



Dear Customer,

These operating instructions describe all series and special equipment of your machine available at the time of publication.

Country-specific differences are possible.

Please note that your machine cannot be equipped with all described functions. This also applies to safety-relevant systems and functions.

The operating instructions are an integral part of the machine.

Always keep the operating instructions readily available on to machine so they can be viewed at all times.

Please ensure prompt replacement of the operating instructions if they should become lost.

Specify the machine type and the machine number stamped on the type plate of your machine when placing an order.

Pass on these operating instructions when leaving the machine to someone else.

#### **Imprint:**



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## 2 Introduction

This chapter contains the most important information about your machine, including:

- Layout,
- Conventions and
- Handling

Of these operating instructions.





## 2.1 Preface

These operating instructions are intended to help you use your SCHWING machine safely and properly, and are an integral part of the machine.

Carefully read this manual before using your SCHWING machine for the first time and observe all corresponding provisions and instructions contained therein.

These operating instructions are intended for all persons who are entrusted with operating or servicing the SCHWING machine described below, as well as the owners and operators of the machine.

The machine is constructed according to state-of-the-art technology and recognised safety-related rules. Nevertheless, they can cause danger to persons and material goods in the event of incorrect use, operation, maintenance or repair.

Any use of the machine requires knowledge and careful observance of these operating instructions.

These operating instructions must always be available on the SCHWING machine.

Please be aware that the figures in these instructions may differ slightly from the actual design of your SCHWING machine.

In addition to the operating instructions, the general relevant legal and other rules on accident prevention of the country of operation should be observed.

SCHWING GmbH is not liable for damages caused by a failure to observe these provisions and/or these operating instructions or by improper use of the machine!

In the event of faults, any questions and to order spare parts, please contact your local representative or:

Address	SCHWING GmbH PO Box 20 03 62 D - 44647 Herne
Telephone	+ 49 (0) 2325 / 987-0
Fax	+ 49 (0) 2325 / 72922
Email	<a href="mailto:info@schwing.de">info@schwing.de</a>

Our customer service department can be reached at:

Telephone	+ 49 (0) 2325 / 987-231 / 232
Fax	+ 49 (0) 2325 / 74674
Email	<a href="mailto:service@schwing.de">service@schwing.de</a>

For all inquiries, always indicate the machine type and machine number. of your machine.

### **2.1.1 Supplier documentation**

SCHWING builds truck-mounted concrete pumps on chassis frames from various manufacturers.

These manufactures provide their own operating instructions about their products.

The same also applies for the manufacturer of integrated motors used in our stationary concrete pumps and trailer pumps.

Other special pieces of equipment on your SCHWING machine may also have their own operating instructions.

Please observe these documents, in addition to the SCHWING operating instructions, in order to service and maintain these components properly.

Should you encounter any problems with your vehicle or integrated motor, please contact the addresses listed in the manufacturer's operating instructions directly.

## 2.2 Structure of the operating instructions

The present operating instructions consist of several different chapters.

The operating instructions are structured logically in accordance with the applications and must be read and understood completely before the initial commissioning.

If you still have any questions or doubts after reading the operating instructions, please do not hesitate to contact the customer service department at Schwing GmbH. If necessary, you can also organise individual training seminars.

These operating instructions are also intended as reference work. The clear table of contents and the headers in the document were designed with that purpose in mind.

The safety chapter was prepared together with the VDMA and other concrete pump manufacturers and can also be ordered separately for training purposes, for example.

### 2.2.1 Typographic conventions

- This symbol marks a list or a hierarchical series, such as required materials, tools or a reminder list.
- This symbol indicates instructions.  
Follow these instructions carefully.  
Each point is a self-contained task.
- 1. Numeric enumerations represent sub-tasks.  
Only after all of the sub-tasks have been performed, is the task considered completed.
- a) Alphabetical enumerations represent lists with an obligatory order.

#### **CAPITALIZATION:**

Words written completely in upper case are proper nouns. Proper nouns are not translated.

Examples:

SCHWING

EASy

VECTOR

### 2.2.2 Contents of the individual chapters in these operating instructions

#### **Introduction**

This chapter is intended to familiarise you with your machine.

It contains, for example, the technical specifications, a short description and an overview of the machine.

#### **Operation**

In this chapter, you will find descriptions of all machine operating procedures, from commissioning to working operation and cleaning to decommissioning.

#### **Maintenance**

This chapter contains essential information on when and how the machine should be serviced, as well as information on filling quantities and the lubricants and operating materials used.

#### **Radio remote control**

Your machine's radio control system is described in a separate chapter. If alternative remote controls are available for your machine, all up-to-date variants are shown here. This chapter is empty in the case of machines for which no radio remote control is offered.

#### **Special equipment**

This chapter provides information on all types of special equipment.

Each machine is tailored to the customer's requirements. Please note that your particular machine might not include all of the special equipment described here.

#### **Appendix**

In the appendix chapter, you will find all of the contact information, along with topics such as organisation and administration.

#### **Safety**

The safety manual is located in the appendix of these operating instructions and contains basic safety instructions regarding the operation of pumping, spraying and spreading machinery for concrete.

The safety manual is prepared jointly by leading manufacturers of concrete pumping and spreading machines under the auspices of the VDMA (Verband Deutscher Maschinen- und Anlagenbau/Mechanical Engineering Industry Association). It is applicable to our machines in full.

For this reason, the safety manual has a chapter of its own and separate page numbers.

Specific warnings can be found directly before descriptions of dangerous activities.

### 2.2.3 Page layout of the operating instructions

#### Header

A dynamic column title is contained in the header on the outer edge of the page.

The column title shows the corresponding sub-chapter currently being read, along with the chapter number and title.

The column title helps to maintain an overview and to find a desired topic quickly.

#### Footer

The outside edge of the footer contains the page number and an ID.

The ID is used to organise the documents internally; it is of no relevance for you.

If you have any questions regarding specific pages in your operating instructions, please provide us with:

- The title of your operating instructions (the exact designation of your machine and the print date)
- The page number
- The chapter in the column title

#### Margin column

The margin column provides a better orientation on the pages.


Using the margin column, you can find headers more quickly perceive any indications more easily.

## 2.2.4 Structure of safety instructions

In these operating instructions, safety instructions are placed in front of certain sections to warn readers of dangers that could cause potential personal injury or material danger.

The measures described to avert these dangers must be adhered to.

Safety instructions are structured as follows:

	<b>Signal word</b>
	Type of danger and its source
	Possible consequence(s) if disregarded
	Measure(s) for averting the danger

## 2.2.5 Warning of personal injury

The following safety instructions describe the grading and meaning of signal words for personal injuries.



### Gefahr!

#### High risk!

Persons can be instantly killed or severely injured.

Describes how the danger can be avoided.

---



### Warnung!

#### Medium risk!

Persons can possibly be injured or killed.

Describes how the danger can be avoided.

---



### Vorsicht!

#### Risk!

Persons can be injured.

Describes how the danger can be avoided.

---



### 2.2.6 Warning of material damage

The following safety instructions describe the meaning of the signal word for material damage.



#### **Achtung!**

##### **Material damage!**

Damage to your own machine or other objects.

Describes how the material damage can be avoided.

---

### 2.2.7 Additional information

The following symbol indicates useful tips and recommendations, as well as information for ensuring smooth and efficient operation.



#### **Information**

Text box for additional information.

---



## 2.3 General safety instructions

Carefully read the “**General safety instructions**” chapter to start with.

Together with “**VDMA safety manual**”, these chapters provide the basis for safely operating your machine.

You must have clearly understood the contents of this chapter before reading the rest of the manual.

Should you have any questions regarding the safety instructions, please contact Schwing’s customer service.

### 2.3.1 Safety instructions for working with the placing boom



#### **Danger!**

##### **Danger to life due to voltage flashover!**

Getting too close to or touching high-voltage lines with the placing boom poses an immediate danger to life due to electric shock!

Keep a minimum distance from high-voltage lines as stipulated in the safety manual.

In case of any doubt, refrain from using the placing boom and, for example, lay a separate pumping line.

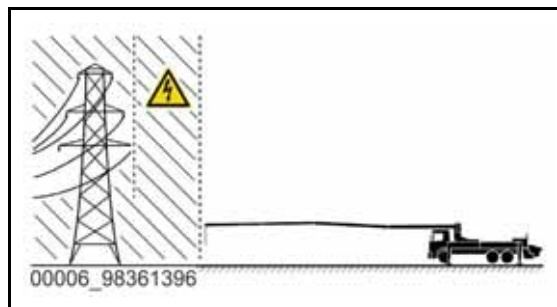


Fig. 1 Distance from high-voltage lines



#### **Danger!**

##### **Danger to life due to the machine toppling!**

If the end hose is in a prohibited working range, the entire machine can topple over and cause death to people!

The end hose must never be extended past the vertical position of the placing boom while in the backwards position.

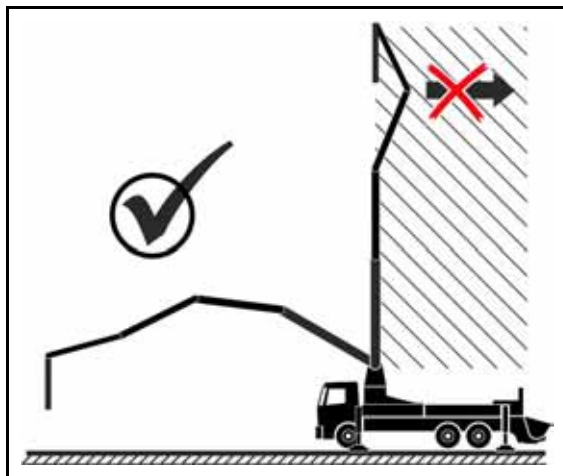


Fig. 2 Placing boom in backwards position



### Danger!

#### Danger to life due to the machine toppling!

It is prohibited to lift loads with the placing boom as this can cause the machine to become unstable and topple over!

The machine can cause death to people.

The placing boom must not be used to lift loads.



Fig. 3 Lifting loads is prohibited



### Warning!

#### Danger of injury due to falling parts!

Remaining beneath the placing boom is prohibited.

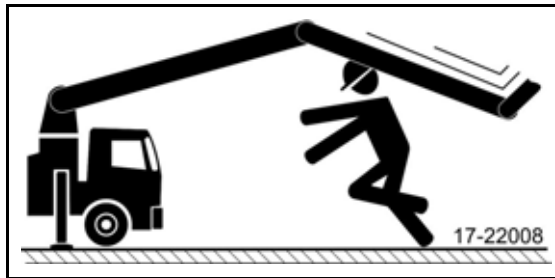


Fig. 4 Danger zone of placing boom



### Warning!

#### **Danger of injury in the danger zone of the placing boom!**

A drop in pressure or lack of attention when moving the placing boom can lead to serious injuries or death.

Make sure that no persons remain under the placing boom when it is in operation.

Always wear the required personal protective equipment.

---

#### **2.3.1.1 Emergency operation for the placing boom**



### Warning!

Increased danger during emergency operation!

Injuries can be caused by crushing, cutting, impact and there is a risk of damage to the placing boom.

Always monitor the placing boom in order to avoid collisions.

Use a signaller if the danger zone is not completely visible.

---



## 2.4 CE labelling

Machines brought into circulation from 01 January 1995 in the member states of the European Economic Area (EEA) must comply with the basic health and safety requirements of the relevant EC regulations.

The machine manufacturers confirm this by affixing a mark (**Fig. 5**) to the machine and by issuing a "Declaration of Conformity".

The CE mark is located on the base frame. The positions of the signs and labels can be found on a drawing in the ET catalogue.



Fig. 5 Communauté Européenne (European Community)

### 2.4.1 Declaration of conformity

SCHWING declares that the machine placed on the market in the European Economic Area complies with the relevant EC directives.

We confirm this by issuing a declaration of conformity and affixing a CE mark to the machine.

The original of each declaration of conformity is archived at SCHWING.

The customer receives a copy of this declaration in the national language, together with the delivery note or invoice.

The following pages each contain a sample of the declaration of conformity for truck-mounted concrete pumps (S) and stationary concrete pumps (SP).



#### Information

Machines placed on the market in the European Economic Area must comply with the valid guidelines.

This does not apply when the machines are placed on the market outside of the European Economic Area. If a certain machine design deviates from the design required for the European Economic Area, SCHWING will not issue a declaration of conformity and the CE marking will not be affixed.

These machines may not be used in the European Economic Area!

## 2.4.2 EC declaration of conformity for truck-mounted concrete pumps

according to EC Machine Directive 2006/42/EC appendix II A

We hereby declare that the machine specified below

Designation of the machine: TRUCK-MOUNTED CONCRETE PUMP

Machine type: S

Machine no. \_\_\_\_\_



complies with the following relevant provisions:

Machine Directive	2006 / 42 / EC
Low Voltage Directive	2014 / 35 / EU
EMC Directive	2014 / 30 / EU
Noise Emission Directive	2000 / 14 / EG

Applied harmonised standards <sup>1)</sup> , especially:	DIN EN 12001, DIN EN ISO 12100, DIN EN ISO 4413, DIN EN ISO 14119, DIN EN 13309, DIN EN 60204, DIN EN ISO 3744, DIN EN ISO 11688, DIN EN ISO 13849, DIN EN ISO 13850
--	--

Applied national standards and technical specifications <sup>2)</sup> , especially:	DIN 24117, DIN 24118
---	----------------------

- 1 Complete list of the applied harmonised standards, see »Normative references in DIN EN 12001 conveying, spraying- and placing machines for concrete and mortar — Safety requirements«
- 2 Complete list of the applied national standards and technical specifications, see »References in DIN EN 12001 conveying, spraying and placing machines for concrete and mortar — Safety requirements«, as well as the SCHWING factory standard.

Noise emission	
Installed effective output	P hydraulic = kW (diesel-hydraulic drive)
Measured sound power level	LWA measured = dB
Guaranteed sound power level	LWA guaranteed = dB

Person authorised, at the request of the market surveillance authorities, for the compilation of the relevant technical documents (declaration of conformity):  
CE-person authorised by SCHWING GmbH

This declaration loses its validity in the event of any unauthorised changes to the machine.

Date/Signature by manufacturer \_\_\_\_\_


Information about signatory Management



### 2.4.3 EC declaration of conformity for stationary concrete pumps

according to EC Machine Directive 2006/42/EC appendix II A

We hereby declare that the machine specified below

Designation of the machine:	STATIONARY CONCRETE PUMP	
Machine type:	SP	
Machine no.		

complies with the following relevant provisions:

Machine Directive	2006 / 42 / EC
Low Voltage Directive	2014 / 35 / EU
EMC Directive	2014 / 30 / EU
Noise Emission Directive	2000 / 14 / EG

Applied harmonised standards <sup>1)</sup> , especially:	DIN EN 12001, DIN EN ISO 12100, DIN EN ISO 4413, DIN EN ISO 14119, DIN EN 13309, DIN EN 60204, DIN EN ISO 3744, DIN EN ISO 11688, DIN EN ISO 13849, DIN EN ISO 13850, DIN EN ISO 13857
--	--

Applied national standards and technical specifications <sup>2)</sup> , especially:	DIN 24118
---	-----------

- 1 Complete list of the applied harmonised standards, see »Normative references in DIN EN 12001 conveying, spraying- and placing machines for concrete and mortar — Safety requirements«
- 2 Complete list of the applied national standards and technical specifications, see »References in DIN EN 12001 conveying, spraying and placing machines for concrete and mortar — Safety requirements«, as well as the SCHWING factory standard.

Noise emission	P hydraulic = kW (hydraulic drive)
Installed effective output	LWA measured = dB
Measured sound power level	LWA guaranteed = dB
Guaranteed sound power level	

Person authorised, at the request of the market surveillance authorities, for the compilation of the relevant technical documents (declaration of conformity):  
CE-person authorised by SCHWING GmbH

This declaration loses its validity in the event of any unauthorised changes to the machine.

Date/Signature by manufacturer \_\_\_\_\_

Information about signatory Management

#### **2.4.4 Termination of the declaration of conformity**

CE marking and declaration of conformity only apply to design and scope of delivery of the machine delivered ex works.

Making changes to the machine without the approval of SCHWING, in addition to using accessories without the approval of SCHWING, shall cause both to lose their validity.

The competent supervisory authorities can decommission corresponding machines.

SCHWING is not liable for the consequences of the above manipulations. Operator and owner of the machine are responsible thereof.

## 2.5 Theoretical service life of a machine

Our concrete pumps and placing booms are designed, under normal use, for a theoretical life of up to 15 years.

The following reference and empirical values are used as a basis:

<b>Truck-mounted concrete pump S 17 - S 43 SX III, S 47 SX III</b>	<b>Reference value <sup>1</sup></b>
Delivery rate [m <sup>3</sup> ] / per year	30 000
Construction jobs per year <sup>2</sup>	850
<b>Truck-mounted concrete pump S 45 SX - S 65 SXF</b>	<b>Reference value <sup>1</sup></b>
Delivery rate [m <sup>3</sup> ] / per year	30 000
Construction jobs per year <sup>2</sup>	500
<b>Truck mixer pumps</b>	<b>Reference value <sup>1</sup></b>
Delivery rate [m <sup>3</sup> ] / per year	15 000
Construction jobs per year <sup>2</sup>	250
<b>Stationary concrete pump / Separate placing booms</b>	<b>Reference value <sup>1</sup></b>
Delivery rate [m <sup>3</sup> ] / per year	20 000
Construction jobs per year <sup>2</sup>	280
<b>Trailer pump</b>	<b>Reference value <sup>1</sup></b>
Delivery rate [m <sup>3</sup> ] / per year	6000
Construction jobs per year <sup>2</sup>	1000

Please note that, in addition to the number of construction jobs and the delivery rate (volume of pumped material), other operating factors can also significantly reduce the service life of a machine under certain conditions, such as:

- Not operating the machine in accordance with its intended purpose
- Misuse (e.g. using the boom as a lifting device)
- Improper extension of the end hoses
- Failure to follow the maintenance guidelines
- Operating a machine under extreme conditions, e.g. under excessive heat or excessive cold
- Improper operation by machine operators without adequate training or instruction
- Using concrete pipelines that are not approved by SCHWING
- Not performing the boom inspections and corresponding repairs on time

<sup>1</sup> See "Maintenance" chapter for restrictions

<sup>2</sup> One construction job is generally defined as one extension and retraction cycle.

Any discrepancies can affect the service life accordingly. The information specified with regard to the theoretical life does not constitute any commitment or guarantee, nor does it represent any other assurance as to a machine's quality and durability.

Furthermore, timely compliance with the prescribed maintenance work and technical safety inspections is also considered part of the intended use. See the "Maintenance" chapter and the safety manual in the appendix of these operating instructions.

In the event of damages of any kind, the entire machine must be inspected.

Contact SCHWING in the event of operations outside of the indicated reference values

The following applies to all SCHWING machines:

Fresh concrete temperature:	+15 °C
Operating site:	Outdoors / in rooms with sufficient ventilation
Operating temperature:	-15 °C / +45 °C
Maximum operating altitude:	2000 MASL (depending on the type of machine)

If exceedances of individual values or the simultaneous exceedance of several values can be expected, also see the "**Difficult operating conditions**" chapter.

### 2.5.1 Final decommissioning and disposal of the machine

The machines contain valuable raw materials that should be reused, but also materials and substances (for example: oils, greases, plastics, electronic components, rechargeable batteries, etc.) that should be disposed of properly due to their properties hazardous to life or -environmentally damaging.

Make sure that the decommissioned machine can no longer be put into operation.

Machines should be dismantled and disposed of in accordance with any regional accident prevention regulations, as well as any provisions regarding health and environmental protection.

Hand the machine over to a certified disposal company in order to ensure that it is disposed of properly.

In the event that certified disposal companies are not available in your region, for example, the authorities responsible for the environmental protection provide appropriate information.

## 2.6 Labelling SCHWING machines

The most common abbreviations and their meanings are listed and explained here.

### 2.6.1 Truck-mounted concrete pumps

S 24 X			
S			SCHWING
	24		approx. vertical reach in m
		X	X-outrigger

S 31 XT			
S			SCHWING
	31		approx. vertical reach in m
		X	X-outrigger
			T Telescoping

S 43 SX III			
S			SCHWING
	43		approx. vertical reach in m
		SX	Super-X-outrigger
			III Series

S 65 SXF			
S			SCHWING
	65		approx. vertical reach in m
		SX	Super-X-outrigger
			F Foldable outrigger

### 2.6.2 Placing booms

20 ZR			
20			approx. vertical reach in m
	Z		Z-folding +
		R	Roll-folding

31 ZRT			
31			approx. vertical reach in m

	Z			Z-folding +
		R		Roll-folding +
			T	Telescoping

36 R				
36				approx. vertical reach in m
	R			Roll-folding

43 RZ				
43				approx. vertical reach in m
	R			Roll-folding +
		Z		Z-folding

### 2.6.3 Marking of concrete pumps

P 2020 - 120 / 80				
P				(Concrete) Pump
	20			2,000 mm stroke of the pumping cylinders
		20		∅ 200 mm of the pumping cylinders
			120	∅ 120 mm of the pistons for the hydraulic cylinders
			80	∅ 80 mm of the piston rods for the hydraulic cylinders

P 2525 - 120 / 85				
P				(Concrete) Pump
	25			2500 mm stroke of the pumping cylinders
		25		∅ 250 mm of the pumping cylinders
			120	∅ 120 mm of the pistons for the hydraulic cylinders
			85	∅ 85 mm of the piston rods for the hydraulic cylinders

### 2.6.4 Type plates

The type plate of the concrete pump is located at the front left side of the base frame in the direction of travel (**Fig. 6**).

The type plate of the placing boom is located at the front left side of the first boom section in the direction of travel.

Example (**Fig. 7**) applies to 5-part placing booms; the plate for 4-part placing booms has a similar design.

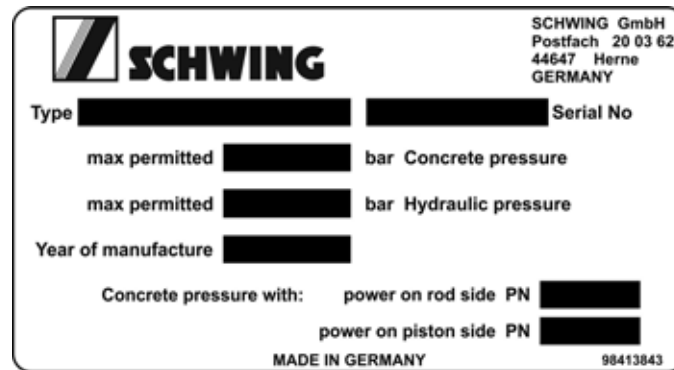


Fig. 6

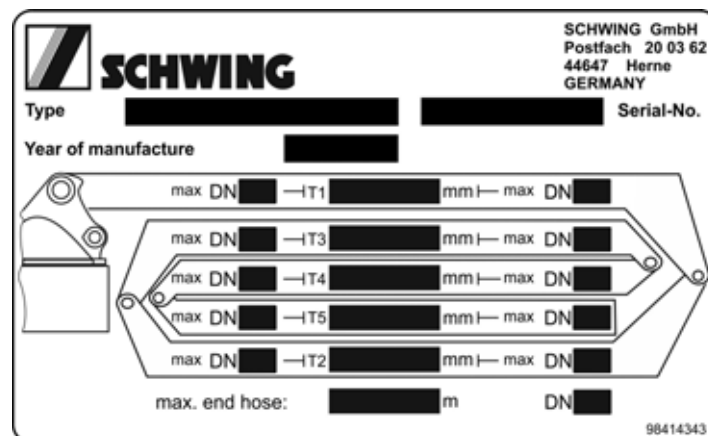


Fig. 7 Similar to illustration

Caption for (Fig. 7)	
Designation	Meaning
max. DN	max. nominal size for inlet side
T	Length of the pipe on the corresponding boom
max. DN	max. nominal size for outlet side

### 2.6.5 Your machine's identification data

The most important data for identifying your vehicle and the installed concrete pump can be displayed in the VECTOR control system, see (“**VECTOR control system**” on page 125).

Scroll down through the "Functions" menu to the “Machine data” or “Vehicle data” sub-menus and record the data here:

SCHWING - machine technical data		Vehicle data	
Mach. no.:		Manufacturer:	
Mach. type:		Type:	
Con. pump type:		Chassis frame no.:	
Hyd. type:			

Always have the machine's technical data available for enquiries.



### 2.6.6 SCHWING pump kits

**P** = Piston side = piston-side pressure

**R** = Rod side = rod-side pressure

**R/P** = Rod and Piston side (delivery is **R**)

**TC** = Twin Circuit (twin-circuit hydraulics)

**SC** = Single Circuit (single-circuit hydraulics)

**RM** = Rock Middle

**RB** = Rock Big

**RS** = Rock Short

**RXL** = Rock **XL** (only for truck-mounted concrete pumps)

**RL** = Rock Long (for stationary concrete pumps only)

**RHP** = Rock High Pressure (for stationary pumps only)



#### Information

Installation of a new/different concrete pump only after technical clarification.

Maximum values can only be reached with sufficient motorisation.

1	2	3	piston-side			rod-side		
			4	5	6	4	5	6
Concrete pump type	l/min	bar	m <sup>3</sup> /h	bar	s/min	m <sup>3</sup> /h	bar	s/min
P 1020-2-90/50 SC RS P	225	330	61	67	32	/	/	/
P 2020-3-120/80 TC RM R/P	380	300	62	108	17	111	60	29
P 2023-3-110/75 TC RM/RB P	380	330	98	75	20	/	/	/
P 2023-5-110/75 TC RM/RB P	535	330	136	75	27	/	/	/
P 2023-6-110/75 TC RM/RB P	636	330	161	75	32	/	/	/
P 2023-5-130/80 TC RM/RB R/P	535	300	98	96	20			
Max. hydraulic oil pressure		330				157	66	31
P 2025-5-120/80 TC RB P	535	300	136	69	23	/	/	/
P 2525-6-120/85 TC RB P	636	330	162	76	22	/	/	/

**Table 1 SCHWING pump kits**

**Column 1:** Concrete pump type, see (“Marking of concrete pumps” on page 44).

**Column 2:** maximum delivery rate of the hydraulic pump(s) in l/min

**Column 3:** configured pressure cut-off

**Column 4:** maximum theoretical concrete delivery rate in m<sup>3</sup>/h

**Column 5:** maximum achievable pumping pressure

**Column 6:** maximum achievable stroke rate for concrete pump (strokes/min)



## 2.7 Technical data

This chapter contains the following data related to your machine:

- Dimensions
- Supporting forces
- Ranges of the placing boom (working area)
- Positions of the most important components on your machine

### 2.7.1 Dimensions of vehicle body / work area



#### Information

The supporting forces specified are maximum values.  
The supporting forces of each machine are dependent on the overall design and indicated on signs on the machine.

Some of the following values may also vary slightly depending on the truck used.

---

### 2.7.2 Vehicle body:

	<b>S20</b>	<b>S20 Hybrid</b>
Length of end hose	: 4 m	3 m
Vertical reach	: 23.46 m	19.50 m
Range	: 19.45 m	15.80 m
Minimum unfolding height	: 4.89 m	3.90 m
Number of arms	: 4	4
Nominal size of pumping line	: 125 mm	125 mm (100 mm upon request)
Support width in front	: 4.69 m / 5.96 m depending on the total weight	2.20 m / 3.85 m depending on the total weight
Support width rear	: 2.24 m / 3.60 m depending on the total weight	2.15 m
Supporting force in front	: 140 kN	110 kN
Supporting force rear	: 90 kN	70 kN

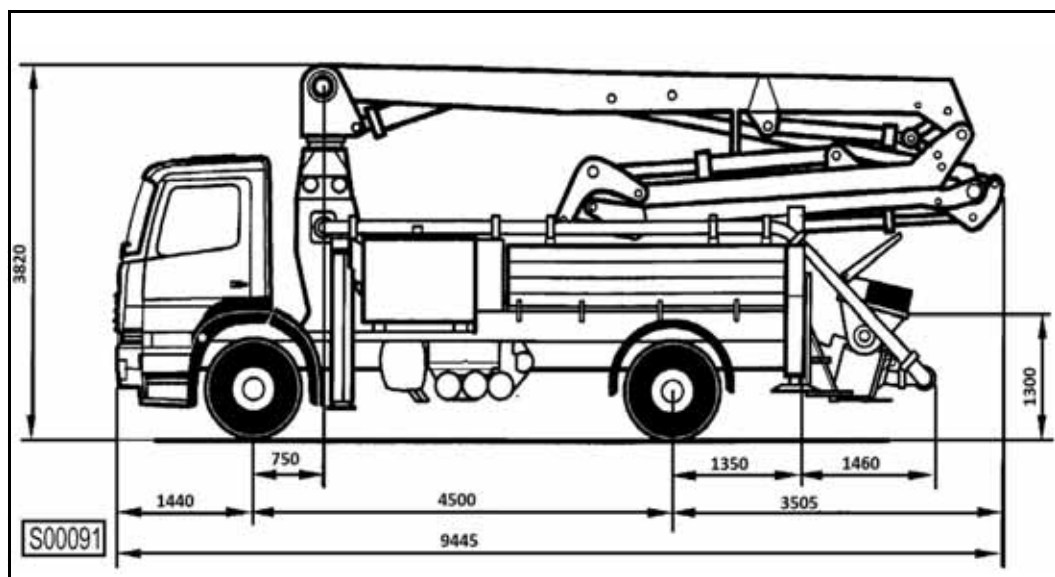


Fig. 8 Model S20

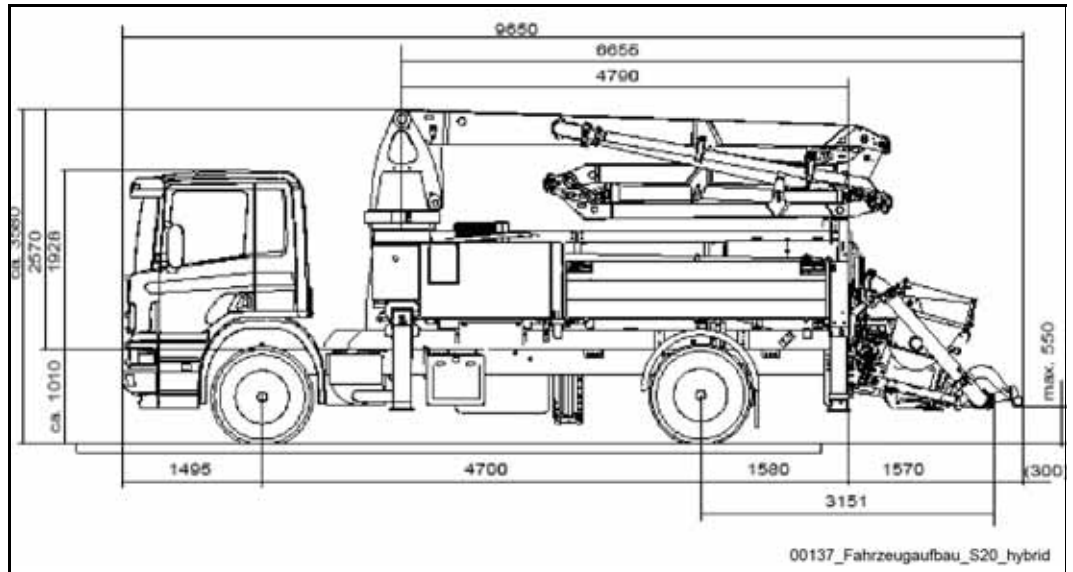
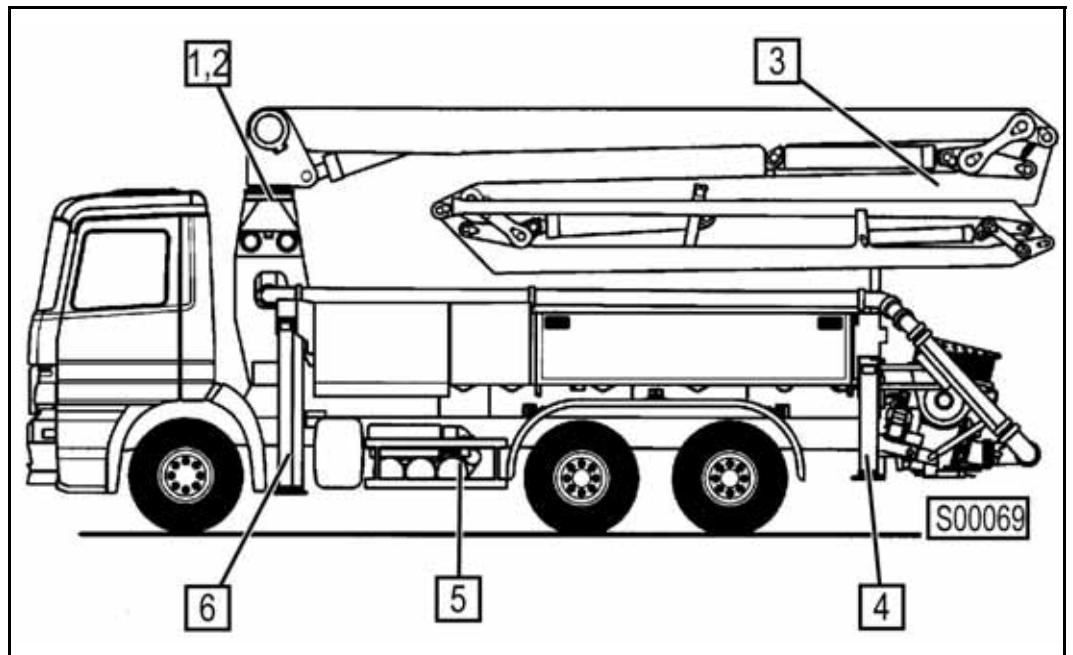


Fig. 9 Model S20 Hybrid

### 2.7.3 The main components of the machine



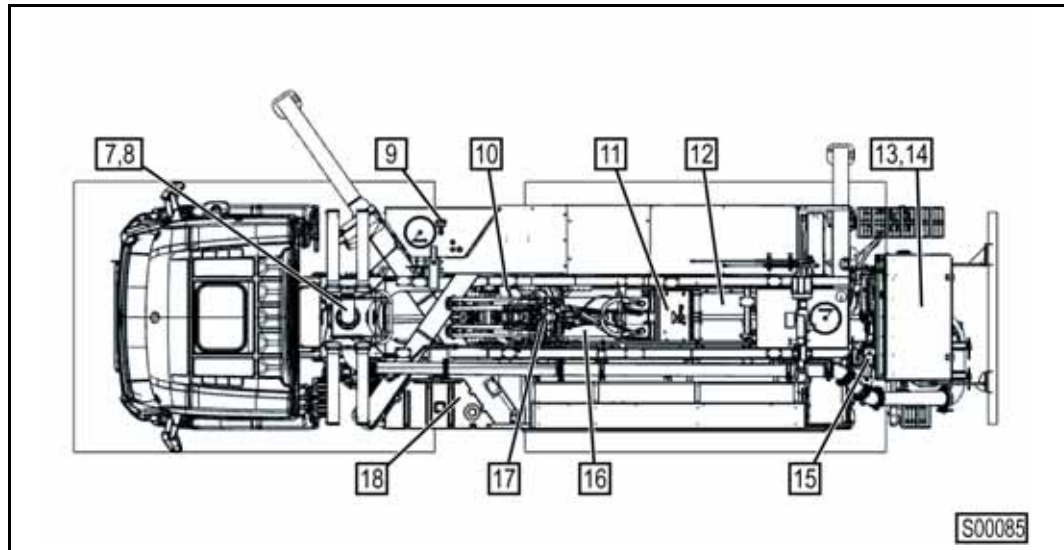
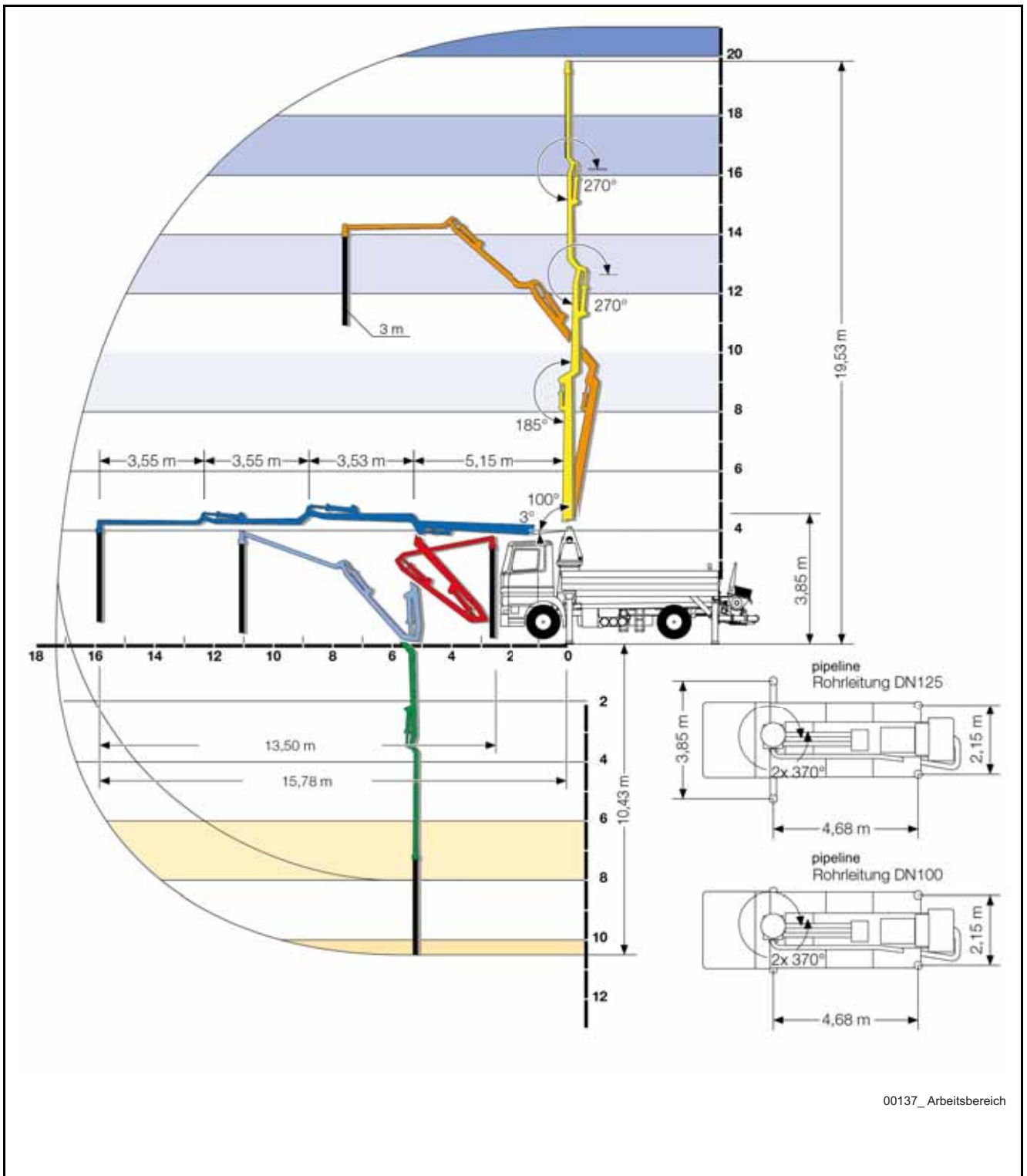


Fig. 10 Components of the machine

Caption for (Fig. 10 Components of the machine)

Pos.	Description	Pos.	Description
1	Turret	10	Pump drive
2	Rotary drive	11	Water box
3	Placing boom with pumping line see <b>(chap. 2.7.5)</b>	12	Pumping cylinder
4	Rear outrigger	13	Rock valve
5	Chassis frame with SCHWING pump drive	14	Concrete filling hopper
6	Front X - outrigger	15	Slewing cylinder
7	Turret	16	Differential cylinder
8	Rotary drive	17	Control block
9	Oil box	18	Water case

**2.7.4 Placing boom: Working range for S20 Hybrid**

**Fig. 11 Working range for S20 Hybrid**

2.7.5 Loading plan for S20/S20 Hybrid model

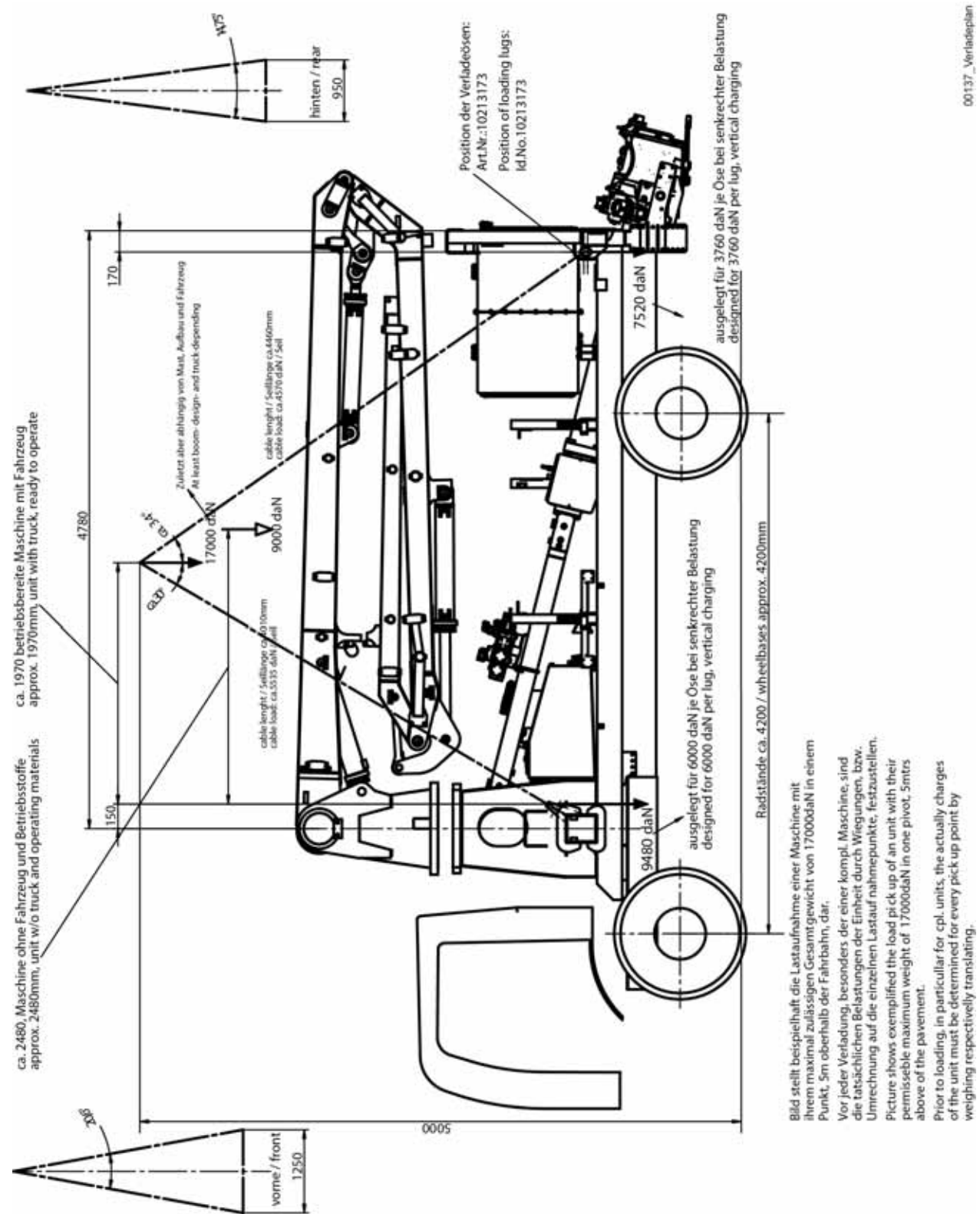


Fig. 12 Loading plan for S20/S20 Hybrid model



### 2.7.6 Placing boom

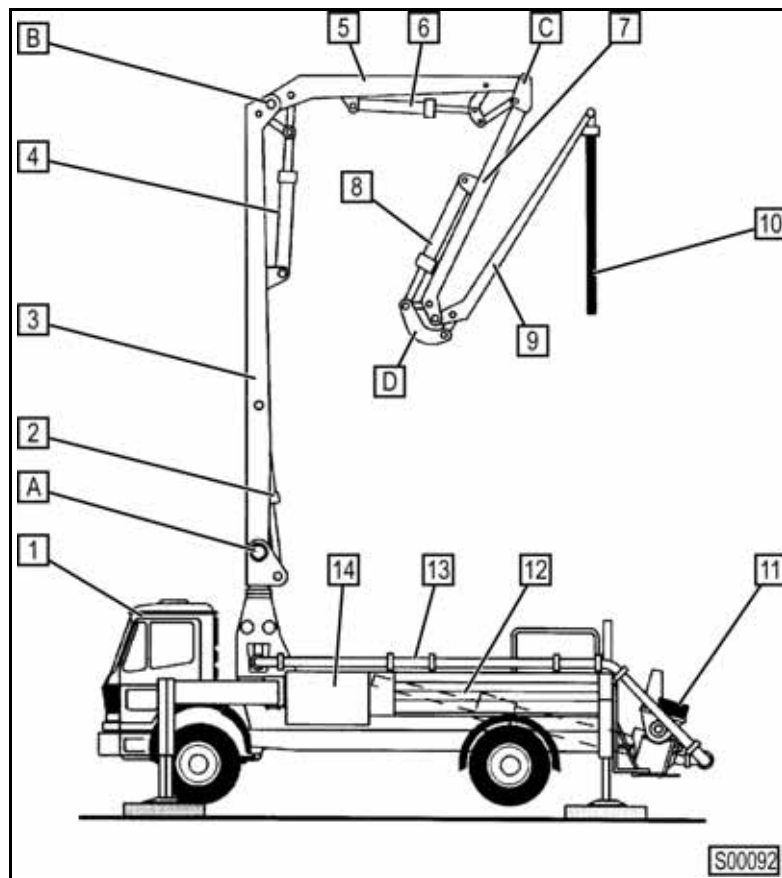


Fig. 13 Placing boom

Caption (Fig. 13 Placing boom)			
Pos.	Description	Pos.	Description
1	Chassis frame	10	End hose
2	Cylinder A	11	Gate valve system
3	Boom section 1	12	Concrete pump kit
4	Cylinder B	13	Pumping line
5	Boom section 2	14	Base frame
6	Cylinder C	A	Joint "A"
7	Boom section 3	B	Joint "B"
8	Cylinder D	C	Joint "C"
9	Boom section 4	D	Joint "D"

**2.7.7 Technical data for the electric motor (optional for S20 Hybrid model)**

An electric motor with the following performance data is used as the power source for the S20 Hybrid variant.

Engine	FCMP 250M - 4 / PHE		
Design	:	IM B35 / IM 2001	
	:	50 Hz	60 Hz
Engine power	:	55 kW	66 kW
Rotational speed	:	1485	1782
Nominal motor torque	:	354 Nm	
Sound pressure level	:	62 dB (A)	
Size	:	250 M	
Protection class	:	IP 55	
Coolant temperature	:	-20 °C to +40 °C	
Max. installation altitude	:	1000 m above NN	

## 2.8 Reversing the pump kits

The pump kits on SCHWING machines can be reversed in part. Reversing means changing from rod-side to piston-side application or vice versa.

Contact SCHWING's customer service for more information!



### Warning!

#### Risk of explosion due to improper reversing!

Severe injuries or even death due to explosive release of pressure.

Reversing is only permitted by authorised SCHWING workshops.

Reconnecting to piston-side pressure generates more pumping pressure. This in turn causes:

- The bursting pressure of the machine's pumping lines to be exceeded
- Any built-in special equipment, such as the chamber valve, to become overloaded
- The pump kit to become potentially overloaded  
(The pressure relief of the hydraulic system has to be set lower accordingly).

You can see whether or not the pump kit installed in your machine can be retooled either on the type plate ("Fig. 14 Concrete pump type plate") or in the "Machine data" menu of the VECTOR control system.

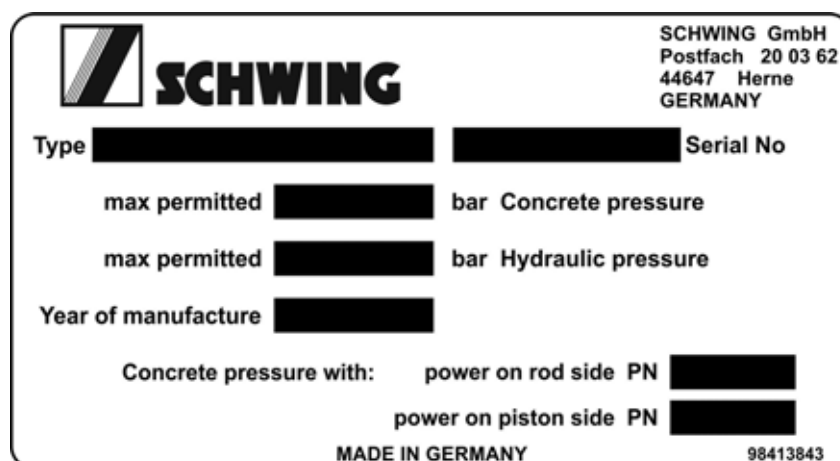


Fig. 14 Concrete pump type plate

The “Max. bar concrete” field on the type plate can contain one or two values.

Example 1: Pump kits marked in such a way cannot be retooled!		
max	<b>- / 85</b>	bar concrete

Example 1: This is a concrete pump that can **only** be driven by the piston side.

Example 2: Pump kits marked in such a way can be retooled		
max	<b>60/108</b>	bar concrete

Example 2: This is a concrete pump that may be driven by the rod side or the piston side.

The lower value refers to the maximum possible pumping pressure for rod-sided application.

The upper value refers to the maximum possible pumping pressure for piston-sided application.



### Information

SCHWING delivers concrete pumps with rod-side application.

## 2.9 Assembly groups and designations

This chapter contains an overview of the main assembly groups for your machine and their respective positions.

### 2.9.1 Base frame

The base frame carries the concrete pump and the placing boom of the truck-mounted concrete pump.

The base frame can be mounted onto chassis frames from different manufacturers.

### 2.9.2 Drive

Concrete pumps, placing booms and most auxiliary units are hydraulically driven. The vehicle engine serves as the power source.

The machine is installed on vehicles with a functional power take-off or with a distribution manual transmission gear.

In the case of machines with power take off, all hydraulic pumps are arranged in a drive train and equipped with "through drives" (Power take-off).

Drive takes place via a drive line. A pump gear is not required.

The variant with a Distribution manual transmission gear is built into the vehicle's cardan shaft train. It can be switched between driving operation and pump operation.

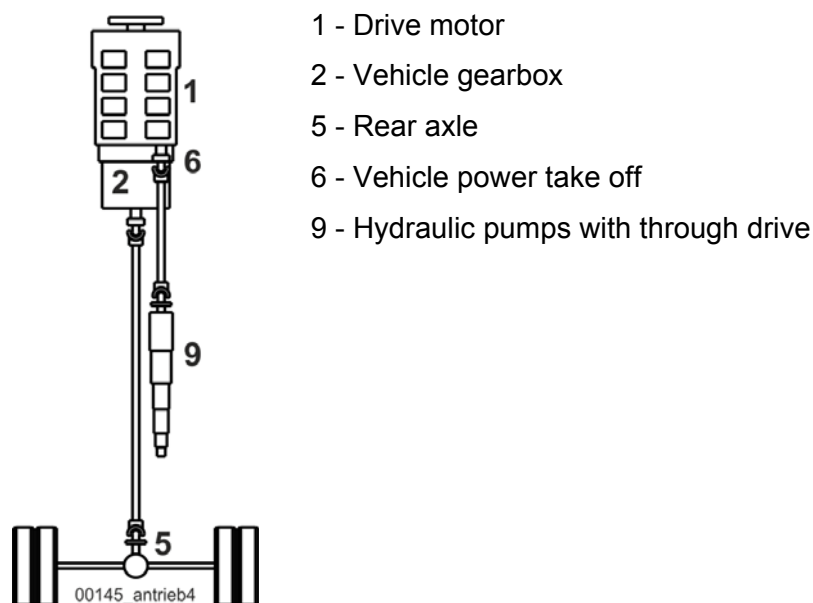
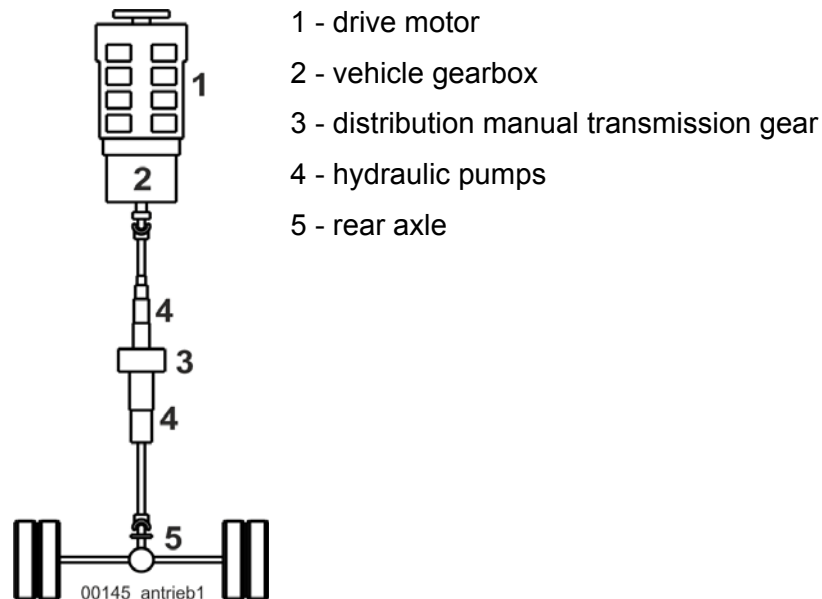


Fig. 15 Power take-off



**Fig. 16 Distribution manual transmission gear**

### 2.9.3 Concrete pump

The concrete pump is a two-cylinder piston pump with a rock valve.

The most important assembly groups (Fig. 17 Concrete pump) include:

- 1 Rock valve
- 2 Pumping cylinder and piston
- 3 Water box
- 4 Hydraulic drive cylinder

Two power-controlled axial piston pumps supply the hydraulic cylinder of the concrete pump and rock valve.

Control is fully hydraulic.

The concrete pump is equipped with an MPS system.

### 2.9.4 Mini pause switch (MPS)

Concrete pumps with a **Mini Pause Switch (MPS)** work with a dual-circuit hydraulic system.

The dual-circuit hydraulic system can be recognised by the pressure accumulator at the rear of the machine.

This function prevents the differential cylinders from hitting your concrete pump kit too hard. This reduces wear and increases the service life of your concrete pump, among other things.

**Function:**

The MPS is a momentary drop in pressure.

The hydraulic oil pressure in the concrete pump system is reduced at the same moment as the differential cylinders switch from suction stroke to pressure stroke.

The hydraulic accumulator required for the MPS control is charged via an individually adjustable hydraulic pump.

**2.9.5 Rock valve**

Like in a reciprocating piston engine, the pumping pistons in the two-cylinder piston pump are constantly changing their direction of motion.

The two pistons run counter to one another.

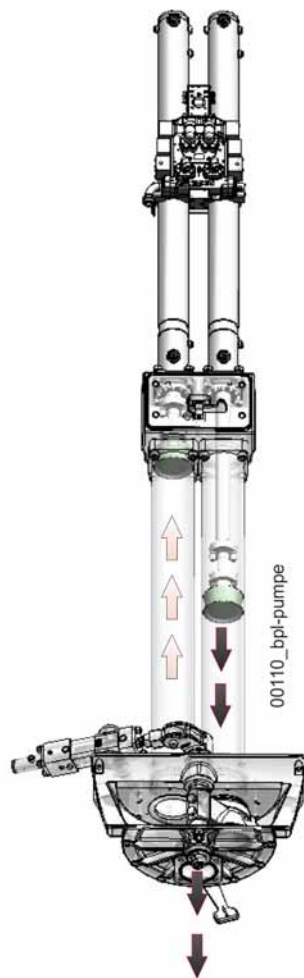
As the receding piston draws concrete out of the filling hopper, the advancing piston pushes the previously drawn-in concrete into the pumping line.

At the same time, the rock valve swivels so that the "drawing" cylinder is connected to the filling hopper and the "pushing" cylinder to the pumping line.

By switching to "SUCTION" (reverse running), the concrete can be drawn from the pumping line and back into the filling hopper.

At the end positions, the hydraulic cylinders of the concrete pump and of the rock valve control hydraulic control valves, which coordinate the cylinder movements.

A hydraulic accumulator supports the rapid switching of the rock valve.



**Fig. 17 Concrete pump**

### 2.9.6 Control

The placing boom is controlled using “proportional valves”. Its pilot control is electro-hydraulic.

Concrete pumps and agitators are electro-pneumatically pilot controlled.

The electrical system is supplied by the vehicle electronics, and the compressed air for the electro-pneumatic pilot control is extracted from the vehicle air reservoir.

The directional valves on the consumers are combined with control blocks and feature control lever slots for emergency operation.

In addition to the outrigger, the control levers can be used to operate the machine in “emergency operation” mode.

The machine is equipped as standard with a radio remote control.

A cable remote control is available.

Emergency operation is ensured for various machines via cable remote controls.



## 2.9.7 Placing boom and outrigger

The placing boom has a "roll-folding" or "Z-folding" design.



### Information

Special features of the S 65 SXF model

The outriggers for model S 65 SXF contain folding segments on the front outriggers, which **first** have to be folded out to support the machine.

If the folding elements are not extended, then the bow outriggers are not "mobile" and the machine cannot be placed into operation.

The front outriggers either extend in a circular arc to the side and front, or diagonally to the front like an X.

The rear outriggers are designed as folding outriggers or telescopic outriggers.

This design facilitates:

- Large support widths
- A lower machine construction height
- The installation of extremely long-stroke concrete pumps.

An axial piston pump powers the boom, outrigger and various pieces of special equipment.

## 2.9.8 Auxiliary units

The machine is equipped as standard with an agitator in the concrete filling hopper and a water pump.

The "agitator pump" feeds the concrete pump pilot control, while the "placing boom pump" also powers the water pump.

The concrete pump's oil cooler and oil filters are located in a common housing.

A fixed displacement pump delivers hydraulic oil through this filter/cooler combination in a separate circuit.

The system is activated immediately after switching on the drive and independent of the activation of other functions.

Additional systems, such as compressors, concrete shut-off assemblies, high-pressure cleaners, etc., can be supplied as accessories.

### 2.9.9 EASy (special equipment)

The machine can be equipped with the EASy one-sided support system.

The "EASy" outrigger system is described in the chapter "**Special equipment**" on page 593.

### 2.9.10 Active (special equipment)

The Active system includes:

- An active vibration damper to silence the boom.

The active vibration damper on the placing boom makes it possible for the boom to operate with precision and virtually without vibrations.

The end hose also remains calmer while pumping, even with high delivery rates.

### 2.9.11 Diractive (special equipment)

The Diractive system includes:

- An active vibration damper to subdue the boom
- A single-lever control

The single-lever control can be used to move the end hose horizontally and vertically directly with one joystick.

This makes it considerably easier to guide the hose.

### 2.9.12 DirectDrive

"DirectDrive" designates machines whose placing boom joints have a certain design.

With this design, various placing boom joints are equipped with rotary actuators.

This replaces traditional hydraulic cylinders.

This makes it possible to control the placing boom more flexibly.

As a result, some joints can be rotated 360°.

### 2.9.13 VarioPressure (special equipment)

The "VarioPressure" accessory makes it possible to adjust the pumping pressure of the SCHWING pump at any time based on the situation at the jobsite.

"VarioPressure" can also be used to protect equipment connected to the pump, such as concrete pumping hoses.

## 2.10 Noise information for truck-mounted concrete pumps

Noise information according to EC Machinery Directive 2006/42/EC and Noise Emissions Directive 2000/14/EC

### 2.10.1 The guaranteed sound power level ( $L_{WA}$ )

The sound power level is a measure of the total sound emitted by a machine in all directions. It is a measured value for technical comparison and is used in the calculation of the total noise level produced by a construction site.

The sound power level does not allow any conclusions to be drawn regarding the noise level at the workplace (of the pump operator).

In the European Economic Area, a sign must be affixed to machines, providing information about the sound power level of the respective machine. See example figure "Fig. 18 Noise level".



**Fig. 18 Noise level**

The indicated value represents an average value for the respective series, plus a safety margin.

SCHWING guarantees that this value will not be exceeded by newly delivered, ex works machines.



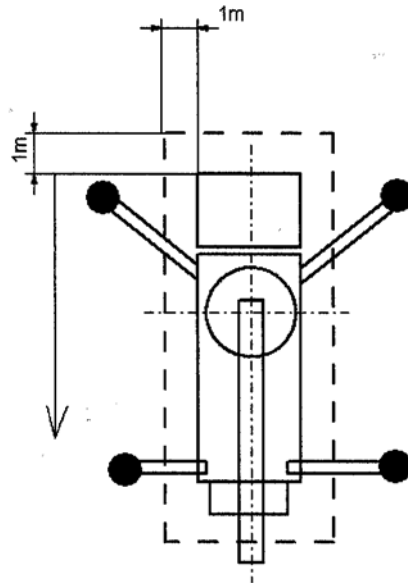
#### Information

Regarding noise emissions, please observe the regionally applicable reductions in operating time!

### 2.10.2 The highest sound pressure level ( $L_{pA}$ )

The sound pressure level is a measure of the sound emissions in the workplace.

In this case, the Machine Directive prescribes that the highest sound pressure level be measured at a distance of 1 m from the machine surface and 1.6 m across the ground, which must be indicated in the operating instructions.



**Fig. 19 Measuring point ( $L_{pAmax}$ ) measured from the front**

Ground clearance:	1.6 m
Taking the measurement:	Operate the machine at maximum hydraulic power



#### Information

The measured sound pressure level ( $L_{pA}$ ) is also influenced by the installed drive power and the type of truck used.

For this reason, we have indicated the highest measured value for each of our truck-mounted concrete pumps.

Machine type	Highest measured sound pressure level ( $L_{pAmax}$ )	Measuring point $L_{pAmax}$ (see "Fig. 19 Measuring point ( $L_{pAmax}$ ) measured from the front")	Guaranteed sound power level ( $L_{WA}$ )
S 20	90 dB(A)	4 m from the front, on the left in the driving direction	117 dB(A)
S 20 Hybrid E	90 dB(A)	2.8 m from the front, on the left in the driving direction	117 dB(A)
S 20 Hybrid D	90 dB(A)	2.8 m from the front, on the right in the driving direction	117 dB(A)
S 24 X	93 dB(A)	2 m from the front, on the left in the driving direction	117 dB(A)
S 28 X			117 dB(A)
S 31 XT	91 dB(A)	at the front of the vehicle	117 dB(A)
S 32 X			117 dB(A)
S 34 X	89 dB(A)	2.5 m from the front, on both sides	117 dB(A)
S 34 XG	91 dB(A)	in the middle, on the right in the driving direction	117 dB(A)
S 36 X	97 dB(A)	2 m from the front, on the right in the driving direction	117 dB(A)
DirectDrive S36X	97 dB(A)	2 m from the front, on the right in the driving direction	117 dB(A)
S 38 SX	91 dB(A)	4 m from the front, on the left in the driving direction	117 dB(A)
S 39 SX	90 dB(A)	2 m from the front, on the left in the driving direction	117 dB(A)
S 42 SX	96 dB(A)	5 m from the front, on the left in the driving direction	117 dB(A)
S 43 SX III	91 dB(A)	4 m from the front, on the left in the driving direction	117 dB(A)
S 46 SX			117 dB(A)
S 47 SX			117 dB(A)
S 52 SX	90 dB(A)	2.5 m from the front, on the right in the driving direction	117 dB(A)
S 55 SX	90 dB(A)	2.5 m from the front, on the right in the driving direction	117 dB(A)
S 58 SX	97 dB(A)	5 m from the front, on the right in the driving direction	117 dB(A)
S 61 SX	97 dB(A)	5 m from the front, on the right in the driving direction	117 dB(A)
S 65 SXF	97 dB(A)	5 m from the front, on the right in the driving direction	117 dB(A)
FBP 21	93 dB(A)	2.5 m from the front, on the right in the driving direction	117 dB(A)
FBP 24	93 dB(A)	2.5 m from the front, on the right in the driving direction	117 dB(A)
FBP 26	93 dB(A)	2.5 m from the front, on the right in the driving direction	117 dB(A)



## 2.11 Pictographs without text

Different warning and information signs in the national language are located on your SCHWING concrete pump, in addition to textless pictographs.

An overview of all signs without text can be found below.

Pictographs without text are situated on various control elements on the machine.



### Information

All signs and pictographs are important components of your machine!

Should the machine be used in a region with a different language than initially planned, the signs and labels must be exchanged for a version in the national language.

Always ensure that the signs are clearly legible and replace any damaged or illegible signs immediately. To do this, refer to the material number on the sign (Fig. 20 Material numbers for signs).

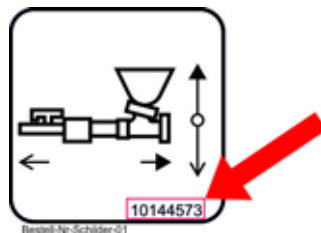


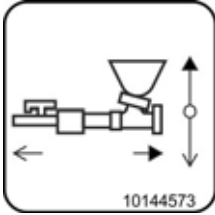
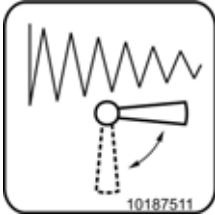


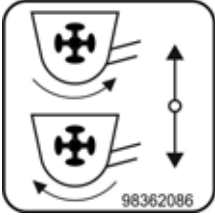
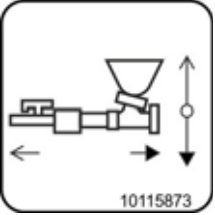
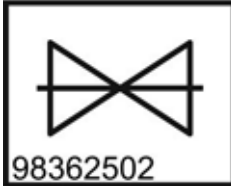
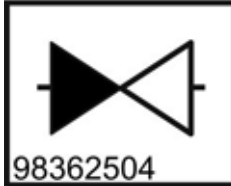
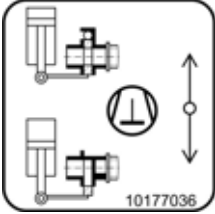
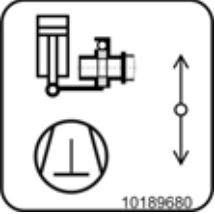
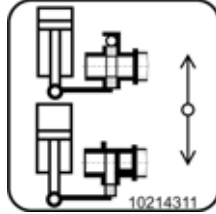
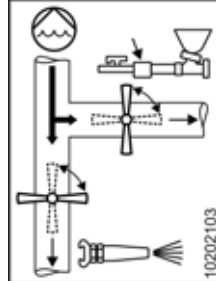
Fig. 20 Material numbers for signs



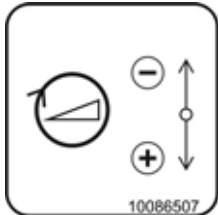



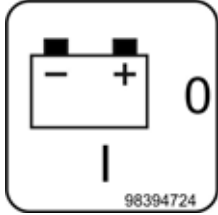
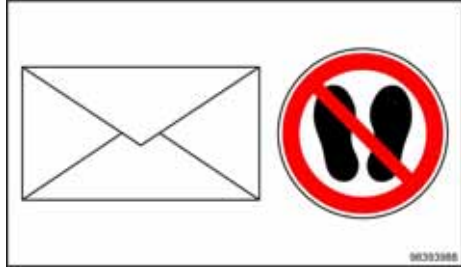
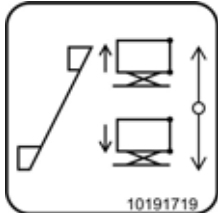


### Information


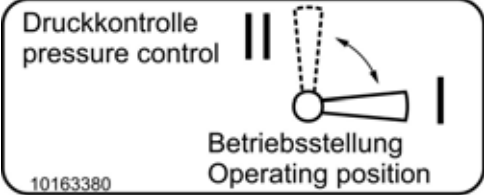
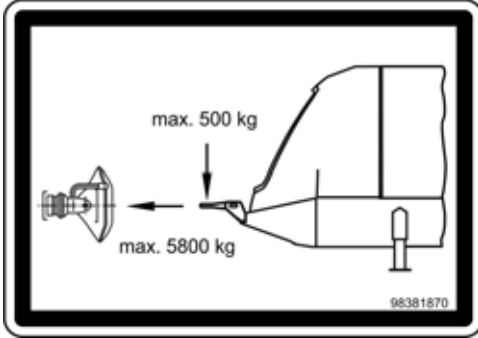
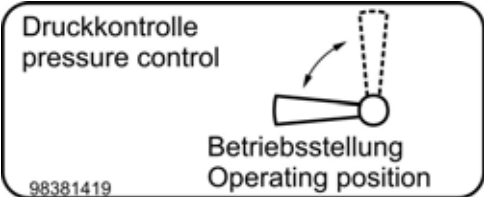

Some of the signs indicated are not available on each machine. The scope of the signs and labels depends on the type and design of your machine.

2.11.1 Pictographs

<p>Concrete pump Pumping - 0 - Sucking</p>  <p>10144573</p>	<p>Start-up damping on / off</p>  <p>10187511</p>	<p>Start-up damping</p>  <p>10144566</p>	<p>Delivery rate adjustment</p>  <p>98362082</p>
<p>Agitator Pump operation (P) - 0 - Suction operation (R)</p>  <p>98362086</p>	<p>Concrete pump Suck - 0 - Pump</p>  <p>10115873</p>	<p>Isolation valve open</p>  <p>98362502</p>	<p>Isolation valve close</p>  <p>98362504</p>
<p>Chamber valve open Compressor Chamber valve closed</p>  <p>10177036</p>	<p>Chamber valve - 0 - Compressor</p>  <p>10189680</p>	<p>Chamber valve Open - 0 - Closed</p>  <p>10214311</p>	<p>Switching water box/ spray hose</p>  <p>10202103</p>



<p>Speed adjuster</p>  <p>10086507</p>	<p>Water pump</p>  <p>10158389</p>	<p>Compressor</p>  <p>10144568</p>	<p>CE signs</p>  <p>10148919</p>
<p>Main switch battery on - off</p>  <p>98394724</p>	<p>Delivery note box - No tread surface</p>  <p>98393988</p>		
<p>Stowing box Up - 0 - Down</p>  <p>10191719</p>	<p>EASy display</p>  <p>10200927</p>	<p>Override protection device</p>  <p>98361549</p>	

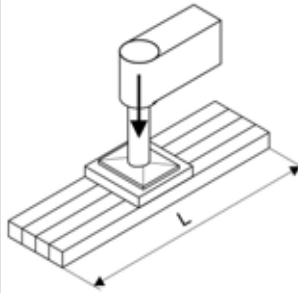
 <p style="text-align: center;">Lifting eye; 98363577*</p>	 <p style="text-align: right;">10163380</p>
<p>Attention! Example values for:</p> <ul style="list-style-type: none"> <li>• Horizontal trailer load</li> <li>• Vertical trailer load</li> </ul>  <p style="text-align: center;">98381870*</p>	 <p style="text-align: right;">98381419*</p>
<p>Warning: hot surface</p>  <p style="text-align: center;">98380738*</p>	

\* = For stationary concrete pumps only

## 2.12 Individual pictographs

These signs are only used for specific machine types. The following signs are sorted according to machine types.

### 2.12.1 Tabular determination of the required supporting surface



supporting forces in kN (see supporting leg)	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400
admissible ground pressure (kN/m <sup>2</sup> )	length L of timber squares in cm 4 timber squares 15 cm x 15 cm (zul. $\sigma_s = 53 \frac{N}{mm^2}$ )														
natural soil	100	84	125	167	209	250	ground not suitable for this kind of support								
Asphalt (min. 20cm thick)	200	84	105	125	146	167	188	209							
crushed stone (compacted)	250		84	100	117	134	150	167	184	200					
silty clay (firm)	300			84	98	112	125	139	153	167	181	195	209		
mixed grain size soil (firm)	350				84	96	108	119	131	143	155	167	179	191	
loose-packed gravel (firm)	400					84	94	105	115	125	136	146	157	167	
	500						75	84	92	100	109	117	125	134	
	750										73	78	84	89	
rock (friable, weathered)	1000	with supporting slabs 60 cm x 60 cm or 65cm x 65 cm without additional timber squares													

Fig. 21: 98336345

### 2.12.2 Signs and labels for the supporting forces on the machine outriggers

S 24 X

Sign on the front outrigger Sign on the rear outrigger



### 2.12.3 Operation plate for emergency operation on the placing boom control station

- 1-6: Placing boom control
- 7: Switching: Boom -0- Outrigger
- 8: Switching: Compressor -0- water pump

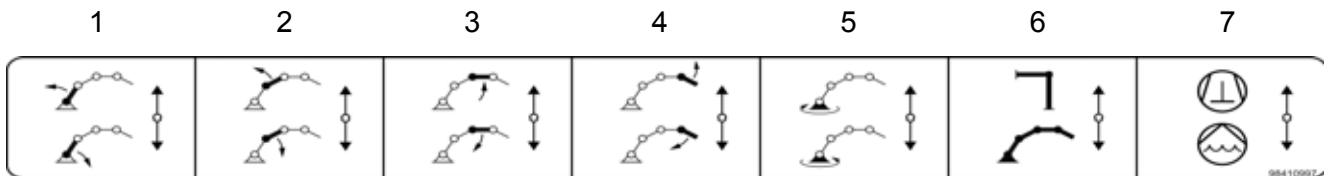


Fig. 22: Operation plate for emergency operation

### 2.12.4 Operation plate on the outrigger control block

Direction right: Outriggers on -0- off

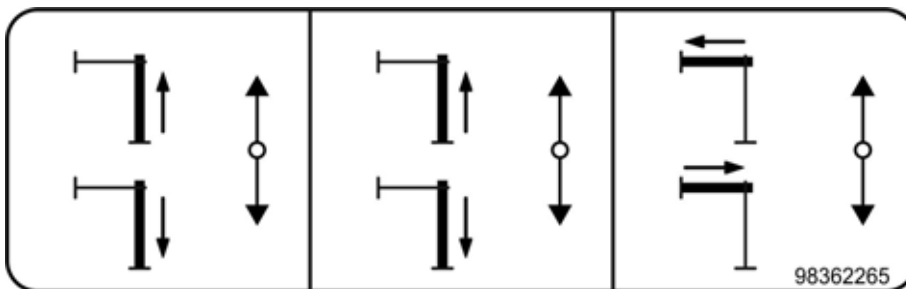


Fig. 23 Operation plate on outrigger control block, on right in direction of travel

### 2.12.5 Operation plate on the outrigger control block

On the left in the driving direction: Outriggers on -0- off

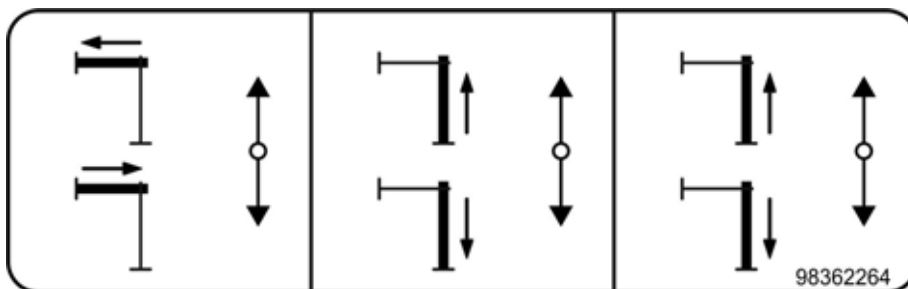


Fig. 24 Operation plate on outrigger control block, on left in direction of travel

## 2.13 Control, warning and steering elements

This chapter clearly describes the positions of the control, warning and steering elements on your machine.

### 2.13.1 Overview

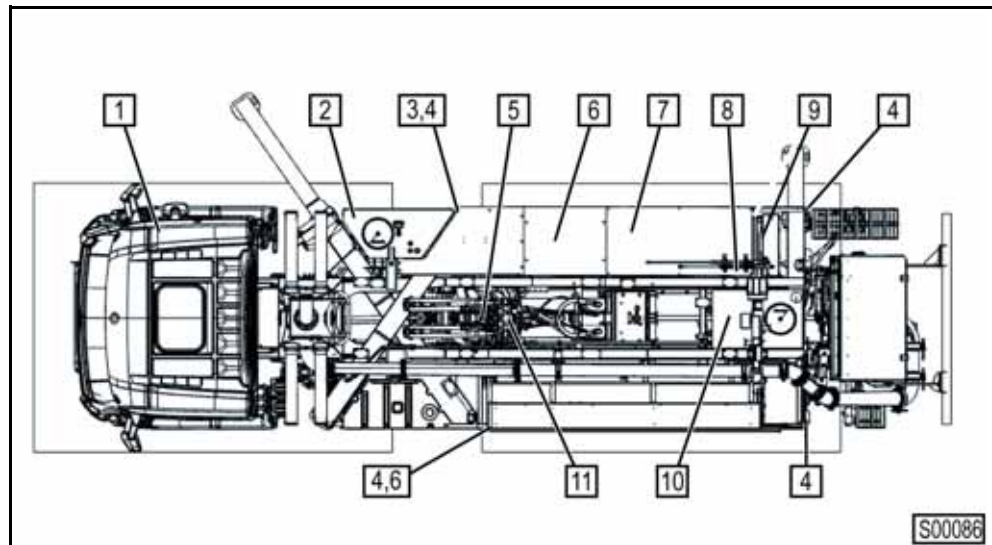


Fig. 25 Overview

Caption (Fig. 25 Overview)			
Pos.	Description		
1	<ul style="list-style-type: none"> <li>Key-operated switch for SCHWING control</li> <li>Gearshift lever for distributor gearbox (special equipment)</li> </ul>	7	Switch cabinet of the control
2	Inspection glass for hydraulic oil level control	8	Accumulator safety block
3	Emergency operation control station	9	Control station for local control Ledge cpl.: Air, water
4	Emergency-stop button	10	Terminal box of the special control: Pumping piston change
5	Ball valve: CP pressure test	11	Ball valve: MPS
6	Outrigger control		



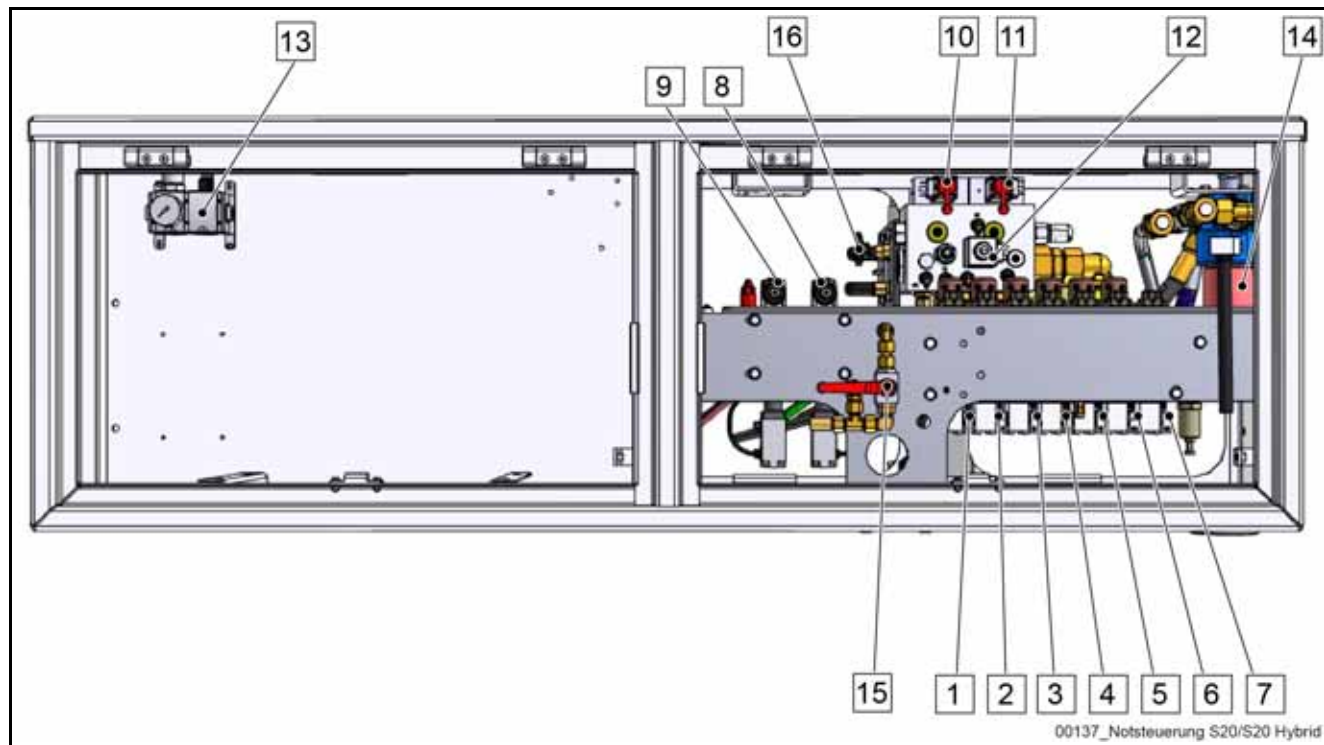
#### Information

Depending on the equipment variant of the machine, other (additional) controls, warning- and control elements can be present.

All elements are marked accordingly with symbols, (see “**Pictographs without text**” on page 69).

### 2.13.2 Control station for operating mode: Emergency operation

The terminal box for the VECTOR control system (**Fig. 29**) and the control station for the hydraulic emergency operation of the S20 / S20 Hybrid (**Fig. 26:**) are located in lockable housings on the right side of the machine (**Fig. 28**).



**Fig. 26: Control station for operating mode: Emergency operation (S20/S20 Hybrid)**

Caption (Fig. 26: Control station for operating mode: Emergency operation (S20/S20 Hybrid))			
Pos.	Description		
1	Control lever slot boom section 1: UP - 0 - DOWN	9	Control lever receiver agitator: FORWARD - 0 - BACKWARD
2	Control lever slot boom section 2: UP - 0 - DOWN	10	Manual override: Concrete pump
3	Control lever slot boom section 3: UP - 0 - DOWN	11	Manual override: Placing boom
4	Control lever slot boom section 4: UP - 0 - DOWN	12	Pressure reducing valve: Emergency output regulation for the concrete pump
5	Control lever receiver rotate boom column: RIGHT - 0 - LEFT	13	Compressed air release valve with pressure gauge
6	Control lever receiver: BOOM - 0 - OUTRIGGER CONTROL	14	Boom filter
7	Control lever receiver: WATER PUMP - 0 - SPECIAL EQUIPMENT	15	Ball valve for start-up damping
8	Control lever receiver concrete pump: PUMPING - 0 - SUCKING	16	Pressure adjustment start-up damping
* = Special equipment			

### 2.13.3 Machine control via electric drive (S20 Hybrid model)

The two switch cabinets (3) for the electric drive, the cable drum (1) and the CEE plugs for the current supply (2) are located on the left-hand side of the machine for the S20 Hybrid model.

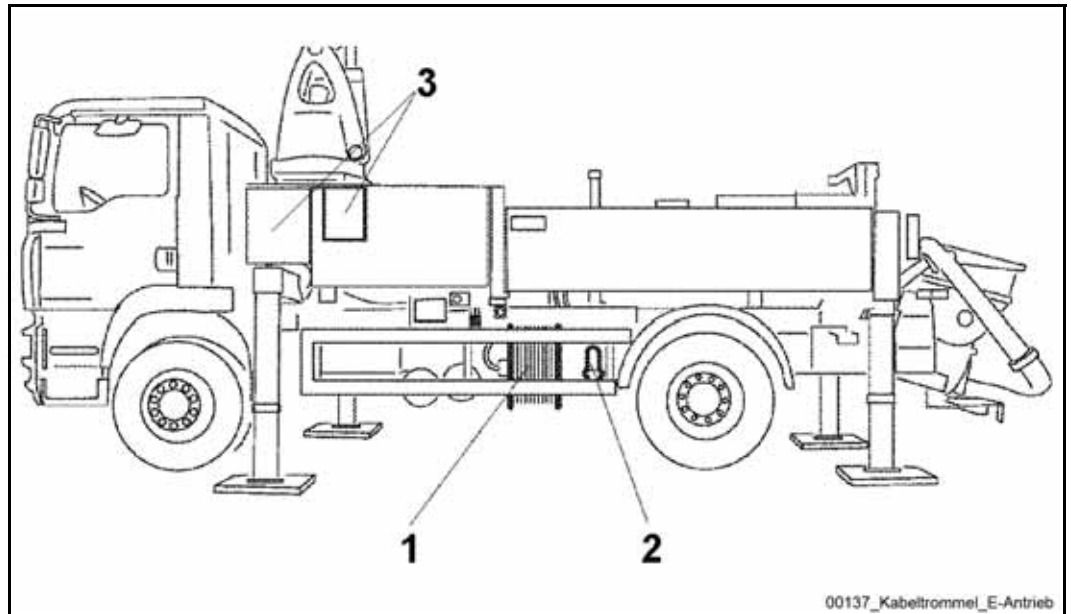
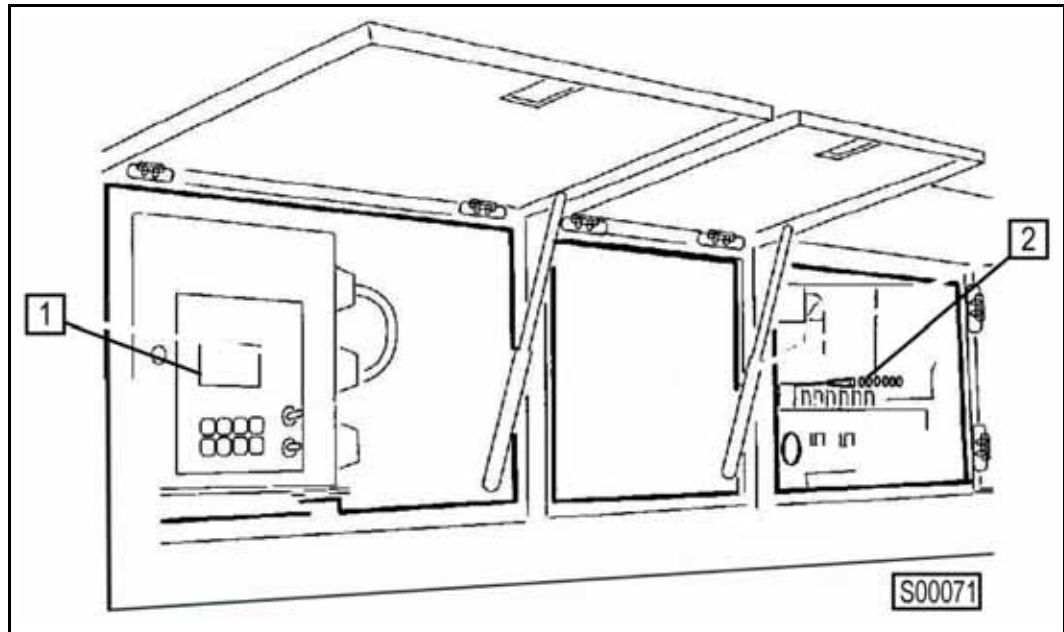


Fig. 27 Switch cabinets for S20 Hybrid model

Caption (Fig. 27 Switch cabinets for S20 Hybrid model)	
Pos.	Description
1	Cable drum
2	CEE plugs
3	Switch cabinets for electric drive

### 2.13.4 Control



**Fig. 28 Control**

The hydraulic emergency control (1) and the terminal box of the electrical control (2) are located on the right side of the machine (**Fig. 28**) in lockable housings.

Caption (Fig. 28 Control)	
Pos.	Description
1	VECTOR control
2	Emergency control



### 2.13.5 Switch cabinet for VECTOR control

(See “VECTOR control system” on page 125)

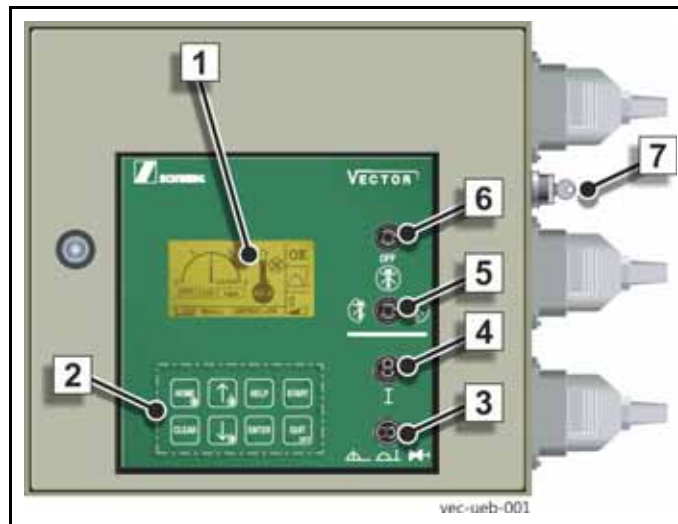


Fig. 29 VECTOR switch cabinet

Caption (Fig. 29)	
Pos.	Designation
1	Display
2	Keypad
3	Selector switch: Operating modes
4	Button: VECTOR control ON
5	Switch: EASy work area
6	Switch: EASy OFF
7	Key-operated switch: EMERGENCY STOP bypass

### 2.13.6 Remote control

During normal operation, a truck-mounted concrete pump is not operated via the remote control unit.

The SC 30 digital radio equipment was specially developed for controlling truck-mounted concrete pumps with a placing boom.

The radio system includes:

- Handset
- Accumulator
- Antenna
- Charger

The handset (**Fig. 30**) is stored in one of the lockable tool boxes.

The antenna (**Fig. 31**) is located near the placing boom's slewing gear.

Further information can be found in chapter **(5.1)**.



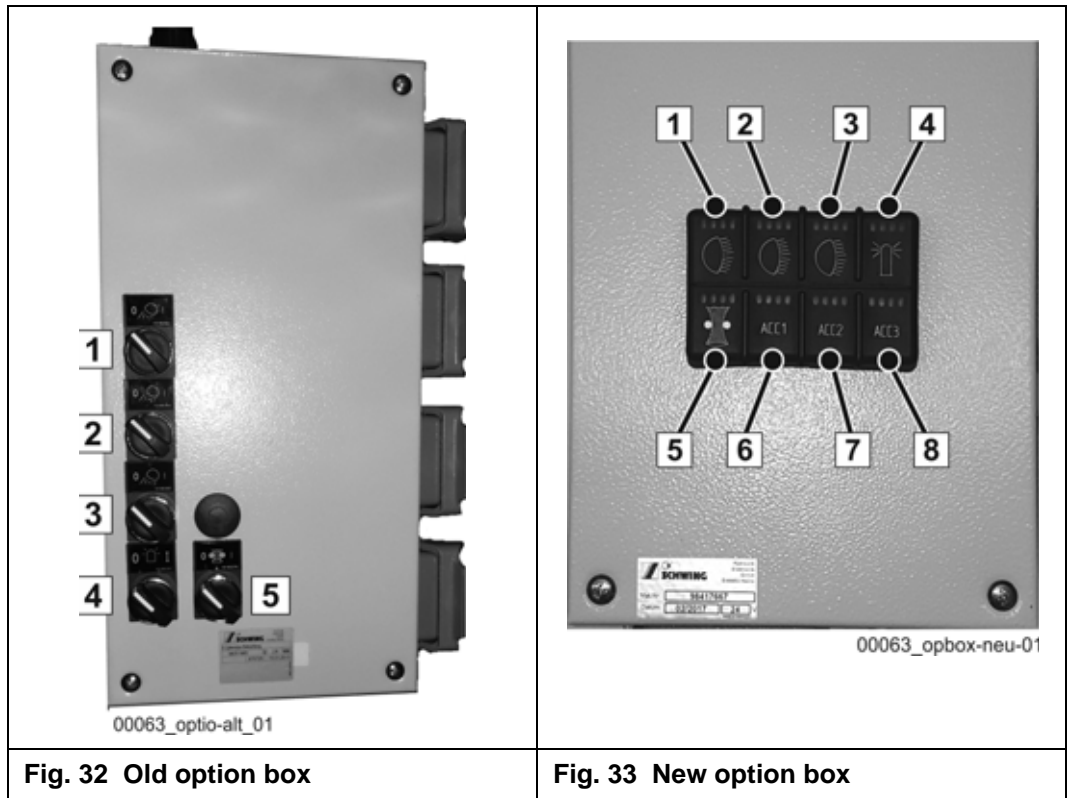
**Fig. 30** Remote control handset



**Fig. 31** Antenna for remote control

### 2.13.7 Option box for special equipment

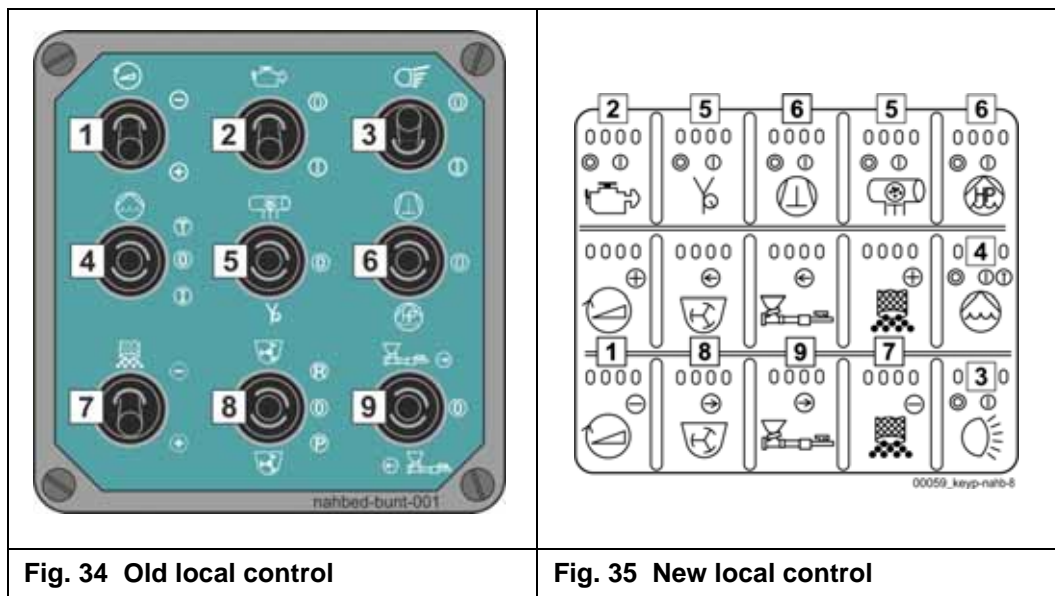
The option box is located in one of the tool cabinets near the VECTOR control switch cabinet.



Caption (Fig. 32) / (Fig. 33)		
Pos.	Description	Function of
1	Switch lighting boom tip:	ON/OFF
2	Switch floodlight B-joint (hopper lighting):	ON/OFF
3	Switch floodlight boom support (deck lighting):	ON/OFF
4	Switch Flashing lights at the outriggers	ON/OFF
5	Switch End hose stop valve	ON/OFF

### 2.13.8 Local control

The local control unit is integrated into the upper section of the supply control.



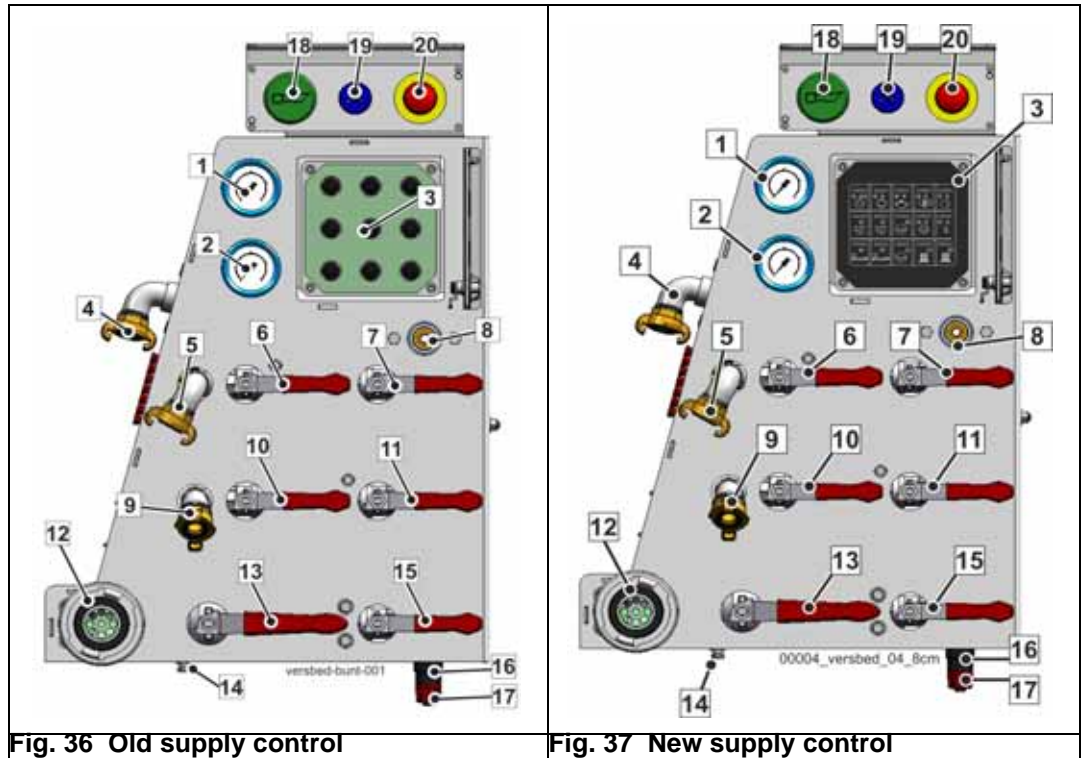
Caption (Fig. 34) / (Fig. 35)		
Pos.	Description	Function of
1	Motor button	Speed adjuster
2	Drive motor button	START / STOP
3	Floodlight switch on hopper	ON/OFF
4	Switch water pump: (also see ch. <b>“Working operation: Water system”</b> on page 271)	Touch function for knee switch ACTIVE - 0 - Water pump ON
5	Switch	Chamber valve <sup>1</sup> - 0 - Vibrator <sup>2</sup>
6	Switch	Compressor - 0 - High-pressure cleaner
7	Button: Concrete pump flow adjustment	+/- 10 %
8	Agitator switch	Pump operation (P) - 0 - Suction operation (R)
9	Concrete pump switch	Pumping - 0 - Sucking

1. Special equipment

2. See Chapter **“Working operation: Concrete pump”** on page 265

**2.13.9 Supply control tail end of vehicle, right**

Deviations are possible depending on the equipment variants.


**Fig. 36 Old supply control**
**Fig. 37 New supply control**

Caption (Fig. 36) / (Fig. 37)			
Pos.	Description	Pos.	Description
1	Pressure control MPS: Mini pauses switch	11	Fill water box / Empty water box
2	Pressure control for concrete pump	12	C-connection: Fill and empty water case
3	Local control	13	Ball valve to pos. 12
4	Input: Water / Compressed air to boom. a) Water to boom: Connect pos. 9 + 4 b) Compressed air to boom: Connect pos. 5 + 4	14	Drainage to pos. 13
5	Output compressor	15	High-pressure cleaner (HDR)
6	Ball valve to pos. 5	16	Water filter (HDR)
7	Ball valve hose reel	17	Emptying (HDR)
8	Air connection of vehicle air (5 bar)	18	Horn
9	Output of water pump (spray hose)	19	Agitator: Change rotational direction
10	Ball valve to pos. 9	20	EMERGENCY STOP

Ball valve position:  
 — = open  
 I = closed

### 2.13.10 Right tail end of vehicle: Back of supply control

(deviations are possible, depending on the version of the machine)

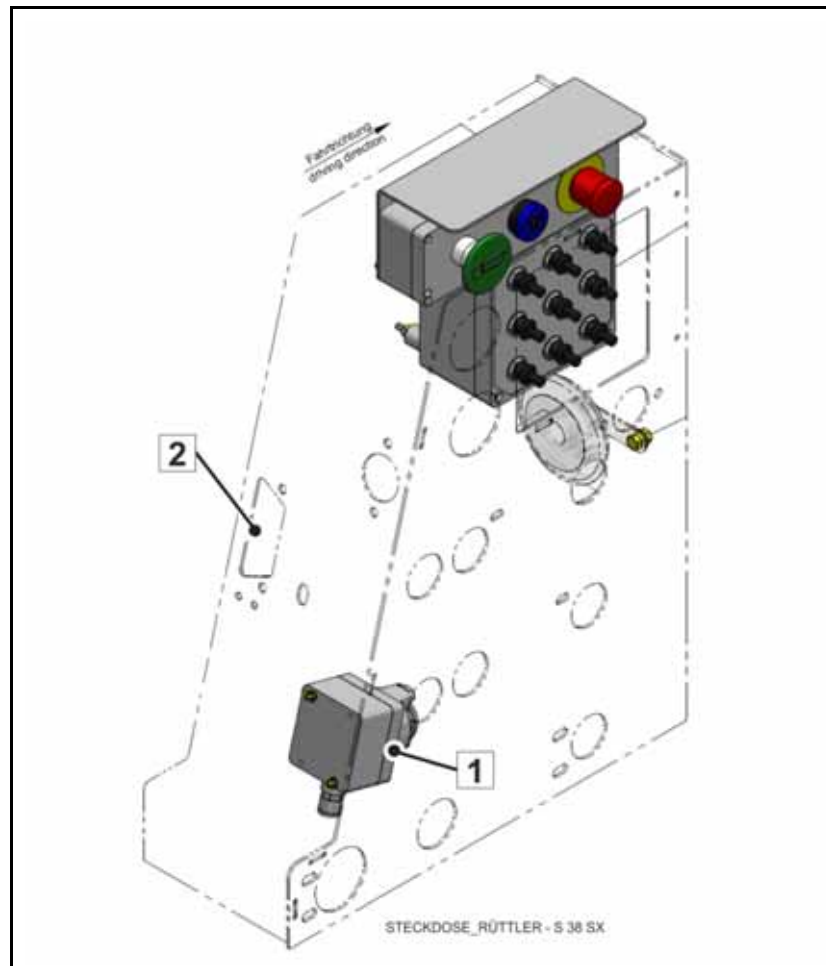
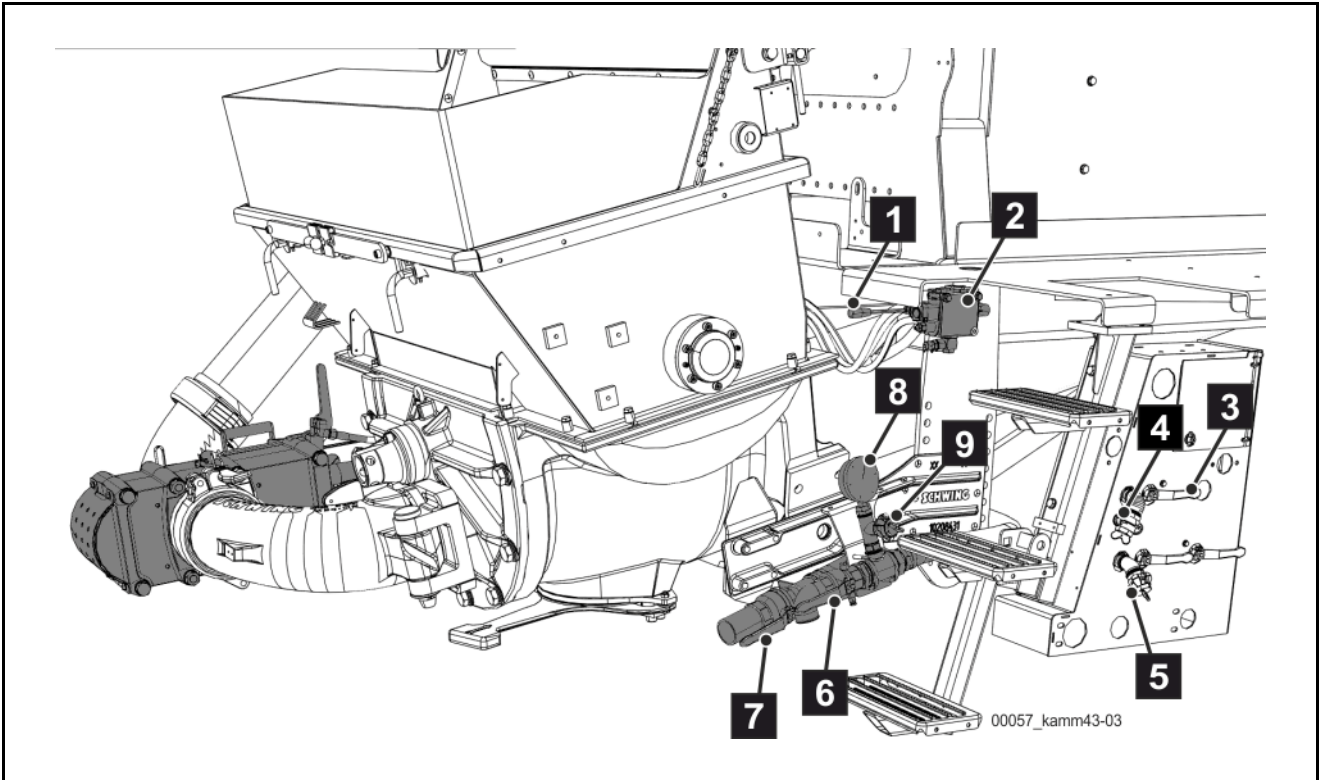


Fig. 38

Caption (Fig. 38 )	
Pos.	Description
1	Power outlet for vibrator
2	Lubrication point of rock and agitator

**2.13.11 Right tail end of vehicle, chamber valve<sup>1</sup> and water box emptying**

**Fig. 39: Components on tail end of vehicle (right)**

Caption (Fig. 39: Components on tail end of vehicle (right))			
Pos.	Description	Pos.	Description
1	Control lever chamber valve: ON - 0 - OFF	6	Drain cock chamber valve
2	Pressure setting chamber valve	7	Ball valve water box emptying
3	Ball valve to pos. 4	8	Pressure gauge chamber valve
4	Output compressor	9	Chamber valve supply: Air/water
5	Hose coupling for chamber valve supply: a) Compressed air: Connect pos. 4 + 9 b) Water: Connect pos. 5 + 9		

1. Special equipment

## 2.13.12 Right tail end of vehicle

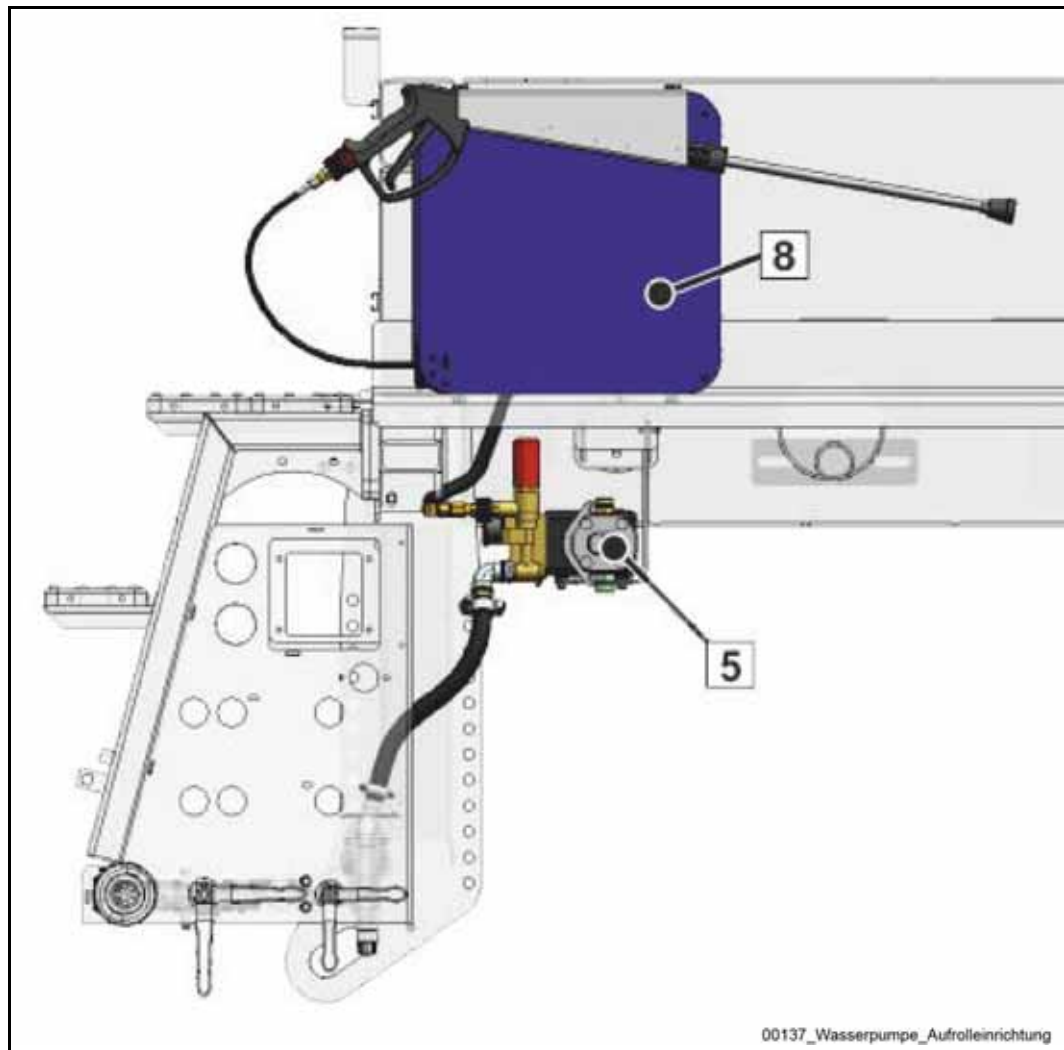


Fig. 40 Water pump and rolling equipment for high-pressure hose

**Caption (Fig. 40 Water pump and rolling equipment for high-pressure hose)**

Pos.	Description
5	High-pressure water pump
8	Rolling equipment for high-pressure hose



### 2.13.13 Special control: Pumping piston change

This control station is located at the rear of the truck-mounted concrete pump, above the concrete filling hopper.

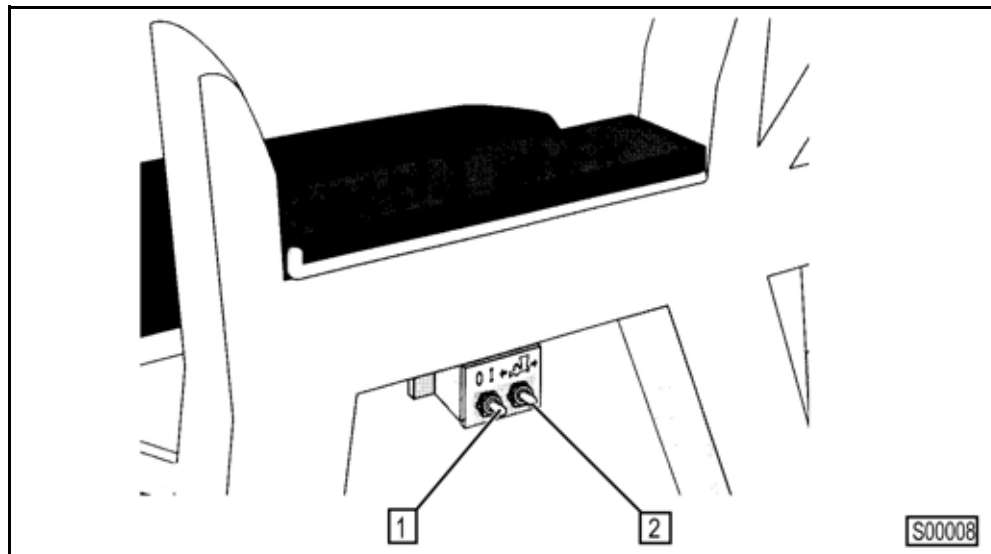
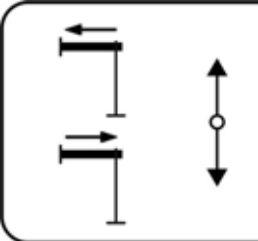
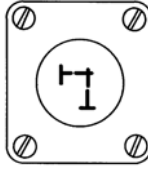
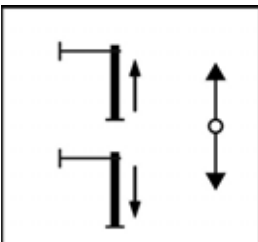
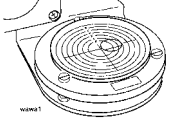
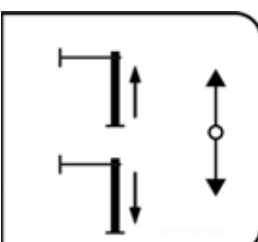



Fig. 41 Pumping piston change on rear boom support

Caption (Fig. 41 Pumping piston change on rear boom support)	
Pos.	Description
1	Selector push-button: Motor on/off
2	Selector push-button: Drive concrete pump in "jog mode"

### 2.13.14 Outrigger

Description of the control levers at both sides of the vehicle. For configuration, see symbols on the machine, e.g.:

1	Outrigger front horizontal: RETRACT - 0 - EXTEND		4	Button outrigger release	
2	Supporting leg front vertical: RETRACT - 0 - EXTEND		5	Spirit level	
3	Supporting leg rear vertical: RETRACT - 0 - EXTEND		6	EMERGENCY-STOP button	

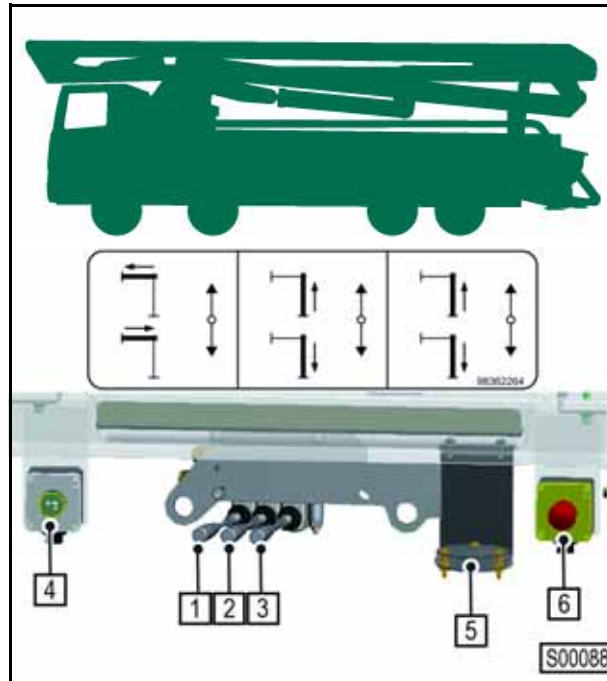
**2.13.14.1 On the left in the direction of travel**


Fig. 42 On the left in the direction of travel

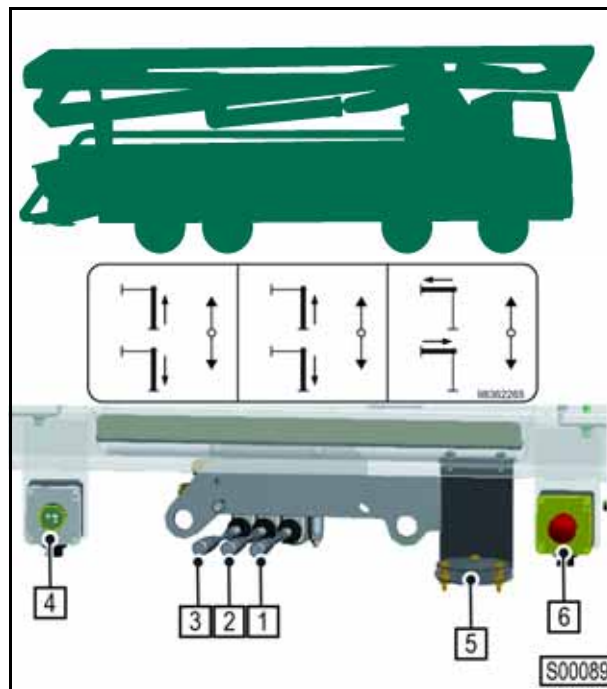
**2.13.14.2 On the right in the direction of travel**


Fig. 43 On the right in the direction of travel

### 2.13.15 Remote control



#### Information

A separate description of the remote control used is provided in chapter “**Remote control**” on page 537 of these operating instructions.

## 2.14 Switches on the instrument panel

This chapter describes the switches in the driver's cab, which are required for controlling the SCHWING machine.

The information is sorted according to vehicle manufacturer.



### Information

The machine has control devices already provided for various special equipment. If the machine is not equipped accordingly, these control functions become functionless.

The positions and arrangements of the switches are shown as examples and vary according to the vehicle's equipment.

### 2.14.1 Mercedes

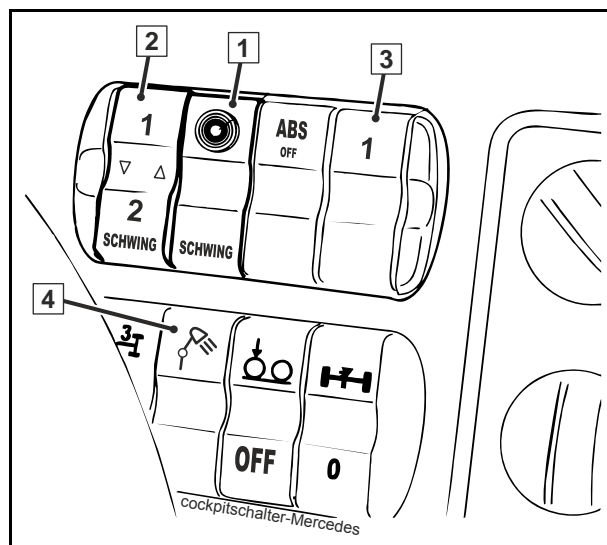


Fig. 44 Mercedes fittings

Caption (Fig. 44 Mercedes fittings)		
Pos.	Description	Function of
1	Pilot light <sup>1</sup> for VECTOR control system	ON / OFF
2	Position 1: VECTOR control Neutral position Position 2: Turn the mixer drum	ON OFF ON
3	Outrigger lighting	ON/OFF
4	Rear floodlight (manoeuvring system)	ON/OFF

1. Vehicle-dependent differences are possible

2.14.2 MAN



Fig. 45 MAN fittings

Caption for (Fig. 45)		
Pos.	Description	Function of
1	Switch position I = VECTOR control Switch position 0 = VECTOR control Switch position II = Turn drum (truck mixer concrete pump only)	ON OFF ON
2	Pilot light for VECTOR control system	ON/OFF
3	rotating warning light	ON/OFF

## 2.14.3 Scania



Fig. 46 SCANIA fittings

Caption (Fig. 46 SCANIA fittings)		
Pos.	Description	Function of
1	VECTOR control	ON
2	Pilot light for VECTOR control system	ON/OFF
3	Distribution manual transmission gear	
	Switch position 0	Machine in drive mode
	Switch position 1	Machine pumping mode
4	Outrigger lighting	ON/OFF

## 2.14.4 Iveco

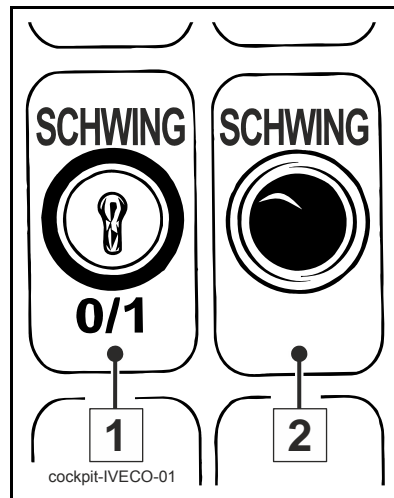


Fig. 47 IVECO fitting

Caption for (Fig. 47)		
Pos.	Description	Function of
1	VECTOR control	ON/OFF
2	Pilot light for VECTOR control system	ON/OFF



## 2.14.5 Renault



00139\_Armatureträger\_Renault

**Fig. 48 Renault fitting**

Caption for (Fig. 48)		
Pos.	Description	Function of
1	VECTOR control	ON/OFF
2	Pilot light for VECTOR control system	ON/OFF

### 2.14.6 Explanation of the "EXT" switch on SCANIA vehicles

Before you can control the machine using a remote control, you must press the "EXT" button (4) in the cab of your SCANIA vehicle.

Only then is it possible to start the vehicle's engine using the vector remote control unit, for example.

The "EXT" button enables the vehicle's computer for external control commands. Check the vehicle's operating instructions for the correct switch!

**Steps to take:**

- Press the "EXT" button (5).

A corresponding acknowledgement message appears on the display panel of the vehicle.

- Switch on the VECTOR control system using switch 5 (Fig. 49 SCANIA "EXT" switch).

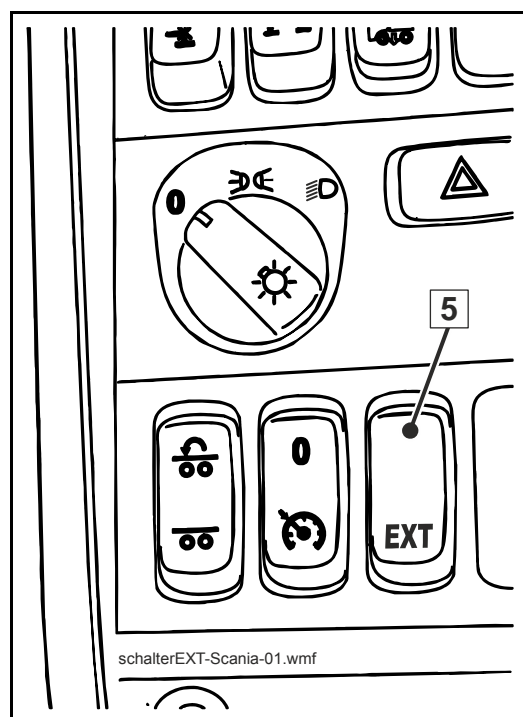


Fig. 49 SCANIA "EXT" switch

Caption (Fig. 49 SCANIA "EXT" switch)		
Pos.	Description	Function of
5	Switch (EXT)	Unlock vehicle electronics for VECTOR control system

## 3 Operation

This chapter describes:

- All of your machine's operating modes
- Safe and proper handling
- Safe and economical operation





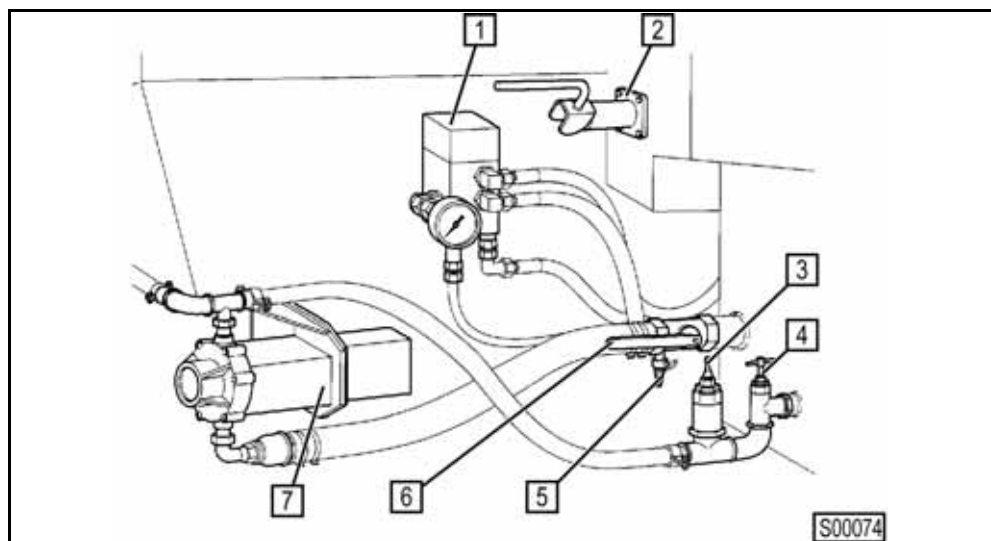
### 3.1 Readyng the machine for operation



#### Information

Some of the work described below should be carried out expediently at the depot before driving the machine to the installation site.

- Perform maintenance according to the maintenance schedule (lubrication service, etc.).



**Fig. 50 Performing maintenance work**

- Check the filling level of the water case on the level indicator on the left side of the machine.
- Fill clean water through the filling neck on the top of the reservoir.



#### Attention!

##### Defective water pump due to dirty water

Contaminated water (dirty water) can impair the functions of the water pump or even destroy it. Fill with clean water in general, as the water pump will wear more quickly otherwise.

- Observe the level gauge while filling and reduce or stop the inflow in due time.
- Check the fuel supply.
- Refuel, if necessary.
- Ensure absolute cleanliness!



**Attention!**

**Risk of explosions due to hot components!**

Hot surfaces can cause fuel to ignite, which can in turn lead to explosions. When refuelling, switch off the motor and auxiliary heating. In addition, observe the safety regulations for handling fuel.

---

### 3.1.1 Filling the water case using a C hose

If the machine is equipped with a "C" connection, exercise appropriate care when using it to fill the water case.



**Attention!**

**Damage to the water case due to excessive pressure!**

When filling through the "C" junction, the resulting internal pressure can damage the reservoir, if the filling process is not interrupted in good time.

Refrain from filling under high pressure (for example, using a hydrant). The existing ventilations are not suitable for discharging the supply of excess water.

---

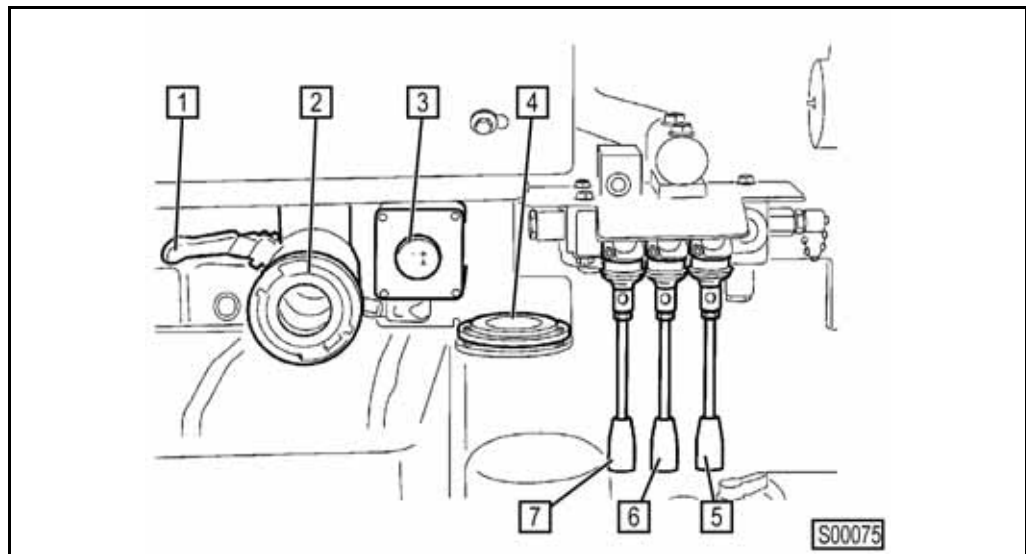


**Attention!**

**Damage to the water case due to plastic deformation!**

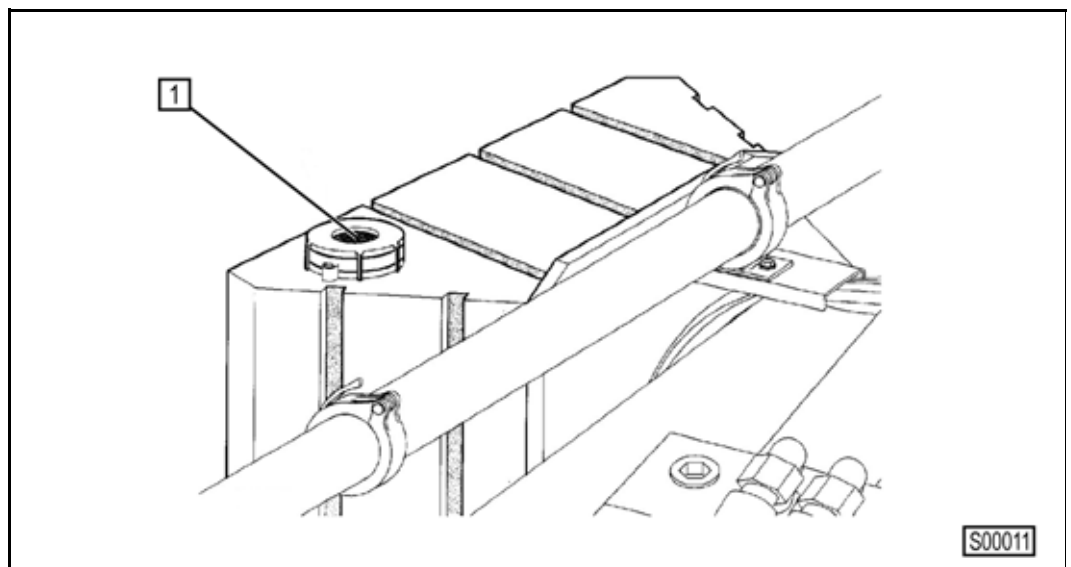
Plastic water cases are suitable for water temperatures up to max. 60 °C (140 °F). Never fill with warm water. The reservoir may deform.

---



**Fig. 51 Connect "C" hose and open gate valve**

- Close the gate valve in the suction pipe of the water pump (6) (Fig. 50 Performing maintenance work)!
- Connect the "C" hose to the coupling and open the gate valve (1) (Fig. 51 Connect "C" hose and open gate valve).



**Fig. 52 Filling cap on the water case**

- Open the filling cap of the water case (1) (Fig. 52 Filling cap on the water case)!
- Use a standard water hose to fill the water case through the filling cap at the top, if secure filling is not possible via the "C" junction.

### 3.1.2 Function of the ball valves on the CP control block:

The ball valve (1) (Fig. 55 CP control block) on the CP control block has to be located in the operating position before you can begin pumping.

The ball valve is open in the operating position.

Ball valve (1):

Blocks the concrete pump during the pressure test and during repair work.

Working operation is only permitted while the ball valve is in the operating position.

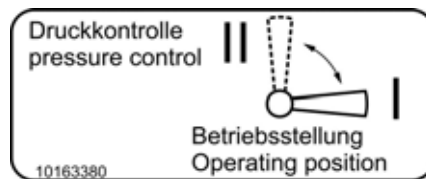
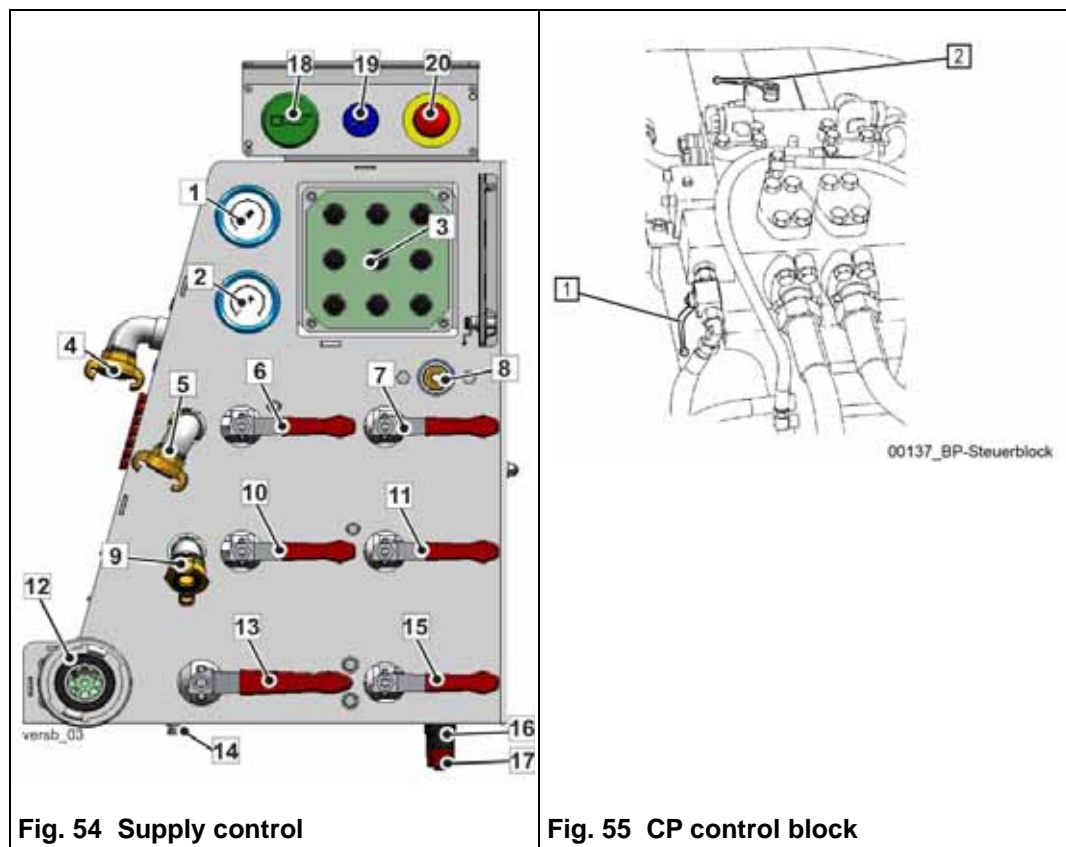


Fig. 53 Position of the ball valve





### 3.1.3 Checking the hydraulic oil level

- Check the oil level of the hydraulic oil box on the inspection glass (1) (Fig. 56 Oil box).
- Check the oil level only when the oil is cold, before you start the hydraulic pump drive for the first time prior to daily use.

To do this, the ready-to-start machine must be positioned horizontally.

Ready to start means that the placing boom and outrigger are in the transport position.

When the oil is cold, the oil level indicator of the hydraulic oil tank inspection glass (Fig. 56 Oil box) must be located between the "Min" and "Max" marking.

As the hydraulic oil expands when heated, correspondingly different oil levels would be shown otherwise.

- Top up with the same oil type, if required.



#### Attention!

**Material damage is possible when using the wrong oil.**

When topping up the oil, use the same oil as is already in the oil box in order to avoid damaging the machine.

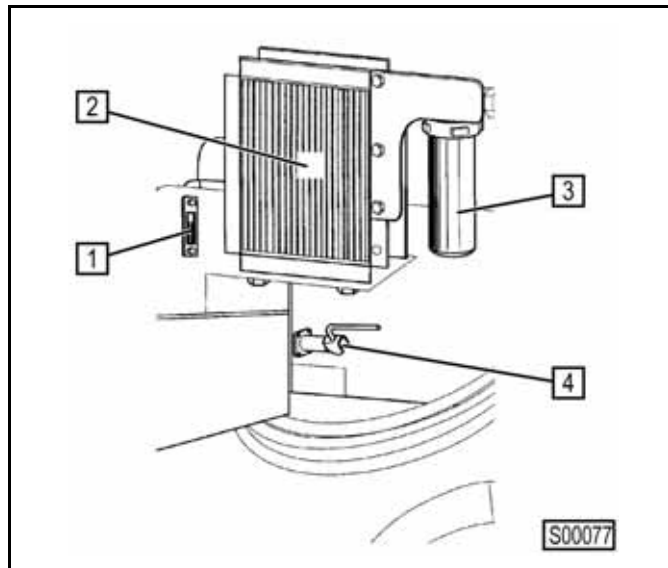


Fig. 56 Oil box

Caption (Fig. 56 Oil box)			
Pos.	Description	Pos.	Description
1	Inspection glass	3	Oil filter
2	Oil cooler	4	Transport safety device



### Information

The diagnosis system of the "VECTOR control" can monitor the oil level as a special equipment. It reports an error when the oil level drops too low.

#### 3.1.4 Grid assembly in concrete filling hopper

- Check the lock on the mesh in the concrete filling hopper (e.g. locking bar 1, (Fig. 57 Concrete filling hopper)).

The concrete may push up the mesh in the event of being unlocked.

This would cause an end limit switch to switch off the concrete pump.

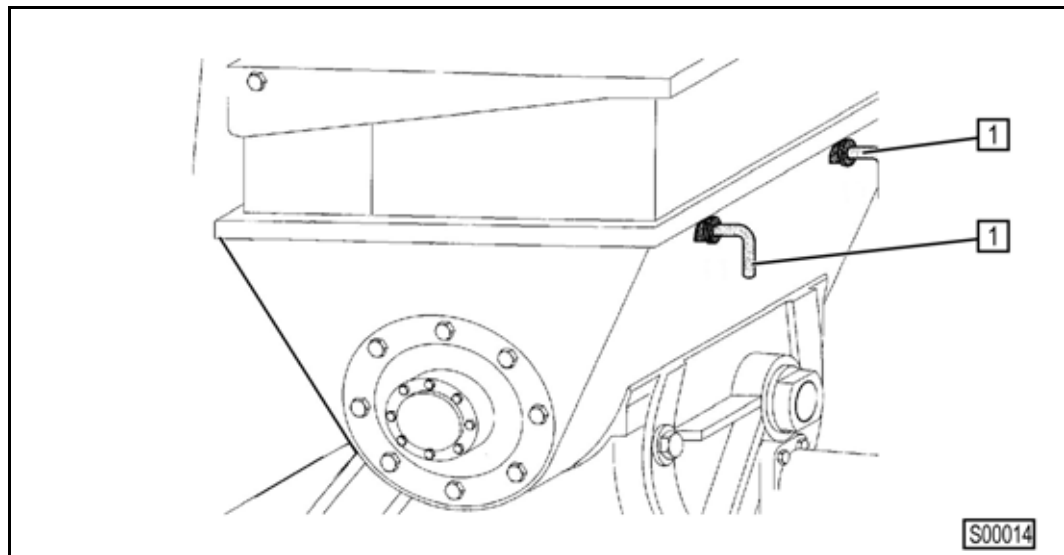


Fig. 57 Concrete filling hopper

### 3.1.5 Preparing the VECTOR control system

The duty cycle also starts with setting up the machine. To do this, operating mode: "LOCAL" is selected.

In order to drive the machine using the local control unit, the plug must always be attached to the transmitter or to the cable remote control on the switch cabinet. See example (8) (Fig. 58 Preparing the VECTOR control system).

Otherwise, it is not possible to start up the machine because the EMERGENCY STOP valves are open in the hydraulic system ("EMERGENCY STOP bypass").

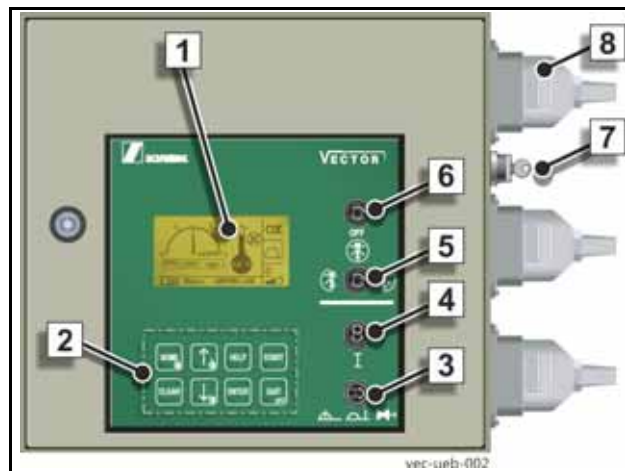


Fig. 58 Preparing the VECTOR control system

### 3.1.6 Preparing the electrical connection (for S20 Hybrid model)

#### 3.1.6.1 Safety instructions and general information

An electric motor is used as the power source for the S20 Hybrid variant. Observe the following instructions.



#### Information

Before commencing any type of work, always observe the “Safety manual – Concrete delivery and placing machines”, which is considered part of the present operating instructions.



#### Danger!

#### **Danger to life due to electric shock!**

**All work with and on electrical components always poses the possibility of a fatal injury due to electric shock.**

As a rule, electrical work must only be performed by authorised specialists. The system operator must ensure that the machine is connected correctly. Please note that a special supply point is prescribed for Germany in accordance with VDE 0100 § 55.



#### Danger!

#### **Danger to life due to electric shock on electrical components!**

Before commencing any type of work, disconnect the machine from the power by pulling the mains plug and moving all main switches into the 0 position.



#### Attention!

#### **Machine damage due to incorrect electrical connection!**

Observe the relevant regulations in the country of use.

- When connecting the supply lines, ensure that a right-hand rotating field is formed.
- Always use the circuit diagrams available in the terminal box as a guide.
- Secure the conductor cross-sections according to the following table:

Electric motor			Supply line max. 100 m	
kW	V	A	mm <sup>2</sup>	Fuse [A]
30	400	55	4 x 16	63
45	400	80	4 x 25	100
55	400	100	4 x 35	125
75	400	135	4 x 50	160
90	400	160	4 x 70	200
110	400	195	4 x 95	224
132	400	230	4 x 120	250
160	400	280	4 x 185	315
200	400	350	4 x 240	400

### 3.1.6.2 Checking the rotational direction of the electric motor (control without phase sequence monitoring)

- Always check the rotational direction of the electric motor prior to commissioning the machine. This is indicated on new machines by means of arrows on the motor fan blowers. The rotational direction is always towards the right when looking at the ventilators, i.e. clockwise.
- Switch on the motor briefly.
- Check the rotational direction by looking at the fan wheel.
- Switch the phases if rotating in the wrong direction.
- Check the rotational direction again.

Checking the rotational direction is always required when:

- Connecting the machine
- Repairing the machine
- Replacing the supply cable or parts of the cable
- Extending the supply cable with an additional cable

### 3.1.6.3 Checking the rotational direction of the electric motor (control with phase sequence monitoring)

For machines with a control featuring phase sequence monitoring, checking the rotational direction is not necessary. The motor does not start if the phase sequence is incorrect.

- In this case, have authorised personnel replace the phase sequence.
- Repeat the start-up procedure.

**3.1.6.4 Technical data for the electric motor**

The following technical data applies to the electric motor being used:

Engine		FCMP 250M - 4 / PHE
Design	:	IM B35 / IM 2001
	:	50 Hz                      60 Hz
Engine power	:	55 kW                      66 kW
Rotational speed	:	1485                      1782
Nominal motor torque	:	354 Nm
Sound pressure level	:	62 dB (A)
Size	:	250 M
Protection class	:	IP 55
Coolant temperature	:	-20 °C to +40 °C
Max. installation altitude	:	1000 m above NN

## 3.2 Driving operation

This chapter only describes measures for making the SCHWING machine ready to drive.

Follow all preparatory measures for driving on public roads.



### **Danger!**

#### **Danger to life when driving with placing boom folded out!**

Fatal injuries while driving with placing boom folded out.

All driving operations, including relocating the machine on the jobsite, with the placing boom folded out are prohibited!

---

### 3.2.1 Preparatory measures

Please observe the following points in particular before driving with the truck-mounted concrete pump in traffic:

- Clean the pumping line and concrete pump (**chap. 3.21**)
- Move the placing boom into the transport position (**chap. 3.24**)
- Ready the machine to drive (**chap. 3.25**)
- Truck-mounted concrete pumps may only be driven in open road traffic with the relevant permit.
- Observe the regulation in the country of use.
- Before projects on unfamiliar jobsites, determine the precise route to be taken, as not all bridges, underpasses, etc. can be traversed by the machine.



### **Attention!**

#### **Damage to the gearbox!**

Avoid high rotational speeds in low gears.

---

When installing machines with distributor gearboxes onto a truck with drives producing especially high torque, the distributor gearbox can potentially be overloaded while driving in lower gears.

Observe the driving rules on an information sign in the driver's cab, if necessary.

**Warning!****Personal injury due to unsecured load!**

Fatal injuries are possible.

Store loads securely.

- Store equipment and accessories securely.
- Securely lock toolboxes and drawers.
- Close locks and remove keys.
- Move all foldable equipment (e.g. steps, (Fig. 59 Folding steps)) into the transport position.
- Check the position of the rear reflector (1) (Fig. 60 Reflector).

**Caution!****Danger to road traffic due to contamination of the roadway!**

Increased risk of skidding for following traffic.

Clean the machine before the journey.

- Make sure that you are not leaking any fluids before the journey.
- Clean the vehicle as thoroughly as possible before leaving the jobsite (e.g. tyre profiles, hopper, lines, exterior walls).

**Warning!****Risk of traffic accident due to outriggers extending on their own while driving!**

Fatal personal injuries are possible as a result of failing to observe the preparatory measures.

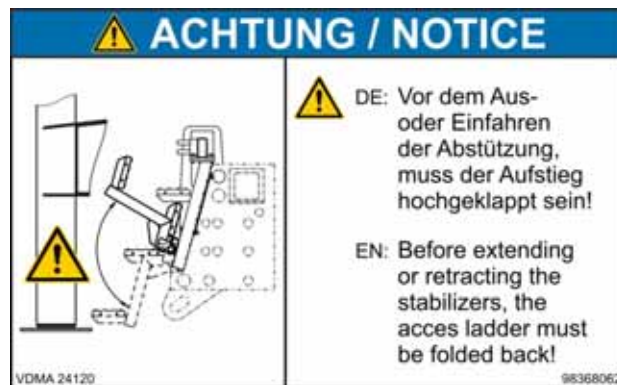
Lock horizontal outrigger with transport safety devices.

**Warning!****Risk of accident due to outriggers not being fully retracted!**

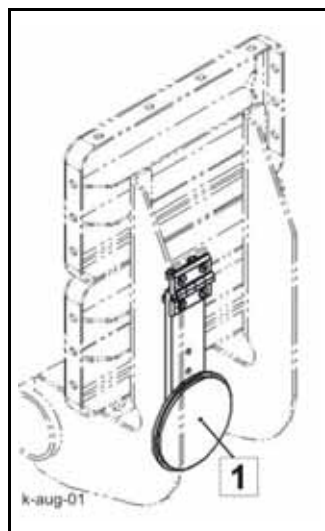
Fatal accidents due to the outriggers coming into contact with the roadway are possible.

Always retract the vertical outriggers up to the limit stop.





**Fig. 59 Folding steps**



**Fig. 60 Reflector**

### 3.2.2 Trailing axle



#### Information

Observe the operating instructions of the vehicle or axle manufacturer.

Depending on the vehicle, the machine can be equipped with trailing axles from various manufacturers.

To guarantee stability during pumping, the bellows of this axle can be vented, see (“**Pneumatic suspension / Levelling**” on page 198).



#### Warning!

##### Risk of accident!

The driving operation is only permitted when bellows are filled properly.

The bellows venting may not be used as traction aid.

As a rule, venting and ventilation are carried out automatically when switching on and off the power take off.

Depending on the axle or vehicle manufacturer, the condition of the bellows can be displayed in the driver's cab.

If the vehicle is parked and the vehicle engine is switched off, the bellows will lose air.

In this case, the axle drops in the rear, thus exceeding the total permissible height in the front.

Thus, make sure that all air systems are filled sufficiently prior to each driving operation.

### 3.2.3 Transporting people and goods

Mobile concrete pumps and placing booms are self-propelled machines.

Self-propelled machines are motor vehicles which, according to their design and the special equipment firmly attached to the vehicle, are intended and suitable for carrying out work, but not for transporting people or goods.



#### **Warning!**

##### **Risk of accidents due to residual concrete!**

Fatal injuries are possible as a result of the machine's centre of gravity changing and residual concrete being ejected.

Before driving, the pumping line, pump and hopper must be emptied.

---

Unfavourable weight distribution worsens vehicle handling and can lead to damage to the chassis frame and structure.

Accessories essential to the work application are excluded from the prohibition. The accessory must be stowed in a roadworthy manner. The permissible total weight and the maximum permissible axle load must not be exceeded.



### 3.3 Installation site of the machine

SCHWING recommends not driving onto the jobsite until you have been briefed by an “instructor” authorised by the site management::

- Before driving onto the jobsite, determine the exact location on the site.
- Together with the instructor, make sure that the allocated location can readily bear the supporting force of your machine.  
(Your machine’s stability must always be guaranteed)
- Refuse to commence operations if the stability cannot be 100% guaranteed by the site management.



- Clear the allocated location of any disturbing unevenness before driving onto the site.
- Pay attention to any disturbing obstacles within the range of the placing boom, especially electrical overhead lines.
- Make sure that the truck mixer can reach the concrete filling hopper without any difficulties.
- Make sure that the placing boom’s range is used optimally.
- Avoid relocating the machine.
- Ensure sufficient ventilation (exhaust fumes, overheating, fire hazards).
- Prevent collisions with other equipment on the jobsite (cranes, diggers, etc.).



#### **Danger!**

#### **Danger to life due to high-voltage lines!**

Death due to electric shock.

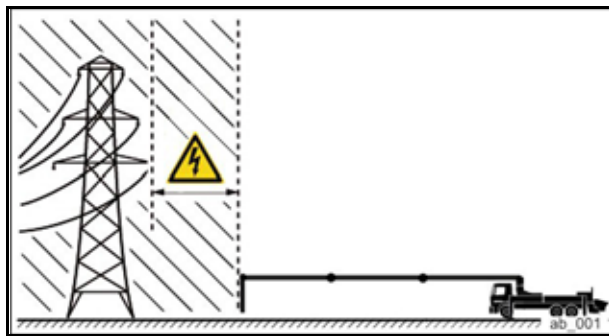
Maintain a sufficient safety distance away from high-voltage lines.

Safety distance: Placing boom length + safety distance.

- Maintain the prescribed safety distance between high-voltage lines and all placing boom positions (Table 2 Safety distances for high-voltage lines), (Fig. 61 Safety distance for high-voltage line).

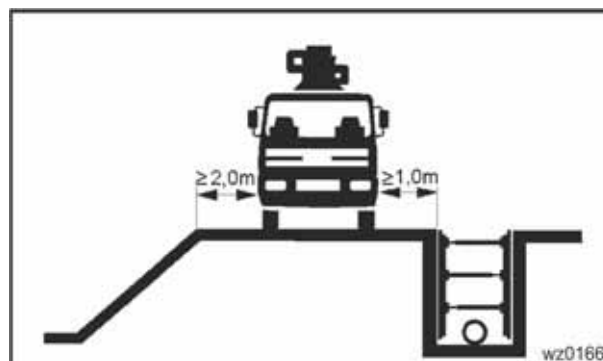
Nominal voltage	Minimum distance
up to 1 kV	1.0 m
1 kV to 110 kV	3.0 m
110 kV to 220 kV	4.0 m
220 kV to 380 kV	5.0 m
Unknown nominal voltage	5.0 m

**Table 2 Safety distances for high-voltage lines**



**Fig. 61 Safety distance for high-voltage line**

- Maintain the prescribed safety distance between the machine and excavation pits (Fig. 62 Distances from excavation pits).



**Fig. 62 Distances from excavation pits**

- Do not impair traffic on the jobsite or on the street.
- Secure the installation site according to regulations if the machine protrudes into traffic.

If stationary concrete pumps (SP) are used with high-rise or downwards pumping, a certain amount of “run-up track” should be provided with horizontally laid tubes.

### 3.3.1 Avoid static charges



#### Danger!

##### **Danger to life due to electric shock!**

Truck-mounted concrete pumps cannot be earthed to protect against high voltage. Operating the machine during storms or near high-voltage lines is prohibited.

---

The equipotential bonding of machines to the ground may only be performed by electricians!

After connecting the earthing cable, measure the resistance.

If necessary, this test can be repeated during prolonged use.

Connecting the machine to the ground does not ensure protection against direct contact with a transmission line or in the event of a lightning strike!

As described in the SAFETY MANUAL, the prescribed safety distance must always be observed when working in proximity to transmission lines, or the line must be disconnected from its power supply.

During bad weather, the placing boom must be folded together into transport position.



#### Information

As of May 2012, SCHWING concrete pumps are equipped with a connection option for an earthing cable.

Before connecting the earthing cable, the supporting surfaces must be bare metal!

The earthing cable and conductive metal rod are not included in the scope of delivery of your SCHWING machine.

---

A stainless steel screw M12 with nut is pre-installed for the earthing connection on one of the two vertical spars (1) (**Fig. 63**) on the rock valve support (screw inside, nut outside).

For thick-walled plates, a stainless-steel M 12 screw is screwed in from the outside at this position.

As the threads are located on both spars (1), the earthing connection can be relocated as needed.

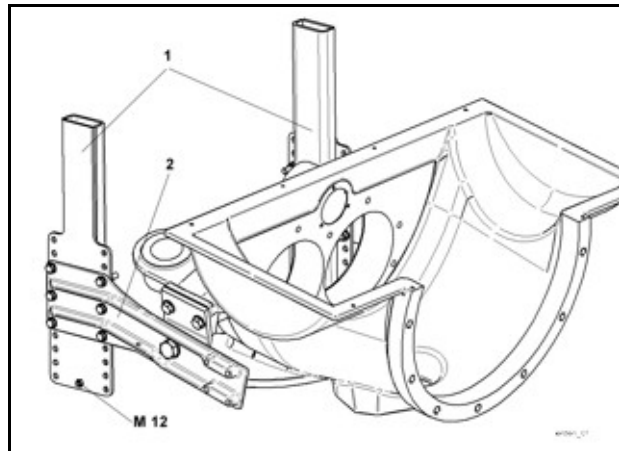


Fig. 63 Rock valve support

### 3.3.2 Preparing the underride protection (special equipment) for concrete pump operation

The underride protection (1) is in the drive position (Fig. 64).

- Release both locks (2) on the underride protection (Fig. 65).
- Lift the spring-activated underride protection until it reaches the limit stop.
- Secure the underride protection using the chain fastener on the left-hand side of the hopper (Fig. 66).

The underride protection is now in the operating position (Fig. 68).



Fig. 64 Underride protection in transport position

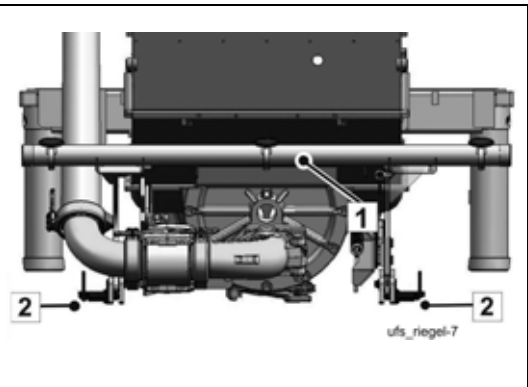
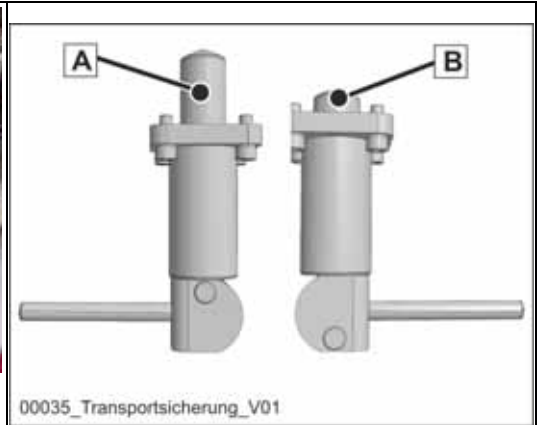


Fig. 65 Lock position (2)

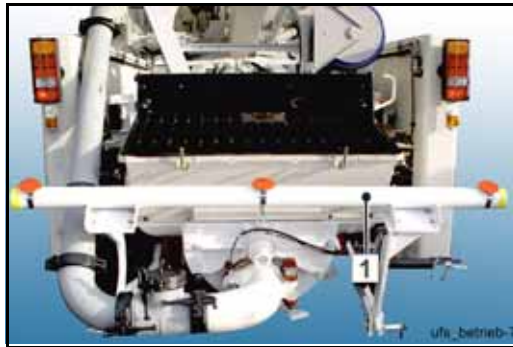




**Fig. 66 Chain fastener**



**Fig. 67 "A" = secured / "B" = released**



**Fig. 68 Underide protection in operating position**

### 3.3 Installation site of the machine

### 3.4 Your machine's EMERGENCY STOP system



#### Danger!

##### **Risk of accident due to inoperative EMERGENCY-STOP button!**

Operating the machine with a defective EMERGENCY STOP system is prohibited and can lead to fatal accidents.

Prior to any working operation, check the function of all EMERGENCY STOP buttons.



#### Information

Inform any relevant persons of the positions of the EMERGENCY STOP buttons on your machine in order to be able to react in emergency situations.

Your machine's EMERGENCY STOP system is intended to allow you to shut off dangerous machine functions as quickly as possible when other protective measures that have already been taken do not suffice.

Thus, you can prevent a dangerous situation from turning into an accident, minimise the severity of an accident or stop a machine malfunction before it causes any damage to the machine.

The EMERGENCY STOP buttons on the machine are always effective when the VECTOR control system is activated.



The machine is equipped with multiple EMERGENCY STOP buttons.

An EMERGENCY STOP button is located on the transmitters for your cable remote control and radio remote units.

This EMERGENCY STOP button is only effective when the remote control unit is active.

The EMERGENCY STOP buttons built into your machine can be seen in (Fig. 69 EMERGENCY STOP buttons; similar to illustration).



**Fig. 69 EMERGENCY STOP buttons; similar to illustration**

### 3.4.1 How to test the EMERGENCY-STOP buttons

- Switch on the VECTOR control system.
- Select the "REMOTE" operating mode.
- Use the radio remote control to diagnose and release the VECTOR control system after interrupting the EMERGENCY STOP.
- Press an EMERGENCY STOP button.

You can read the results of the test on the display of the radio remote control unit.

- Unlock the EMERGENCY STOP button that was tested.
- Release the VECTOR control system again using the remote control.
- Proceed to the next EMERGENCY STOP button and follow the same testing procedure as with the first button.
- Use this procedure to test all of the EMERGENCY STOP buttons on your machine.

Make sure to test the EMERGENCY STOP buttons on the cable and radio remote control units as well.

### 3.4.2 Using the EMERGENCY STOP buttons during operations

Only press the EMERGENCY STOP buttons in the event of an emergency or malfunction.

Actuating an EMERGENCY STOP button immediately stops all dangerous machine functions.



#### **Warning!**

#### **Risk of accident due to uncontrollable machine movements.**

If your machine starts to carry out unwanted movements, first let go of all control levers.

If this does not cause the movements to cease or if the machine does not react or reacts incorrectly to the control commands, you must actuate the nearest EMERGENCY STOP button.

---

### 3.4.3 Restarting the machine after an EMERGENCY STOP

- Remedy the fault.
- Set all engaged selector switches for the active control unit to the "0 or centre position" and unlock all EMERGENCY STOP buttons. Otherwise, it will not be possible to start up the machine!
- Restart the previously active control unit (remote or local).

The restart protection is a function in the VECTOR control system that prevents the machine functions from being restarted immediately after unlocking the EMERGENCY STOP buttons.

The VECTOR control monitors the positions of the EMERGENCY STOP buttons and the selector switch for the selected operating mode.

You can see the status of the "Restart protection" on the display of the VECTOR control system. The "No zero position for operating switch" symbol is displayed when the restart protection is active.



#### Information

Option: "Shut down the drive motor"

Optionally, the drive motor (vehicle engine) can also be switched off when an EMERGENCY STOP button is actuated.

Whether or not this function is available for your machine depends on the respective vehicle manufacturer.

---

Always switch off machine functions and motor by means of the appropriate control devices under normal operating conditions.

### 3.4 Your machine's EMERGENCY STOP system

## 3.5 VECTOR control system

### 3.5.1 Introduction / Overview

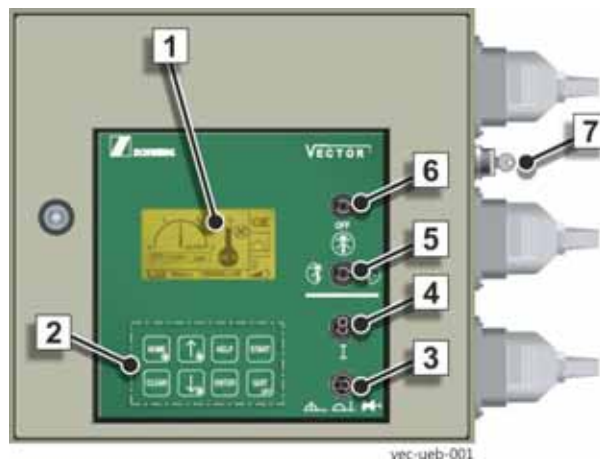
The VECTOR control unit includes a remote control system (**chap. 5**) and an integrated diagnostic system.

The diagnosis system monitors the machine and controls for faults and improper operating states.

Errors are reported acoustically and indicated on the display (1) (**Fig. 70**).

In addition to the monitoring function, the diagnostic system can display data important to operation.

The following operating instructions are to help you obtain a quick overview of the control system.



**Fig. 70** Switch cabinet for VECTOR control

Caption (Fig. 70)		
Pos.	Description	Function of
1	Display	
2	Control panel	Menu system
3	Switch for the operating modes:	Local / Remote / Pumping piston change
4	Control release	confirm with [START]
5	EASy working range	Select work area
6	EASy <sup>1</sup>	OFF
7	EMERGENCY STOP bypass	active / inactive

1. optional

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### 3.5.3 Start screen

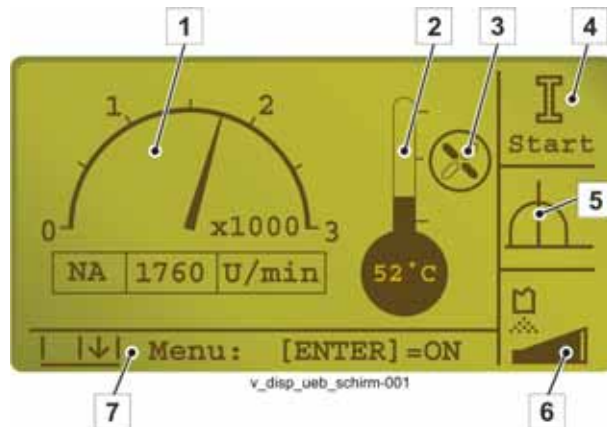











Fig. 71 Display overview

Caption (Fig. 71)			
Position	Start screen	Function of	
1	Power take off rotational speed		
2	Hydraulic oil temperature		
3	Oil cooler active		
4	Control status		Please start control
			Control ready for operation
			No zero position for operating switch
			EMERGENCY STOP active
		?	Awaiting input
5	Operating modes		Remote active
			Local active
			Pumping piston change active
			Maintenance mode active
			Teach mode active (for setting the boom functions)
6	Concrete pump delivery rate indication		
7	Menu bar for menu system status		

### 3.5.4 Commissioning

The electrical VECTOR control can only be switched on after proper activation of the drive circuit:




- Switch on vehicle ignition
- Disengage the vehicle's drive gear (neutral position)<sup>1</sup>
- Engage parking brake
- Switching on the power take-off<sup>1</sup>
- Switch on VECTOR control in the driver's cab

The electrical VECTOR control system starts up, which is indicated by a bar chart on the display.

After that, the start screen appears (**Fig. 72**).

- Select desired operating mode with switch (3) (**3.5.5**)

The selected operating mode is displayed in field (5) on the display (**Fig. 72**).

	Local
	Remote
	Pumping piston change

The following functions are ready for operation without releasing an operating mode:

- Signal horn on
- Motor off
- Reduce rotational speed
- Lighting

---

1. Distribution manual transmission gears (VSG) are operated differently! Please see the relevant chapters for more information!

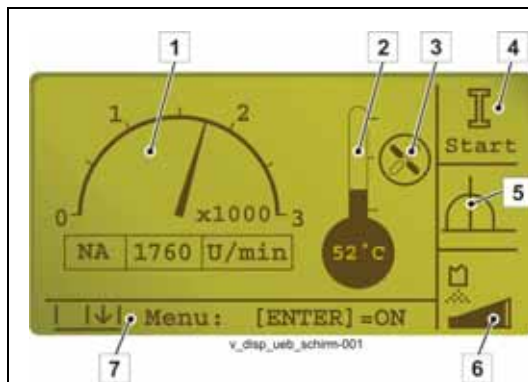


Fig. 72 VECTOR start screen

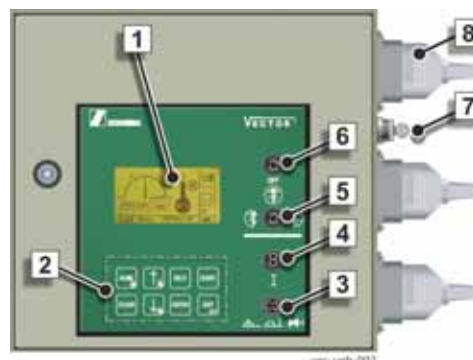









Fig. 73 Switch cabinet for VECTOR control

### 3.5.5 Operating mode: Local

	Symbol flashing: Operating mode ready for release!
	Activate the "LOCAL" operating mode using switch (3) on the switch cabinet of the VECTOR control system (Fig. 74).
	Release the "LOCAL" operating mode with button (4) (Fig. 74).
	A short acoustic signal confirms the release and field (4) (Fig. 74) shows this symbol.
	"LOCAL" operating mode active! Field (5) (Fig. 75) on the display shows this symbol.

While the "Local" operating mode is active, the following symbols may be displayed in field (4) on the start screen (Fig. 75).

	Symbol flashing: EMERGENCY STOP button at the machine is actuated! Unlock all EMERGENCY STOP buttons!
	Symbol flashing: Switch for local control (3) (Fig. 74) is enabled! Set all switches for the local control unit (Fig. 76) / (Fig. 77) to position 0!

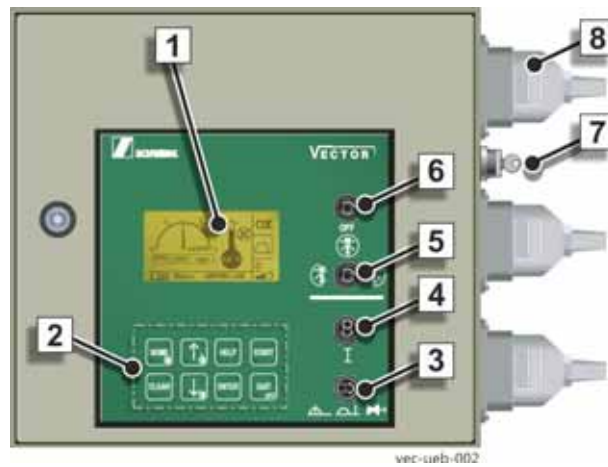


Fig. 74

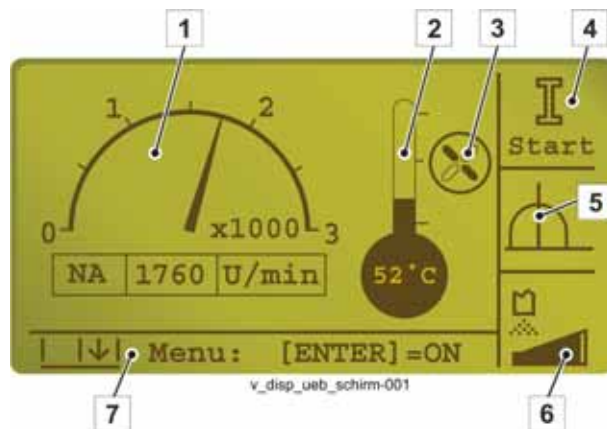


Fig. 75 Start screen

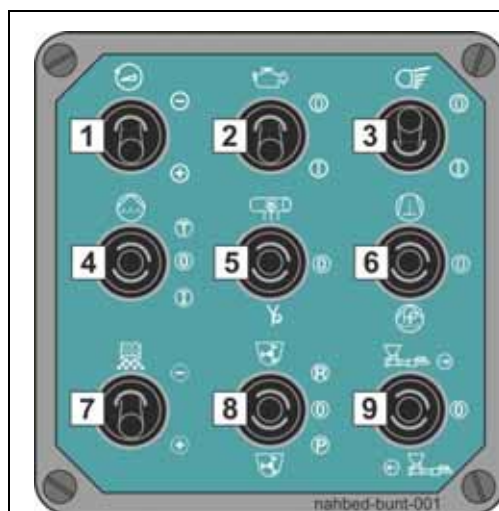


Fig. 76 Local control

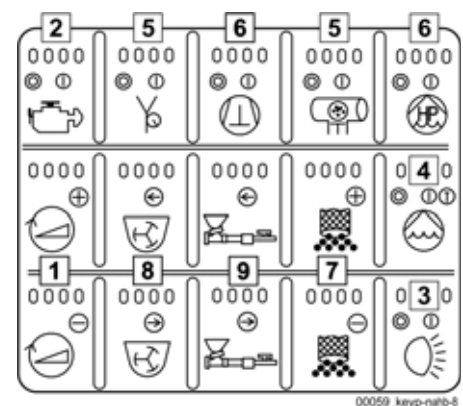









Fig. 77 Local control keypad

### 3.5.6 Operating mode: Remote

	Symbol flashing: Operating mode ready for release!
	Activate the "REMOTE" operating mode using switch 3 on the switch cabinet of the VECTOR control system ( <b>Fig. 78</b> ).
	Release the "REMOTE" operating mode with button S3 (control release or diagnostic horn) on the remote control.
	A short acoustic signal confirms the release and field (4) ( <b>Fig. 79</b> ) shows this symbol.
	Field (5) on the display ( <b>Fig. 79</b> ) shows this symbol.

While the "REMOTE" operating mode is active, the following symbols can be displayed in field (4) on the start screen (**Fig. 79**).

	Symbol flashing: EMERGENCY STOP button is actuated. This symbol also flashes when the remote control unit is switched off. Unlock all EMERGENCY STOP buttons or switch on remote control!
	Symbol flashing: A switch on the remote control unit is active. Set all switches to position 0!

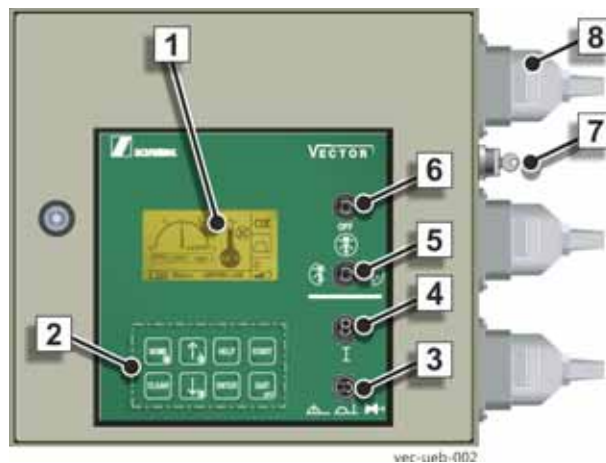


Fig. 78

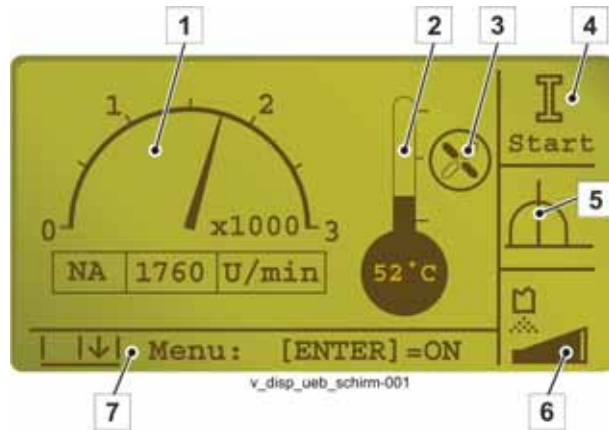
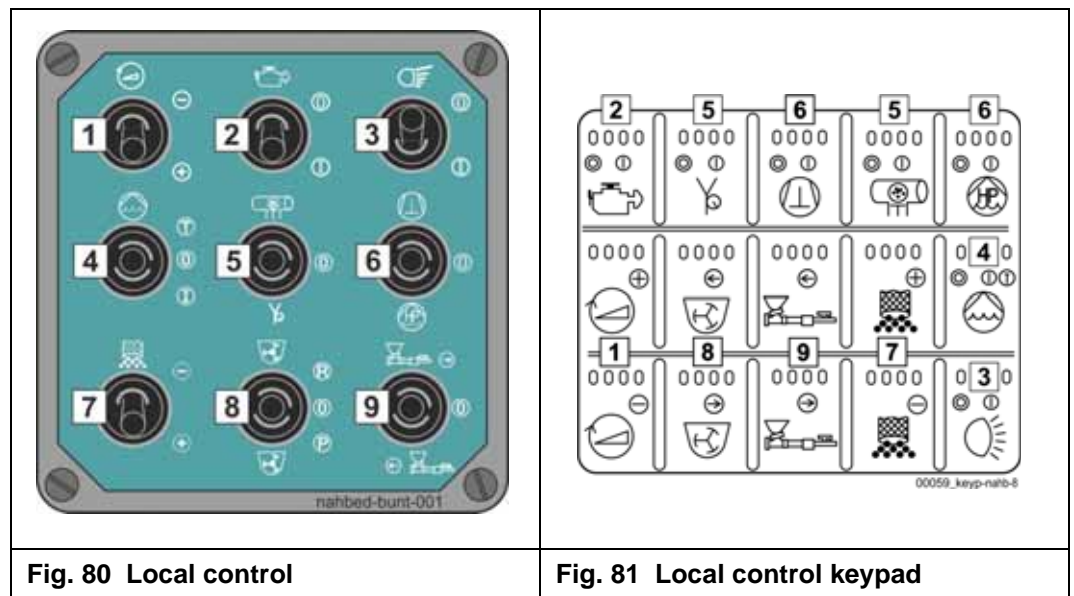








Fig. 79



### 3.5.7 Operating mode: Pumping piston change

	Symbol flashing: Operating mode ready for release!
	Activate the "Pumping piston change" operating mode using switch 3 on the switch cabinet of the VECTOR control system ( <b>Fig. 82</b> ).
	Release the "Pumping piston change" operating mode with button (4).
	A short acoustic signal confirms the release and field (4) ( <b>Fig. 83</b> ) shows this symbol.
	Field (5) on the display ( <b>Fig. 83</b> ) shows this symbol.

While the "Pumping piston change" operating mode is active, the following symbols can be displayed in field (4) on the start screen (**Fig. 83**).

	When an EMERGENCY STOP button is actuated on the machine, this symbol flashes in field (4): Unlock all EMERGENCY STOP buttons!
--	---

Activating the "Pumping piston change" operating mode automatically reduces the rotational speed of the drive motor to the minimum working speed while activating the minimum movement speed of the pumping pistons.

Control of the concrete pump and the drive motor is transferred to the terminal box for the "Pumping piston change" operating mode (1) (**Fig. 84**), see ("**Pumping and differential cylinders, pumping piston change**" on page 481).

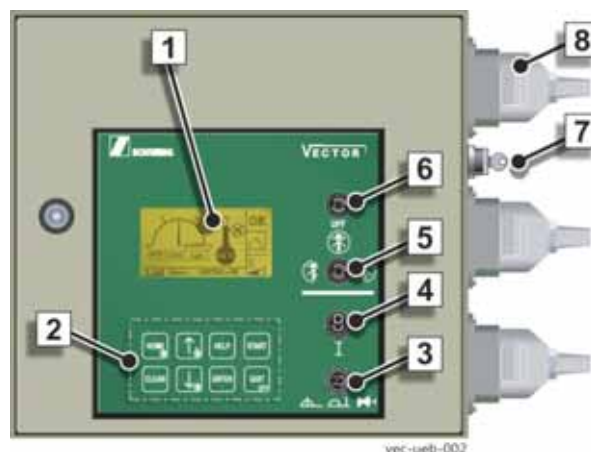


Fig. 82



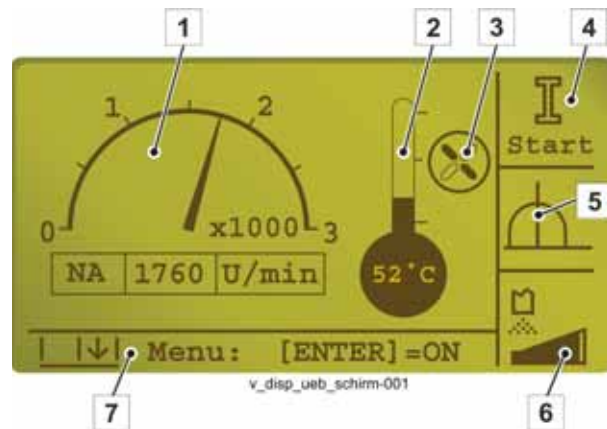


Fig. 83

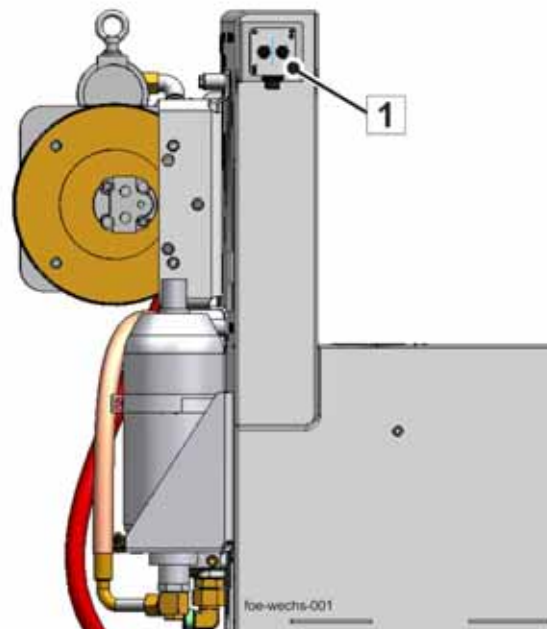


Fig. 84





### 3.5.8 Operating mode: Maintenance operation

For machines supplied within the European Economic Area, the VECTOR control system features the operating mode "Maintenance operation" as of software version V 1.40.

In maintenance operation, the placing boom can slightly be lifted out of the transport position and lowered again without having to support the machine horizontally as required for working operation. Vertically, the machine must be supported as described in (**chap. 3.9**).

The extent to which this additional operating mode can be used depends on the individual features of each machine.

In order to lift the placing boom out of transport position, proceed as follows:

	<ul style="list-style-type: none"> <li>▶ Using the operating mode switch (3) (<b>Fig. 82</b>), select the "Local" operating mode</li> <li>▶ Lower all vertical outriggers until all of the vehicle's wheels are no longer in contact with the ground</li> </ul> <p>A horizontal extension of the outriggers is not required.</p>
	<ul style="list-style-type: none"> <li>▶ Switch the operating mode switch to the "Remote" operating mode</li> </ul>
	<p>The display automatically changes to operating mode "Maintenance operation".</p> <p>This is indicated by a short animation.</p>
	<ul style="list-style-type: none"> <li>▶ Release the boom control using button S3 (control release or diagnostic horn) on the remote control unit.</li> </ul>

The placing boom can then be moved to a limited extent using the remote control.

## 3.5.9 Safety

### 3.5.9.1 Vehicle engine: Start / Stop

In order to prevent any functions from being triggered inadvertently, the vehicle motor can only be started when all switches (except lighting) on the local and remote control units are in the neutral (0) position.

It is possible to switch off the vehicle motor while a function is active, however, this should be avoided in order to prevent potential material damage.

Carry out the following regular procedure to switch the vehicle motor off:

1. Switch off all machine function(s)
2. Reduce the rotational speed to the minimum working speed
3. Switch the vehicle motor off.

### 3.5.9.2 EMERGENCY STOP

In case of a fault or an emergency, the most important machine functions are immediately interrupted by pressing one of the EMERGENCY STOP buttons. The vehicle motor continues running.

While the EMERGENCY STOP function is active, the vehicle motor cannot be switched off with the operating controls at the local or remote control.



#### Information

Optionally, when an EMERGENCY STOP button is pressed, the "VECTOR control" can switch off the drive motor in addition to the hydraulic functions.

Whether or not this option can be selected depends on the vehicle electronics and the approval of the motor manufacturer.

---

Under normal operating conditions, always switch off machine functions and vehicle motor by using the control devices intended for the purpose.

### 3.5.10 EMERGENCY STOP bypass

#### When is an EMERGENCY-STOP bypass necessary?

Bypassing the EMERGENCY STOP system is necessary if the electrical control system fails in order to move the machine into the transport position.

#### 3.5.10.1 Special precautions for the machine operator

The EMERGENCY STOP valves must be bypassed only in an extreme emergency!

Working operation must be stopped immediately!

This "emergency operation" is permitted only to fold the placing boom and establish safe driving operation.

Clean the machine prior to transport if this is required for safety reasons.

The machine operator must inform maintenance staff of his intervention and initiate appropriate repair work!



#### Warning!

##### Loss of machine stability!

Severe crushing of body parts and death.

EMERGENCY STOP devices and any existing safety end limit switches will not function.

Incorrect behaviour of the machine operator without active safety end limit switches (e.g. in EASy mode) may cause the machine to fall over.

Order a second person to safeguard the working area.

Carry out all movements at the lowest speed, with the utmost caution and under constant supervision!

---

In this situation, the machine can be operated only from the emergency operation control platform.

For machines with "Diractive", additionally with the "cable remote control for Diractive emergency operation".

Due to the location of the emergency operation control platform, the view of the working area is severely restricted. As in addition the safety functions are inactive, the slightest inattention may cause severe injury and damage to property when the placing boom is moved.



### Information

Excursus:

The EMERGENCY STOP valves of the machine are open if not energised, meaning that:

These valves will open in case of a defect in the EMERGENCY STOP system. The hydraulic fluid reaches the hydraulic tank without pressure. Initiated working movements are not carried out.

### 3.5.10.2 Carrying out an EMERGENCY-STOP bypass



### Warning!

**This could cause serious accidents!**

The machine may only be operated with a properly functioning EMERGENCY-STOP system.

- To do this, insert the key into the key-operated switch (7) (**Fig. 85**) and switch on the EMERGENCY STOP bypass function. The key cannot be removed in this position.
- Carry out the machine movements using the operating controls at the emergency operation control platform (for Diractive additionally using the “cable remote control - Diractive emergency operation”).
- Return the key-operated switch (7) (**Fig. 85**) to the neutral position and remove the key before leaving the jobsite.
- Have the machine repaired immediately.

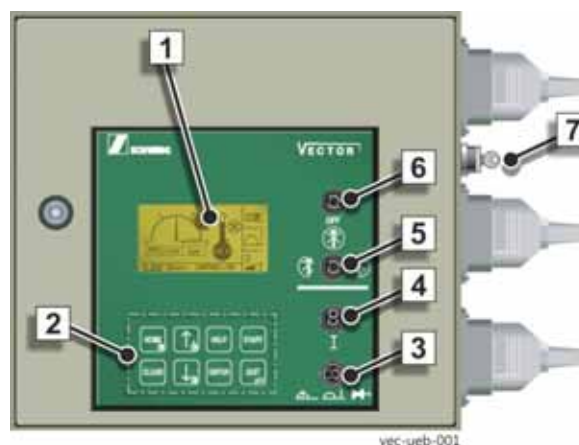


Fig. 85

### 3.5.11 Control and check devices

#### 3.5.11.1 Switch cabinet for VECTOR control

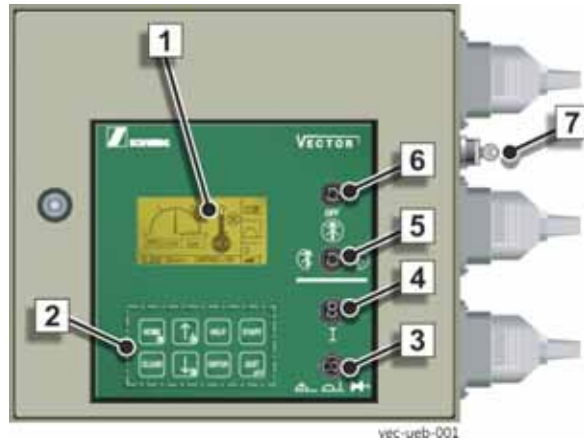


Fig. 86 Switch cabinet for VECTOR control


Caption (Fig. 86)		
Pos.	Description	Function of
1	Display	
2	Control panel:	Menu system
3	Operating mode switch:	Local Remote Pumping piston change
4	Button:	Control release
5	Switch:	Select EASy working range
6	Button:	EASy off
7	Key-operated switch:	EMERGENCY STOP bypass

### 3.5.11.2 Displays

The following information is displayed in the menu system:

(see “**Start screen**” on page 128 for the start screen)



Pressing the  button on the control panel displays additional menus with additional operating data.

### 3.5.11.3 Display screen: Concrete pump

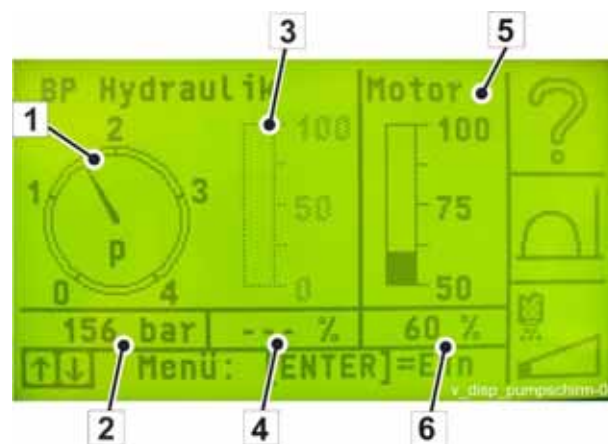


Fig. 87 “Concrete pump” screen

Caption (Fig. 87)		
Pos.	Description	Function/Value
1	Graphic display:	Hydraulic oil pressure concrete pump
2	Hydraulic oil pressure	CP (bar)
3	Graphic display:	Hydraulic oil tank filling level <sup>1</sup>
4	Filling level for hydraulic oil tank:	(%) <sup>1</sup>
5	Graphic display:	Drive motor load <sup>1</sup>
6	Drive motor load:	(%) <sup>1</sup>

1. Special equipment

### 3.5.11.4 Display screen: for slewing gear

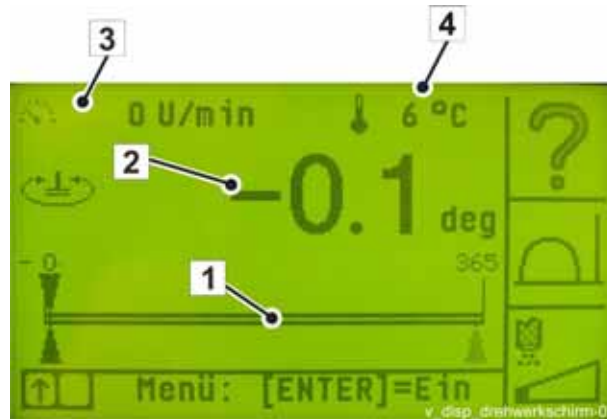







Fig. 88 "Slewing gear" screen

Caption (Fig. 88)		
Pos.	Description	Function of
1	Graphic display: Slewing gear range	
2	Slewing gear range (degrees)	
3	Rotational speed of power take-off (rpm)	
4	Hydraulic oil temperature (°C)	

### 3.5.11.5 Status indicators in VECTOR control system






The following conditions can be displayed in field (4) (**Fig. 89**) of the display:

	Control ready, please release.
	Control released and active.
	Start not possible: Switches not in "0" position?
	Start not possible: EMERGENCY STOP active!
	System not ready! Waiting for input!



### 3.5.11.6 Operating mode screen

The following operating modes can be displayed in field 5 (**Fig. 89**) of the display:

	Remote (radio or cable)
	Local
	Pumping piston change
	Teach mode
	Upon introduction of software version V1.40 and in case of CE equipment, the "Maintenance operation" operating mode can also be displayed here.

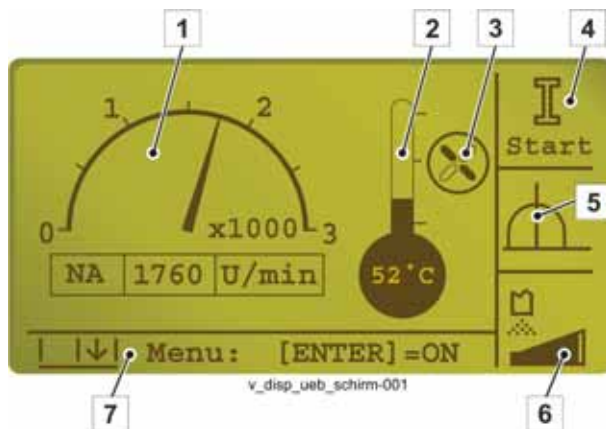
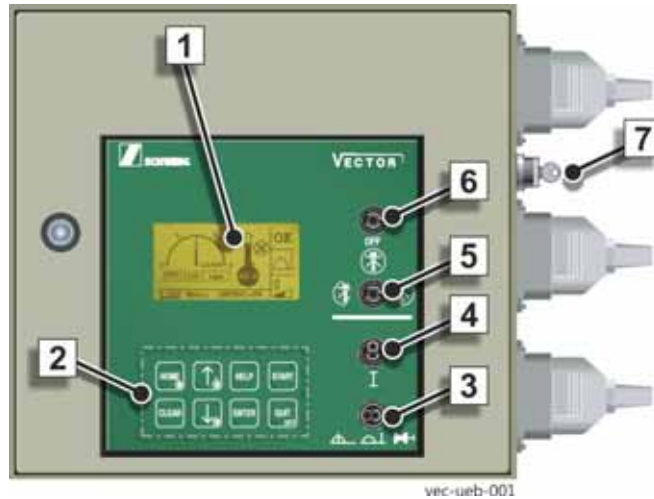


Fig. 89









### 3.5.12 Menu operation

Basic functions of control panel (2) (**Fig. 90**):



**Fig. 90**

When actuated, the function of the button is displayed by a symbol in the upper left corner of the display.

	Complete return to the start screen (initial screen).
	Scroll up one item in the menu selection.
	Scroll down one item in the menu selection.
	Additional information on specific screens of the diagnostic system. Currently without function!
	Performing certain processes, e.g. resetting the output meter of the concrete pump.
	Go back one menu level.
	Select displayed menu item or activate change mode.
	Confirm and acknowledge diagnostic messages.

### 3.5.13 Shortcuts

#### 3.5.13.1 Manual contrast adjustment for the LC display

During adjustment, the contrast value, ranging from 0% to 99%, is shown on the display:

Press buttons simultaneously:



#### 3.5.13.2 Manual language selection for all displays (MMI language)

Press buttons simultaneously:



#### 3.5.13.3 Explanation of abbreviations

E =	ENTER
C =	CLEAR
S =	START
I / O =	INPUT / OUTPUT

### 3.5.14 Menu overview - main menu

Figures are in English.

Start screen



v\_disp\_menu\_01



Concrete pump



v\_disp\_menu\_02



for slewing gear



v\_disp\_menu\_03

Functions?



v\_disp\_menu\_04

ENTER

see ("Sub-menus" on page 147).  
Functions?

Pumping rate?



v\_disp\_menu\_05

ENTER

see ("Sub-menus" on page 147).  
Pumping rate?

Fault list?



v\_disp\_menu\_06

ENTER

see ("Sub-menus" on page 147).  
Fault list?

Operating data?

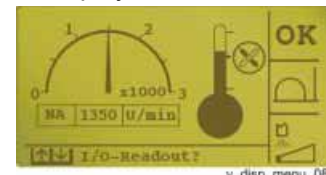


v\_disp\_menu\_07

ENTER

see ("Sub-menus" on page 147).  
Operating data?

I/O display?



v\_disp\_menu\_08

ENTER

see ("Sub-menus" on page 147).  
I/O display?

Parameters:


































v\_disp\_menu\_09

ENTER

see ("Sub-menus" on page 147).  
Parameter?







### 3.5.15 Sub-menus

Functions 	Pumping rate 	Fault list 	Operating data 	I/O display 	Parameters 
EMERGENCY OFF 	Pumping rate	(if there are no faults) “!!!No entries!!!”  Otherwise, see (3.5.26 Message list)	Oil pressure concrete pump (bar)	Digital input?	Silent diagnosis
			Oil temperature (°C) 		
Remote control 			Oil level tank (%)	Digital output?	MMI language?
			Power take off (h) 		
Placing boom 			Concrete pump (h)	Analogue input?	Display cbm/cby
			Boom (h) 		VarioPressure
for slewing gear 				Proportional output? 	
			Water pump (h) 		Password?
Concrete pump 			HP water pump (h)	MMI input?	
			Compressor (h) 		
Water pump 			Agitator (h)	Remote control?	
			Oil cooler (h) 		
High-pressure water pump 			Vibrator (h)	Module I/O?	
Compressor 			Daily amount CP <sup>1</sup>		
			Pumping rate CP <sup>1</sup>		
Diesel engine 			Strokes CP <sup>1</sup>		
			Stroke rate (h/min)		
Oil cooler 			Retract pressure boom A <sup>1</sup>		
			Central greasing (h) 		
Outriggers 			Hours of movement		
			Boom (h)		
Agitator 			Slewing gear (h)		
			Outriggers (h)		
Concrete vibrator 					
Machine data 					
Vehicle data 					
System data 					
System clock 					

1. See VECTOR control display

### 3.5.16 Example of a menu operation

#### Resetting the daily delivery rate of the concrete pump

BUTTON:	DISPLAY:
	Menu bar in start screen: Menu: [ENTER = On]
	Next menu bar: Functions? EC
	Next menu bar: Pumping rate? EC
	Display of the daily delivery rate, e.g.: 18.0 m <sup>3</sup>
	Daily delivery rate will be set back to 0,0 m <sup>3</sup>
	Return to start screen

### 3.5.17 Language selection

Text messages are displayed in three selectable languages. Selectable languages always include German, English and the language of the country.

The language for the text output can be selected in the "Parameter?" menu under "MMI Language?".

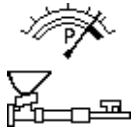
If "International" is selected, the display will show symbols without text whenever possible. If this is not possible, display will be in English.

Chapter (3.5.26 Message list) provides a complete list of text messages and the corresponding international symbols.

The messages are sorted alphabetically by code.

Message:	Pressure relief for the concrete pump is active!
Code:	P01M

**Table 3 Example: Text output**

Message:	
Code:	P01M

**Table 4 Example: International output**


### Information

In the international output, symbols are used more than once.

Chapter **(3.5.26)** is essential for identifying the messages clearly!


Text output and international output may contain additional information for service personnel.

PO41 means for example:

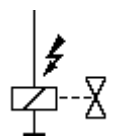

- Proportional output 41

The following additional information is possible:

- PO= Proportional output
- DO= Digital output
- K= Relay
- F= Fuse

Cable break/Overcurrent Proportional valve Turn right - PO41!	
---	--

**Table 5 Example: Text output**

	PO41	
---	------	--

**Table 6 Example: International output**

### 3.5.18 Diagnostic system

The integrated diagnosis system informs the machine operator of certain operating statuses, indicates faults and provides specific information on possible causes.

The messages are shown on the display of the VECTOR control system (1) (**Fig. 91**) and, in abbreviated form, on the display of the remote control unit, see (“**Remote control**” on page 537).

The display of the VECTOR control always consists of a code and the corresponding message.

MESSAGE
CODE

#### 3.5.18.1 Code

The four-column code is set up as follows:

<b>X xx X</b>			
X			Signalling area
	xx		Number of message
		X	Type of message

**Example:**

<b>P01M</b>			
P			Pump (concrete pump)
	01		Number of message
		M	Message (notification)

#### 3.5.18.2 Possible message areas

B = boom	Placing boom control
D = diesel engine	Vehicle diesel engine
M = machine	General machine control
O = optional	Optional control functions
P = pump	Concrete pump
R = remote	Remote control system
S = system	System
E = expansion	Expansions



### 3.5.18.3 Possible types of messages

M = message	Message
L = low level fault	Minor fault
H = high level fault	Serious fault

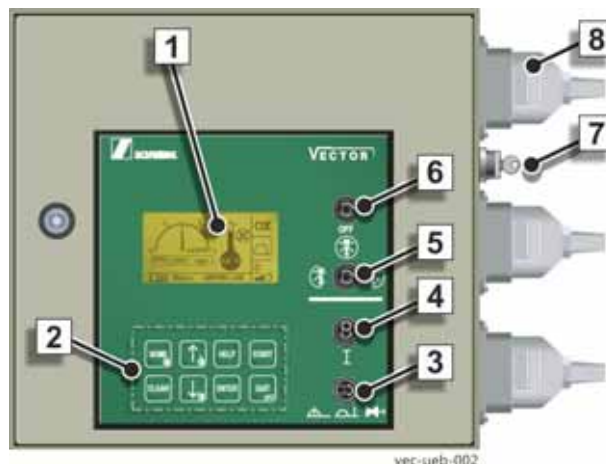


Fig. 91

### 3.5.19 Silent diagnosis

Under "Silent diagn?" in the "Parameter?" menu, you can choose to have errors reported by means of a recurring horn signal or a buzzer (VECTOR control or remote control).

The following configurations are possible for the "REMOTE" operating mode:

#### Silent diagnosis: Yes

- Error message is shown on the display of the VECTOR control system and the remote control unit
- Acoustic signal by means of buzzer on the remote control unit

#### Silent diagnosis: No

- Error message is shown on the display of the VECTOR control system and the remote control unit
- Recurring horn signal

The following configurations are possible for the "LOCAL" operating mode:

#### Silent diagnosis: Yes

- Error message is shown on the display of the VECTOR control system and the remote control unit
- Acoustic signalling by means of buzzer from the VECTOR control system

**Silent diagnosis: No**

- Error message is shown on the display of the VECTOR control system and the remote control unit
- Acoustic signalling by means of buzzer from the VECTOR control system



**Information**

While in the "LOCAL" operating mode, the acoustic alert is always sent by the buzzer from the VECTOR control system.

### 3.5.20 Configure values for VarioPressure

#### 3.5.20.1 Configure maximum values for VarioPressure

After the vector control has been started in the usual way, go to the VarioPressure menu (**Fig. 96**) and set the desired maximum value for the delivery pressure.

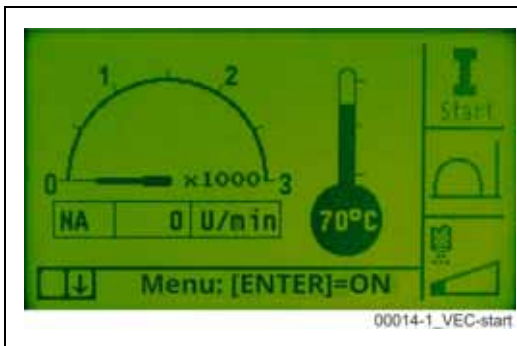


Fig. 92 Start screen

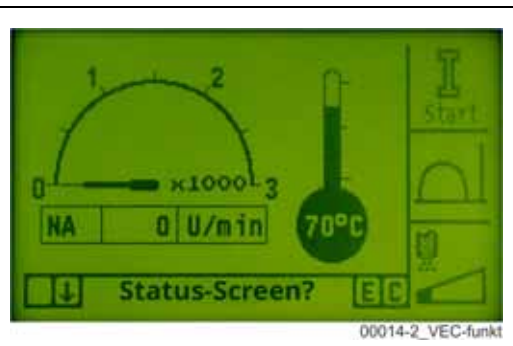


Fig. 93 The first submenu "Function" can be reached with ENTER

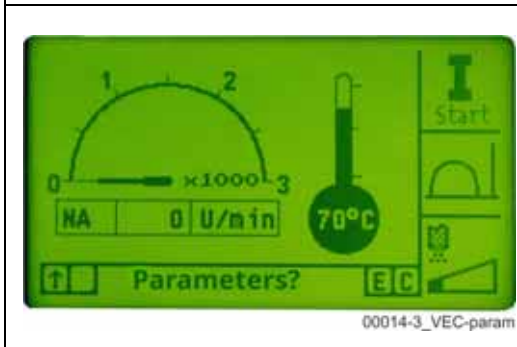
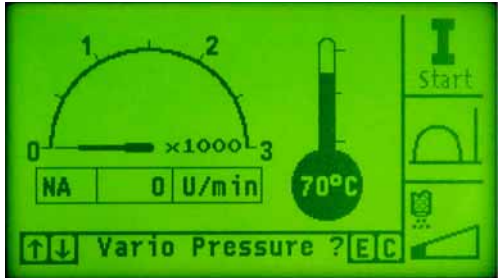

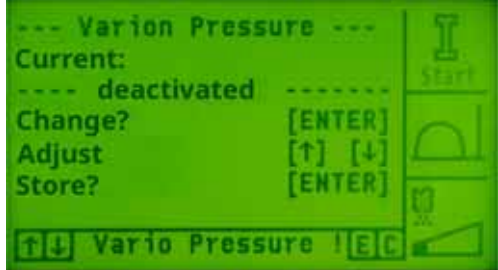


Fig. 94 Use the down arrow key to access the "Parameters" menu



Fig. 95 Press ENTER to access the "Silent Diagnosis" menu

 <p>00014-5_VEC-vario-titel</p>	 <p>00014-6_VEC-vario-menu-01</p>
<p><b>Fig. 96</b> Use the down arrow key to navigate to the VarioPressure menu</p>	<p><b>Fig. 97</b> Press ENTER to access the setting mask</p>
 <p>00014-7_VEC-vario-menu-02</p>	
<p><b>Fig. 98</b> Press ENTER again to set the value for the VarioPressure.</p>	<p>Save the set value by pressing the ENTER button.</p>

Ensure that the last set value is saved by the vector control.

- Now switch to the remote control and
- start the pump

### 3.5.21 Error definition

Error messages are primarily related to the operational safety of the machine.

When reading the error text, the machine operator must decide the extent to which the error indicated influences the operating safety.

In case of a "minor fault", the working operation may be completed, possibly with restrictions.

"Serious errors" may result in imminent damage or dangerous impairment of the machine's operating safety.



### Danger!

#### **Failure to observe fault messages could lead to accidents!**

The company SCHWING is not liable for damage caused by unresolved faults!

Indication of a "minor fault" does not mean that the fault can be completely ignored but only that the working operation may be completed, possibly with restrictions!

The machine operator is responsible for ensuring that any fault displayed will immediately be remedied, so as to prevent the possibility of most serious damage to property and injury to persons.

If an error message is deleted but the fault is not remedied, the error message will not be shown again during operation!

### 3.5.22 Acknowledging messages

Messages (M = message) are not faults!

They are only shown visually on the display and can be deleted from there using the "CLEAR" button.



### 3.5.23 Acknowledging errors

Errors are acknowledged depending on the operating mode selected (LOCAL or REMOTE) and the severity of the fault.

The acoustic signal can be disabled via the remote control.

The following pages provide examples of error acknowledgement.

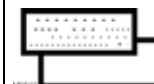
### 3.5.24 Acknowledging multiple errors

If several messages exist, a symbol appears at the bottom right of the VECTOR display:

- Acknowledge the first message as per usual

The next message appears and the buzzer sounds.

- Acknowledge that message and any other messages until no further messages are displayed



### 3.5.25 Switching off the control system

All error messages will finally be acknowledged if the VECTOR control is switched off!

**Information**

A permanently pending error is detected anew and reported by the diagnostic system!

---

Any fault detected and reported (whether minor or serious) will only be detected again after the VECTOR control has been switched off.

This is regardless of whether the fault has been acknowledged or not.

**Danger!****Risk of accidents and machine damage!!**

After a shutdown caused by a serious fault, the control and if applicable, the drive motor must be restarted.

- Be sure to resolve any serious errors before restarting as otherwise this can result in severe damage!
- 

**Information**

Major errors can only be acknowledged using the “QUIT” button on the VECTOR switch cabinet.

Regardless of the operating mode selected, i.e. LOCAL or REMOTE.

---

**Example 1:**

Operating mode:	LOCAL
Silent diagnosis:	YES / NO
<b>Minor fault</b>	

**Table 7**

to Table 7	VECTOR	SC 30
Optical indication	X	
Buzzer	X	
Horn signal		

**Table 8**

- Pressing the "QUIT" button once on the VECTOR switch cabinet turns off the buzzer.



The message remains on the VECTOR display and can be read at your convenience (**Table 9**).

After the acknowledgement:

to Table 8	VECTOR	SC 30
Optical indication	X	
Buzzer		
Horn signal		

**Table 9**

Indication of a "minor fault" does not mean that the fault can be completely ignored but only that the working operation may be completed, possibly with restrictions!

- Press the "QUIT" button again on the VECTOR switch cabinet.



The fault is finally acknowledged.

The message disappears from the VECTOR display and is entered into the malfunction list.

**Example 2:**

Operating mode:	LOCAL
Silent diagnosis:	YES / NO
<b>Serious fault</b>	

**Table 10**

to Table 10	VECTOR	SC 30
Optical indication	X	
Buzzer	X	
Horn signal		
EMERGENCY OFF		X

**Table 11**

In addition, the control system is set to the "EMERGENCY STOP" operational status. Optional shutdown of the drive motor is also possible.

- Pressing the "QUIT" button once on the VECTOR switch cabinet turns off the buzzer.

The message is still visible on the VECTOR display and can be read calmly



After the acknowledgement:

to Table 11	VECTOR	SC 30
Optical indication	X	
Buzzer		
Horn signal		
EMERGENCY OFF		X

- Press the "QUIT" button again on the VECTOR switch cabinet. The fault is finally acknowledged.

The message disappears from the VECTOR display and is entered into the malfunction list.


**Danger!**
**Risk of accidents and machine damage!!**

After a shutdown caused by a serious error, the control system and, if applicable, the drive motor must be restarted.

- Be sure to resolve any serious errors before restarting as otherwise this can result in severe damage!

**Example 3:**

Operating mode:	REMOTE
Silent diagnosis:	NO
<b>Minor fault</b>	

**Table 12**


to Table 12	VECTOR	SC 30
Optical indication	X	X
Buzzer		
Horn signal	X	

**Table 13**

► Press button S3 "Control release or diagnostic horn" on the remote control unit.

The recurring horn signal becomes silent.

The message on the display of the remote control unit is deleted (Table 14 ).



After the acknowledgement:

to Table 13	VECTOR	SC 30
Optical indication		
Buzzer		
Horn signal		

**Table 14**

Indication of a "minor fault" does not mean that the fault can be completely ignored but only that the working operation may be completed, possibly with restrictions!

Upon changing the operating mode from **REMOTE** to **LOCAL**, the error is indicated on the VECTOR display and signalled by the buzzer in the VECTOR switch cabinet.

to Table 12	VECTOR	SC 30
Optical indication	X	
Buzzer	X	
Horn signal		



- Pressing the “QUIT” button once on the VECTOR switch cabinet turns off the buzzer.

The message is still visible on the VECTOR display and can be read at your convenience (Table 15 ).



to Table 12	VECTOR	SC 30
Optical indication	X	
Buzzer		
Horn signal		

**Table 15**

- Press the "QUIT" button again on the VECTOR switch cabinet.

The fault is finally acknowledged.

The message disappears from the VECTOR display and is entered into the malfunction list.



### Information

Minor faults that have been immediately acknowledged in REMOTE operating mode using the "QUIT" button at the VECTOR switch cabinet will not be reported again when changing from LOCAL to REMOTE.

**Example 4:**

Operating mode:	RE- MOTE
Silent diagnosis:	YES
<b>Minor fault</b>	

**Table 16**


to Table 16	VECTOR	SC 30
Optical indication	X	X
Buzzer		X
Horn signal		

**Table 17**

➤ Press button S3 "Control release or diagnostic horn" on the remote control unit.

The buzzer on the remote control unit becomes silent (if not disabled manually, the buzzer will be switched off automatically after 60 seconds).

The message on the remote control display is deleted (**Table 18**).



After the acknowledgement:

to Table 17	VECTOR	SC 30
Optical indication		
Buzzer		
Horn signal		

**Table 18**


Indication of a "minor fault" does not mean that the fault can be completely ignored but only that the working operation may be completed, possibly with restrictions!

Upon changing the operating mode from **REMOTE** to **LOCAL**, the error is indicated on the VECTOR display and signalled by the buzzer in the VECTOR switch cabinet.

to Table 16	VECTOR	SC 30
Optical indication	X	
Buzzer	X	
Horn signal		

➤ Pressing the "QUIT" button once on the VECTOR switch cabinet turns off the buzzer.

The message is still visible on the VECTOR display and can be read calmly



Effect of example 4:	VECTOR	SC 30
Optical indication	X	
Buzzer		
Horn signal		

➤ Press the "QUIT" button again on the VECTOR switch cabinet.

The fault is finally acknowledged.

The message disappears from the VECTOR display and is entered into the malfunction list.



### Information

Minor faults that have been immediately acknowledged in REMOTE operating mode using the "QUIT" button at the VECTOR switch cabinet will not be reported again when changing from LOCAL to REMOTE.

---

**Example 5:**

Operating mode:	REMOTE
Silent diagnosis:	NO
<b>Serious fault</b>	

**Table 19**

to Table 19	VECTOR	SC 30
Optical indication	X	X
Buzzer		
Horn signal		X
EMERGENCY OFF	X	

**Table 20**

In addition, the control system is set to the "EMERGENCY STOP" operational status. Optional shutdown of the drive motor is also possible.

- Press button S3 "Control release or diagnostic horn" on the remote control unit.

The recurring horn signal becomes silent.

The message is still visible on the VECTOR display and can be read at your convenience (**Table 21**).



After the acknowledgement:

to Table 20	VECTOR	SC 30
Optical indication	X	
Buzzer		
Horn signal		
EMERGENCY OFF	X	

**Table 21**

- Press the "QUIT" button on the VECTOR switch cabinet.

The error is finally acknowledged

The message disappears from the VECTOR display and is entered into the malfunction list.



**Danger!****Risk of accidents and machine damage!!**

After a shutdown caused by a serious fault, the control and if applicable, the drive motor must be restarted.

- Be sure to resolve any serious errors before restarting as otherwise this can result in severe damage!

**Information**

Serious faults can be acknowledged only with the "QUIT" button at the VECTOR switch cabinet, regardless of the operating mode selected, i.e. LOCAL or REMOTE.

---

**Example 6:**

Operating mode:	REMOTE
Silent diagnosis:	YES
<b>Serious fault</b>	

**Table 22**

to Table 22	VECTOR	SC 30
Optical indication	X	X
Buzzer		X
Horn signal		
EMERGENCY OFF		X

**Table 23**

In addition, the control system is set to the "EMERGENCY STOP" operational status. Optional shutdown of the drive motor is also possible.

- Press button S3 "Control release or diagnostic horn" on the remote control unit.

The buzzer becomes silent (if not disabled manually, the buzzer will be switched off automatically after 60 seconds).

The message is still visible on the VECTOR display and can be read at your convenience (**Table 24**).



After the acknowledgement:

to Table 23	VECTOR	SC 30
Optical indication	X	
Buzzer		
Horn signal		
EMERGENCY OFF		X

**Table 24**

- Press the "QUIT" button on the VECTOR switch cabinet

The fault is finally acknowledged.

The message disappears from the VECTOR display and is entered into the malfunction list.



### 3.5.26 Message list



#### Information

The number of characters per text message that can be displayed is limited. For this reason, some messages are abbreviated and may not always be completely identical to the messages shown in these operating instructions.

---



#### Danger!

#### **Injury to persons and damage to property due to failure to remedy faults!**

Failure to observe error messages may cause serious accidents!

The machine operator is responsible for ensuring that any fault displayed will immediately be remedied, so as to prevent the possibility of most serious damage to property and injury to persons.

Contact SCHWING's customer service if no qualified personnel are available. Always inform customer service of the reported fault code.

---

Indication of a "minor fault" does not mean that the fault can be completely ignored but only that the working operation may be completed, possibly with restrictions!

If an error message is deleted but the fault is not remedied, the error message will not be shown again during operation!


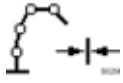
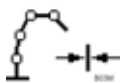
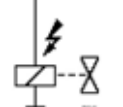




#### Information


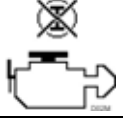



Error messages and messages are to help the operator rectify any impairments of functions.

---




## 3.5.26.1 B = Boom (placing boom control)

Code	International output	Text output (national)
B01M		Slewing gear limitation active!
B02M		Boom limitation active!
B03M		Boom functions locked externally!
B04L		Cable break / overcurrent EMERGENCY OFF valve boom!
B18L		Sensor; boom in support defective!
B17H		Safety shutdown; faulty boom control!



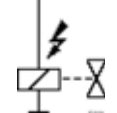
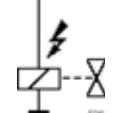




## 3.5.26.2 D = Diesel engine (vehicle diesel engine)













D01M		No release for diesel start !
D02M		Load limiter Diesel engine active!
D03L		Faulty power take off or sensor rotational speed Defective power take off!
D04L		Limit rotational speed Power take-off exceeded!
D05L		Signal Power take off engaged missing!























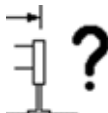
D16H		!Safety shutdown! Excess temperature Diesel engine!
D17H		!Safety shutdown! Filling level MIN Hydraulic oil!
D18H		!Safety shutdown! Diesel oil pressure dropped!









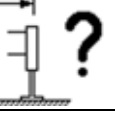

### 3.5.26.3 E = Expansion (expansion)

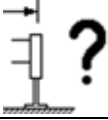
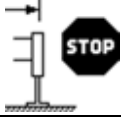
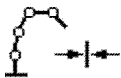
Code	International output	Text output (national)
E01L		CAN-FBP/FBP module failed! (FBP only)
E02L		Cable break/Overcurrent Drum potentiometer Driver's cab/loc. cont. !
E03L		Cable break/Overcurrent Proportional valve Drum mixing!
E04L		Cable break/Overcurrent Proportional valve Drum emptying!
E05H		!Safety shutdown! EASy safety circuit activated!
E06H		!Safety shutdown! EASy safety circuit faulty!
E07L		EASy safety circuit faulty!
E08L		CAN-EWB/EWB module failed! (EWB only)

Code	International output	Text output (national)
E09H		!Safety shutdown! CAN-EWB/EWB module failed!
E10L		Switch 'AB selection' faulty!
E11H		!Safety shutdown! EASy interrupted by operator!
E12L		Multiple absolute encoders with same CAN-ID available!
E13L		Configuration for absolute encoder slewing gear incorrect!
E14L		Configuration for absolute encoder boom joint A incorrect!
E15L		Incorrect/New absolute encoder for detected for slewing gear!
E16L		Incorrect/New absolute encoder for detected for boom joint A!
E17L		Electrical connection to the sensor Slewing gear faulty!
E18L		Electrical connection to the sensor Boom joint A faulty!
E19L		sensor for for slewing gear inoperable!
E20L		sensor for for boom joint A inoperable!





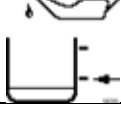
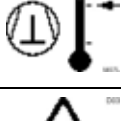


Code	International output	Text output (national)
E21L		absolute encoder for for slewing gear has internal defect!
E22L		absolute encoder for for boom joint A has internal defect!
E23L		External control sensor for for slewing gear!
E24L		External control sensor for for boom joint A!
E25L		Zero point adjustment sensor for Slewing gear too big!
E26L		Zero point adjustment sensor for boom joint A too big!
E27L		Zero point adjustment of cam switch for Slewing gear too big!
E28L		Switching point cam switch for slewing gear not set up correctly!
E29L		of cam switch for for slewing gear faulty!
E30L		Measured value offset for sensors on the slewing gear too large!
E31L		Switching function of cam switch for slewing gear faulty!
E32H		! Attention! Driver's cab protection affected by internal fault!

Code	International output	Text output (national)
E33M		AB selection changed inadmissibly!
E34M		Boom functions locked due to EASy malfunction!
E35L		Inadmissible change of the work area!
E36L		Measurement change absolute encoder for boom joint A too big!
E37L		Function of absolute encoder for Slewing gear faulty!
E38L		Function of absolute encoder for Boom joint A faulty!
E39M		Desired AB locked in EASy due to malfunction!
E40H		!Safety shutdown! EASy interrupted due to a fault!
E41M		Weight on lifting device too high! (LBS)
E42H		!Safety shutdown! Weight on the lifting device too high! (LBS)
E43H		!Safety shutdown! Sensor failure on the lifting device! (LBS)
E44M		Outriggers not fully extended! (OPT)

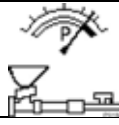
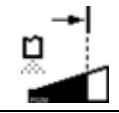
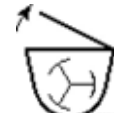
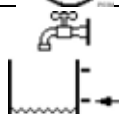


Code	International output	Text output (national)
E45H		!Safety shutdown! Machine is not supported correctly! (OPT)
E46L		CAN Box CBO failed! (CBO)
E47L		Tilt sensor for boom 1 inoperable! (OPT)
E48L		Angle detection for slewing gear inoperable! (OPT)
E49H		!Safety shutdown! Slewing gear limits reached!
E50H		Safety shutdown! External control for slewing gear! (OPT)
E51H		!Safety shutdown! External control for boom joint A! (OPT)
E52H		Zero point adjustment of cam switch for Slewing gear too big! (OPT)
E55M		Check outriggers!
E56L		Measured offset for sensors on boom 1 too large!
E57M		Check sensors for slewing gear reference!

Code	International output	Text output (national)
E69M		Machine is not correctly supported!
E70H		Safety shutdown! Machine is not correctly supported!
E71H		Safety shutdown! Active boom limitation!

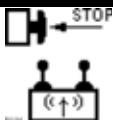








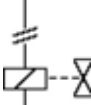


### 3.5.26.4 M = Machine (general machine control)

Code	International output	Text output (national)
M01M		Chamber valve is switched on!
M02M		Concrete discharge barrier End hose active!
M04L		Oil filter of boom circuit dirty! Please change filter!
M05L		Oil filter BP circuit dirty! Please change filter!
M06L		Top up hydraulic oil!
M07L		Compressor Excess temperature!
M08L		sensor for Oil level of hydraulic tank defective!
M36H		Safety shutdown Excess temperature Hydraulic oil!




3.5.26.5 P = Pump (concrete pump)

Code	International output	Text output (national)
P01M		Pressure relief of the concrete pump is active!
P02M		Output limitation of the concrete pump is active!
P03M		Hopper grid opened!
P04M		Top up water tank!
P05L		Oil temperature too high, power limitation CP active!
P07L		sensor for Stroke count CP defective or CP blocked!

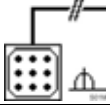










## 3.5.26.6 R = Remote (remote control system)








Code	International output	Text output (national)
R01M		EMERGENCY STOP open on radio manual switch!
R02M		Battery undervoltage in radio manual switch! Please charge battery!
R03M		CAN-FST/ Remote control failed!
R04M		No radio transmission possible!
R05L		Joystick 1 of remote control defective!
R06L		Joystick 2 of remote control defective!
R07L		Joystick 3 of remote control defective!
R08L		EMERGENCY-STOP button Radio manual switch defective!
R09L		Radio telegram with external address received!
R10L		Cable break valve boom release!
R11L		Overcurrent/Valve boom release!
R12H		!Safety shutdown! Hydraulic enable faulty!
R13M		Pairing process active!



Code	International output	Text output (national)
R14M		Pairing process successfully concluded!
R15L		Pairing process with fault interrupted!
R16H		!Safety shutdown! Remote control does not match the machine!
R17L		System failure of radio equipment!

## 3.5.26.7 S = system (memory, multi-fuse, interfaces)

Code	International output	Text output (national)
S00M		no entries!
S01M		Disconnection of cable/ plug of local control!
S05L		Relay contact K 13 bypassed/defective! (K 13)
S06L		Fuse F 18 defective! (F 18)
S07L		Fuse F 20 defective! (F 20)
S08L		Fuse F 16 defective!
S09L		Fuse F 31 defective!
S10L		Fuse F 32 defective!
S11L		MF1 : Current supply Diagnosis EMERGENCY-STOP board DI15 - DI18 faulty!
S12L		MF2 : Current supply Diesel interface, among others DI21 - DI27 faulty!
S13L		MF3 : Current supply DI28, DI38, DI46, DI48 faulty!
S14L		MF4 : Current supply DI31-DI35, DI43, DI44 faulty!

Code	International output	Text output (national)
S15L		MF5 : Current supply DI36,DI37,DI45 faulty!
S16L		MF6 : Current supply DI41,DI42,DI47,AI21,AI22 faulty!
S17L		MF7 : Current supply CP piston toggle switch DI51-DI54 faulty!
S18L		MF8 : Current supply DI55 - DI58 faulty!
S19L		Reference voltage for analogue sensors AI12, AI13, AI14, AI16 faulty!
S20L		Multi-fuse on MMI board faulty!
S21H		!Safety shutdown! Boom not in support with operation of supports!
S22M		Please use a current WinTerminal version!
S23M		Please update the main board software!
S24M		VECTOR software not compatible!
S25M		VECTOR hardware defective!
S26M		VECTOR parameters defective!

### 3.5.26.8 Economic Engine Control (EEC)

The economic engine control (EEC) is supplementary software for our VECTOR control system.

"EEC" supports the machine operator in setting the speed of the drive motor during operation.

"EEC" can only be activated for vehicles with electronic motor controllers.

The "EEC software" can only be (de)activated by SCHWING.

"EEC" is only active in "REMOTE" operating mode.

"EEC" is automatically activated when the motor is started in "REMOTE" operating mode.

The "EEC" symbol is then visible inside the revolution counter scale for the VECTOR control system.

In many cases, "EEC" will set the rotational speed to "ECO". This rotational speed saves fuel in concreting operations in particular.

Even though "EEC" is active, the machine operator can adjust the rotational speed at any time. After manual adjustment, "EEC" is switched off for one minute.

The machine operator can adjust the rotational speed within the limits "MIN/MAX". However, if the motor is working at its load limit, manual reduction of the rotational speed is blocked.

### 3.5.26.9 Automatic speed control (pump operation)

After switching on the concrete pump in the direction "PUMP", the rotational speed "ECO" is set.

After setting the delivery rate to equal to/greater than 98%, the rotational speed is set to "MAX".

After reducing the delivery rate to below 98%, the rotational speed is set to "MAX".

If the CP is switched off and then switched on again, the following rotational speeds are set:

1. Rotational speed greater than "ECO"	= Rotational speed "ECO" is set.
2. Rotational speed lower than "ECO"	= Former rotational speed is set.

If the CP is switched off and no boom movement takes place, the rotational speed will be reduced to "MIN" after 10 seconds.

### 3.5.26.10 Automatic speed control (boom operation)

With boom movements, automatic speed control changes are only carried out when the concrete pump is switched off.

If the "Snail / Hare" switch is set (Fig. 99 ):

- To "Hare", the rotational speed is set to "MAX"
- To "Snail", the rotational speed is reduced to "ECO". If the boom is idle for a period of 10 seconds, the rotational speed is reduced even further to "MIN".

If the boom is then moved to the "Snail" position, the rotational speed is not increased.



Fig. 99

### 3.5.27 Abbreviations used

AB	Work area
BP	Concrete pump
CAN	Controller area network (Serial bus system)
CBO	Can Box Outrigger
CAN- BOX- CBO	Housing for the serial bus system of the horizontal outriggers
CAN-FST	CAN interface for the remote control unit
cbm	cubic metres (cubic meter - m <sup>3</sup> )
cby	cubic yard (cubic yard - cyd.)
ECO	Economic engine speed
EEC	Economic engine control (EEC)
ETA-Vol BP	Volumetric efficiency of the concrete pump (Degree of filling of the pumping cylinder)
EPB	Expansion board
TBP	Truck mixer concrete pump
REMOTE	Remote control
DR	Delivery rate
HD	High-pressure

Boom jt.	Boom joint
MAX	maximum engine speed adjustable with SCHWING control
MIN	minimum engine speed adjustable with SCHWING control
MMI	Man-machine interface
OPT	Optional
Poti	Potentiometer
Prop	Proportional hydraulic system with arbitrary intermediate positions between open and closed.
CG	Central greasing

### 3.5.28 Explanations

absolute encoder for	CAN sensor: Sensor that indicates the angle of the boom joint/slewing gear.
----------------------	--

### 3.6 Boom teaching - VECTOR control system

The activities described in this chapter must be carried out only by expert personnel.



#### Caution!

##### **Danger due to improper settings!**

Operational safety may be impaired or lost due to improper settings (teaching).

---

SCHWING rejects all liability for damage resulting from incorrect settings (teaching).

The teach key used for the configuration (teaching) is recognised by the VECTOR control system and its teach key number is saved.

The teach key must not be given to a third party.



#### Information

The response behaviour of placing boom joints with rotary actuators cannot be modified at the moment.

---

#### 3.6.1 What is boom teaching?

The response behaviour of the remote control joysticks for operating the placing boom speeds is set by default. This goes for all movements of the placing boom.

The response behaviour of the remote control joysticks and hence the moving speeds of the placing boom can be adjusted to your personal taste by means of teaching.

Examples to explain this:

You can adjust whether the placing boom will move slowly or rapidly when the joystick is deflected slightly.

The maximal speed at full joystick deflection can be limited.

The minimal or maximal limit values given by the hydraulic system must not be changed.



### Caution!

#### Risk of collision!

The placing boom will move during teaching!

Watch the placing boom during teaching.



If necessary, have auxiliary personnel support you.

### 3.6.2 Frequently used buttons on the remote control



Fig. 100 Transmitter for the remote control

### 3.6.3 Frequently used symbols

Explanations symbols		
Symbol	Meaning	Display Teach mode
 SNAIL	MIN value	< >
 HARE	MAX value	<< >>

### 3.6.4 Explanations for teach mode

Concrete pumps and auxiliary functions are blocked in teach mode.

Auxiliary functions include high-pressure cleaner, water pump, vibrator etc.

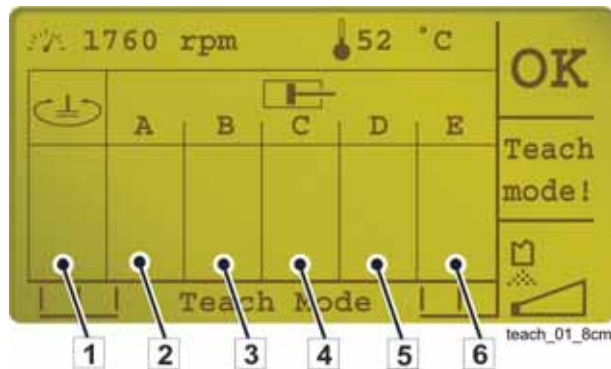


The boom and vehicle motor functions can be controlled without limitation.

Note that during the teaching process you can only configure and adjust one boom movement at a time. You can test the modified setting(s) after teaching. After teaching, multiple boom movements can be made simultaneously again.

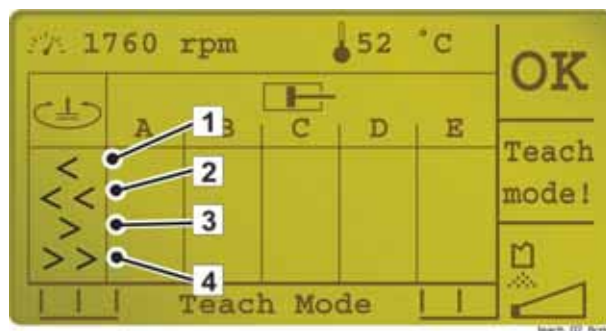
Fields (1-6) (**Fig. 101**) are empty at the start of teach mode.

The settings made are indicated by arrows in the respective fields (example: (**Fig. 102**) and (**Fig. 103**).



**Fig. 101** First display for teach mode

Caption for ( <b>Fig. 101</b> )		
Pos.	FUNCTION	
1	MIN / MAX VALUE	ROTATE
2	MIN / MAX VALUE	BOOM SECTION 1
3	MIN / MAX VALUE	BOOM SECTION 2
4	MIN / MAX VALUE	BOOM SECTION 3
5	MIN / MAX VALUE	BOOM SECTION 4
6	MIN / MAX VALUE	BOOM SECTION 5



**Fig. 102** Teach display for the slewing gear

Caption for ( <b>Fig. 102</b> )	
Pos.	FUNCTION

1	MIN value	ROTATE LEFT
2	MAX value	ROTATE LEFT
3	MIN value	ROTATE RIGHT
4	MAX value	ROTATE RIGHT

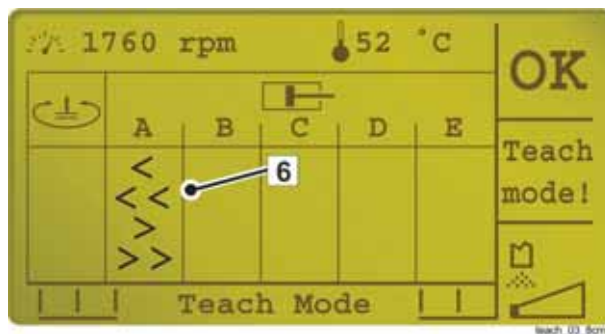


Fig. 103 Teach display for boom section A

Caption for (Fig. 103)		
Pos.	FUNCTION	
5	MIN value	BOOM SECTION 1 (A) DOWN
6	MAX value	BOOM SECTION 1 (A) DOWN
7	MIN value	BOOM SECTION 1 (A) UP
8	MAX value	BOOM SECTION 1 (A) UP

### 3.6.5 Explanations for the teaching process

Please note that you need to actuate two operating controls simultaneously during the teaching process, releasing one operating control while still holding the other.

Before you may release the held operating control for intermediate storage, you need to confirm the setting with button S3.



#### Caution!

##### Risk of collision!

While you are actuating the joystick, the placing boom moves at the currently set speed.

Monitor the placing boom during the teaching process.

If necessary, have auxiliary personnel support you.

Depending on the value to be adjusted, the following screens will be displayed, for example, (Fig. 104) + (Fig. 105).

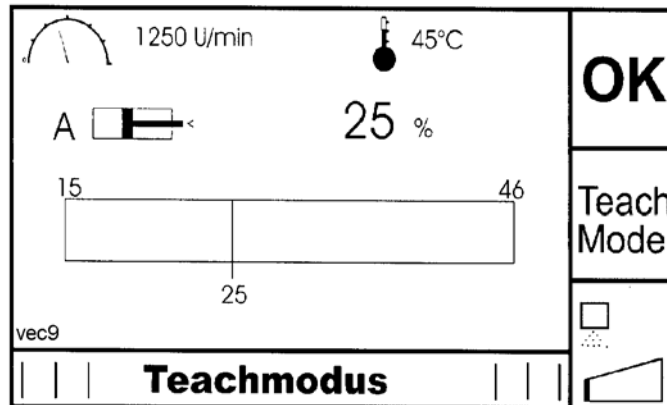


Fig. 104 Boom section 1 (A) DOWN, MIN value (snail)

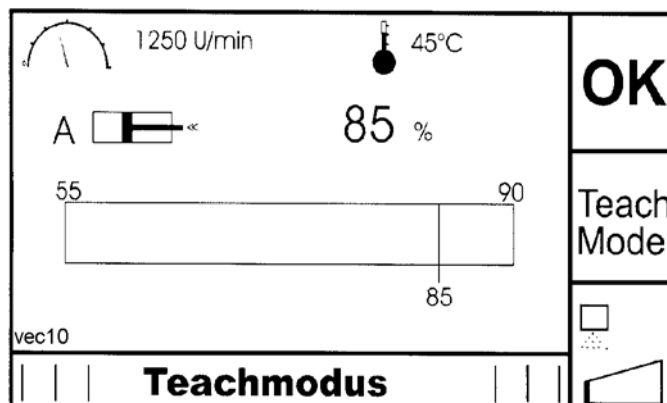



Fig. 105 Boom section 1 (A) DOWN, MAX value (hare)

### 3.6.6 Starting teach mode

The teach mode is initiated via the transmitter of the radio remote control:

- Switch on the VECTOR control system in the driver's cab.
- Select operating mode "REMOTE".
- Activate the transmitter for the radio system (unlock EMERGENCY STOP and hold button  until the LEDs light up continuously).
- Start vehicle motor and set maximal rotational speed.
- Insert teach key (Fig. 106) into its slot at the top left of the switch cabinet for the VECTOR control system (Fig. 107) and screw together.






### Attention!

#### Danger of damage and short-circuit!

The teach key can only be inserted in one position!

- Insert the teach key straight into the slot.

	The screen ( <b>Fig. 108</b> ) appears and the "Start" display flashes.
<p>S3</p> 	Actuate button S3 at the remote control (transmitter) downward to start the teach mode.
	Successful start is confirmed by a short acoustic signal and the symbol "OK". The screen ( <b>Fig. 109</b> ) appears.

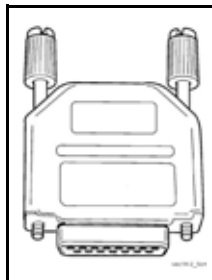


Fig. 106 Teach key



Fig. 107 Slot for the teach key

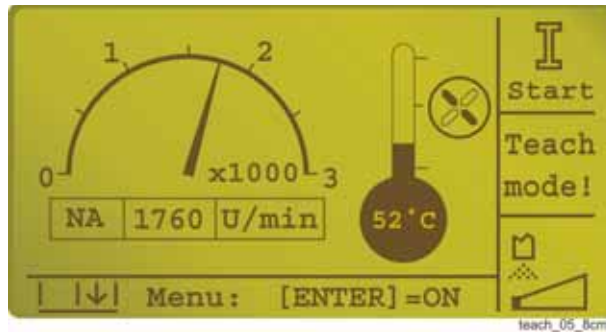


Fig. 108 Teach key start screen

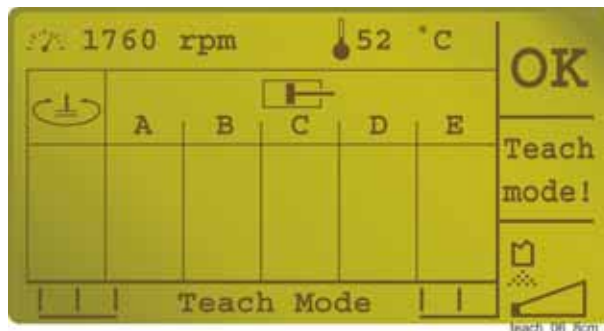








Fig. 109 Start screen for teach mode

### 3.6.7 Performing the teaching process

	<ul style="list-style-type: none"> <li>➤ Select the range to be adjusted, “Snail / Hare”</li> </ul>
	MIN value
	or
	MAX value
S3 	<ul style="list-style-type: none"> <li>➤ Press down and hold button S3 (control release / diagnostic horn) on the transmitter.</li> </ul>
	Select the boom movement to be adjusted by maximally deflecting the respective joystick.
S3 	<ul style="list-style-type: none"> <li>➤ Release button S3 (control release / diagnostic horn), keep joystick actuated.</li> </ul>
S4 	By actuating button S4, change the value within the specified limits: (+) = Increase value (-) = Reduce value

<p>S3</p> 	<p>➤ Press button S3 up to save.</p> <p>The display indicates which value was saved in the cache (<b>Fig. 110</b>).</p>
---	---



**Information**

Change values will be transmitted while the joystick is being actuated.

If the joystick is moved to neutral position or the "Snail / Hare" switch is actuated, the new value is discarded.

### 3.6.8 Checking settings

After caching, the next joystick (next boom movement) can be adjusted and cached in the same way.

After caching, all boom movements are automatically activated again. Several boom movements can again be carried out simultaneously. You can check your settings.

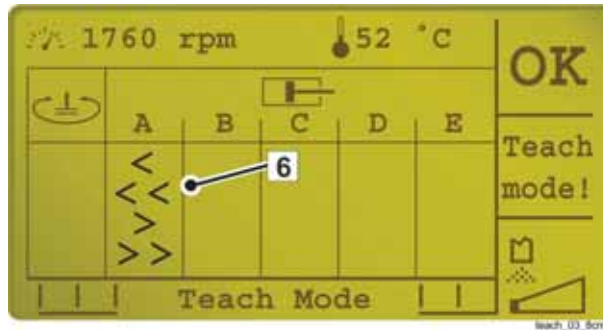







Fig. 110 Teaching boom segment "A"

### 3.6.9 Saving the settings

	Once all settings have been made, end the teaching process by switching the operating mode from "REMOTE" to:
	"LOCAL" or
	"PUMPING PISTON CHANGE".

The message (**Fig. 111**) appears on the display if at least one new boom movement was cached.

Confirm the messages on the display using the buttons "ENTER" and "CLEAR" on the VECTOR control.

	"ENTER" = YES
	"CLEAR" = NO

If terminated with "YES" (ENTER), the cached values are stored permanently in the machine parameter set of the VECTOR control and the teach mode is terminated.

If answered with "NO" (CLEAR) or if no boom movement was changed, the message (**Fig. 112**) appears on the display.

If answered with "YES" (ENTER), the newly set values are replaced with the machine parameter set of the condition on delivery.

If answered with "NO" (CLEAR), the last permanently stored values remain.

An automatic restart of control is executed.

- Remove the teach key (**Fig. 113**).

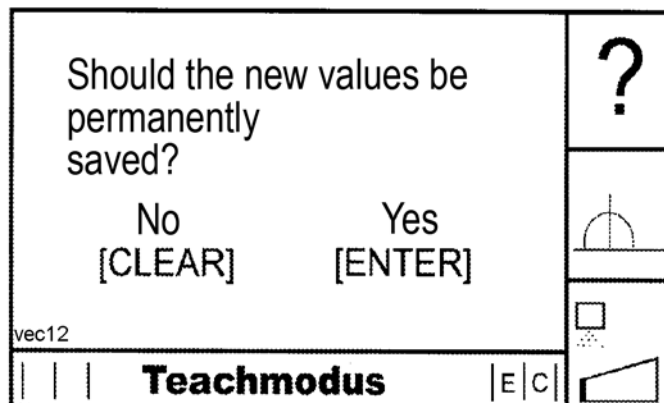


Fig. 111 Saving the teach settings

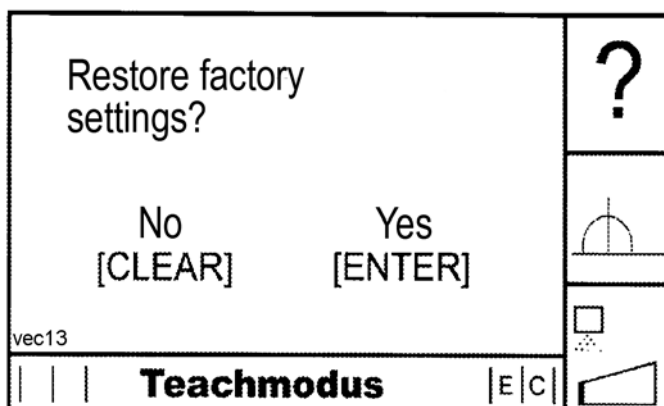


Fig. 112 Restoring the factory configuration

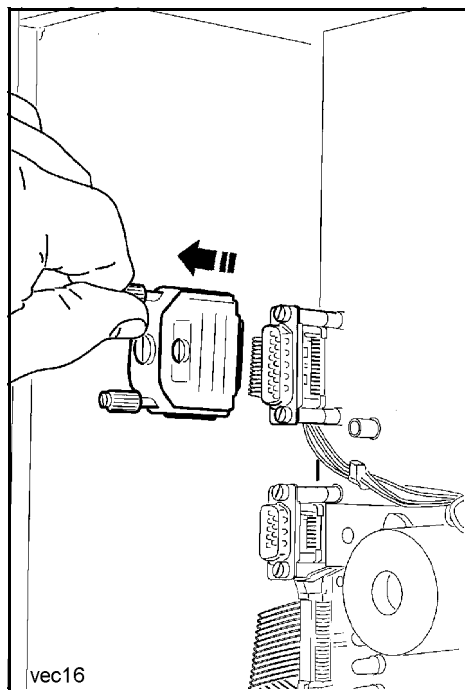















Fig. 113 Removing the teach key

### 3.6.10 Summary

- Switching on the VECTOR control system
- Select operating mode "REMOTE" 
- Activate the transmitter for the radio system (unlock EMERGENCY STOP and hold button  until the LEDs light up continuously)
- Start vehicle motor and set maximal rotational speed
- Insert the teach key into the slot in the VECTOR switch cabinet

	► Start teach mode
	Confirmation by a short, acoustic signal and the symbol "OK".
	► Select setting:
	MIN value
	or
	MAX value



S3 	► Press and hold button S3.
	► Select the boom movement to be adjusted by moving the respective joystick as far out as possible.
S3 	► Release button S3, keep joystick actuated.
	► Set the value:
	(+) = Increase value or
	(-) = Reduce value
	Cache new value.
	► Terminate the teaching process by switching the operating mode from "REMOTE" to
	"LOCAL" or
	"PUMPING PISTON CHANGE".
	Automatic restart of control is executed.
	► Remove the teach key.



### 3.7 Activating pump operation

In order to be able to pump concrete at the jobsite, you must switch from “Drive mode” to “Pump mode”.

Depending on your vehicle, two different pump drives are possible:

- 1 Power take-off
- 2 Distributor gearbox (VSG)

The respective pump drives are switched on in different ways.

- 1 Switch on the vehicle's ignition.
- 2 Switch the vehicle drive gear to neutral position.
- 3 Engage the parking brake.
- 4 Switch the pump drive on.
  - a) see Start-up procedure for the power take off for power take-offs or
  - b) Start-up procedure for the distribution manual transmission gear for distribution manual transmission gears.



#### Information

Although the switch for the distribution manual transmission gear is located in the driver's cab, it does not depend on the vehicle.

Most other switches on the instrument panel are described in your vehicle's manual.

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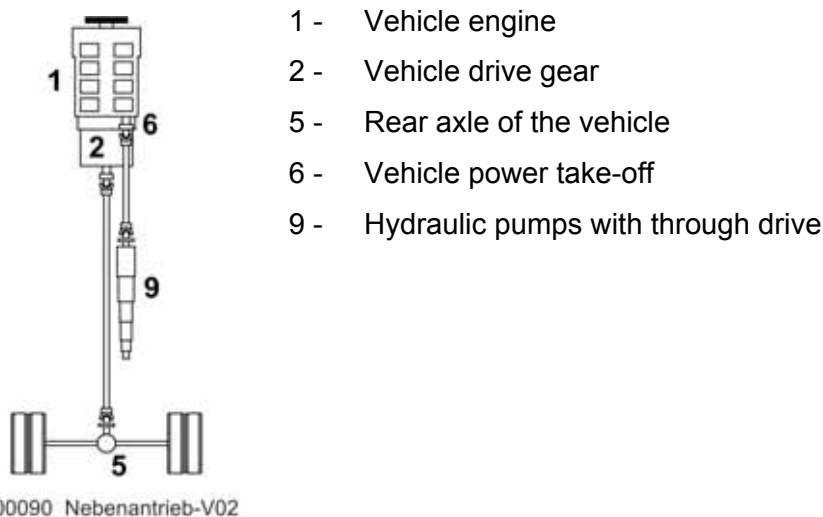
#### 3.7.1 Vehicles with a clutch pedal

It is essential to wait 10 seconds after disengaging the clutch before switching the power take-off on or off.

This avoids consequential damage.

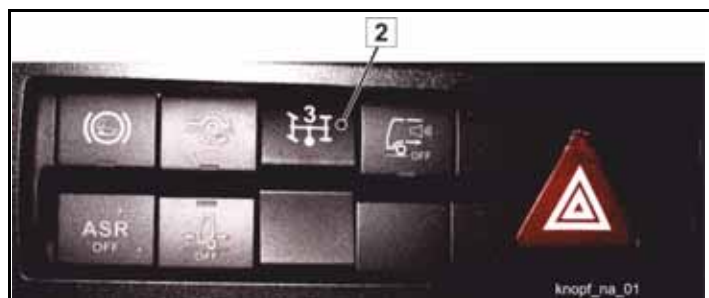
Auxiliary units, e.g. hydraulic pumps, can be powered by the VECTOR control. Depending on the usage ratio, the motor and the power take off must be operated at a specified speed (operating speed).

### 3.7.2 Start-up procedure for the power take off



**Fig. 114 Power take-off**

In the cab of your vehicle, there is a switch with a symbol like in position (2) (**Fig. 115**).



**Fig. 115 Cab switch**



#### Information

How the power take-off is switched on depends on the type of vehicle.

This procedure is described in your vehicle's manual.

Observe the information signs in the driver's cab and chapter (**chap. 3.7.6**).

### 3.7.2.1 Switching on the power take-off

- Stop vehicle.
- Engage parking brake.
- Put gear into neutral.
- Allow the engine to idle.
- For vehicles with manual transmission:  
Press and hold the clutch.
- Switch on power take-off on the instrument panel.

### 3.7.2.2 Switching off power take-off

- Allow the engine to idle.
- For vehicles with manual transmission: Press and hold the clutch.
- Switch off power take-off on the instrument panel.



#### Attention!

##### **Risk of gearbox damage!**

- The motor-dependent power take offs of various vehicles are provided with a hydraulically actuated clutch.
  - Preventing the coupling from slipping requires a certain hydraulic pressure, which only becomes available when the vehicle engine reaches an appropriate rotational speed.
  - It is for this reason that SCHWING uses the opportunity for automatic speed increase, if provided by the vehicle manufacturer.
  - The speed increase becomes active after switching on the power take off.
  - Should such an option not be available, the machinist has to raise the rotational speed manually, if necessary.
  - Information on the proper drive circuit and required minimum rotational speed can be found in the manual of the vehicle manufacturer.
-

### 3.7.3 Start-up procedure for the distribution manual transmission gear

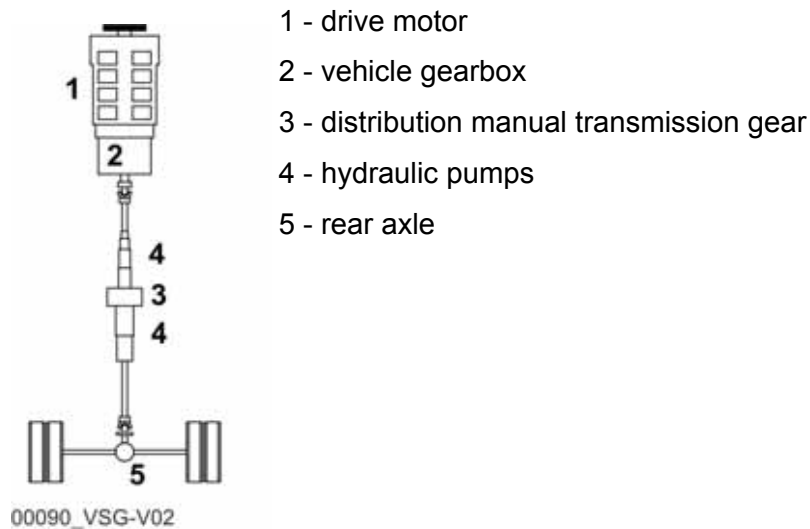


Fig. 116 VSG



#### Information

Depending on the vehicle, the VSG is activated using an e-box or by means of a switch on the instrument panel in the driver's cab.

- Stop vehicle
- Engage parking brake
- Put gear into neutral
- Switch off motor

Use a switch to change from "Drive mode" to "Pump mode"  
(Example: Move switch (1) (**Fig. 117**) in the driver's cab from "D" to "P").

You can recognise the respective switches based on the letters "D" and "P".

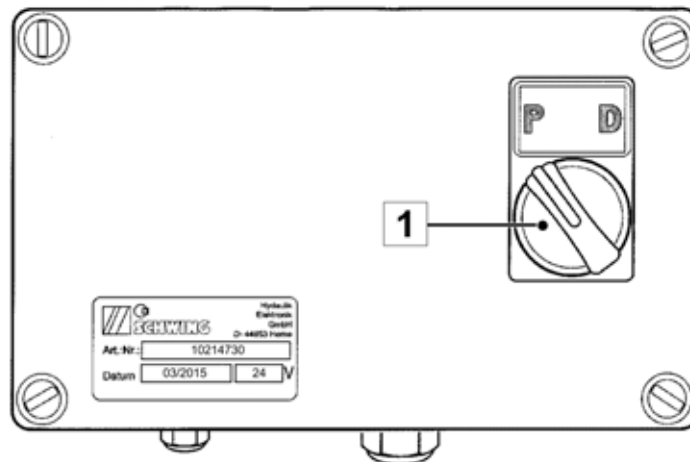


Fig. 117 E-box

Pos.	Designation	Local language designation
P	pump mode	Pump operation
D	drive mode	Driving operation



### Attention!

#### Possible damage due to insufficient air pressure!

Make sure that sufficient compressed air is available for properly switching the e-box. Start the motor briefly to fill the air reservoirs, if necessary.

Wait for approx. 5 seconds and then set the switch (1) on the e-box (**Fig. 117**) from position "D" for "Drive" to "P" for "Pump".



### Attention!

#### Risk of gearbox damage!

The distributor gearbox may only be switched when at standstill.

- Start the motor and run at idle.
- Press the clutch and engage the "pump gear".
- The coupling action is indicated on a sign in the driver's cab.
- Slowly engage the clutch.



#### Attention!

##### **Damage to the hydraulic pumps!**

Do not engage a gear other than the coupling action. An excessively high motor speed destroys the hydraulic pumps.

---



#### Information

As of 2008, our distribution manual transmission gears are primarily equipped with electro-pneumatic switching.

The switching from

D (drive) = drive gear

to

P (pump) = pump operation

and vice versa, may only take place under the conditions described above.

---

### 3.7.4 Pneumatic suspension / Levelling



#### Danger!

##### **Danger due to toppling machine!**

In order to ensure that the truck-mounted concrete pump operates safely, it is essential that the pneumatic suspension be prevented from activating during operation.

The wheels are pressed against the bottom when venting the bellows with supported machine.

The machine is "lifted" and can topple over.

---

To achieve the required machine stability, it may be necessary to vent the bellows of air-sprung (trailing) axles, depending on the vehicle.

In most cases, the bellows are automatically de-aired down to a residual pressure when the power take off is switched on.

Air is also supplied automatically when the power take off is switched off.

In doing so, the bellows are vented in a short time according to the axle load.

Some vehicles display the condition of the bellows in the driver's cab.



**Information**

Refer to the operating instructions of the vehicle- or axle manufacturer.

If the vehicle is equipped with a chassis frame levelling, it must be switched off prior to the support of the machine, since levelling endangers the stability of the supported machine.

In connection with pneumatic suspension and levelling, additional vehicle-specific measures may be to set up the machine safely.

We will provide you with special customer information, if needed.

### 3.7.5 Switching on the VECTOR control system

- Switch on the power supply to the VECTOR control system in the driver's cab.

Example:

Toggle switch (2) (**Fig. 118**) or key-operated switch (1) (**Fig. 119**).

The computer boots up, which is indicated by a progress bar on the display (1) (**Fig. 120**).

- Switch on the outrigger lighting, if necessary, e.g. by using the toggle switch (3) (**Fig. 118**).
- Leave the driver's cab.

**Caution!****Danger due to unauthorised starting of the machine!**

Bar access to the cab by unauthorised persons by locking it during pumping operations!

- Walk around the machine and inspect the installation site.
- On your way, unlock the transport security devices of the front outriggers.

**Information**

The rear folding outriggers are automatically unlocked after starting the machine control.

- Flip the selector switch (3) (**Fig. 120**) to the "Local control" position.



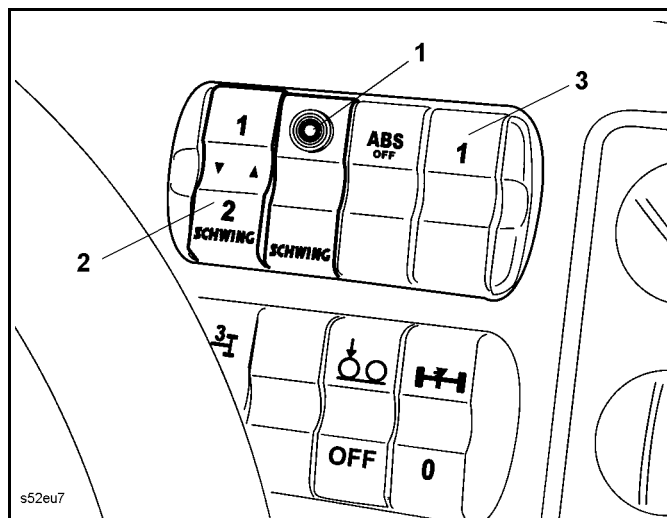


Fig. 118 Cab toggle switch

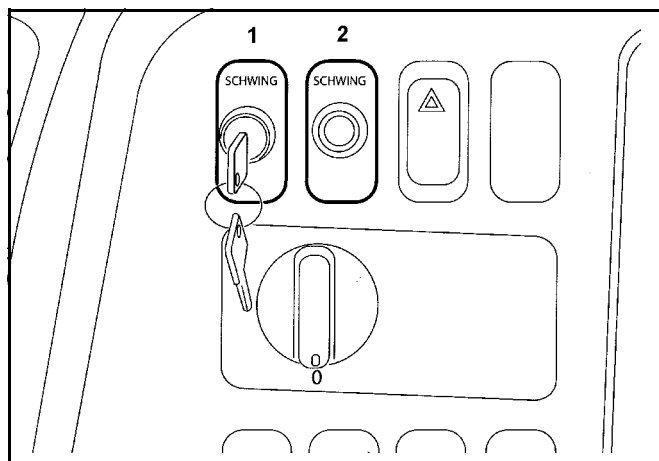


Fig. 119 Cab key-operated switch

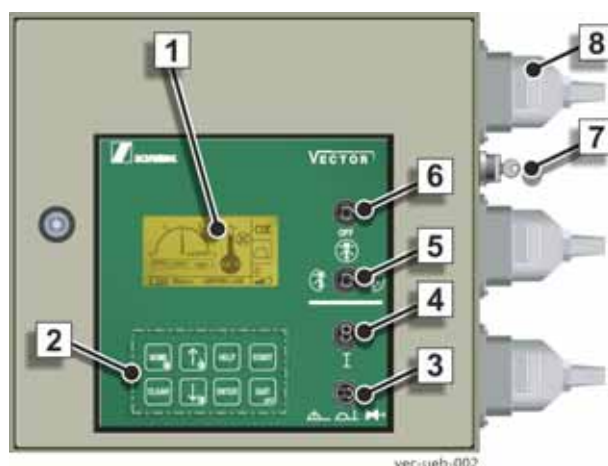


Fig. 120 Switch cabinet for VECTOR control system




- Switch all engaged selector switches on the local control unit (Fig. 121) to the neutral (0) position and unlock all EMERGENCY STOP buttons on the machine; otherwise, it will not be possible to start the machine up.





**Information**

The control monitors the positions of the EMERGENCY STOP buttons and selector switch of the active control.

Display (1) (**Fig. 120**) contains a relevant note, see (“**VECTOR control system**” on page 125).

	<p>When the system is ready, this symbol flashes in the display.</p>
	<p>➤ Start the control with the button (4) (<b>Fig. 120</b>).</p>
	<p>A short acoustic signal confirms the start, and the display indicates this symbol.</p>

➤ Go to the local control unit (**Fig. 121**).

	<p>➤ Start the diesel engine.</p>
	<p>➤ Increase its rotational speed.</p>



### Attention!

#### Risk of damage to the hydraulic pumps!

Do not, under any circumstances, increase the engine speed with the accelerator or the cruise control in the driver's cab with switched on pump drive.

In these cases, the factory-set overspeed trip unit is inactive.

The hydraulic pumps can over-rev and, therefore, be destroyed.

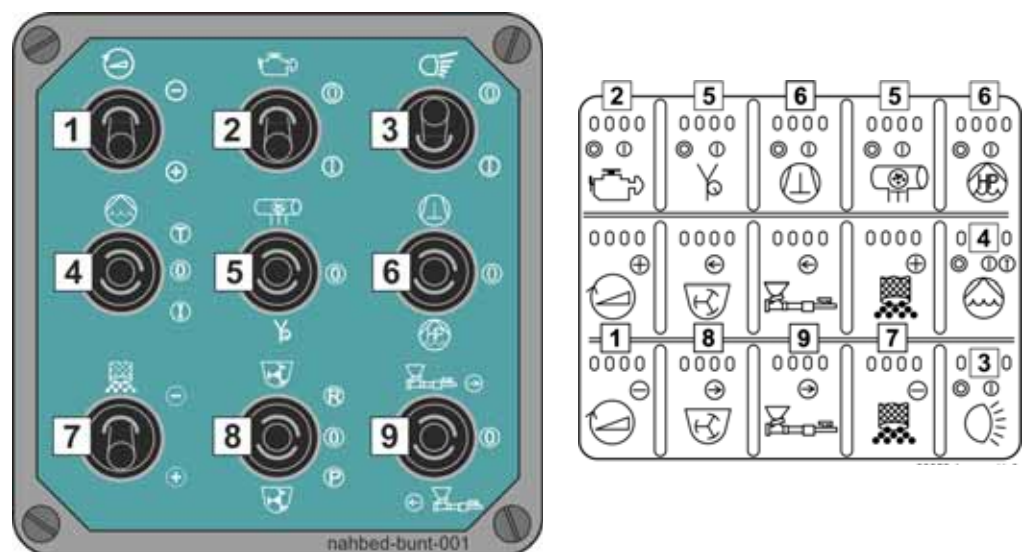


Fig. 121 Local control



### Information

Display (1) (**Fig. 120**) indicates the rotational speed of the power take-off or the drive speed of the distributor transmission.

The rotational speed is not identical to the engine speed!

The permissible rotational speed for the engine and gear is stamped onto a sign in the driver's cab.

When exceeding the maximum rotational speed, immediately reduce the engine speed and check the drive circuit and motor speed adjuster.

### 3.7.6 Vehicles with special features

This chapter describes special start-up procedures for the power take-off.

See also “**Explanation of the "EXT" switch on SCANIA vehicles**” on page 96.

#### 3.7.6.1 Renault with automatic transmission

##### Switching on the power take-off

- Stop vehicle.
- Engage parking brake.
- Move gear selector switch into the “N” position.
- Start vehicle engine.
- Switch on SCHWING control using the key-operated switch (1). The green signal lamp (2) (**Fig. 122**) for “Control ON” turns on and the SCHWING control starts up.
- The electronic instrument cluster (3) (**Fig. 123**) indicates that the engine control unit regulates the activation of the power take-off.
- The transmission engages the power take-off and reverts to the speed of 850 rpm (4) (**Fig. 124**).
- If the engaging operation and the speed adjustment have been completed, then the actuation takes place by lighting up the power take-off button (5) (**Fig. 125**).
- As soon as the power take-off is engaged, an electronic gear lock (6) (**Fig. 126**) is activated immediately. When the gear selector switch is actuated, the electronic instrument cluster signals the gear selection and responds that the transmission is in “Automatic” mode. The gear is not changed!

##### Switching off power take-off

- Allow the engine to run.
- Switch off the SCHWING control using the key-operated switch; the green signal lamp remains on for “Control ON” and the SCHWING control remains on.
- Press the power take-off button (**Fig. 125**) until it turns off; the speed is reduced further, the power take-off is disengaged and the VECTOR control is switched off.
- Switch off the engine and ignition.

While working with the machine, the engine can be switched on and off at any time via the control platforms; the transmission automatically engages and disengages the power take-off.



Fig. 122 SCHWING control



Fig. 123 Renault electronic instrument cluster



Fig. 124 Transmission engages



Fig. 125 Activation display



00139\_Anzeige-Getriebesperre

**Fig. 126 Gear lock display**

### 3.7 Activating pump operation



### 3.8 Preheating the hydraulic system

The correct operating temperature is important in order to ensure proper functioning of and low wear on the hydraulic system and hydraulic oil.

For our machines, this is between 40 °C and 60 °C.

The hydraulic system has been designed so that with:

- proper use,
- correct function of all components
- and the selection of an appropriate hydraulic oil,

an operating temperature of 80 °C is not exceeded.

Conversely, it is advantageous to warm up the cold system before beginning operations.

This is carried out as follows:

- Switch on the pump drive and operate the hydraulic system without a load at medium speed.

The hydraulic oil warms up, during which it is circulated "without pressure" by the pump.

#### 3.8.1 Cold start limit

If the cold start limit of an oil is exceeded (oil is too viscous), the required lubricating film could fail to establish. "Cold start wear" occurs due to friction. Hydraulic pumps cannot correctly draw in oil that is too viscous. They suck in air (oil foams) and are damaged.

The cold start limit is dependent on the viscosity of the oil, see table:

ISO viscosity class	Cold start limit
VG 32	approx. - 18 °C
VG 46	approx. - 10 °C
VG 68	approx. - 3 °C
VG 100	approx. 3 °C

The supplied multi-purpose oil has a cold start limit of -10 °C.

If low temperatures are expected, the machine should be parked in a locked hall if it is to be used the next morning.

### 3.8.2 Preheating the outrigger control blocks

During working operations, the outrigger hydraulics are separated from the remainder of the hydraulic system.

Depending on the ambient temperature, all outrigger components cool off, including the enclosed oil.

Should the outriggers now be retracted (after finishing the work assignment), the hot hydraulic oil will shoot to the control blocks for the outrigger hydraulics.

Due to this "temperature shock", the control blocks can jam.

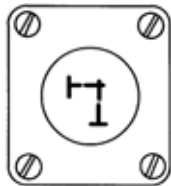
At low ambient temperatures we recommend:

#### **For machines with type S65SXF:**

- Press the each of the four release buttons on the outrigger for approx. 20 to 30 seconds before actuating any of the outrigger control levers.

#### **For all other machines:**

- Press the release button on the outrigger to be moved for approx. 20 to 30 seconds before actuating any of the control levers.



The inside of the outrigger control block is flooded with warm hydraulic oil in pressureless circulation.

- Repeat the procedure if you detect sluggishness in the control levers after the "preheating phase".



#### **Attention!**

#### **Risk of damage!**

Do not force jammed control levers.

## 3.9 Setting up the machine (changeover mode)

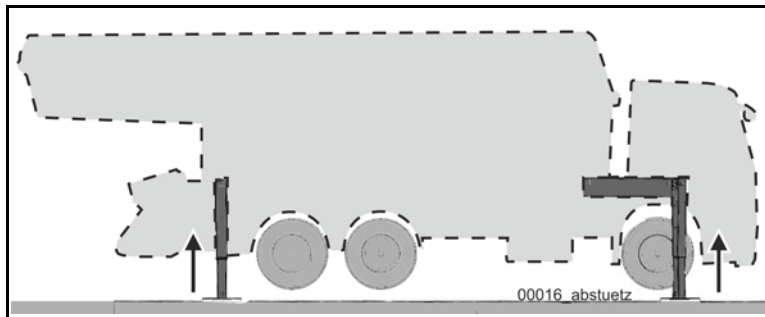
### 3.9.1 Safety instructions



#### **Danger!**

##### **Danger to life due to loss of stability as a result of improper support!**

Improper support can cause the machine to lose its stability. The machine can then slide or tip over. Support the machine as prescribed. All vehicle wheels lift off the ground and are no longer in contact with the ground (**Fig. 127**).



**Fig. 127 Supporting the machine**



#### **Danger!**

##### **Danger to life due to loss of stability as a result of setting up the machine on unsuitable ground!**

Setting up the machine incorrectly can impair its stability. The machine can then slide or tip over.

Set up the machine on suitable ground (**Fig. 128**).

There may be no voids or other floor unevenness under the supporting legs. Asphalts, concrete slabs, etc. can be undermined. Never place the machine on back-fill with obvious or known voids or uneven ground.

Always enquire about the bearing capacity of the ground (permissible ground kN/m<sup>2</sup>) from the site manager/responsible persons. Assume worst-case-scenario when load-bearing capacity is unknown.



Fig. 128 Unsuitable set-up ground



**Danger!**

**Danger to life due to loss of stability as a result of excessive inclination!**

Excessive inclination can impair the machine's stability. The machine can then slide or tip over.

The machine must not be set up in an axle with an incline of more than 3°! See (Fig. 129)

For checking purposes, spirit levels are attached near the outrigger control blocks (Fig. 130).



Fig. 129 3° incline

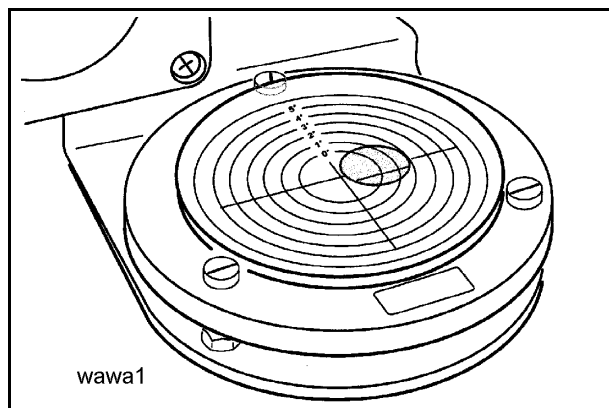


Fig. 130 Spirit levels

**Danger!****Danger to life due to loss of stability as a result of improper operation!**

Operating the machine incorrectly can impair its stability. The machine can then slide or tip over.

Without the EASy system, the outriggers must always be extended or folded out horizontally up to their end positions (**Fig. 131**). Intermediate positions are prohibited without EASy!

Otherwise, the "VECTOR control" system will output an error message.



**Fig. 131 Extend outriggers to end positions**

Machines equipped with the one-sided EASy / EASy 200 support systems from SCHWING are exempt from this prohibition.

A guide to this system is available in the chapter "Special equipment" of this operating manual.

One-sided support is only permitted under the conditions there described.

If your machine was retrofitted with EASy / EASy 200, ensure that the appropriate, up-to-date guide was issued. Do not skip briefings.



### Danger!

#### Danger to life due to loss of stability as a result of excessive ground pressure!

The machine may not be installed when the maximum ground pressure of the machine exceeds the permissible ground pressure. Inquire about the permissible ground pressure at the jobsite.

- Always use the standard, load-distributing support pads, which are between the two rear axles by default (**Fig. 132**). This enlarges the support surface (**Fig. 133**).

Wooden underlays are optionally available. Please note that using wooden underlays may result in a different support surface and thus change the ground pressure.

If necessary, the support surface must be increased using suitable means in order to avoid exceeding the permissible ground pressure, see table 135 on page 214.

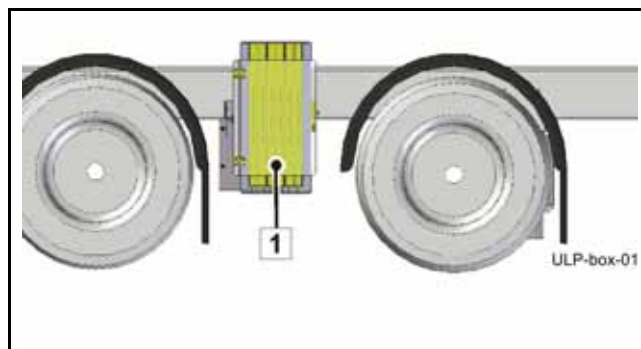


Fig. 132 Storing the support pads

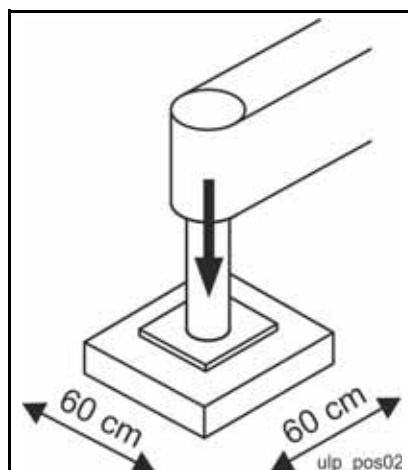


Fig. 133 Enlarging the support surface with support pads

### 3.9.2 Calculation of the ground pressure for a outrigger

The maximum ground pressure of a outrigger is calculated as follows:

$$\frac{\text{max. SUPPORTING FORCE}}{\text{SUPPORTING SURFACE}} = \frac{\text{kN}}{\text{m}^2}$$

The supporting force is dependent on the design of the vehicle and is, for example:

	front (approx.)	rear (approx.)
S 20	max. 140 kN (14,0 t)	max. 90 kN (9,0 t)
S 20 Hybrid	max. 110 kN (11,0 t)	max. 70 kN (7,0 t)

The maximum supporting force is specified on each outrigger (**Fig. 134**). The signs must always be present and clearly legible.

A support pad measuring 600 mm x 600 mm is placed below each support in the centre.

The supporting surface then measures 0.6 m x 0.6 m = 0.36 m<sup>2</sup>.

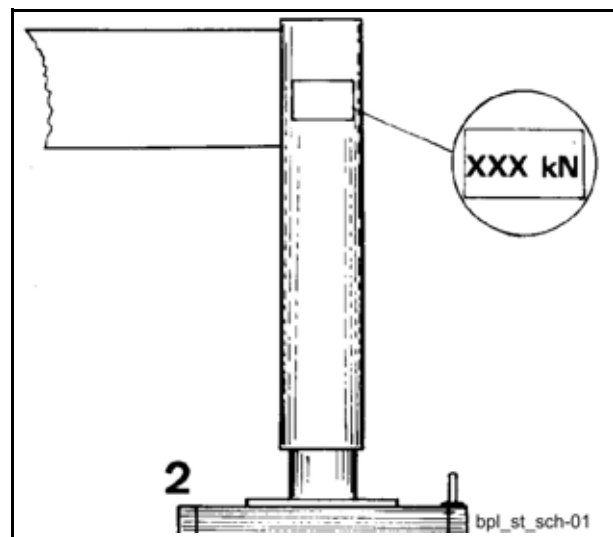
Calculate the ground pressure as in the following example:

Front: 140 kN / 0.36 m<sup>2</sup> = 389 kN/m<sup>2</sup> (3.89 kg/cm<sup>2</sup>)

Rear: 90 kN / 0.36 m<sup>2</sup> = 250 kN/m<sup>2</sup> (2.50 kg/cm<sup>2</sup>)

Based on (**Fig. 135**), determine whether the standard support pads are suitable for the respective ground (permissible ground pressure).

If the standard support pads are not adequate for the present ground conditions, the support surface must be increased using appropriate measures (squared timber) based on table (**Fig. 135**).

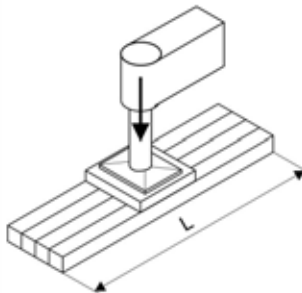


**Fig. 134** Specification of supporting force on each outrigger

### 3.9.3 Tabular determination of the required supporting surface

The required supporting surface can be determined using table (Fig. 135) from the known values for permissible ground pressure (kN/m<sup>2</sup>) and supporting force (kN).

Indicated are the lengths of square timber which must also be placed under one of the standard supplied support pads.



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supporting forces in kN (see supporting leg)	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	
admissible ground pressure (kN/m <sup>2</sup> )	length L of timber squares in cm 4 timber squares 15 cm x 15 cm (zul. $\sigma_s = 53 \frac{N}{mm^2}$ )															
natural soil 100	84	125	167	209	250	ground not suitable for this kind of support										
Asphalt (min. 20cm thick) 200			84	105	125	146	167	188	209							
crushed stone (compacted) 250				84	100	117	134	150	167	184	200					
silty clay (firm) 300					84	98	112	125	139	153	167	181	195	209		
mixed grain size soil (firm) 350						84	96	108	119	131	143	155	167	179	191	
loose-packed gravel (firm) 400							84	94	105	115	125	136	146	157	167	
500								75	84	92	100	109	117	125	134	
750											73	78	84	89		
rock (friable, weathered) 1000	with supporting slabs 60 cm x 60 cm or 65cm x 65 cm without additional timber squares															

Fig. 135 Determining the size of the supporting surface



### 3.9.4 Preparation for installing the machine



#### Danger!

#### Danger being crushed by outrigger!

Too much force of the outrigger may cause contusions and shearing with dire consequences! Do NOT remain in the danger area while actuating the support legs! Only pull out the drawers of the mechanical version using the handles provided for this purpose (**Fig. 131**).

Hydraulically powered supports can only be operated in the "Local" position of the selector switch (3) (**Fig. 136**)!

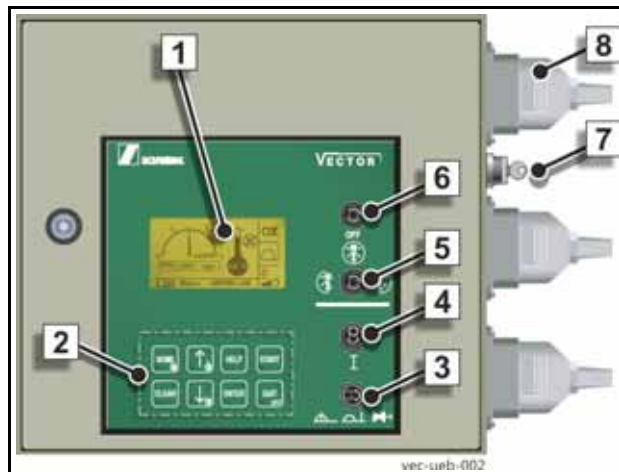


Fig. 136 VECTOR control

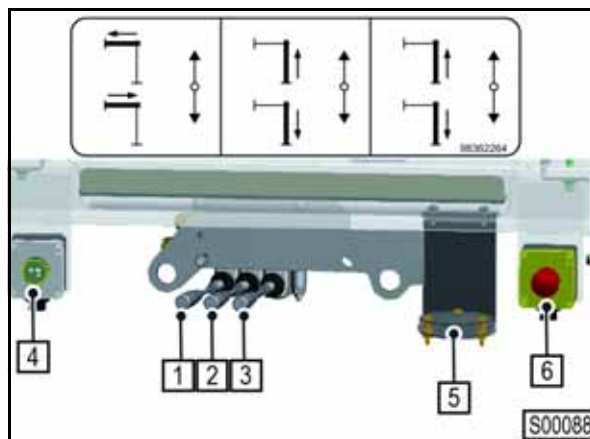
Caption (Fig. 136)	
Pos.	Designation
1	Display
2	Keypad
3	Selector switch: Operating modes
4	Button: VECTOR control ON
5	Switch: EASy work area
6	Switch: EASy OFF
7	Key-operated switch: EMERGENCY STOP bypass

For safety reasons, the machine is equipped with a "fixed-position outrigger control".

In order to operate the outrigger, the release button (4) must be held down while the control levers (1 - 3) are pressed.

If only one control element is actuated, or an element is released during control, then no movement is possible.

The outrigger can only be controlled from the control blocks on the corresponding side of the machine.



**Fig. 137 Example: Outrigger control**

Caption (Fig. 137)	
Pos.	Description
1	Control lever 1
2	Control lever 2
3	Control lever 3
4	Release button
5	Spirit level
6	Emergency-off button

### 3.9.5 Installing the machine



#### **Danger!**

##### **Loss of stability!**

- Always retain the rear axle before setting up the machine!
- Make sure that all vehicle wheels do not touch the ground while operating the boom! Otherwise, the machine can tilt extremely.

It is necessary to release the axle again for the driving operation.

Machine built onto vehicles with pneumatic suspension require special measures, if necessary, during the installation.

If necessary, we will create customer information thereto enclosed in the operating instructions.

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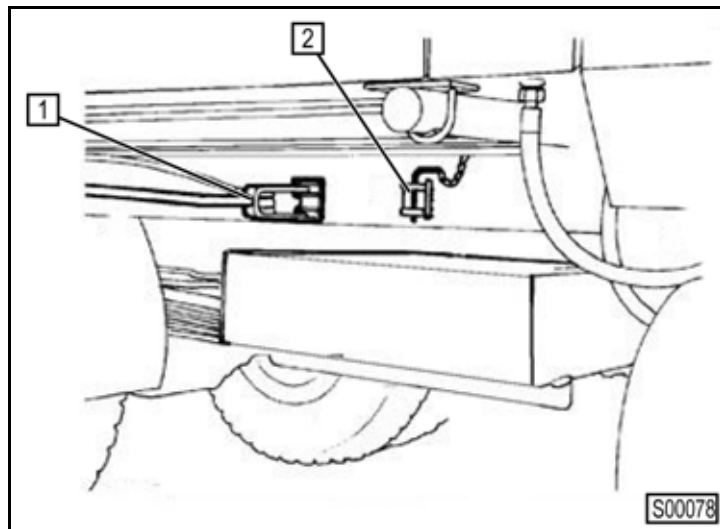
#### **Information**

SCHWING truck-mounted concrete pumps built on two-axle chassis frames are equipped with an axle safety catch.

This catch prevents the rear axle from ground pressure and thus creates an additional tipping force when setting up the machine.

If the back wheels are lifted off the ground, the weight of the rear axle increases the stability moment. This improves the stability and the machine is quieter during the boom operation.

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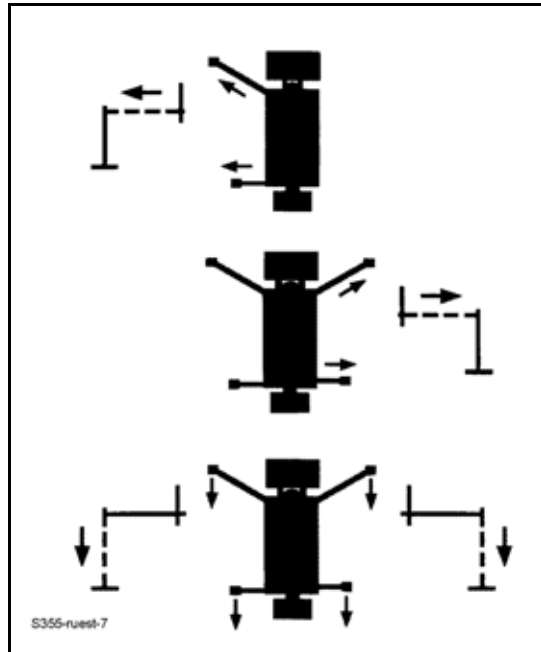


**Fig. 138 Axle safety catch**

Caption (Fig. 142)	
Pos.	Description
1	Lever
2	Safety bolt

- For two-axle vehicles, "catch" the rear axle using the axle safety catch.
- Swing the levers (1) (**Fig. 138**) forward on each side of the vehicle and secure with the safety bolt (2) (**Fig. 138**).

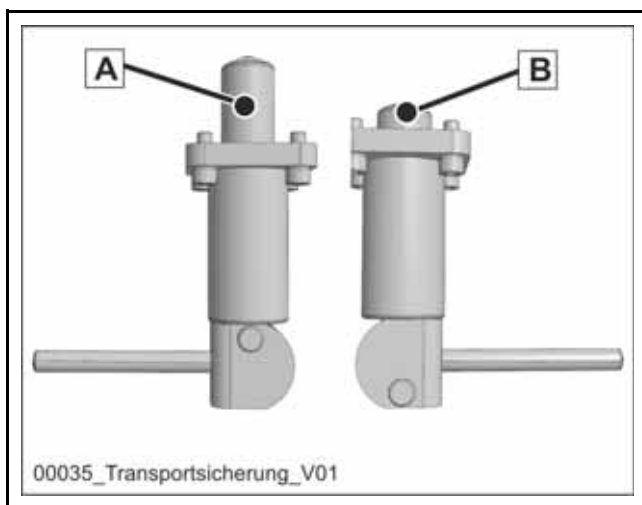
- Observe the correct order when retracting the outriggers (read from top to bottom):



**Fig. 139** Order of outriggers

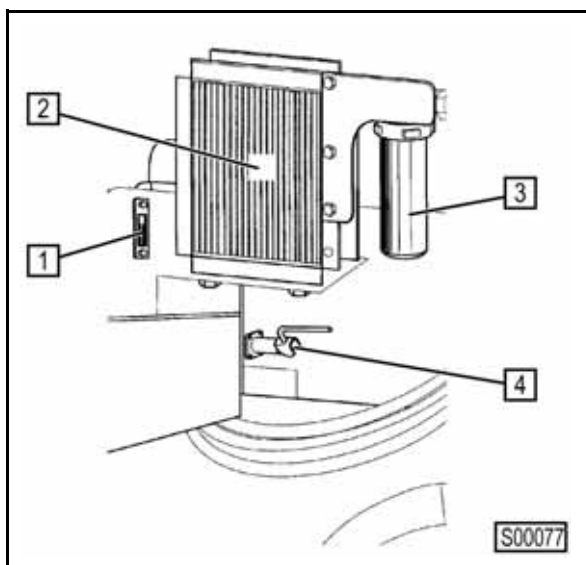
- Remove the transport safety devices (4) from the front (**Fig. 141**) and rear (**Fig. 142**) outriggers.
- Fold the rear supports out to the end position.
- Extend the front outriggers to the end position.
- Steer the outriggers carefully in order to prevent them from crashing into the horizontal end positions.

- Reinsert the transport safety devices (**Fig. 140**), if provided for in the design.



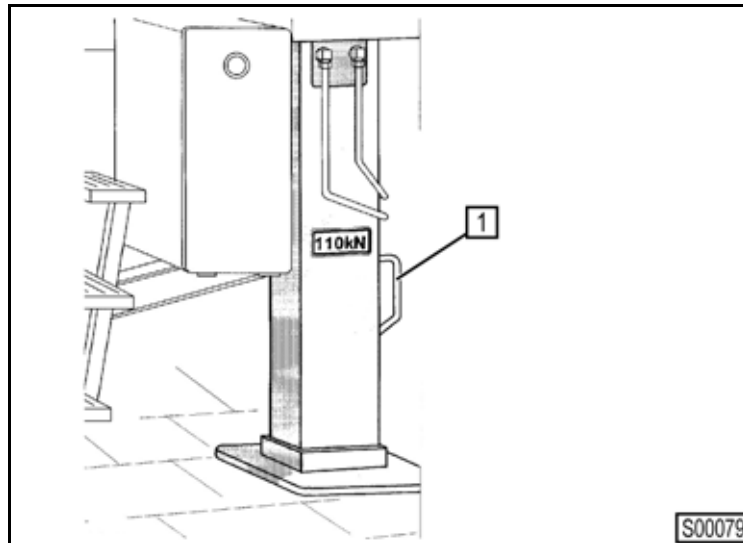
**Fig. 140** Transport safety devices

Caption (Fig. 140)	
Pos.	Description
A	Secured
B	Not secured



**Fig. 141** Front transport safety device outrigger

Caption (Fig. 141)	
Pos.	Description
1	Hydraulic oil level indicator
2	Hydraulic oil cooler
3	Mast filter
4	transport lock

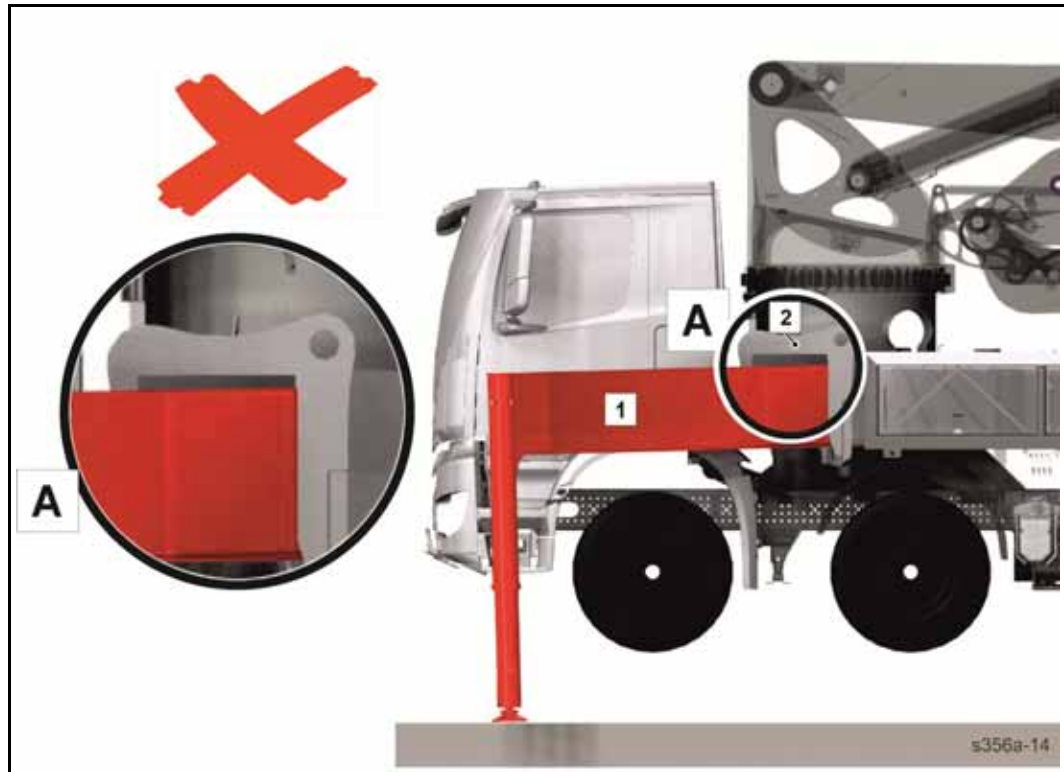


**Fig. 142 Rear transport safety device outrigger**

Caption (Fig. 142)	
Pos.	Description
1	Supporting leg

- Check the space beneath the supporting legs. The surfaces must be even and firm.
- Place the support pads under the centre of each supporting leg as illustrated in **(Fig. 142)**. If necessary, only improve the positions of the support pads; do not move the outrigger.
- The load-distributing support pads must be undamaged and free of ice, oil, grease, etc.
- Extend the front and rear supporting legs until the supporting legs touch the centre of the underlays.
- Raise the machine gradually by alternately actuating the control levers on both sides of the machine. This prevents unnecessary stress on the outrigger and base frame, to which they would otherwise be subjected if only one supporting leg were extended.

- Note that there is no space between the supports (1) and base frames (2) after being raised (none of the vehicle wheels are touching the ground), see **(Fig. 143)** and **(Fig. 144)**. Should one of the outrigger stands not be in contact with the base frame, extend the outrigger leg further until the outrigger stand is in contact with the base frame.



**Fig. 143** Example of incorrect distance between outrigger and base frame

Caption (Fig. 143)	
Pos.	Description
1	outrigger
2	Base frame



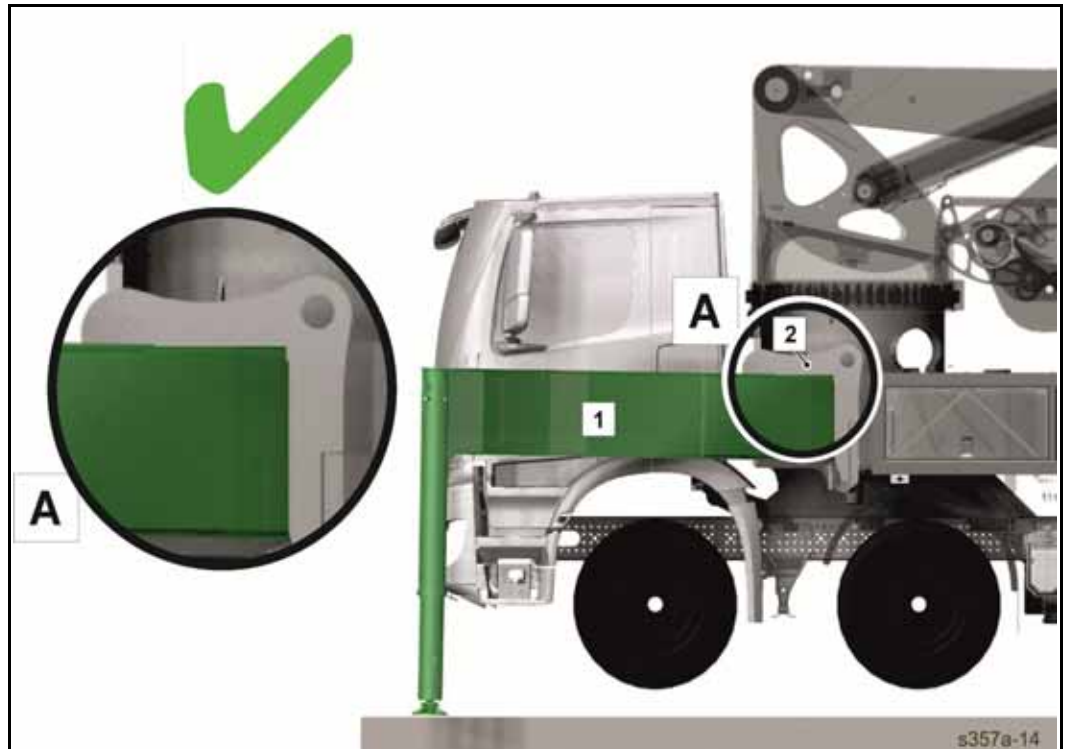


Fig. 144 Example of correct distance between outrigger and base frame

Caption (Fig. 144)	
Pos.	Description
1	outrigger
2	Base frame

### 3.9 Setting up the machine (changeover mode)

### 3.10 Operating the pumping line

This chapter describes how to operate the pumping line on various SCHWING products. The principle remains the same in each case.

Before each pumping operation, make sure that the pumping line system is in good working order.

#### 3.10.1 Observation during operation

Prior to operation, make sure that the pumping line is in sound operating condition. Check the safety devices of the pumping line, see (Fig. 145).



Fig. 145



#### Caution!

##### Injury caused by the cocking lever springing open!

Injuries such as bone fractures or concussions are possible

Immediately secure the cocking levers on the pumping pipe couplings after installing them.

When mounting split couplings, injuries can be caused by the cocking lever springing open unexpectedly.

Secure the cocking lever of the split couplings immediately after closing the cocking lever by using the "safety for split couplings".

Secure the cup expansion couplings evenly with the "Safety for cup expansion couplings" (clip pin).

The laying and operation of hose lines may only be carried out by appropriately trained personnel.

During operation, the pumping line must be observed for leaks.

A leaking pumping line induces clogging due to drying up "bleeding" of the concrete.

In the event of leaks, stop operation immediately and remedy the leak.



### Danger!

#### Danger to life due to pipe breakage!

Severe injuries or even death due to pipes breaking.

Cease operation immediately if fluid is leaking from any lines. Release pumping line by means of reverse pumping!

If liquid is leaking from a pumping line component (e.g. a coupling, pipe wall or pipe elbow), there is a very high risk of accident.

A single inappropriate coupling can cause failure of the pumping line and accidents.

Check the pumping line frequently with a suitable wall thickness measurement device according to the operating conditions, see chapter (4.19).

SCHWING's customer service can recommend suitable measurement devices depending on the pumping line material being used.

We strongly recommend setting up the pumping line exclusively with appropriate SCHWING material.

This is an important contribution to high operational safety and efficiency.

SCHWING is not liable for any damages caused as a result of using inappropriate material!

### 3.10.2 Marking pumping pipes and elbows

All SCHWING pumping pipes and elbows are marked as follows, example (Fig. 146) - (Fig. 149).

The marking for pumping pipes is stamped / engraved on the top side of a flange (Fig. 146).

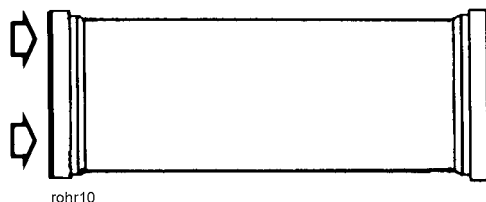


Fig. 146 Position of the tube marking until approx. 2017

Caption for (Fig. 146)	
Designation	Meaning
SH	Manufacturer SCHWING Herne
DN	Nominal size in mm (inner)

Caption for (Fig. 146)	
Designation	Meaning
PN	permissible operating pressure in bar
s	Wall thickness

<b>SCHWING</b>			
Charge	772792	1019280.00	Date 19/16
Material	10133770	960mm	DN 125 SUPER2000
WTmm	4,5 (2,5+2,0)		PN 85 bar / 1.233 psi
WeightNET/pc.	16,0 kg / 35,2 lbs		ODmm 132,0
WeightFWC/pc.	43,4 kg / 95,6 lbs		WeightFWC/l 42,2kg/m / 93.1lbs/ft

00065\_Förderrohr\_V01

Fig. 147 Pumping pipe marking as of approx. 2017

<b>SCHWING</b>			
Charge	77292	1019280.00	Date 19/16
Material	10115878	1550mm	DN 150/125 SUPER2000
WTmm	7,1		PN 85 bar / 1.233 psi
WeightNET/pc.	41,0 kg / 90,4 lbs		
WeightFWC/pc.	97,0kg / 213,9lbs		

00065\_Reduzierrohr\_V01

Fig. 148 Tapered tube marking as of approx. 2017

<b>SCHWING</b>			
Charge	77292	1019280.00	Date 19/16
Material	10189900	90,0°	DN 125 SUPER2000
WTmm	9,5 (7,0+2,5)		PN 85 bar / 1.233 psi
WeightNET/pc.	16,0 kg	35,3 lbs	
WeightFWC/pc.	27,8 kg/pc	45,6 lbs/pc	

00065\_Rohrbogen\_V01

Fig. 149 Elbow marking as of approx. 2017

Caption for (Fig. 147) - (Fig. 149)	
Designation	Meaning
Charge	Order no., customer no.
Date	Production week (MM/YY)
Material	SCHWING item no.
--	Dimensions mm/degree

Caption for (Fig. 147) - (Fig. 149)	
Designation	Meaning
DN	Nominal size in mm (inner diameter)
SUPER 1000	SCHWING quality label
WTmm	Total thickness (inside wall + outside wall)
PN	permissible operating pressure in bar
WeightNET/pc.	Net unit weight
OD	Outer diameter mm
Weight-FWC/pc.	Tube, elbow and tapered tube weight per unit, filled with concrete
WeightFWC/l	Tube weight per metre without flange, filled with concrete

### 3.10.3 Marking the pumping line on the placing boom

A distinctive type plate is located on the placing boom for the placing boom pumping line (**Fig. 150**). The nominal sizes (DN) specified on this type plate are the maximum allowable.

The nominal sizes and the wall thicknesses of the pumping line and the gross density of the pumped concrete must not exceed the specified limits.

The maximum operating pressures (PN) specified on the components and type plates are the maximum permissible operating pressures for components in new condition. If the minimum wall thickness is not met, then replace the tubes and elbows.

With truck-mounted concrete pumps, the pumping pressure for rod and piston-side application is also indicated on the type plate of the concrete pump (**Fig. 151**).

If no value is given for the rod side, it refers to a piston-sided pressurised concrete pump.

This concrete pump may not be interchanged!

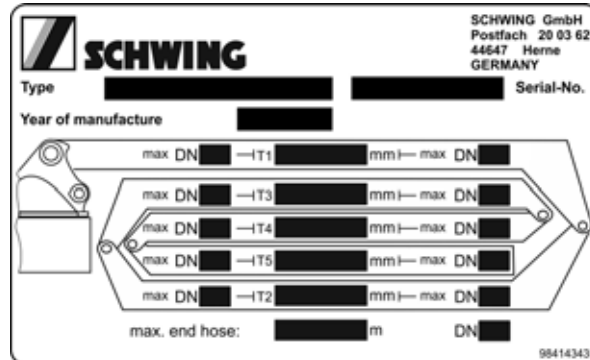


Fig. 150 Example: Type plate on 5-part boom

Caption for (Fig. 150)	
Designation	Meaning
max. DN	max. nominal size for inlet side
T	Length of the pipe on the corresponding boom
max. DN	max. nominal size for outlet side

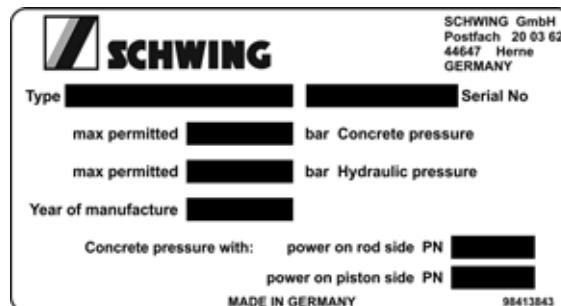


Fig. 151 Concrete pump type plate

### 3.10.4 Pumping line on the placing boom

Normally, a truck-mounted concrete pump delivers the concrete directly via the pumping line of the assembled placing boom.

A separate placing boom is supplied by a separate concrete pump.



**Danger!**

**Loss of stability due to excessively heavy pumping lines on the placing boom!**

The machine can topple over and cause severe or even fatal injuries as a result.

The concrete pumping line installed on the placing boom is an integral part of the machine and must not be changed.

In an extreme situation, the increased breakdown torque may cause the machine to topple over.

Pumping pipes with an excessive tare weight (thicker walls) and pumping pipes with larger diameters can overload the placing boom.

Unsuitable pumping lines cause damage (especially broken tube holders, cracks in boom profiles, etc.).

Due to changes to the pumping line, other safety-relevant adjustments of the machine may be mandatory.

After major changes that are not carried out by SCHWING, placing booms must be inspected by an expert before being recommissioned, see **(3.10.5)**.

### 3.10.5 Disclaimer

Independent modifications to the machine and using spare parts and accessories that have not been approved by SCHWING fall under the definition of "improper use".

This also applies to the use of individual parts, such as: Tubes, couplings, elbows, etc.

We would like to draw attention once again to the fact that SCHWING is not liable for damages caused by improper or negligent operation, maintenance and repair or improper use.

This also applies to expansions and conversions, as well as other changes to the machine not approved by SCHWING.

For mounting and operation of separate pumping lines (tubes or hoses), the operator bears sole responsibility!



### 3.10.6 Reconnectable concrete pumps

In the interest of a high concrete delivery rate, reconnectable concrete pumps are usually supplied with rod-side pressure.



#### Danger!

#### **Danger to life due to pipe breakage!**

Severe to fatal injuries as a result of liquid being discharged explosively from defective pipelines.

The machine must only be modified by SCHWING's customer service.

With piston-side pressure, only use suitable pumping line material.

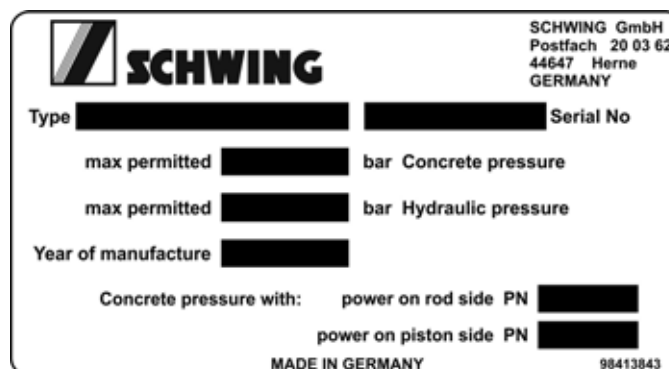
These concrete pumps must not pump through the end hose and boom pumping line with piston-side pressure.

Reconnectable concrete pumps can produce concrete pressures with piston-sided pressure exceeding the maximum permissible operating pressures of the boom pumping line and other components.

The concrete pressures for rod and piston-side pressure are indicated on the type plate of the concrete pump, see **(Fig. 152)**.

Separately installed pumping lines are an exception.

The pumping pressure that can be reached by the hydraulic pressure must not exceed the maximum permissible pumping pressure of the pumping line components in use.



**Fig. 152 Concrete pump type plate**



### Danger!

#### Danger to life due to moving parts!

Severe injuries or even death due to severed limbs.

Do not reach into the gate valve.

Before opening the pumping line / outlets, switch the drive motor off and secure it against unauthorised activation.

See (Fig. 153).



Fig. 153

### 3.10.7 Short outlet (foldable)

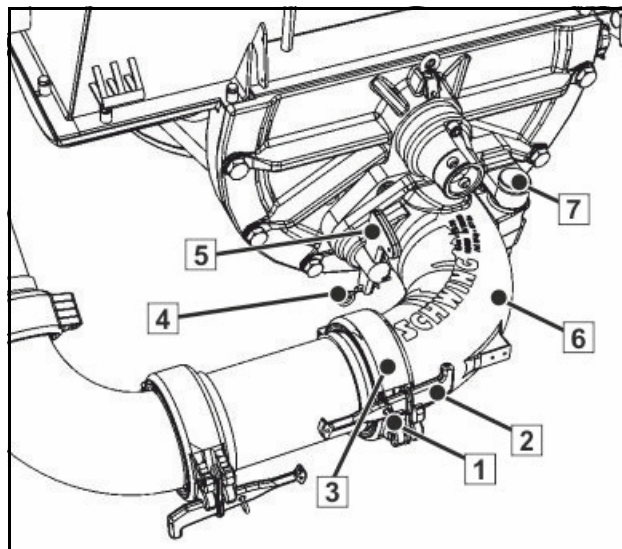
The foldable pipeline outlet can make the connection flange of the rock valve accessible and cleaned trough the foldable pipeline outlet.

In order to make the connection flange freely accessible:

- Pull the clip pin (1) (**Fig. 154**)
- Loosen the wedge (2)
- Remove the coupling (3)
- Pull the clip pin (4) out of the wedge (5)
- Remove the wedge (5) (**Fig. 154**) and keep it ready to use as a chock for the hinge (7)
- Fold open the outlet (6) to the right
- At an opening angle of approx. 100°, the wedge (5) (**Fig. 154**) can be wedged into the notch on the hinge, as illustrated in (**Fig. 155**).

The connection flange of the rock valve is now freely accessible and can be cleaned.

Once all the work on the flange of the rock valve has been completed, proceed in reverse order to fold back the pipeline outlet and mount to the pumping line of the truck-mounted concrete pump.



**Fig. 154** Foldable outlet

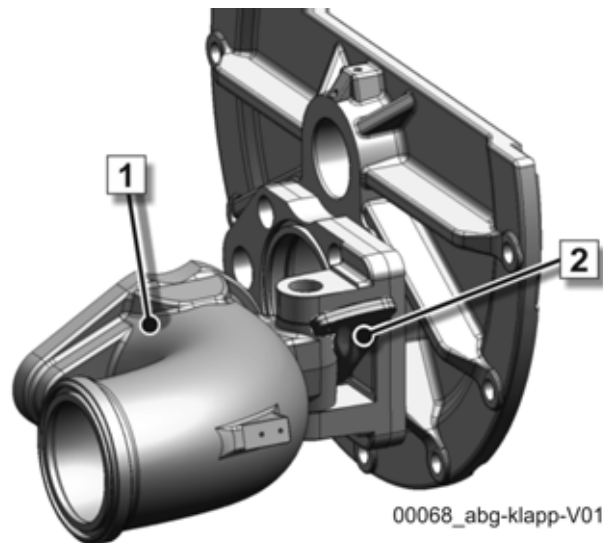


Fig. 155 Wedge lock

### 3.10.8 Short outlet (foldable and rotatable)<sup>1</sup>

In order to connect a separate pumping line more easily, certain SCHWING truck-mounted concrete pumps can be optionally equipped with a foldable and rotatable outlet (6; **(Fig. 156)**).

The short, foldable outlet (standard) can be fully replaced by the foldable and rotatable outlet.

In order to rotate the foldable and rotatable outlet:

- Pull the clip pin and remove the wedge (1) and coupling (5) first
- Pull the clip pin and remove the wedge (2)
- Open the foldable and rotatable outlet
- Loosen both the safety screw (4) and the second safety screw offset by 180° by approx. half a rotation
- Rotate the foldable and rotatable outlet into the required position (e.g. 6; **(Fig. 156)**) and fold it back
- Reinsert the wedge (2), but do not hammer it in place yet
- If necessary, correct the position of the foldable and rotatable outlet and then hammer the wedge (2) down. Secure the wedge using the clip pin.
- Reattach the upper and lower safety screws (4) Connect a separate pumping line.

In order to reconnect the foldable and rotatable outlet with the pumping line of the machine, proceed in reverse order.

<sup>1</sup>.Optional, only for truck-mounted concrete pumps

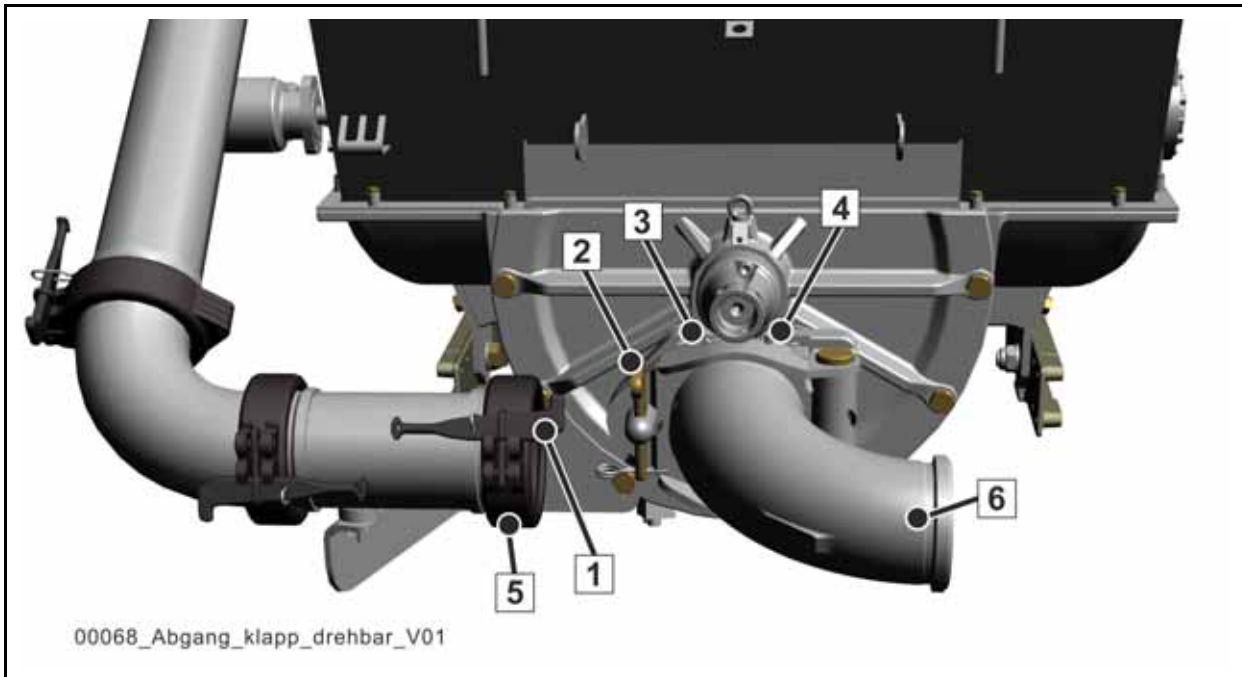


Fig. 156 Outlet, foldable and rotatable

### 3.10.9 Large outlet DN 180/180/150 (foldable)

The folding function is the same as for the short outlet. The larger outlet 180/180/150 has the advantage of having less concrete resistance.

Use the “large outlet” when pumping concrete that is difficult to pump.

The larger outlet 180/180/150 also has a 14-degree elbow mounted on the rock valve, see (1) (Fig. 157).

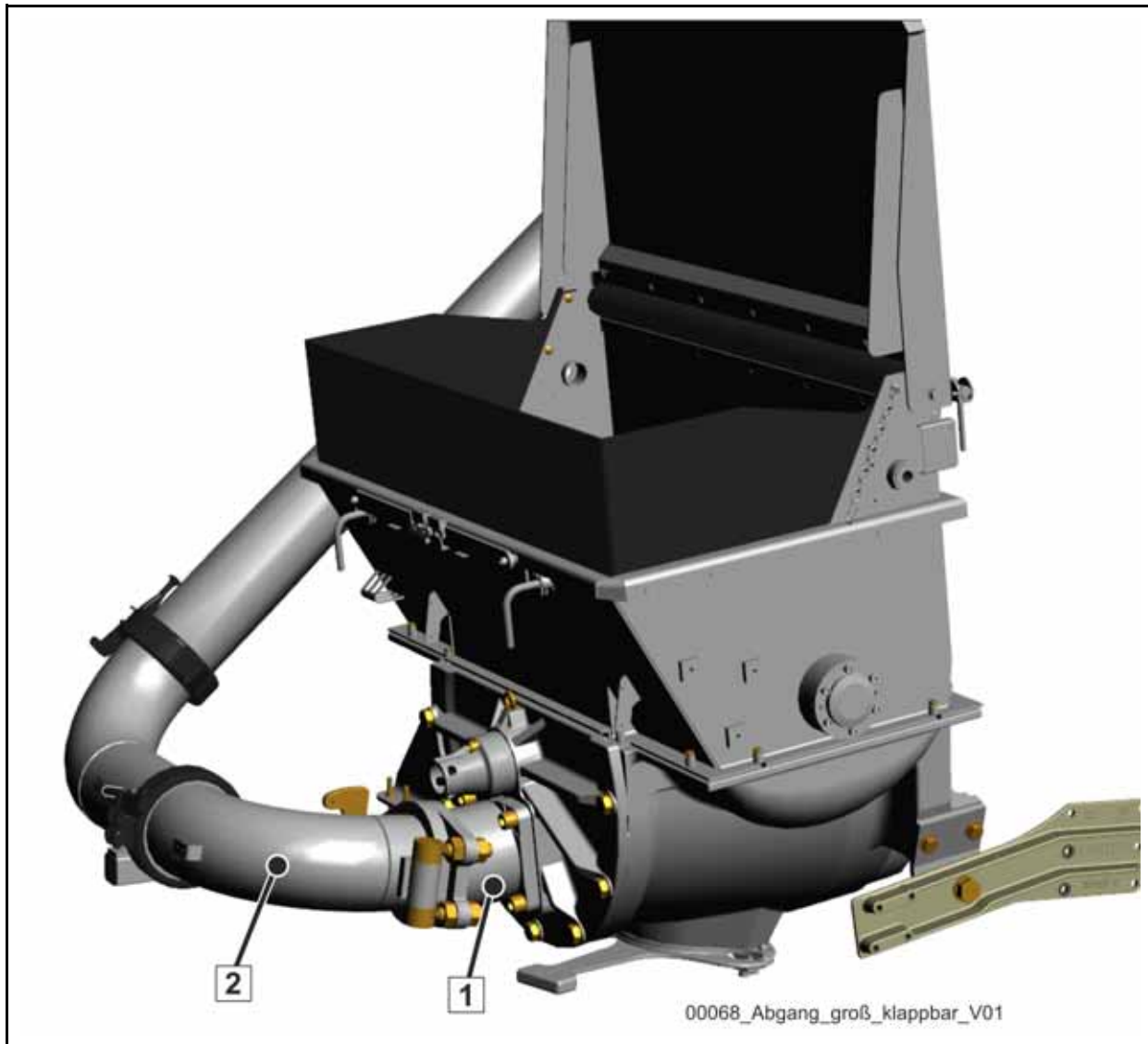


Fig. 157 Large outlet, foldable

### 3.10.10 Servicing the foldable and rotatable outlet

Once a week, squeeze some lubricating grease into the grease nipple (3) (**Fig. 156**) and into the second nipple offset by 180°.

Actuate the grease gun until the grease visibly emerges.

Lubricate the seal of the split coupling with lubricating grease prior to mounting.

Clean used seals and check them for damage prior to mounting.

### 3.10.11 Separate pumping line

The use of a stationary concrete pump / trailer pump must always be planned carefully.

In addition to the selection of the right pump, the selection and installation of the pumping line is of great significance.

Both must be done with great care and expertise.

SCHWING offers an extensive range of pumping lines and accessories.

Should you have any questions regarding the pumping line, please contact SCHWING Customer Service.

When selecting the pumping lines, observe the maximum possible pumping pressure of the concrete pump, depending on the:

- Drive power of the concrete pump
- installed pump kit
- Application of the differential cylinder

Certain stationary concrete pumps can, for example, generate a pumping pressure of over 200 bar, see type plate.

These maximum values are rarely achieved during the normal operation.

However, given that, in the event of clogging, the complete pipeline between the concrete pump and the clog is under maximum pressure, the entire pumping line must be able to tolerate these values.

### Separate pumping lines are available in different versions:

#### 1 Pumping pipes for split couplings (Fig. 158)

These correspond to the system used for placing booms. They can be used with a pressure of up to 85 bar depending on the nominal sizes (DN). Separately installed pumping lines are suitable up to 110 bar.

Due to the external seal (3), which must be removed and cleaned with each modification, this solution as a separate pumping line is not as economical as the following ones:

#### 2. Pumping pipes with a male and female flange for cup-tension couplings (Fig. 159).

The following versions are available:

- a) Standard tubes up to 4.5 mm thick walls (depending on the nominal size) are suitable for up to max. 110 bar.
- b) Thick-walled tubes with walls that are 7.1 mm thick are suitable for up to max. 160 bar.
- c) Ultra high pressure tubes with a wall thickness of 7.1 to 10 mm (depending on the nominal size) are suitable for up to 200 bar of pumping pressure.

Ultra high pressure tubes are fitted with special high-pressure nozzles (Fig. 160).

They are indispensable for using our concrete pumps SP 3800 - 9500 HDR.

Cup expansion couplings are also used for our extreme pressure tubes.

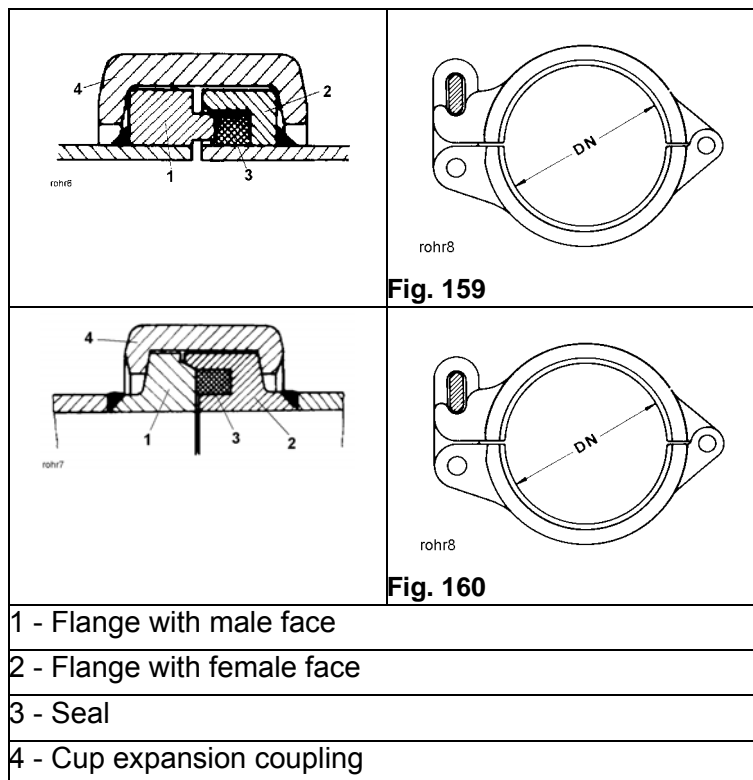
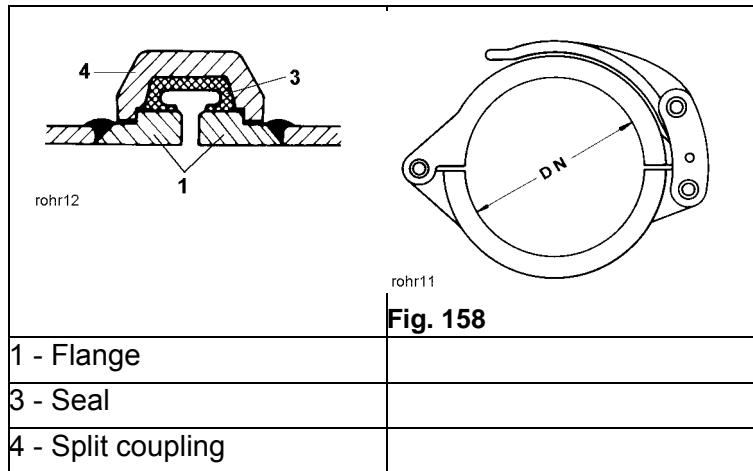


### Information

The figures show typical characteristics of the flange. The exact design is slightly different depending on the nominal size.







### 3.10.12 Concrete pumping hoses

#### 3.10.12.1 End hoses

An end hose is connected at the end of the pumping line for the distribution of the concrete.



#### **Danger!**

#### **Direct danger to life in the danger zone of the end hose!**

Danger of death due to flapping end hose, spraying concrete and stones shooting out!

Always adhere to the required safety regulations!

---

Observe the following points in particular:

- The hose must hang freely when commencing pumping, when starting to pump again, and after blockages. No-one may remain in the danger zone of the end hose. The diameter of the danger zone is double the length of the end hose. It is prohibited to guide the end hose during pumping.
- Do **NOT** use fixed end pieces, reductions or extensions on the end hose! Connecting hoses with double-sided fixing are not permitted for use as end hoses!
- Do **NOT** use a longer end hose!  
The maximum lengths and nominal sizes of the end hose are given for placing booms.

In exceptional cases, modifications and extensions are only permitted in strict accordance with the manufacturer's instructions, see the "End hose modification options" table in the ET catalogue. When using a longer end hose, the diameter of the danger zone also increases!

Observe the safety instructions on the machine, see (Fig. 161) - (Fig. 163).

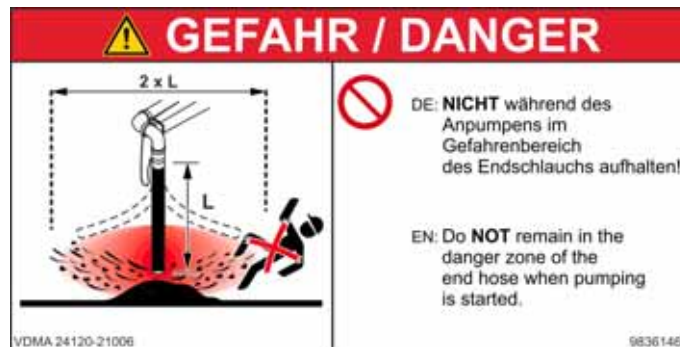


Fig. 161



Fig. 162



Fig. 163

### 3.10.13 Connecting hoses

Connecting hoses with double-sided fixing can be used as flexible intermediate pieces in rigid pumping lines based on their permissible pumping pressure.

### 3.10.14 Hose pipes

Multiple connecting hoses are often connected to hose pipes in mobile restoration operations.

The hoses are usually carried on a specially equipped truck-mounted concrete pump, installed before use and removed again after use.

#### 3.10.14.1 Installing and operating a hose pipe

The installation of the hose line, as well as its operation, requires special care and expertise.



#### **Danger!**

#### **Danger to life due to flapping hoses!**

Block off the danger zone and fix the hoses, cover hose in a suitable manner if required!

In order to avoid a premature failure and possible accidents, ensure the following:

- Only use functional, clean hoses, couplings, seals, etc. of the same system to set up a hose pipe.
- The maximum possible pumping pressure of the concrete pump must not exceed the permissible pumping pressure of all pumping line parts.
- The concreting personnel at the placement site must be aware of any potential dangers and be familiar with all necessary work.
- Install hoses in widest possible radius - do not bend (Radii that are too narrow cause abrasion on one side, thus allowing any bends to quickly destroy the hose. Narrow radii and bends encourage clogging and cause the hose to pulsate).
- Do not pull hoses, especially not over sharp edges.
- Do not twist hoses.
- Do not allow hoses to hang loose.
- Do not strike the hoses.
- Place hoses and fasten securely with belts. Do not use incising fixing parts.
- Do not drive over hoses. Place hose pipe in a protected manner.
- No unauthorised persons may remain near the hose pipe during pumping operations
- Moisten hose with water, then pump with flow mixture.
- Always observe the maximum grain size, depending on the diameter of the hose.
- Pump at a low delivery rate, hose must remain still.

### 3.10.14.2 Cleaning the hose pipe



#### **Danger!**

#### **Direct danger to life due to flapping hoses!**

Blowing out pumping hoses with compressed air is prohibited, see safety manual.

---

Hoses must be carefully cleaned after each use.

A thorough internal cleaning is especially important for this.

Dirty hoses wear out faster and cause clogging.

Suck back the cleaning ball, then knock off individual hoses and rinse thoroughly with water.

If it cannot be sucked back, knock off individual hoses, tip out and rinse thoroughly with water.

- Always make sure that the hose system is perfectly clean.

A clean hose helps prevent clogging.

Dried-up concrete can coalesce with rubber.

This means that not only the remaining concrete, but possibly a piece of rubber, will be pulled out during the next pumping.

### 3.10 Operating the pumping line

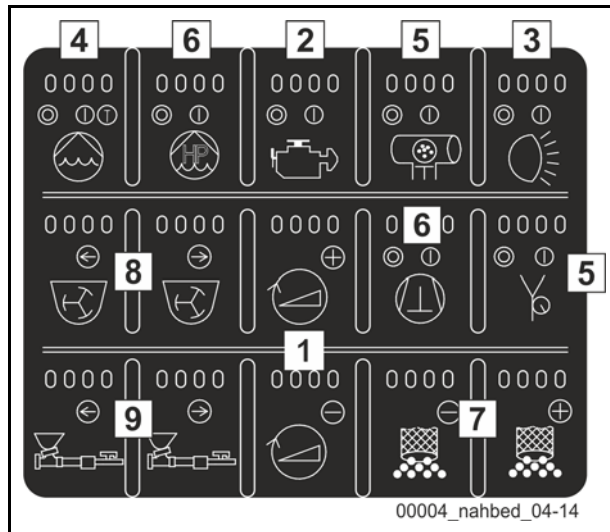
### 3.11 Local control

The local control (**Fig. 164**) is primarily used for cleaning the machine.

Reason:

Both hands are needed to clean the rear section of the machine, which makes a remote control more of a hindrance.

All of the functions needed for cleaning are located on the local control unit.


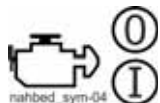









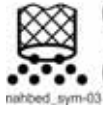










**Fig. 164** Variants of the local control unit

#### 3.11.1 The individual functions

In “REMOTE” operating mode, the local control unit’s functions are all locked except for the floodlights.



In “LOCAL” operating mode, all of the local control unit’s functions (**Table 25**) are available.

Pos.	Symbol	Description
1	 nahbed_sym-01	Change speed of the vehicle engine
2	 nahbed_sym-04	Drive motor START / STOP
3	 nahbed_sym-08	Floodlight ON/OFF

4	 	Water pump ON (I)toggle (continuous operation) (T)momentarily (special control)
5.1		Chamber valve activated
5.2		Vibrator ON
6.1		Compressor ON
6.2		High-pressure water pump (HDR) ON
7	  	Delivery rate of the concrete pump (+)increase (-)reduce
8	   	Agitator (R) reverse / suction (0) OFF (P) forward / pumping
9.1	 	Concrete pump ON Pump in "reverse" = suction
9.2	 	Concrete pump ON Pump "forwards"

**Table 25 Local control functions**

The following features are only available on the local control panel (**Fig. 164**):

	Floodlight on (also active in "REMOTE" operating mode)
	High-pressure water pump on (special equipment)





### Information

The agitator and vibrator work automatically in “REMOTE” operating mode.  
The local control is locked in “REMOTE” operating mode.

Operating data and malfunctions that occur while using the local control unit are output on the display of the VECTOR control system (1) (**Fig. 166**).

### 3.11.2 Position of the local control unit

The local control unit is always positioned on the back of your machine in the direction of travel. The local control unit is in supply mode (3) (**3.11.3**).

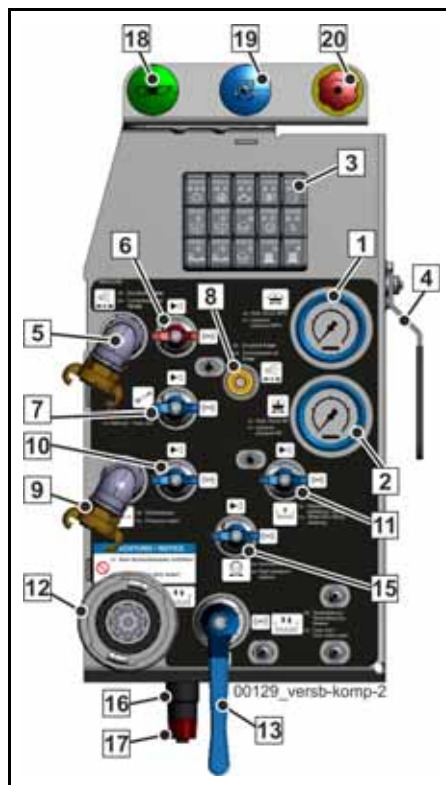


Fig. 165 Supply control

### 3.11.3 Enabling local control

Read Chapter (3.7) for how to activate the local control unit.

The local control is activated during running operations in the VECTOR control system by selecting and confirming “LOCAL” operating mode.

### 3.11.4 Switching operating modes

If the operating mode needs to be changed during operation (e.g. from “remote” to “local”), all engaged selector switches must be moved into the neutral (0) position.

Otherwise, it will not be possible to start the machine.

If not all of the switches are in the neutral position, the VECTOR control display (1) (**Fig. 166**) will output a corresponding error message and it will not be possible to change operating modes.

Switching to an inactive transmitter when changing from local to remote operating mode triggers an EMERGENCY STOP.

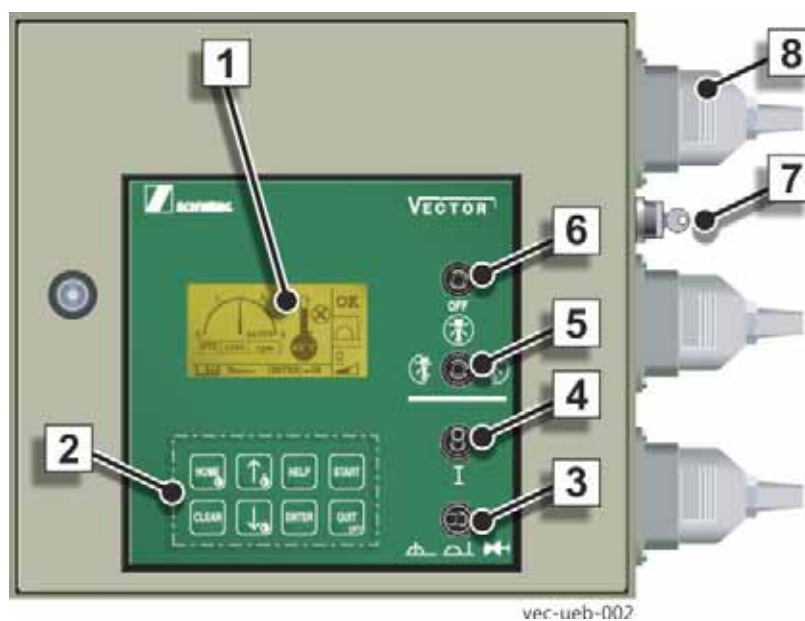


Fig. 166

### 3.12 Remote control



#### Information

No stationary control platform is defined for our truck-mounted concrete pumps.

Normal working operation is only permitted using the remote control unit.

Control devices directly on the machine may only be used for:

- Supporting the machine
- Maintenance (repairs, servicing, cleaning)
- Emergency operation.

By working operation, we mean concrete placing tasks as well as every placing boom movement.

- Select your location so that you can easily see the concrete placement site and communicate with the mixer driver.

If this is not possible, guides are absolutely mandatory.



#### Caution!

**Risk of injury due to unintended or unauthorised activation of the machine controls!**

Various machine control elements and the hydraulic emergency operation system are located behind lockable covers (**Fig. 167**).

Always keep these covers locked and only open them to carry out tasks that are required immediately.

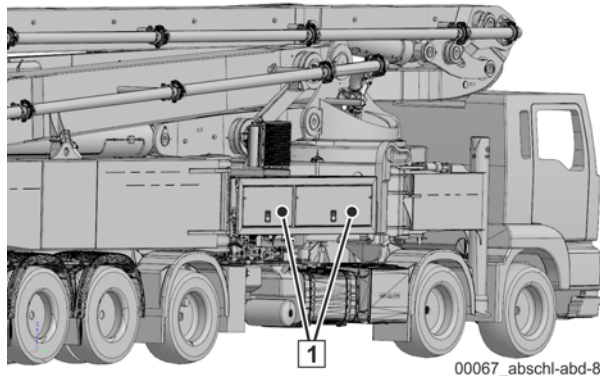


Fig. 167 Example: lockable covers (1)

### 3.12.1 Remote controls used

Machines with the VECTOR control system are equipped with a radio remote control by default.

Operating instructions for the remote control used can be found in chapter “Remote control” on page 537.



#### **Caution!**

#### **Risk of injury due to malfunction!**

Only run your machine using a remote control unit that corresponds to the delivery condition of the ex-works machine.

SCHWING is not liable for any damage caused as a result of using other systems.

### 3.12.2 Switching operating modes

If, during operation, you need to switch the operating mode (e.g. from remote to local or from cable to radio control), all engaged selector switches must be flipped to the neutral 0 position.



#### Information

If the selector switches are not in the neutral 0 position, then it will not be possible to switch the operating mode.

The display (1) (**Fig. 168**) of the VECTOR control system shows an appropriate error message.

If, for example, it is switched to an inactive transmitter (EMERGENCY STOP actuated, transmitter off), an EMERGENCY STOP is initiated immediately for the machine.

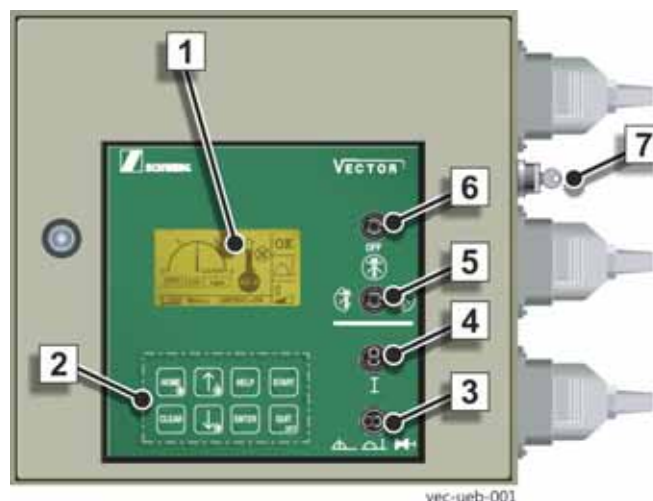


Fig. 168 VECTOR switch cabinet



### 3.13 Working operation: Placing boom

#### 3.13.1 Safety

The placing boom is designed for concrete with a maximum specific weight of 2400 kg/m<sup>3</sup>.



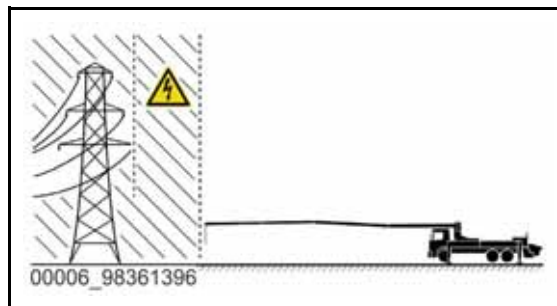
#### **Danger!**

##### **Danger to life due to voltage flashover!**

Getting too close to or touching high-voltage lines with the placing boom poses an immediate danger to life due to electric shock!

Keep to the minimum distance from high-voltage lines as stipulated in the safety manual (**Fig. 169**).

In case of any doubt, refrain from using the placing boom and, for example, lay a separate pumping line.



**Fig. 169** Distance from high-voltage lines



#### **Danger!**

##### **Danger to life due to the machine toppling!**

If the end hose is in a prohibited working range, the entire machine can topple over and cause death to people!

The end hose must never be extended past the vertical position of the placing boom while in the backwards position (**Fig. 170**).

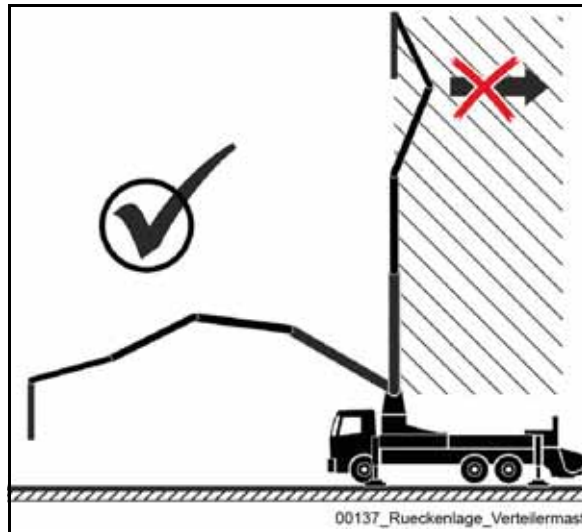


Fig. 170 Placing boom in backwards position



### Danger!

#### Danger to life due to the machine toppling!

It is prohibited to lift loads with the placing boom as this can cause the machine to become unstable and topple over!

The machine can cause death to people.

The placing boom must not be used to lift loads (**Fig. 171**).

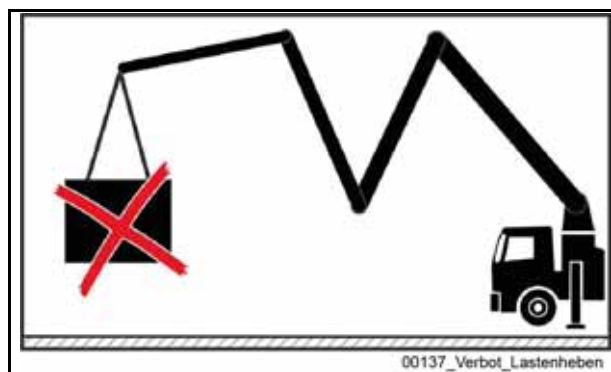


Fig. 171 Lifting loads is prohibited



### Warning!

#### Danger of injury due to falling parts!

Remaining beneath the placing boom is prohibited (**Fig. 172**).



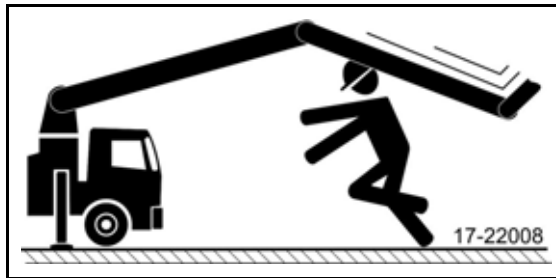


Fig. 172 Danger zone of placing boom



### Warning!

#### **Danger of injury in the danger zone of the placing boom!**

A drop in pressure or lack of attention when moving the placing boom can lead to serious injuries or death.

Make sure that no persons remain under the placing boom when it is in operation. Always wear the required personal protective equipment.

---



### Caution!

#### **Risk of injury due to unintended or unauthorised activation of the machine controls!**

Various machine control elements and the hydraulic emergency operation system are located behind lockable covers.

Always keep these covers locked and only open them to carry out tasks that are required immediately.

---



### Caution!

#### **Risk of injury due to unauthorised use!**

To prevent unauthorised persons from accessing the machine, the emergency operation control station must be locked

along with the control levers. Remove the control levers again from the slots after use.

---



### Caution!

#### **Risk of injury due to obstructed vision while working!**

Always operate the machine in such a way that you can monitor the entire working range.

---



### Information

Control of the placing boom during work operations is principally carried out using the remote control. Using the emergency operation system to control the machine is only permitted in cases of emergency in order to move the placing boom into a safe position.

---



### Information

Before using it, screw the emergency operation control levers into the control lever slots in order to actuate them.

---



### Information

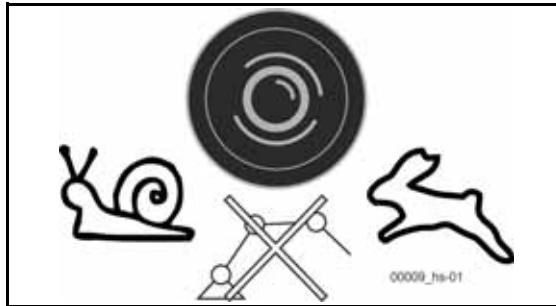
The movements of the placing boom are proportional to the deflection of the respective control lever. When moving the placing boom using the emergency operation, all electronic safety devices for the boom movements are decommissioned. A higher level of attention is therefore required from the operator when in this operating mode!

---

### 3.13.2 Controlling the speed of the placing boom

The "HARE" / "SNAIL" selector switch can be used to control the speed of the placing boom.

When this selector switch is in centre position (0) (as illustrated in **(Fig. 173)**), all boom functions are switched off.



**Fig. 173 Controlling the movement speeds**

All other functions can be used. This is important when the boom must not be moved inadvertently during pumping operation.

- Select "Snail" or "Hare", depending on the desired speed:
  - "Snail" = **slow** is intended for normal working operation. Speeds of between 0 and 50 % can be achieved.
  - "Hare" = **fast** is intended for raising the placing boom. Speeds of between 0 and 100 % can be achieved.

### 3.13.3 End positions



#### Information

Make sure that the angle sensors partially monitor the permissible working range of the placing boom.



#### Information

The control will reduce the maximum possible movement speed shortly before reaching the end position (danger zone).



### Information

You move the placing boom out of the danger zone by steering in the opposite direction.

- Move the placing boom carefully and at a reduced speed when approaching the end position of the placing boom, e.g. **(Fig. 174)**, **(Fig. 176)** and **(Fig. 175)**.
- Do not move into the end position at full speed! Following this procedure protects the placing boom and machine.
- Pay even more attention when the machine is operated at higher power, e.g. pumping operation with higher delivery rates.

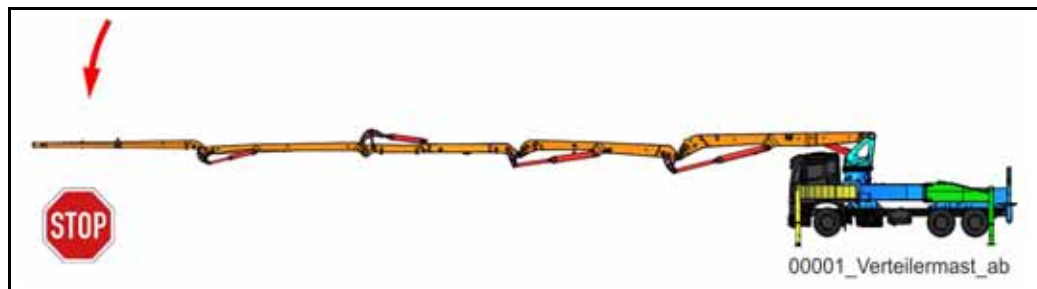


Fig. 174 Placing boom extended, movement stopped

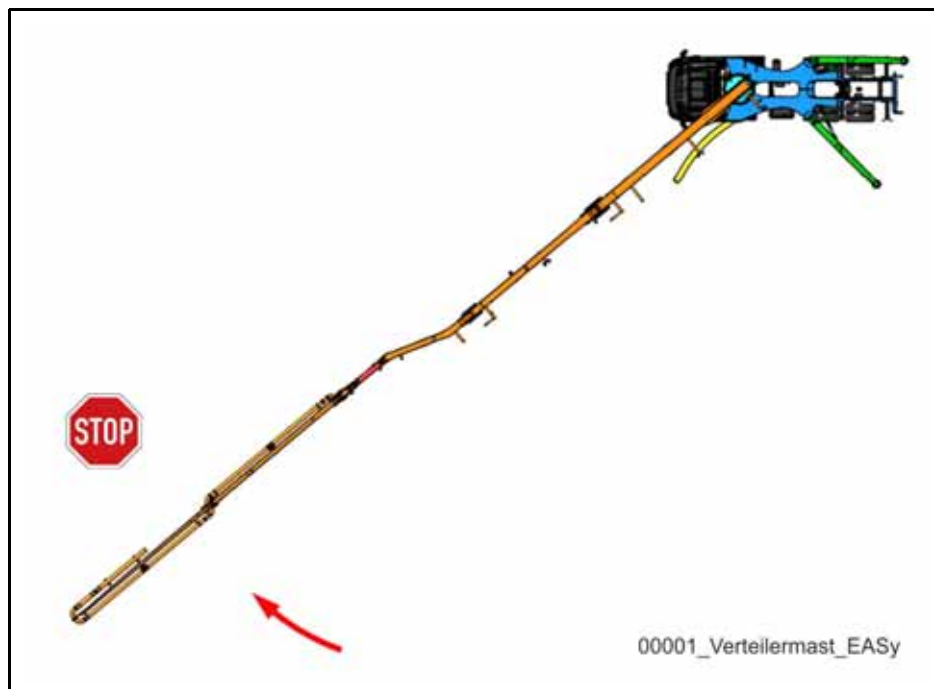


Fig. 175 Placing boom extended, turning movement with EASy

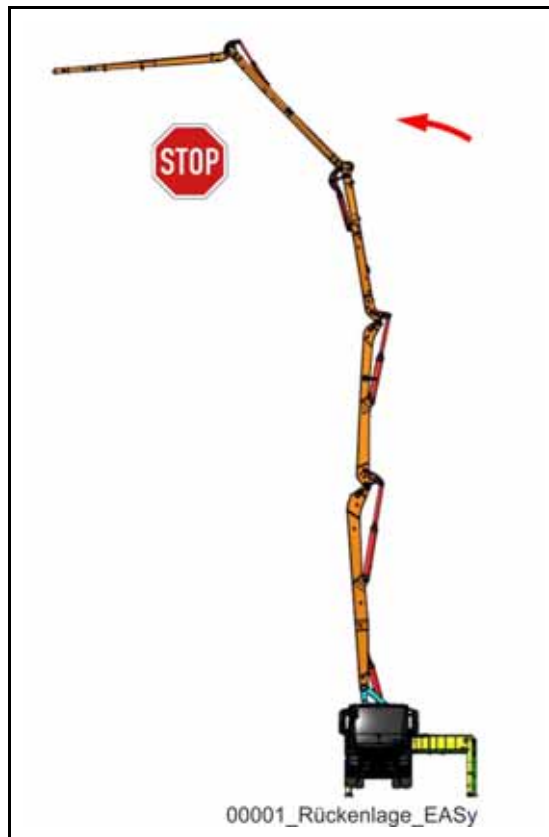


Fig. 176 Placing boom in backwards position with EASy

#### 3.13.4 Storm and bad weather operation



##### **Danger!**

##### **Danger to life due to lightning strikes!**

During storms, lightning poses an imminent danger to life. The machine and its immediate vicinity are charged with electricity. Earthing the machine does not reduce this risk. Move the placing boom into the transport position.



##### **Caution!**

##### **Risk of injury and risk of damage due to excessive wind speeds!**

If the permitted values for excessive wind speeds are exceeded, the machine can tip over and thus be damaged. Observe the permitted wind speeds in conjunction with the vertical reach. Move the placing boom into the transport position.



### Information

If the wind speeds described in this chapter deviate from those specified in the safety manual, the values indicated in this chapter shall take precedence.

The work position of the placing boom does not play a role here. When wind speeds reach the permissible thresholds, the placing boom must be moved into the transport position.

When using an outrigger on one side with EASy, the same maximum permissible wind speeds apply to the placing boom as they do to fully supported machines.

- Placing booms with a vertical reach of 42 m or more may only be operated during winds of up to and including force 7 (51 km/h = 14 m/s).
- Placing booms with a vertical reach of less than 42 m may only be operated during winds with a force of up to 8 (72 km/h = 20 m/s).

The placing boom should also be folded if the max. permissible wind force is only exceeded by gusts.

Tower cranes on jobsites often have a wind gauge, allowing you to enquire about the wind speed at any time.

If no wind gauge is available, you can enquire about the wind speed at your nearest meteorological office, or roughly estimate the wind speed using the following rule of thumb:

- Starting at wind force 7, green leaves will break off trees and there will be noticeable difficulties when walking outside.
- Starting at wind force 8, small twigs will break off trees and there will be significant difficulties when walking outside.

### 3.13.5 Working position



#### Warning!

##### **Risk of accident and damage as a result of exceeding backwards position!**

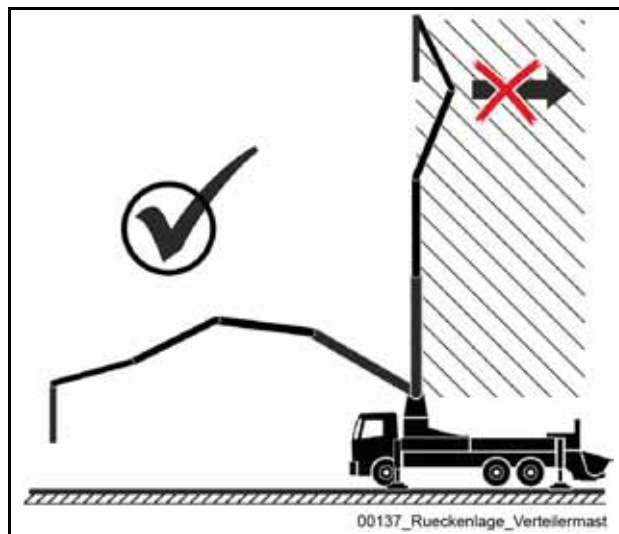
In order to avoid overloading the placing boom hydraulics, the end hose must not be extended in the "backwards position" beyond the vertical line into the prohibited area (**Fig. 177**).



#### Attention!

##### **Risk of damage due to incorrect order of work steps when folding out!**

If the folded boom package is raised (**Fig. 178**), it will pound against boom section 1 before reaching the end bearing! Always follow the correct order when folding the boom section! Exercise particular caution when carrying out multiple movements at once.



**Fig. 177 Backwards position and prohibited range**

The ZR 20 can be folded out in halls with a ceiling height of approx. 3.9 m.

- Raise boom section 1 as far as possible.
- Rotate boom section 1 into the working position.
- Extend boom section 4 (**Fig. 179**).
- Extend boom section 3 (**Fig. 180**).
- Extend boom section 2 (**Fig. 181**).

In the following position, it is possible to place concrete near the vehicle (**Fig. 179**).

All other positions are achieved by moving the boom extensions up to the maximum range.

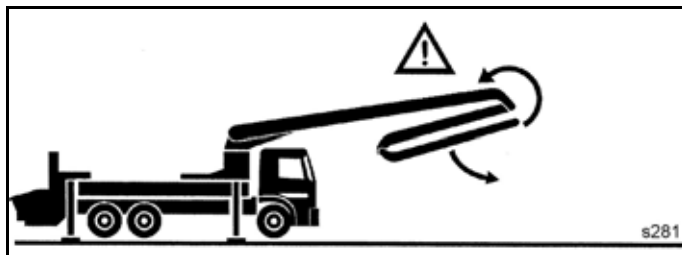


Fig. 178 Folded boom package

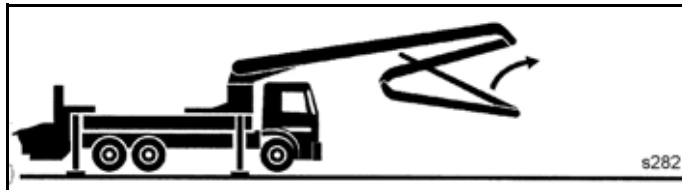


Fig. 179 Extend boom section 4

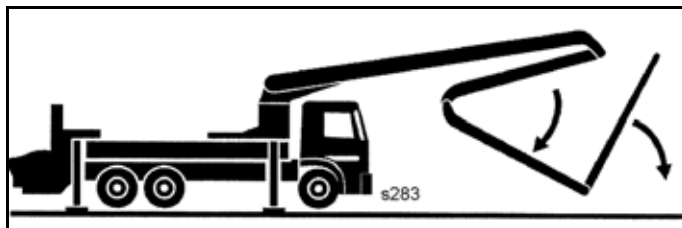


Fig. 180 Extend boom section 3



Fig. 181 Extend boom section 2



### 3.13.6 Pumping



#### Danger!

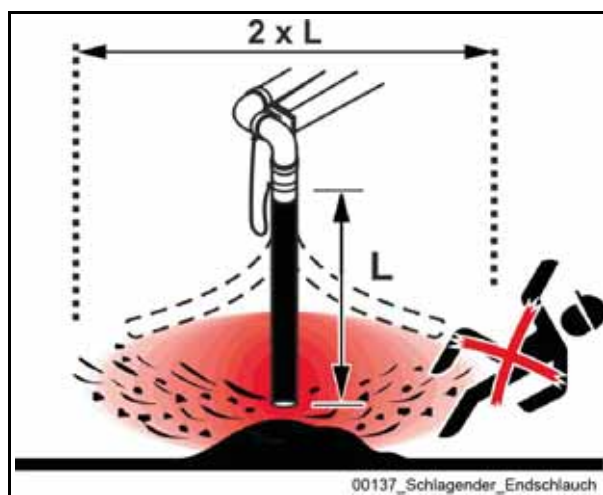
**Danger to life due to end hose flailing about and spraying concrete!**

Do NOT stay in the working area of the end hose while pumping.

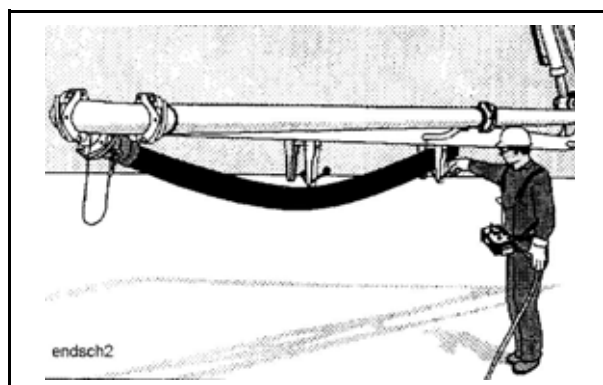
The diameter of the danger zone is double the length of the end hose (**Fig. 182**).

Since the first pumped concrete has segregation tendencies, the end hose should hang vertically during pumping.

- Lower boom section 4 at the placement site and release the end hose from the transport support. (**Fig. 183**).
- Make sure the hose safety catch (**Fig. 184**) is attached and in order.



**Fig. 182 Flailing end hose**



**Fig. 183 Release end hose lock**

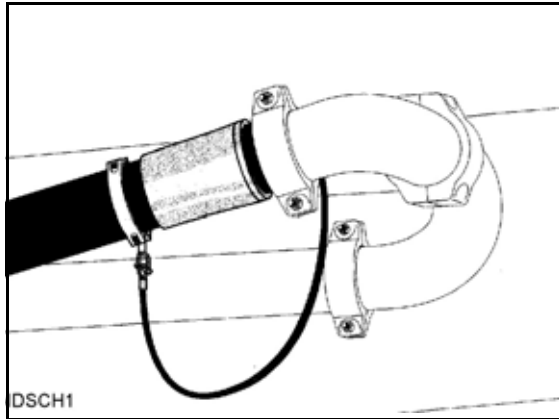


Fig. 184 Check end hose safety lock

### 3.14 Working operation: Concrete pump



#### Warning!

##### **Risk of accident due to entering the machine while active!**

Severe injuries due to machine falling over.

DO NOT enter the machine while in operation!

---



#### Attention!

##### **Damages to machines due to freezing water!**

Containers filled with water can freeze, which poses a risk of frost wedging.

In case of danger of frost, fill water immediately before concreting.

After completing the work, empty all containers filled with water.

---

- Fill the water box of the concrete pump.
- Lightly spray the concrete filling hopper with mould oil from the outside before pumping for the first time. This facilitates subsequent cleaning.



#### Information

Use only rubber-compatible media.

---

- Switch on the agitator and (or) concrete vibrator.
- Fill the lubrication mixture into the concrete filling hopper.  
The lubrication mixture consists of two parts cement, and one part sand and water.  
The amount is determined by the length and diameter of the pumping line.  
If you have a short pumping line or are pumping ready-mix concrete, the lubrication mixture may consist solely of cement and water.
- Never switch on the concrete pump with an empty filling hopper. Dry running wears out the pumping piston and kidney seal faster.  
Fill water into the filling hopper for maintenance and cleaning work.
- Fill concrete into the filling hopper before the lubrication mixture has been completely pumped out.
- Never pump at full speed; instead set the required pump power output after concrete starts to exit the end of the pumping line.

- In case of wait times, especially in hot weather, "agitate" the concrete from time to time by pumping and sucking alternately.
- Spray off the machine occasionally with water during operation to prevent concrete from setting.
- Pump concrete with slowly increasing power.



### Caution!

#### Risk of accident due to compressed air!

Do not pump concrete filling hopper empty during operation.

Intake air is compressed in the pumping line and escapes abruptly at the end of the line.

Persons in the danger zone can be injured by flailing end hose and flying stones, see ("VDMA safety manual" on page 759).

### 3.14.1 Covering for hopper

The folding covering for hopper serves as splash guard in unfolded condition.

#### 3.14.1.1 Opening the cover

- Unlock the safety bolt (1) (**Fig. 185**).
- Lift the cover (3) until the bolt can be slid into one of the holes on the locking bar (2).
- Make sure that the bolt is latched securely.



#### Information

The locking bar (2) (**Fig. 185**) has two holes because the possible opening angle of the cover varies in some machines.

#### 3.14.1.2 Closing the cover

- Lift the cover slightly until the safety bolt can be unlocked easily.
- Slowly lower the cover (do not drop it!).

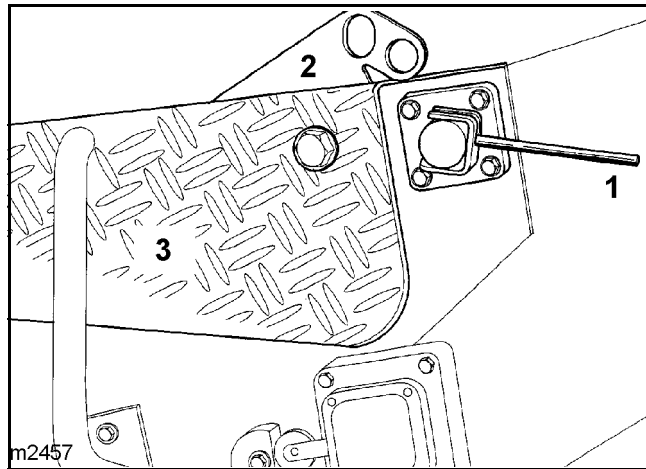


Fig. 185 Covering for hopper

### 3.14.2 Operation settings

(see active control)

VIBRATOR (special equipment)



➤ Switches the vibrator on.

The concrete vibrator only starts after switching on the concrete pump and stops automatically after switching off the concrete pump.

### 3.14.3 Agitator



➤ Switches the agitator on.



#### Information

The agitator may also have to be switched on so that pilot pressure is available to switch on the concrete pump.

The agitator starts in normal direction (pump operation). By switching the concrete pump from pumping to sucking and vice versa, the movement direction of the agitator is adjusted automatically.

By pressing the button:

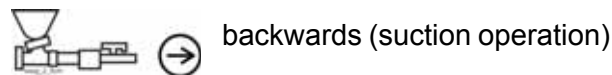
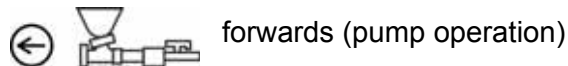


at the rear of the machine, the movement direction of the agitator (for example, during faults) can be switched.

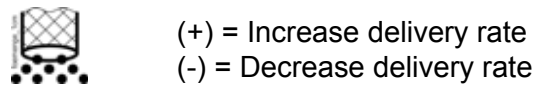
After releasing the button, the agitator rotates back into its original direction.

### 3.14.4 Concrete pump

► Switch on the concrete pump:



► Adjust the delivery rate of the concrete pump:

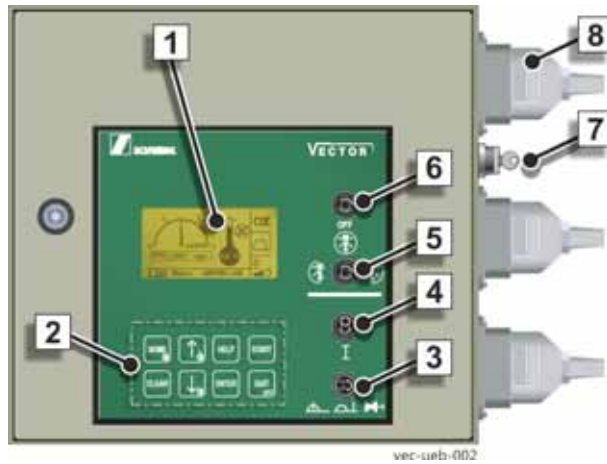


### 3.14.5 Operating data for the concrete pump

Various pieces of information about the concrete pump can be shown on the display of the switch cabinet (1) (**Fig. 186**).

Menu operations are carried out with the buttons (2).

It is possible to record the concrete delivery volume and to reset it to "0", (see "**VECTOR control system**" on page 125).



**Fig. 186 ( Steuerschrank der VECTOR-Steuerung)**

An LED display (1+2) (**Fig. 187**) for the status of the concrete pump is available as special equipment.

CP ON	LED = GREEN (1)
CP OFF	LED = RED (2)



**Fig. 187 LED display**





### 3.15 Working operation: Water system

#### 3.15.1 Safety instructions



#### Caution!

##### **Danger of injuries and damage due to high-pressure water jet!**

The high-pressure water jet generated by the spray gun (1) (**Fig. 191**) is very dangerous. Improper use of the cleaning system and rolling equipment may cause injuries and damages. Only operate the system after having read and understood the operating instructions in the appendix.

---



#### Attention!

##### **Risk of machine damage due to closed ball valves!**

Do not switch on the water pump while the ball valve is shut. Open the ball valve before switching it on.

---



#### Attention!

##### **Risk of machine damage due to frost!**

If there is danger of frost, the entire water pipe must be emptied after each operation, see (“**Drain the water system**” on page 274).

---



#### Attention!

##### **Risk of machine damage due to empty water case!**

Do not forget to fill the water case and to open the ball valve (6) (**Fig. 190**) in the suction pipe before switching on the water pump or the high-pressure cleaning system (special equipment).

---



#### Attention!

##### **Risk of machine damage due to insufficient compressed air!**

Fill the vehicle air reservoir according to instructions of the vehicle manufacturer before setting off.

---

### 3.15.2 Structure of the water pump

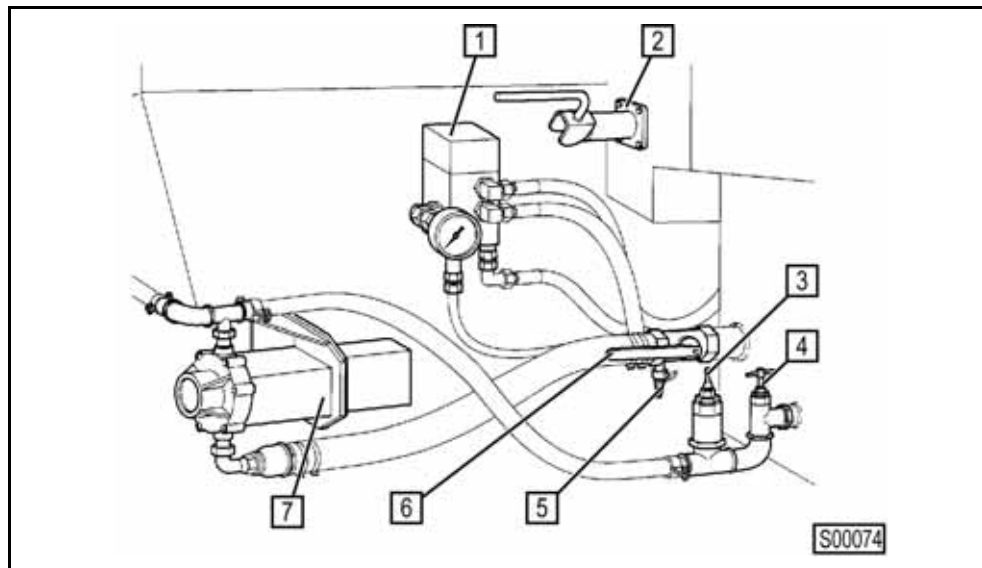


Fig. 188 Water pump system

Caption (Fig. 188)	
Pos.	Description
1	???
2	???
3	Air connection
4	???
5	Drain cock
6	Ball valve
7	Water pump (hydraulically powered)


The hydraulically powered water pump (7) (**Fig. 188**) is located to the left of the boom column. It supplies the water necessary for machine cleaning, filling of the water box and preparation of a lubrication mixture to the ball valves on the right rear of the machine.

Water can be extracted there or fed to the water box of the concrete pump by appropriate switching of these ball valves (arrangement of the ball valves depending on machine equipment).

### 3.15.3 Operation settings

- Check the water level in the reservoir.

A sensor in the water case stops the water pump at too low water level or prevents it from switching on. The VECTOR control display contains a relevant message.

- Open the ball valve (6) (**Fig. 188**) in the suction pipe of the water pump.
- Switch the ball valve into the desired position.
- Connect the spray hose, if necessary.
- Switch on the water pump with the selector switch  of the active control.

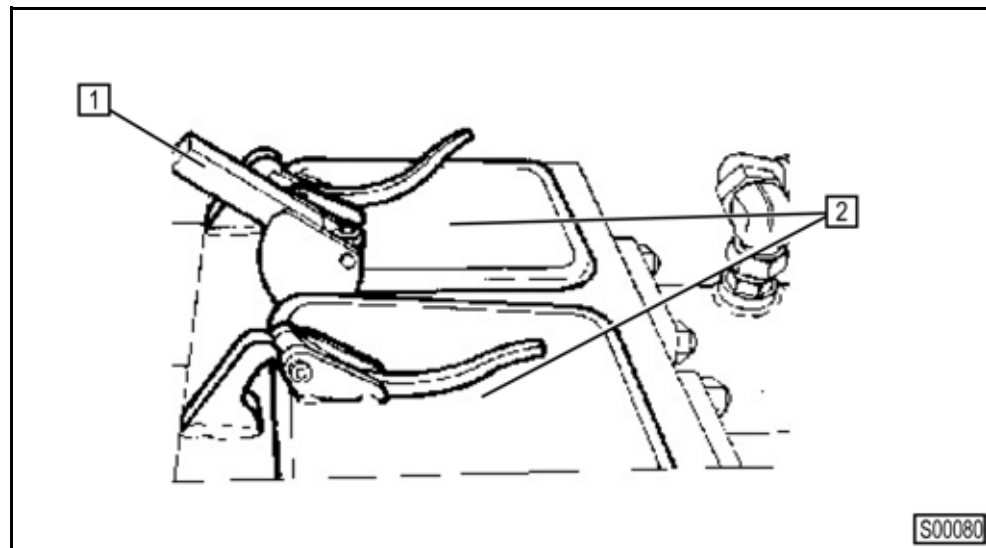
### 3.15.4 Drain the water system

If there is danger of frost, the entire water pipe must be emptied after each operation:

- Close the ball valve (6) (**Fig. 188**) to prevent the water case from running dry.
- Open the drain cock (5) (**Fig. 188**).
- Remove the spray hose at the rear and empty it.
- Empty the water pipes by appropriate switching of the ball valves at the rear of the machine.

In the event that the machine should be kept outside overnight, the water box of the concrete pump and water case should also be emptied:

- Use the lever (1) to open the drain valve on the concrete pump's water box (**Fig. 189**).



**Fig. 189** Open the drain valve on the water box

Caption ( <b>Fig. 189</b> )	
Pos.	Description
1	Lever for opening the drain valve
2	Water box

- Start up the concrete pump briefly with lower stroke count to drain the water from the pumping cylinders.
- Switch off concrete pump immediately when water ceases to escape - wear!
- Open the drain cock on the water case (1) (**Fig. 190**) to empty the water case.

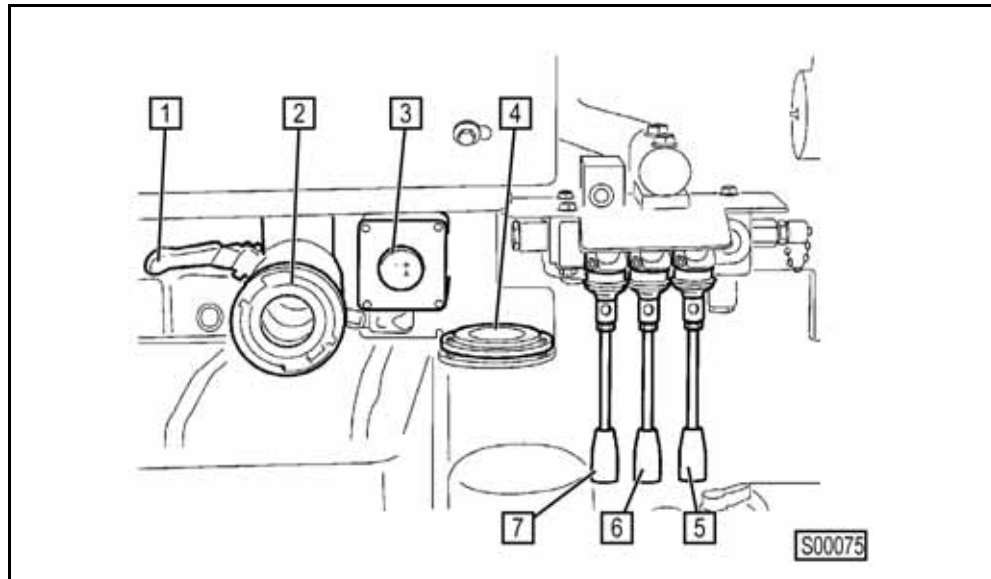


Fig. 190 Open the drain cock on the water case

Caption (Fig. 191)	
Pos.	Description
1	Drain cock
2	???
3	???
4	???
5	???
6	???
7	???

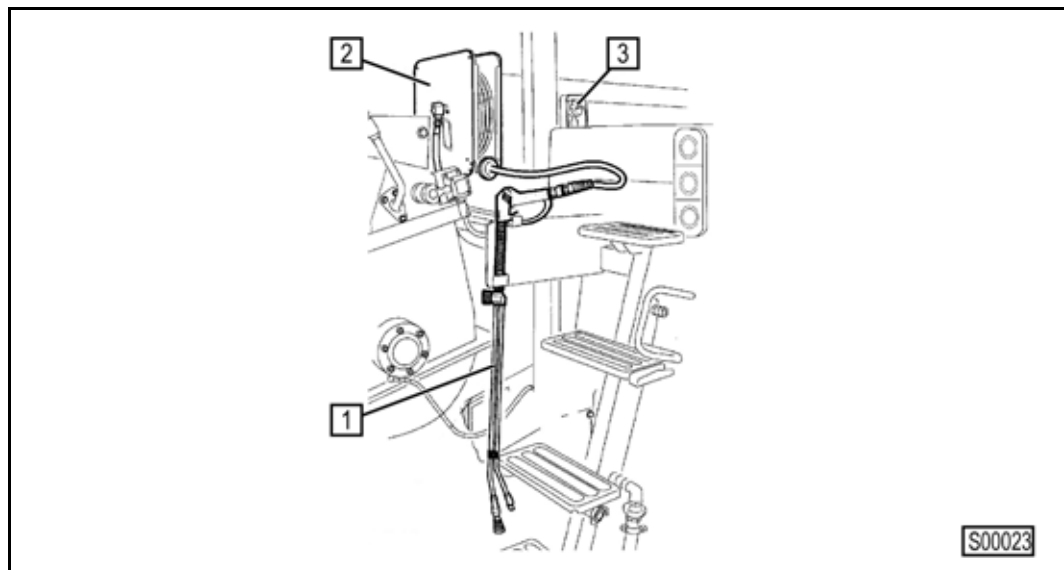
### 3.15.5 High-pressure cleaner (HDR)

A high-pressure cleaning system is available as special equipment.

The system's hydraulically powered high-pressure water pump (7) (**Fig. 188**) is located near the water case.

The system can only be switched on with the appropriate selector switch of the active local control.

It is possible to fit the equipment with rolling equipment for the high-pressure hose 2 (**Fig. 191**).



**Fig. 191** Rolling equipment for the high-pressure hose

Caption ( <b>Fig. 191</b> )	
Pos.	Description
1	Spray gun
2	High-pressure hose
3	???

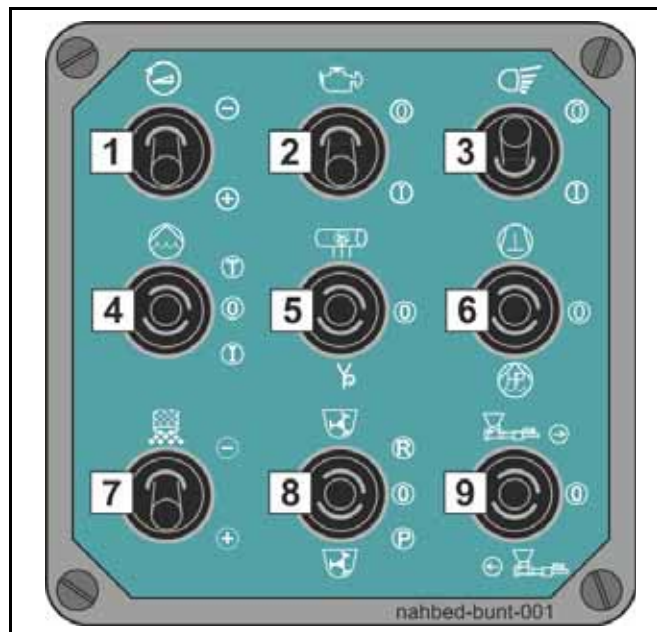
- Empty the high-pressure cleaning system in case of danger of frost, as described in the operating instructions in the appendix.

### 3.15.6 Release: Push-button for water pump

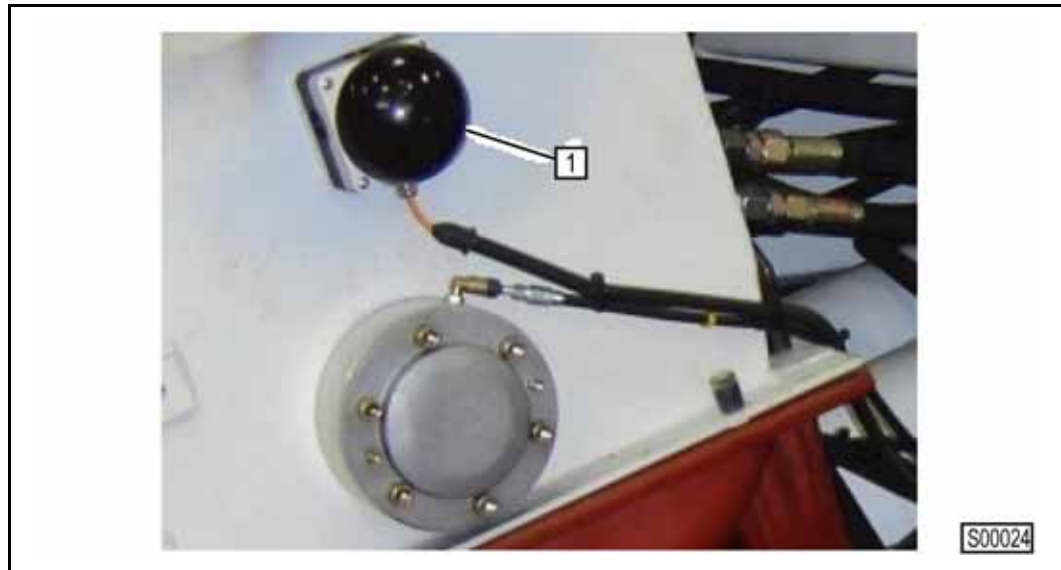
If the selector switch (4) (**Fig. 192**) is flipped to position "T" in "LOCAL" operating mode, the water pump can be switched on and off using the mushroom-head push-button (1) (**Fig. 193**).

The mushroom-head push-button (1) is located on or near the concrete filling hopper (**Fig. 193**).

- Select the operating mode "CLOSE" on the VECTOR control.
- Flip the selector switch (4) (**Fig. 192**) on the local control unit to position "T".
- Switch the water pump on by shortly tapping on the mushroom-head push-button (1) (**Fig. 193**). Renewed pressing of the mushroom-head push-button switches off the water pump.
- Return the selector switch (4) (**Fig. 192**) to the centre position when the water pump is no longer needed.



**Fig. 192** Selector switch on the local control unit



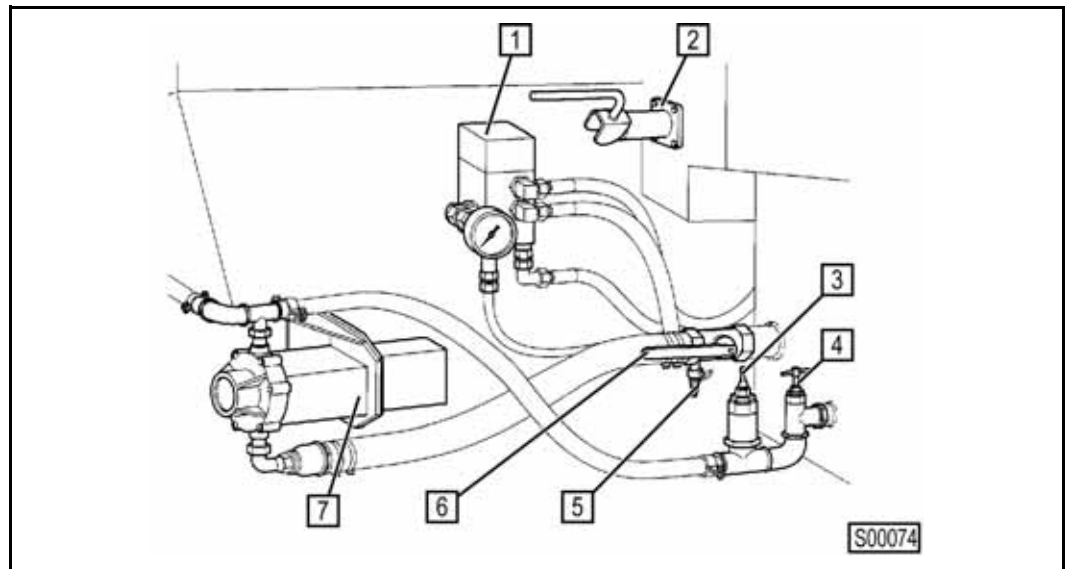
**Fig. 193 Mushroom-head push-button**

Caption (Fig. 193)	
Pos.	Description
1	Mushroom-head push-button



### 3.15.7 Blowing out the water pump and water pipes

In order to empty the water pump and pipes **thoroughly**, the machine is equipped with an air connection (3) (**Fig. 194**).



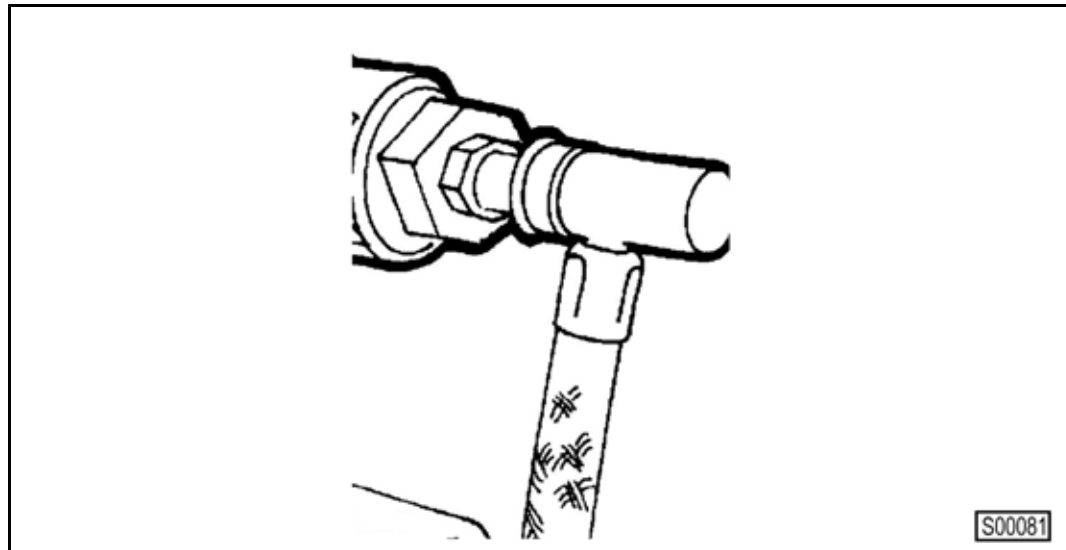
**Fig. 194 Drain the water pump system**

Caption (Fig. 194)	
Pos.	Description
1	???
2	???
3	Air connection
4	???
5	Drain cock
6	Ball valve
7	Water pump (hydraulically powered)

Installation location and design of the individual components vary somewhat depending on the series of the machine, however, the drainage method always remains the same.

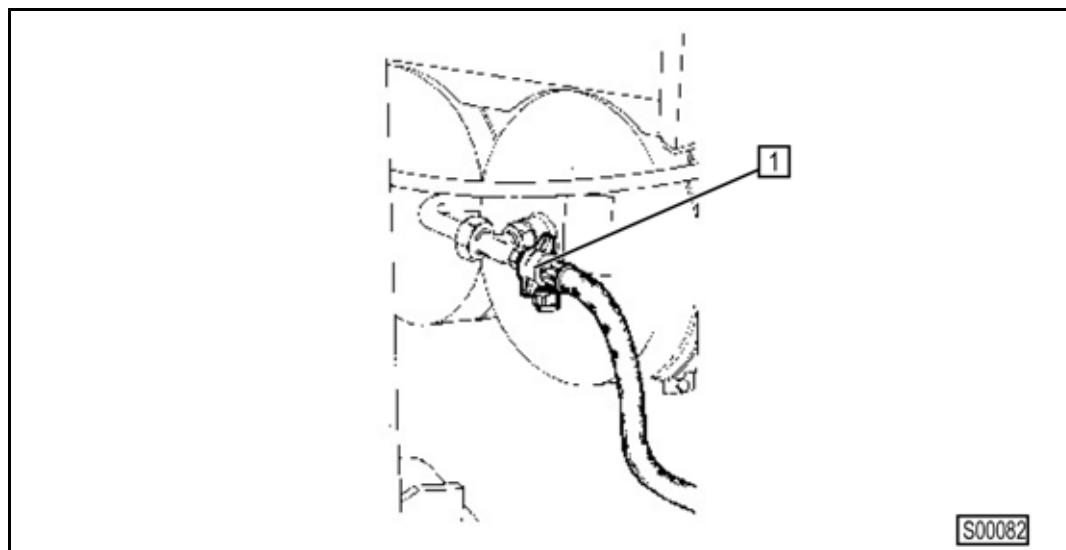
Procedure:

- Start the vehicle engine to fill the vehicle air reservoir.
- Close the ball valve (6) (**Fig. 194**) in the suction pipe if the water case should **not** be drained.
- Open the drain cock (5) (**Fig. 194**). Suction pipe and water pump run dry.
- Remove the cap on the air connection (3) (**Fig. 194**).
- Attach the filler cap for the tyre filling hose (**Fig. 195**) to the air connection (3) (**Fig. 194**). The tyre filling hose is part of the tool set.



**Fig. 195 Tyre filling hose**

- Screw the air hose coupling (1) onto the vehicle air system's tyre filling connection (example: (Fig. 196)).



**Fig. 196 Coupling on air hose (example)**

**Observe instructions for extracting air in the vehicle operating instructions.**

The built up air pressure pushes the residual water out of the drain cock (5) (Fig. 194).

- Close the drain cock (5) when water ceases to escape. The air pressure lines up with the ball valve at the rear of the machine.
- Blow out the line to the water box by switching the ball valve accordingly.
- Remove the air hose and screw on the locking cap for the air system when the water system is empty.

### 3.16 Working operation: Compressed air system

The machine can be equipped with an extensive air system as special equipment. The elements mentioned below can be ordered separately.



#### Caution!

#### Compressed air can be very dangerous!

Please observe the appropriate operating information on cleaning, as well as the operating instructions of the chamber valve in the appendix.

Only use accessories in perfect condition approved by SCHWING for your compressed air system!

#### 3.16.1 Compressed air 5.5 bar

The machine can be equipped with plug connections for a compressed air hose. This makes it possible, for example, to connect a spray gun for release agents.

The air is extracted from the vehicle air system.

#### 3.16.2 Compressor

The compressor (**Fig. 197**) supplies up to 10 bar compressed air to the stopcocks on the machine.

- Open these stopcocks to prevent pressure peaks when switching on the device.



- Switch on the compressor via the selector switch on the active control unit.

#### 3.16.3 Chamber valve

Chamber valves (**Fig. 198**) are usually used in connection with a compressor for cleaning the concrete pumping line.



- Use the selector switch on the active control unit to switch the appropriate directional valve of the machine control. The chamber is extended and retracted using another control lever on the machine.

See operating instructions in the appendix.



Fig. 197 Compressor

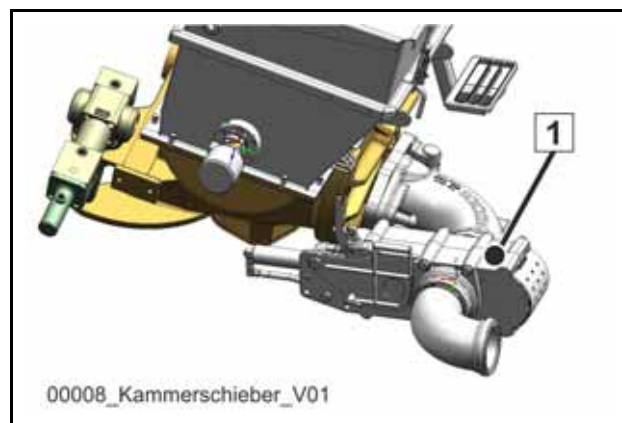


Fig. 198 Chamber valve

#### 3.16.4 Corrosion

The intake air of a compressor always contains - depending on the humidity - a certain amount of water.

This water is evaporated in the hot compressor as determined by the system, and discharged with the compressed air.

With the use (cleaning of the pumping line) typical for the concrete pump operation, the short duty cycle is often not sufficient to bring the compressor up to operating temperature.

Water can collect in the compressor and cause damage.

**Attention!****Corrosion due to condensation!**

Switching on the compressor once a week for at least 30 minutes continuously.

- Adhering to the maintenance intervals for the compressor.
- Only use original spare parts and the prescribed compressor oil when servicing your compressor.

Our maintenance packages:

10170389 (standard maintenance) and

10170388 (oil separator cartridge)

contain all of the spare parts needed to service your compressor, including the compressor oil.

### 3.16.5 End hose stop valve

The end hose stop valve prevents the pumping line from leaking while pumping.

Separate operating instructions can be found for this in the appendix.

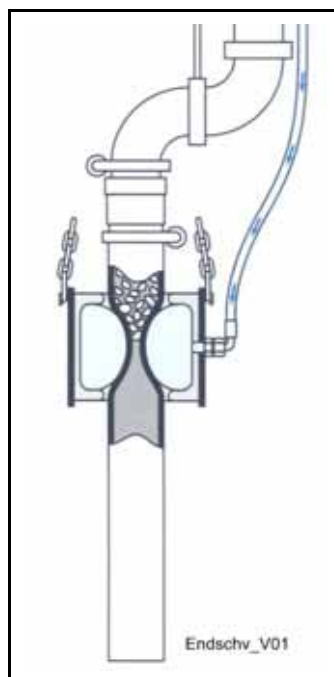


Fig. 199 End hose stop valve



### 3.17 Control of operations

The main machine functions can be interrupted by pressing an EMERGENCY STOP button, see (“**Your machine’s EMERGENCY STOP system**” on page 121).

The control system monitors the machine during operation and displays any detected errors, see (“**Troubleshooting (error handling)**” on page 293).

Error messages and damages can be prevented through careful observation:

- Pay attention to unusual noises, vibrations, etc. caused by the machine.

There may be a damage that could be localised through timely repair.



#### **Caution!**

##### **Risk of accidents due to parts or material being ejected!**

Intake air is compressed in the pumping line and escapes abruptly at the end of the line or through the hopper.

Persons in the danger zone can be injured by the flailing end hose and by flying parts.

To avoid this, the hopper must be filled up to the agitator shaft with concrete so that no air is drawn in.

---

- Inform the mixer driver when removing the remote control.
- Agree on clear communication signals (horn!) and inform the mixer driver about the purpose, function and position of the EMERGENCY STOP buttons.

### 3.17.1 Water box

Check the water level before and after each pumping operation.

To top up and rinse out the water box, simply open the ball valve (11) (3.17.2) on the supply line until the water box is full.

- Flush the water box on a regular basis in conjunction with the state of wear of the pumping pistons and cylinders.
- Check the water box weekly for deposits that could not be removed by the normal flushing process, see (“**Cleaning**” on page 319).



Fig. 200 (11) Fill / Rinse water box

### 3.17.2 Proper sealing of pumping line

- Repair leaks as quickly as possible, as this can cause concrete to “bleed”.
- “Bleeding” of the concrete results in clogging.
- Immediately prevent clogging at the outset.
- In the event of clogging, stop pumping immediately and reverse pump the concrete!

Should the clogging not be resolved thereby, switch off concrete pump and fix the problem.



**Danger!**

**Medium under high pressure!**

Do NOT open the pumping line couplings under pressure!  
Always release pumping line through reverse pumping!



### 3.17.3 Monitoring the agitator

If the agitator jams, change its rotational direction briefly using the agitator button (Fig. 201).



Fig. 201 Agitator button

### 3.17.4 Monitor any potential loss of fluids

- Check the filling levels of all reservoirs.

### 3.17.5 Checking the machine's stability

- Adjust the position of the machine, if necessary.
- At least three of the supporting dishes must be firmly on the ground at all times.
- Spirit levels are located on the outrigger control stations to check whether the machine is level.



#### Warning!

#### Machine can topple!

Do NOT set up the machine with more than a 3° incline!

---



#### Warning!

#### There is a high risk of accident if an outrigger sinks into the underground!

Release the outrigger immediately by rotating or (and) folding in the placing boom, and move the boom into the transport position.

---

- Prevent the placing boom from striking against obstacles.



### Attention!

#### Major material damage to placing boom due to collisions!

Collisions can result in malfunctions, functional failures and even the bending of the placing boom.

Never use the placing boom to clear obstacles out of the way or to lift loads.

The boom components with links allowing large angles of rotation are especially at risk of damage.

The necessary bell crank of the boom kinematics increase the forces acting on the boom component inadmissibly even with low hydraulic oil pressure when the boom component is driven against an obstacle.



### Warning!

#### Overloaded placing boom hydraulics!

In order to avoid overloading the placing boom hydraulics, the end hose must not be extended in the "backwards position" beyond the vertical line into the prohibited area (**Fig. 202**).



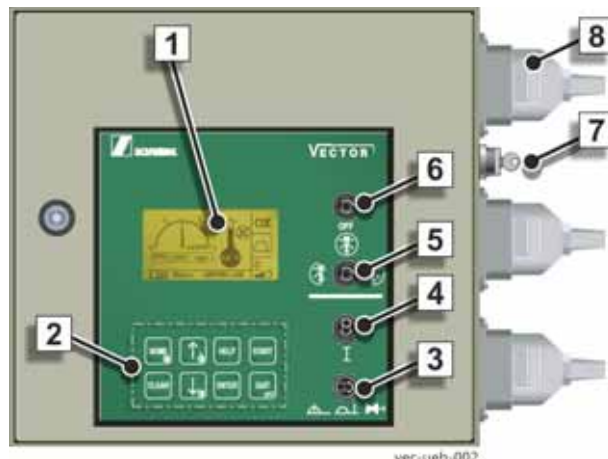
Fig. 202



Fig. 203 Sign valid for S 24 X, TVMD only

### 3.17.6 Operating data display


The display (1) (**Fig. 204**) shows the most important operating data on its two start screens.



**Fig. 204**

The first start screen contains:

- Rotational speed of the power take off
- Hydraulic oil temperature in container
- Oil cooler ventilator on
- Control status
- Selected operating mode
- Delivery rate of the concrete pump (chart)











After pressing the button,  the second start screen shows additional operating data:

- Hydraulic oil pressure for the concrete pump
- Filling level of the hydraulic oil box in % (special equipment)
- Drive motor load in % (vehicle-dependent special equipment)







More information can be displayed by "scrolling" through the menu:

**OPERATING DATA**

You access this menu as follows:

Press:	Display:
	Functions?
	Pumping rate?
	Fault list?
	Operating data 1 - Oil pressure CP ..... bar - Oil temperature ..... °C - Oil level in tank ..... % - Power take-off ..... h - Concrete pump ..... h - Boom ..... h
	Operating data 2 - Water pump ..... h - HP water pump ..... h - Compressor ..... h - Agitator ..... h - Oil cooler (ventilator) ..... h - Vibrator ..... h
	Operating data 3 - Daily amount CP ..... cbm - Pumped volume CP ..... cbm - Strokes CP ..... - Central greasing ..... h
	Operating data 4 Movement hours - Boom ..... h - Slewing gear ..... h - Outriggers ..... h
	Return to the previous screen
	return to the heading: Operating data?
	Return to the start

### 3.17.7 Resetting the daily delivery rate of the concrete pump

Press:	Display:
	Return to the start screen
	Functions?
	Pumping rate
	Display of the daily delivery rate, e.g.: 18.0 m <sup>3</sup>
	Daily delivery rate is reset to 0.0 m <sup>3</sup>
	Return to start screen

We recommend to query important operating data on a regular basis, such as

- Hydraulic oil pressure and
- Hydraulic oil temperature

The supporting conditions must be improved under increased pressure, by reducing the stroke rate for example.

Check the oil level and cooling at elevated temperature.

This prevents the output of fault messages and possible interventions of the diagnostic system in the machine control.

### 3.17.8 Faults

The diagnostic system monitors the main machine functions automatically.

A horn sounds to indicate an error messages.

Proceed as described in chapter **(chap. 3.18)**.



### 3.18 Troubleshooting (error handling)

In software versions V 1.11 and higher, the VECTOR control features an extensive diagnostic system. This diagnostic system shows:

- Information about operating states
- Information about malfunctions
- Information about the reasons of malfunction

The notifications are divided into three categories:

- Messages
- Minor faults
- Serious faults

The messages are shown on the display (1) (**Fig. 205**).

Errors are reported optically on the display and acoustically by an interval signal.

Different languages can be selected for the optical display.

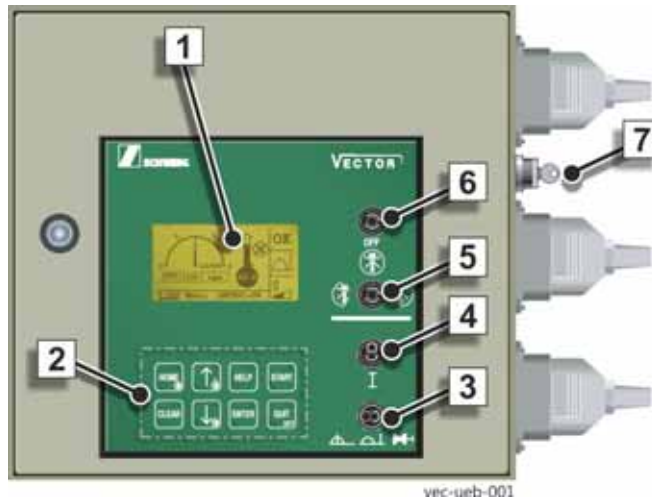
There is also an "international" language available as symbols.



#### Information

The diagnostic system and error handling are described in detail in chapter **(3.5)**.

---



**Fig. 205 VECTOR display**

Caption (Fig. 205)	
Pos.	Designation
1	Display
2	Keypad
3	Selector switch: Operating modes
4	Button: VECTOR control ON
5	Switch: EASy work area
6	Switch: EASy OFF
7	Key-operated switch: EMERGENCY STOP bypass



### 3.18.1 Release of blockages

If interventions are required in the machine technology to release blockages, which go beyond the measures described below, these may only be carried out by qualified personnel.



#### **Danger!**

##### **Danger to life due to suspended loads!**

Never work on a raised, unsecured placing boom.

The boom can drop suddenly when loosening screw joints of the hydraulic system. Hydraulic oil may leak under high pressure and injure persons.

Always lower placing boom or secure in a suitable manner.

- Switch off the drive.
- Secure the drive to prevent it from restarting.
- Release the hydraulic system.
  - For example, by opening manual relief valves or
  - by manual switching the respective directional valve in both directions repeatedly.



#### **Warning!**

##### **Danger of serious injury due to hydraulic oil at high pressure!**

Although pressure relief valves help prevent the machine from overloading, the hydraulic system is under pressure when tripping the release of pressure.

Only work on unpressurised hydraulic systems.

Uncontrolled blockage of the machine is a serious fault.

If the energy stored during the blockage is suddenly released, it can cause serious accidents due to autonomous movements of the machine or the failure of components.

Even the use of inappropriate measures to clear such blockages can suddenly release the stored energy and cause serious accidents.

Proceed as follows during an uncontrolled blockage:

- In case of danger, press an EMERGENCY STOP button immediately
- Keep calm under at all times
- Try to locate the blockage!

### 3.18.1.1 Blockage in the pumping line

In the event of clogging (blockage) of the pumping line, the pressure in the hydraulic system of the concrete pump will rise until the pressure relief valve (hereafter: PRV) opens.

- The concrete pump stops,
- the drive motor works under high load,
- the hydraulic oil passing through the PRV produces a loud noise.



#### Information

A rapid pressure rise indicates a blockage directly behind the concrete pump.

The pressure rise is slower if a blockage is located at the end of the concrete pumping line.

The best way to prevent blockages is by keeping the pumping lines clean and free of leaks and by conveying standardised quality concrete see ("**Technical preconditions for concreting**" on page 375).

- Remove the blockage by reverse pumping the concrete with the concrete pump.
- After that, cautiously start pumping again.
- If necessary, repeat the procedure until the blockage becomes loose.

If the blockage cannot be removed in this way, the pumping line must be discharged and the section affected must be dismantled.



#### Danger!

#### Danger to life due to violently moving end hose!

The end hose may pulsate and stones may be thrown from the cable end.

The end hose of the placing boom must hang freely each time you start pumping.

No one must stay in the danger zone.

The diameter of the danger zone is double the length of the end hose.

No one must stay at the end of separately laid pumping lines.



### Danger!

#### Danger to life due to pressurised pumping lines and blockages!

Concrete exiting at high pressure may seriously injure persons due to violent movements of the pumping line and also at a distance due to stones or fragments of the pumping line flying about.

Never try to loosen a blockage by using compressed air or pressure rise of the hydraulics. This presses in the blockage firmer and causes the pumping line to burst. Possible damage to the machine.

Never open a pumping line under pressure and do not tap it.

Relieve the pumping line by reverse pumping the concrete with the concrete pump.

Never work while directly bent over the line.



### 3.18.1.2 Mechanical blockage

Mechanical blockages may occur in all of the machine's systems, usually as a result of damage.

If no blockage exists as described above, try to locate the blockage.

### 3.18.1.3 Blockages in the motor, gear, drive shaft

In most cases, blockages in the drive system cannot be eliminated on site.

If necessary, the machine has to be placed into transport stand and towed.

In order to move the placing boom into the transport position in the event of damage, we recommend keeping an emergency unit on hand, see ("**Emergency oil supply for the placing boom hydraulics**" on page 315).

### 3.18.1.4 Blockages in the control system

Blockages in the hydraulic pilot control system are often caused by dirt in the hydraulic oil.

This dirt causes the control piston to jam and in turn to not execute control commands or to execute them incorrectly.

A clogging of the oil is prevented through careful oil maintenance (filter change). Metallic abrasion in the oil points to damage.

Control blocks may also jam due to high temperature differences, for example, when feeding hot hydraulic oil to a cold control block in winter.

This can be avoided by heating the hydraulic system, see ("**Preheating the hydraulic system**" on page 207).



#### **Warning!**

#### **Danger due to uncontrolled movement of the machine.**

Immediately press an EMERGENCY STOP button if the machine moves on its own.

- Use the emergency control device to move the machine into the transport position, see ("**Emergency operation**" on page 303)..
-

### 3.18.2 Towing truck-mounted concrete pumps

Only use slinging equipment, chains or ropes that are suited for this load case (siehe Tabelle 26) and in sound condition.

In normal road traffic on tarmac streets, your SCHWING machine offers two options:

1. Vehicle-specific towing devices, around the driver's cab, mostly on the front bumper (see vehicle's operating manual).
2. SCHWING towing lugs on tail end of vehicle (1) (**Fig. 206**)

#### 3.18.2.1 Position of the towing lugs

Depending on the SCHWING machine's design, the towing lugs may have slightly different shapes, but they are always in the same location.

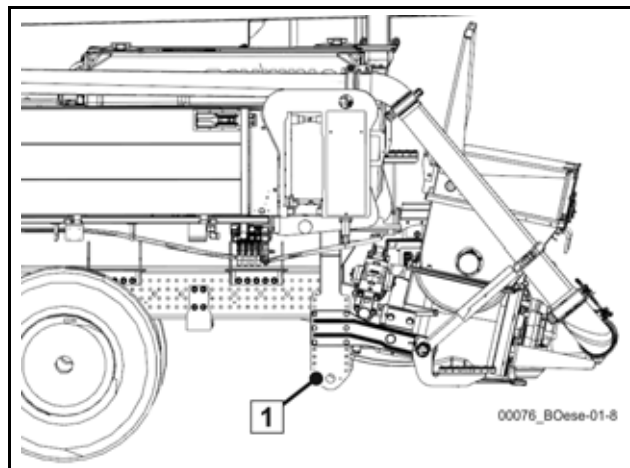


Fig. 206 (1) Towing lugs

#### 3.18.2.2 Using the towing lugs



#### Attention!

**Using the towing lugs incorrectly can cause material damage!**

Towing lugs, suspension and frame can be damaged if used improperly.

In general, the towing lugs must not be used to tow other vehicles, to salvage vehicles from rough terrain, or to move loads.

Only use towing lugs on public and/or tarmac streets.

When towing, always make sure that the slinging equipment is attached correctly.

### 3.18.2.3 Total permissible weight for SCHWING truck-mounted concrete pumps

Permissible total weight of SCHWING truck-mounted concrete pumps (weight in tons)							
Number of axles	2	3	4	5	6	7	8
S20	18	-	-	-	-	-	-
S24X	18	26	-	-	-	-	-
S28X	18	26	-	-	-	-	-
S31XT	-	27,5/ 28	32/ 35	-	-	-	-
S36X / DiDr	-	27,5 / 33	32/ 35	-	-	-	-
S38SX	-	28	32	-	-	-	-
S39SX	-	28/ 33	32/ 37	-	-	-	-
S42SX	-	33	35/ 41	-	-	-	-
S43SX	-	33	35/ 41	-	-	-	-
S46SX	-	-	41	-	-	-	-
S47SX	-	-	0	-	-	-	-
S47SX III	-	-	-	-	-	-	-
S52SX	-	-	48/ 50	50	-	-	-
S55SX	-	-	48/ 50	50	-	-	-
S58SX	-	-	-	50	-	-	-
S61SX	-	-	-	50	-	-	-
S65SXF	-	-	-	-	65	-	-
S65SXF	-	-	-	-	-	-	67,6

**Table 26 Total permissible weights**

The right-hand column of **(Table 26)** (8 axles) only applies to the United States market.

- Use (Table 26 Total permissible weights) to determine the suitable slinging means.
- When performing towing work, always use both of the machine's towing lugs, see **(Fig. 207)**.

The central force transmission point (2) must be located at least 2.0 m behind the member of the towing lug, see **(Fig. 207)**.

Maintain some distance between the towing chains. An appropriate crossbar (1) **(Fig. 207)** can be used for this purpose.

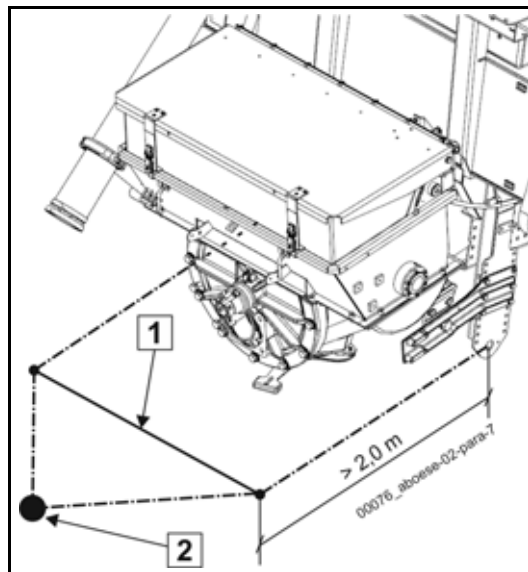
The height of the central force transmission point should be selected in such a way that the towing ropes or chains do not touch the rock (RM, RB and RL) or the tube outlet during the salvaging process.

If this is not possible, the tube outlet can be removed prior to the salvaging work (**Fig. 207**).

To tow your vehicle, only use the devices provided for that purpose.

Also observe the instructions of your vehicle manufacturer!

Always observe the regulations and rules applicable to the slinging means used.



**Fig. 207**





### 3.19 Emergency operation

Emergency operation is only intended to move the machine into the “transport position” in order to drive it to a repair shop.

In order to take away the machine, all necessary functions can be operated manually.

However, any other monitoring systems that would otherwise be available are out of service in this case. You have to move the machine with utmost caution.

This requires a great deal of practice and oversight. Do not move the machine in emergency operation without the assistance of a second person.

This chapter also describes temporary solutions to overcome disturbances.

#### 3.19.1 Safety instructions



#### **Danger!**

##### **Danger to life due to uncontrolled movement of the machine!**

The machine is relatively large and unwieldy. During emergency operation, it must be prepared for transport. Make sure that a second person is available to monitor the movements when moving the machine or any machine components.

---



#### **Attention!**

##### **Damage to hydraulic hoses!**

If the placing boom is operated with emergency control, the electrical monitoring is not active! The hydraulic hoses may be torn off when the placing boom is slewed excessively.

During emergency operation, move the placing boom at the lowest possible speed and with utmost caution.

Observe the boom constantly in order to prevent collisions with machine- and vehicles parts.

The emergency control must be used only to bring the machine into transport position.

---

### 3.19.2 Switching valve emergency actuation



#### Information

Control elements / control platforms on the machine may not be used for normal operation.

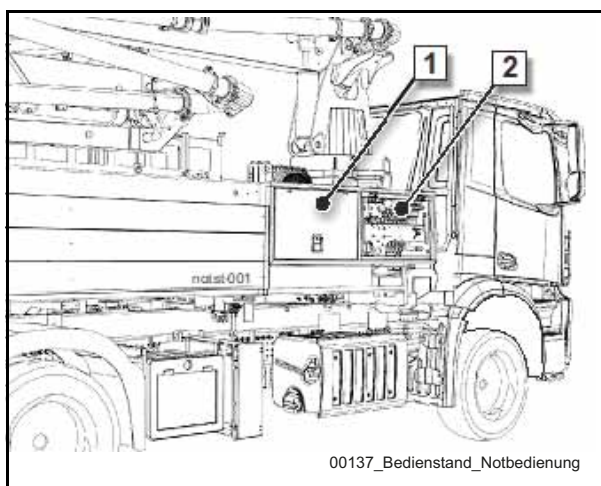
Exceptions:

Setup / dismantling / cleaning / maintenance / repairs / emergency operation

During emergency operation, the power supply of the electrical control must be switched on because otherwise all EMERGENCY STOP valves will be open.

➤ Activate "Local" operating mode on the VECTOR control system.

The emergency operation control platform (2) (**Fig. 208**) is located on the right in the direction of travel, behind a lockable flap (1) (**Fig. 208**).



**Fig. 208** Position of "emergency operation" control station

Caption (Fig. 208)	
Pos.	Description
1	Lockable flap
2	"Emergency operation" control station

### 3.19.3 Operating the placing boom in emergencies



#### Information

In order to initiate emergency operation correctly, it may be necessary for two people to operate the lever. Depending on the position of the lever, it may be difficult for one person to carry out the operation.

During normal operation, the placing boom is exclusively operated via the remote control unit.

In order to move the placing boom into the “transport position” after a power outage, for example, the boom has to be moved using the “emergency operation” function.

For this purpose, the manual override (11) (**Fig. 209:**) must be pulled out and pushed upwards. The manual override must then be held in this position until the emergency operation is complete. Afterwards, the control lever (6) (**Fig. 209:**) has to be moved into the “Placing boom” position and held there.

If necessary, instruct a helper to hold the control lever (6) or the manual override (11) in the corresponding positions until the placing boom has reached the “Transport position”.

If the control lever is released, then the spring centring device automatically moves it into the neutral position and the placing boom stops abruptly.

If the manual override is released, the emergency operation process stops automatically.

### 3.19.4 Operating the outriggers in emergencies

During normal operation, the “Release button” is pressed while actuating the outrigger control block in order to operate the corresponding outrigger.

In emergency operation, the release button may not work and the control lever (6) (**Fig. 209:**) has to be actuated manually.

The necessary control levers first have to be installed (screwed in).

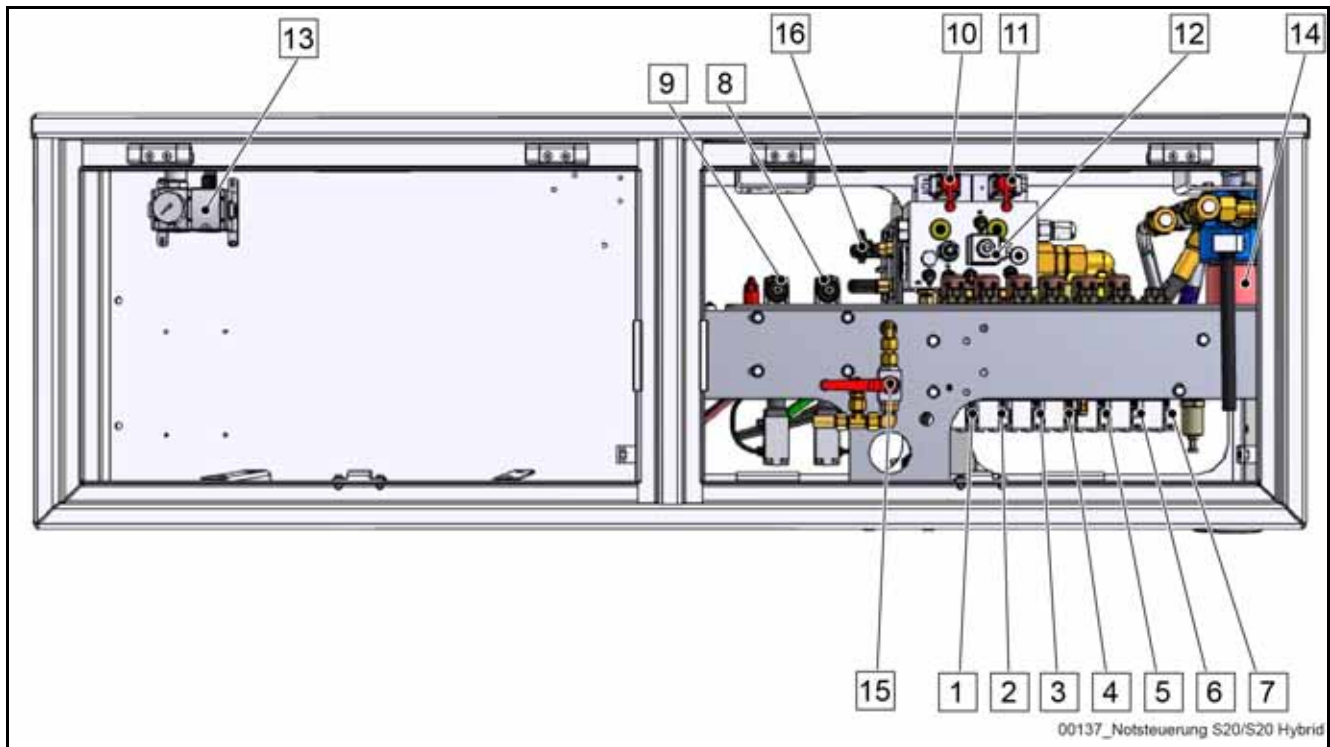
If this is not possible, instruct an assistant to switch the control lever (6) (**Fig. 209:**) into the “Outrigger” position and to hold it in place.

Then, retract the outriggers by actuating the appropriate control levers.

The emergency operation control lever slots are spring-centred and return to the “0” position when released.

The boom movements can be driven proportionally through appropriate deflection of the control lever.

After operation, unscrew the control levers and store them securely.



**Fig. 209: Control station for operating mode: Emergency operation (S20/S20 Hybrid)**

Caption (Fig. 209: Control station for operating mode: Emergency operation (S20/S20 Hybrid))			
Pos.	Description		
1	Control lever slot boom section 1: UP - 0 - DOWN	9	Control lever receiver agitator: FORWARD - 0 - BACKWARD
2	Control lever slot boom section 2: UP - 0 - DOWN	10	Manual override: Concrete pump
3	Control lever slot boom section 3: UP - 0 - DOWN	11	Manual override: Placing boom
4	Control lever slot boom section 4: UP - 0 - DOWN	12	Pressure reducing valve: Emergency output regulation for the concrete pump
5	Control lever receiver rotate boom column: RIGHT - 0 - LEFT	13	Compressed air release valve with pressure gauge
6	Control lever receiver: BOOM - 0 - OUTRIGGER CONTROL	14	Boom filter
7	Control lever receiver: WATER PUMP - 0 - SPECIAL EQUIPMENT	15	Ball valve for start-up damping
8	Control lever receiver concrete pump: PUMPING - 0 - SUCKING	16	Pressure adjustment start-up damping
* = Special equipment			

The delivery rate of your concrete pump is set by default and generally cannot be adjusted.

If the electrical system fails, however, it may be necessary to manually change the stroke rate of your concrete pump on this valve.

In both operating modes (LOCAL and REMOTE), the stroke rate of your concrete pump is regulated via this electrically adjustable valve (**Fig. 210**).

The design and position of the valve may vary (see **(Fig. 210)** / **(Fig. 211)**).

If the electrical system fails, the concrete pump operates at the maximum stroke rate.



**Attention!**

**Damage due to faulty settings!**

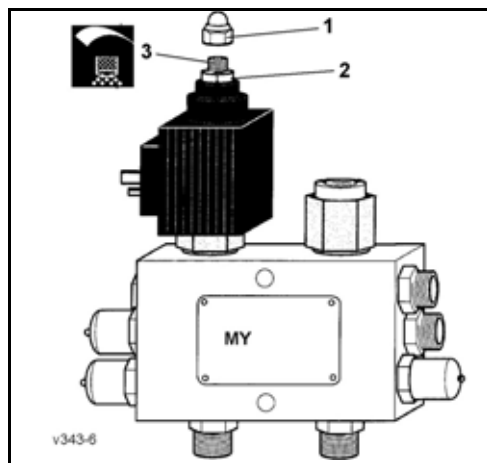
The concrete pump can be damaged irreparably.

The stroke rate may only be manually adjusted by specially trained personnel.

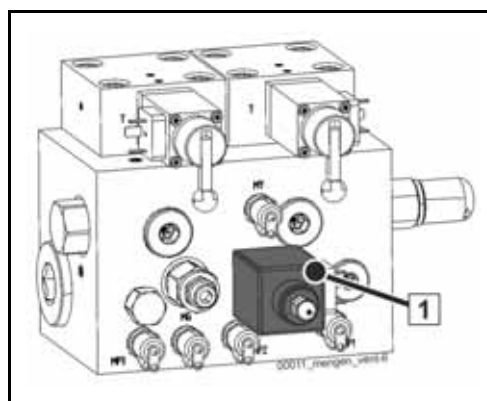
The stroke rate must be adjusted manually only in an extreme emergency.

Reduce the stroke rate as follows:

- Remove the cap nut (1) **(Fig. 210)**.
- Hold the screw spindle (3) with an Allen key and loosen the lock nut (2).
- Check that the screw spindle is fully unscrewed.
- Set the desired stroke count of the concrete pump by slowly screwing in.



**Fig. 210 Valve design 1**



**Fig. 211 Valve design 2**

### 3.19.6 Mini Pause Switch (MPS)

Concrete pumps with a **Mini Pause Switch (MPS)** work with a dual-circuit hydraulic system.

The dual-circuit hydraulic system can be recognised by the pressure accumulator at the rear of the machine.

This function prevents the differential cylinders from hitting your concrete pump kit too hard. This reduces wear and increases the service life of your concrete pump, among other things.

#### **Function:**

The MPS is a momentary drop in pressure.

The hydraulic oil pressure in the concrete pump system is reduced at the same moment as the differential cylinders switch from suction stroke to pressure stroke.

Defective valves, dirt, defective hoses, etc. can cause malfunctions.

Errors may be noticeable as follows:

#### **a. Malfunction 1: The pressure is not reduced when switching the cylinders:**

- The switching of the concrete pump becomes audibly louder.
- While switching, the pointer on the concrete pump pressure gauge shoots up instead of dropping in supply mode.

#### **Suggested solution - malfunction 1:**

You can complete the work assignment by observing the following:



#### **Attention!**

#### **Material damage due to pressure peaks!**

The hydraulic system can be damaged by pressure peaks.

It is absolutely necessary to reduce the stroke rate of the concrete pump to approx. 60 % of the maximum value.

---

Note that without reducing the pressure the differential cylinders will strike harder and the machine will become louder.

**b. Malfunction 2: The “MPS function” remains active permanently:**

- Depending on the required delivery pressure, the concrete pump’s output drops considerably (adjusting the flow rate on the remote control no longer prompts a reaction).
- The concrete pump pressure gauge does not indicate more than approx. 50 bar in supply mode.
- The hydraulic oil becomes very hot because a large portion of the oil flows constantly through the pressure relief valve (PR2; 50 bar reduction (**Fig. 213**)).

**Suggested solution - malfunction 2:**

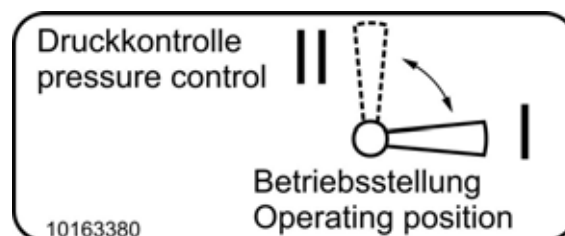
First check the maximum operating pressure as follows:


**Attention!**
**Damage to the pump kit!**

The hydraulic system can be damaged by pressure peaks.

It is absolutely necessary to reduce the stroke rate of the concrete pump to approx. 60 % of the maximum value.

- Switch off concrete pump.
- Close ball valve (1) (**Fig. 213**) (position “Pressure control”).
- Move ball valve (2) (**Fig. 213**) / (**Fig. 214**) into position (II) “Pressure control”.



**Fig. 212 Sign on pump kit control block**

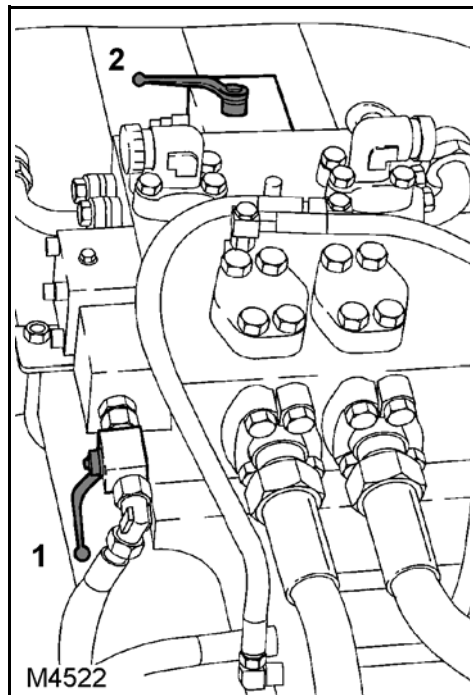


Fig. 213 Ball valves on pump kit control block

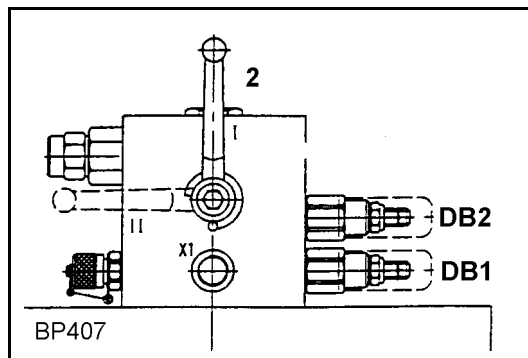


Fig. 214 In detail: Ball valve 2

This bypasses the pressure relief valve (PR2 - max. 50 bar).

- Configure the max. delivery rate (stroke rate) for the concrete pump on the “emergency-off block” for adjusting the delivery rate (Fig. 210)/(Fig. 211).
- Switch concrete pump back on.

The pumping pistons are moved into the end position and remain there.

The indicator on the concrete pump pressure gauge must rise to the set safety pressure in supply mode.

The configured safety pressure varies depending on the type of machine.

For hydraulic pumps with a pressure cut-off, the indicated value must be approx. 20 bar below the setting for the pressure relief valve DB 1.

If this is the case, you can terminate the work assignment as follows:

- Leave the ball valve (2)(Fig. 213) in position (II) “Pressure control” and



- Reopen the ball valve (1).

Note that without reducing the pressure the differential cylinders will strike harder and the machine will become louder.

Wear and tear increase.



#### Information

The measures described above represent an **EMERGENCY OPERATION** and are not a permanent solution.

---

- Contact your SCHWING representative as soon as possible for repair.
- After the repairs, switch the ball valve (2) back to the "Operating position" (I).

### 3.19.7 EMERGENCY STOP bypass

When actuating an EMERGENCY STOP button, the voltage on the EMERGENCY STOP valves drops. The valves open and the hydraulic movements stop.

If the voltage drops due to a defective valve, these movements also stop.

EMERGENCY STOP valves must not be bridged electrically or separated hydraulically from the system during normal operation.

If immediate repair is not possible, the valves can be energised manually:

- Switch the key-operated switch (7) (**Fig. 215**) to position "I".



#### Information

If the EMERGENCY STOP valves are shut, the EMERGENCY STOP buttons will not function.

During normal working operation, the key in the switch cabinet of the VECTOR control must be removed.

The entire electrical control is switched off when the key-operated switch is in position "I". It is not possible for local- and remote control to use the electrical control elements.

---

- Move the machine into the transport position using the emergency operation control station (**Fig. 209:**) for the S20 Hybrid and S20.
- Return the key-operated switch on the switch cabinet for the VECTOR control system to position "0".
- Remove the key and store it securely.

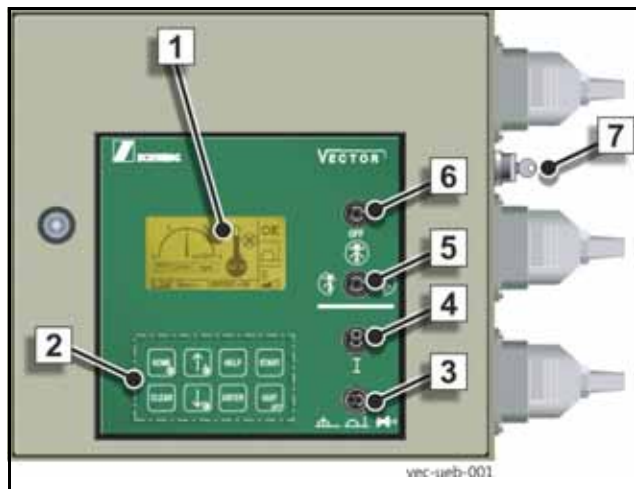


Fig. 215 VECTOR display

Caption (Fig. 215)	
Pos.	Designation
1	Display
2	Keypad
3	Selector switch: Operating modes
4	Button: VECTON control ON
5	Switch: EASy work area
6	Switch: EASy OFF
7	Key-operated switch: EMERGENCY STOP bypass

### 3.19.8 Operating the concrete pump and agitator in emergencies



#### Information

In order to initiate emergency operation correctly, it may be necessary for two people to operate the lever.

Depending on the position of the lever, it may be difficult for one person to carry out the operation.

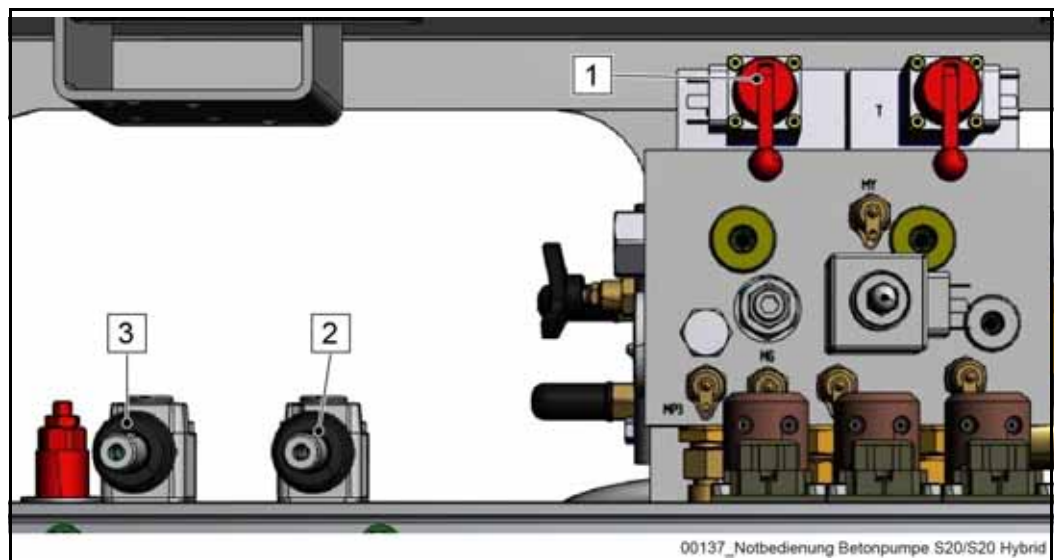


Fig. 216 Emergency operation - concrete pump, agitator

Caption (Fig. 216)	
Pos.	Description
1	Manual override: Concrete pump (CP)
2	Control lever receiver concrete pump: PUMPING – 0 – SUCKING
3	Control lever receiver agitator: FORWARD – 0 – REVERSE

The following measures must be taken in order to operate the concrete pump and/or the agitator during power outages:

- Lift lever (1) on the emergency control block continuously so that the hydraulic oil does not immediately flow back into the hydraulic tank.
- Using the screw-in lever, actuate valve (2) to operate the concrete pump.
- Using the screw-in lever, actuate valve (3) if the agitator needs to be rotated.

The direction of the movements depends on the position of the lever.



## 3.20 Emergency oil supply for the placing boom hydraulics

### 3.20.1 Safety instructions



#### Warning!

##### **Risk of injury as a result of working on hydraulic systems!**

Working on hydraulic components poses a risk of injury in general, as the components may be pressurised. Therefore, work on hydraulic systems must only be performed by specially trained personnel.

---



#### Attention!

##### **Risk of hydraulic hoses being ripped off if placing boom is turned too far!**

If the placing boom is being operated with the manual override, the electrical monitoring will be inoperative.

For this reason, carry out the emergency operation at the lowest speed possible and with utmost care, and monitor the boom constantly in order to prevent collisions with machine and vehicle parts.

---



#### Attention!

##### **Material damage as a result of overloading emergency unit!**

When working operation is interrupted, **always** press an EMERGENCY STOP button to relieve the emergency unit.

---



#### Information

Delivery pressure can be increased for aggregates.

When using an aggregate with a low delivery rate, a thinner pressure hose can be connected to "P" through a reduction.

---

### 3.20.2 External hydraulic pump

In order to bring the machine into transport position in the event of drive failure, the hydraulic system is equipped with connections for an external hydraulic pump.

The connections are located near the pressure filter (1) (**Fig. 217**). The pressure filter is installed in the control cabinet next to the boom control block on the right side of the machine.

**The delivery connection (P) is marked red.**

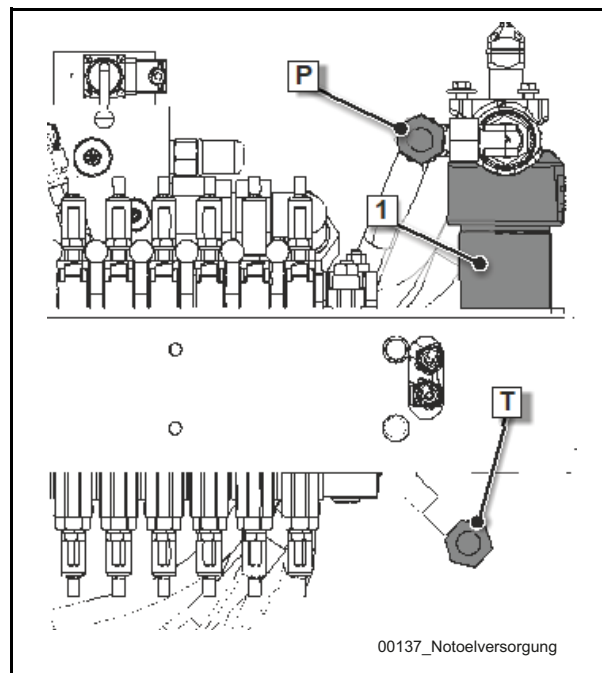
**The return connection (T) is marked blue.**

Please observe the following for an emergency operation:

- Max. power of the hydraulic oil pump: 18 l/min at 280 bar.
- Hydraulic oil quality and viscosity according to the type being used, (see “**Recommended lubricants and fuels**” on page 387).
- Required pressure hose: 20/4 x 5700 (DKOS/DKOS).
- Required return hose: 20/4 x 5700 (DKOS/DKOS).
- The screw joints necessary for the connection are included in the tool set.
- Ensure ABSOLUTE CLEANLINESS for interventions in the hydraulic system.

The work described below may only be carried out:

- By suitably trained personnel
- In accordance with the operational safety regulations
- Only in case of emergency



**Fig. 217 Emergency oil supply**



Caption (Fig. 217)	
Pos.	Description
1	Pressure filter
P	Delivery connection (red mark)
T	Return connection (blue mark)

### 3.20.3 Connecting the auxiliary machine

Connecting to an external machine is often problematic, even if the machine features connection options and identical conditions with respect to the pump delivery rate and the oil quality.

Under certain circumstances, only part of the oil removed will flow back into the tank of the auxiliary machine and constant transfer is necessary.

When connecting a pressure controlled pump, it must be made available in the load message.

Therefore, we recommend an emergency unit for potential emergency operation, as described below.

### 3.20.4 Connecting the emergency unit

We recommend using our emergency unit, item no.: 10131131 (**Fig. 218**):

- Position the emergency unit in a suitable place above the oil level of the hydraulic oil box.
- Open the cleaning cover above the oil level.
- Hang the suction hose into the opening.



**Fig. 218** Portable emergency unit

- Connect P-connection on the emergency unit to the P-connection on the machine (**Fig. 218**).
- The T-connection does not need to be opened in this case, since the oil box captures the returning oil.

In order to start the drive motor of the emergency unit against the dynamic pressure, the EMERGENCY STOP valve for the placing boom hydraulics must be opened.

- Press an EMERGENCY STOP button on the machine.
- Start the pump unit's drive motor.
- Unlock the EMERGENCY STOP button and start the machine control.
- Move the placing boom and outrigger into the transport position.
- When working operation is interrupted, **always** press an EMERGENCY STOP button to relieve the emergency unit.



## 3.21 Cleaning

After concreting, the pumping line and concrete pump must be cleaned thoroughly in order to prevent material damage.

This chapter describes how to clean various SCHWING products. But the principle remains the same in each case.

- Finish the concrete feeding in good time so that the content of the hopper and pumping line can still be situated at the construction site.
- We recommend hosing down the equipment occasionally with a water hose during concrete breaks to prevent the concrete from setting.

### 3.21.1 Cleaning devices

Suitable devices can be ordered from SCHWING. For example:

- Compressor (**Fig. 219**).
- Water pump (1) and/or high-pressure cleaner (3) (**Fig. 220**).
- Cleaning head and trap basket (**Fig. 221**).



#### Attention!

#### Unsuitable material may cause damage!

Only use accessories in perfect condition approved by SCHWING for cleaning machine and pumping line.

SCHWING is not liable for damages caused by defective or unsuitable equipment and unsuitable cleaning methods and -means.



Fig. 219 Air compressor

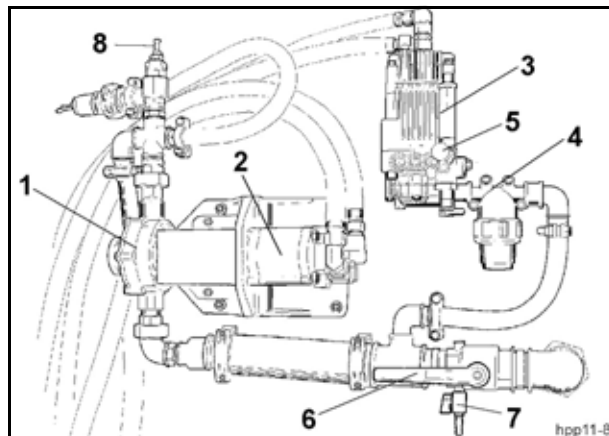


Fig. 220 (Schematic diagram)

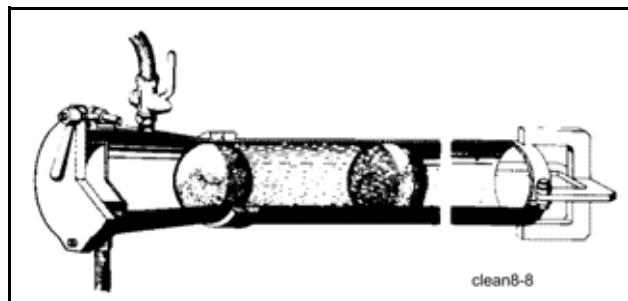


Fig. 221 Cleaning head and trap basket



### Information

For information on the special equipment “High-pressure cleaning system”, please read the separate chapter.

### 3.21.2 Cleaning the pumping line

- After work, clean the pumping line first since this is where the concrete sets quicker.

The total quantity of concrete located in the pumping line is calculated as follows:

DN	50	=	2.0 l/m
DN	65	=	3.3 l/m
DN	75	=	4.4 l/m
DN	100	=	7.8 l/m
DN	112	=	9.8 l/m
DN	125	=	12.3 l/m

**Danger!****Danger caused by concrete under pressure!**

When opening pumping lines, sudden releases of pressure can cause severe injuries or even death.

Before opening the pumping line, the concrete column must be released by pumping backwards.

---

Various methods can be applied to clean a pumping line.

### 3.21.3 Reverse pumping concrete

Reverse pumping of concrete using a sponge rubber ball represents the normal cleaning of a placing boom pipeline:

- Produce a thin-consistency concrete and pump the pumping line full.
- Close the foldable covering for the hopper (1) **(Fig. 222)** / **(Fig. 223)**.

**Warning!****Risk of accident from badly secured cover!**

Secure the cover to prevent it from popping up due to overpressure in the filling hopper.

The safety device **(Fig. 222)** releases the overpressure through the lowered hopper rubber border in the back.

Ensure that the safety device is in sound operating condition and do not make any modifications!

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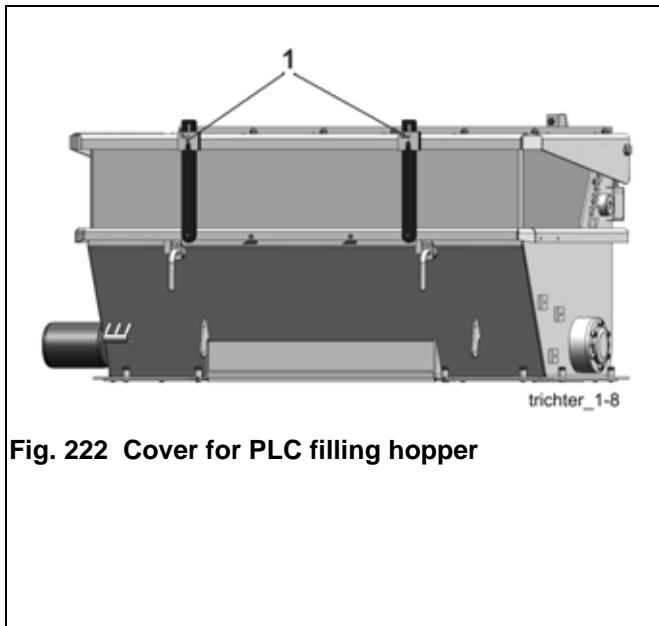


Fig. 222 Cover for PLC filling hopper

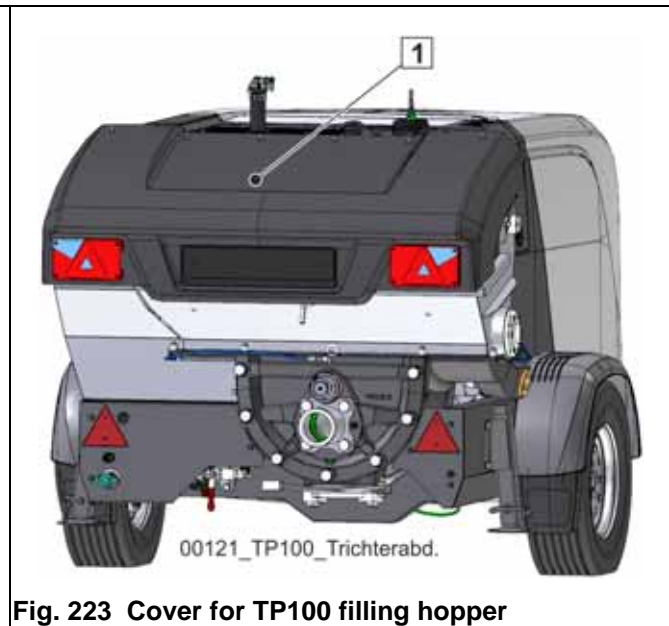


Fig. 223 Cover for TP100 filling hopper

- Slowly pump hopper as empty as possible.
- Position the placing boom as shown in (Fig. 224).

A pumping pipe with a cleaning cover (2) (Fig. 225) is available as special equipment.

If the top cover is installed reversed, it retains the cleaning ball during reverse pumping.

- Switch agitator to reverse if the machine is not equipped with an automatic adjustment of the agitator rotational direction to pumping or suction operation.

Do not forget to switch. Machines with a VECTOR control switch automatically.

- First push the damp sponge rubber ball into the end hose (Fig. 226), then switch the concrete pump to "Suction" (reverse running) with a lower stroke rate.



### Attention!

#### Material damage to pumping lines and agitator

Failure to observe this information can cause deposits in the pumping line and subsequent clogging, as well as damage to the agitator.

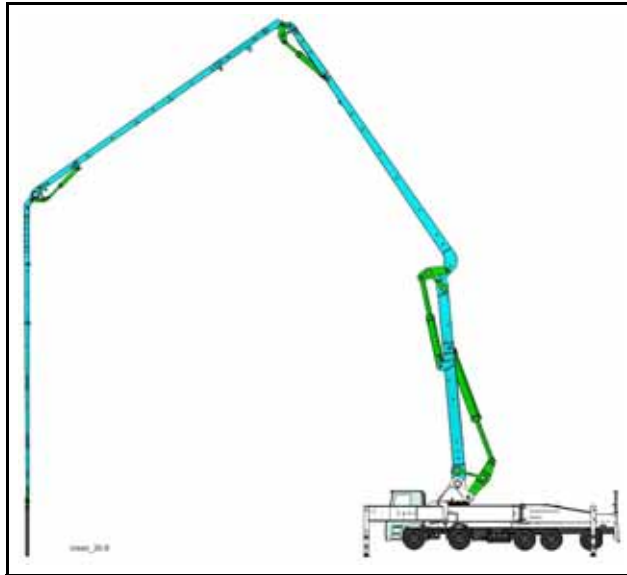


Fig. 224 Cleaning position for placing boom (schematic diagram)

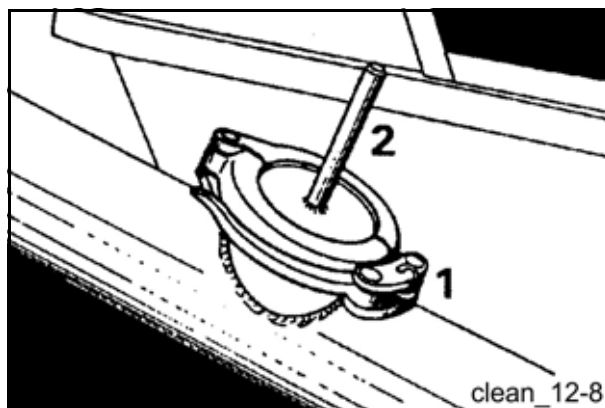


Fig. 225 Cleaning cover



Fig. 226 Sponge rubber ball

- Briefly tap on the pumping pipe with the handle of a hammer just in front of the cleaning aperture.

If there is still concrete in the line at this point, the tapping will produce a deep, dull sound (Fig. 227).

If the concrete and sponge rubber ball have passed the tapping point, the tapping will produce a high-pitched sound (**Fig. 228**).



### Attention!

#### Damage to the pumping line!

Only use the handle of the hammer to tap the pumping line. Do not use metal objects:

- Dents cause rapid wear of the pumping pipe!
- The inner hardened layer of highly wear-resistant tubes can spall.

- 
- Remove the top cover (2) (**Fig. 229**) and take out the cleaning ball.
  - Reattach the top cover in "operating position".



### Information

Bear in mind that the content of the pumping line can exceed the volume of the concrete filling hopper during back siphonage.

In such cases, it is necessary to interrupt the process and empty the filling hopper.

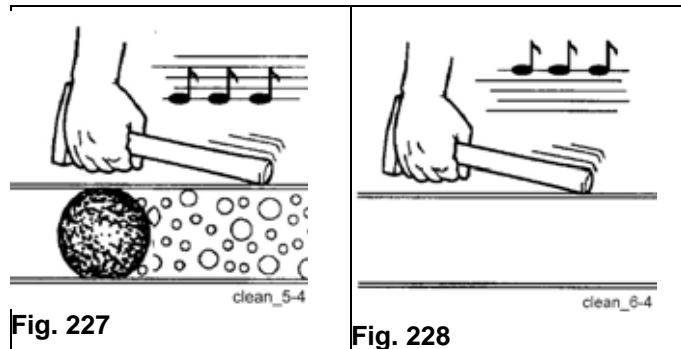


Fig. 227

Fig. 228

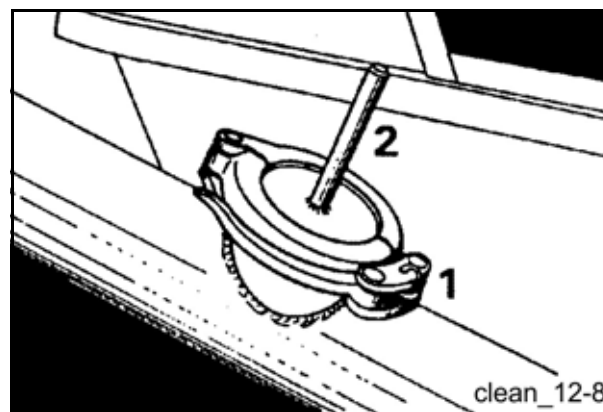


Fig. 229 Cleaning cover

It depends on several factors whether the concrete filling hopper can completely receive the flowing back concrete or how quick the hopper is full:

1. Volume of the filling hopper
2. Volume of the pumping line
3. Volume of the pumping cylinder
4. Degree of filling of the pumping cylinder

**Example:**

S 58 SX with pump kit 2525

at 1. = approx. 600 l

for 2. = approx. 850 l

for 3. = approx. 125 l (one cylinder)

for 4. = unknown

A theoretical degree of filling of the pumping cylinder of 100% would require approx. 7 strokes to empty the pumping line.

**850 l/125 l = approx. 7 strokes**

Which would cause the filling hopper to overflow.

In this case, we recommend interrupting the back-siphonage process after 4 strokes at the latest and emptying the hopper:

**4x 125 l = 500 l**

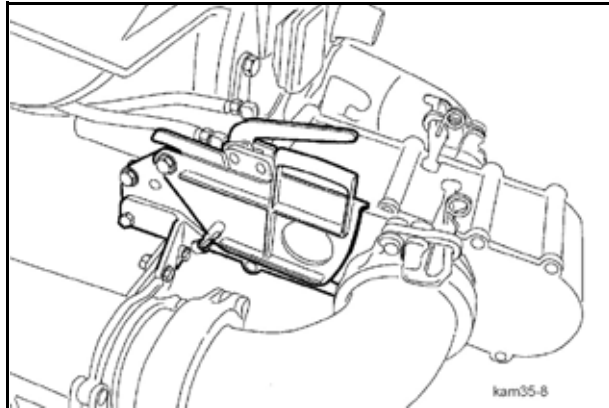
A certain degree of experience is helpful here.

The basic principles are:

The longer the pumping line, the sooner an overflow of the filling hopper during back siphonage can be anticipated.

The larger the volume of the pumping cylinder, the fewer strokes are required to empty the pumping line.

We recommend using our chamber valve (**Fig. 230**) to clean the pumping line, especially for larger machines.



**Fig. 230 Chamber valve**

### 3.21.4 Clearing the pumping line with water

This method is ideal for separately laid, long pipelines, vertical lines and lines with a downstream placing boom.

For stiff, rough, fine-grained or sand-poor concretes, this method can also be recommended for the boom pipeline of truck-mounted concrete pumps.

The following is required in addition to a powerful water pump (**Fig. 231**):

1. Cleaning head with water connection
2. Soft sponge rubber ball
3. Paper plug

The paper plug is made of soaked, double-folded, tightly rolled-up, empty cement bags.



#### Information

The plug must be completely sealed to prevent the concrete from leaching.

### 3.21.5 Rinsing the pumping line

Cement residues are removed from the tube walls by rinsing the emptied pumping line.

- To do this, press a soft sponge rubber ball about 1 m into the pumping pipe (**Fig. 232**).
- Mount the cleaning head, with a soft sponge rubber ball attached to it, onto the pipeline.
- Fill with water between both balls.



- Use the water cushion to press both balls through the line, like when blowing out with air, (see “**Blowing out the pumping line with compressed air**” on page 328). Raise the placing boom if necessary.

**Attention!****Frost damage!**

In case of danger of frost, remove water from the pumping line.

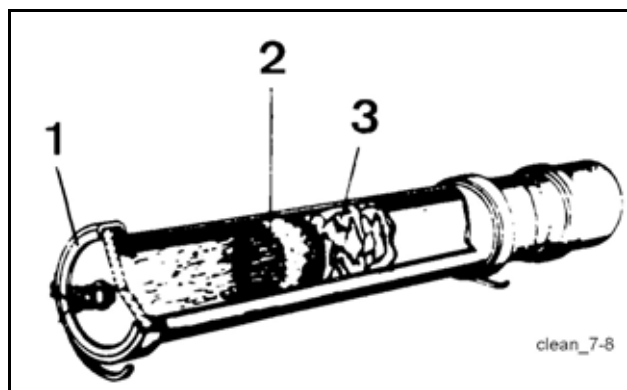


Fig. 231 Blowing out the pumping line

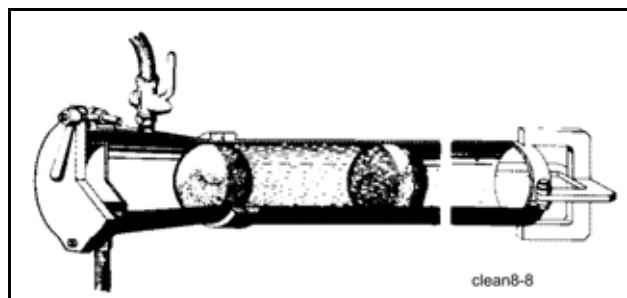


Fig. 232 Rinsing the pumping line

### 3.21.6 Blowing out the pumping line with compressed air



#### Warning!

##### Severe injuries due to compressed air

Severe injuries due to flying material.

Air can become compressed in pumping pipes and be discharged explosively, which can result in severe injuries.

Avoid excessive concentrations of compressed air in pumping pipes.

---

The following points must be observed when blowing out the pipeline with compressed air.

1. The blowing out must be carried out under expert guidance.
2. Elbows or hoses may not be mounted at the end of the pipeline.
3. No-one may remain in the area of the concrete output.
4. Empty and rinse tapered tubes manually. Only blow out pumping lines of the same nominal size.
5. A trap basket must be connected to the concrete outlet (**Fig. 233**).
6. Set the concrete output high so that the concrete can escape freely.
7. The cleaning head must be equipped with a functioning pressure gauge (2) and a large-dimensioned blow-out cock (3) (**Fig. 234**).
8. The length of the plug must be such that it seals the pipeline hermetically on the trap basket upon completion of the blowing out.
9. The plug must be sealed in order to prevent the compressed air from penetrating past it into the concrete.
10. Only work on unpressurised pipelines. Open blow-out cock (3) (**Fig. 234**). Concrete emerging under pressure can injure persons.
11. Individual tubes and short 10 m-long tube strings may not be blown out. High risk of accident caused by recoil due to low mass!

In addition to the prepared paper plug, as described above, a hard sponge rubber ball can be used to blow out tubes.

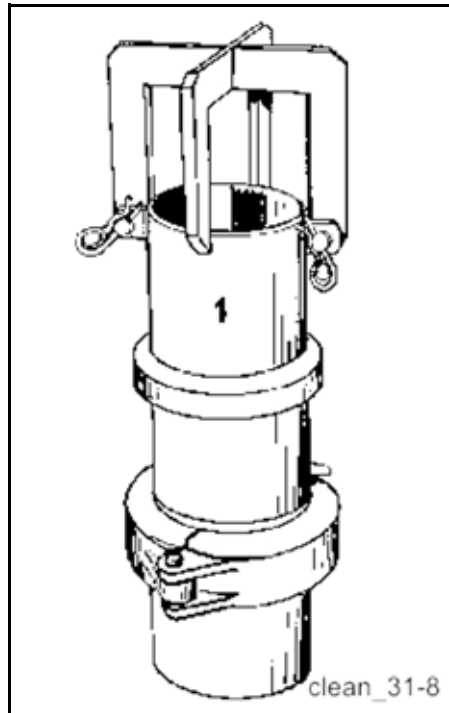


Fig. 233 Trap basket

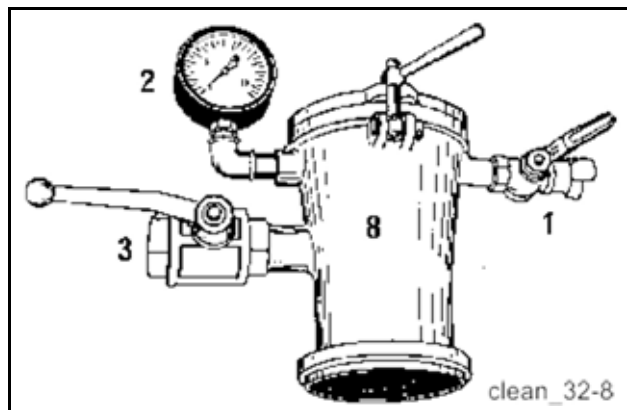


Fig. 234 Cleaning head

### 3.21.7 Cleaning the concrete pump



#### Danger!

##### Danger to life due to electric shock!

- Do not direct water jets or the jet of a pressure cleaner towards the electrical components of the machine.

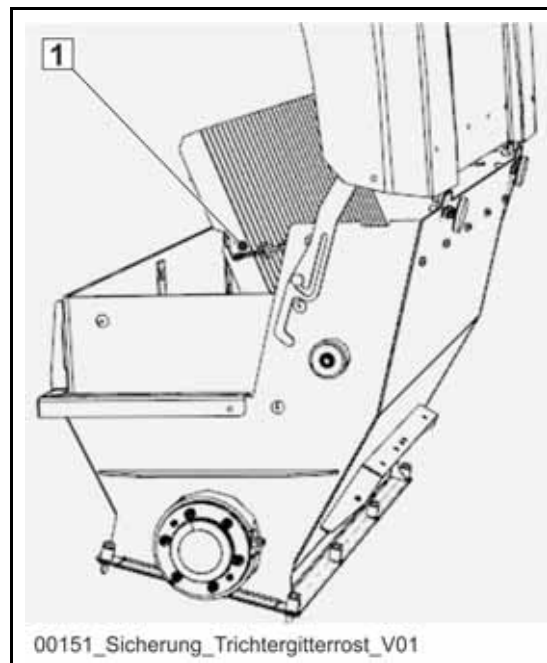


#### Warning!

##### Risk of being crushed by machine components starting automatically!

- Do not remove or step on the hopper grate in the concrete filling hopper.
- Do not reach into the machine while the drive motor is running or the pressure accumulator is charging (if possible), and do not hold objects in openings.

An end limit switch stops the concrete pump and the agitator if the hopper grate in the concrete filling hopper is opened. The hopper grate may online be opened in exceptional cases. Before lifting the hopper grate, shut down the machine! Lock the raised hopper grate in place using the hook (1) (**Fig. 235**).



**Fig. 235** Example: Hopper grate raised and secured

### 3.21.7.1 Behaviour of truck-mounted concrete pumps after closing the hopper grate

After closing the hopper grate:

- The agitator turns back on.
- The concrete pump must be switched back on (restart protection for end hose).

### 3.21.7.2 Behaviour of stationary concrete pumps / trailer pumps after closing the hopper grate

After closing the hopper grate:

- An EMERGENCY STOP notification must be acknowledged on the control unit.
- The agitator must be switched back on.
- The concrete pump must be switched back on (restart protection).

### 3.21.8 Securing the machine

- Remove the remote control cable.
- Connect the radio remote control transmitter.
- Use the local control.



#### **Warning!**

**Severe injuries can be caused if the machine is left unattended!**

If the machine has to be switched on for cleaning, the machinist is responsible that no unauthorised persons come near the open gate valve housing.

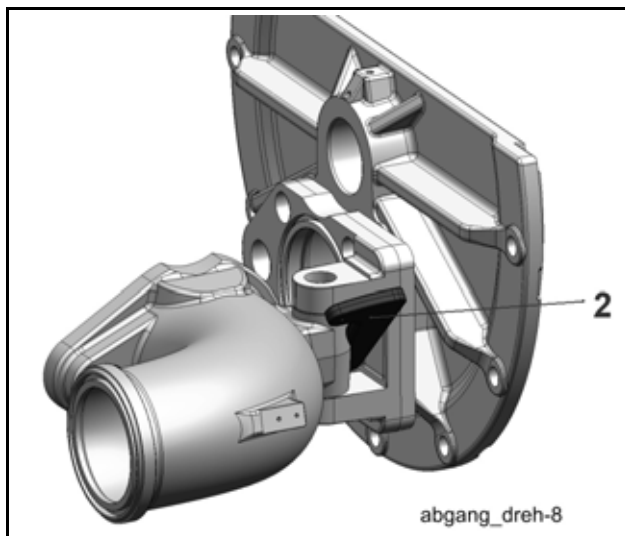
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### 3.21.9 Interior cleaning

- Have a drip pan ready for residual concrete before beginning with the cleaning.
- Remove the tapered tube from the outlet on the pump by pivoting it to the side and securing it with the supplied wedge (2) (**Fig. 237**).
- Start up the concrete pump at the lowest stroke rate, in order to pump any residual concrete out of the hopper.
- Discard the residual concrete if you are no longer able to use it at the jobsite.
- Connect the water hose and hose out the filling hopper (**Fig. 236**). The concrete pump sucks in water and rinses out the pumping cylinders.
- Switch off the concrete pump and the vehicle engine.



**Fig. 236** Cleaning the filling hopper



**Fig. 237** Rotatable outlet

- Open the cleaning flap (**Fig. 238**) under the rock valve housing.
- Flush out the rock valve housing.
- Clean the agitator, gate valve housing, outlet, etc. using a strong water jet. Only hold the water jet and not the hose nozzle inside the opening of the gate valve housing (**Fig. 239**).
- Rinse the water box by switching on the concrete pump briefly with the lowest stroke rate with open drain valve.

**Attention!****Material wear!**

Switch off concrete pump immediately if water no longer comes out

---

- Hose out the water box with pressure water (**Fig. 240**). Do not remove the grid from the water box!
- Fill water box with fresh water.
- Check the water box weekly for deposits that could not be removed by normal flushing process. Increasing deposits may indicate wear on the pumping piston.

**Warning!****Danger of crushing!**

Always switch off the drive motor and relieve any existing pressure accumulators before opening the top covers on the water box.

Protective grids are only available in those water boxes whose top covers can be opened without tools!

After cleaning, mount protective grill and cover for water box properly.

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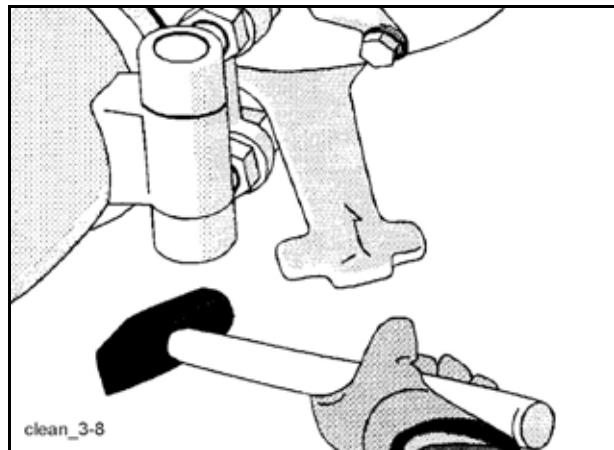
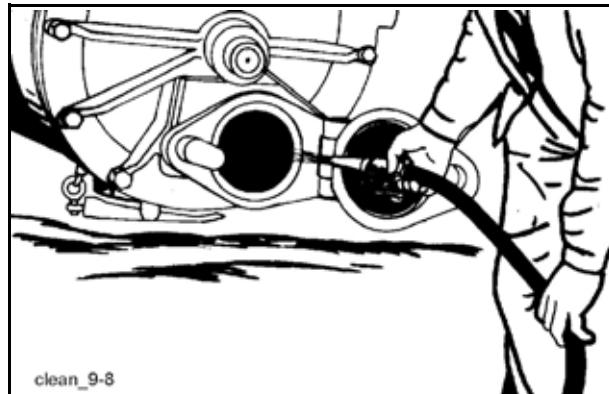


Fig. 238 Open cleaning flap



clean\_9-8  
**Fig. 239 Clean concrete filling hopper**



clean\_1-8  
**Fig. 240 Hose out water box**

- Close and secure the cleaning flap on the rock valve (**Fig. 241**).
- Close the slewing lever on the cleaning flap by hitting it with a hammer in the axial direction.



### Information

The hammer blows jam the flap in the wedge-shaped guides.  
Vibrations can cause the flap to open.




**Attention!**
**Material damage!**

Never let rock valve machines run "dry".

The kidney seal faster can be damaged.

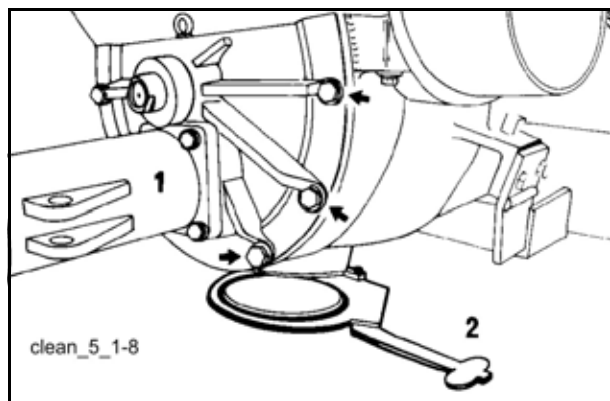
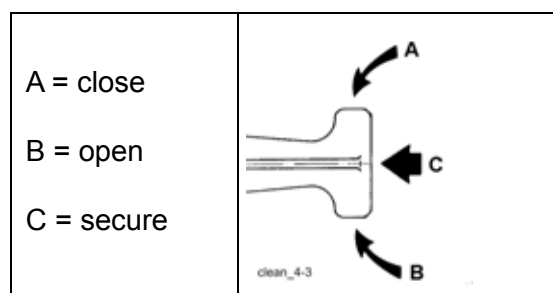


Fig. 241



### 3.21.10 Exterior cleaning

- We recommend the occasional hosing down with a water hose during breaks to prevent the concrete setting.
- Lightly spray the outside of the concrete pump filling hopper with formwork oil.


**Information**

Only use environmentally-friendly oils.

Make sure that no oil enters the filling hopper.

### 3.21.11 Using high-pressure cleaners (HP cleaners)



#### Warning!

##### Poor preparation can cause accidents!

Observe the operating instructions of the high-pressure cleaner system, and wear the appropriate personal protective covering.



#### Information

New paints are only properly dry after approx. 3 months.

Do not clean the machine with an HP cleaner during this time.  
This also applies to repainted sub-areas.

Newly painted surfaces may only be cleaned with a spray hose and cold water during the first 3 months. Use a soft brush, if necessary.

No HP cleaner should be used in areas with mechanical paint damage, because this can cause painted areas to separate even more.

Damaged painted surfaces should be repaired as soon as possible and in a professional manner.

During subsequent use of the HP cleaner, please observe:

- Maximum permissible water temperature 60 °C.
- Do not use additives.
- Maximum permissible water pressure 160 bar.
- Minimum permissible spraying distance 30 cm.



#### Attention!

##### Damages caused by strong water jet!

- If the HP cleaner used generates a higher water pressure, the spraying distance must be increased accordingly.

### 3.21.12 Using cleaning agents



#### Danger!

##### Fire hazard!

Do not use highly flammable agents.

- Do not use aggressive cleaning agents. They can corrode different materials (e.g. rubber) and painted surfaces.
- Commercially available paint cleaner and care products can be used, provided they do not exceed a pH value of 9 or fall below a pH value of 4.



#### Information

Ask the manufacturer of the cleaning agent to confirm its suitability.

Observe his directives on the application and health protection.

- Always rinse off the cleaning agents thoroughly with clean water. Do not leave puddles.

### 3.21.13 After cleaning

- Lubricate all lubrication points after cleaning.

We recommend spraying the dry machine with a wax-based preservative for protection against corrosion.

### 3.21.14 Water box flushing (special equipment)

Our concrete pumps can be equipped with a pressure flush function for the water box as a special accessory.

With this device, the usual manual cleaning of the water box is omitted to a large extent.

Four spraying nozzles in the top cover of the water box rinse the inside of the water box and piston rods of the differential cylinder.

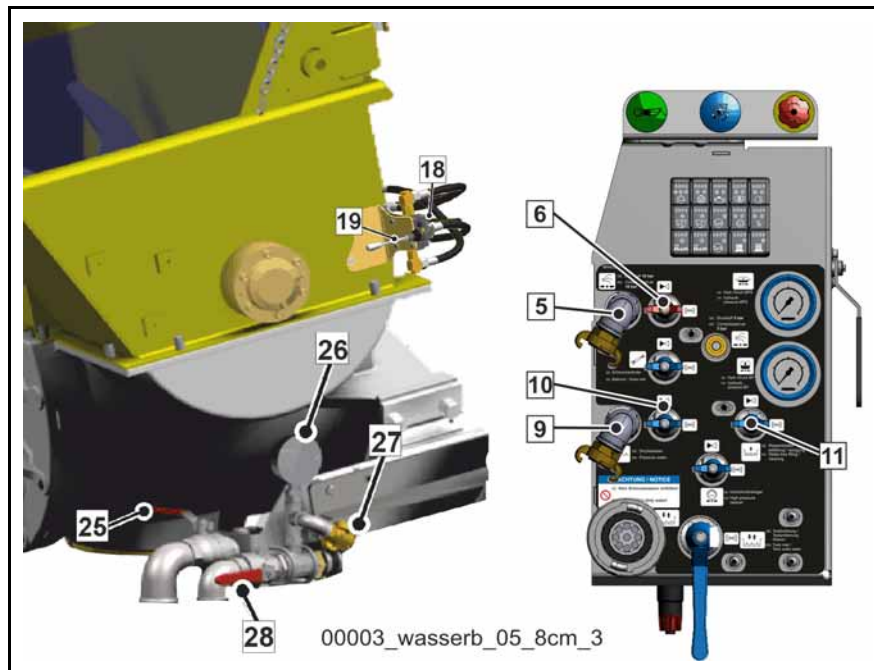
Application:

- Open the drain cock (25) (**Fig. 242**) on the water box at the rear of the machine.
- Start the water pump and route pressurised water into the spraying nozzles (3, 4) (**Fig. 243**) on the water box by switching the corresponding ball valves (11) (**Fig. 242**) on the rear of the machine and (2) (**Fig. 243**).
- Start the concrete pump at a lower stroke rate.

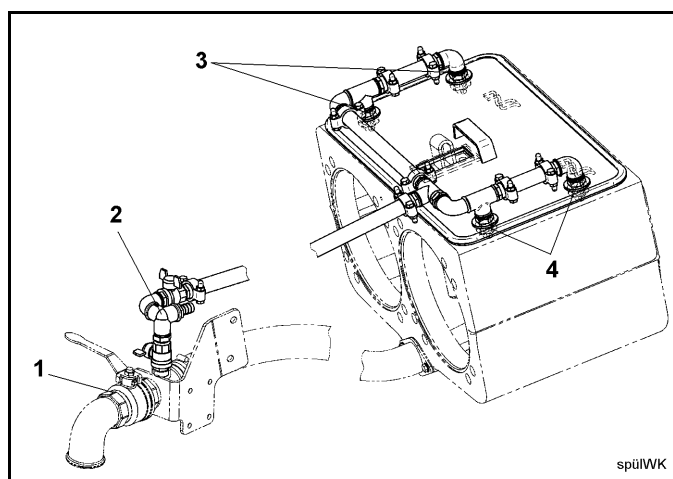
- End the cleaning process when clean water emerges from the drain cock.
- Close the drain cock and fill the water box with clean water.

This can also be done with the spraying nozzles or, as usual, through the drain hose.

Always rinse the water box immediately after each use of the concrete pump and visually inspect it once a week to make sure that it is clean.



**Fig. 242** Rear of the machine



**Fig. 243** Flushing the water box

## 3.22 Hazard prevention on the concrete filling hopper



### **Danger!**

#### **Danger of death due to exposed agitator!**

Danger of death as a result of being crushed by or pulled into the agitator!

Disassembled or open hopper grates, as well as defective or manipulated end limit switches, can cause serious injuries and even death.

The following actions are prohibited on the agitator during operation:

- Reaching through the hopper grate.
  - Passing items (e.g. water hose, rod, etc.) through the hopper grate.
- 

### 3.22.1 Hopper grate

The hopper grate in the concrete filling hopper is coupled to an end limit switch.

The end limit switch stops the rock valve and agitator when the hopper grate is opened.



### **Warning!**

#### **Risk of serious injury due to defective end limit switch!**

If the agitator does not stop automatically when lifted, there is a risk of serious injury and even death.

The end limit switch has to be inspected daily and replaced in the event of a defect.

Arrangement and design of the hopper grate according to EN 12001.

---

Clean the concrete filling hopper with a strong water jet.

The water jet should be directed onto the area to be cleaned, do not pass the hose nozzle through the hopper grate.

Before removing any fixed concrete residues with the appropriate tools:

- Stop the machine.
- Switch off the drive motor and prevent it from starting up.
- Discharge the pressure accumulator, if applicable.

### 3.22.2 Cleaning flap and pipeline outlet



Fig. 244 Do not reach into the hopper



Fig. 245 Additional label for stationary concrete pumps

Secure the machine from being switched off before opening the cleaning flap under the rock valve housing or the elbow of the pipeline outlet of concrete pumps.

- Stop the machine.
- Switch off the drive motor and prevent it from starting up.
- Discharge the pressure accumulator - if present.

For older machines, the signs (**Fig. 244**) (**Fig. 245**) to the left and right of the agitator hopper and in its proximity may have to be updated.

Other signs can be ordered.

The adhesive areas must be clean and free of grease.

Make sure the signs are in good condition and replace damaged signs immediately.

## 3.23 Servicing/Cleaning

### 3.23.1 Maintenance operation



#### Warning!

##### **Danger of being crushed by the placing boom!**

Lowering the placing boom in an uncontrolled manner can cause persons to become trapped between the boom and structure!

As it cannot be excluded that the placing boom drop independently (wear, fault, etc.), remaining under the boom is strictly forbidden, also for cleaning and maintenance.

Support the machine completely, as required for working operation. Turn the boom package out of the danger zone before carrying out work on the machine deck.

This also applies for changing pumping pistons, for example.

When working on the placing boom itself, the boom must be secured properly.

Since 28 February 2013, truck-mounted concrete pumps that are brought into circulation for the first time in the European Economic Area must have a system that ensures that the outrigger is positioned correctly before the placing boom control is released.

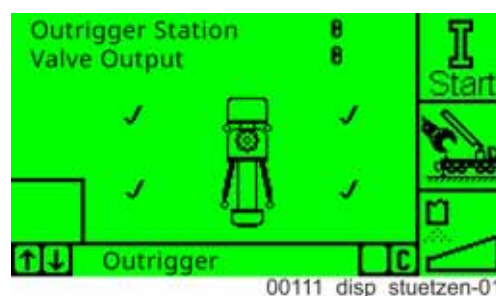


#### Information

The front folding elements have to be fully supported for machines from model series S65SXF in order to move the rear folding outriggers. Spread the rear folding outriggers until a confirmation appears on the Vector control system.

Always support type S65SXF machines if the placing boom is to be raised.

The “Outrigger” display (**Fig. 246**) in the VECTOR control system contains a confirmation of how far the rear folding outriggers have to be extended.



**Fig. 246** The “Outrigger” VECTOR display

### 3.23.2 Cleaning operation

To facilitate cleaning and maintenance work in the concrete filling hopper, it is helpful to lift the placing boom slightly without having fully braced the machine beforehand.

For this reason, the operating mode "maintenance operation" has been integrated into the VECTOR control as of software version V 1.40.


It is possible to lift the placing boom slightly out of the transport position (transport position means: all outriggers are retracted, secured and the placing boom is in the tray) and lower it again without having to support the machine as required for work assignments.

To what extent this additional operating mode can be used depends on the individual features of each machine.



### 3.23.3 Activating maintenance operation

In order to lift the placing boom out of transport position, proceed as follows:

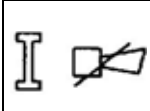
#### 3.23.3.1 Moving the outriggers

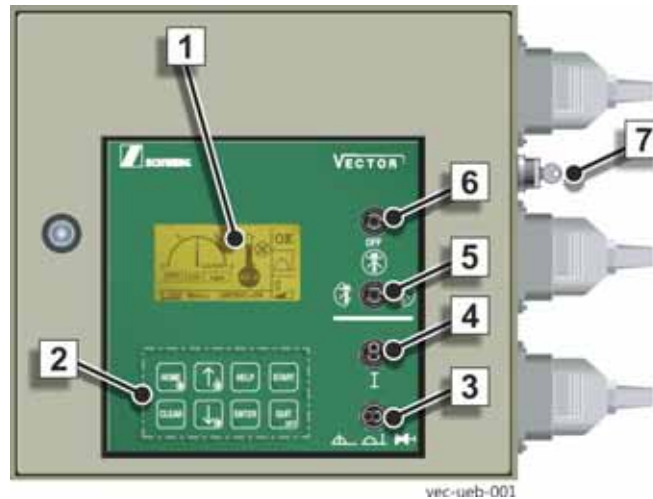
	<ul style="list-style-type: none"> <li>➤ Select the "Local" operating mode using the operating mode selector switch (3) (<b>Fig. 247</b>).</li> <li>➤ Lower all vertical outriggers until they are touching the ground. A horizontal extension of the outriggers is not required.</li> </ul> <p><b>Exception for S65SXF</b></p> <p>For models with the type S65SXF, the folding elements in the front bow outrigger have to be completely extended before extending the rear folding outriggers partially (see Vector control display) and bracing them vertically.</p>
---	---

#### 3.23.3.2 Moving the placing boom

	<ul style="list-style-type: none"> <li>➤ After switching the operating mode selector switch (3) to operating mode "Remote"....</li> </ul>
	<p>... the display changes automatically to the operating mode "Maintenance operation".</p> <p>This is indicated by a short animation.</p>



	Release the boom control with the selector switch of the remote control.
---	--



**Fig. 247 VECTOR control system**

The placing boom can then be moved to a limited extent using the remote control.

For machines with a roll-folding design, boom section 1 is released.

For machines with overhead roll-folding, boom section 2 is also released up to an angle of 20°, as this is a prerequisite for erecting section 1.

Furthermore, it is possible to draw the boom package together in case a section drops while lifting.

Turning the placing boom at a low speed is possible if this is necessary to safely position it when lowering the boom package into the tray.



### 3.24 Assembling the placing boom

#### 3.24.1 Safety instructions



#### Danger!

#### **Danger to life due to the machine toppling!**

If the end hose is in a prohibited working range, the entire machine can topple over and cause death to people!

The end hose must never be extended past the vertical position of the placing boom while in the backwards position (**Fig. 248**).



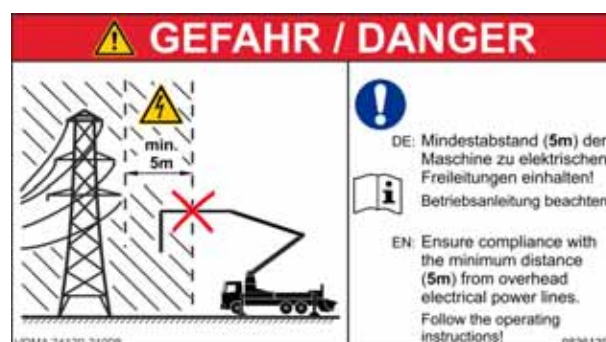
**Fig. 248** Placing boom in backwards position



#### Danger!

#### **Danger to life due to electric shock on transmission lines!**

As a result of its design, the placing boom has a very wide range of motion. Maintain a minimum distance of 5 m from electrical transmission lines (**Fig. 249**), as contact with them may result in a fatal electric shock otherwise.



**Fig. 249** Observe minimum distance to transmission lines



### Caution!

#### Risk of damage and accidents as a result of placing boom moving!

As a result of its design, the placing boom has a very wide range of motion. Observe the boom constantly and avoid contact with machine parts and obstacles.

Exercise particular caution when performing multiple overlapping movements at the same time.



### Warning!

#### Risk of injury or damage as a result of moving the boom sections into the prohibited area!

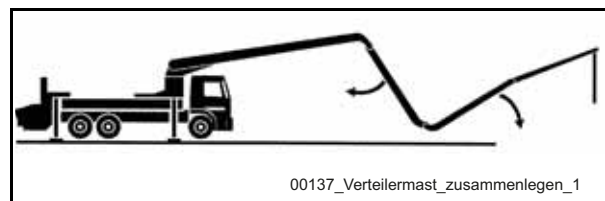
Boom sections 3 and 4 must never be moved beyond the vertical position into the prohibited area (**Fig. 250**).



**Fig. 250 Prohibited area for boom sections 3 and 4**

The correct method for assembling the placing boom depends on the starting position and could be as follows:

- Raise boom section 1 as far as possible.
- Retract boom section 2 while keeping boom sections 3 and 4 horizontal (**Fig. 251**).



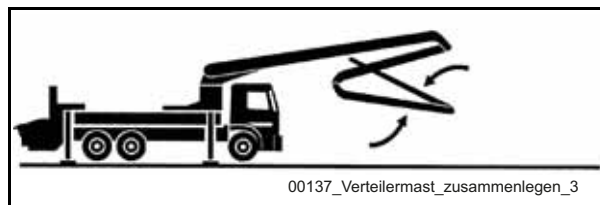
**Fig. 251 Retract boom section 2**

- Retract the boom section 4 up to the system on 3 (**Fig. 252**).



**Fig. 252 Retract boom section 4**

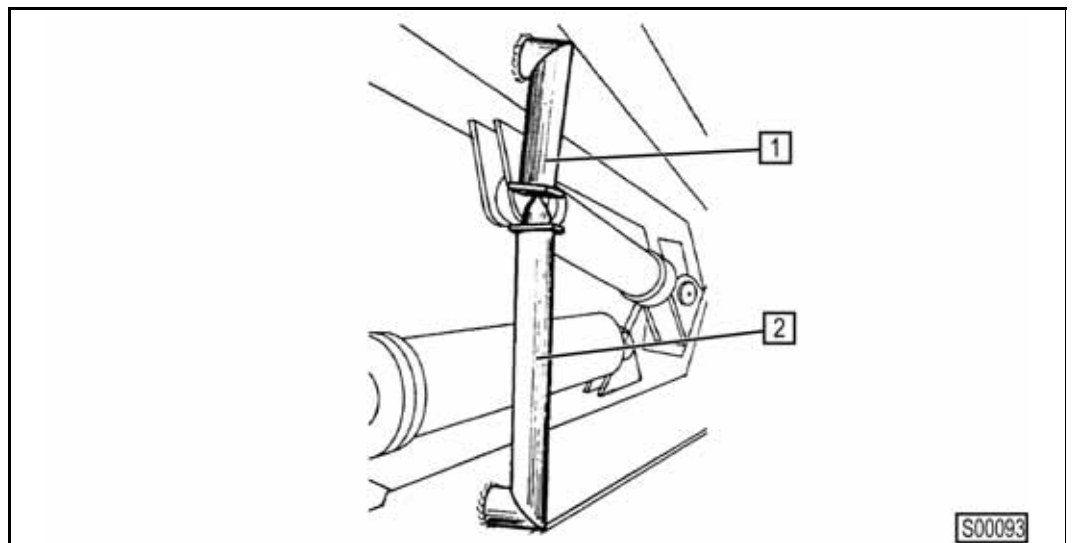
- Make sure that the transport safety devices take up the end hose.
- Fold in boom section 3 up to the system on 2 (**Fig. 253**).
- Align the placing boom with the vehicle.
- Lower the boom package.



**Fig. 253 Fold in boom section 3**

**Ensure that**

- The transport securing devices take up the end hose.
- The boom sections are fixed below one another by the respective limit stops, e.g. (1 and 2) (**Fig. 254**).
- The boom column is aligned correctly (**Fig. 253**).
- The supports on the machine frame hold the boom package **without pressure** (**Fig. 255**).



**Fig. 254 Limit stops for boom sections**

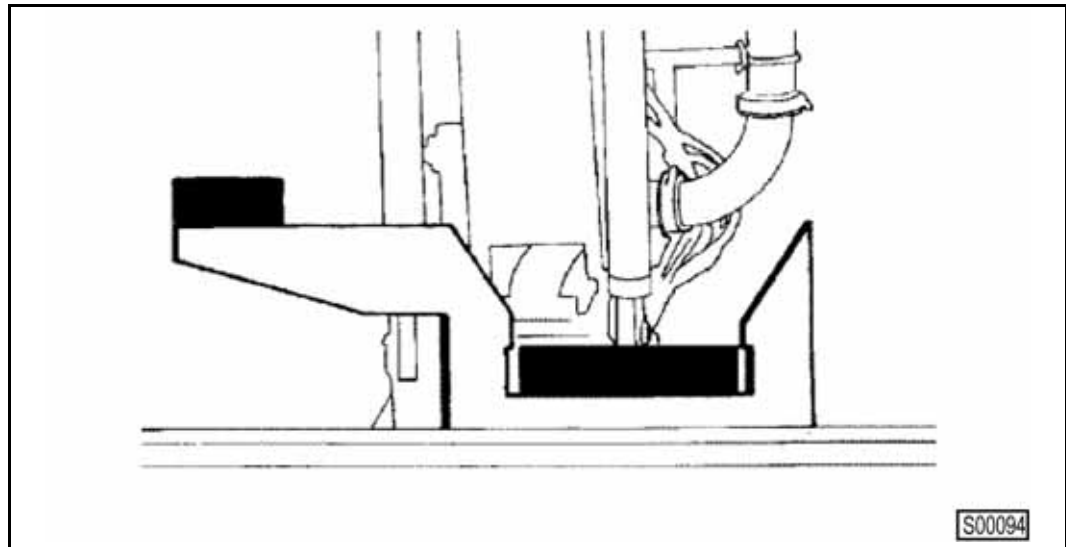


Fig. 255 Supports on machine frame

### 3.24.2 Storm and bad weather operation



#### **Danger!**

##### **Danger to life due to lightning strikes!**

During storms, lightning poses an imminent danger to life. The machine and its immediate vicinity are charged with electricity. Earthing the machine does not reduce this risk. Move the placing boom into the transport position.

---



#### **Caution!**

##### **Risk of injury and risk of damage due to excessive wind speeds!**

If the permitted values for excessive wind speeds are exceeded, the machine can tip over and thus be damaged. Observe the permitted wind speeds in conjunction with the vertical reach. Move the placing boom into the transport position.

---



#### **Information**

If the wind speeds described in this chapter deviate from those specified in the safety manual, the values indicated in this chapter shall take precedence.

---

The work position of the placing boom does not play a role here. When wind speeds reach the permissible thresholds, the placing boom must be moved into the transport position.

When using an outrigger on one side with EASy, the same maximum permissible wind speeds apply to the placing boom as they do to fully supported machines.

- Placing booms with a vertical reach of 42 m or more may only be operated during winds of up to and including force 7 (51 km/h = 14 m/s).
- Placing booms with a vertical reach of less than 42 m may only be operated during winds with a force of up to 8 (72 km/h = 20 m/s).

The placing boom should also be folded if the max. permissible wind force is only exceeded by gusts.

Tower cranes on jobsites often have a wind gauge, allowing you to enquire about the wind speed at any time.

If no wind gauge is available, you can enquire about the wind speed at your nearest meteorological office, or roughly estimate the wind speed using the following rule of thumb:

- Starting at wind force 7, green leaves will break off trees and there will be noticeable difficulties when walking outside.

- Starting at wind force 8, small twigs will break off trees and there will be significant difficulties when walking outside.



## 3.25 Preparing the machine for driving

This chapter describes how to prepare your machine for driving in traffic after the work assignment.

Initial situation:

You have already completed the pumping operation and moved the placing boom into the transport position (see previous chapter).

In order to prepare the machine for driving, all outriggers first need to be retracted.

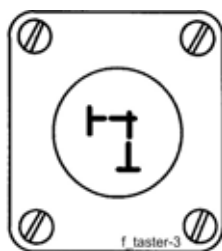
### 3.25.1 General safety instructions

The outriggers can only be moved while the local control unit is active!



For safety reasons, the machine is equipped with a "fixed-position outrigger control".

In order to move the outrigger cylinders, the release button (**Fig. 256**); (6) (**Fig. 258**) next to the outrigger control block must be held down while the control lever is actuated.



**Fig. 256 Release button**

If only one control element is actuated, or an element is released during control, then no movement is possible.

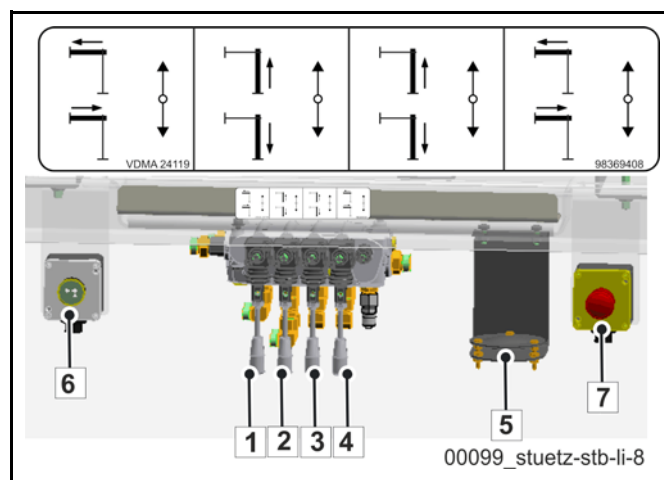
The hydraulic cylinders for the outriggers can only be controlled from the control blocks on the respective side of the machine.

### 3.25.2 Retracting the vertical outriggers

- First, gradually lower the machine by actuating the control levers on both sides of the machine alternately.

This prevents unnecessary loads on the outriggers, as would be the case if only one outrigger cylinder were retracted completely.

- Retract vertical support cylinders up to the end position (only for S 47 SX III: only retract the front vertical support cylinders until the supporting leg is almost in contact with the rubber sleeve).
- Store support pads.



**Fig. 257 Example illustration: Outrigger control block for model S36X, on the left in the direction of travel**

Caption (Fig. 257)			
Pos.	Description	Pos.	Description
1	Control lever, move front outrigger horizontally	5	Spirit level for aligning the machine
2	Control lever, move front outrigger vertically	6	Release button for outrigger hydraulics
3	Control lever, move rear outrigger vertically	7	Emergency stop
4	Control lever, move rear outrigger horizontally		

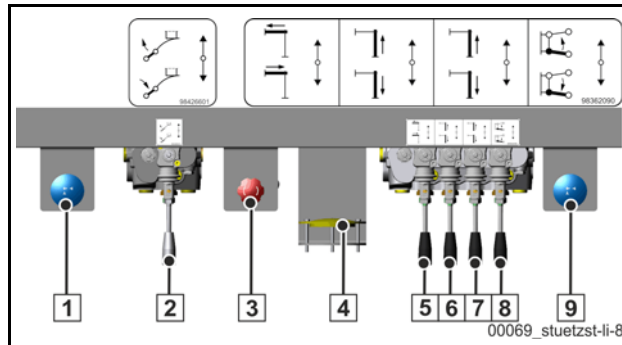


Fig. 258 Example illustration: Outrigger control block for model S65SXF, on the left in the direction of travel

Caption (Fig. 258)			
Pos.	Description	Pos.	Description
1	Release button for front folding outrigger	6	Control lever, move front outrigger vertically
2	Control lever for front folding outrigger	7	Control lever, move rear outrigger vertically
3	Emergency stop	8	Control lever, fold rear outrigger horizontally
4	Spirit level for aligning the machine	9	Release button for large control block
5	Control lever, move front outrigger horizontally.		



### Attention!

#### Attention: Material damage caused by active power take-off!

The power take off may NOT be switched on during driving operation!

Observe the following warning before folding in the horizontal outriggers (**chap. 3.25.4**)!



### Attention!

#### Material damage due to rear underride protection!

When folding in the rear outriggers, they can collide with the underride protection in the “operating position”.

For machines with model S65SXF, the rear underride protection has to be moved into the “transport position” before the rear folding outriggers can be completely retracted.

### 3.25.3 Retracting the horizontal outriggers



#### Information

When disassembling machines with the type S65SXF, please note that the folding element on the front bow outrigger has to be folded in at the very end.

If the folding element is moved first, your machine's control system will switch off the outrigger control in order to prevent material damage to the driver's cab.

Items 1 and 2 only apply for machines of model S 46 and 47 SX.

1. Move the toggle (2) (**Fig. 259**) on the rear folding outriggers into a vertical position.
2. Fold in the outriggers up to the end position.
3. Secure the folding outriggers by moving the toggles (2) (**Fig. 259**) into a horizontal position.

➤ Fold in the rear outriggers up to the end position.

➤ Lock the outriggers with the transport safety device (1) (**Fig. 260**).

This prevents the rear outriggers from folding out on their own while driving.

➤ Remove the transport safety devices (1) (**Fig. 261**) from the front outriggers (if available).

➤ Retract the front drawers to their end position and reinsert the transport safety device.

➤ Retract the front supporting leg against the rubber sleeve (only for S 47 SX III).

➤ Fold in the rear outriggers up to the end position.

➤ Move the outriggers by carefully actuating the control levers!

Avoid hitting the outriggers against anything!



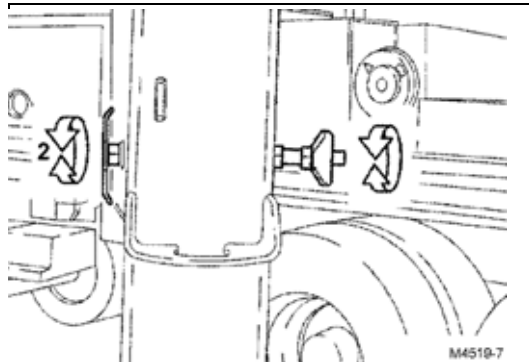
#### Warning!

#### Risk of severe injury or death!

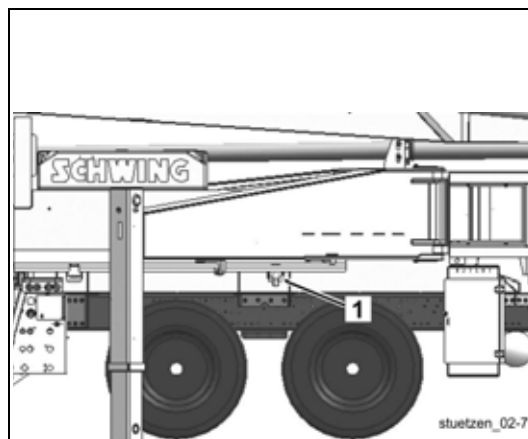
Outriggers can independently extend while driving, leading to deaths or severe injuries!

Severe damage is possible!

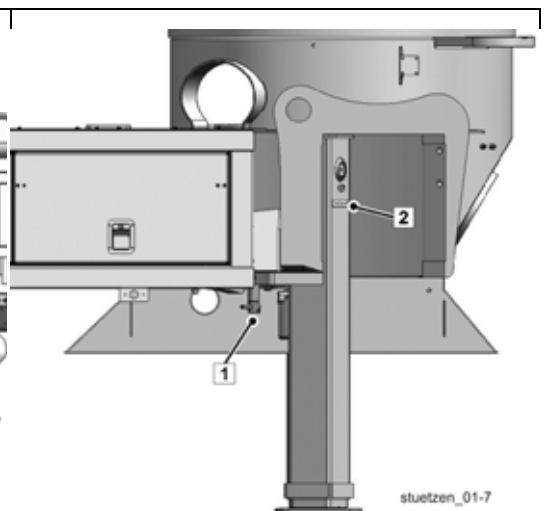
- Only drive the machine with the outriggers secured!
- Stow away all accessories securely to prevent them from getting lost during the ride.
- Walk around the machine again and make sure you have not forgotten anything.



**Fig. 259** Only for machine models S46SX and S47SX



**Fig. 260** Transport safety device (example illustration)



**Fig. 261** Transport safety device (1)



**Fig. 262** Transport safety device

### 3.25.4 Preparing the underride protection (special equipment) for driving operation



#### Information

Modifying the underride protection or participating in open traffic without having the underride protection in the transport position is prohibited.

Failing to observe these instructions results in the termination of the operating licence and insurance coverage.

The underride protection (1) is in the operating position (**Fig. 263**).

- Loosen the chain fastener (1) (**Fig. 264**) for the underride protection on the left-hand side of the hopper.
- Move the underride protection downwards into the transport position and secure the underride protection using the two locks (2) (**Fig. 265**).

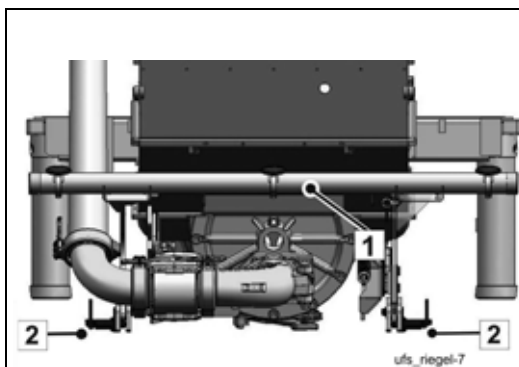
The underride protection is now in the transport position (**Fig. 266**).



**Fig. 263** Underride protection in operating position



**Fig. 264** Chain fastener for underride protection in operating position



**Fig. 265** Locks



**Fig. 266** Underride protection in transport position

### 3.25.5 Shutting down special equipment

Your machine can be equipped with special equipment, which must be shut down before starting the drive (for example, the end hose non-return valve).

The operating instructions for special equipment are summarised in **(chap. 6)** of these operating instructions.

- Observe the instructions for shutting down special equipment before starting the journey.

#### 3.25.5.1 Switching off the control unit

- Set the motor to idle.
- Lock all flaps on the machine.
- Switch off the power supply of the machine control with the key-operated switch (1) **(Fig. 267)** in the driver's cab.
- Do not forget, if necessary, to switch off the side floodlights with the switch (3).  
The pilot light in the switch must be off.

#### 3.25.6 Switching off the pump drive

- a) Switch off the power take-off:

How the power take off is switched off depends on the type of vehicle.  
closely observe the operating instructions from the vehicle manufacturer.

- b) Switch distribution manual transmission gear to driving operation:

- Bring the motor to idling speed.
- Disengage the coupling and switch the drive gear to neutral.
- Switch off motor.
- Wait for approx. 5 seconds before flipping the switch from "P" (pump) to "D" (drive) **(Fig. 268)**.



#### Attention!

#### Material damage is possible to gears!

The distribution manual transmission gear may only be switched when at a standstill.

---

The machine is now ready to drive.

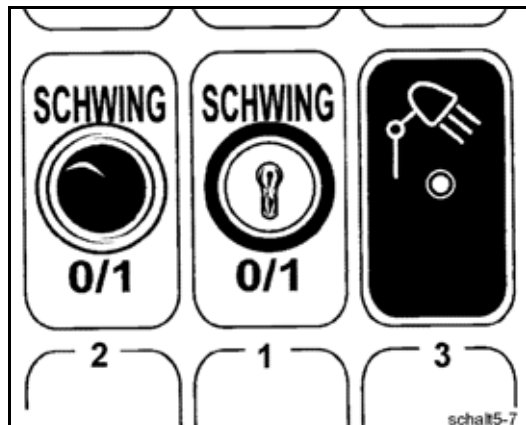


Fig. 267 Switch in the driver's cab

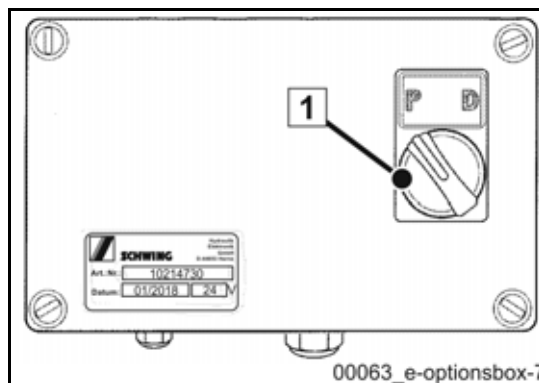


Fig. 268 Switching on distribution manual transmission gear (VSG)

### 3.25.7 Monitoring the placing boom tray (special equipment)

The machine can be equipped with a "boom support" switch, monitoring the position of the placing boom in the boom support.

After switching off the pump drive or by releasing the handbrake, this "boom support" switch activates a buzzer in the driver's cab if the boom is not situated in the tray properly.

This warns the driver and prompts him to drive the placing boom properly into the transport stand.

No message is displayed if the placing boom is situated correctly.



### 3.26 Difficult operating conditions

Heat, cold, dust, dirt, high humidity, sea water, continuous operation, etc. complicate the working conditions of your SCHWING machine.

Under certain circumstances, these working conditions exceed the "limits of the machine". Refer to chapter (2.5).

Our machines can be used by default at ambient temperatures of  $-15\text{ }^{\circ}\text{C}$  to  $+30\text{ }^{\circ}\text{C}$  when operating materials are used according to our recommendations.



#### Attention!

**Placing booms may not be used at ambient temperatures below  $-15\text{ }^{\circ}\text{C}$  (Fig. 269)!**

There is a danger that it may cause brittle fractures to steel components. In addition, extreme cold can destroy rubber- and plastic parts.

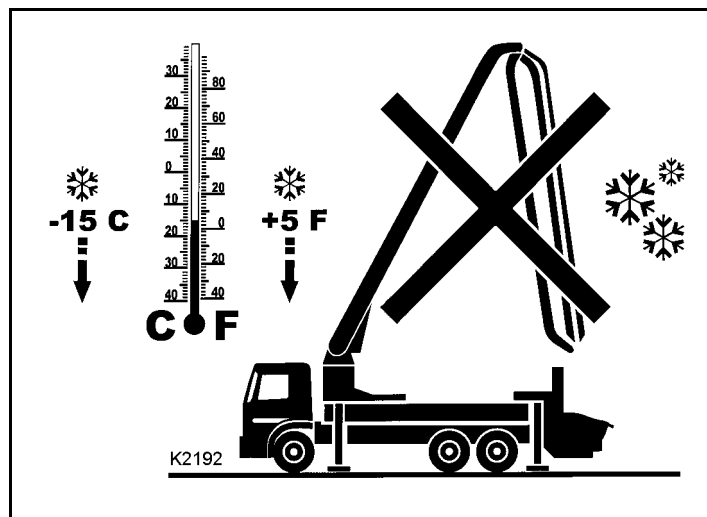


Fig. 269

In case of frost, danger of frost, and in extreme heat, special measures are required, as summarised in the following chapters:

- (3.26.1 Low ambient temperatures (up to  $-15\text{ }^{\circ}\text{C}$ ))
- (3.26.2 High ambient temperatures)

### 3.26.1 Low ambient temperatures (up to -15 °C)

#### 3.26.1.1 General information

- Move the machine into an enclosed building overnight, if possible.

#### 3.26.1.2 Vehicle motor and integrated motor

Observe the manufacturer's operating instructions. Experience has shown that at least the following measures are required:

- Change oil and filter, unless a suitable multi-purpose oil is being used
- Check frost protection
- Adapt frost protector for air system
- Refuel with winter diesel fuel
- Ensure that the electrical system is in good condition, see (3.26.1.9).

#### 3.26.1.3 Water system



#### Attention!

#### **Danger of ice and frost damage!!**

Overflowing water freezes and can cause serious material damage.

Do not switch on frozen aggregates (e.g. water pump).

Do not heat with a flame or pour hot liquid over them.

Defrost machine fluids in an enclosed building.

- Fill the water into the water box and water case immediately before the first assignment.

A layer of ice must not form on the inside walls of the water box and pumping cylinders! Seals and pumping pistons will be destroyed.

Possibly fill with warmed (not hot!) water.

The water in the water box does not freeze as long as it is moving and all aggregates produce sufficient heat.

It is possible to add antifreeze to the water in the water case of the truck-mounted concrete pump.

**Information**

Water offset with antifreeze may not come into contact with concrete!

- After the assignment, drain the entire water system (water pipes and pump, water box, water case). Switch on the concrete pump briefly to remove the water from the pumping cylinders.

### 3.26.1.4 Hydraulic system

SCHWING recommends appropriate hydraulic fluids for different climates and applications, see (“**Recommended lubricants and fuels**” on page 387).

The multi-purpose hydraulic oil filled in at the Herne factory can remain in the system, as long as the starting temperature does not drop below -10 °C.

Should work be performed at temperatures ranging between -10 °C and -15 °C, switching over to winter oil (VG 32) is required.

Otherwise, the great oil viscosity can cause a risk of damage during a cold start. The hydraulic pumps suck in air (oil foams) and will be damaged.

When changing the oil, also replace the filters.

Make sure that the optimum operating viscosity (16 to 36 mm<sup>2</sup>/s) is also at an oil temperature between approx. 35 and 65 °C for hydraulic oil with viscosity class\* VG 32.

**Information**

The system may only be fully loaded in the area of the optimum operating viscosity.

However, the highest permissible temperature for VG 32 is below that of VG 46 or VG 68.

See diagram in (Table 27 Comparison of viscosity classes).

- a) Cold-start limit in °C
- b) Oil temperature in °C
- c) Viscosity in mm<sup>2</sup>/s
- d) Operating temperature and viscosity

\* Viscosity = Resistance to flow

Viscosity-temperature diagram:

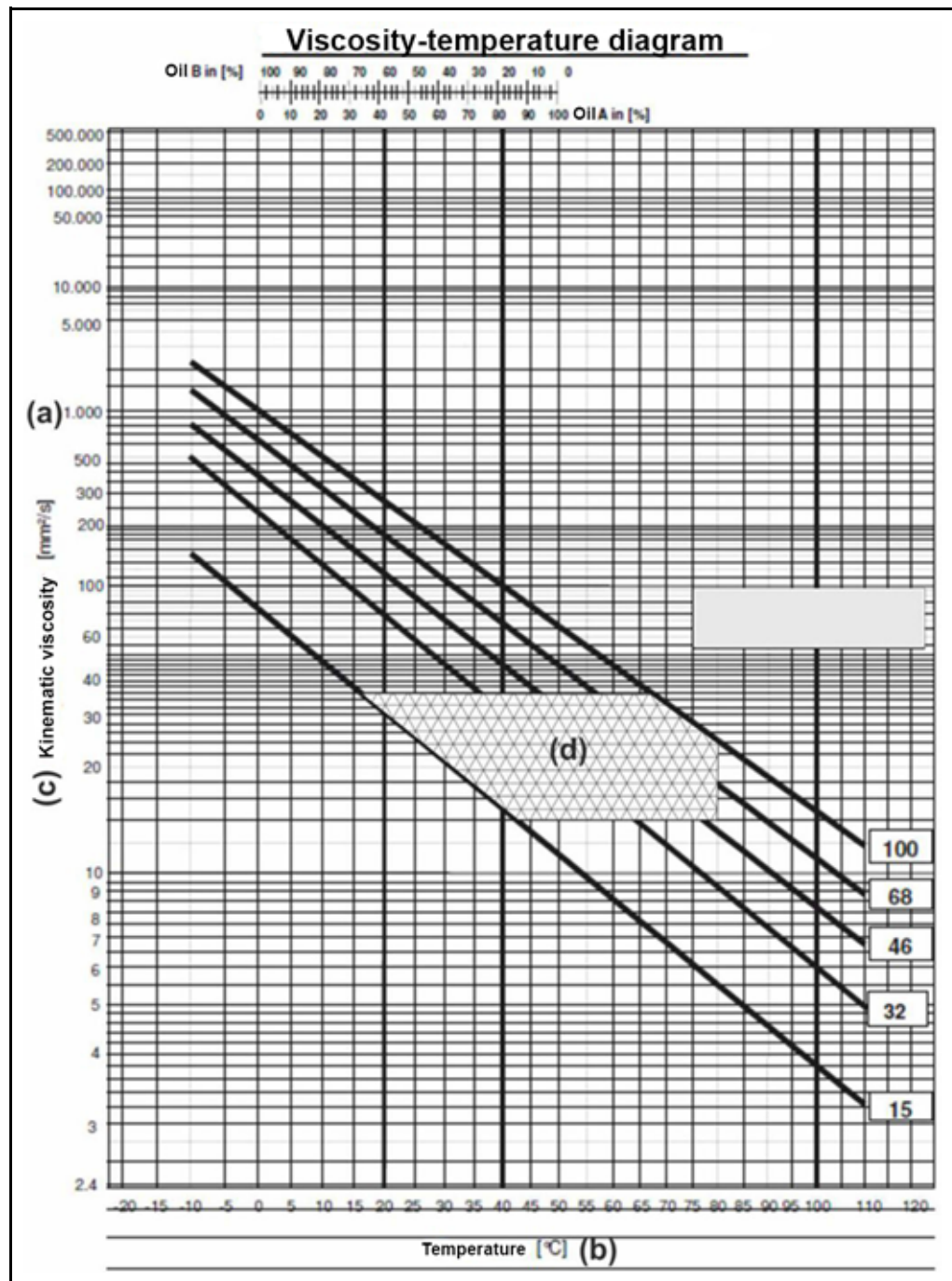


Fig. 270 Viscosity-temperature diagram

Concessions must also be made for various winter oils regarding the pressure load and wear protection.

Please ask your supplier about the measures required when using its oil.

We recommend using a hydraulic oil from the same supplier and same series, as was the case for "summer operation". In these cases, lower quality losses are generally to be expected. However, residual oil in the system causes the viscosity range to shift.

Should series or manufacturer be changed, flushing with the new type of oil is required. Thereby switching all valves several times. Fully extend and retract all cylinders.

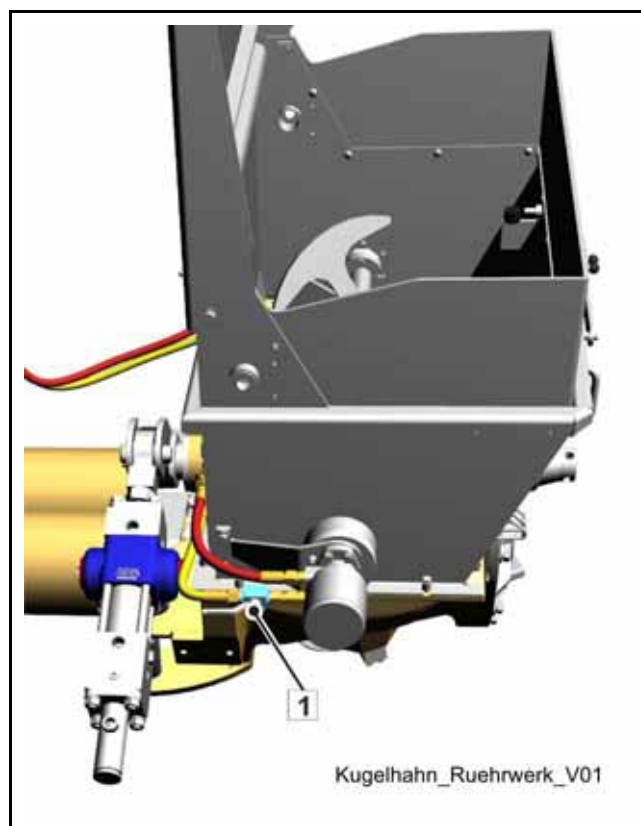
At temperatures below freezing, it is possible to warm the hydraulic oil in truck-mounted concrete pumps using the sturdier gear pump of the agitator circuit.

- To do this, close the ball valve (1) (**Fig. 271**) on the agitator motor.

The hydraulic oil is then routed to the tank via the pressure relief valve and thereby warms up faster.

The temperature of the hydraulic oil (optimal operating viscosity) can be found in the control system.

If the optimum hydraulic oil temperature has been reached according to diagram (**Fig. 270**), reopen the ball valve.



**Fig. 271**

### **3.26.1.5 Air system**

Rotation compressors can be used at up to  $-15\text{ }^{\circ}\text{C}$ , with appropriate maintenance.

Since the vehicle air system supplies the electro-pneumatic pilot control for some truck-mounted concrete pumps, it is also important to set the vehicle air system to winter operation.

Vehicle air systems are equipped with air dryers or frost guards to prevent condensation water or to keep water from freezing.

### **3.26.1.6 Gear**

A gear oil change is only required at continuous temperatures below  $-10\text{ }^{\circ}\text{C}$ .

It is also possible to use a multi-purpose oil.

Should such oil not be available, use an oil with a viscosity level "thinner" than the recommended gear oil (see gear type plate).

VG 150 instead of VG 220 (industrial gear oil) or

SAE 80 instead of SAE 90 (vehicle gear oil)

### 3.26.1.7 Comparison of viscosity classes


Industry standard	Vehicle standard		
e.g. hydraulic oil	Motor oil	Gear oil	
ISO-VG	SAE	SAE	
22	5W		"thin"
32	10W	75	
46	15W		
68	20W / 20		
100	30	80	
150	40		
220	50	90	
320			
460		140	
680		140	
1000		250	

Table 27 Comparison of viscosity classes

### 3.26.1.8 Grease lubrication points

The KP2K lubricating greases listed in **(chap. 4.3)** are suitable for temperatures up to - 20 °C.

### 3.26.1.9 Electrical system

The initial capacity of the batteries depends on the charging status and ambient temperature.

- Always ensure the batteries are well charged. Remove batteries when machine is not used.
- Store batteries in a warm and dry place, recharge, if necessary.
- Ensure good contact of the terminal connections.
- Check the V-belt tension and charging status of the generator.

### 3.26.1.10 Radio remote control

The radio control can be used at up to -20 °C.

Please heat the driver's cab or use a separate charger, if possible, at a room temperature of +20 °C.



### Information

Charging the battery becomes problematic at temperatures below +10 °C.

#### 3.26.1.11 Setting up the machine

Frost, thaw, rain, etc. can significantly change the load-bearing capacity of the ground.

- Before starting to work, check the ground conditions and monitor them during operation.

#### 3.26.1.12 Cold start

- Move the machine into an enclosed building overnight, if possible.
- After a cold start, operate the hydraulic system without a load at a low speed for several minutes.

This will cause aggregates and oil to heat and build up a stable lubricating film.

- Extend the connection pieces at a low pump speed.
- Raise the placing boom at a low pump speed and run through all boom cylinders.
- Run the concrete pump with a reduced stroke count until the hydraulic system reaches the operating temperature.

#### 3.26.1.13 Pump operation

In general, heated concrete is used at ambient temperatures below freezing. Expect short setting times.

In order to prevent "bleeding", the heated concrete must be mixed thoroughly.

- Keep pumping breaks as short as possible.
- Clean the pumping line and concrete pump immediately after pumping.
- Be sure to remove residual water immediately and completely after cleaning.



### 3.26.1.14 Decommissioning

- Clean the machine after the work assignment.
- Clean steps, platforms, etc. from ice and dirt.
- Position the machine on firm, dry ground.
- Secure the machine properly from rolling away.
- Only release the parking brake (can freeze) if the machine can be otherwise secured effectively from rolling away.

### 3.26.2 High ambient temperatures



#### Attention!

##### **Material damage due to overflowing fluids!**

Overflowing fluids can cause serious material damage and even fires.

Always make sure that containers are filled according to regulations and keep the containers closed.

---

#### 3.26.2.1 General information

In principle, it is useful to keep an eye on the temperatures of the pumping line, individual aggregates and fluids at high ambient temperatures.

If possible, set up the machine so that it is protected from direct sunlight.

Machine and pumping line should be painted brightly.

Relocate separate pumping lines preferably in the shade, cover, if necessary.

Please note, the VECTOR control system in our truck-mounted concrete pumps monitors the hydraulic oil temperature and reduces the power of the concrete pump starting at approx. +85 °C. The concrete pump switches off at +95 °C.

Furthermore, the temperatures of the motor coolant and compressors can also be monitored.

This monitoring can also be combined with a switch off function.

It is, therefore, useful to ensure optimum cooling:

- Fill all the oils and the coolant up to the max. mark.
- Prevent fluids from overflowing. This can damage the machine.
- Keep the blades of the motor radiator and hydraulic cooler clean.
- Clean more frequently in the event of high dust accumulation.
- Replace the insert of the motor air filter, if necessary.
- Do not open the maintenance flaps in order to augment the cooling effect.

This could interfere with the air circulation and have the opposite effect.

- Ensure that the hydraulic system is configured correctly. For example, a pressure relief valve that is set too low will cause the oil temperature to increase because oil is continuously discharged under high pressure through a small cross section.
- Replace the water in the water box with fresh water if it becomes too warm.
- Sprinkle the differential cylinders of the concrete pump with a water hose.



### Attention!

#### **Do not use water to cool down hydraulic oil box!**

Cooling down the box causes heavy water condensation inside the box.

Condensate water in the hydraulic oil can cause material damage to the hydraulic system.

---

- Do not pump with maximum stroke rate.  
High stroke rates increase the temperature of the hydraulic system and are extremely pointless for stiff concrete, as they are then sucked in poorly.
- Prevent air from being sucked in. Air in the pumping pipes can cause the boom to move and the end hose to flail about! Always make sure that the agitator shaft is in the concrete so that no air can be sucked in.
- Run the system in idle during pumping breaks.  
This will continue pumping the hydraulic oil through the radiator, and the motor oil transporting the heat away from the hot turbo charger.

#### **3.26.2.2 Vehicle motor and integrated motor**

Observe the manufacturer's operating instructions. Experience has shown that at least the following measures are required:

- Change oil and filter, unless a suitable multi-purpose oil is being used.
- Adapt frost protector for air system.

#### **3.26.2.3 Water system**

- Also make sure that the water case is well filled because water may be required to cool the concrete pump.

#### 3.26.2.4 Hydraulic system

The multi-purpose hydraulic oil filled in at the Herne plant covers the viscosity class VG 46 and the viscosity class VG 68, intended for tropical applications, see (“**Recommended lubricants and fuels**” on page 387).

If a single-purpose oil VG 46 is used, the oil must be changed to VG 68. When changing the oil, also exchange the filters.

Should these oils be insufficient despite having configured the hydraulic system properly and despite optimum cooling, see (**chap. 3.26.2.1**), please contact us.

Please note that a "thicker" hydraulic oil with viscosity class VG 100 has a cold-start limit of +3 °C, and the optimum operating viscosity is significantly higher.

This can cause difficulties in areas with highly variable temperatures (night/day), see (Fig. 270 Viscosity-temperature diagram).

#### 3.26.2.5 Air system

The synthetic oil prescribed for our rotation compressors is suitable for temperatures up to +40 °C.

This is sufficient for the normal concrete pump application (no continuous operation).

Should the VECTOR control cause the machine to shutdown nevertheless due to overheating, please contact us.

#### 3.26.2.6 Gear

The gear oils recommended in (**chap. 4.3**) are suitable for continuous ambient temperatures of approx. -10 °C to approx. +40 °C.



#### Information

A gear oil change is only required at continuous temperatures below +40 °C.

It is also possible to use a multi-purpose oil.

If such an oil is not available, please use an oil with a higher viscosity level than the recommended gear oil (see gear type plate), i.e. VG 320 instead of VG 220 (industrial gear oil) or SAE 140 instead of SAE 90 (vehicle gear oil), see (Table 27 Comparison of viscosity classes).

#### 3.26.2.7 Grease lubrication points

The KP2K lubricating greases listed in (**chap. 4.3**) are suitable for temperatures of -20 °C to +140 °C.

### **3.26.2.8 Electrical system**

Check the acid level of the battery cells more frequently at high ambient temperatures.

Only refill with distilled water!

### **3.26.2.9 Radio remote control**

The radio control can be used at up to +60 °C.

### **3.26.2.10 Setting up the machine**

The load-bearing capacity of heat-sensitive subsoils, such as asphalt, decreases as the ambient temperature rises.

- Make sure the ground is firm.

### **3.26.2.11 Cold start**

Make sure in particular to start the system gently when the machine is equipped with special lubrications for high temperatures.

Lubricants of high viscosity (viscous) only reach their maximum optimum operating viscosity later on.

The hydraulic pumps can be damaged, as described under in (**chap. 3.26.1.12**).

### **3.26.2.12 Pump operation**

The concrete is frequently prepared in hot areas with cooled aggregates or cooled water.

The placement of the concrete should take place preferably during cooler periods of the time, such as in the morning or evening.

- Rinse a heated pumping line with water before pumping.
- Use a somewhat mushier start-up mixture for long lines.
- Make sure that the concrete can be pumped easily.



- Avoid extended breaks.

Cover the concrete in the filling hopper of the concrete pump with wet bags, for example.

- Start cleaning immediately after pumping.

### **3.26.2.13 Decommissioning**

- Let the machine idle for some minutes with the pump drive active.

This way, the turbo charger transports the heat away from the diesel engine and cools the hydraulic oil by continuing to pump it through the radiator.



## 3.27 Decommissioning

If the machine is to be decommissioned for an extended period of time, please observe the following list.

### 3.27.1 Tasks prior to decommissioning

1. Clean and lubricate the machine thoroughly.
2. Check the concentration of antifreeze for liquid-cooled motors and top up if necessary.
3. Drain condensation water from fuel, hydraulic and air system reservoirs.
4. Fill fuel tank and oil box to the brim.  
Change the oil if it is in poor condition.
5. Fill all gearboxes with the prescribed amount of oil.  
Change the oil if it is in poor condition.
6. Apply acid-free grease to bare machine parts or spray them with preserving oil.
7. Preserve concrete pumping pipes by pushing a cotton waste plug soaked in preserving oil through the pumping line.
8. Retract all hydraulic cylinders.
9. Set all control elements to position 0.
10. Discharge the pressure accumulator (if present).
11. Preserve the motor as described in the motor's operating instructions.
12. Drain water from the reservoir, water box and water pump.
13. Spray water box with a rust-protective agent.
14. Close all openings and waterproof.
15. Jack up the vehicle in order to let down the tyres.
16. Check tyre air pressure.
17. Release parking brake.
18. Remove starter batteries (lead-acid batteries) and store in a cool (5-15 °C), clean and dry location.
19. Permanently connect batteries to a charger with trickle charging, or charge at monthly intervals (no quick charging). Then check the fluid level.
20. In order to prevent damage as a result of downtime/storage, run the machine to operating temperature and run through its full range of operation every 6 months. Afterwards, store it again as described.

**Attention!****Never allow batteries to remain discharged!**

Deep discharge will destroy them!

Frost can cause the housing of discharged batteries to rupture due to freezing of the contents!

---

In order to prevent premature ageing, up to destruction, the above instructions must be observed!

Observe further instructions in chapter 4.60, in addition to the operating instructions from the motor or chassis manufacturer.

**3.27.2 Recommissioning**

1. Remove preservation.
2. Check all oil levels.
3. Empty hydraulic oil box to inspection glass level, when full to the brim.
4. Check and install batteries.
5. Check tyre air pressure.
6. Completely lubricate machine.
7. Carry out functional testing.

**Information**

For storage of the machine under difficult conditions, special regulations apply.

Difficult conditions include, for example:

- Storage periods of over 6 months.
- High air humidity.
- Sea air, etc.

Contact SCHWING customer service.

---



### 3.28 Technical preconditions for concreting



#### Information

Pumped concrete is not a special concrete, but a standardised quality concrete.

---

#### 3.28.1 Properties of pumped concrete

- Minimum fine grain content (grain size < 0.125 mm) of approx. 400 kg/m<sup>3</sup> with a maximum grain size of 32 mm (+ 10% when using maximum grain size of 16 mm),
- Minimum cement content of 250 kg/m<sup>3</sup> when using maximum grain size of 32 mm (+ 10% for maximum grain size of 16 mm),
- Water/Cement ratio of 0.42 w/c - 0.65 w/c.
- Grain composition according to grading curve AB as per DIN 1045-2,
- Consistency of K 2 to K 3.
- When using plasticisers, the flow spread is not an indicator for the pumpability of the concrete.

We are happy to give advise for varying concrete formulas and to provide you with recommendations for an application-specific solution.

#### 3.28.2 Errors that inhibit pumping

- Incorrect concrete composition (see above).
- Poor upkeep of the machine and pumping line (cleaning!).
- Inadequate mixing quality.
- Separation caused by improper transport.
- Incorrect maximum grain size selected based on diameter of pumping line.
- "Bleeding" of fresh concrete.
- Incorrect use of admixtures.



## 4 Maintenance

This chapter contains maintenance instructions for a SCHWING product.

Further measures should be implemented by SCHWING's customer service department or by trained and qualified personnel. Otherwise, the warranty and liability shall become void for this machine.





## 4.1 General maintenance instructions

Carry out the maintenance on time and with care.

We recommend copying the maintenance report (**chap. 4.7**).

The maintenance personnel can then acknowledge the work carried out on the copies.

Schwing expressly prohibits any maintenance work carried out by personnel who are not specially trained and authorised.



### **Danger!**

**Severe to fatal accidents and serious material damage can be caused by unqualified personnel!**

Should you not have trained personnel and appropriate workshop equipment, commission the SCHWING customer service to service your machine.

---

### 4.1.1 Maintenance work on special equipment

Maintenance work on special equipment is described in chapter “**Special equipment**” on page 593.

### 4.1.2 Cleanliness

- Clean all units located within the work area before starting to work.



### **Attention!**

**Material damage caused by high-pressure cleaner!**

The use of high-pressure cleaners can damaged sensitive parts!

Do not use a steam jet to clean rubber and electrical parts.

---

- As a rule, prevent dirt from entering - especially in the hydraulic system.
- Lubricate your entire machine after a high-pressure cleaning.

### 4.1.3 Corrosion protection

Heavy rust weakens the material and may cause fractures and cracks.

- Repair damaged painted surfaces within due time and grease bare machine parts.

### 4.1.4 Checking the oil level

In general, take the following points into account when checking the oil:

- Make sure that the machine is level
- Switch off the drive approx. 10 min. before performing an oil check
- Move mobile machines into the transport position and brace them (outrigger in transport position).

### 4.1.5 Oil change

- Drain the oil while it is still at operating temperature in order to flush out contaminants better.



#### Caution!

#### Risk of injury caused by hydraulic oil!

Hydraulic fluid can cause irritation to the skin and eyes!

Always wear suitable protective clothing.

- Always fill hydraulic fluid from clean vessels through the filling hole on the tank provided for the purpose.
- If possible, use flushing or filtration units to add the new oil.



#### Caution!

#### Danger caused by pressure rise in the oil box!

Do not fill reservoir with pressure! Make sure that the displaced air can easily escape from the reservoir.

Hang the filling hose loosely in the oil box. Never screw in the filling hose so that it is airtight!

- Always prevent containers from overflowing.
- Check the oil level after each test run.
- Do not store hydraulic oil barrels outdoors.

- Do not store hydraulic oil barrels horizontally.
- Prior to removal, the barrel must remain stationary for an extended period of time.  
Contaminants can deposit easily.
- Never roll hydraulic oil barrels to the filling site.
- Make sure not to insert the suction hose too deep into the hydraulic oil barrel in order to avoid sucking in contaminants from the barrel floor.



#### Information

Before each oil change, we recommend taking an oil sample and examining it for discolouration and solid materials (suspended particles).

This makes it possible to determine early on whether preventive maintenance measures need to be initiated.

#### 4.1.6 Draining condensation water

Humidity and fluctuating temperatures form condensation in hydraulic oil boxes, which mixes with the oil.

As the ratio of water increases, the lubricating power of the mixture decreases rapidly.

##### **Solution:**

After several days of not using the machine, the water separates from the oil and collects at the bottom of the box.

By opening the drain screw on the hydraulic oil box, you can then drain the water from the bottom of the box.



#### Information

Best downtime!

The hydraulic oil used at SCHWING requires a downtime period of at least 2 days in order to achieve good results.

**4.1.7 Seals and fuse elements**

- Make sure that no seals, spring washers, etc. are lost when removing top covers, closing screw plugs, and the like.
- Before closing them again, clean the sealing surfaces of the screws and covers, etc. and make sure not to damage them.
- Replace the seals, split pins, spring washers, etc. immediately if they are worn or damaged.

**4.1.8 Lubrication**

- Clean grease nipples before and after lubrication.
- Remove any excess grease from the lubrication points.

**4.1.9 Leaks**

- Check all containers, hoses, screw connections, etc. regularly for leaks.

**Attention!****Environmental damage caused by flowing out oil!**

Check the system for oil leaks and eliminate their causes.

---

**Warning!****Risk of serious injury due to leaks in lines and tubes!**

Bursting lines or operating material emerging under pressure can cause serious injuries.

---

- Immediately replace any damaged tubes and damaged or moist hydraulic hoses.



#### 4.1.10 Repairs, exchange



##### Information

It may be less expensive to exchange complete units instead of repairing them. Contact SCHWING's customer service for an individual consultation.

- Only use original SCHWING spare parts for repairs or replacements. SCHWING will not be held liable for damage caused by use of third-party products or improper equipment.
- Only use mineral oil-based greases for installation work on the hydraulic system.
- If a unit (pump motor, etc.) fails, flush out the entire hydraulic system and replace the filters in order to prevent consequential damages caused by metallic dust.

Contact SCHWING's customer service for non-binding informational material on available flushing / filtration units (**Fig. 272**).



**Fig. 272 Available flushing / filtration units**

- After such procedures, always perform a test run with the machine and then check the oil level afterwards. During the test run, watch for unusual sounds, temperatures and leaks.
- Perform maintenance work on repaired or exchanged units as per usual.

### 4.1.11 Welding

Welding work may only be carried out by trained professionals according to manufacturer regulations, see (“**Repair welding**” on page 535).

### 4.1.12 Mechanical processes

Cover devices, cables etc. when drilling or grinding work etc. is to be carried out on the machine.

### 4.1.13 Painting and working with aggressive substances

Cover devices, cables etc. to protect them against paint mist and aggressive substances.

### 4.1.14 High-pressure cleaning

Cover any electrical and electronic components. Never direct a water or steam jet to these components. Any penetrating moisture leads to malfunctions and can destroy electronics and electrical components completely.

### 4.1.15 Electrically powered machines

- Have an electrician disconnect the power supply to such machines prior to carrying out repair work on the respective machine.



#### **Danger!**

#### **Danger to life due to electric shock!**

Working on systems still connected to a power source poses an acute danger to life from electric shock!

Always turn off all main switches and secure them against being turned back on without authorisation.

Repairs on electrical systems may only be performed by electricians!

---



#### 4.2 Consumable volumes (in litres)

### 4.3 Recommended lubricants and fuels



#### **Danger!**

##### **Oil under pressure is very dangerous!**

The following points must be observed:

- Only qualified personnel may work on hydraulic systems.
- Personal protective equipment must be worn during work (safety glasses, suitable gloves and clothing).
- Only work on depressurised systems. The trapped oil can also be under pressure when the drive is at a standstill and the pressure accumulator (if available) is depressurised.
- If, for example, systems under pressure need to be opened when venting, mount a breather line first while the system is depressurised or use the existing mini-measurement connection.
- If this is not possible due to a lack of space, for example, make sure that nobody can be hit by escaping oil.
- Open the breather screw very carefully until oil emerges. By no means open further or remove the junction.



#### **Danger!**

##### **Danger caused by oil jet!**

Hydraulic oil escaping under pressure can penetrate the skin and cause severe tissue damage.

This represents an acute medical emergency.

Immediately consult a doctor!

Even with a minor injury caused by an oil jet, insist on immediate medical help!

---

### 4.3.1 Behaviour in case of injuries

Immediately seek a doctor familiar with such injuries.

Seek a doctor even if the wound seems harmless.

Hydraulic fluid sprayed under the skin must be removed immediately. This could result in serious circulatory disorders and tissue damage (gangrene).

These could require significant surgical procedures.

Penetration of bacteria could also accelerate tissue destruction.

The bacteria entering the bloodstream causes danger to life.

On the following pages you will find a limited number of suitable lubricants and equipment. If these products are not available, other materials can be used in accordance with the specified standard marks. Selection and sequence of the products listed do not include qualitative assessment.

### 4.3.2 Explanation of the abbreviations used

#### 4.3.2.1 General information

BI	= Central Federation of the German Construction Industry. As an alternative to the lubricants and fuel recommended, the normal lubricants specified in column "BI" can be used.
DIN	= German National Standard.
ISO	= International Organisation for Standardisation.
MIL-L	= American Military Standard for Lubricants.
API	= American Institute for Lubricants.
SAE	= Merger of American Automotive Engineers.
VL	= Viscosity grade in mm <sup>2</sup> /s at 40 °C.

#### 4.3.2.2 Hydraulic oil

API-CD	= Motor oil for heavy-duty diesel engines with and without supercharging.
EO	= BI normal lubricant, a quality motor oil.
HLP	= A hydraulic oil according to DIN 51524 with agents designed to improve anti-corrosion, durability and wear protection within the mixed friction range.
HVLP	= A hydraulic oil according to DIN 51524 with low viscosity temperature dependence, otherwise HLP.

**4.3.2.3 Industrial gear oil**

CLP	= A circulating lubricating oil according to DIN 51517 with agents designed to improve anti-corrosion, durability and wear protection in the mixed friction range, and to increase the gear capacity.
PG	= Synthetic lubricating oil for extreme load on polyglycol base suitable as long-term lubricant.
PAO	= Synthetic gear oil with excellent high-pressure properties and excellent temperature behaviour based on poly alpha olefin.

**4.3.2.4 Vehicle gear oil**

GO 90	= BI standard lubricant, a gear oil according to API-GL 5.
MIL-L 2105 B	= Hypoid gear oil for severe stress in gears and axles, roughly corresponds to API-GL 5.

**4.3.2.5 Compressor oil**

VDL	= Mineral oil for air compressor with agents designed to improve anti-corrosion and durability. Carbon residue after ageing max. 3 % according to DIN 51352.
Rotor oil 8000 F2	= Synthetic, all-season oil for rotary compressors.

**4.3.2.6 Lubricating grease**

KP 2 K	= A lubricating grease according to DIN 51502 for high pressure stress in the service temperature range of -20 °C to +140 °C, worked penetration 265 to 295, no changes or minor changes caused by water.
MPG-A	= BI standard lubricant, a lubricating grease according to KP2N, covering KP2K and K2K.
MLE2N-40	= Special lubricant for material pairing: Plastic / metal for prolonged lubrication of the slider in the telescopic arms.
Art. no.:	= SCHWING drive line grease.
10197297	Only use this grease to lubricate the SCHWING drive lines.

### 4.3.3 Recommended hydraulic oil

Viscosity (ISO):	VG 32		VG 46		VG 68	
Type (DIN):	HLP	HVLP	HLP	HVLP	HLP	HVLP
<b>BP Energol</b>	HM 32		HM 46		HM 68	
<b>Fuchs Renolin</b>		B 32 HVI		B 46 HVI		B 68 HVI
<b>Fuchs Renolin</b>		Xtreme Temp 32		Xtreme Temp 46		
<b>Klüber Lamora</b>	HLP 32		HLP 46		HLP 68	
<b>Liqui Moly</b>				HVLP 46		
<b>Mobil DTE</b>	24		25		26	
<b>Mobil Nuto</b>	H 32		H 46		H 68	
<b>Mobil Unavis</b>		N 32		N 46		N 68
<b>Q8 HVLP Hydraulic Oil</b>				46		
<b>Shell Tellus</b>	S2 MX 32	S2 VX 32	S2 MX 46	S2 VX 46	S2 MX 68	S2 VX 68
<b>SRS Wiolan</b>	HS 32	HV 32	HS 46	HV 46 <sup>1</sup>	HS 68	HV 68

1. Standard filling SCHWING GmbH Herne

VG 32 = Winter operating conditions in Central Europe

VG 46 = Summer operating conditions in Central Europe

VG 68 = Rooms with high amounts of heat or tropics



#### Attention!

#### Material damage can be caused by the wrong oil quality!

Do not mix hydraulic oils from different manufacturers!

Using hydraulic oil from another manufacturer, or using an oil of a different quality, requires a complete oil and filter change.

Mixing the same oils with different viscosities is only permitted after consultation with SCHWING GmbH.

Only use oils that contain zinc.



#### 4.3.4 Recommended gear oil (see gear type plate)

<b>4.3.4.1 Industrial gear oil</b>	
Viscosity according to ISO:	VG 220
Quality according to DIN:	CLP
ARAL	Degol BG 220/Degol BMB 220
BP	Energol GR-XP 220
KLÜBER	Klüberoil GEM 1-220
MOBIL	Mobilgear 600 XP 220
SHELL	Omala oil 220
SUNOCO	Sunep 1220
TEXACO	Meropa 220
WINTERSHALL	Wiolan IT 220
BI	/
<b>4.3.4.2 Vehicle gear oil</b>	
Viscosity according to SAE:	90 (85w-90)
Quality according to MIL-L:	2105 B
ARAL	Gear oil HYP
BP	Energear HYPO 90/Hypogear 90 EP
MOBIL	Mobilube HD-A 85w-90
SHELL	Spirax HD/Spirax MB 90
SUNOCO	GL-5
TEXACO	Geartex EP-C
WINTERSHALL	Wiolan Hypoid gear oil 90
BI	GO 90



#### Information

The gear oils described above are suited for continuous ambient temperatures of approx. -10 °C to approx. +40 °C.

For extreme operating conditions, please contact us. The viscosity class ISO VG 220 roughly corresponds to SAE 90.

<b>4.3.4.3 Industrial gear oil (polyglycol base)</b>	
Viscosity according to ISO:	VG 220
Quality according to DIN:	PG
ARAL	Degol GS 220
AVIA	Avilub VSG 220
BP	Energol SG - XP 220
ELF	Syntherma P 270
FUCHS	Renodiol PGP 220
MOBIL	Glygoyle 30
SHELL	Tivela WB
TEXACO	Synlube CLP 220
BI	/



### Attention!

#### Material damage can be caused by the wrong oil quality!

The synthetic lubricating oils with a polyglycol base listed above must not be mixed with oils using another base.

<b>4.3.4.4 Industrial gear oil (poly alpha olefin base)</b>	
Viscosity according to ISO:	VG 220
Quality according to DIN:	PAO
ADDINOL	CKT 220
TOTAL	CARTER SH 220
BP	Energol HTX 220
AVIA	Syntogear PE 220
CASTROL	Alphasyn EP 220
MOBIL	Mobilgear SHC XMP 220
FUCHS	RENOLIN UNISYN CLP 220
FUNKE	Finkol PA 220

#### 4.3.5 Recommended compressor oil

##### 4.3.5.1 Rotary compressor



#### Attention!

**Material damage caused by the wrong oil!**

Only synthetic ROTOR OIL 8000 F2 may be used for our rotary compressors.

---

### 4.3.6 Recommended grease

#### 4.3.6.1 SCHWING drive line grease

Only use this grease to lubricate the SCHWING drive lines.

SCHWING item no.: 10197297

400 g cartridge for hand grease gun

#### 4.3.6.2 Lithium-saponified high-pressure grease

KP 2 K according to DIN 51502 without solid lubricant

ARAL	Aralub HLP 2
BP	Energrease LS-EP 2
KLÜBER	Centoplex 2 EP
SHELL	Alvania EP Fett 2
SUNOCO	Multi Duty EP-2
TEXACO	Multifak EP 2
MOBIL	Mobilux EP 2
WINTERSHALL	Wiolub LFP 2
BI	MPG-A

#### 4.3.6.3 Special lubricants for severe operating conditions

Under severe operating conditions, we recommend using a particularly adhesive and pressure-resistant grease for the SLIDING BEARING OF THE BOOM COLUMN and SLIDING PIECES OF THE ROTARY DRIVE, such as:

OPTIMOL-OPTIPIT

KLÜBER-COSTRAC GL 1501

Severe applications are, for example:

- high exposure to dust, dirt, heat, humidity, sea water
- strong impact load and vibrations
- multi-week abandonment.

It is imperative to use OPTIMOL-OPTIPIT in the mounting of the above components. It is available in 400g cartridges under art. no.: 10087948 from SCHWING's spare parts service.

<b>4.3.6.4 Recommended spray-on grease</b>	
Sprayable EP lubricating grease for open gears with MOS2 and graphite additive	
ARAL	Sinit FZ 2
BP	Energol WR P
KLÜBER	Grafloscon C-SG 0 ULTRA
	Grafloscon CA 901 ULTRA-SPRAY
SHELL	Cardium Fluid D
TEXACO	Crater XX Fluid
MOBIL	Mobilgear OGL 007
BI	LUB-A
<b>4.3.6.5 Special lubricants for the plastic sliders in the telescopic arm</b>	
Designation according to DIN: MLE2N-40	
SCHWING item no.: 10194658	10 kg tin
<b>4.3.6.6 Special lubricants for couplings and seals in pumping lines</b>	
OPTIMOL OLIT CLS	10 kg tin
SCHWING item no.: 10149905	
Optimol Olit CLS is a rubber-friendly, water-resistant, high-performance grease on lithium/calcium base.	
As an alternative to Optimol Olit CLS, the high-pressure grease listed in table Lithium-saponified high-pressure grease	
SHELL Alvania EP grease 2	
can also be used. When switching between these two types, remove old grease residues carefully.	

### 4.3.7 Excerpt from the safety data sheet for hydraulic oil

This is an excerpt from the manufacturer's safety data sheet according to the Directive 91/155/EC.

Please request the complete safety data sheet from your oil supplier in your country of operation.

**TRADE NAME:**

(Product name of oil)

**USAGE:**

Hydraulic oil

**PREPARATION:**

Mixture of highly-refined mineral oils and additives

**POTENTIAL DANGERS:**

Prolonged and repeated skin contact may cause drying of the skin, irritation and dermatitis.

Avoid formation of oil mist.

Avoid uncontrolled release into the environment.  
Not fully biodegradable.

**FIRST-AID MEASURES:**

**After inhalation:**

Take the affected person into fresh air and place in a resting position. Seek medical advice.

**After skin contact:**

Remove contaminated clothing and wash skin with water and soap.

If the skin was penetrated by high pressure, consult a doctor immediately.

**After eye contact:**

Immediately rinse thoroughly for 15 minutes under running water with the eyelids open and consult a doctor.

**After ingestion:**

Do not induce vomiting. Seek medical advice.

**Note to the doctor:**

Symptomatic treatment.

**FIRE PREVENTION AND -FIGHTING:**

Do not smoke when handling the product, no open flame or other exposure to heat.

Fire class according to DIN EN2: B

**Suitable extinguishing agent:**

Foam, powder, carbon dioxide, sand or earth.

**Do not use strong water jet!**

**ACCIDENTAL RELEASE MEASURES:****Person-related measures:**

Ventilate affected rooms thoroughly. Avoid skin contact.

**Environmental protection:**

Prevent further leakage and flow into drains.

Erect sand or earth barriers or other suitable blocking measures.

In case of leakage into water, canalisation or soil, contact competent authorities.

**CLEANING AND ABSORPTION:**

Absorb or contain with sand, earth or absorbent material.

Shovel into a marked reservoir and dispose of according to local regulations.

**HANDLING AND STORAGE:**

Do not eat, drink, smoke or sniff during work. Avoid spilling.

Avoid sun, direct exposure to heat and strong oxidants during storage. Store dry and do not expose to large temperature switches.

**PERSONAL PROTECTIVE EQUIPMENT:****Respiratory protection:**

Use oil mist protective mask with filter for organic vapours and particles.

**Hand protection:**

Protective gloves made of PVC or nitrile rubber, provided they meet safety standards

**Eye protection:**

Wear protective glasses in case of risk of splashing

**Body protection:**

Avoid skin contact, wear overalls.

**GENERAL PROTECTIVE- AND HYGIENIC MEASURES:**

Do not carry oil-soaked cleaning rags within the clothing. Do not eat, drink, smoke, sniff during work.

**SAFETY-RELEVANT DATA:**

See safety data sheet from the manufacturer.

**DISPOSAL:****Product:**

By approved waste disposal company. EU waste code no.: 130110

**Packaging:**

Completely emptied by approved waste disposal company.

**MARKING:**

Not subject to marking regulations according to EU directives. Observe national regulations!





## 4.4 Spare parts and accessories



### Information

Please observe the special instructions on safety components in chapter “**Safety inspections**” on page 529.

Spare parts and accessories must comply with the requirements defined by SCHWING.

This is guaranteed by the use of original SCHWING spare parts and accessories. Use the article numbers of the machine-specific spare part catalogue in order to clearly identify the spare parts.

Spare parts with the same name can differ from one another slightly with regard to their shape and appearance, or in some cases not at all. However, the material quality, weight, function, etc. can be extremely different. Therefore, only use spare parts that comply with the specifications in the spare part catalogue.

SCHWING can also provide - beyond the legal provisions - original spare parts for older machines.

A wide range of accessories is also available.

SCHWING is not liable for damages resulting from the use of spare parts and accessories that do not comply with the above requirements.

It is possible that, by using unsuitable or unauthorised accessories, the definition of "improper use" is met.

We recommend using our customer service for installing our original spare parts and accessories, as well as for all maintenance and repair work on your SCHWING machine.

Please note that SCHWING must rule out all warranties in the event that you or a third party commissioned by you carry out improper work.

SCHWING is also not liable in such cases for any consequences thereof.

Also see our "Delivery, service and payment terms and conditions".

The machine's accessories should also be checked during safety-related inspections, regardless of whether they can be installed securely or carried along loosely.

Make sure that, in addition to being in sound operating condition, this accessory is suitable and approved by SCHWING.

### 4.4.1 Wear parts - Signs of wear

All components of a machine are subject to natural ageing. In addition, the wear of moving parts varies greatly depending on their load.

Careful maintenance and upkeep, as well as proper use of the machine can delay, but not entirely prevent, this so-called wear.

Since the wear and tear on various components of your SCHWING machine can vary greatly depending on their operating conditions, there are no universal rules to be applied for inspecting and replacing these parts.

However, there are signs indicating the need for an early review.

#### 4.4.1.1 Case examples

##### **Sand in the water box of the concrete pump**

If, while conducting your regular cleaning of the water box, you notice that the water is becoming increasingly contaminated with concrete particulate matter, this means that the pumping pistons are worn.

If the same incident occurs again in the short term, the pumping cylinders also need to be replaced.

##### **Hydraulic oil in the water box of the concrete pump**

If you notice oil streaks on the water surface or a milky emulsion in the water box when the concrete pump is upright, the seal on the differential cylinders could be worn.

##### **Water in the hydraulic oil**

Small amounts of condensation in the hydraulic oil box are normal and should be drained regularly according to maintenance schedule.

A strong increase of the water content suggests water ingress from the outside.

It can also be assumed in this case that the seal in the differential cylinder is worn.

##### **Dirt in the hydraulic oil**

If clogging from an outside source can be excluded (e.g. refilling from an unclean reservoir), an oil analysis should be carried out first, see the “**Hydraulic fluid and filters**” chapter.

The oil analysis determines the type of clogging.

In consequence thereof, e.g. the condition of the hydraulic pumps (metal particles) can be concluded.

If you determine that the clogging is caused by concrete particulate matter, the seals on the differential cylinders should be checked as well.



### Information

Our machines are constantly optimised in the course of improving the specification. In doing so, a critical focus is on the improvement of the wear and tear.

Special components are also available for special applications.

If necessary, please ask our customer service for the optimal solution to your wear problem.

---



## 4.5 Explanation of maintenance schedule



**Fig. 273: Similar to illustration**

Symbols used in the following maintenance schedule:

①= CHECK   ②= LUBRICATE   ③= CLEAN   ④= REPLACE

①②③④ = ditto, after the initial commissioning

Time interval in the following maintenance schedule:

A = daily or 10 operating hours

B = weekly or 50 operating hours

C = monthly or 200 operating hours

D = quarter-annually or 500 operating hours

E = semi-annually or 1000 operating hours

F = annually or 2000 operating hours

G = every 2 years

whichever comes first!



### Information

The "VECTOR control" system records the operating hours of various aggregates.

The movement hours for the boom, slewing gear and outrigger are recorded.

Operating and movement hours performed can be seen in the menu "Operating data".

Regular querying of this data enables the performance of maintenance according to the exact operating times of the individual aggregates.



**Information**

Record all maintenance procedures that have been performed in the maintenance report (**chap. 4.7**).

A copy template can be found in the appendix of your operating instructions.

## 4.6 Maintenance schedule

Maintenance intervals and maintenance work related to the vehicle are not covered in these operating instructions.

All information on this topic can be found in the vehicle's operating manual.

### 4.6.1 General information

Description		A	B	C	D	E	F	G	Chap.
A1	Technical safety inspection by experts. Intervals according to time or operating hours, whichever occurs first.								(chap. 7.4) (chap. 4.22)
A2	Visual and functional test by machine operators	①							(chap. 4.22)
A3	Check hydraulic oil level (before every commissioning)	①							(chap. 4.8)
A4	Hydraulic oil (after successfully passing an oil inspection, the hydraulic oil can be used for more than 2 years)						①	④	(chap. 4.8)
A5	Draining condensation from the hydraulic oil box		③						(chap. 4.8)
A6	Clean cooling vanes of the hydraulic oil cooler, as well as those of the radiator		③						(chap. 4.10)
A7	Pressure checks			①					(chap. 4.9)
A8	Grease joints of the operating levers			②					--
A9	Check the hydraulic and water systems, aggregates, reservoirs, pumping lines, etc. for leaks		①	②					(chap. 4.19)
A10	Check that the base frame, outrigger, pumping line, reservoirs, aggregates, pump kit, drive lines, etc. are fastened correctly		①	①					(chap. 4.17)
A11	Checking the filling level of the reservoir	①							(chap. 3.15)
A12	Check + lubricate the drive lines of the pump drive (normal operation)		①	②					(chap. 4.12)
A13	Check + lubricate the drive lines of the pump drive (heavy operation)	①	②**						(chap. 4.12)
A14	Check oil level of the distributor gearbox (special equipment)			①		④			
A15	Ventilation filter for hydraulic oil box			④		④			(chap. 4.8)

(\*\* = lubricate every 100 operating hours)

Interval:	Explanation of the symbols								
After the first commissioning:	①	= inspect	②	= lubricate	③	= clean	④	= replace	
After time interval:	①	= inspect	②	= lubricate	③	= clean	④	= replace	
Time interval after operating hours:									
A =	daily or every 10 operating hours	B =	weekly or every 50 operating hours	C =	monthly or every 200 operating hours				
D =	every three months or every 500 operating hours	E =	semi-annually or every 1000 operating hours	F =	annually or every 2000 operating hours				
G =	every 2 years			whichever comes first!					

### 4.6.2 Placing boom

Description	A	B	C	D	E	F	G	CHAP.
V1					④			(chap. 4.8)
V2			②					--
V3	①							(chap. 4.19)
V4		② **						(chap. 4.18)
V5			①					(chap. 4.14)
V6			④		a) ④		b) ①	(chap. 4.14)
V7	①							(chap. 4.14)
V8			②					(chap. 4.18)
V9			①	①				(chap. 4.18)
V10		②						--
V11		②						--
V12			②					--
V13	①		②					--
V14	①		②					--
V15			①					(chap. 4.15)
V16								Appendix
V17	①							

(\*\* = lubricate every 100 operating hours)

Interval:	Explanation of the symbols								
After the first commissioning:	①	= inspect	②	= lubricate	③	= clean	④	= replace	
After time interval:	①	= inspect	②	= lubricate	③	= clean	④	= replace	
Time interval after operating hours:		B =		C =		D =		E =	
A =	daily or every 10 operating hours	B =	weekly or every 50 operating hours	C =	monthly or every 200 operating hours	D =	every three months or every 500 operating hours	E =	semi-annually or every 1000 operating hours
F =	annually or every 2000 operating hours	G =		whichever comes first!					



### 4.6.3 Concrete pump (pump kit)

Description		A	B	C	D	E	F	G	CHAP:
B1	Flush water box	⑤							(chap. 3.17)
B2	Check water box for deposits, clean as required		③						(chap. 3.17)
B3	Replace main hydraulic oil filter after maintenance interval or in the event of an error message					④			(chap. 4.8)
B4	Check fixing of pumping pistons	①		①					(chap. 4.17)
B5	Lubricate grease nipple on rock valve, slewing cylinder, agitator and filling hopper	②							(chap. 4.16)
B6	Check clamping screws of the rock valve swivel head for tightness		①						(chap. 4.16)
B7	Make sure screws on the rock valve cover are fit tightly		①						(chap. 4.16)
B8	Check axial play of the rock valve slewing shaft		①						(chap. 4.16)
B9	Check seal of the rock valve slewing shaft			①			①		(chap. 4.16)
B10	Check cutting ring of the rock valve		①						(chap. 4.16)
B11	Check pressure accumulator (only in case of MPS)		①	①	①				(chap. 4.11)
B12	Technical safety inspection of the pressure accumulator (only in case of MPS)						①		(chap. 4.11)

Interval:	Explanation of the symbols							
After the first commissioning:	①	= inspect	②	= lubricate	③	= clean	④	= replace
After time interval:	①	= inspect	②	= lubricate	③	= clean	④	= replace

Time interval after operating hours:					
A =	daily or every 10 operating hours	B =	weekly or every 50 operating hours	C =	monthly or every 200 operating hours
D =	every three months or every 500 operating hours	E =	semi-annually or every 1000 operating hours	F =	annually or every 2000 operating hours
G =	every 2 years		whichever comes first!		

#### 4.6.4 Special equipment

Description		A	B	C	D	E	F	G	CHAP.
S1	Check grease supply and function of the central greasing	①							(chap. 6.5)
S2	Clean suction filter on high-pressure cleaner	③							(chap. 6.2)
S3	Check water case heater heating device according to manufacturer's instructions								(chap. 6.7)
S4	Check fluid level in heating equalising reservoirs (before every commissioning)	①							(chap. 6.7)
S5	Change the ultra-fine filter insert (special equipment) according to the maintenance indication, but at least annually.						④		(chap. 4.8)
<b>Rotary compressor:</b>									
S10	Check oil level (before every commissioning)	①							(chap. 4.20)
S11	Oil change with ROTORÖL 8000 F2			④			④		(chap. 4.20)
S12	Replacing the oil filter			④			④		(chap. 4.20)
S13	Replacing oil return valves			④			④		(chap. 4.20)
S14	Clean / Replace air intake filter			③		④			(chap. 4.20)
S15	Cleaning the oil cooler			③					(chap. 4.20)
S16	Replacing the oil separator cartridge							④	(chap. 4.20)
<b>Chamber valve:</b>									
S17	Clean, lubricate	③		②					(chap. 6.4)

Interval:	Explanation of the symbols							
After the first commissioning:	①	= inspect	②	= lubricate	③	= clean	④	= replace
After time interval:	①	= inspect	②	= lubricate	③	= clean	④	= replace

Time interval after operating hours:					
A =	daily or every 10 operating hours	B =	weekly or every 50 operating hours	C =	monthly or every 200 operating hours
D =	every three months or every 500 operating hours	E =	semi-annually or every 1000 operating hours	F =	annually or every 2000 operating hours
G =	every 2 years		whichever comes first!		

Maintenance of chassis frame, motor, special equipment etc. according to manufacturer's instructions!

#### 4.6.5 Test intervals according to concrete delivery rate

The amount of wear on your machine's parts depends on the operating conditions (e.g.: concrete type, concrete pump stroke rate, etc.).

We therefore recommend testing new components after having pumped a specified amount of concrete.

This allows you to determine the wear behaviour of the components and define the necessary test intervals:

		First test after m <sup>3</sup>	Further tests after	Further information chapter
P1	Concrete pumping line	5000	Demand	SHB + <b>(chap. 7.4)</b>
P2	"Rock" swivel head	5000	Demand	<b>(chap. 4.16)</b>







## 4.8 Hydraulic fluid and filters

### 4.8.1 Safety instructions



#### **Danger!**

##### **Danger of explosions due to flammable oil residue!**

Oil residue in the reservoir is highly flammable and can explode. Do not use any naked flames or fire.

---



#### **Caution!**

##### **Risk of injury as a result of working on systems under pressure!**

The hydraulic system may be under pressure. For all work on the pressure equipment, ensure that the affected pressure space (filter housing) is depressurised.

---



#### **Caution!**

##### **Risk of injury as a result of working on pressure equipment!**

The equipment may be under pressure. For all work on the pressure equipment, ensure that the affected pressure space (filter housing) is depressurised. Disconnect the power supply to the optional motor. Ensure that the ventilator is no longer rotating and that the device has cooled down.

---



#### **Attention!**

##### **Risk of injury due to oil level being too high or too low!**

If the oil level is too high, the reservoir can overflow when the oil is heated!

If the oil level is too low, there is a risk of damage because the hydraulic pumps suck air in. Always check the oil level before commissioning the machine.

---

**Attention!****Risk of damage due to contamination!**

Contaminated oil can damage machine components. Always ensure absolute cleanliness and use SCHWING's flushing and filtration unit, for example, to top up the oil. For more information on this, contact SCHWING.

---

**Attention!****Risk of damage as a result of mixing different oils!**

Mixing different types of oil can cause the oil to lose its lubrication properties, which in turn can strip away the lubricating film entirely. As a rule, do not mix different types of oil with one another and always use the same type.

---

**Attention!****Risk of damage due to incorrect oil purity classifications!**

Failing to comply with the oil purity classification stipulated by the manufacturer makes it impossible to ensure the proper functioning of the components. Always make sure to adhere to the recommended purity classifications of SCHWING GmbH, as a minimum those of the component manufacturer, in order to avoid damage.

---

**Attention!****Risk of damage due to improper cleaning!**

Improper cleaning can destroy the pumps. Textile fibres and solvents can damage the hydraulic system. Therefore, steel wool, diesel oil, petrol, etc. must not be used for cleaning purposes. For this reason, perform the interior cleaning with flushing oil and a lint-free cloth.

---



**Attention!****Risk of damage due to unintentional draining!**

Unintentionally draining the entire system can result in there being no more hydraulic fluid in the system. Commissioning the system then results in damages. Do not leave the draining site while draining is in progress and monitor the drain.

---

**Attention!****Risk of damage due to air in system!**

After removing the suction hoses, air may enter the system. This can damage or destroy the pumps. Bleed the pumps with the drive at a standstill before commencing operation.

---

**Attention!****Risk of damage due to dirty filter inserts!**

Dirty filter inserts can damage the hydraulic system. As a rule, replace all filters. Cleaning all filter inserts is not sufficient.

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**Attention!****Risk of damage as a result of operating the system without filters!**

Filters protect the hydraulic system,. Never operate the system without filters in order to prevent the system from clogging.

---

**Information**

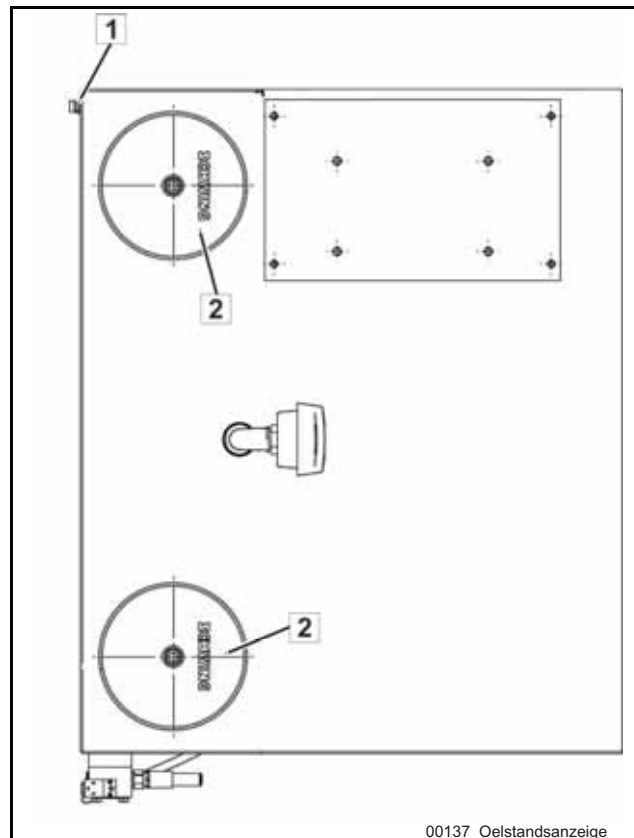
The smaller the values, the purer the hydraulic oil!

Further information on purity classifications and contaminations of operating materials can be obtained from the manufacturer information on filter systems as well as lubrication and operating materials.

---

### 4.8.2 Checking the fill level of the reservoir

The reservoir for the hydraulic oil is equipped with an oil level indicator (1) (**Fig. 274**).



**Fig. 274 Oil level indicator**

#### Caption (Fig. 274)

1	Oil level indicator
2	Cleaning cover (filling cap)

- Check the oil level only when the oil is cold, before you start the hydraulic pump drive for the first time prior to daily use.

To do this, the ready-to-start machine must be positioned horizontally. Ready to start means that the placing boom and outrigger are in the transport position.

When the oil is cold, the oil level must reach the centre of the oil level indicator (**Fig. 274**) Oil level indicator.

When warm, the hydraulic oil is expanded and the indicated oil level is not correct.

- If the oil level is too low, top up the hydraulic oil through the cleaning cover (2) (**Fig. 274**).

If your machine has the necessary special equipment, the diagnostic system of the VECTOR control will monitor the oil level and warn you of low hydraulic oil levels. Do not mix different types of oil.

### 4.8.3 Filling the empty oil box

- Top up the hydraulic oil box as described above.
- Wait approx. 10 minutes until the oil is free of air bubbles and top up with more oil if necessary.
- Run all functions.
- Check the oil level again when the oil is cold and the machine is positioned horizontally and ready to start.
- If the oil level is too low, top up the hydraulic oil through the cleaning cover (2) (Fig. 274).

### 4.8.4 Purity of the hydraulic oil

The purer the hydraulic oil is, the smoother the hydraulic systems and greasing units will function. 75 percent of all system failures are due to damage to the inserted components - caused by impure hydraulic oil.

In complex hydraulic systems, the most sensitive component determines the required purity in the entire system.

For components used in SCHWING GmbH hydraulic systems, a purity classification as set out in the manufacturer's specifications is required, which should at least be compliant with or better than classification 20/18/15 according to ISO 4406.

SCHWING GmbH supplies its machines with purity classification 18/16/13 according to ISO 4406.

#### 4.8.5 What does the purity classification mean?

Contaminations cannot be convincingly detected through a visual inspection.

The classification of solid contamination in lubricants and hydraulic fluids is determined according to ISO 4406.

To determine the oil purity classification, solid particles are counted in 100 ml of fluid, arranged according to size and quantity and divided into particle areas.

Depending on the procedure for the particle counting, there will be 2 or 3 areas.

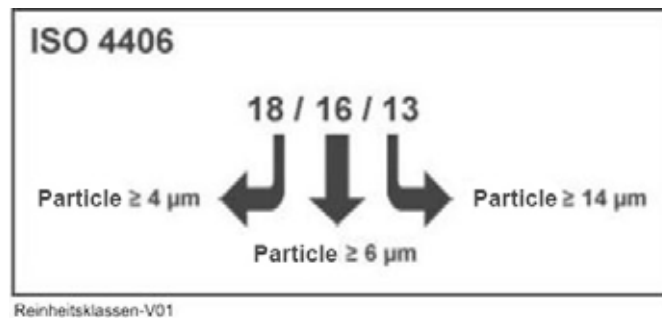


Fig. 275 Purity classifications



#### Information

The smaller the values, the purer the hydraulic oil!

Further information on purity classifications and contaminations of operating materials can be obtained from the manufacturer information on filter systems as well as lubrication and operating materials.

#### 4.8.6 What advantages are there in observing the purity classification?

Adherence to the purity classification contributes significantly to the reduction of costs due to the extension of the oil change interval and to the prevention of damage due to contamination.

As such, machine availability and productivity increase.



#### Information

Failure to comply with the purity classification results in the loss of warranty!

#### 4.8.7 Extended changing intervals for hydraulic oil

Through diligent oil care and regular changing of the oil filter, the oil changing interval can be extended, in order to initiate appropriate measures for preventive maintenance.

The oil quality must be monitored through regular laboratory tests.

The laboratory report contains the analysis values of your sample, comments from expert technicians on the state of the oil and machine, as well as recommendations on how to proceed.

For an oil analysis, the oil must be removed from the system and sent to a laboratory for analysis.

To keep your personal costs as low as possible, we recommend analysis sets.

The samples can thus be taken cleanly, quickly and easily and sent.

#### 4.8.8 Description of the oil sampling procedure

Take the sample:

- During operation or shortly after shut-down – because dirt and wear particles are floating, potentially present water has not been removed.
- At a normal operating temperature (max. 80 °C), warm oil can be removed more quickly.
- Always following the same method and at the same point.
- Wherever possible before the filter, never out of the filter.
- Not shortly after an oil change or after a large quantity of oil has been refilled.
- Only in a clean and dry sample cup – at best directly into the "original" from the analysis set.

You can obtain suitable measuring and flushing devices via SCHWING.

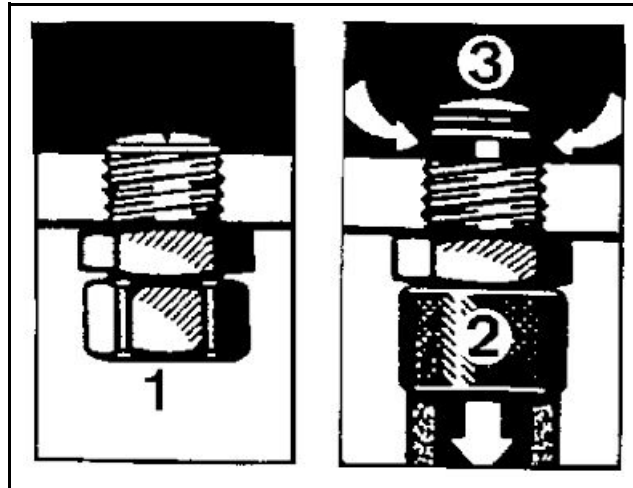
Please contact our Customer Services:

Telephone: + 49 (0) 2325 / 987 - 231/232

Email: [service@schwing.de](mailto:service@schwing.de)

### 4.8.9 Draining condensation water

After an extended period of downtime, drain any water from the hydraulic oil box. To do this, use the drain valve (1) (**Fig. 276**) on the bottom of the box.



**Fig. 276** Draining condensation water

Caption (Fig. 276)	
1	Locknut on drain valve
2	Drain hose
3	Open drain valve (automatic)

- Remove the locknut from the drain valve (1) (**Fig. 276**)
- Screw the drain hose (2) onto the drain valve (3). The drain valve opens automatically.
- Remove the drain hose immediately once clean hydraulic fluid starts to emerge and reattach the locknut.
- After draining, check the level of the hydraulic oil.

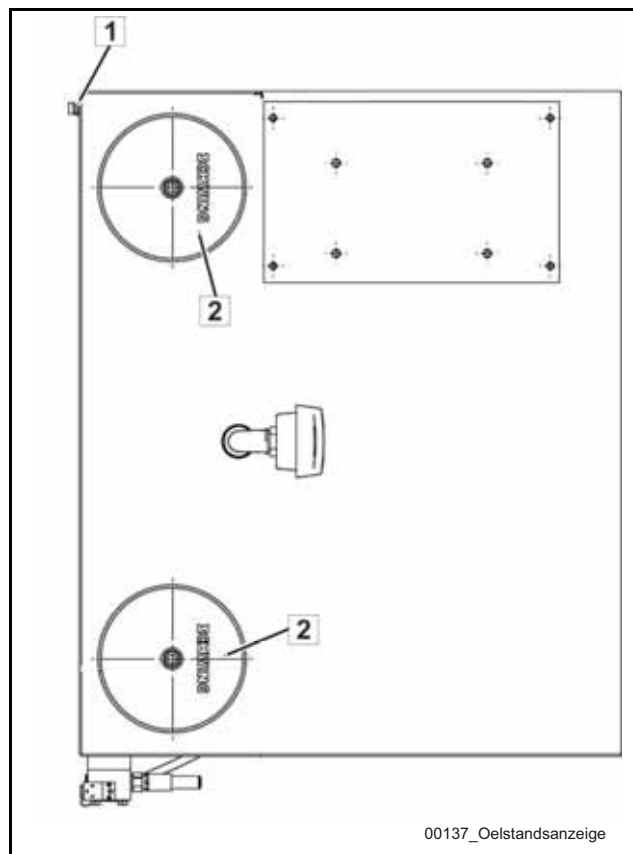
### 4.8.10 Changing the hydraulic fluid

- Warm up the hydraulic unit.
- Provide an old oil box.
- Due to the large quantity to be changed, you should first pump out as much fluid as possible through the upper cleaning opening. We recommend using our flushing and filtration unit for this.
- Drain residual oil with the drain valve as described above.
- Before each oil change, clean the box and replace the filter inserts.

### 4.8.11 Cleaning the reservoir

In particular during long periods at standstill, the hydraulic oil excretes dirt particles which are deposited onto the bottom of the container.

- Therefore, during each oil change, check the inner walls and the inner floor.
- Clean the oil box as needed.
- Also clean the area around the cleaning cover. To do this, remove the cleaning cover (2) (**Fig. 277**).



**Fig. 277** Cleaning cover

Caption (Fig. 274)	
1	Oil level indicator
2	Cleaning cover (filling cap)

- Remove the suction hoses on the hydraulic pumps from the container and seal them shut so that no dirt can enter the pumps.
- Wipe the inside of the container dry.
- Inspect the seal and attach the cleaning cover.



### Attention!

#### Risk of damage due to air in system!

After removing the suction hoses, air may enter the system. This can damage or destroy the pumps. Bleed the pumps with the drive at a standstill before commencing operation.

#### 4.8.12 Replacing the filter inserts

- Replace the filter inserts after receiving an error message from the diagnosis system and (or) during each oil change.

In order to prevent error messages, the filter monitoring first becomes active at an oil temperature of more than 30 °C.

- Clean and check all individual parts. Watch out for rubbed-off metallic particles in the filters (indication of damage!).



### Information

Old filter inserts belong in special waste.

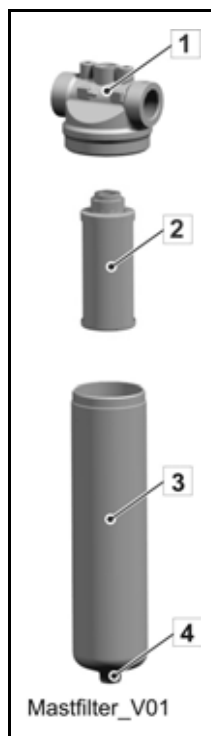
#### 4.8.13 Boom filter

The boom filter (**Fig. 278**) for the placing boom hydraulic system is a built-in tube filter located in the emergency control switch cabinet, near the placing boom control block.



#### 4.8.14 Dismantling

- Unscrew the filter bowl (3) (**Fig. 278**) at the bottom hexagon (4) using a ring spanner.
- Collect the liquid in a clean container and clean it or dispose of it in an environmentally friendly manner.
- Unscrew (pre-2011 models: "pull") the old filter insert (2) from the filter head.
- Clean the filter bowl and filter head, making sure that the thread in particular is clean.
- Inspect the O-rings and back-up rings and replace them if necessary.



**Fig. 278 Boom filter**

Caption (Fig. 278)	
1	Filter cover
2	Filter insert
3	Filter bowl
4	Hexagon

#### 4.8.14.1 Mounting

- Apply clean operating fluid to the thread and sealing surfaces of the filter bowl, filter head and O-ring.
- Screw (pre-2011 models: "insert") the new filter insert (2) into the filter head.
- Screw in the filter bowl (3) completely and then loosen it by one fourth of a rotation.
- Bleed the hydraulic system.



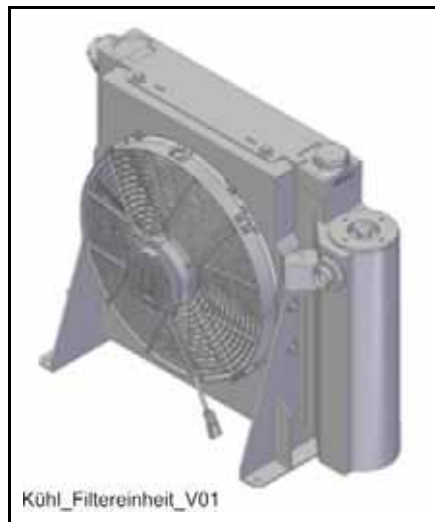
#### Information

The sealing effect is not improved through tightening.

#### 4.8.15 Replacing the insert in the main filter

The main filter is integrated into the oil cooler circuit. When the pump drive is switched on, a separate pump keeps the hydraulic oil in constant circulation.

Cooler, filter and ventilator form a compact unit (**Fig. 279**).



**Fig. 279** Cooling filter unit

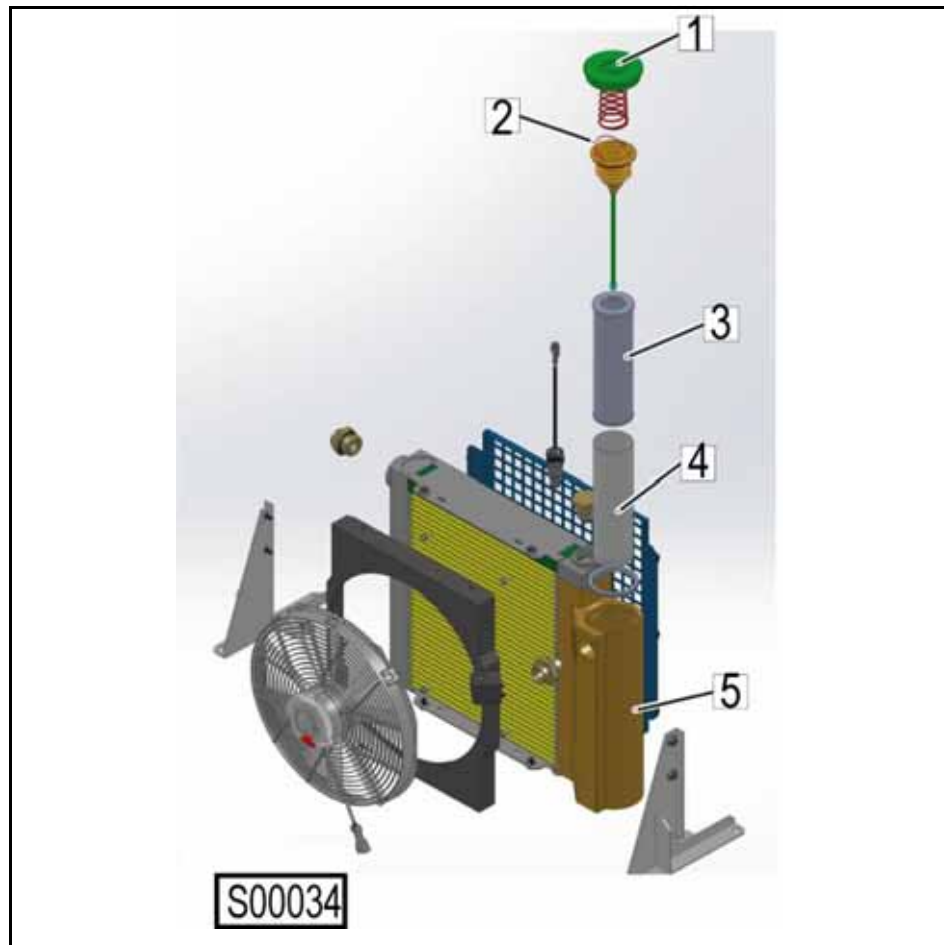


Fig. 280 Filter insert

Caption (Fig. 280)	
1	Filter cover
2	Stirrup
3	Filter insert
4	Filter housing
5	Filter chamber

- Remove the filter cover (1) (**Fig. 280**) (socket wrench insert 24 mm).
- Collect the fluid in a suitable receptacle and clean it or dispose of it in an environmentally responsible way.
- Pull the filter housing (4) out of the filter chamber (5) by its stirrup (2).
- Remove the filter insert (3) from the filter housing (4).

- Rinse out the filter screen of the filter housing and wash dirt off with a soft brush.
- Dry the filter screen and inspect it for damage.
- Inspect the sealing rings at the filter cover and the underside of the filter housing and replace them if necessary.
- Grease threads and sealing surfaces and cautiously insert the new filter insert into the filter housing.
- Insert the filter housing into the filter chamber.
- Carefully attach the filter cover and tighten the cover to approx. 35 Nm (socket wrench insert 24 mm).
- Document the oil and filter changes using the appropriate SCHWING tags, see **(Fig. 281)** and **(Fig. 282)**.



Fig. 281 “Hydraulic oil” trailer

Fig. 282 “Filter elements” trailer

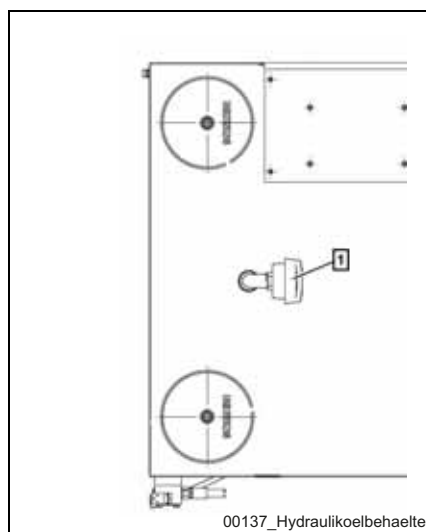
Caption for (Fig. 281) and (Fig. 282)		
1	“Change hydraulic oil” trailer	Art. no.: 98391708
2	“Replace filter elements” trailer	Art. no.: 98391709

### 4.8.16 Dehumidifying the hydraulic oil box

All SCHWING truck-mounted concrete pumps with VECTOR control have been equipped with an automatic dehumidification system for the hydraulic oil box since roughly October 2009.

Thus, cool, dry air is directed from the vehicle air system into the container via the oil surface. It warms the air and removes the humidity from the environment. The warmed, damp air leaves the oil box via the housing of the vent filter (3) (**Fig. 283**).

The completely automatic dehumidification of the hydraulic oil box reduces the risk of corrosion on the inside of the container, as well as the absorption of water into the hydraulic oil.



**Fig. 283 Hydraulic oil box**



**Fig. 284 Ventilation filter**

Caption (Fig. 283)	
1	Ventilation filter

Caption (Fig. 284)	
1	Filter insert
2	Pressure gauge

### 4.8.16.1 General information

A pressure gauge (2) (**Fig. 284**) is located in the housing of the vent filter, which can help to check the functioning of the dehumidification system.

When the dehumidification system is active, the pressure gauge must display a value between 0 and less than +0.2 bar.

A safety valve in the dehumidification system opens at 0.2 bar overpressure.

If the display of the pressure gauge is in the minus area, it means that with a decreasing oil level ambient air is sucked through the vent filter in the container. The oil level decreases when, for example, the outrigger or placing boom is extended.

### 4.8.16.2 Start-up conditions

- VECTOR control ON
- Pressure in the vehicle air reservoirs higher than 5.5 bar
- Hydraulic oil temperature at least 60°C

If the above conditions are fulfilled, start the system for 15 minutes. Then there is a pause of 45 minutes, which is followed by a venting phase as long as the above conditions are fulfilled.

### 4.8.16.3 Maintenance and inspection

The filter insert (1) (**Fig. 284**) cannot be cleaned but rather has to be replaced according to the maintenance schedule. If an overpressure of 0.2 bar appears continuously on the display when the dehumidification system is switched on, the vent filter insert is dirty and must be replaced ahead of schedule. It is not possible to clean it.

It should be inspected for perfect function from time to time. In so doing, observe the described start-up conditions.

When replacing the air filter in the dehumidification system, also observe the maintenance interval of the air filter in the vehicle air system.

## 4.9 Pressure checks

All hydraulic consumers are secured by pressure relief valves.

These valves are set at the factory. Readjustment is as a rule only necessary after replacement or repair of the hydraulic systems.

Regular pressure checks serve to detect errors early on. Carry out the checks while the machine is running at operating temperature and speed.



### Warning!

**The factory-set pressures must not be altered. Settings may only be configured by technically qualified workshop personnel!**

- Only loosen hydraulic system connections if the drive is not running and the pressure accumulator (if present) is relieved. This also applies to the assembly and disassembly of test pressure gauges.
- When checking the pressure of the concrete pump hydraulic system, be sure to set the direction to "Pump".

In the direction "Sucking", the seals of the concrete pump control block may be pushed out.

### 4.9.1 Concrete pump system

A11 hydraulic pumps power the concrete pump.

Different pump combinations can achieve different power densities. See examples, **(Fig. 285)** and **(Fig. 286)**.

A11 pumps are equipped with a "pressure cut-off" function. This swivels the pump back before the maximum operating pressure set on the pressure relief valve (PRV) is reached.

The pressure cut-off prevents a loss of performance and oil from being heated, which occurs when hydraulic oil is diverted through the pressure relief valve.

During a pressure check, the value displayed on the pressure gauge should be approx. 20 bar lower than the setting on the pressure relief valve DB 1.

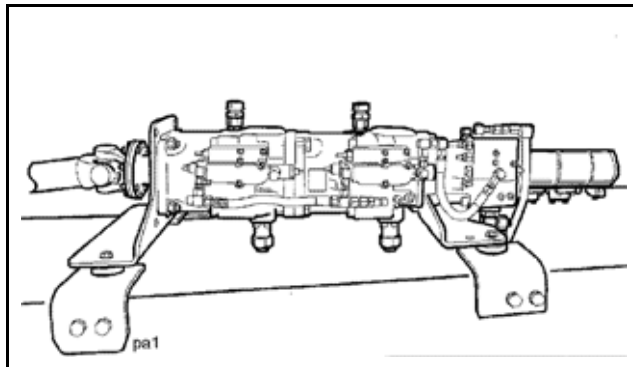


Fig. 285

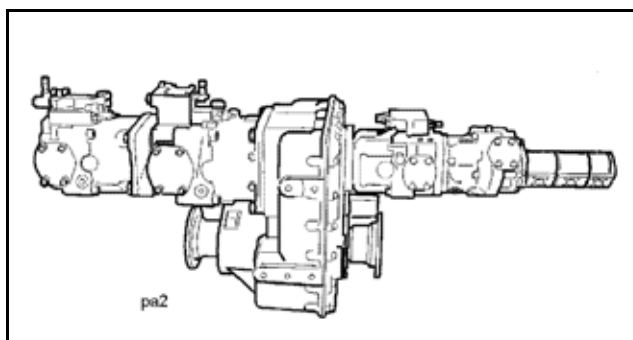


Fig. 286

Appropriate settings are configured on the hydraulic pumps and the pressure relief valve.

If during the checks the result is clearly above or below the prescribed values, leave the required adjustment work to SCHWING's customer service.

Shut down the machine and submit the measured values to customer service.

#### 4.9.2 Performing a pressure check

- Close the ball valve (1) (**Fig. 288**).
- For machines with MPS, set the ball valve (2) (**Fig. 288**) to position (II): Pressure check (**Fig. 287**).
- Configure the max. delivery rate (stroke rate) of the concrete pump.
- Switch on the concrete pump.

The pumping pistons are moved into the end position and remain there.

The indicator on the concrete pump pressure gauge (2) on the rear of the machine (**Fig. 289**) must increase to the value set for the pressure cut-off.



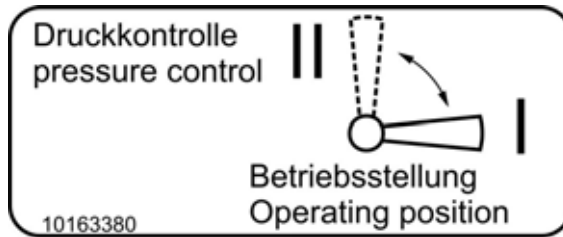


Fig. 287

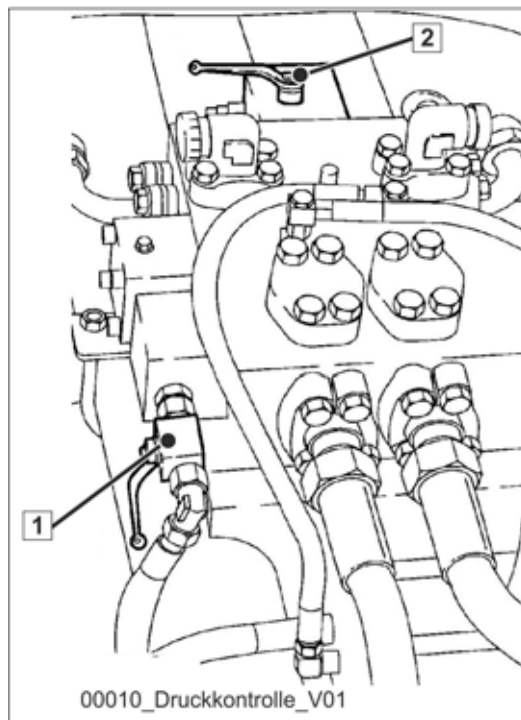
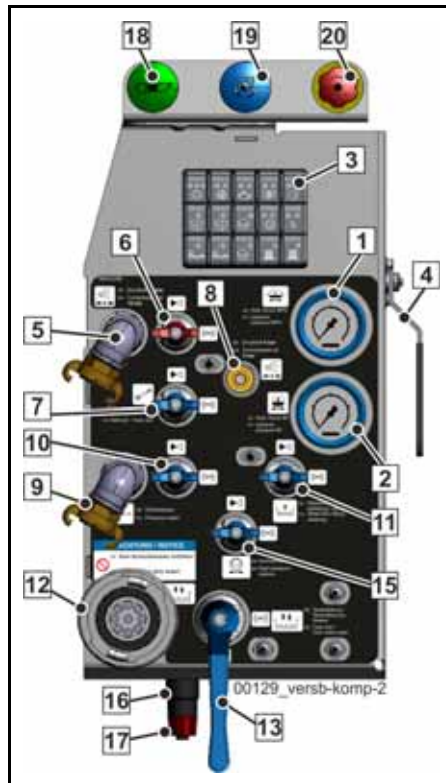


Fig. 288



**Fig. 289 Pressure gauge for concrete pump**

- After the pressure check, first switch off the concrete pump, then switch the ball valves back to their operating position. In this way, you prevent uncontrolled running of the concrete pump after turning the ball valve.



### Attention!

**Working operation is only permitted while ball valve (2) (Fig. 288) is in the operating position (I)!**

If the concrete pump is switched on after more than 120 seconds of being blocked, "VECTOR control" issues an error message.

#### 4.9.3 Placing boom, auxiliary units

Placing boom hydraulics are likewise powered by an A11 pump.

The pressure check is performed by installing test pressure gauges.

The pump operates with a pressure limit, which is similar to the pressure cut-off described above.

In the event of a malfunction, let the SCHWING customer service take care of inspecting and configuring this system.

#### 4.9.4 Hydraulic pilot control

When testing hydraulic pilot pressures, always connect a test pressure gauge capable of up to 600 bar.

Excessive pressure can destroy the "40 bar pressure gauge".

##### 4.9.4.1 S1 valve

The hydraulic pilot control unit for the "S1" valve on the concrete pump is powered by the agitator hydraulics.

In order to ensure sufficient pressure also when the agitator is not running, a pre-charging valve is installed in the agitator control unit.

##### 4.9.4.2 Placing boom

The pilot control pressure is enabled via a pressure relief valve in the "pilot control plate" of the placing boom control block.

#### 4.9.5 Pneumatic pilot control

The directional valves for concrete pump and agitator pilot control systems are pneumatically piloted.

Various types of special equipment also require compressed air.

That air is supplied from the vehicle air system.

For this purpose, the vehicle must feature a 4-circuit protection valve with a free junction.



**Danger!**

**Malfunctions can affect the vehicle's braking system!**

Only representatives of the vehicle manufacturer may work on the 4-circuit protection valve.

---



## 4.10 Hydraulic oil cooler



### Warning!

#### Rotating fan blades and hot machine parts!

Before working on radiators:

- Switch off all control units.
- Switch off the motor and ignition.
- Allow the cooler to cool down.
- Wear work gloves and safety goggles.
- Remount all safety devices after finishing the cleaning work.

Only then, recommission the machine.

### 4.10.1 Hydraulic oil cooler

The oil cooler and oil filter are located in the same housing (**Fig. 290**).

A fixed displacement pump delivers hydraulic oil through this filter/cooler combination in a separate circuit.

The system is activated immediately after switching on the drive and independent of the activation of other functions.

Dusty precipitation on the cooling vanes of the oil cooler reduces the cooling capacity.

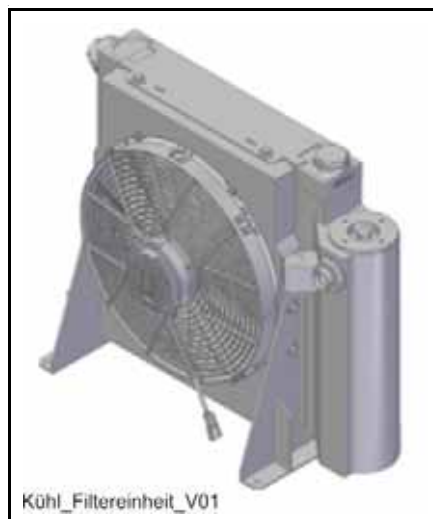


Fig. 290

#### **4.10.2 Cleaning the exterior of the hydraulic oil cooler**

Soiling on the radiator fins of the oil cooler reduces the cooling capacity.

Carefully clean the radiator with compressed air. To do this, bring the air flow parallel to the cooler fins and against the normal flow direction.

Cleaning with water or steam jet is possible for heavy soiling.

Observe:

- Disassemble fan motor.
- Only use cleaning agents that do not corrode aluminium.
- Use water and steam jets carefully.

#### **4.10.3 Cleaning the interior of the hydraulic oil cooler**

- Remove the cooler.
- Connect cooler to a flushing system with filters.
- Flush for at least 30 minutes.
- After cleaning, remove the flushing medium completely.

Then, flush the cooler with the appropriate type of oil for the hydraulic system.

#### **4.10.4 Motor cooler**

Liquid-cooled motors have an appropriate cooler.

Depending on the type, the drive motor can be additionally equipped with a motor oil cooler.

The motor cooler vanes must be cleaned from time to time in order to avoid impairing the cooling performance.

Otherwise, this can result in damage due to the motor overheating.

Instructions on how to clean the cooler can be found in the respective motor or vehicle operating instructions.

#### 4.11 Pressure accumulator (bladder accumulator)

These components only control the switching of the rock valve so that it can be switched with sufficient force.

Bladder accumulators are pressure vessels in the sense of Pressure Equipment Directive 97/23EG, see example figure (**Fig. 291**).



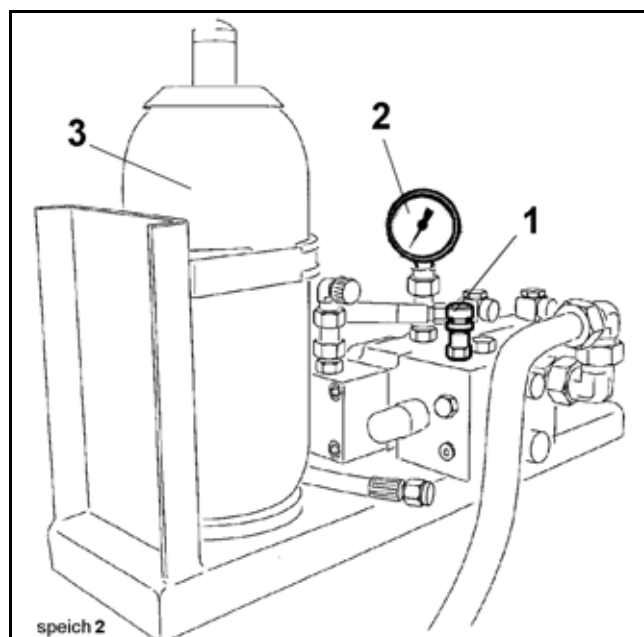
#### Warning!

##### **Risk of severe injuries due to systems under pressure.**

Improper handling can cause explosive releases of pressure and result in severe injuries.

Work on the hydraulic systems may only be carried out by authorised, qualified personnel!

Prior to any repair work, the system must be depressurised.



**Fig. 291 Pressure accumulator**

Before commissioning and during operation, the applicable local regulations in the country of use must be observed.

The machine operator is responsible for adhering to these regulations.

It is essential to observe the documentation provided by the manufacturer of the accumulator. This must be kept with the machine's papers.

In Germany, an inspection by an approved inspection body is prescribed upon commissioning and then at least every 10 years thereafter.

As part of the regular technical safety inspection, a competent person must inspect the bladder accumulator externally.

#### 4.11.1 Maintenance and testing of the pressure accumulator

Regularly carry out the following work:

- Check nitrogen filling pressure.
- Make sure connections are tight and check for leaks.
- Check that fittings and safety devices are in proper working condition.
- Check fixing elements.

#### 4.11.2 Test intervals

Carry out the work listed above in accordance with the maintenance schedule:

If no noticeable loss of gas has occurred, carry out the regular work every three months.

#### 4.11.3 Checking the nitrogen filling level of the bladder accumulator

- Start the motor and fill the accumulator.
- Switch off the motor.

The accumulator is automatically discharged (hydraulic fluid drains off).

- Monitor the pressure gauge, e.g. (2) (**Fig. 292**) or (2) (**Fig. 293**),

At first, the pressure decreases slowly. Only when the accumulator is completely empty, then the pressure drops abruptly.

- The last pressure value indicated before the pressure gauge pointer abruptly drops to "0" corresponds to the nitrogen filling pressure.



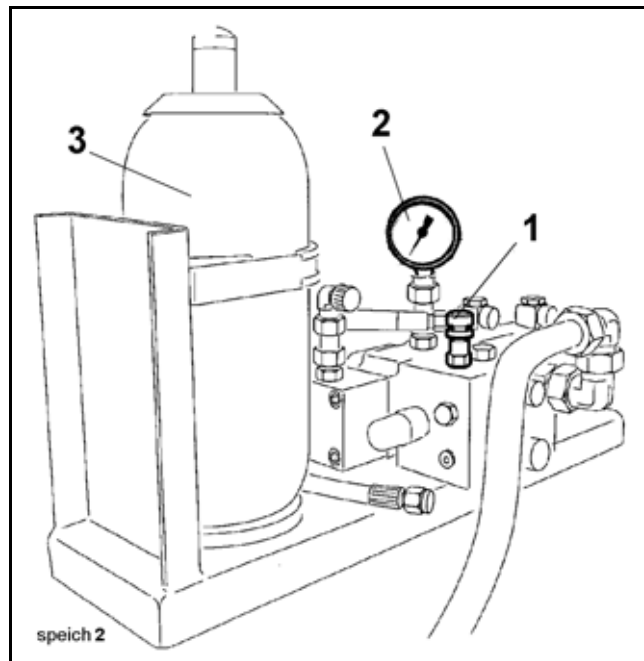


Fig. 292



### Information

Depending on the type of machine, the pressure gauge (2) is located directly on the accumulator safety block (Fig. 292) or at another position that is easy to see for the operator, e.g. (2) (Fig. 293).

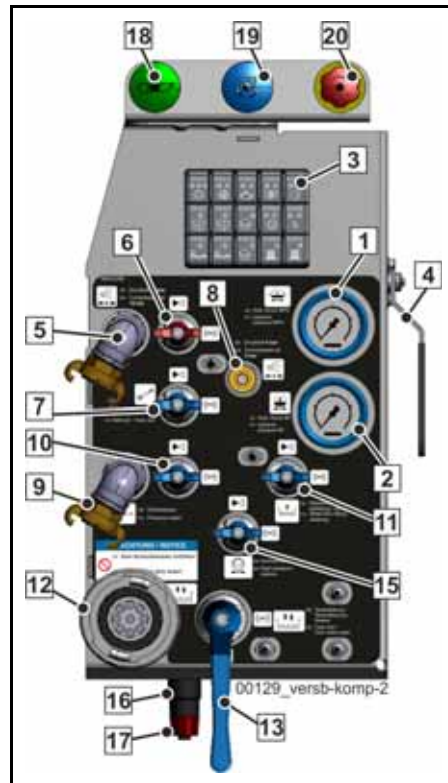


Fig. 293 (2) Pressure gauge of the concrete pump / supply control



### Danger!

#### Risk of explosion!

- Only fill the bladder accumulator with nitrogen!
- Under no circumstances fill with oxygen or air!

Do not exceed the indicated filling pressure!

Should the filling pressure not be correct, fill the accumulator using the original filling device from the manufacturer in accordance with the manufacturer's instructions.

The filling pressure "P0" is specified in the switching diagram or on an adhesive sign attached to the bladder accumulator.

#### 4.11.4 Working on machines with bladder accumulators



##### Warning!

##### Rock valves can switch independently!

Hydraulic oil can escape under pressure!

Failure to observe these instructions can result in accidents!

Work on the hydraulic systems may only be carried out by authorised, qualified personnel!

Prior to any repair work, the system must be depressurised.

---

The breather valve of the accumulator safety block opens automatically under certain operating conditions and discharges the bladder accumulator.

For reasons of occupational safety, before working on the machine (e.g.: cleaning, connecting pressure gauges, repair work, replacement of wearing parts etc.):

- switch off the machine control system.
- Switch off the drive motor and secure it against switching back on (e.g. remove the "ignition key").
- Open the manual accumulator breather valve (1) (**Fig. 292**).
- Read pressure gauge (2); it should be pointing to 0 bar.

#### 4.11.5 Safety inspection for bladder accumulator

Pressure tanks must be inspected regularly in accordance with the regulations in the country of use.

In Germany, an inspection by an approved inspection body is prescribed upon commissioning and then at the latest every 10 years thereafter.

As part of the regular technical safety inspection, a competent person must inspect the bladder accumulator externally.

#### 4.11.6 Repairing the accumulator system



#### Warning!

**Improper assembly and commissioning can result in serious accidents.**

Severe injuries are possible as a result of explosions.

Neither welding nor soldering work may be carried out on the accumulator body, nor any kind of mechanical work - RISK OF EXPLOSION!

Work on the hydraulic systems may only be carried out by authorised, qualified personnel!

---

- Prior to any repair work, the system must be depressurised.
- Repair work may only be carried out according to manufacturer regulations.
- Defective components may only be replaced with original spare parts.
- No modifications may be made to any part of the accumulator system. We advise against improper repairs on the strongest possible terms.

After repairing the accumulator charging circuit, it must be completely vented.

## 4.12 Drive lines of the pump drive

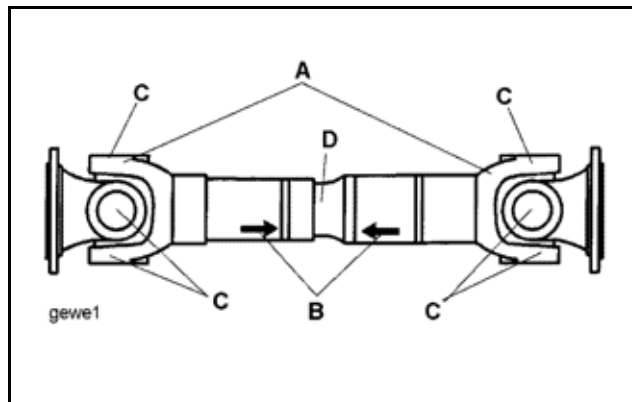


Fig. 294

For the safe and trouble-free operation of drive lines, control and lubrication work is necessary.

Before lubricating, check the play of the articulated bearing "C" and the length compensation "D". Replace drive line in case of noticeable play.

Also be alert to abnormal running noises and vibrations during operation of the machine. If required, determine the cause and remedy the error.

Timely action on signs of wear keeps the machine operationally ready.

Downtimes are reduced and damage avoided.

### 4.12.1 Lubrication



#### Information

##### Drive line grease.

For the relubrication of drive lines, please only use our SCHWING drive line grease, art. no.: 10197297.

Relubrication with other greases is absolutely to be avoided.

Before relubricating, clean the high-pressure lubrication heads.

The maximum permissible lubrication pressure is 15 bar. Avoid strong surges of pressure so as not to damage the seals.

If a lubrication point is positioned opposite to a link, lubricating one lubrication head is sufficient.

The grease reaches all four articulated bearings via the central lubrication head in the journal cross.

Lubricate the lubrication points of the links until the new lubricant emerges from all sealing lips. Dirt is ejected from the bearings along with the old grease. Do not allow all bearings to be lubricated, remove the shaft.

"Over-lubrication" is not possible. Wipe away excess grease.

As a rule, the length compensation of the drive lines is coated in Rilsan and as such requires no maintenance. If a lubrication head is located in this position, then this should be sparingly greased, as it collects some of the grease in the shaft.

If drive lines are cleaned with pressure water or steam jet, re-lubricate after each cleaning. Under no circumstances should the drive lines be cleaned using chemical cleaning agents. These can attack the seals of the articulated bearings, for example.

### 4.12.2 Relubrication intervals

The respective operating conditions determine the relubrication intervals.

The intervals specified in the maintenance schedule are reference values. Under certain circumstances, shorter intervals are necessary.

Regular visual inspections of the universal joints must be carried out at least once every 50 operating hours. The joints must also be checked for zero play.

### 4.12.3 Transport and storage

Drive lines manufactured by SCHWING are delivered as installation-ready drive elements, see example (**Fig. 294**).

They must always be transported and stored in a horizontal position. Also secure them to prevent them falling apart.

Protect exposed parts, e.g. flange surfaces, from corrosion and store drive lines in a dry space.

In order to maintain the factory-set balance, avoid strikes and impacts to the drive lines. Do not remove balance compensation parts.

## 4.13 Distribution manual transmission gear

### 4.13.1 Checking the oil level

- Place machine in a horizontal position.
- Unscrew the inspection plug (1) (**Fig. 295**).
- If necessary, top up oil through the filling and breather screw (2) until it overflows at (1).
- Wash screw (2) with fuel and blow out with compressed air.

### 4.13.2 Changing the oil

- Unscrew drain plug (3); close after emptying.
- Top up oil as described above.



#### Information

We recommend:

During each oil change, examine an oil sample for discolouration and solid particles in order to initiate appropriate measures for preventive maintenance.

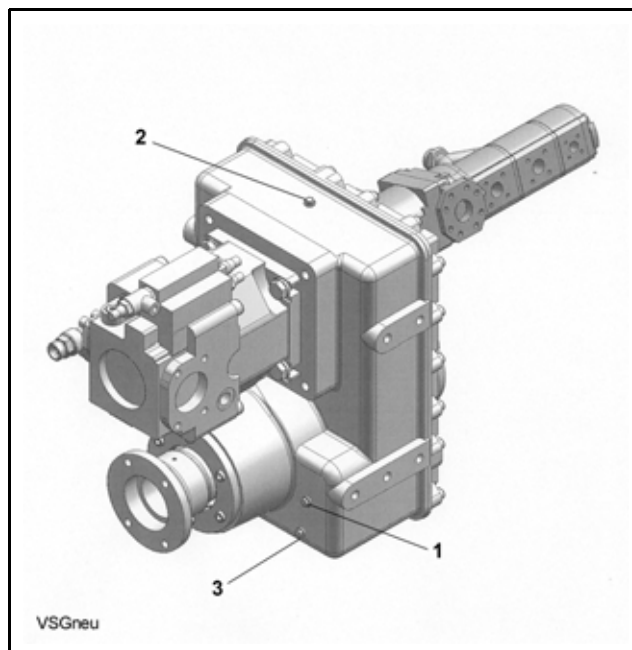


Fig. 295 Distribution manual transmission gear





## 4.14 Maintenance for slewing gear

SCHWING automatic concrete pumps can be equipped with two types of slewing gears.

For the machines S 31 XT / S 34 X / S 32 X / S 36 X, see (**chap. 4.14.8**)

### 4.14.1 Checking the oil level

Check the gear oil level monthly or before recommissioning.

Check oil level while the gear is cold, in addition:

- Place machine in a horizontal position.
- If applicable, open the maintenance flap above the gear.
- Remove the dipstick along with the vent filters (1) (**Fig. 296**) and wipe off with a cloth.
- Screw in the dipstick by hand, then remove again and read the oil level.
- If necessary, top up the gear oil via the dipstick opening until it reaches the upper mark on the dipstick.
- Clean the vent filters with a cleaning agent, mount the oil dipstick and close the maintenance flap.

### 4.14.2 Vent filters

In the event a layer of dust has been deposited, vent filters must be cleaned, even before the minimum period of three months has passed.

- Remove vent filters
- Clean vent filters with a cleaning agent
- Dry or blow with compressed air



#### **Attention!**

#### **Damage to the gear!**

Keep the vent filters completely clean and accessible.

Blocked vent filters can affect the function of the slewing gear and lead to damage to the gear.

---

### 4.14.3 Attention - Long-term lubrication!

Slewing gears can be filled with a long-term polyglycol-based lubricant.

Observe the information on the gear type plate.

CLP = Mineral oil

PG = Polyglycol

Polyglycols must not be mixed with fluids of a different composition (loss of lubricating ability).

Only a lubricant in compliance with the information on the gear type plate may be used. Otherwise, the sealing elements risk being damaged.

When filling with the above long-term lubricant, we recommend taking a test sample every two years and changing the lubricant only in the case of a poor evaluation.

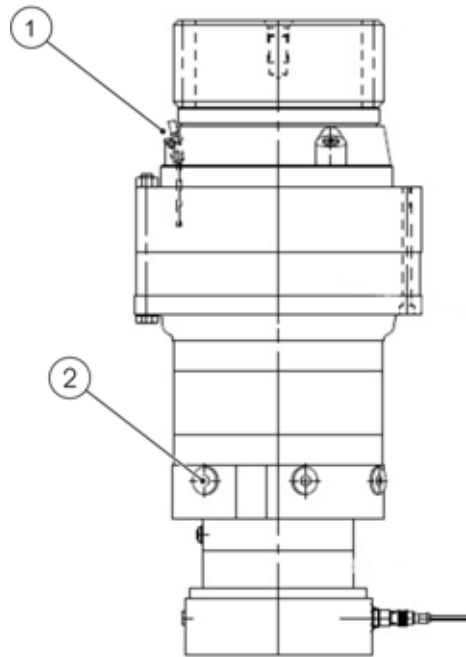
### 4.14.4 Changing the oil

- Drain the oil while the gear is still warm immediately after shutting down the machine.
- If the ambient temperature is low, flush the gear with a little bit of new oil in order to rinse out any dirt and dust.
- To eliminate negative pressure, remove the oil dipstick along with the vent filters (1) (**Fig. 296**).
- Place a sufficiently large receptacle under the oil drain to catch the old oil
- Remove one of the oil drain screws (2) (**Fig. 297**) in order to drain the oil. The old oil drains out into the receptacle.
- Thoroughly clean the oil drain screw.
- Check the condition of the sealing rings.
- Replace the sealing rings if they are worn out.
- Screw in the oil drain screw (2) (**Fig. 297**).
- Fill with oil up to the middle of the "MIN/MAX" mark.
- Screw the oil dipstick back in along with vent filters (1) (**Fig. 296**).



### Information

During each oil change, we recommend examining an oil sample for discolouration and solid particles in order to initiate appropriate measures for preventive maintenance.

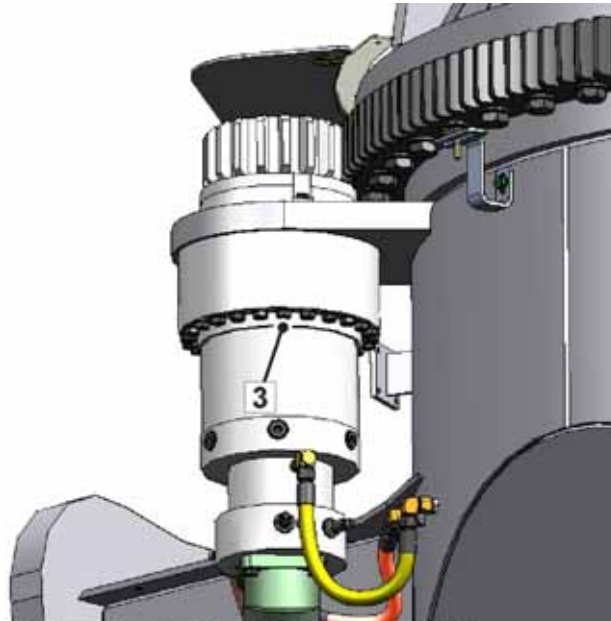


Drehwerkgetriebe-V01

Fig. 296 Design 1 of a slewing gear

#### 4.14.5 Checking the gear fixing

Regularly check to make sure the screws are tight in accordance with the maintenance schedule (3) (**Fig. 297**).



Drehwerkgetriebe-Befestigung-V01

**Fig. 297**

#### 4.14.6 Toothing play on rotary connection

The tothing play of the rotary connection is significant for the wear of the tooth flanks and is directly connected to the slewing movement of the placing boom.

When the tothing play between the rotary connection and the slewing gear is no longer within the factory tolerances, the slewing behaviour of the placing boom changes considerably for the worse.

As such, when ending a slewing movement, the placing boom can continue to swivel out as it "normally" would.

In order to prevent this change of the tothing play, lubricate the tothing of the rotary connection according to the maintenance plan and pay attention to any potential abrasions of the toothed wheels.

**Warning!****Increased swivelling out of the placing boom!**

Danger of collisions and crushing due to bigger slewing movements of the placing boom.

If, when ending a slewing movement, the placing boom makes unusual swivelling out movements, contact SCHWING customer service immediately for inspection purposes.

Arrange for SCHWING's customer service to repair any damage immediately.

---

#### 4.14.7 Slewing gear brakes

The multi-disc brake serves only to stop the boom. The slewing gear brake disc stack is held in place by spring force when at rest and is hydraulically vented (released) by initiating the slewing movement or automatically vented (blocked) upon completion of the slewing movement.

The slewing movement is stopped via built-in hydraulic brake valves. A choke ensures the even rise or fall of pressurisation in order to avoid an excessively abrupt braking action.

As such, the boom is not stopped abruptly but is rather stopped or started up slowly.

The choke is set at the factory and should only be adjusted by SCHWING customer service.

Errors in the slewing gear brakes can be detected via the following behaviour of the placing boom:

- The placing boom no longer remains in its last position
- After completing a rotation, the braking distance of the placing boom is longer than normal

If a malfunction is detected in the slewing gear brake(s), contact SCHWING's customer service immediately for the purpose of an inspection and repairs.

**Warning!****Faulty or weakened effect of the slewing gear brakes!**

Danger of collisions and crushing due to unintended slewing movements of the placing boom.

Observe the placing boom for changed stopping and braking behaviour.

Arrange for SCHWING's customer service to repair any damage immediately.

---

#### 4.14.8 Slewing gear maintenance for machines S31XT, S34X, S32X, S36X

During operation, pay attention to temperature, vibrations and unusual noises in the gear.



##### **Warning!**

**Serious personal injury or material damage can be caused by exposed gears!**

Parts of the body can be crushed or severed.

Do not open any locks or covers during operation!

After performing maintenance, replace the sealing discs and change the lubricating oil.

How to check the oil level:

#### 4.14.9 Routine maintenance provided by the operator for machines S31XT, S32X and S36X

##### 4.14.9.1 After the first 150 operating hours

- Check the magnetic locks on the gear for metal residue (1) (**Fig. 298**). In the event of large amounts of metal residue on the magnetic lock, contact Schwing's customer service
- Clean the surface of the gear and the vent openings
- Change the gear oil the first time, see Chapter (**4.14.9.4**)
- Check to make sure that all of the screws are tight and tighten them if necessary

##### 4.14.9.2 ¼ annually or every 500 operating hours

- Check the oil level on the lock (1) (**Fig. 302**)
- Check all of the seals for possible leaks
  - If any inexplicable leaks are discovered, report them to Schwing's customer service.
- Check to make sure that all of the screws are tight and tighten them if necessary

#### 4.14.9.3 Every 2000 operating hours or at least once per year

- Clean the surface of the gear and the vent openings
- Check to make sure that all of the screws are tight and tighten them if necessary
- Change the gear oil

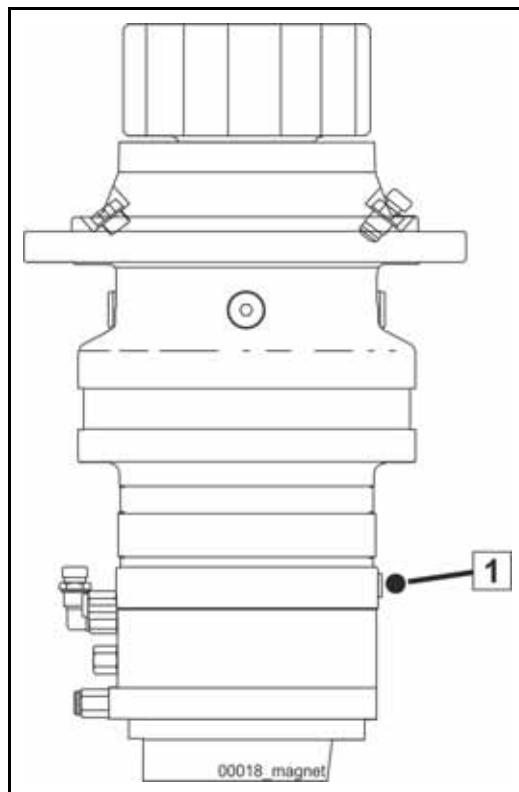


Fig. 298 Magnetic lock

#### 4.14.9.4 Changing the oil



#### Attention!

**Material damage on the gear due to incorrect oil viscosity.**

Never mix different types of oil and viscosity classes!

Synthetic oils must never be mixed with mineral oils!

It is recommended to change the gear oil while it is still warm. In other words, shortly after operation.



### Warning!

#### Attention, risk of scalding!

Surfaces of the slewing gear can be hot.

When changing the oil, pay attention to the oil temperature in order to avoid burns.

After each oil change, check the oil level the first time the gear is operated. Top up the oil if necessary.



### Information

Mixing old oil with other waste is prohibited by law.

Dispose of old oil properly in accordance with applicable legal requirements.

- Place the machine in a horizontal position

We recommend:

- Unfold the driver's cab to provide for better accessibility
- Have two people remove the cover to avoid possible damage
- Remove the slewing ring cover so that the toothed wheels are easily accessible (1) **(Fig. 299)**
- Place a sufficiently large receptacle under the oil drain to catch the old oil (2) **(Fig. 302)**
- Unscrew the lock of the side 90° elbow and clean it (1) **(Fig. 302)**
- Unscrew the filler plug using a suitable Allen wrench **(Fig. 300) + (Fig. 301)**
- Remove the oil drain screw (2) **(Fig. 302)** and details **(Fig. 303)** to drain the oil
- Let the oil drain completely (takes approx. 2 hours when oil is cold)
- Thoroughly clean the oil drain screw
- Replace the sealing rings on the screws
- Reattach the oil drain screw (2) **(Fig. 302)** and details **(Fig. 303)**
- Fill with new gear oil until it is visible on the upper edge of the side 90° elbow (approx. 2.6 litres)



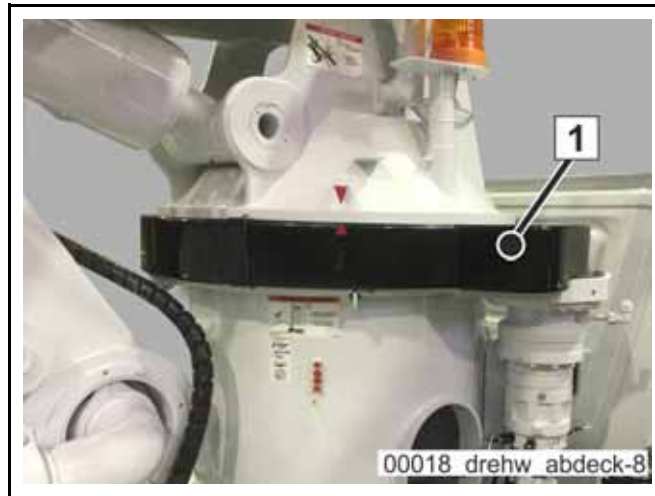


Fig. 299 Slewing ring cover



Fig. 300 Allen wrench



Fig. 301 Oil fill opening



### Attention!

#### Damage to the gear!

Keep the vent opens completely clean and easily accessible.

Blocked vent openings can affect the function of the slewing gear and cause damage to the gear.

---

#### 4.14.10 Attention - Long-term lubrication!

Slewing gears can be filled with a long-term polyglycol-based lubricant.

Observe the information on the gear type plate.

CLP = Mineral oil

PG = Polyglycol

Polyglycols must not be mixed with fluids of a different composition (loss of lubricating ability).

Only a lubricant in compliance with the information on the gear type plate may be used. Otherwise, the sealing elements risk being damaged.

When filling with the above long-term lubricant, we recommend taking a test sample every two years and changing the lubricant only in the case of a poor evaluation.

#### 4.14.11 Checking the gear fixing

Regularly check to make sure the screws are tight in accordance with the maintenance schedule (3) (**Fig. 302**).

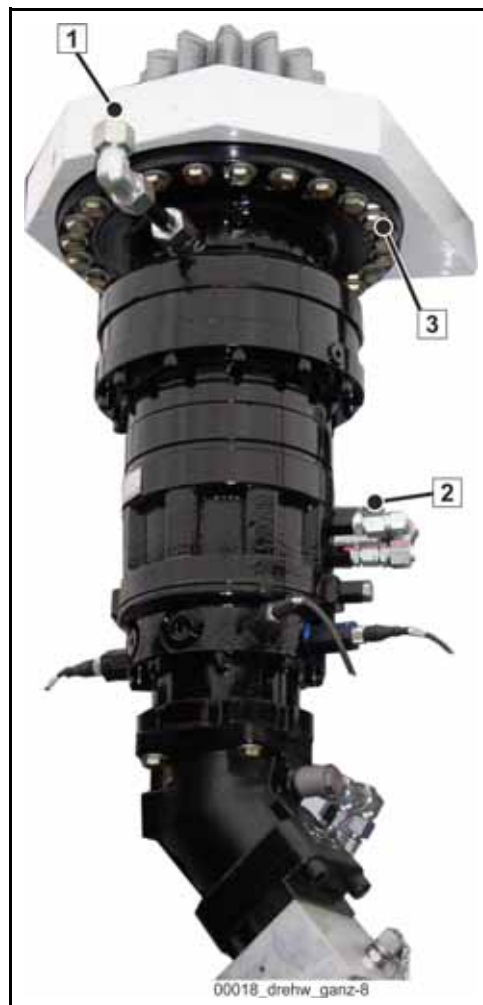


Fig. 302



Fig. 303

#### 4.14.12 Tothing play

The placing boom is rotated horizontally with the slewing gear.

A certain degree of “tothing play” must not be exceeded between the toothed wheel of the slewing gear and the toothed wheel of the placing boom.

You notice too much “tothing play” in the slewing movements of the placing boom after completing a rotation.

If the boom swings out farther than usual, contact Schwing’s customer service immediately.

In order to prevent this change of the tothing play, lubricate the tothing of the rotary connection according to the maintenance plan and pay attention to any potential abrasions of the toothed wheels.

**Warning!****Danger of being crushed if the placing boom swings out too far!**

Danger of collisions and crushing due to bigger slewing movements of the placing boom.

If, when ending a slewing movement, the placing boom makes unusual swivelling out movements, contact SCHWING customer service immediately for inspection purposes.

Arrange for SCHWING's customer service to repair any damage immediately.

---

#### 4.14.13 Slewing gear brakes

The slewing gear is equipped with two different brakes:

- The "multi-disc brake" keeps the boom still while the machine is out of operation.
- Hydraulic brake valves stop the placing boom from rotating while in operation.

As such, the boom is not stopped abruptly but is rather stopped or started up slowly.

#### 4.14.14 Malfunctions in the slewing gear brakes

Malfunctions in the slewing gear brakes can be detected as follows:

- The placing boom no longer remains in its last position (the placing boom "wanders")
- After completing a rotation, the braking distance of the placing boom is longer than normal

If a malfunction is detected in the slewing gear brake(s), contact SCHWING's customer service immediately for the purpose of an inspection and repairs.

**Warning!****Faulty or weakened effect of the slewing gear brakes!**

Danger of collisions and crushing due to unintended slewing movements of the placing boom.

Observe the placing boom for changed stopping and braking behaviour.

Arrange for SCHWING's customer service to repair any damage immediately.

---



## 4.15 Support drive for SX outrigger

This chapter only applies to machines with an SX outrigger.

The bow-shaped drawers of the SX outrigger are moved by a steel cable connected to a wire rope hoist motor (hydraulic motor).

From mid-2019, self-braking wire rope hoist motors will also be installed. For these motors, observe the special procedure for tensioning the rope **(4.15.2)** and the manual release of the brake in the event of hydraulic problems **(4.15.3)**.

The steel cable is self-lubricating. In order to achieve the necessary friction between the cable and rope pulley, no additional lubricants should be applied.

Observe the extension and retraction of the supporting stands during operation.

Adjust the tension of the cable if a supporting stand does not drive or only drives hesitantly (rope pulley slips).

This may be more common in newer cables than in older (worn or elongated) cables.

a) The cable should be taut on the outside of the drawer **(Fig. 304)**.

#### 4.15.1 Tensioning the steel cable (wire rope hoist motor without brake)

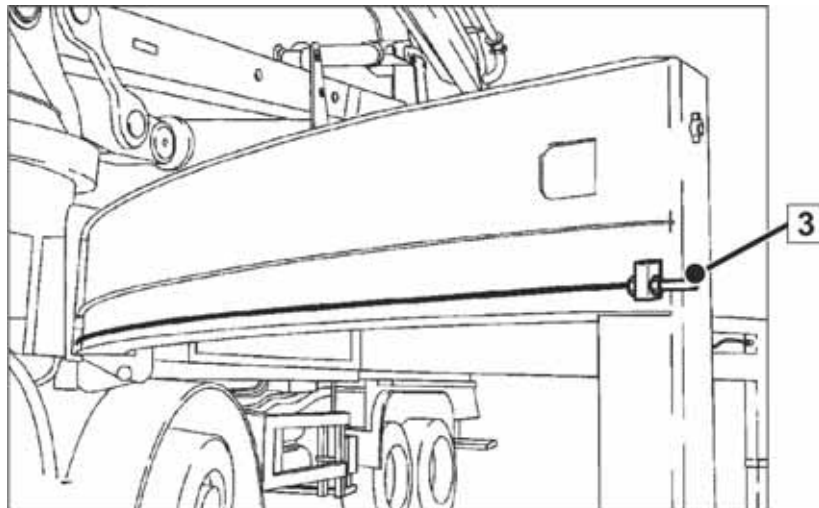
- Completely extend the bow outrigger
- Retract the bow outrigger halfway in order to move the rope into the neutral position
- Loosen the lock nut on the outrigger head (3) (**Fig. 304**)
- Tighten the adjustment nut (3) as follows:  
(for 8 mm ropes = 40-45 Nm,  
for 9 mm ropes = 45-50 Nm)
- Tighten the lock nut again
- Retract the outrigger
- Test the outrigger with a test run
- Repeat the procedure until the outrigger retracts correctly again

Applying the torque to one side of the rope is sufficient as the rope tension is distributed evenly onto both ends.



#### Information

Immediately replace damaged or overly stretched cables.



00019-SX-Abstützung-V01-außen

**Fig. 304 SX exterior (similar to illustration)**



#### 4.15.2 Tensioning the steel cable (wire rope hoist motor with brake)

- Loosen the locking screw (1) (**Fig. 305**) on the one-way restrictor
- Close the one-way restrictor (2) (**Fig. 306**)
- Completely extend the bow outrigger
- Retract the bow outrigger halfway in order to move the rope into the neutral position



##### Information

By extending the outrigger, the brake of the wire rope hoist motor remains released for approx. 30 min.

Due to internal leaks, the outrigger must be retracted again after 30 min., so that the brake of the wire rope hoist motor remains released and the steel cable can be adjusted.

- Loosen the lock nut on the outrigger head (3) (**Fig. 304**)
- Tighten the adjustment nut (3) as follows:  
(for 8 mm ropes = 40-45 Nm,  
for 9 mm ropes = 45-50 Nm)
- Tighten the lock nut again
- Release the one-way restrictor (2) (**Fig. 306**) (brake closes and releases again)
- Tighten the locking screw (1) (**Fig. 305**) on the one-way restrictor
- Retract the outrigger
- Test the outrigger with a test run
- Repeat the procedure until the outrigger retracts correctly again

Applying the torque to one side of the rope is sufficient as the rope tension is distributed evenly onto both ends.



##### Information

Immediately replace damaged or overly stretched cables.

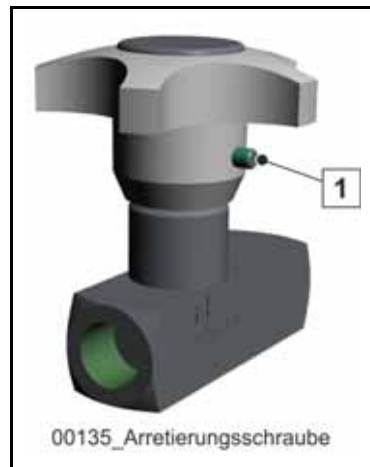


Fig. 305

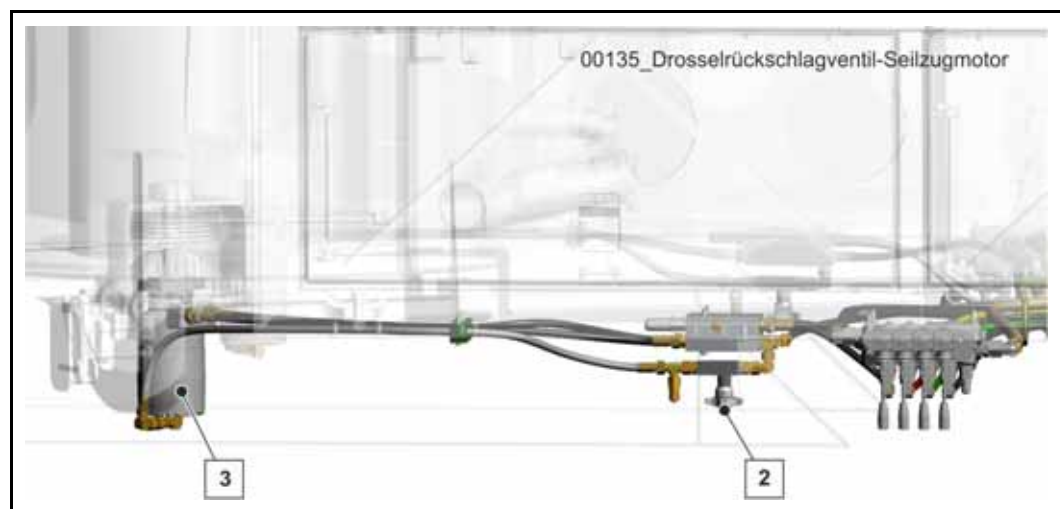


Fig. 306 Wire rope hoist motor (3) with one-way restrictor (2)

### 4.15.3 Manually loosen the brake of the wire rope hoist motor

The brake of the wire rope hoist motor is spring-centred. If there is a defect in the hydraulics, the brake will be applied automatically. The brake can be released manually. Perform the following steps to release the brake.

- Remove the blanking plugs from the openings (1) (**Fig. 308**) to manually release the brake.

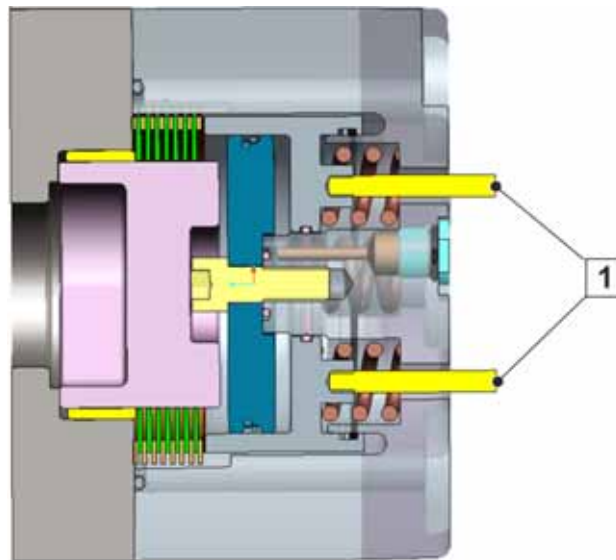


#### Information

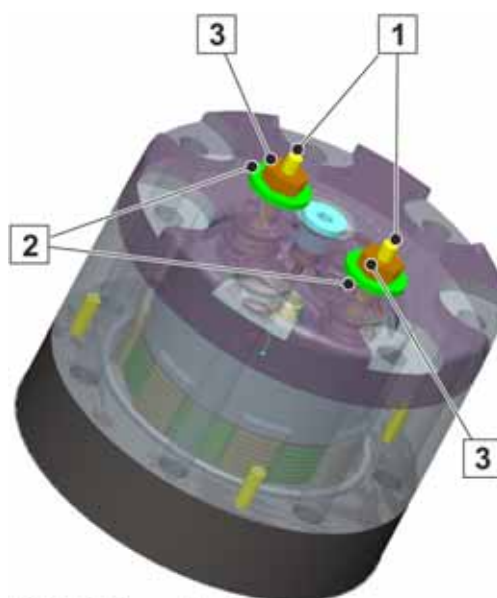
Hydraulic oil can leak from the openings of the wire rope hoist motor.

Put an oil drain pan under the wire rope hoist motor.

- Tightly screw screws 10-24 UNC 2B (1) (**Fig. 307**) from the tool set into the openings.
- Mount washers (2) and nuts (3) (**Fig. 308**) on the screws.
- Tighten the nuts one by one crosswise (no more than one turn respectively) to release the brake.
- Remove the screws again after troubleshooting!



00144\_Seilzugmotor\_1

**Fig. 307 Screw assembly (1) after releasing the brake**


00144\_Seilzugmotor\_2

**Fig. 308 Nuts (3) and washers (2) for releasing the brake**



## 4.16 Rock valve



### **Danger!**

#### **Risk of being crushed and sheared!**

To prevent unwanted working movements prior to working on the rock valve, always follow the points below!

- Switch off the drive motor and prevent it from starting up.
- Switch off concrete pump and agitator.
- Do not reach into the gate valve while the drive motor is running.
- Discharge the pressure accumulator, if applicable.

### 4.16.1 Lubricating the bearing points

Concrete pumps without central greasing have a central greasing strip, see examples (**Fig. 309:**) and (**Fig. 310:**).

The grease nipples on this strip are connected to the bearing points of the rock valve.

Bearing points include:

- Slewing shaft
- Slewing cylinder
- Agitator

Depending on the type of rock valve, the number of grease nipples can vary. Additional grease nipples are located on the greasing strip for the mixer bearing in truck mixer concrete pumps.

Lubricate all grease nipples daily on the greasing strip. Lubricate more frequently during continuous operation, at least every 8 hours:

Lubrication procedure:

- Clean the lubrication point.
- Remove the protection caps from the grease nipples.
- Press grease into each grease nipple until the old grease emerges from the bearing point.
- Wipe off old grease with cleaning rags. Dispose of grease and cleaning rags properly.
- Reattach the protection caps.

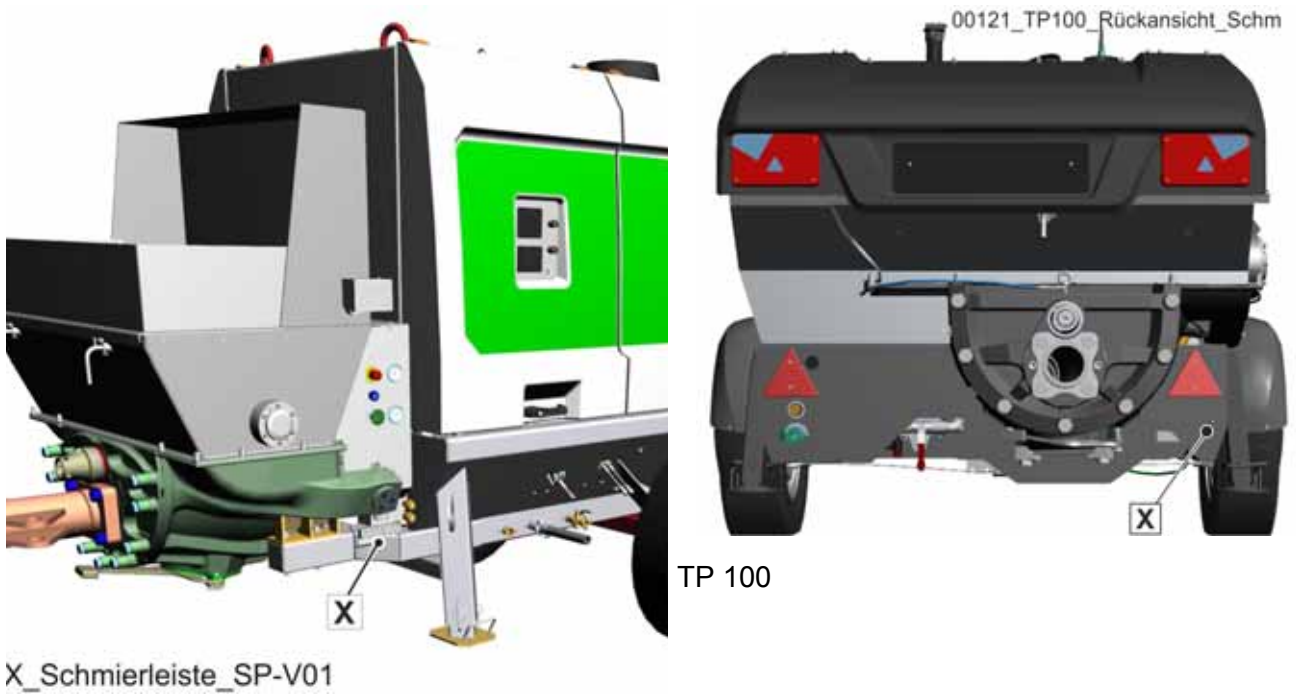


Fig. 309: Greasing strip on stationary concrete pumps / trailer pumps



Fig. 310: Greasing strip on truck-mounted concrete pumps

**Information**

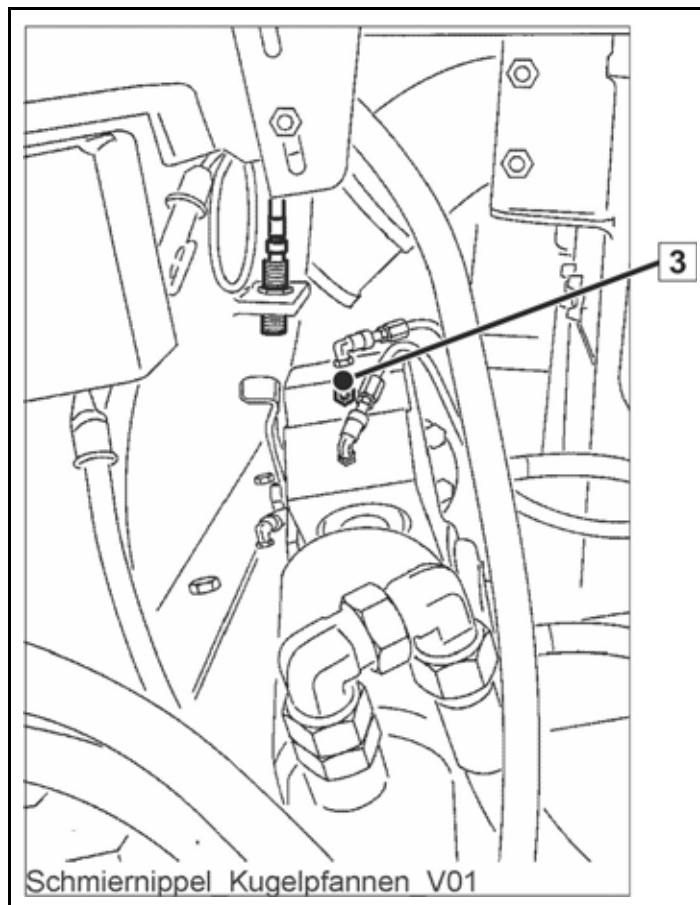
In various pumping units, the swivel head of the rock valve is powered by the mounted ball bearing of the hydraulic cylinder.

Cylinders with unilateral and bilateral ball bearings are allowed.

The appropriate lubrication points are connected to the lubrication point (or the central greasing) through the greasing lines.

The additional grease nipples, e.g. (1) (**Fig. 311**) do not have to be lubricated!

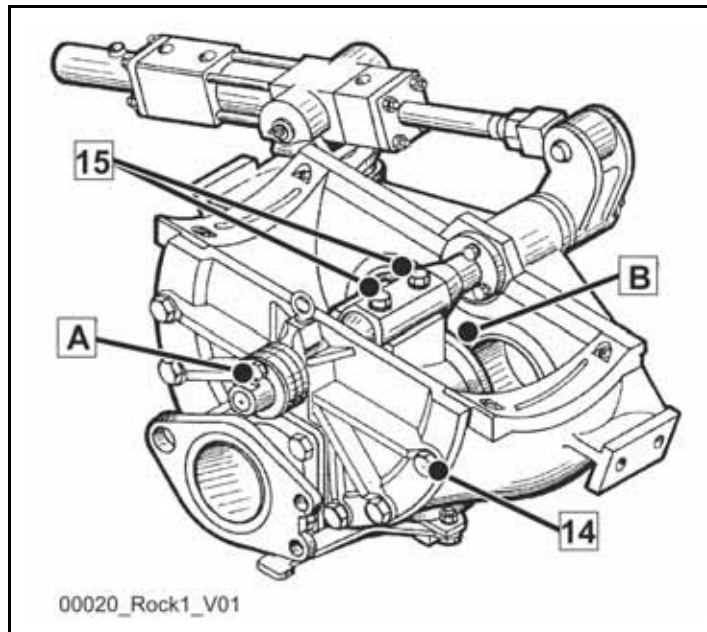
They are used to press out the ball socket during repair work.

**Fig. 311**

### 4.16.2 Checking the screw-type connections

Regularly make sure that the cover screws (14) and clamping screws on the swivel head (15) are tight, in accordance with the maintenance schedule (**Fig. 312**).

If necessary, tighten screws using a torque wrench in accordance with the torque table in the preface of the spare parts catalogue.



**Fig. 312 Example**

Caption ( <b>Fig. 312</b> )	
Pos.	Designation
A	See detailed view ( <b>Fig. 313</b> )
B	See detailed view ( <b>Fig. 314</b> )
14	Cover screws
15	Clamping screws

### 4.16.3 Checking the axial play of the slewing shaft

No air gap may be visible between the bearing bushing (4), the locking wheel (2) and the adjusting nut (1) (**Fig. 313**), even during operation.

There must be a measurable distance of distance of 1.5 to 3.0 mm between the swivel head (rock) (5) and housing lining (6) while the kidney seal (7) is in contact with the housing lining (6) (**Fig. 314**).

Metallic contact between the swivel head (rock) and housing lining is an indication of an error, for example:

- Kidney seal (7) defective.
- Adjusting nut (1) too tight.



- Cutting ring jammed.
- Too much grease was used during assembly or parts were not cleaned carefully.

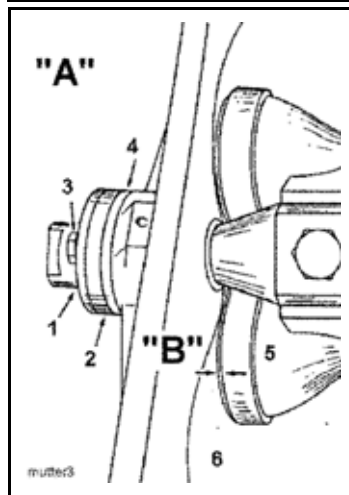


Fig. 313

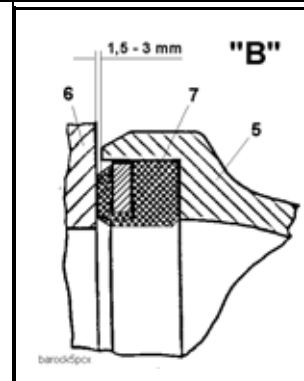


Fig. 314

Caption for (Fig. 313) and (Fig. 314)	
Pos.	Designation
1	Adjusting nut
2	Locking disc
3	Safety screw
4	Bearing bushing
5	Swivel head (rock)
6	Housing lining
7	Kidney seal

#### 4.16.4 Configuring the axial play of the slewing shaft

- Remove safety screw (3) (Fig. 313) together with disc.
- Set distance "B" = 1.5 to 3.0 mm using the adjusting nut (1).
- Align the bore in the collar of the adjusting nut with the nearest threaded bore in the locking disc (2) (rotate the nut forward or backward).
- Attach safety screw (3) with disc.

### 4.16.5 Checking the cutting ring

The cutting ring and wearing insert on the housing lining are worn unevenly due to external influences (e.g. varying types of concrete) and different stresses in sub-areas (area "B", (Fig. 312)).

Grooves are caused primarily by friction and breaking of stones.



#### Information

Grooves are irrelevant as long as the wearing insert is not fully worn.

A one-piece wearing insert (9) (Fig. 315) made of white cast iron is used as standard.

A two-piece wearing insert (9) (Fig. 316) made of white cast iron with an appropriate support plate is available as special equipment.

In order to achieve an even wear pattern and thus considerably longer service lives of the parts, we recommend:

- After a thorough cleaning, bring the rock into the left and right end position and check the condition of the cutting ring and wearing insert along the entire perimeter of the cutting ring in accordance with the maintenance schedule.
- If a visible gap has formed between the cutting ring (10) and the wearing insert (9) (max. allowed 1.0 - 1.5 mm), rotate the cutting ring 90°.

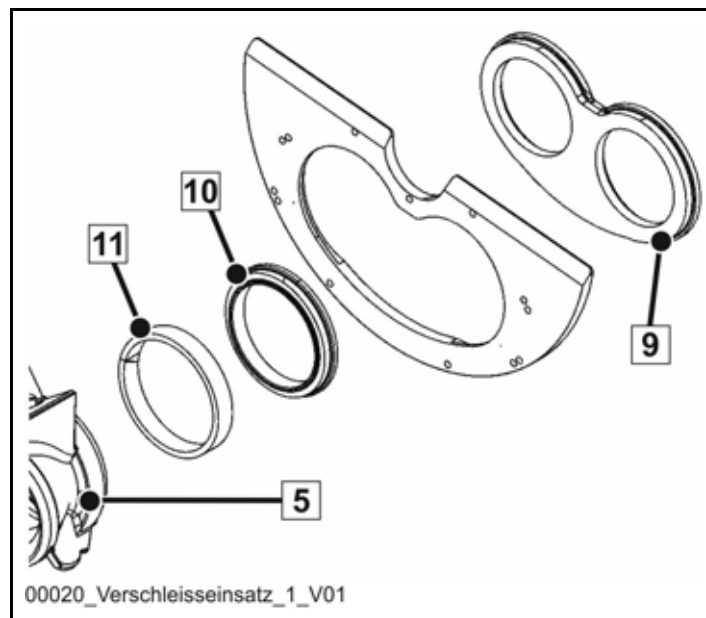


Fig. 315

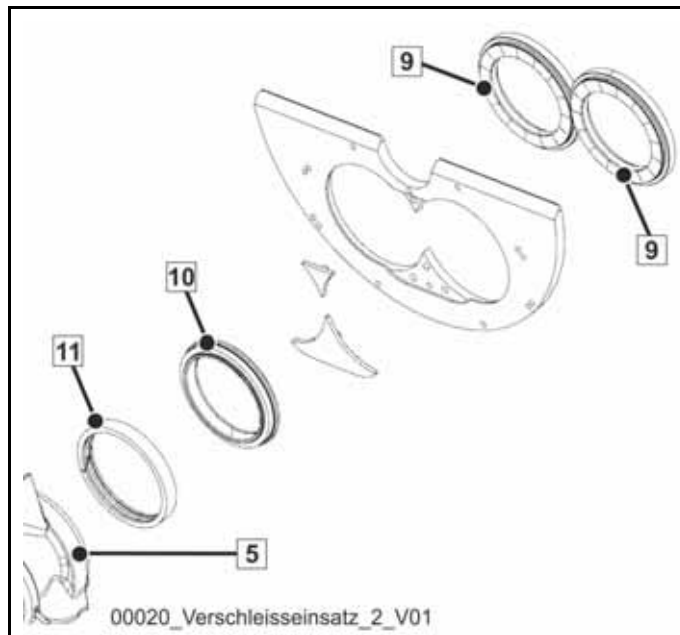


Fig. 316

#### 4.16.6 Rotating the cutting ring

In order to be able to rotate the cutting ring, proceed as follows:

- Disconnect the pumping line from the outlet of the rock valve. To do this:
  - a) Remove the tapered tube for stationary concrete pumps.
  - b) Remove the wedges (1+2) and the coupling (3) for truck-mounted concrete pumps.
- Swivel the outlet for the boom (4) to the side and secure with a wedge (1), (**Fig. 317**).

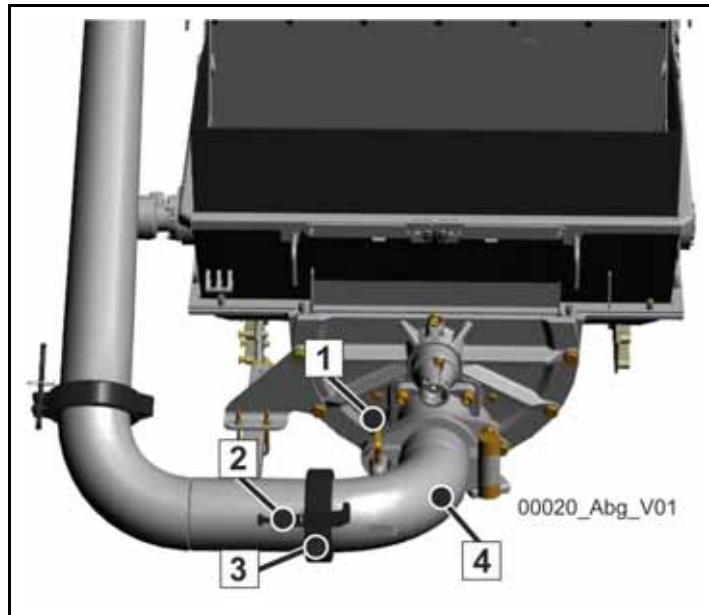


Fig. 317

- Loosen the adjusting nut (1) (**Fig. 318**) by two to three turns.
- Loosen the cover screws (14) evenly by approx. two to three turns to release the pressure spring in the cutting ring.



### Caution!

#### Danger of crushing and breakage!

If you were to remove the cover screws completely, the heavy steel cover would fall off.

This can cause personal injury and material damage!

Do not unscrew the cover screws completely!

- Press off the cover of the housing using two assembly levers until it hits the loosened screws; there are press-off points (arrow) (**Fig. 318**) located on the top cover for this purpose.
- Retract the swivel head (rock) until the cutting ring is released. If the cutting ring is not exposed yet, then loosen the cover screws some more and repeat the process.
- Loosen the cutting ring, if necessary, by tapping on it lightly.
- Rotate the cutting ring 90°.



### Information

Always rotate the cutting ring into the same direction!

- Make sure that the cutting ring is guided securely by the rock and cannot fall out or tilt.
- Also make sure that no stones etc. are trapped between the individual components when tightening the cover screws.
- Tighten the cover screws (14) evenly and carefully. Make sure that the cutting ring slides into the rock without tilting.
- Gradually tighten all cover screws (14) crosswise using a torque wrench. Observe the proper tightening torque for these screws.
- Set the axial play of the slewing shaft approximately in order to be able to switch through the rock valve for "setting" the parts. To do this, set the adjusting nut (1) into position and loosen it by a ½ turn.
- Dampen the kidney seal with water and switch through the rock valve several times in order for all parts to "set".



### Attention!

#### Risk of damage!

Do not switch through the rock valve when dry.

- Set the axial play of the slewing shaft as described in chapter (4.16.4).

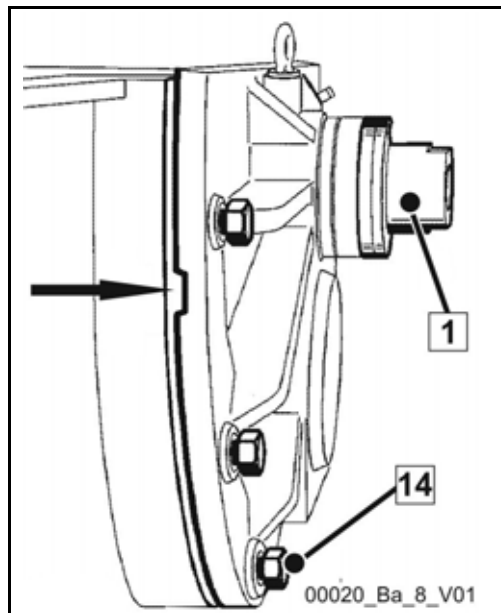


Fig. 318

- Check the distance between the cutting ring (10) and the swivel head (rock) (5) (Fig. 319) and (Fig. 320) after each rotation. If it is more than 8 mm, the cutting ring is no longer guided securely in the rock and must be replaced.
- When replacing the cutting ring, check the condition of the wearing insert (9) and pressure spring (11) (Fig. 320).

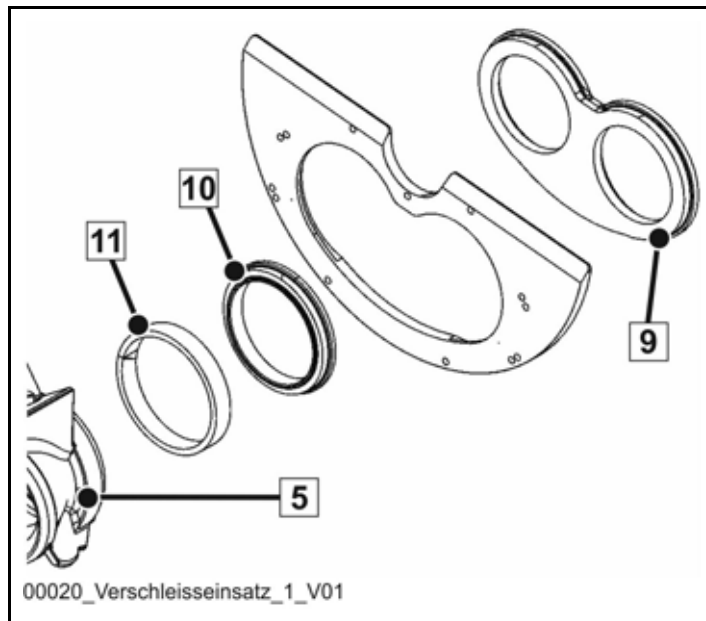


Fig. 319

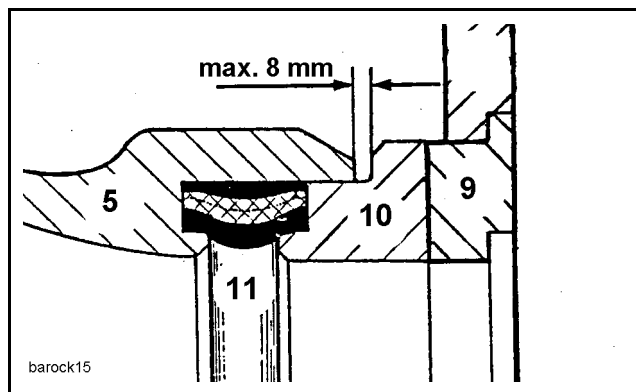


Fig. 320

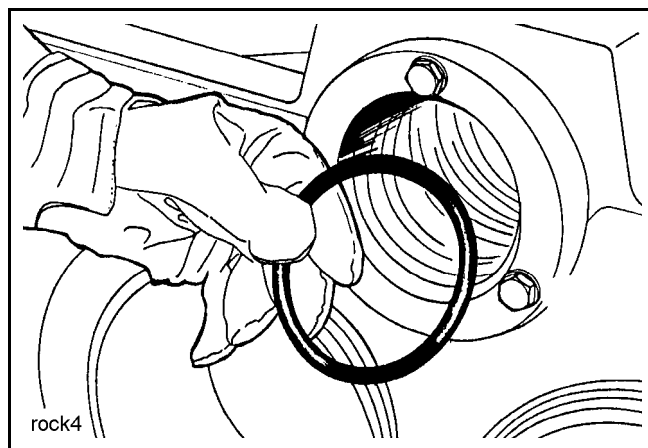


Fig. 321

#### 4.16.7 Checking the seal of the slewing shaft

The bearings of the slewing shaft are sealed against the medium being pumped with O-rings (**Fig. 321**).

In the event of leaks, replace the O-rings (super-fine concrete components penetrate outwards through the bearing) immediately before the bearing is destroyed.

To do this, the slewing shaft has to be removed, see separate rock valve repair manual.

#### 4.16.8 Prolonged downtime

Should the rock valve not be used for an extended period of time, we recommend lubricating the kidney seal and the housing lining with a lubricating and anti-corrosive agent of specification MIL 907D (e.g. ANTI-SEIZE by LOCTITE).

This agent prevents the seal from "caking".



#### **Attention!**

**Spray may affect rubber parts!**

Do not use a spray.

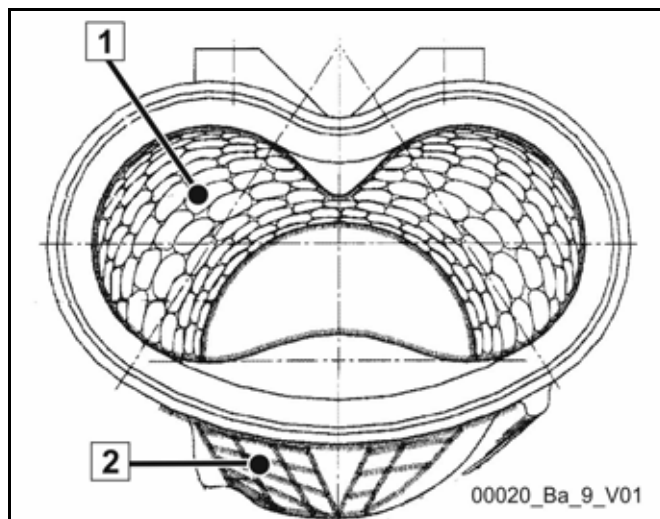
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#### 4.16.9 Checking the wear of the rock

Most of our swivel heads (rocks) are armoured on the outside and inside by means of welding to reduce wear.

The means of armouring depends on empirical values from the main fields of application for the individual swivel heads (rocks), see example (**Fig. 322**).

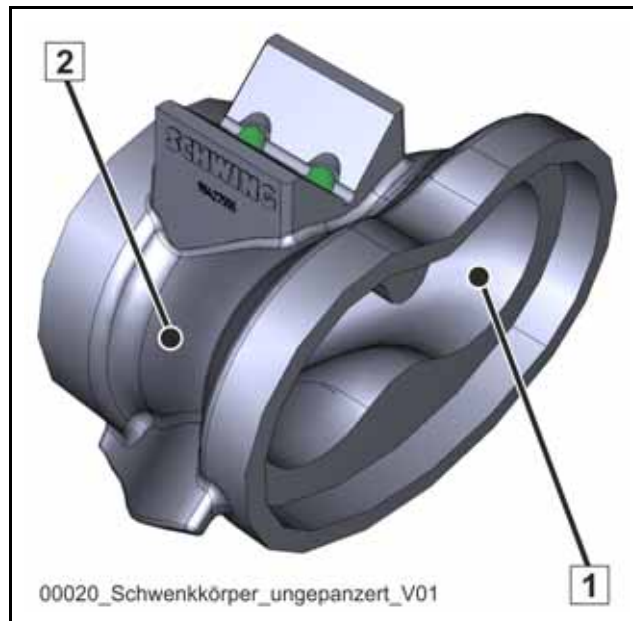
The swivel head of the RXS rock valve is installed in the TP 100 trailer pump, for example. This swivel head (**Fig. 323**) is not armoured.



**Fig. 322 Swivel head (rock), armoured**

Caption ( <b>Fig. 322</b> )	
Pos.	Designation
1	Inner armour
2	outer armour





**Fig. 323 Swivel head (rock), unarmoured**

Caption (Fig. 323)	
Pos.	Designation
1	Inner walls
2	Outer walls

#### 4.16.10 Preventive maintenance of armoured swivel head (rock)

Since the wear largely depends on the operating conditions, we recommend checking a new, armoured swivel head (rock) for the first time after pumping approx. 5000 m<sup>3</sup> of concrete:

- To do so, clean the concrete pump as per usual.
- Move the armoured swivel head (rock) into an end position.



### Danger!

#### **Danger of crushing and injury caused by switching rock valve!**

Switch off the drive motor and empty the pressure accumulator (if available) to prevent the swivel head (rock) from moving on its own.

- Loosen the outlet and inspect the inside of the armoured swivel head (rock) with a torch.
- Move the armoured swivel head (rock) into the other end position and repeat the inspection.

Further inspection intervals can now be determined depending on the condition.

The armoured swivel head (rock) must be replaced if the basic material "shows through" at certain points.

The inner armouring usually wears faster than the outer armouring.

The exterior should be checked as soon as significant wear is detected on the inside.



#### **Information**

A regeneration by means of renewed hard facing is no longer possible for the materials currently used!

We strongly advise against unqualified welding and the use of replicas.

SCHWING is not liable for damages caused by improper repair attempts or replicas.

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## 4.17 Pumping and differential cylinders, pumping piston change



- Make sure the fastening screws on the differential and pumping cylinders are tight.
- Tighten any loose fastening screws crosswise in three steps using a torque wrench (**Fig. 324**).

The necessary tightening torques can be found in the preface of the spare part catalogue.

### 4.17.1 Pumping piston change

The machine is equipped with a special control for the pumping piston change.



- Flip the selector switch (3) (**Fig. 325**) to the "Pumping piston change" position.



#### Information

The control monitors the positions of the EMERGENCY STOP buttons and selector switch of the active control.

Display (1) (**Fig. 325**) contains a relevant note (see "**VECTOR control system**" on page 125).



When the system is ready, this symbol flashes in the display.



- Enable the control with the button (4) (**Fig. 325**).



A short acoustic signal confirms the start, and the display indicates this symbol.

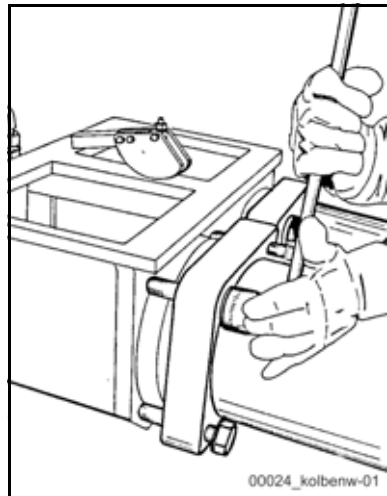


Fig. 324

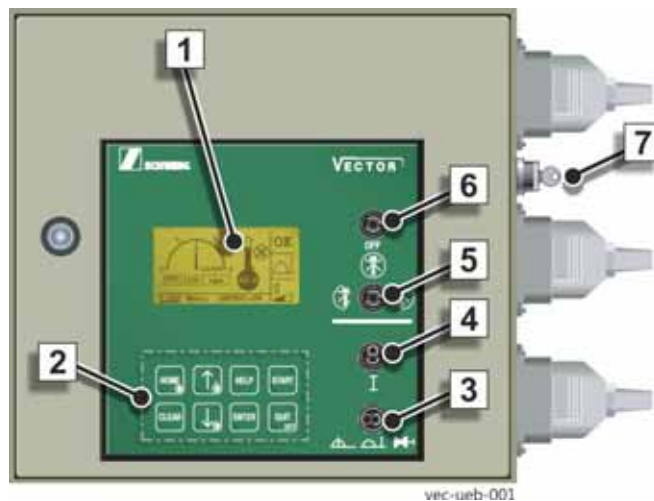


Fig. 325

Activating the "Pumping piston change" operating mode automatically reduces the rotational speed of the drive motor to the minimum working speed while activating the minimum movement speed of the pumping pistons.

The control of the concrete pump and diesel engine is transferred to the "Pumping piston change" control station (Fig. 326).

The "Pumping piston change" control station is located on the rear boom support / cross member.

Selector buttons "1" + "2" can control the following functions:

1- Motor on/off

2- Drive pumping piston forward/backward in jog mode\*.

\* after actuating selector button "2", the pumping pistons start in the selected direction and stop after releasing the button.

If the "EMERGENCY STOP" is pressed while the special control is active, the control must be restarted. (see "VECTOR control system" on page 125).

**Danger!****Rock can switch!**

Before working in the water box, always switch off drive motor and release pressure accumulator in order to prevent unwanted working movements of the concrete pump.

Proceed to a safe location when driving the concrete pump with open water box.

Do not reach into the water box!

No other work must be carried out on the concrete pump while working on the pumping piston.

Make sure that no-one comes near the sliding system.

In the event of danger, actuate the EMERGENCY-STOP button.

#### 4.17.2 Checking the fastener

- Lift off the top cover of the water box and remove the protective grill.
- Move an intermediate piece into the water box.
- Drain the water.
- Make sure the fastening screws are tight (**Fig. 327**).
- Move the second intermediate piece into the water box and repeat the check.

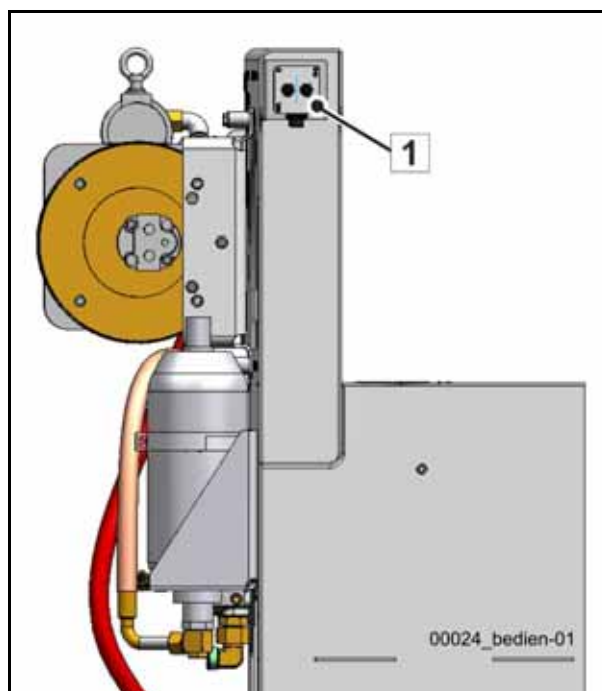


Fig. 326 "Pumping piston change" control station

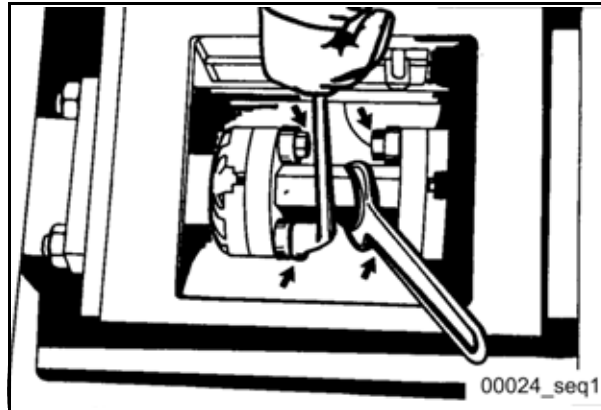


Fig. 327 Piston change

### 4.17.3 Changing the pumping piston



#### Attention!

##### **Material damage caused by leaking pistons.**

If sand is in the water box, the pumping pistons are worn and need to be replaced.

Leaking pistons cause premature wear of the pumping cylinder.

However, should sand get into the water box despite new piston, then the cylinders must also be replaced.

---



#### Caution!

##### **High weight!**

Depending on the size, a pumping piston weighs over 25 kg.

Use tools for installing and removing (e.g. a belt), and have another person help you.

Instruct the assistant. Only switch on the motor again when the assistant has left the machine.

---

#### 4.17.3.1 Removal

- Close the ball valve (1) (**Fig. 328**) from the concrete pump control block. Closing the ball valve prevents the piston rods from switching into their end positions.
- Remove the cover from the water box.
- Drain the water.
- Move the piston to just in front of the rear end position. The distance piece (**Fig. 329**) must be fully visible in the water box.

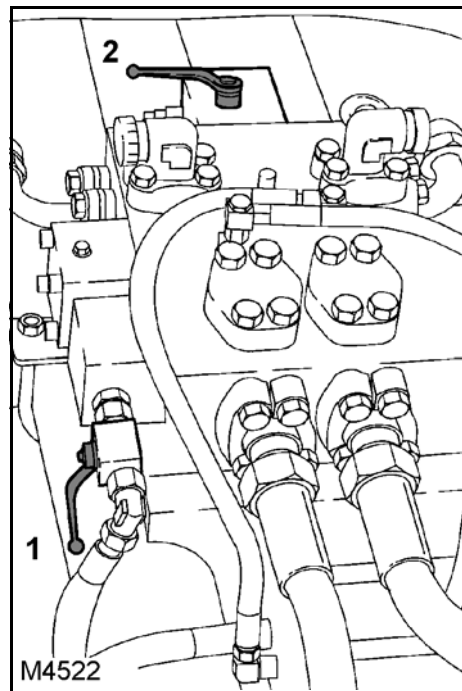


Fig. 328

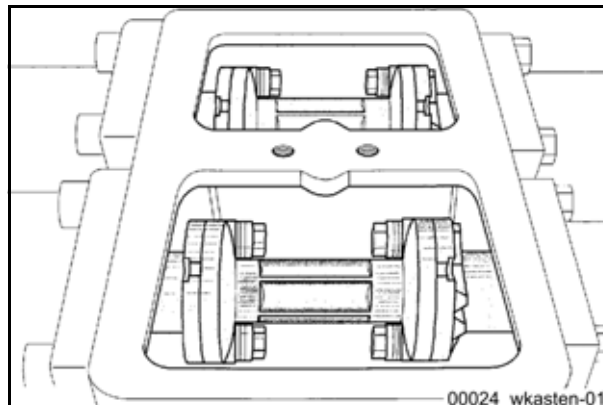


Fig. 329

- Loosen the fastening screws on the distance piece and remove them. While doing so, hold the distance piece on the continuous hexagon (Fig. 330).
- Move the piston rod into the rear end position.
- Remove the distance piece (Fig. 331).
- Slowly move the piston rod onto the pumping piston.
- Connect the piston rod flange (1) to the pumping piston flange (2) using a screw and nut as shown in (Fig. 332) / (Fig. 333).



### Information

(Fig. 333) depicts the “Multi-piece” variant.





- Tighten the screws by hand.
- Slowly retract the piston rod.
- Pull the piston out of the cylinder (**Fig. 333**).
- Loosen the screw connection.
- Remove the pumping piston from the water box.
- Clean and check all parts.

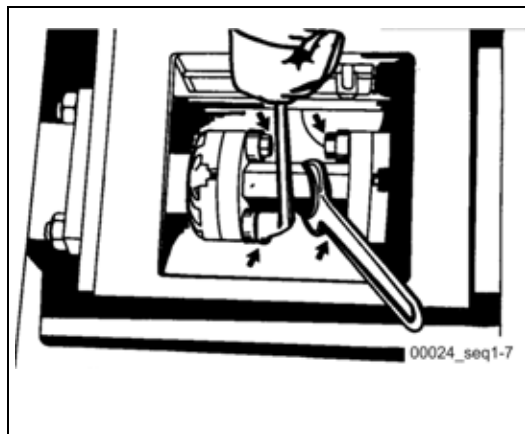


Fig. 330

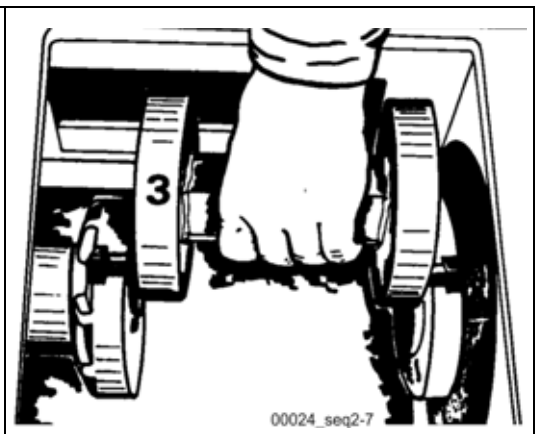


Fig. 331

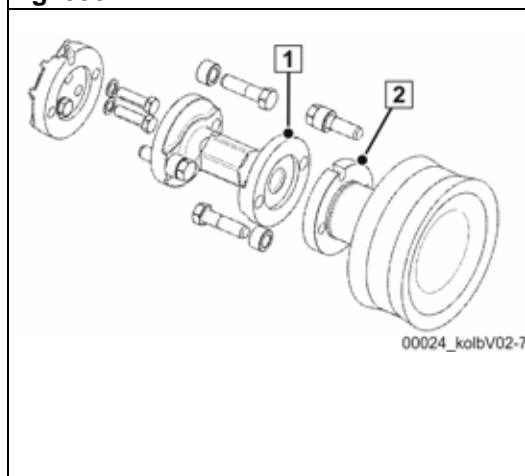


Fig. 332

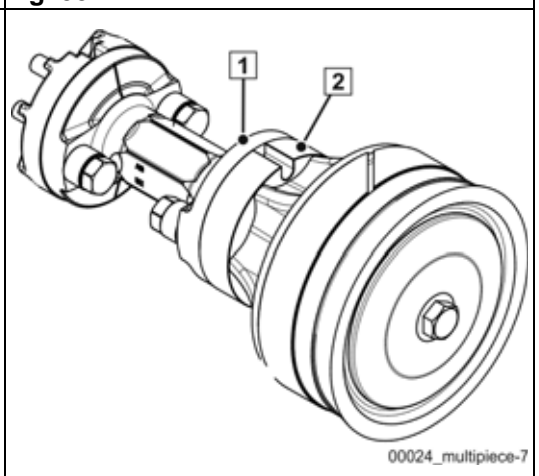


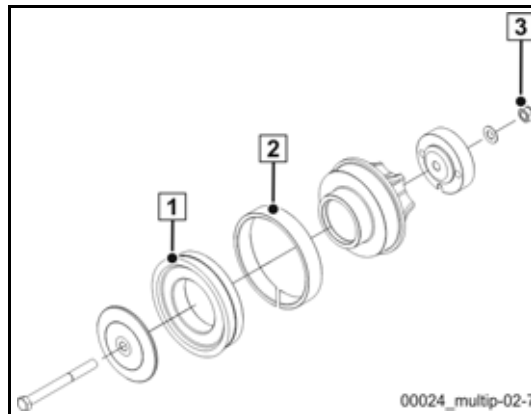
Fig. 333 Multi-piece

### 4.17.3.2 Wear parts for “multi-piece” piston

In the event of wear, only the following multi-piece piston parts (**Fig. 334**) have to be replaced:

Sleeve (1) / guide ring (2) / nut (3).

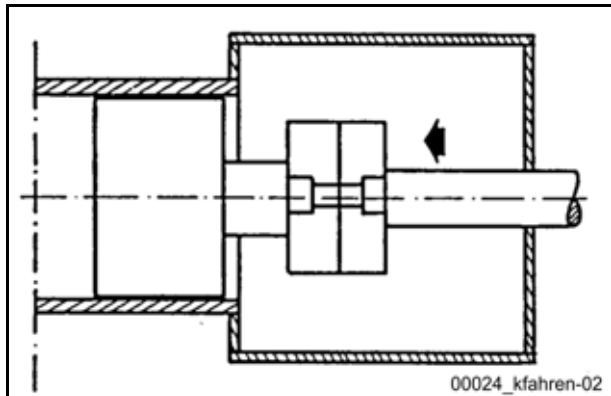
Please refer to your machine’s spare part catalogue for the item numbers required to place the order.



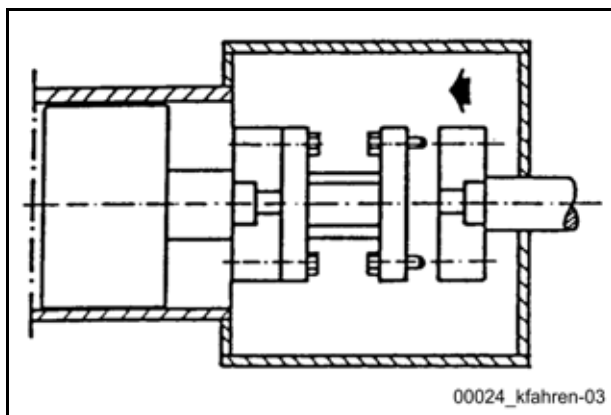
**Fig. 334 Multi-piece piston**

### 4.17.3.3 Installation

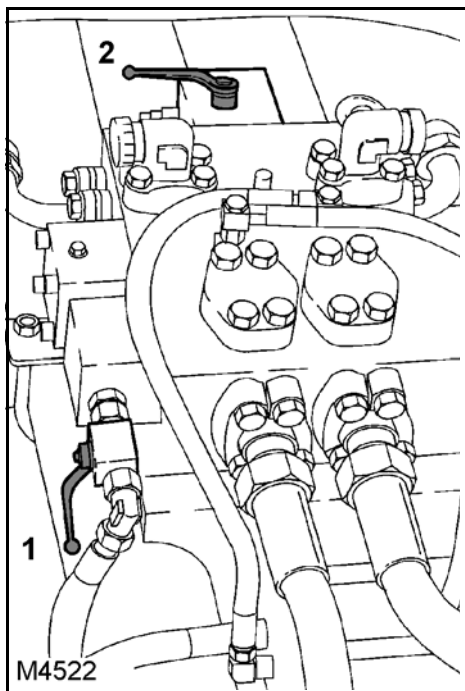
- Apply a thick layer of grease to the new piston and cylinder wall.
- Attach the new pistons to the piston rod flange using a screw and nut.
- Move the pumping piston into the cylinder far enough that the screw connection can still be loosened (**Fig. 335**).
- Remove the screw connection.
- Retract the piston rod.
- Insert the distance piece and screw it onto the pumping piston (**Fig. 336**).
- Slowly move the piston rod onto the distance piece.
- If necessary, align the distance piece and screw it onto the piston rod.
- Add water.
- Attach the protective grill and the top cover of the water box.
- Open the ball valve (1) (**Fig. 337**) on the concrete pump control block.



**Fig. 335** Retract pumping piston



**Fig. 336** Insert distance piece



**Fig. 337** Concrete pump control block



## 4.18 Boom column - pivot bearing

### 4.18.1 Lubricate base and collar bearings, sliding pieces on the rotary drive



#### Warning!

#### Danger of crushing!

To better distribute the lubricant:

- Lubricate the parts while the boom is rotating slowly, or
- Slew the boom after lubricating the parts and repeat the process.

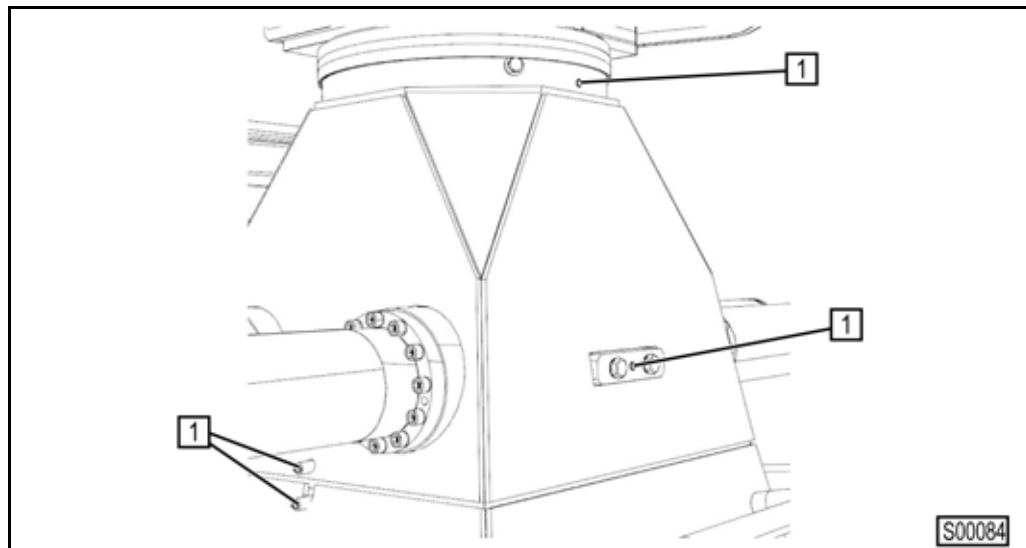


Fig. 338 Grease nipples on boom column

The respective grease nipples are located on the outside of the boom column (**Fig. 338**).

It is especially important to lubricate the base and collar bearings designed as sliding bearings on a regular basis.

SCHWING recommends a special lubricating grease for severe applications.

In order to prevent outside forces from acting on the bearings, place the boom in a vertical position during the lubrication process.



## 4.19 Servicing the pumping line

This chapter describes how to service the pumping line on various SCHWING products. The principle remains the same in each case.



### **Danger!**

#### **Risk of explosion due to ruptured tubes!**

Pumping lines are wear parts.

If the minimum wall strength is not met, then there is a great risk of tube breakage.

Check the pumping line regularly using a suitable wall-thickness measuring device.

If the minimum wall thickness is not met, then replace the tubes and elbows.

---

Under extreme conditions, daily checks may be necessary.

SCHWING's customer service can recommend suitable measurement devices depending on the pumping line material being used.

The minimum permissible wall thickness depends on the maximum possible pumping pressure of the concrete pump.

During operation, the operator must monitor the pumping line for leaks (water escaping). Leakages lead to blockages due to the concrete "bleeding" out. Stop operation immediately and remedy leakage.



### **Warning!**

**If fluid leaks from the walls of a pipe or formed part, there is a great risk of accidents due to pipe breakage.**

Stop operation immediately and release pumping line by means of back-siphonage!



### **Attention!**

**Tapping with a hammer is not recommended, because:**

- Any resulting dents can lead to accelerated wear.
- It can damage the hardened layer of highly wear-resistant tubes



### Information

Depending on the installation situation, the wear and tear on the pumping lines can vary greatly.

Check the elbows and reductions under highest strain especially carefully.

Experience has shown that the concrete pump outlet as well as the “impact elbows” on the last section of the boom (see “**Impact bend**” on page 498) wear more quickly than the rest of the pumping line.



### Caution!

#### **Injury caused by the cocking lever springing open!**

When mounting split couplings, injuries can be caused by the cocking lever springing open unexpectedly.

Injuries such as bone fractures to concussions are possible.

Secure the cocking lever of the split coupling immediately after closing the cocking lever by using the “safety for split couplings”.

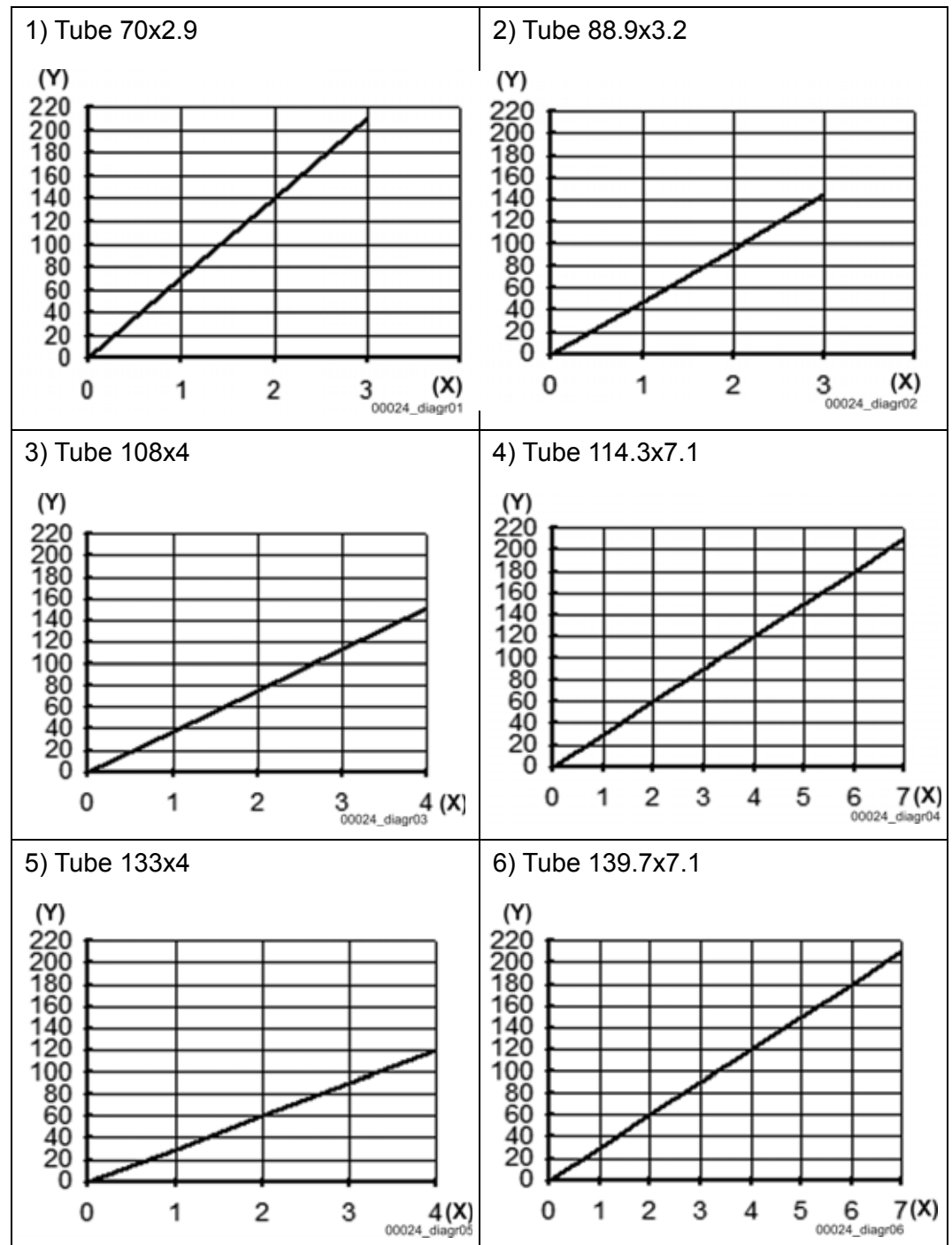


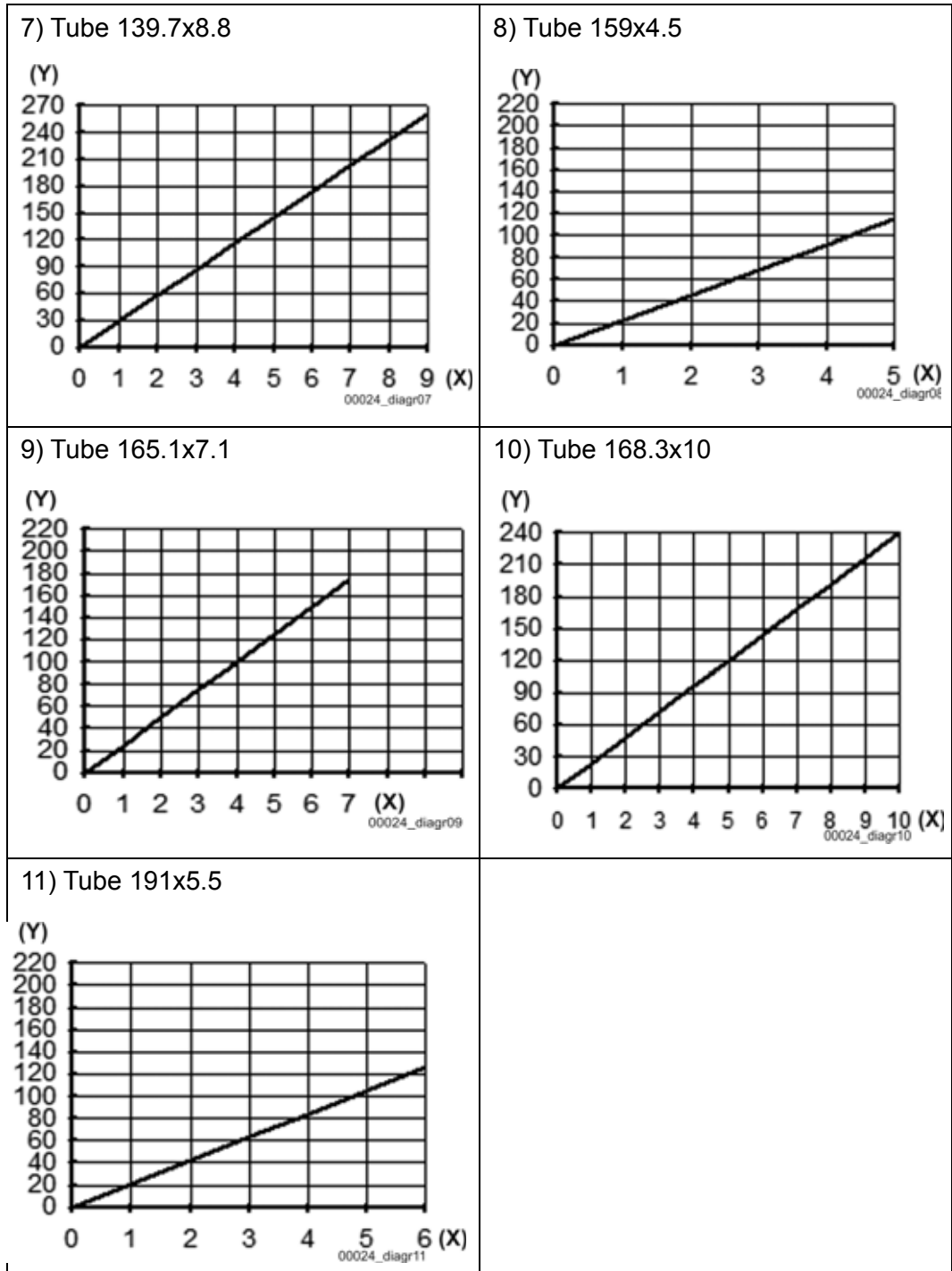
### 4.19.1 Diagrams

For determining the required minimum wall strengths of concrete pumping lines from P 355 (with prescribed, twofold safety):

(Y) = Pumping pressure PN in bar

(X) = Minimum wall strength in mm



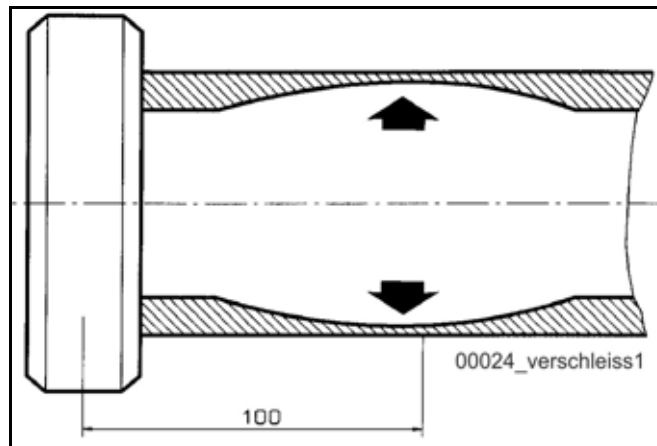


### 4.19.2 Main wear zones

(pay particular attention during inspections)

Pumping pipes

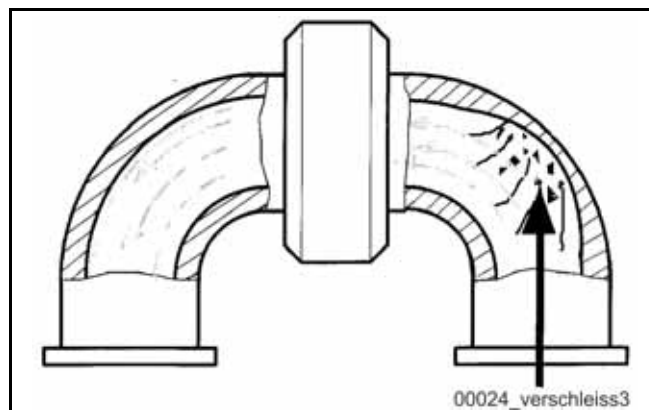
The main wear zone is located in the direction of the flowing concrete approx. 100 mm behind the flange (**Fig. 339**).



**Fig. 339**

Elbows

The main wear zone is located in the direction of the flowing concrete in the "inlet bend" (**Fig. 340**).



**Fig. 340**

Two-layer materials

Two-layer materials must be replaced, at the latest, when the inner hardened layer has worn through to the outer layer in places (**Fig. 341**).

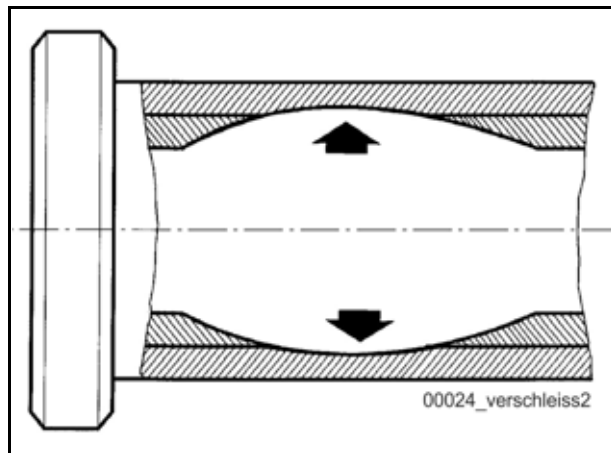


Fig. 341

### 4.19.3 Impact bend

The impact bend (1) (**Fig. 342**) is the penultimate bend in the boom pumping line. The concrete frequently falls into this elbow and the impacting material causes so-called impact wear.

Impact wear can be largely avoided if the last boom section is positioned horizontally during the pumping process (**Fig. 343**).

Position "1" + "2" = limited impact wear

Position "3" = high impact wear

Measurement points:

Wear measurement is only possible via a regular optical inspection, as the main wear points vary greatly between concrete pumps. Empirical values can be extended individually by the indicated measurement, if necessary (**Fig. 344**).

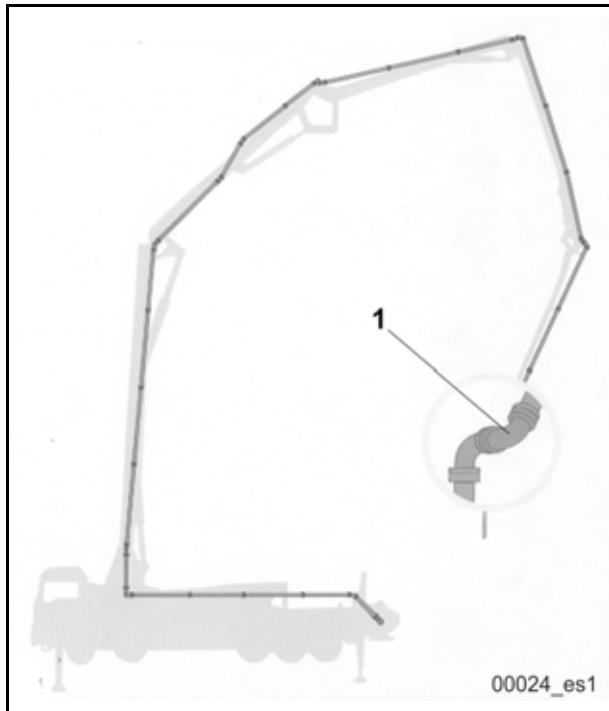


Fig. 342

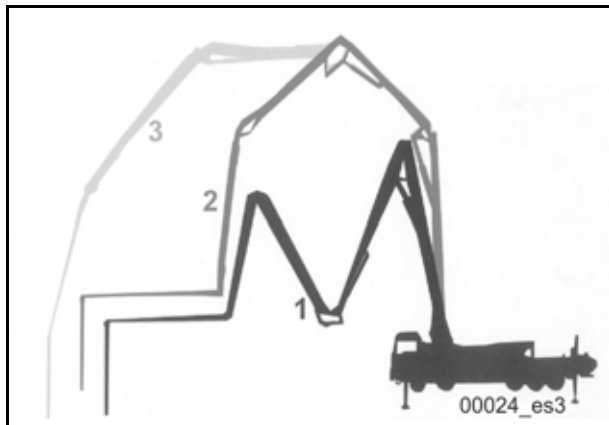


Fig. 343

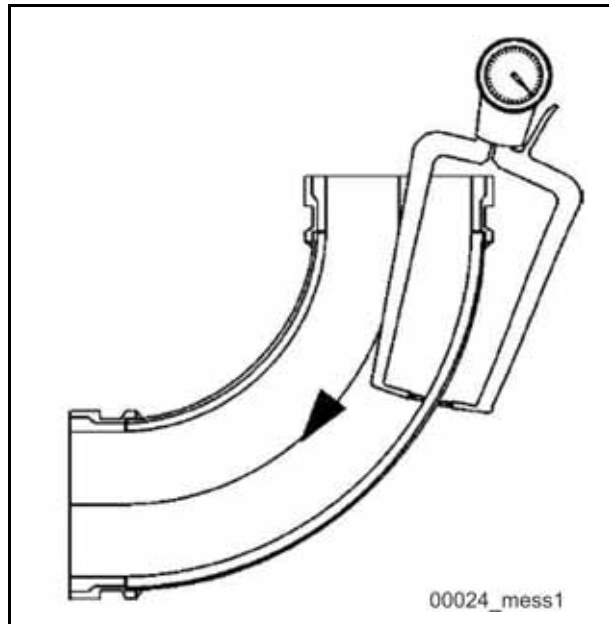


Fig. 344

#### 4.19.4 Measuring the wall thickness

(Excerpts from Sales Booklet Esser ES4045)

The wall thickness of pumping pipes can be measured using a commercial calliper ((**Fig. 345**) company Kroeplin GmbH). Observe the operating instructions from the manufacturer of the measuring device.

Double-walled pumping pipes cannot be measured using ultrasound.

Procedure:

##### 1. Type specification of the pipeline component

Determine which type is available in which quality.

The measurement sheet is selected based on the type. Should you have questions or be missing measurement sheets, please contact SCHWING's customer service.

##### 2. Specification of the installation situation

The respective installation situation is specified on the measurement sheet, according to the installation present.

##### 3. Taking the measurement

Depending on the prescribed measurement methods, the respective minimum wall strengths must be specified.

##### 4. Comparison of indicator values

The measured minimum wall strengths must now be compared with the indicator values taken from the relevant measurement sheets.



### 5. Decision on further use

If one of the measured values has been reached, then at this critical point the pumping pipe has a remaining wall thickness of 0.5 mm and should be replaced as soon as possible.

#### Summary

1. Type specification
2. Installation situation
3. Measurement
4. Comparison
5. Decision



**Fig. 345**

Wall-thickness sensor C3R30 supplied by Kroeplin GmbH

## 4.19.5 Measuring points for various installation situations

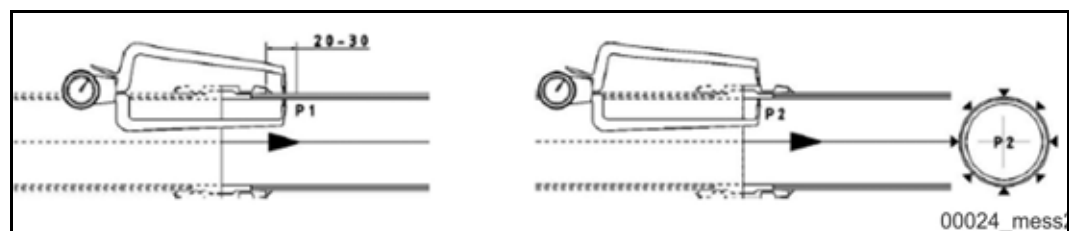
### 4.19.5.1 Tube after tube

Measurement points:

(P1) approx. 20-30 mm behind the welding seam of the inlet flange

(P2) measurement on the shoulder of the inlet flange around the entire circumference.

Set the measuring tip as far on the end of the shoulder as possible, in the direction of the groove.



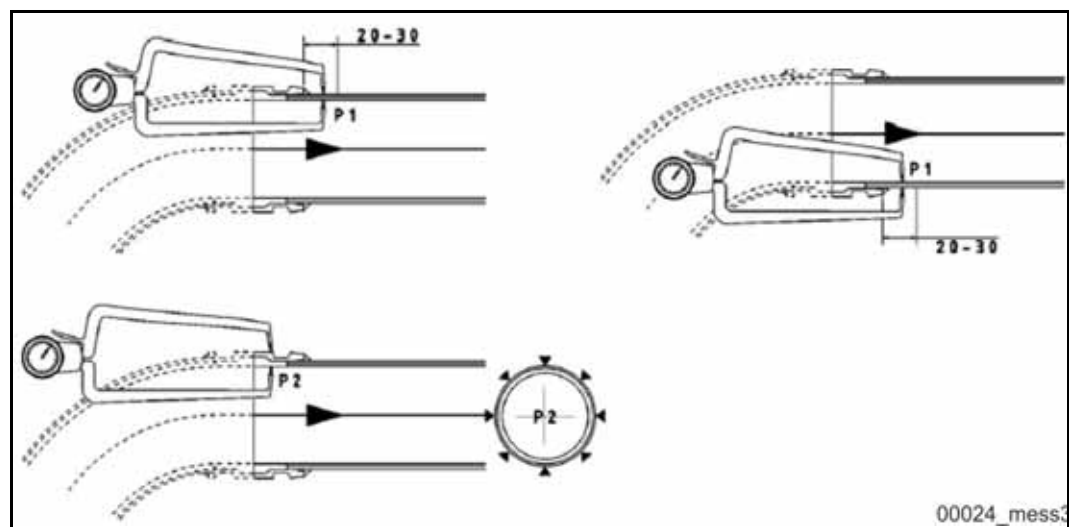
### 4.19.5.2 Tube after elbow

Measurement points:

(P1) approx. 20-30 mm behind the welding seam of the inlet flange in extension of the elbow inner radius and elbow outer radius.

(P2) measurement on the shoulder of the inlet flange around the entire circumference.


Set the measuring tip as far on the end of the shoulder as possible, in the direction of the groove.






#### 4.19.6 Measurement sheet - tubes

(As of 31/10/2012, excerpt from Esser Sales Booklet EM120029 \_ EM130023 DE 141208):

 Removal of the pipe component must be done on reaching a measurement point (P1 or P2) at the latest!				
Type: SUPER 2000 TUBES (ESSER TWIN PIPE 700 TUBES)				
Nominal size DN [mm]	Quality type	Wall thickness [mm]	P1 [mm]	P2 [mm]
100	700	4.0 (2.0+2.0)	2.7	10.2
100	700	7.7 (4.5+3.2)	3.8	10.2
125	700	4.0 (2.0+2.0)	2.7	8.3
125	700	4.5 (2.5+2.0)	2.7	8.3
125	700	8.6 (5.6+3.0)	4.0	8.3

 Removal of the pipe component must be done on reaching a measurement point (P1 or P2) at the latest!				
Type: SUPER 3000 TUBES (ESSER TWIN CAST 900 TUBES)				
Nominal size DN [mm]	Quality type	Wall thickness [mm]	P1 [mm]	P2 [mm]
112	900	2.0+2.0	2.9	15.6
125	900	2.0+2.0	2.9	9.6
125	900	3.0+1.5	2.4	8.8
125	900	5.6+3.0	4.1	8.8

##### 4.19.6.1 Tubes without leg extension

For all elbows of 10° to 90° with standard connection, but without leg extension

Measurement points:

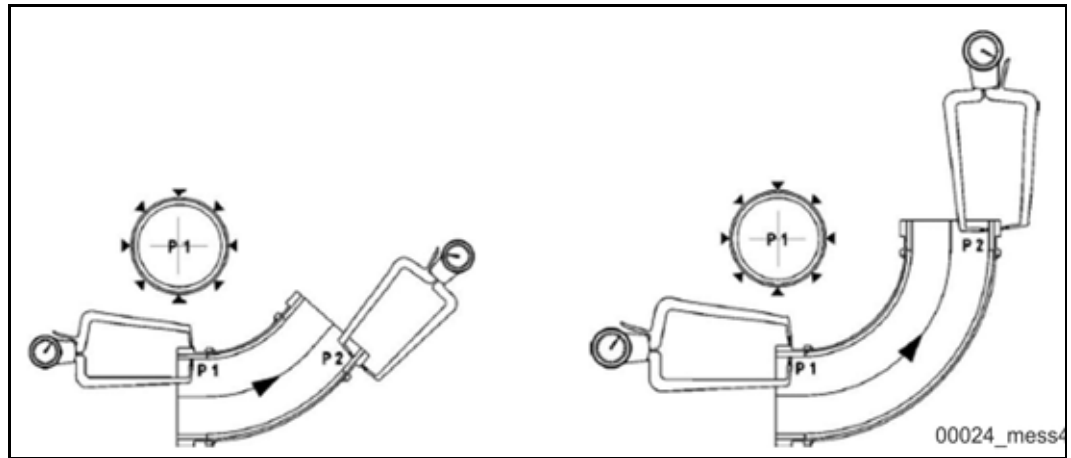
(P1) measurement on the shoulder of the installation flange around the entire circumference.

Set the measuring tip as far on the end of the shoulder as possible, in the direction of the groove.

(P2) measurement on the shoulder of the outlet flange in extension of the elbow outer radius.


Set the measuring tip as far on the end of the shoulder as possible, in the direction of the groove.

#### 4.19 Servicing the pumping line



#### 4.19.7 Measurement sheet - elbows

(As of 31.10.2012, excerpt from the Esser Sales Booklet ES4045):

		Removal of the pipe component must be done on reaching a measurement point (P1 or P2) at the latest!		
Type: SUPER 2000 ELBOWS (ESSER TWIN PIPE 700 ELBOWS)				
Nominal size DN [mm]	Quality type	Wall thickness [mm]	P1 [mm]	P2 [mm]
100	700	8.2 (5.0+3.2)	10.0	10.0
125	700	10.6 (7.0+3.6) 11.0 (7.0+4.0)	8.0	8.0

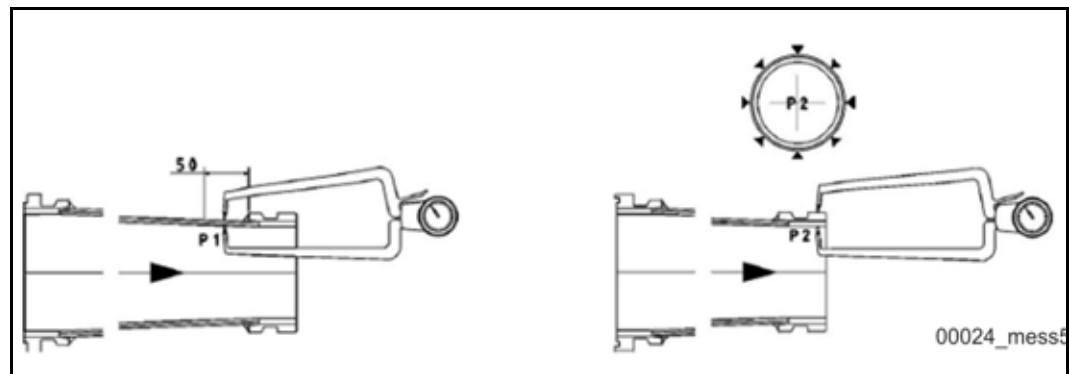
### 4.19.8 Tube type - tapered tubes

Measurement points:

(P1) measurement in the 50 mm area in front of the outlet flange welding seam.


(P2) measurement on the shoulder of the outlet flange around the entire circumference.

Set the measuring tip as far on the end of the shoulder as possible, in the direction of the groove.



#### 4.19.8.1 Measurement sheet - tapered tubes

(As of 31.10.2012, excerpt from the Esser Sales Booklet ES4045):

		Removal of the pipe component must be done on reaching a measurement point (P1 or P2) at the latest!			
Type: SUPER 2000 TAPERED TUBES (ESSER TWIN PIPE 700 TAPERED TUBES)					
DN inlet [mm]	DN outlet [mm]	Quality type	Wall thickness [mm]	P1 [mm]	P2 [mm]
125	100	700	8.0 (4.0+4.0)	4.9	10.3
150	125	700	8.0 (4.0+4.0)	4.9	8.7

#### 4.19.9 Extending the service life



##### Information

Does not apply to directional tubes and elbows!

Directional tubes and elbows may only be installed in the pumping direction. For this purpose, directional arrows are located on the material.

The service lives of conventional (non-directional) tubes and elbows can be extended if the parts are rotated regularly.

- Turn pumping pipes and elbows  $180^\circ$  from the inlet side to the outlet side after 50 % of their expected service life (Fig. 346 ).

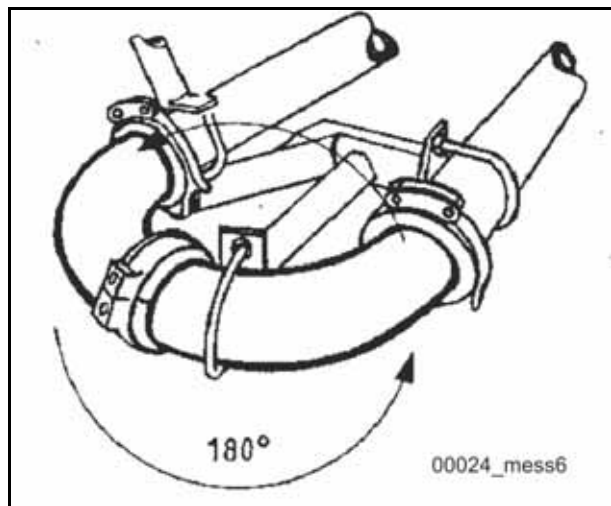


Fig. 346

#### 4.19.10 Replacing pumping pipes end elbows



##### Information

Directional tubes and elbows may only be installed in the pumping direction. For this purpose, directional arrows are located on the material.

- Pay attention to the quality and correct size of spare parts.

Only original SCHWING spare parts correspond exactly to the factory-installed parts.

- During the initial assembly at the factory, the boom pumping line is assembled without tension on a folded placing boom.

Incorrect assembly can lead to an increased load on the placing boom kinematics and damage such as broken line holders.

In order to avoid damage, likewise always exchange individual parts on a folded placing boom.

The length of the pipe installed in the pumping line outlet is specified on a sign on the machine (**Fig. 347**).

When pumping line parts are replaced later on, a different pipe length may be required in some cases. For this reason, always give the required length when ordering.



##### Warning!

##### **Pumping pipes and elbows can be very heavy!**

A 3 m long pumping pipe DN 125 of Super 2000 quality weighs, for example, approx. 45 kg.

Attach tubes and elbows to lifting gear before removing them.

- Use new seals and fuses for the couplings.
- Clean and check the couplings carefully.
- Lubricate the couplings and seals with a rubber-compatible lubricant, e.g. "Optimol Olit CLS".

"Optimol Olit CLS" is a water-resistant, high-performance grease with a lithium/calcium base.

**Information**

While being assembled at the factory, the pumping lines are fitted with special web seals. As such, the required precision is achieved when first assembling the pumping line. The centres of rotation for the pumping lines, however, are fitted with simple seals without web. When replacing worn pumping line parts later on, the seals with a web can be replaced with simple seals at all tube connection points.

If you would like to replace multiple parts of the pumping line, replace those parts individually and sequentially.

Do not disassemble the entire pumping line. In this case, the centres of rotation would have to be determined again when installing the new line.

This work should only be carried out by specially trained persons using special equipment.

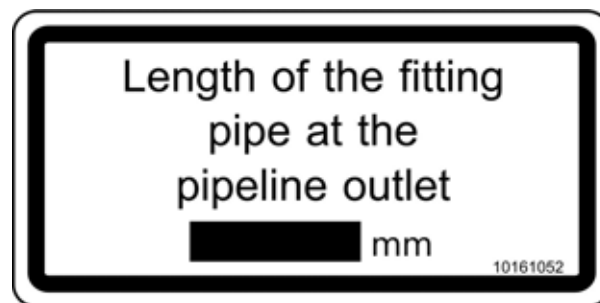


Fig. 347

#### 4.19.11 Testing the pumping hoses

Due to natural ageing, rubber hoses may be 6 years old at most (including a storage time of 2 years).

They must be replaced every 6 years from the date of manufacture, even if they appear "alright" on the surface.

For end hoses and connecting hoses, a daily, external visual inspection is prescribed.

Loose pumping hoses must be tested before every use.

As wear strongly depends on the operating conditions (concrete, pressure, delivery rate, etc.), then the inner side of all new hoses should be tested for the first time after pumping approx. 1000 m<sup>3</sup> of concrete:

Plan further tests on the basis of the test results.

#### 4.19.12 Visual inspection (exterior)

- Check the safety catch on one of the placing boom end hoses to make sure it is in proper working order.
- The outlet end of an end hose must not be "frayed".
- Check all pumping hoses for dents, kinks or other deformations that might indicate displaced or destroyed armour hose casing (steel cord insert).
- Check the outer skin for cuts, ruptures or abrasions that could imply damage to the armour hose casing.

Hoses with a damaged casing must be replaced!

#### 4.19.13 Visual inspection (internal)

- Lay the cleaned hose out horizontally and use a pocket torch.
- Pay attention to points at which the armour casing is exposed or protrudes.
- Also pay attention to areas with loose rubber coating, dents, cuts and local wear zones.
- Check the main wear zones on the inlet side of the hose in particular. The heaviest wear is located on the first 30 cm of the rubber coating (behind the fixing).

Hoses with damaged armour casing or excessive wear must be replaced!

#### 4.19.14 Visual inspection of fixings

- Make sure the fixings are tight.

The hose and fixing must be firmly connected together.

- Check the inner sides of the fixings for wear.
- Check the sealing surfaces for damage and clean any concrete residue off of them.

Hoses with damaged or loose fixings (hose creeps out of the fixing) must be replaced!



#### Information

Take extra care to check end hoses equipped with a non-return valve.

Due to the greater load, check end hoses with a non-return valve (**Fig. 348**) especially carefully in the pressure area of the non-return valve.



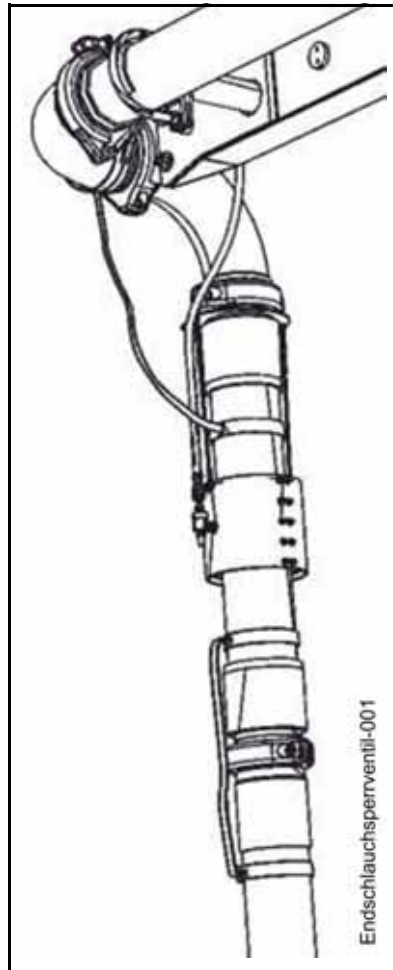


Fig. 348



## 4.20 Rotary compressor

### 4.20.1 Maintenance packages

SCHWING provides two different packages with material for servicing your compressor:

#### 4.20.1.1 Maintenance package 1

(Standard maintenance) art. no.: 10197336

This package contains all filters, seals and a reservoir with compressor oil for the maintenance work described below.

The oil quantity is sufficient for an oil change and possible refill between changes.

#### 4.20.1.2 Maintenance package 2

(Oil separator cartridge) art. no.: 10170388

This package contains an oil separator cartridge and all of the seals necessary for replacing it.



#### Information

In order to ensure safe and smooth operation, please only use the material mentioned above.

SCHWING is not liable for any damages caused by improperly performed maintenance and/or unsuitable material.

\* = Special equipment



#### Information

Read these instructions before starting with the work.

Do not use flammable substances and naked flames during cleaning work and maintenance.

### 4.20.2 Checking the oil level

- Check oil level when drive is at a standstill and compressor is depressurised (pressure gauge at "0").
- Place vehicle on level ground.
- The sight glass **(4)** can be used to check the oil level (**Fig. 349**).

The oil level must exceed the upper edge of the sight glass.

The oil level should reach about the centre of the sight glass with a running compressor.

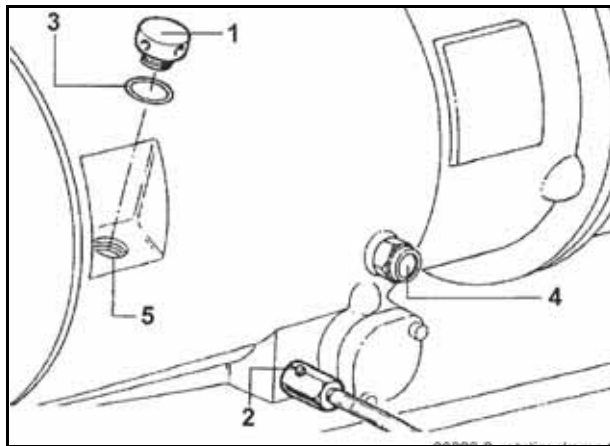


Fig. 349 Maintenance openings on compressor



#### Caution!

#### Attention, risk of burns!

The surface of the compressor can be very hot!

Contact with the skin can cause burns.

When working on and with the compressor, always wear appropriate protective clothing.

### 4.20.3 Topping up the oil

- Top up oil when drive is at a standstill and compressor is depressurised (pressure gauge at "0").
- Carefully open the filler plug **(1)** (**Fig. 349**) to equalise the pressure.
- Make sure that no oil foam emerges from the opening **(5)**.
- Wait a few minutes, if necessary, until the oil foam has reduced.
- Only use the same oil for refill as is in the compressor.



#### Attention!

#### Material damage caused by the wrong compressor oil.

Using the wrong oils or mixtures of various oil types can cause severe material damage to the compressor.

Always use the recommended oil and do not mix compressor oils of different brands and viscosities.

- 
- Refill the oil until it overflows over the opening **(5)**.
  - Replace the sealing ring **(3)** and attach the filler plug **(1)**.

### 4.20.4 Changing the oil

Drain the oil at operating temperature for it to drain properly.

- First loosen the filler plug **(1)** as described above.
- Open the drain cock **(2)**.
- Close the drain cock after emptying it completely.
- Fill in new oil, as described above.
- Let the compressor run for a few minutes, then check the oil level and check for leaks. Add more oil, if necessary.

**Information**

New compressors are filled with a run-in oil. That oil must be changed during the first oil change with a compressor oil recommended by the compressor manufacturer.

Using the correct oil is imperative for the safe function of the compressor.

Only use the Rotor Oil 8000 F2 included in maintenance package 1.

Rotor Oil 8000 F 2 is a synthetic all-season oil suitable for an ambient temperature of -25 to 40 °C.

It may not, under any circumstances, be mixed with other oils.

**4.20.5 Cleaning / Replacing the air filter**

- Loosen the knurled nuts **(1)** (**Fig. 350**).
- Remove the sealing ring **(2)** and filter cover **(3)**.
- Pull out the filter insert **(4)**.
- Clean all parts with compressed air (max. 5 bar).
- Blow out the filter insert from the inside out using upward and downward movements until dust no longer emerges.
- After multiple cleanings, replace the filter insert in accordance with the maintenance schedule (see “**Maintenance schedule**” on page 405).
- Install filter in reverse order.

#### 4.20.6 Cleaning the oil cooler

- Clean the cooling fins of the oil cooler with a compressed air gun (**Fig. 351**).  
A dirty cooler causes the oil to heat up more and can result in outages due to overheating. If oil is too hot, it ages faster and loses its lubrication properties. This increases the wear on the compressor.
- Blow the compressed air opposite the normal flow direction of the cooling air.

#### 4.20.7 Replacing compressed air hoses

Compressed air hoses must be replaced after 3 years at the latest.

The production information is engraved on the hoses.

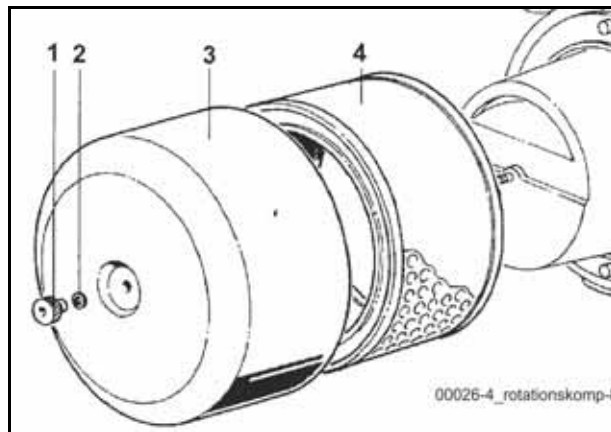


Fig. 350 Air filter



Fig. 351 Air compressor

#### 4.20.8 Replacing the oil filter

- Drain the old oil as described above.
- Loosen the screws **(1)** on the filter cover **(2)** (**Fig. 353**).
- Rotate the top cover 90° and remove the cover together with the filter.
- Remove the filter **(3)** from the top cover.
- Clean the top cover and seating surfaces of the housing.



#### Warning!

#### Do not use flammable cleaning agents!

No traces of cleaning agent may get into the compressor.

---

- Attach a new filter to the top cover.
- Attach the top cover with a new sealing ring **(4)**.
- Top up the compressor oil as described above.

#### 4.20.9 Replacing oil return valves

- Loosen the hollow screws **(1)** (**Fig. 352**).
- Pay attention to the sealing rings **(3)**.
- Unscrew the return valves **(4)** from the separator housing.
- Install new valves with new O-rings **(5)**.
- Attach the screw connections **(2)** with new sealing rings **(3)**.



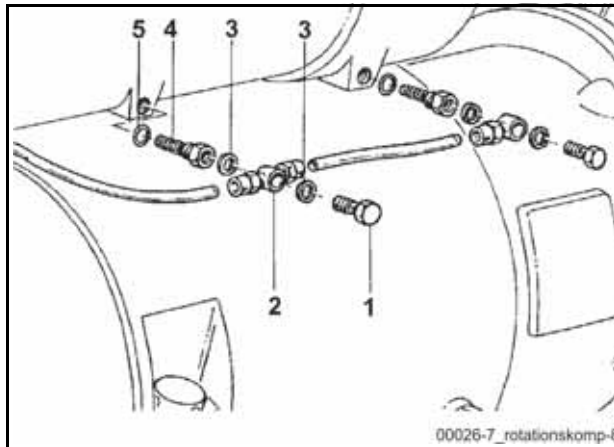


Fig. 352 Oil return valves

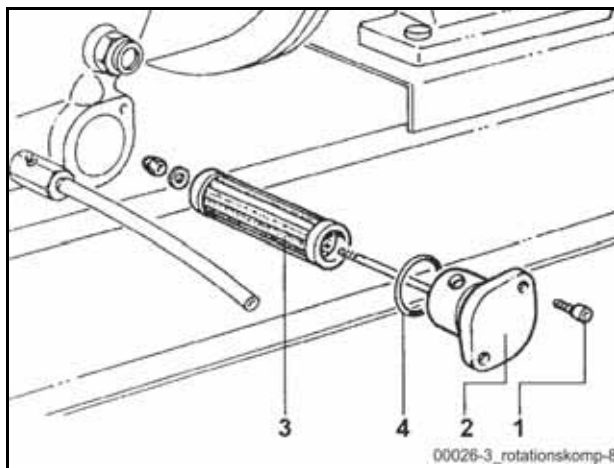


Fig. 353 Oil filter

## 4.20.10 Replacing the oil separator cartridge

### 4.20.10.1 Removing the oil separator cartridge

- Disconnect the plug for the solenoid valve (1) on the separator housing (2) (Fig. 354) and loosen the air hose (3).
- Loosen the oil return valve (4) as described above.
- Remove the compressed air tube (5) from the separator housing.
- Remove the radial groove nut (6).



#### Information

Pay attention to the mounting mark on the connection tube (7).

Mark position, if necessary.

The connection tube must be remounted later in exactly the same position.

- Loosen the connection tube and lift the separator housing (2) out of the oil chamber.
- Remove the connection tube (7) from the separator housing.
- Lever the cover of the housing (8) with the oil separator cartridge (12) carefully out of the housing.
- Loosen the nuts (9) and remove the sealing disc (10) and top cover (11).
- Remove the old oil separator cartridge (12) together with O-rings (13).

#### 4.20.10.2 Installing the oil separator cartridge

- Install the parts in reverse order.
- Always use a new oil separator cartridge and new seals (10, 13, 14, 15, 16).
- Press the O-rings (13) with some grease into the seat pan of the oil separator cartridge.
- Make sure that:
  1. The separator cover (8) is mounted in the indicated position (arrow)
  2. The connection tube (7) is mounted according to its marking

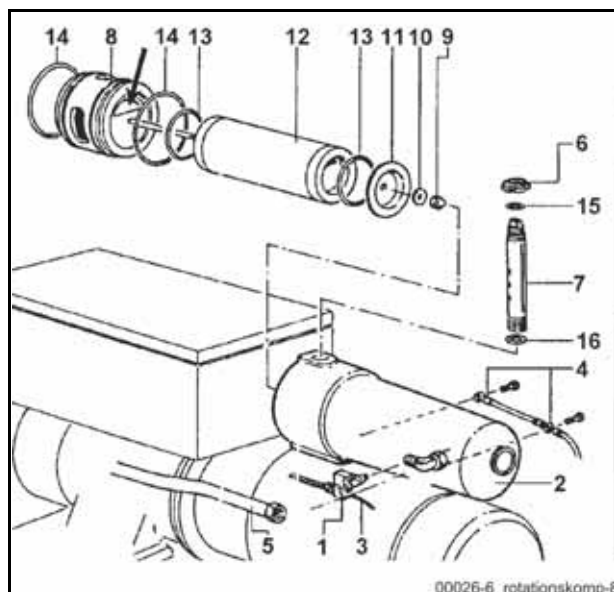


Fig. 354 Oil separator cartridge

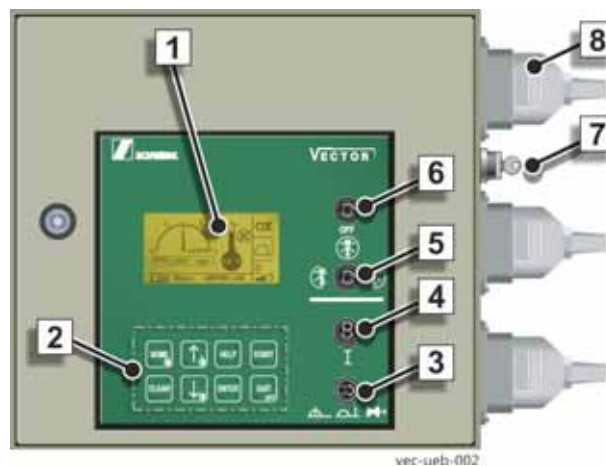
## 4.21 Electrical / Electronic system, software

### 4.21.1 Electrical safeguarding of SCHWING components

Depending on the type of machine, the system can be secured in several places:

- A main safety fuse near the starter battery
- Safety fuses near the vehicle fuse box (usually in the driver's cab of the truck-mounted concrete pump)
- Safety fuses in the switch cabinet or control cabinet of the concrete pump, see **(Fig. 355)** and **(Fig. 356)**

Also see electrical circuit diagram.



**Fig. 355 Example: Switch cabinet of a truck-mounted concrete pump**



Bedienpult-SP

Fig. 356 Example: Control station of a stationary concrete pump

#### 4.21.2 Changing the fuses of SCHWING components

- Switch off the machine control unit and the drive motor.
- Open the top cover of the switch cabinet or control station using the special key.
- The allocation of the fuses can be found in the diagram on the inside of the switch cabinet cover or in the electrical circuit diagram.

The fuses are marked with "F". Commercial vehicle fuses are used.

- Only replace defective fuses with equivalent new ones.

If a fuse is tripped once again, there is a short circuit. Stop the machine and have an electrician inspect the system.

**Attention!**

The electrical/electronic system can be destroyed due to overrated or bypassed fuses.

---

### 4.21.3 Working on electrical / electronic components

**Warning!**

**Only suitably qualified personnel may work on the electrical control and electronics.**

Unqualified interventions impair operational safety and result in the termination of the operating license and CE certification.

---

➤ Before working on electrical or electronic components, disconnect:

1. first the negative lead (-),
2. then the positive lead (+)

from the drive motor's starter batteries. This is sufficient for preventing short circuits and protecting the SCHWING control unit.

➤ Connect in reverse order.

**Attention!****Risk of short circuit!**

Do not place tools on batteries.

---

Further protective measures may be required for the electronics in the vehicle (e.g. for the anti-lock braking system ABS) or for the drive motor.

- Read the operating instructions of the engine manufacturer or vehicle manufacturer to find out about how to protect its electronics.
- Do not touch live parts.
- Never check the voltage by touching the ground.
- Replace defective control lamps immediately.
- Never disconnect a cable from the starter batteries, alternator or regulator while the motor is running.
- Earth the machine to establish equipotential bonding between the machine and the ground.

#### 4.21.4 Software

Only representatives of SCHWING are permitted to alter the machine's software. This also applies to updates.



#### **Danger!**

**Unauthorised modifications to the software can result in serious damage and accidents.**

SCHWING is not liable for the consequences of unauthorised software modifications.

---

#### 4.21.5 Electrically powered machines

Have an electrician disconnect the power supply to such machines prior to carrying out repair work on the respective machine.



#### **Danger!**

**Danger caused by electric shock!**

Only qualified electricians may work on the electrical system.

---

#### 4.21.6 The arc welding process

(see “Repair welding” on page 535)

#### 4.21.7 Jump starting

Connect the jumper cable as described in the operating instructions for the vehicle or the motor.

#### 4.21.8 Jump starting stationary pumps with batteries connected in series

Machines can be supplied with 24V by two 12V batteries connected in series.

The following should be observed when jump starting due to the spatial separation of both batteries (e.g. one on the right and one on the left side of the machine).

- Connect the positive terminal of the machine battery (the battery is located near the starter motor) to the positive terminal of the donor unit using the red jump lead.

- Next, attach the black jump lead to the negative terminal of the donor unit and then to the negative terminal of the machine battery (e.g. on the opposite side of the machine).

Make sure to observe the correct order!

Under no circumstances may the terminals of the batteries be connected the other way round.

If the engine starts, then the cables can be removed again in the reverse order.

A diesel engine uses considerably more power to start than a gasoline engine, which must be taken into account when selecting the donor unit. The jump lead should be made of high-quality copper cable in accordance with DIN 72553-25 and have a cross section of min. 25 mm<sup>2</sup>.

#### **4.21.9 Machining work on the machine**

Cover devices, cables etc. when drilling, grinding or other types of machining work is to be carried out on the machine.

#### **4.21.10 Painting and working with aggressive substances**

Cover devices, cables etc. to protect them against paint mist and aggressive substances.

#### **4.21.11 Steam jet cleaning**

Cover any electrical and electronic components.

Never direct a water or steam jet onto these components.

Any penetrating moisture leads to malfunctions and can destroy electronics and electrical components completely.

#### 4.21.12 Starter batteries (lead-acid batteries)



##### **Danger!**

##### **Risk of explosion!**

The gases discharged when charging the lead acid rechargeable batteries are highly explosive! Fire, sparks, smoking and naked lights are prohibited in the vicinity!

##### **Danger of acid burns!**

Wear protective glasses and protective gloves! Avoid any contact with skin and clothing!

##### **Risk of short circuit!**

Do not place tools on batteries!

---



##### **Attention!**

**The following instructions do not apply to maintenance-free starter batteries.**

Strictly observe the manufacturer instructions!

---

#### 4.21.13 Checking the acid level

- Clean battery surface, open locking caps.
- The fluid should typically be 10 to 15 mm above the plates or at the level of the control device. Observe the manufacturer instructions.
- Refill with distilled water (not acid!), if necessary.
- Mount locking caps.

#### 4.21.14 Checking the open-circuit voltage

In order to achieve a correct result, the battery may have been neither connected to a load nor charged at least two hours before the measurement.

If the open-circuit voltage is to be measured with a built-in battery, first disconnect the negative terminal and then the positive terminal from the battery. Otherwise there is a danger of short circuiting!

- Measure the voltage between the terminals.

If the measuring device displays at least 12.5 volts, then the battery is in order. The battery must be charged immediately once below 12.5 volts.

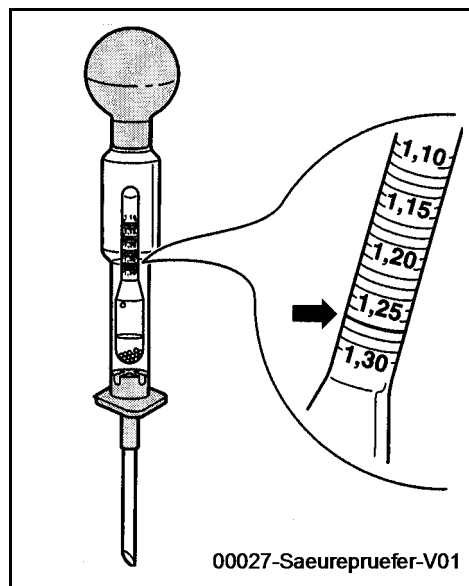


#### 4.21.15 Checking the acid density

Using a hydrometer (**Fig. 357**) measures the acid density of each individual cell. The acid temperature must be at least at 10°C during this process.

The acid densities of the individual cells may not deviate by more than 0.03 kg/l. Otherwise, the battery is defective and must be replaced.

It should further be noted that the acid density is lower under tropical conditions. See table (**Table 28**).



**Fig. 357 Hydrometer**

Acid density (kg/l)		Charging status	Action
Normal	Tropics		
1.28	1.23	good	-
1.20	1.12	half	charged
1.12	1.08	empty	charge immediately!

**Table 28**

#### 4.21.16 Charging the battery

Charge battery by running the motor for several hours or with a charger.

When charging with a charger, the battery must be at a temperature of at least 10 °C.

- Disconnect both terminal posts from the battery.


**Information**

**Always disconnect the negative terminal first and then the positive.**

Otherwise, there is a risk of short circuiting!

- Open locking caps.
- Charging current max. 10% of the battery capacity:

Example:	120 Ah battery
Charging current max.:	12 ampere

- Stop charging after reaching an acid density of 1.28 kg/l or 1.23 kg/l (in the tropics) if the charger does not have an automatic control device.
- Check acid level and refill with distilled water, if necessary.
- Clean battery terminals and terminal posts.
- First connect the positive terminal and then the negative terminal. Otherwise, there is a risk of short circuiting! Only tighten terminal posts by hand.
- Apply a thin layer of acid protective grease to the terminal posts.

#### 4.21.17 Storage and installation

Keep battery clean and dry in order to prevent discharge through leakage.

Ensure proper installation in the machine. Vibrations shorten the service life. Damage to the battery case entails high follow-up costs due to escaping acid.

#### 4.21.18 Disposal

Turn in old batteries at a collection point. Observe regional regulations for disposal of batteries and sulphuric acid.


**Information**

Please refer to the operating instructions from the vehicle or engine manufacturer for further information on the starter batteries.

## 4.22 Safety inspections

Alongside regular maintenance work, continuous observation and technical safety inspections are essential tools in maintaining operational and work safety with the machine and accessories.

As such, the responsibilities are as follows:

### 4.22.1 Machine operator

The machine operator is responsible for the visual and functional inspections of "his" machine, including accessories, before and during operation.

He must discontinue use of the machine if he/she discovers defects endangering work safety.

He/she is responsible for the external condition of "his/her" machine. As such, he/she must ensure e.g. the timely repair of damage to paintwork.

Especially on placing booms, corrosion pitting can lead to tears and breaks!

As the vehicle driver, he/she is responsible for the roadworthy condition of his/her vehicle, in the sense of local regulations in the country of use.

### 4.22.2 Competent person (specialist)

A competent person has to carry out the necessary technical safety inspections at regular intervals and record the results in the inspection book.

The definition of a competent person is given in the SAFETY MANUAL.

We recommend only contracting SCHWING employees to carry out this inspection.

### 4.22.3 Expert

An expert must be consulted in case of significant changes and extensive repairs (for example, if welding is carried out on load-bearing parts).

The definition of an expert is given in the SAFETY MANUAL.

### 4.22.4 Additional inspections

For certain units relevant to safety, such as accumulators, the relevant inspection regulations in the country of use must be observed.

If no qualified personnel are available, we highly recommend contracting a SCHWING employee to carry out the inspection.

#### 4.22.5 Technical safety inspection

As there is more risk of damage with older machines, the technical safety inspection interval for concrete pumps and placing booms is dependant on the age of the machine.

That means that older machines must be more frequently checked than newer ones.

The respective inspection intervals are given in the SAFETY MANUAL.



##### Information

Test intervals

Adhering to these inspection intervals is imperative for increasing the service life and reducing repair costs!

Due to the dynamic loads that occur on all machines, over time fatigue can occur on steel parts, leading to cracks or fractures.

Of course other components also age, for example through environmental influences, and should be checked regularly.

The older the machine, the higher the probability of damage.

Therefore the graded, regular technical safety inspection is an effective means for detecting damage at an early stage, before it leads to machine failure and (or) an accident.



##### Information

Case of damage!

Please be aware that in the event of damage, the question of whether the machine was checked regularly and correctly can be critical for assessing liability!

#### 4.22.6 Safety components

If a defect is detected on a safety component during a technical safety inspection or on any other occasion, the machine must not be used until it is repaired.

As a rule, special skills are required to carry out repairs, which is why we strongly recommend contracting SCHWING's customer service to perform this inspection.

If you carry out repairs on safety components yourself or hire a third party to do this, we encourage you to notify us of the damage and the work carried out.

You help us to improve our products and if necessary, initiate appropriate urgent measures.

For your notification you can use a copy of the form found on the next page.

#### 4.22.6.1 What are safety components?

The SCHWING factory standard distinguishes between safety components of the first (S1) and second order (S2).

The failure of S1 parts can pose a danger to life and limb. All persons inside the danger zone are in extreme danger of being killed.

**S1 parts include, for example:**

- Placing boom arms
- Levers and bolts on the placing boom
- Hydraulic cylinders on the boom and outrigger
- Outriggers
- EMERGENCY STOP parts and controls

Upon failure of S2 parts, primarily the main functions of the machine, such as "pumping concrete" or "distributing concrete", fail.

**S2 parts include, for example:**

- Hydraulic pumps
- Drives
- Gear
- Chutes
- Concrete filling hoppers

In practice, S1 and S2 components are often installed together. This makes it difficult to clearly assess a component's individual relevance to technical safety in the event of a failure.

It also always depends on the specific situation. Ruptured concrete pumping lines or hydraulic hoses, for example, can result in machine failure and can also endanger the lives and health of people located nearby!

Please also do not hesitate to inform us of damage of which the technical relevance is not immediately apparent.

In any case, you still help us to improve our products - and you are on the safe side.

In advance, we thank you very much for your help.

Please copy!

#### 4.22.7 Notification of damage for safety components

Please complete the copy of this questionnaire and send the completed copy to:

SCHWING GmbH  
Service  
PO Box 20 03 62  
D-44647 Herne

Of course you can also fax us this page or reply by email:

Email: [service@schwing.de](mailto:service@schwing.de)

<b>Customer no.:</b>	
<b>Address:</b>	
<b>Contact person:</b>	
<b>Tel.:</b>	
<b>Fax:</b>	
<b>Email:</b>	
<b>Machine type:</b>	
<b>Machine no.:</b>	
<b>Operating hours:</b>	
<b>Concrete delivery volume in m<sup>3</sup>:</b>	



**Short description of the damage:**

--

**The following parts were replaced (item number, if known):**

--

<b>Was welded?</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If so, where?		
<b>Were mechanical procedures carried out?</b>		
<input type="checkbox"/> Drilling	<input type="checkbox"/> Sanding	<input type="checkbox"/> Other
If so, where?		
<b>Was the work documented by photos or drawings?</b>		
<input type="checkbox"/> Yes		<input type="checkbox"/> No
<b>If so, is this document attached to this message?</b>		
<input type="checkbox"/> Yes		<input type="checkbox"/> No



## 4.23 Repair welding

On the placing boom, on the outrigger or on other components important to work safety, welding may only be carried out by authorised representatives of the manufacturer.

In general, welding should only be carried out by personnel specially trained and qualified for this activity.

Work must comply with the maintenance instructions and with all relevant safety rules and local regulations.

Welding work must be inspected by an expert.

Observe the sign on the machine (**Fig. 358**)

Before performing electric welding, disconnect the control unit and all batteries. If necessary, carry out protective measures for the vehicle and engine electronics.

Refer to the documentation from the vehicle or engine manufacturer.

Disconnect the multi-plug of the cable remote control or the radio receiver from the machine.

Attach the negative pole of the welding machine directly to the component to be welded.

The welding current should not pass through a hydraulic cylinder, for example, as doing so will result in damage to the chrome layer of the piston rods.

Protect equipment, cables and cable connectors from the heat, slag, etc.

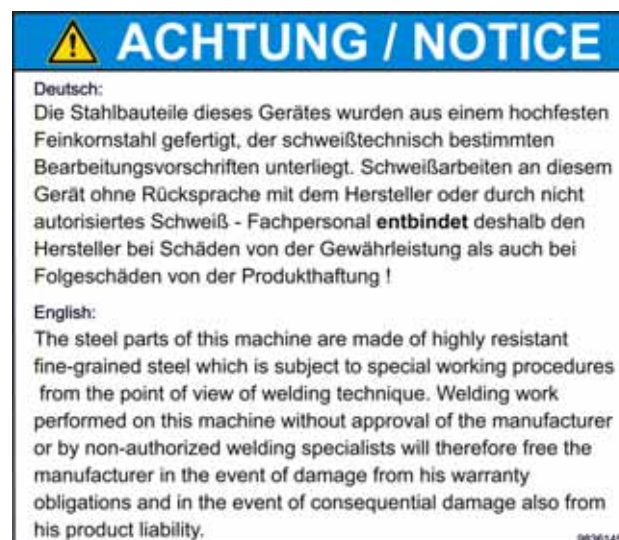


Fig. 358







## 5.1 Radio control system SCHWING Control SC30



### 5.1.1 Scope of the chapter

This chapter describes the radio control system SC 30\* as it is intended for SCHWING truck-mounted concrete pumps with a “VECTOR control” system.

(\* hereinafter referred to as system or radio equipment)

### 5.1.2 Manufacturer

SC 30 radio equipment are manufactured for SCHWING by the company:

**SCANRECO**

Scanreco Industrietelektronik AB\*\*

Box 47144

SE-100 74 Stockholm

Sweden

(\*\* hereinafter referred to as manufacturer)

### 5.1.3 Declaration of conformity

Radio equipment used in countries of the European Economic Area must comply with the guidelines mutually agreed there.

The manufacturer confirms this agreement by issuing corresponding declarations of conformity.

The type plate of the receiver contains the following marking:



The notified body issues the declarations of conformity in English.

They are part of these operating instructions.

The operating instructions must be available at the installation site of the system.

Supervisors should be given inspection rights of the operating instructions with reference to the above pages.

#### 5.1.3.1 Registration (notification)

The manufacturer of the radio equipment always registers with the States of the Community.

No further registration measures are required by these States, and operation is free of charge.



### Declaration of Conformity ISO 13849

We, the undersigned Company certify and declare under our sole responsible that the following equipment is tested to and conforms to the essential requirements for protection and safety according to ISO13849-1:2015.

**Type of equipment:** Remote control equipment  
**Brand name:** Scanreco  
**Product:** G3B Mini Joy-3, G3B CU  
**Manufacturer:** Scanreco AB  
**Address of the manufacturer:**  
 Stensåtravägen 13, 12 739 Skärholmen, Sweden

The products described above fulfil the requirements for Category 3 for PL=d of the standard ISO13849-1:2015 for the following functions:

- **Stop function:**
  - Deactivating Boom Enable and the Safety Loop
- **Prevention of unintended movement when in standstill and joysticks are in neutral positions:**
  - Deactivating Boom Enable

The following predicted reliability values are valid for the stop function:

PCU and CU combination	DCavg	MTTFd [years]
G3B Mini Joy-3 and G3B CU	0.9556	70.48

The following predicted reliability values are valid for the Prevention of unintended movement when in standstill and joysticks are in neutral positions

PCU and CU combination	DCavg	MTTFd [years]
G3B Mini Joy-3 and G3B CU	0.9536	67.94

Date of issue: 2016-11-23



Signature  
 Kaj Johansson  
 CEO / President

**Postal address**  
 Box 90304/Stensåtravägen 13  
 SE-12 739 Stockholm, SWEDEN

**Telephone** +46 8 556 32 800  
**Telefax** +46 8 556 32 828  
**E-mail** [scanreco@scanreco.com](mailto:scanreco@scanreco.com)

**VAT No** SE556245004801  
**Org No** 556245-0048

00030\_scan-CE

Fig. 359 Example of a declarations of conformity

### 5.1.3.2 Basic safety instructions for handling the radio equipment

- Read through these operating instructions completely before starting up your radio system!

You must have understood the operating manual fully before you begin to operate the system.

- Observe all applicable occupational safety and accident prevention regulations!
- For the operation of the machine, the corresponding machine operating manual applies!
- Only specifically assigned persons may work with the radio equipment, after being trained by an expert!

This also applies to the alternative cable control!

- During operation, you must always be able to see the entire machine and work area.
- Do not put down the operational transmitter. Always secure it against unauthorised use (switch it off and close it)!
- Always check the safety-relevant functions prior to starting up the equipment.

Do not operate the system if you detect faults.

Do not continue to use the system if faults occur during operation.

- Report all faults to your supervisor.
- The radio equipment may only be used for its intended purpose of controlling a SCHWING truck-mounted concrete pump designed for this.

Any other use is not permitted!

- Improper use, incorrect operation, poor maintenance and unauthorised access to the system can lead to serious material damage and personal injury!
- In the event of malfunctions or defects, immediately press the red EMERGENCY STOP button. Switch the transmitter off and store it safely!
- The radio equipment may only be repaired by the manufacturer or professionals authorised by the manufacturer!



#### **Warning!**

#### **Risk of injury from falling down!**

Accessing the truck-mounted concrete pump is prohibited during operation!

If it is necessary to enter the machine for repair work on the radio equipment, this must only occur when the pump drive is switched off.

Safe climbing aids and fall arresters are required for working on the machine.

- The system parameters, programming tasks and "pairs" of system may only be configured by specially trained experts.



- Failure to observe the safety instructions voids all warranty and liability claims against the manufacturer of the radio equipment and SCHWING!
- Only use original battery cassettes for the transmitter.

**Attention!****Material damage due to incorrect batteries!**

Unsuitable batteries can lead to malfunctions and damage to the transmitter.

---

**Attention!****Material damage due to incorrect chargers!**

The rechargeable battery could explode!

Do not use any third-party chargers.

---

**Warning!****Severe injury due to hazardous fluids and gases!**

Can result in injuries to the eyes, airways, etc.

Do not open any batteries. Hazardous substances can escape!

---

- Dispose of old batteries properly by dispensing of them at a waste disposal facility.

## 5.1.4 Technical data

### 5.1.4.1 Overall system

Frequency band (ISM*)	EU* and other NAFTA* Select countries	= 433.050 – 434.790 MHz = 902.000 – 928.000 MHz = 863.000 – 870.000 MHz
Channels	67	
Channel management	automatic	
Channel sequence	random	
Channel bandwidth	25 kHz	
HF - power	10 mW	
Modulation	FM / FSK*	
System address	more than 16 million unique system addresses	
Redundancy	CRC* Security algorithms	

ISM*	Systems with regional approval
EU*	European Union
NAFTA*	North American Free Trade Area (USA, Canada, Mexico)
FSK*	Frequency Shift Keying (automatic changing of different frequencies)
CRC*	Determination of a test value for fault recognition

### 5.1.4.2 Receiver

Current supply	via vehicle battery
Weight	1.25 kg
Protection class	IP 67, protected against the ingress of dust and water in case of temporary immersion in standardised conditions
Power consumption	80 – 140 mA (dependent on operating status)
Weight	1.25 kg
Permissible ambient temperature	approx. -25 °C to 70 °C (-13 °F to 158 °F)

### 5.1.4.3 Transmitter

Current supply	exchangeable battery cassette (7.2 V; NiMH) or via the on-board power supply of the machine when the control cable is connected
Weight	1.7 / 1.95 kg (with/without rechargeable battery)
Protection class	IP 65, protected against the ingress of dust and spray water in standard conditions
Operating life with battery operation	maximum 8 hours
Operating temperature range	approx. -25 °C to 70 °C (-13 °F to 158 °F)
Dimensions	290 x 160 x 190 mm
Range of radio connection	approx. 100 m in industrial areas
Length of the control cable	Standard: 20 m

### 5.1.4.4 Charger

Installation location	Depending on the machine type, in the driver's cab or next to the VECTOR control switch cabinet
Current supply	10 V - 35 V DC
Weight	0.25 kg
Protection class	IP 21, protected against dripping water and the ingress of foreign particles greater than 12.5 mm diameter in standard conditions
Power consumption	10 – 20 mA without a battery inserted, 320 – 560 mA during charging
Weight	0.25 kg
Operating temperature range	approx. -25 °C to 70 °C (-13 °F to 158 °F) Observe the temperature limits for battery charging! See chapter 15.
Dimensions	252 x 85 x 36 mm
Safeguard	depending on the machine type in the driver's cab, via the fuse of the vehicle power outlet (cigarette lighter), or in the switch cabinet, via the 7.5 A fuse of the current supply for the VECTOR control system

### 5.1.5 Identifying the system, type plates

Transmitters and receivers are each provided with an individual type plate. When contacting SCHWING, please always provide the information on these type plates.

When you assign this operating manual to a particular system, you can enter the relevant data here:

### 5.1.5.1 Transmitter

YYWW	
<b>SCANRECO RC400</b>	
TYPE	S.No

00030\_typ-sc30-1

### 5.1.5.2 Receiver

<b>SCANRECO</b>	<b>RC400/TR02</b>
TYPE: SN: Rev: YYWW:	<b>CE 0470</b>

00030\_typ-sc30-2

The following mean:

YYWW: Year of manufacture, week

TYPE: Equipment type

S.No or SN: Serial number

Rev.: Revision

### 5.1.6 Short description of the radio equipment

The digital radio equipment was specially developed for controlling truck-mounted concrete pumps with a placing boom. The system is protected against electromagnetic and high-frequency interference. Transmitters and receivers communicate with each other, they operate thus as transmitters and receivers. The backup procedure used protects the sent data against loss or falsification due to interference. The machine cannot be controlled by other transmitters in the near vicinity. In exceptional cases, should the communication be affected by strong interfering transmitters, the machine will enter the safe EMERGENCY STOP mode.

The current supply of the transmitter occurs via a replaceable battery cassette. A charger connected to the vehicle battery serves to charge the battery cassette. A charger for mains operation is also available on request. If the control cable is connected, the charging occurs via this cable.

The joysticks have 3 control levels. As such, the system can be used for the control of all 3-, 4- and 5-part booms, as well as the 4-part boom with telescope function from the company SCHWING. If individual control levels are not required, corresponding movements of the joystick remain ineffectual.

As the transmitter is suitable for various types of mast, the system is operationally ready for the first time when the transmitter and receiver are successfully "paired". It is always possible to refresh the "pairing" of transmitters and receivers of the same type.

The receiver is installed in a suitable position on the truck-mounted concrete pump, normally on the boom column. The receiver is connected to the VECTOR control system by means of a cable. The connection sleeve for the cable control is located at an easily accessible, protected position, normally in the cabinet of the hydraulic emergency operation system. It is also connected via cable with the receiver.

The transmitter antenna is installed in the transmitter. The receiver is equipped with a removable antenna. As needed, this can be replaced by an external antenna.

The components of the radio equipment are:

- Transmitter
- Receiver with antenna
- Charger
- Battery cassette
- Control cable

(see **“Overview of the components”** on page 548)

## 5.1.7 Overview of the components

### 5.1.7.1 The transmitter

The following inspection and control elements are found on the transmitter:



Fig. 360

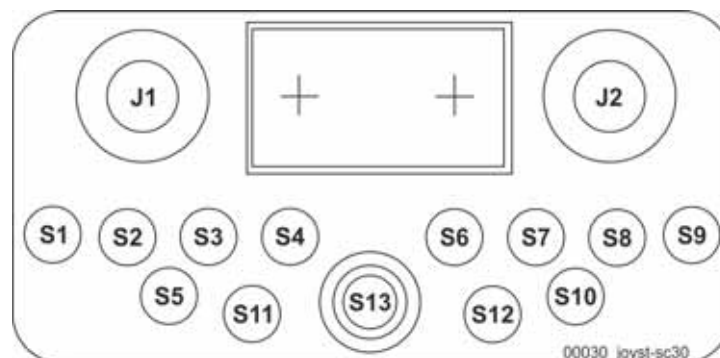


Fig. 361

### 5.1.7.2 General explanation of the joystick

Using the joysticks J1 (left) and J2 (right), the placing boom is controlled proportionally. As such, the movement speeds of the placing boom depend on the degree of the displacements. In contrast to machines with DirectDrive, it is only possible to drive at one speed in this case due to the design. The operation label between the joysticks shows the possible movement directions of the placing boom. If the transmitter is used for a machine with a different boom type ("pairing" required), this sign must be exchanged.

### 5.1.7.3 Possible movement directions of the joystick

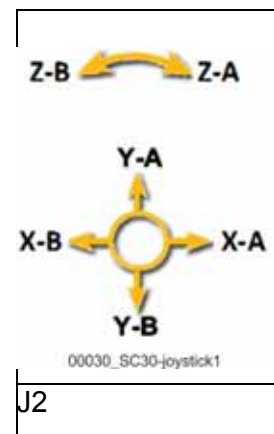
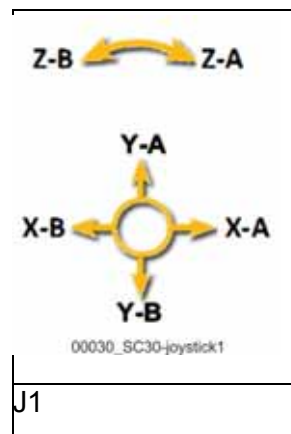
X = horizontal axle

Y = vertical axle

Z = turn the joystick in clockwise / anti-clockwise direction

A+B= movement direction

According to the boom type, not all control levels are required.

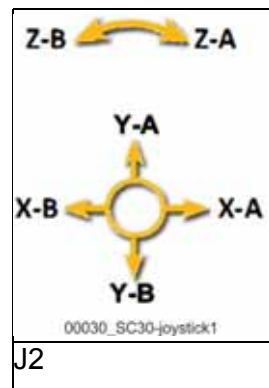
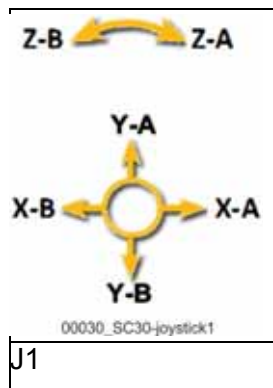


#### 3-part boom

J	Axle	Direction "A"	Axle	Direction "B"
J1	X-A	Boom section 2 down	X-B	Boom section 2 up
J1	Y-A	Boom section 3 down	Y-B	Boom section 3 up
J1	Z-A	no function	Z-B	no function
J2	X-A	Turn boom to the right	X-B	Turn boom to the left
J2	Y-A	Boom section 1 down	Y-B	Boom section 1 up
J2	Z-A	no function	Z-B	no function

#### 4-part boom

J	Axle	Direction "A"	Axle	Direction "B"
J1	X-A	Boom section 3 down	X-B	Boom section 3 up
J1	Y-A	Boom section 4 down	Y-B	Boom section 4 up
J1	Z-A	no function	Z-B	no function
J2	X-A	Turn boom to the right	X-B	Turn boom to the left
J2	Y-A	Boom section 1 down	Y-B	Boom section 1 up
J2	Z-A	Boom section 2 up	Z-B	Boom section 2 down



**5-part boom**

J	Axle	Direction "A"		Direction "B"
J1	X-A	Boom section 4 down	X-B	Boom section 4 up
J1	Y-A	Boom section 5 down	Y-B	Boom section 5 up
J1	Z-A	Boom section 3 up	Z-B	Boom section 3 down
J2	X-A	Turn boom to the right	X-B	Turn boom to the left
J2	Y-A	Boom section 1 down	Y-B	Boom section 1 up
J2	Z-A	Boom section 2 up	Z-B	Boom section 2 down

**4-part boom with telescope**

J	Axle	Direction "A"		Direction "B"
J1	X-A	Boom section 3 down	X-B	Boom section 3 up
J1	Y-A	Boom section 4 down	Y-B	Boom section 4 up
J1	Z-A	Boom section 2 up	Z-B	Boom section 2 down
J2	X-A	Turn boom to the right	X-B	Turn boom to the left
J2	Y-A	Boom section 1 down	Y-B	Boom section 1 up
J2	Z-A	Extend telescope	Z-B	Retract telescope

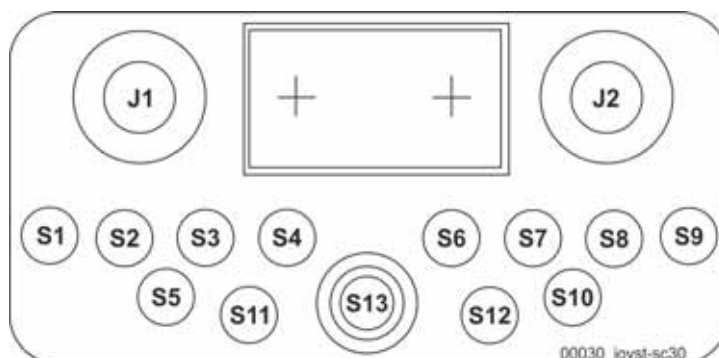


Fig. 362



### 5.1.7.4 Dual switch assignment

Several of the radio remote control switches have dual functions.

This provides the radio control system with a second functional level.

Dual button assignments are required for the following functions:

- EHH = open end hose holder pneumatically (press switches S3 + S1 down “Motor stop”)
- VarioPressure OFF (press switches S3 + S2 up (end hose stop))
- Operate rotatable stowing boxes (press switches S3 + S2 down (chamber valve + joysticks J1 and J2)).



**Fig. 363 Designation of SC30 buttons.**

In order to activate the second functional level, button (S3) must first be held down. Now actuate the dual-function button (S1 or S2).

The second functional level remains active until the selector switch is moved into a different position.

After an emergency stop, the second functional level is disabled and must be reactivated.

#### 5.1.7.4.1 EHH end hose holder, pneumatic

When operating the end hose holder, several safety-related aspects must be observed.

Make sure to read the corresponding chapter on operating the DirectDrive, see (“**Working operation: Placing boom**” on page 253).

#### 5.1.7.4.2 VarioPressure

VarioPressure is a safety function used to prevent blockages when pumping and to adjust the pumping pressure variably to the jobsite conditions, see (“**VarioPressure**” on page 725).

### 5.1.7.4.3 Rotatable stowing boxes


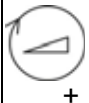

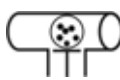
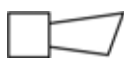

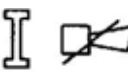


The rotatable stowing boxes are optionally available for certain machines (see S24X “**Rotatable stowing box**”, for example) and make it possible to load additional hoses and pumping pipes.

- In order to operate the stowing boxes, position yourself behind the rock valve looking towards the driver’s cab.

The stowing boxes are operated using the joysticks on the radio control system.

The joysticks are used in the same manner as for the placing boom.

In order to operate the stowing boxes safely, you must read the respective chapter.

S 1	Selector push-button: I-0-I	S 4	Selector push-button: I-0-I
0 	Vehicle engine (0) = off (stop) (I) = on (start) / <b>open EHP</b>	-  +	Speed of the vehicle engine (-) = reduce (+) = increase
S 2	Selector switch: I-0-I	S 5	Push-button: I-0
	End hose stop: Automatic of / <b>VarioPressure on</b>	2	Browse display
0	End hose stop: Automatic on		
	Activate chamber valve / <b>rotate stowing boxes</b>		
S 3	Selector push-button: I-0-I	S 6	Potentiometer: min - max
	Signal horn on vehicle on		Adjust the delivery rate of the concrete pump proportionally
0 	Acknowledge control release or diagnosis horn (switch off)		
		S 7	Selector switch: I-0-I
			Concrete pump on forwards (pump operation)
		0	
			Concrete pump on backwards (suction operation)

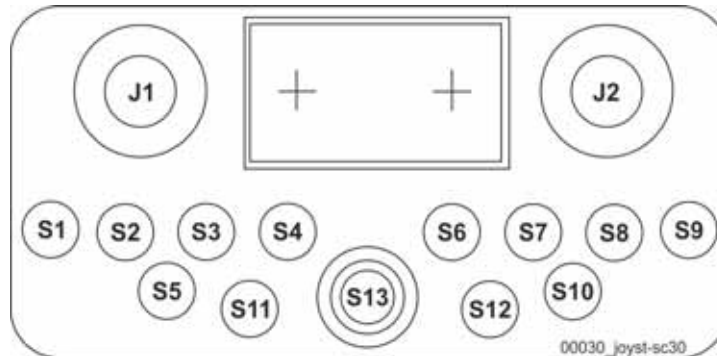











Fig. 364

S 8	Selector switch: I -0- I	S 11	Selector switch: I -0- I
 <small>nafbed_sym-09</small> 0	Compressor on	  	Boom speed slow (concreting work)  Placing boom control off  Boom speed fast (installation and removal)
 0	Agitator automatic operation on	 <small>00030 SC30-stetter</small>	Transmitter on
 0  	Water pump on  Concrete vibrator automatic operation on	S 12	Push-button: I - 0
 <small>00030 SC30-stetter</small>	Display lighting on / off	S 13	<b>EMERGENCY STOP button:</b> I - 0
			Transmitter off / EMERGENCY STOP

### 5.1.8 The LCD display

The left vertical display bar (**Fig. 365**) shows the charging status of the transmitter battery and the right the signal strength on the receiver.

The display also shows different machine data. They are identical to the information on the display of the VECTOR control.

Further information (see “**The feedback system**” on page 557).

### 5.1.9 The LEDs

The LEDs (**Fig. 366**) "antenna" 1 and "voltage" 2 are multifunctional indicators.

Further information (see “**Operating status displays**” on page 563).

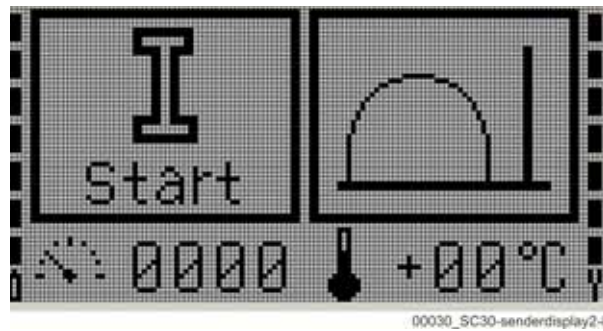


Fig. 365



Fig. 366

### 5.1.10 The receiver

The receiver (**Fig. 367**) is located in a suitable position on the machine, usually on the boom column.

It is connected via cable to the machine control and the external connection socket for the cable control.

The two-part display (1) shows different operating statuses for the system. As the receiver is normally located on the boom column of the machine, some messages are also shown on the display of the VECTOR control system (1) (**Fig. 368**).

The display of the receiver serves exclusively for the functional inspection during repair work. Reading the messages on this display during operation is not permitted and also not necessary.



#### Warning!

##### Risk of falling!

Accessing the truck-mounted concrete pump is prohibited during operation!

If it is necessary to enter the machine for repair work on the radio equipment, this must only occur when the pump drive is switched off.

Safe climbing aids and fall arresters are required for working on the machine, see (“VDMA safety manual” on page 759).



Fig. 367

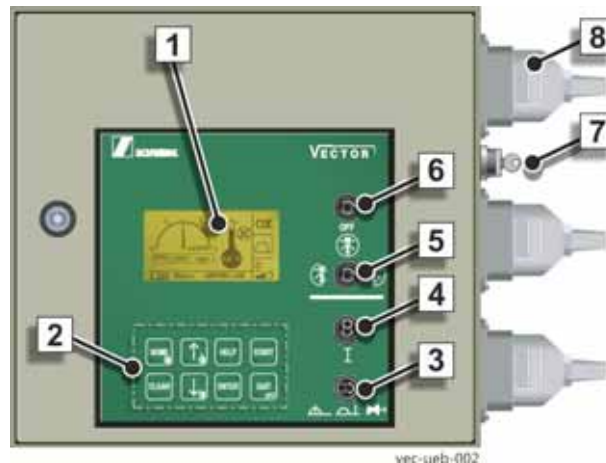


Fig. 368

### 5.1.11 The charger

The charger (**Fig. 369**) is connected to the vehicle battery via a safety fuse.

After inserting the battery cassette, the rechargeable battery charges quickly. Then the charger switches to conservation status.

The green LED

The green LED 1 flashes during the charging process and lights up continuously when the rechargeable battery is charged.

The red LED

The red LED 2 lights up when the current supply is connected.

### 5.1.12 The battery cassette

The battery cassette (**Fig. 370**) is protected against humidity and shocks. It contains a rechargeable 7.2 V NiMH\* battery.

\*Nickel metal hydride

The cassette is protected against short-circuits. For the correct orientation during insertion, it is mechanically coded.

Replacing or charging the battery (see "**Changing / Charging the battery**" on page 578).

### 5.1.13 The control cable

The transmitter and receiver can be connected to each other via the control cable (no illustration), should radio operation not be possible or desired at a given moment. It is also required for the "pairing" of the system.

The control cable transfers all control commands that are acknowledged by the radio control unit.

Furthermore, the transmitter battery is charged via the connected cable.



**Fig. 369** Charger



**Fig. 370**

### 5.1.14 The feedback system

The feedback system of the G3 radio equipment serves to present current machine data on the display of the transmitter.

It thus brings important information of the VECTOR control directly to the operator who is at a distance from the machine.

The display is located on the top side of the transmitter (**Fig. 371**).

In addition, there is an acoustic signal transducer in the transmitter, which alerts the operator to certain machine statuses or faults. For this, see the description of the VECTOR control.

#### 5.1.14.1 The display lighting



The S 10 button (**Fig. 372**) can be used to switch on the display lighting for 30 seconds.

### 5.1.14.2 Illustration of the feedback data

#### Basic display

If the transmitter is operated while the receiver is switched on, the default screen appears initially on the display (**Fig. 373**). It is divided into several areas. See next page.



Fig. 371

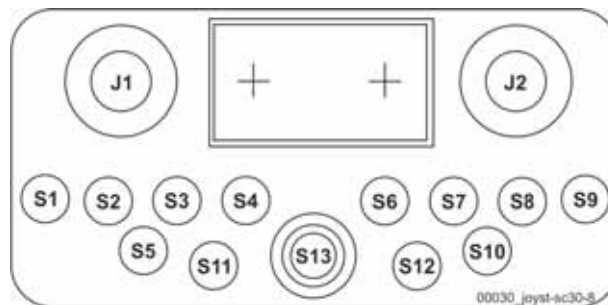


Fig. 372

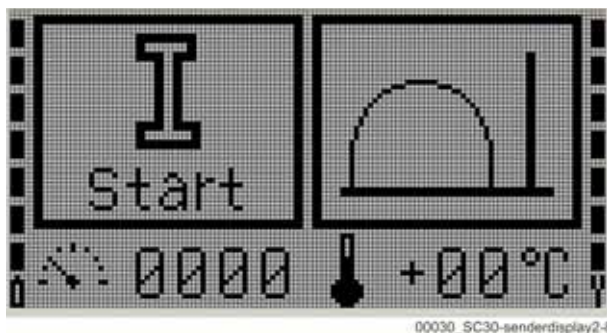
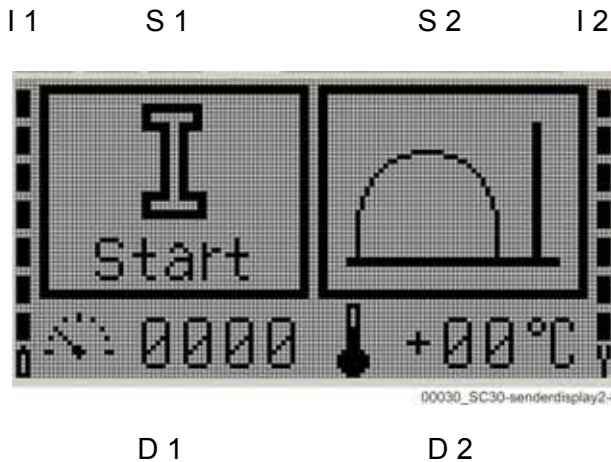


Fig. 373





Areas:	
I 1	Charging status of the transmitter battery
I 2	Signal strength on the receiver
S 1	Control status
S 2	Mode
D 1+2	Machine data with symbols

Fig. 374:

I 1:

The display bar in the I1 area on the left edge of the screen is a measure for the charging status of the transmitter battery. The shorter the bar, the less charge the battery has.

I 2:

The display bar in area I2 on the right edge of the screen is a measure for how strong the signal of the transmitter is received by the receiver. The longer the bar is, the stronger the signal (e.g., because the operator is next to the pump).

S 1:

The S1 status area shows the status of the control system. It corresponds to the display in the VECTOR control display. In the example above, it can be seen that the system is ready to start.

S 2:

The selected operating mode of the control system can be viewed in area S2. Here, the operating mode is "Remote".

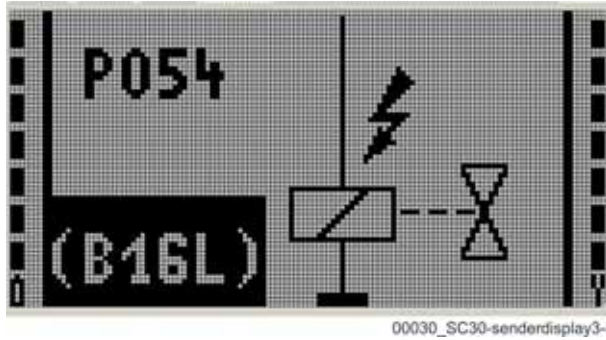
D 1 + D 2:

The data areas D1 and D2 on the lower edge of the screen contain current machine data along with the associated symbols (pictograms). In the example above, the display for the engine speed is on the left and the oil temperature on the right.

What can be seen in D1 and D2 is automatically determined by the control depending on the operation.

However, the S 5 button (**Fig. 371**) + (**Fig. 372**) can be used to make the selection yourself.

I 1    Additional text                      Error symbol                      I 2



00030\_SC30-senderdisplay3-8

Error code

### 5.1.15 Error messages

In the event of errors, the display automatically switches from the default screen to the error screen, which always takes precedence. It is also divided into several areas:

I 1 + I 2

The meaning of both bar displays I 1 and I 2 for battery status and reception strength is the same as for the basic display.

Error symbol

The symbol (pictogram) associated with the error appears in the "Error symbol" field on the right.\*

Additional text

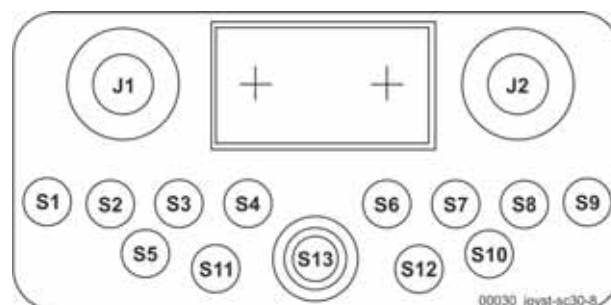
For certain errors, additional text for a more detailed explanation is also displayed.

Error code

For each error, a corresponding code is displayed.\* This code is displayed in a light font on a dark background at the bottom on the left.

For the automatically displayed error messages, too, you can switch between the error screen and the different data areas D 1 and D 2 using the S 5 button (**Fig. 375**).

This can be useful for the further specification of the cause of the error and is effected by pushing the button once or several times.

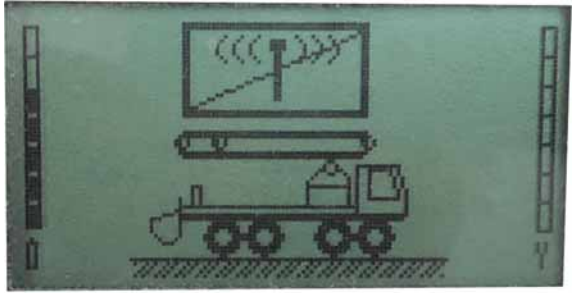
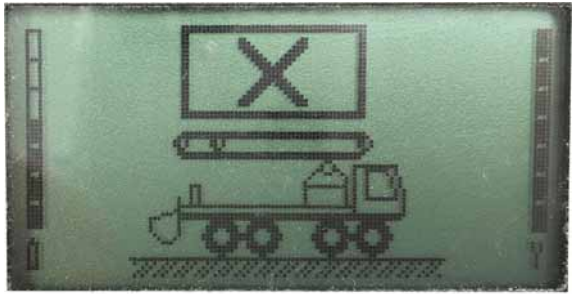


**Fig. 375**

\*See the description of the VECTOR control.

### 5.1.16 Feedback errors

In the event of malfunctions in the SC30, the system's self-diagnosis displays the following messages.

Display	Meaning
 <p style="text-align: center;">00030_SC30-disp-hardw-1</p>	No radio connection available
 <p style="text-align: center;">00030_SC30-disp-hardw-2</p>	CAN communication failed between receiver and VECTOR control system

### 5.1.17 Special equipment

If the machine has special equipment, such as the one-sided outrigger system EASy, errors are shown on the display of the VECTOR control system as well as on the transmitter display.

### 5.1.18 Operating status displays

The light-emitting diodes "antenna" 1 and "voltage" 2 are multifunctional indicators and show various operating statuses. They can light up in red or green.























		 = ON  = OFF  = FLASHING
"Antenna" (1) 	"Voltage" (2) 	MEANING
OFF 	OFF 	Transmitter off
green, on 	green, on 	Transmitter is operationally ready. No function actuated (basic position).
green, flashing 	green, on 	One or more functions actuated. Transmitter transfers control data.
red, on 	green, on 	Transmitter on, but no connection to the receiver.
red, flashing 	red, on 	Transmitter on and active. Issue of command blocked by safety function.
red, flashing 	red, on 	Transmitter on and joystick actuated. No release by the selector switch S 11.
any signal possible   	red, flashing 	Low voltage of the transmitter battery. Replace battery within 30 min., before the transmitter is switched off.

Fig. 376:

### 5.1.18.1 The receiver

The receiver is normally located on the boom column of the machine

The display of the receiver serves exclusively for the functional inspection during repair work. Reading the messages on this display during operation is not permitted and also not necessary.



#### Warning!

#### Risk of falling!

Accessing the truck-mounted concrete pump is prohibited during operation!

If it is necessary to enter the machine for repair work on the radio equipment, this must only occur when the pump drive is switched off. Safe climbing aids and fall arresters are required for working on the machine, see (“**VDMA safety manual**” on page 759).



Fig. 377 Receiver

LED display	Meaning
88	Receiver off
17	Standby mode: Transmitter search (shown through circulating bars)
1P	Standby mode: Connection with the transmitter
1-	Communication via cable: Identification (ID code) accepted
2-	Communication via cable: Identification (ID code) not accepted
1H	Radio transmission O.K. (frequency hopping*)
Po Id	ID programming active
6L	ID programming rejected

\*Frequency hopping means the automatic transfer of control commands in small packages on different frequencies.




### Information

Should other messages be displayed, (see “**Troubleshooting**” on page 586).

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## 5.1.19 Starting up the radio control system

### 5.1.19.1 Switching on the receiver

- Make sure that the cable connector (8) (**Fig. 378**) of the radio receiver is plugged into the switch cabinet of the machine.
- Switch the machine control on and set up the machine as described in the operating instructions for the truck-mounted concrete pump.
- Switch the selector switch (3) to the position  "Remote control".

The receiver display (**Fig. 379**) shows the message: Standby mode: Transmitter search.



There is still no connection with the transmitter.

The VECTOR control remains in EMERGENCY STOP mode.

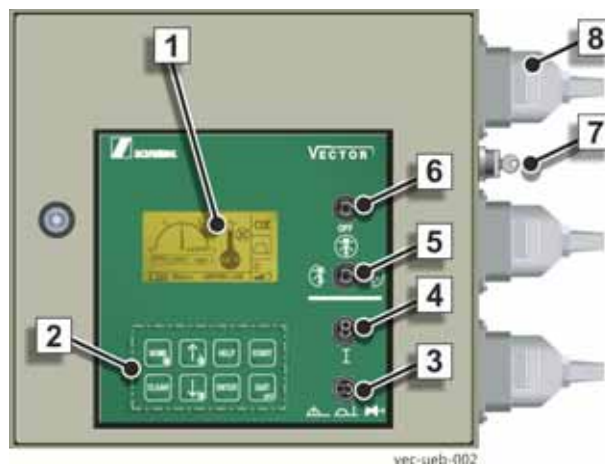


Fig. 378



Fig. 379



### 5.1.19.2 Switching on the transmitter

- Insert a battery cassette into the transmitter (see “**Changing / Charging the battery**” on page 578).
- Switch all engaged selector switches on the transmitter to the “0” position and unlock the EMERGENCY STOP button (3) (**Fig. 380**) by turning it once clockwise.
- Unlock all EMERGENCY STOP buttons on the machine as well; otherwise, it will not be possible to start the machine.
- Press and hold button 5 until LED 2 lights up continuously.

The display of the VECTOR control system now changes from EMERGENCY STOP to START (**Fig. 381**).



#### Information

If no connection to the receiver can be established, the LED (1) lights up red.

Make sure that the receiver is switched on and the device pairing (see “**Pairing the transmitter and receiver**” on page 583) has been carried out successfully.

The VECTOR control monitors the positions of all EMERGENCY STOP buttons and the selector switch of the active control.



Fig. 380

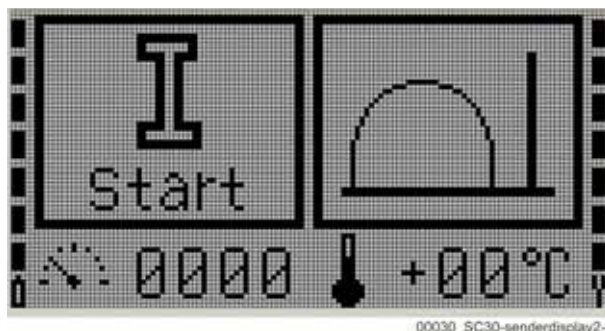





Fig. 381

### 5.1.19.3 Starting the system

	<p>When the system is ready, this symbol flashes on the display of the VECTOR control system (<b>Fig. 382</b>) and the transmitter (<b>Fig. 383</b>).</p>
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	<p>Release the control by briefly actuating the S3 button (<b>Fig. 383</b>) + (<b>Fig. 384</b>)</p>
---	---

	<p>The start is confirmed by a short, acoustic signal and the displays show "OK".</p>
---	---

As such, the transmitter is operationally ready. It is located in basic position. The LEDs (1+2) (**Fig. 385**) light up green.

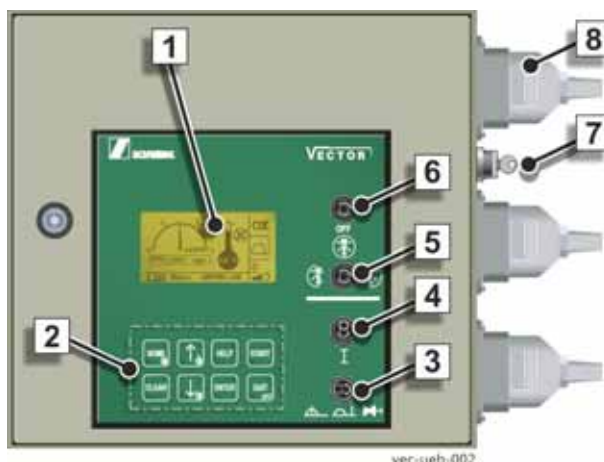


Fig. 382



Fig. 383

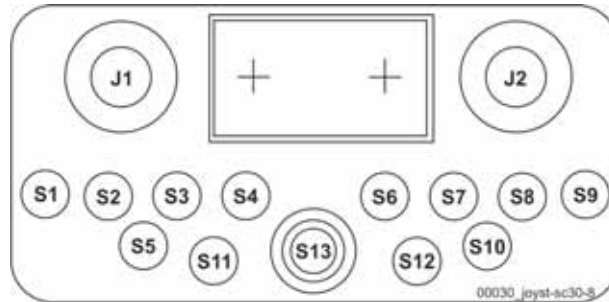


Fig. 384



Fig. 385

### 5.1.20 Starting up the cable control

- Use the cable to connect the transmitter to the machine.

The connection socket of the transmitter (1) (**Fig. 386**) is located on the side of the housing.

The connection socket of the receiver (2) is located on the machine in the switch cabinet of the hydraulic emergency control unit.

Depending on the machine type, the connection socket is located on the left or right side in the switch cabinet (example (2), (**Fig. 387**).

- Insert the cable into the switch cabinet from the bottom and connect it.
- Close the flap of the emergency control unit and lock it.
- Restart the system as described in “**Starting up the radio control system**” on page 566.

In the function diagram for the remote control in the VECTOR menu, the identification for the cable remote control is shown:

Active: Cable



#### Warning!

#### Danger due to unauthorised actuation of the emergency control!

The flap over the emergency control must be closed and locked.



#### Information

For the cable control it is not necessary for a battery cassette to be located in the transmitter.

The battery is however charged when the cassette remains in the transmitter.



Fig. 386



Fig. 387

### 5.1.21 Operation

Once the system is operationally ready, all specified functions can be remotely controlled.

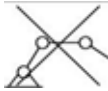


If no switch is actuated, LEDs 1+2 (**Fig. 388**) light up green, thus indicating operational readiness (default position).

During the transfer of control commands, the LED 1 flashes green. The selected functions are carried out by the machine.

After resetting all switches to the "0" position, the transmitter returns to the default position.

For further display options with LEDs 1+2, (see "**Operating status displays**" on page 563).

#### 5.1.21.1 Selecting the boom speed

	<p>It is not possible to move the boom when the selector switch (4) (<b>Fig. 388</b>) is in the centre position. This is important, for example, when the boom must not be moved inadvertently.</p>
	<p>In the "hare" position, all boom movements can be driven proportionally up to the maximum speed of 100%. This position is intended for the installation and removal of the placing boom.</p>
	<p>In the "screw conveyor" position, the boom speed is reduced by 50%. This position is intended for the operation of the placing boom.</p>



#### Information

For safety reasons, both joysticks must be in the neutral position when switching the S 11 switch (**Fig. 389**).

If this is not the case, the diode (2) will light up red and the buzzer in the transmitter will sound.



Fig. 388

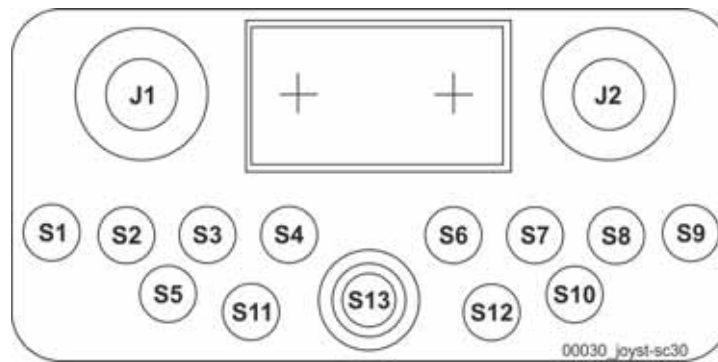


Fig. 389

### 5.1.22 Operating interruptions



#### Warning!

#### Danger due to unauthorised use!

Do not put down the operational transmitter. Always switch it off and lock it.

- Turn the relevant selector switch on the transmitter to position “0” to stop individual functions.
- Press the EMERGENCY STOP button (3) (**Fig. 390**) to shut down the transmitter.

The transmitter sends the EMERGENCY STOP signal, which immediately interrupts all primary machine functions.

Then the transmitter switches off automatically.

To restart the machine, restart the transmitter as described in “**Starting up the radio control system**” on page 566.



#### Information

If the transmitter is switched off while the selector switch (3) (**Fig. 391**) is in the “Remote control” position”, the VECTOR control automatically switches to the secured EMERGENCY STOP status.

- Switch the selector switch (3) to the “local control” position beforehand, if this is not required.



Fig. 390

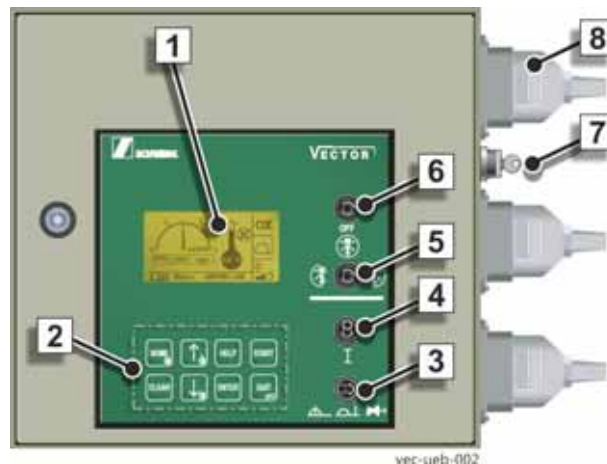


Fig. 391

### 5.1.23 EMERGENCY STOP

By pressing an EMERGENCY-SOP button, the main machine functions are interrupted immediately.

The VECTOR control can also switch off the drive motor.

It depends on the vehicle electronics and consent of the motor manufacturer whether this option is used.

Please only use the EMERGENCY STOP button on the machine in emergency situations, especially if your machine is equipped with the motor shutdown function described above.

When the remote control is active, the EMERGENCY STOP button on the transmitter also serves to shut down the transmitter.

Always switch off machine functions and motor by means of the appropriate control devices under normal operating conditions.

#### Recommissioning after EMERGENCY STOP

- Remedy the fault.
- Set all engaged selector switches on the transmitter to the "0 or centre position" and unlock the previously activated EMERGENCY STOP button. Otherwise, it will not be possible to start the machine.
- Start up the control system.

The restart protection prevents the machine functions from starting by simply unlocking the actuated EMERGENCY STOP button.

If one or more functions are detected as active when switching on the transmitter (no "0" position), the LED power lights up red.

After approx. 30 seconds, the LED "Power" switches from red to green. All functions having been identified as switched on are now switched off and the control can be placed into limited operation. All switches not previously identified as active, may now be used.



Joystick errors are reported by optical and acoustic signals.

Faulty functions are deactivated.

Use self-test mode to detect faults.

The control monitors the positions of the EMERGENCY STOP buttons and selector switch of the active control.

The display shows a corresponding notification.

#### 5.1.24 Starting / Stopping the motor

In order to prevent a function from starting unintentionally, the motor can only be started when all selector switches are in the neutral (0) position.

While it is possible to switch off the motor with an activated function, this should be avoided.

If it is not an emergency, always

- Switch off function(s) first, then
- Reduce rotational speed to idle, then
- Switch off motor



#### Attention!

##### **Material damage due to overheated motor!**

Turbo chargers can be damaged due to overheating if the motor is suddenly switched off at a high speed.

If it is not an emergency, switch off the motor as described above.

---

### 5.1.25 Checking the reception quality

Receiver and transmitter have the ability to display the reception quality.

#### Receiver

When the reception quality is optimal, the receiver display (**Fig. 392**) shows the message



("H" stands for automatic frequency management)



#### Information

Short flashing of the notification indicates a temporary loss of quality, and is of no relevance.

Frequent flashing indicates a persistent impairment requiring an adjustment (relocate, etc.).

The reception quality is also displayed in the function diagram of the remote control in the VECTOR menu.

#### Transmitter

LED 1 (**Fig. 393**) indicates the reception quality.

- LED flashes red => poor signal
- LED on permanently => no signal

In addition, the right display bar shows the signal strength on the display (**Fig. 394**).



Fig. 392



Fig. 393

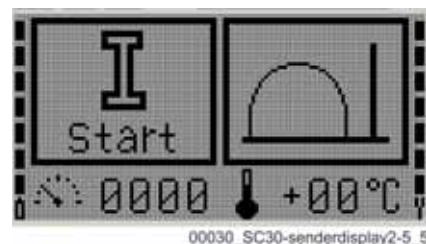


Fig. 394

## 5.1.26 End of operation


**Information**

If the transmitter is switched off while the selector switch (3) (**Fig. 395**) is in "Remote" operating mode, the VECTOR control automatically switches to the EMERGENCY STOP status.

- Switch the selector switch (3) to "Local" operating mode beforehand, if this is not required.
- 
- Switch off the transmitter by pressing the EMERGENCY STOP button (3) (**Fig. 396**).
  - Store the transmitter in the driver's cab when no longer required.
  - Switch off the machine control using the switch in the driver's cab.
  - Switch off the vehicle power take-off.

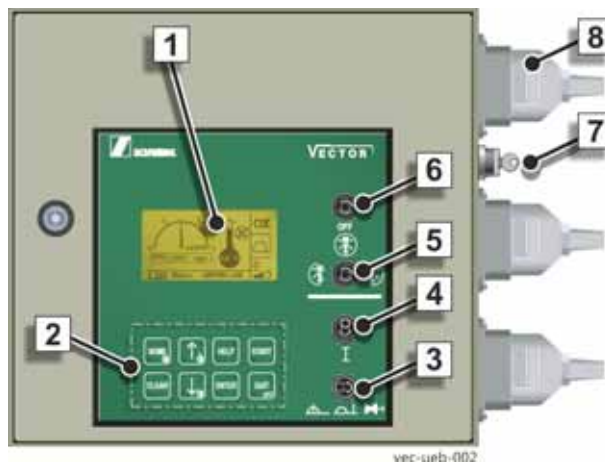


Fig. 395



Fig. 396

## 5.1.27 Changing / Charging the battery

### 5.1.27.1 Changing the battery

The compartment for the battery cassette is located at the bottom of the transmitter (**Fig. 397**).

The cassette can only be inserted in the correct position in the transmitter with mechanical encoding.

- Clean the contacts, if necessary, before inserting the cassette.

A fully recharged battery lasts for about 8 operating hours. Very cold weather can reduce the capacity.

A monitoring device switches off the transmitter when the joystick was inactive for 30 minutes (standby mode).



#### Information

A low charging status is indicated for the battery when the buzzer sounds 3 times and the LED (2) (**Fig. 398**) flashes red.

The left bar on the display (**Fig. 399**) also shows the charging status of the battery.



Fig. 397



Fig. 398

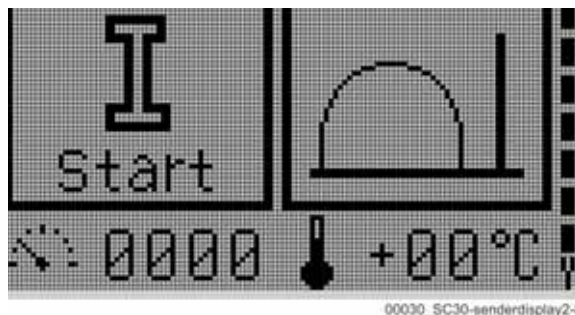


Fig. 399

### 5.1.27.2 Charging the battery

The battery is charged with the quick charger (**Fig. 400**) or via cable when the control cable is connected.



#### Warning!

#### Battery can explode!

Do not use any third-party chargers.

---



#### Caution!

**Charging the battery becomes problematic at ambient temperatures below 10 °C (50 °F).**

If possible, use the charger supplied as an original accessory for mains operation at a room temperature of 20 °C (68 °F).

The ambient temperature during charging may not exceed 45 °C (113 °F). Rechargeable battery is damaged!

---

### 5.1.27.3 Charge with the charger

After inserting the rechargeable battery into the charger, it starts with a quick charge. The charger switches to the conservation status when rechargeable battery is fully charged.

The average charging time for a depleted rechargeable battery is about 3 hours.

The charger is designed such as not to damage the rechargeable battery.

The green LED 1 flashes during the charging process and lights up continuously when the rechargeable battery is charged (conservation status).

The red LED 2 lights up when the current supply is connected.



Fig. 400

Sign in charger (translation)



#### Attention!

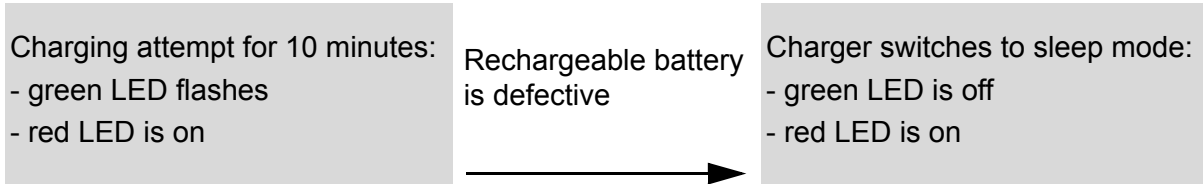
**Please read prior to use!**

Only for the interior!

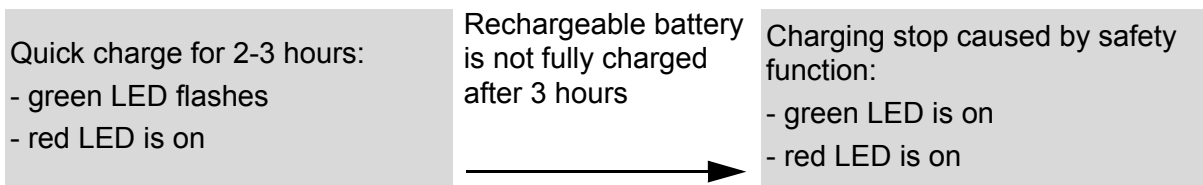
Do not cover charger!

Observe admissible ambient temperature when charging the battery (see links)!

### 5.1.27.4 Charging cycle for the charger



Rechargeable battery is OK



Battery fully  
 charged for  
 another 3 hours

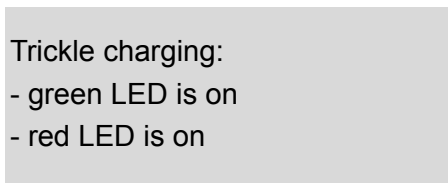


Fig. 401

### 5.1.27.5 Charging via control cable

The connected control cable charges the transmitter battery from the vehicle battery via a receiver and cable.



Fig. 402

## 5.1.28 Storage, maintenance, upkeep, disposal

### 5.1.28.1 Storage

- Store the system in a dry room. Avoid humidity and extreme temperatures.
- Remove the battery cassette when the transmitter is not in use for an extended period of time.

Place the cassette into an active charger or charge the rechargeable battery every 2 weeks.



#### Warning!

##### **Danger due to unauthorised use!**

The machine operator is responsible for the safe storage of the transmitter in order to prevent unauthorised persons from accessing it.

Enclose the transmitter!

---

### 5.1.28.2 Maintenance

- Check the system regularly or upon observing abnormal behaviour.
- Check the transmitter for damages. Pay particular attention to such damages enabling water to ingress.
- Check the cables on the receiver for damages.
- Carry out a functional check periodically before driving the machine to the job-site.
- Report damages immediately to your supervisor.



#### Attention!

##### **Risk of damage:**

Only carry out maintenance on the currentless radio equipment.

Disconnect all cables from the receiver before carrying out electric welding work on the machine.

---



### 5.1.28.3 Upkeep

- Use a damp cloth to clean the system on the outside only. Do not open housing! Dry with a soft cloth.



#### Attention!

##### Risk of damage:

Do not spray system, do not immerse or hold under running water.

Do not use cleaning agents such as spray oil, diesel oil, alcohol, etc. These agents damage the seals.

---

### 5.1.28.4 Disposal

- Dispose of old batteries properly by dispensing of them at a waste disposal facility.

Do not throw away rechargeable batteries!

### 5.1.29 Pairing the transmitter and receiver

Pairing refers to the programming of an individual identification code (ID code). This is necessary for the wireless communication between a particular transmitter and a particular receiver.



#### Warning!

##### Danger caused by malfunction:

The system may only be programmed by specially-trained experts.

---

1. Set the VECTOR control system to “Local” operating mode, (3) (**Fig. 403**).
2. Switch off transmitter (remove rechargeable battery).
3. Connect transmitter and receiver with the control cable.
4. Unlock the EMERGENCY STOP button on the transmitter.
5. Switch off/on the receiver by unplugging cable connector 8 (**Fig. 403**) and plugging back in.
6. Actuate button 5 (**Fig. 404**) on the transmitter within 45 seconds and hold for 10 seconds until the buzzer in the transmitter sounds.
7. The display of the VECTOR control system shows the notification R 13 M “Pairing in progress!”

8. Release button 5 (Fig. 2) and wait until the buzzer produces 5 beeps in quick succession and the transmitter is switched off automatically.
9. Switch on the transmitter again with button 5.



### Information

If the transmitter is being paired for the first time, observe the work sequence as of step 9a!

Now, the following notification appears on the display of the VECTOR control system:

**R 14 M “Pairing completed successfully!”**

then the pairing process was successful.

10. The basic display appears in the display of the transmitter after 30 seconds. This concludes the successful pairing of the transmitter and receiver.

Remove the control cable and insert the rechargeable battery into the transmitter.

Set the VECTOR control system to “Remote” operating mode, (3) (Fig. 403).

The system is now ready for radio operation.

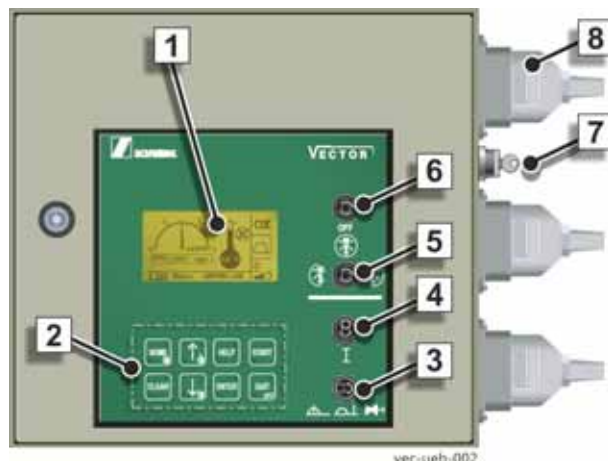


Fig. 403



Fig. 404

11. If the transmitter is paired for the first time, data from the receiver must still be transmitted to the transmitter.

Wait until the display of the transmitter shows the message illustrated in **(Fig. 405)**.



**Attention!**

**Potential material damage due to unauthorized shutdown!**

Switch off system first when both messages are displayed with "done".

Cancelling the charging can cause the transmitter to be re-set by customer service.

12. After the transmission, switch off the transmitter and switch it on again.

If the basic display appears in the display of the transmitter after 30 seconds, the successful pairing of the transmitter and receiver is concluded.

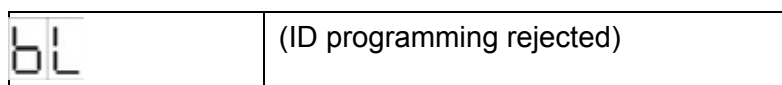
- Remove the control cable and insert the rechargeable battery into the transmitter.

The system is now ready for radio operation.



**Fig. 405**

If the buzzer in the transmitter produces a long sound, and the receiver display shows the notification "bL", the pairing process was interrupted.



At the same time, the display of the VECTOR control system shows the notification R 15 L "Pairing cancelled with error!"

- Repeat the pairing procedure.
- Adhere to the time limit between step **(5.)** and **(6.)!**

After repair work on the system or unusual performance, repairing the system again might be required.

### 5.1.30 Troubleshooting



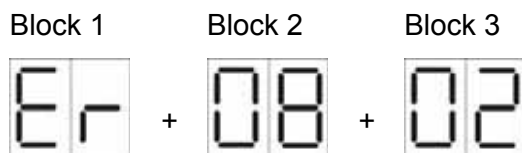
**Warning!**

**Danger caused by malfunction.**

The following error table provides assistance to qualified personnel authorised by the manufacturer to carry out repair- and programming work. Should such personnel not be available, please contact the SCHWING customer service. Inform the customer service of the error code indicated in the display of the receiver or display of the VECTOR control.

Occurring errors are displayed in three blocks and repeated three times. The error code always starts with "Er" (Error)

Example:



Error 08 02 signifies:

Block 2	Block 3	Description	Cause	Remedy
08	02	CAN notification memory overflow	CAN notification memory full, refers to both the input and output memory.	The system reboots automatically. Perform a system reboot at CAN level.

If the system recognises a minor error, it will automatically reset to standby in order to correct the error.

If the system determines a fatal error, the error code will continue to be shown in the display until the system is switched off.

**5.1.30.1 Error codes (information for qualified personnel)**

Block 2	Block 3	Description	Cause	Remedy
01	01	Error in EEPROM	CRC checksum is faulty, last programmed software uses CRC	Reboot the system, should the problem persist, the operating software must be reloaded.
01	02	Error in flash memory	CRC checksum is faulty, last programmed software uses CRC	Reboot the system, should the problem persist, the operating software must be reloaded.
01	03	Error in stack memory	Incorrect data length for the CAN open protocol, error in the data flow or stack overflow	The system reboots automatically. If the problem persists, the operating software must be reloaded.
01	04	Error in RAM memory	Incorrect memory- or hardware identification	The system reboots automatically. If the problem persists, the operating software must be reloaded.
02	01	Unauthorised voltage on the boom switch outlet	Error on the boom switch outlet or external voltage source connected to the boom switch outlet	The system reboots automatically. Check the plug connector for the boom release outlet and remove the plug connector, if necessary. Restart the system.
02	02	Short-circuit on the boom switch on output	Error on the boom switch outlet or overload of the boom switch outlet	The system reboots automatically. Check the plug connector for the boom release outlet and remove the plug connector, if necessary. Restart the system.
02	03	Error on the safety switch	Safety switch output read back error or incorrect voltage (battery instead of mass)	The system reboots automatically. Remove the plug connector of the in- and outputs. Restart the system.

Block 2	Block 3	Description	Cause	Remedy
02	05	CAN error in the safety loop	Incorrect safety loop status.	The system reboots automatically. Check the CAN safety loop.
04	00	Short-circuit on the digital output	Digital outputs (1-14) are short-circuited or overloaded.	The system reboots automatically. Remove the plug connector of the in- and outputs. Restart the system.
08	01	CAN is passive	CAN Bus is in passive operating status.	The system reboots automatically. Check the CAN bus connection and ensure that all other CAN participants are functioning.
08	02	CAN notification memory overflow	CAN notification memory full, refers to both the input and output memory.	The system reboots automatically. Perform a system reboot at CAN level.
08	03	CAN hardware error	General communication error.	The system reboots automatically. Check the CAN bus connection and ensure that all other CAN participants are functioning.
08	04	CAN PDO notification is too long	CAN PDO notification exceeds maximum length.	The system reboots automatically. Perform a system reboot at CAN level.
08	05	CAN PDO notification length error	CAN PDO notification falls below minimum length.	The system reboots automatically. Perform a system reboot at CAN level.
08	06	CAN COB-ID transmitter conflict	Too many conflicts on the CAN Bus.	The system reboots automatically. Check the CAN bus connection and ensure that all other CAN participants are functioning. Perform a system reboot at CAN level.

Block 2	Block 3	Description	Cause	Remedy
10	00	Transmitter error: EMERGENCY STOP	Transmitter error sent, unauthorised status for the EMERGENCY STOP switch.	The system reboots automatically. Ensure that the EMERGENCY STOP switch on the transmitter is not activated.
11	00	Transmitter error, analogue input	Transmitter error sent, analogue inputs are active	Ensure that all proportional control elements on the transmitter are in the resting position.
12	00	Transmitter error, analogue input	Transmitter error sent, signal redundancy test of the analogue inputs are faulty.	The system reboots automatically. Diagnose the transmitter in TEST MODE.
13	n/a	Transmitter error, analogue input	Transmitter error sent, signal redundancy test of the analogue inputs are faulty.	The system reboots automatically. Diagnose the transmitter in TEST MODE.
14	01	ID programming error	ID code and/or operating parameters are faulty.	The system reboots automatically. Ensure that the ID programming sequence is successful. Restart the system.
14	02	Programming error	Parameters for the programmable logic are faulty.	The system reboots automatically. Restart the system.
17	01	Low supply voltage	Supply voltage is below 8.5 V.	The system reboots automatically. Ensure that the current supply and cabling are in proper working condition. Restart the system.
17	02	Supply voltage too high	Supply voltage exceeds 36 V DC.	The system reboots automatically. Ensure that the current supply and cabling are in proper working condition. Restart the system.
98		Undefinable error	Transmitter	Check transmitter in self-test mode.
99		Undefinable error	Receiver	Check current supply and plug connector.

### 5.1.31 Self-test mode

The radio transmitter features a test mode that can be used to check that all switches, buttons, potentiometers and joysticks are functioning properly.

Procedure for activating self-test mode:

1. Bring all switches and output potentiometer to zero position.
2. Release emergency switch and actuate the ON/OFF button.
3. Before accessing the start-up screen, actuate the ON/OFF switch 10 times in quick succession until the power LED starts flashing in rapidly and the buzzer emits a sound confirming the self-test mode.
4. The LCD display shows now the software version (firmware) and serial number.



#### Information

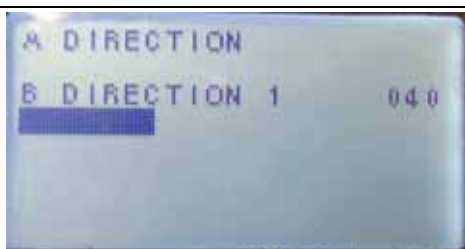
If all switches and potentiometers were not in the zero position, this display will not appear.

Bring all switches and potentiometers to zero position and repeat process!

Switches, buttons, potentiometers and joysticks can now be tested by actuating them. The functions are shown on the display and at the same time actuated acoustically by a buzzer.

Proportional inputs (joysticks and potentiometers) are displayed as a bar chart, **(Fig. 406)**.

Digital inputs (black/white) are displayed as a function symbol, **(Fig. 407)**.



00030\_SC30-disp-selbsttest1

Fig. 406



00030\_SC30-disp-selbsttest

Fig. 407





Fig. 408



## 6 Special equipment

Please note that the possibility to use special equipment depends on the machine model.





## 6.1 EASy + EASy Extend

### 6.1.1 Preface

In order to ensure safety with all permissible placing boom movements, all boom concrete pumps are equipped with appropriate support systems.

Stability can be achieved only if, among other things, all outriggers are extended horizontally up to their end positions.

Unfortunately, at many installation sites the required space is not available.

This is precisely where Schwing's one-sided outrigger system (EASy) comes into play. It offers the possibility of supporting the machine on one side by locking dangerous placing boom positions.

EASy Extend is an add-on for the EASy system. It allows for a wider range of placing boom rotations than would be possible with EASy alone.

EASy Extend is part of the "EASy-flex" configuration and is not available for all machine models.

The extended range of rotation is achieved by increasing the stability, which is done by extending the second front outrigger partially as well.

With EASy Extend equipped, you can choose between the EASy and EASy Extend modes.

The "EASy" outrigger system described here applies exclusively to truck-mounted concrete pumps without overhead folding of the placing boom.

Knowledge and strict observance of these operating instructions are essential for the safe operation of the machine.



#### Information

You must read and understand the VECTOR control chapter to understand all EASy functions.

---

## 6.1.2 General safety information

- Read the chapter carefully and contact Schwing's customer service should you have any questions.
- Learn how to correctly operate the system.
- Work carefully and closely follow these operating instructions.

The machine must be supported on one side only if EASy is active.

To do so, the outriggers on the machine side where pumping will occur are extended horizontally to their end positions.

In EASy Extend mode, the second front outrigger must be partially extended.

You can only choose between the EASy system and full support.

The full support variant requires all outriggers to be completely extended in the horizontal position. Afterwards, lift the Schwing machine vertically until all wheels are off the ground!



### Information

The working operation of the placing boom is strictly only permissible using remote control!

Do not set up the machine if you have doubts as to the suitability of the ground for bearing the load.



### Danger!

#### Loss of stability due to unsuitable ground!

If the load-bearing capacity of the ground is exceeded, machines can topple over and cause fatal accidents.

Only set up the machine on suitable ground!

Do not set up the machine if you have doubts as to the suitability of the ground for bearing the load.

Below are excerpts from the “**Setting up the machine (changeover mode)**” on page 209 chapter

Pay special attention to the requirements for setting up your machine safely, e.g.:

Safe installation site:

- Max. inclination of 3°
- Check the condition of the support pads
- Maintain the required distance from excavations, etc.

- Always put the standard support pads under all four supporting plates. If required, underlay with further, suitable material.

**Information**

EASy should be used only in exceptional cases.

Together with the site management, try to find a suitable installation site at which all outriggers can be completely extended!

### 6.1.2.1 Preventing unauthorised access

- Protect the control elements of the EASy-flex system against unauthorised actuation by locking the cover of the control panel and removing the key.

### 6.1.2.2 Functional test for the machines S24X and S28X

Automatic functional testing is provided to preserve the working safety of the system.

### 6.1.2.3 Storm and bad weather operation

During storms and bad weather, move the placing boom into the transport position.

When wind speeds reach the permissible threshold, the placing boom must be moved into the transport position.

When using an outrigger on one side with EASy, the same maximum permissible wind speeds apply to the placing boom as they do to fully supported machines.

- Placing booms with a vertical reach of 42 m or more may only be operated during winds with a force of up to 7 (51 km/h = 14 m/s).
- Placing booms with a vertical reach of less than 42 m may only be operated during winds with a force of up to 8 (72 km/h = 20 m/s).

The placing boom should also be folded if the max. permissible wind force is only exceeded by gusts.

Impermissibly high wind speeds can lead to damage to and toppling of the machine.

Also fold up the placing boom when bad weather is approaching. During bad weather, there is a risk of lightning strikes.

**Danger!****Danger to life due to lightning strikes!**

Getting close to or touching the machine can result in a fatal flashover.

The machine and its immediate vicinity is under electric load during a lightning strike.

---

Earthing the machine does not decrease this risk!

Tower cranes on jobsites often have a wind gauge, allowing you to enquire about the wind speed at any time. If no wind gauge is available, you can enquire about the wind speed at your nearest meteorological office, or roughly estimate the wind speed using the following rule of thumb:

- Starting at wind force 7, green leaves will break off trees and there will be noticeable difficulties when walking outside.
- Starting at wind force 8, small twigs will break off trees and there will be significant difficulties when walking outside.

**Information**

If the wind speeds described in this chapter deviate from those specified in the safety manual, the values indicated in this chapter shall take precedence.

---

### 6.1.3 Control and check devices

Our machines with VECTOR control can be equipped with the EASy system.

The control panel for the VECTOR control has two extra switches in addition to the necessary sensors and additional electronics (**Fig. 409**).

These include (**Fig. 410**):

- (5) - Selector switch: Select work area.
- (6) - Button "OFF": EASy OFF.





Fig. 409 Control panel without EASy-flex.

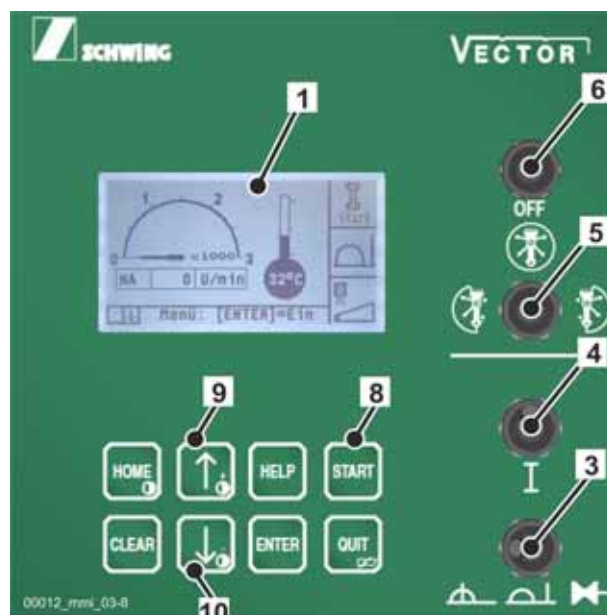


Fig. 410 Select remote control.

Display (1) and buttons (8) to (10) are known elements from VECTOR control and are also used with EASy:

Via the display (1), the EASy assistant interactively guides you through the operation.



The button (8) "START" is used here to send feedback from the operator to the EASy assistant.



### Information

Always confirm the "START" button (8) on the machine.



Experienced machine operators actuate the corresponding buttons on the remote control.

The buttons (9 + 10) are required if the machine is equipped with EASy Extend. You can use them to switch between EASy and EASy Extend mode.



Use the arrow keys (9 + 10) to select the required EASy variant.



## 6.1.4 Preparation



### Information

The EASy system features a yellow rotating beacon (1) (**Fig. 411**) on the machine.

To use the maximum possible working range while EASy is active, the vehicle must be positioned parallel to building (**Fig. 412**).

- Start up the VECTOR control system as described in the “**VECTOR control system**” chapter.

When the VECTOR control is switched on, the rotating beacon of the EASy system is also activated.

The rotating beacon remains active until a defined work area is reached and the VECTOR control is enabled on the switch cabinet.

- You can then select the desired working range at the VECTOR control using the selector switch (5).

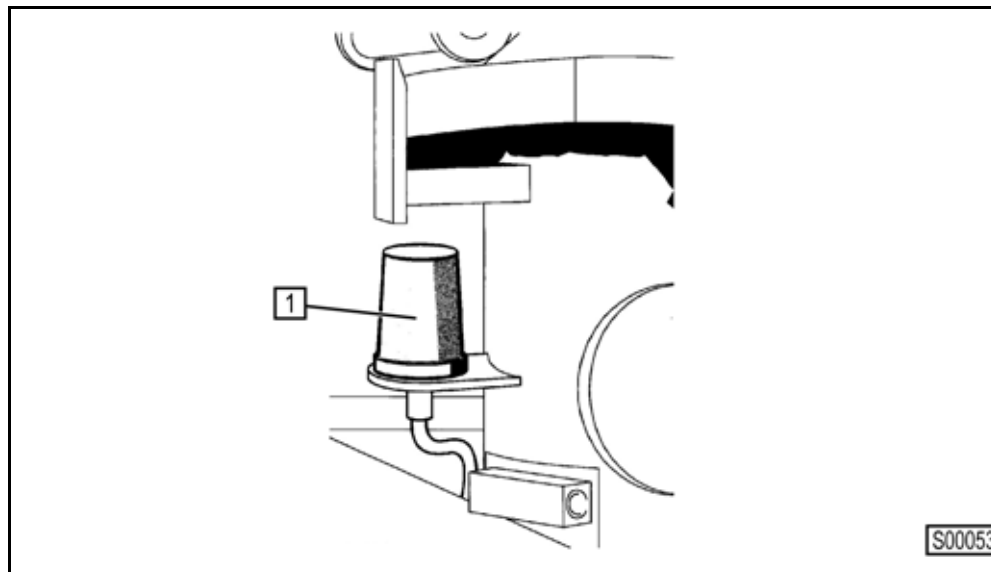


Fig. 411 Rotating beacon.

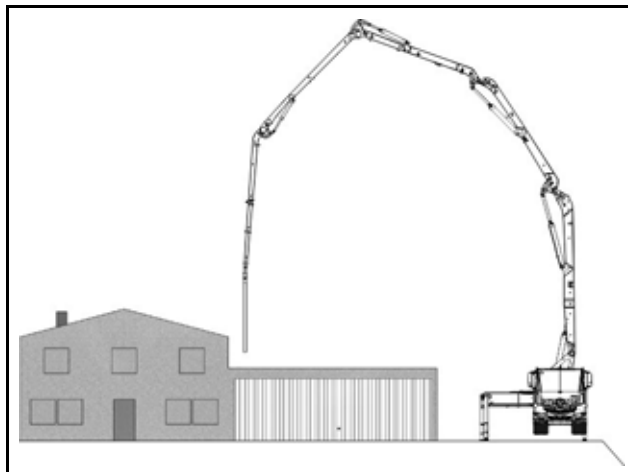


Fig. 412 Parallel arrangement

### 6.1.5 Full support - activating the entire work area

If you chose full support in section “**Preparation**” on page 600, continue from here!

Move the selector switch (5) (**Fig. 410**) to centre position:

The EASy assistant reacts to your selection with the following message:

```
EASy is switched off!  
Please confirm  
with the OFF  
switch!  
Or select  
work area!
```

The system awaits your input.



This is indicated by a question mark in the status field of the control.

- Confirm the selection of full support with the "OFF" button. (6; **(Fig. 410)**).

The EMERGENCY STOP shutdown by EASy-flex is cancelled and the display returns to the start screen **(Fig. 414)**.

The yellow rotating beacon goes off, because a work area is now defined and the placing boom is in the work area.

Now the relevant operating notes apply, according to the operating instructions of the machine.

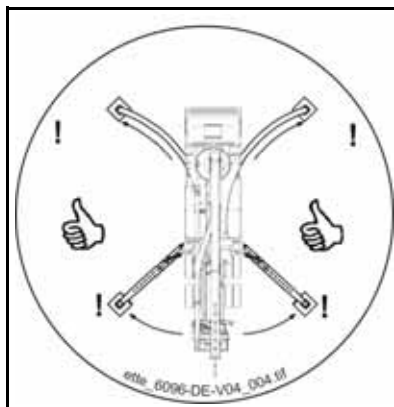


### Information

Once you have fully extended all outriggers, you can move the placing boom by 360° without any restrictions.

EASy is now deactivated!

- Extend all horizontal outriggers to their end positions.
- Lift the machine until all wheels are off the ground **(Fig. 413)**.



**Fig. 413**



- Select the remote control (3) **(Fig. 410)**.

- Lock the cover of the Vector control panel and remove the key.

The machine is then ready for pumping!

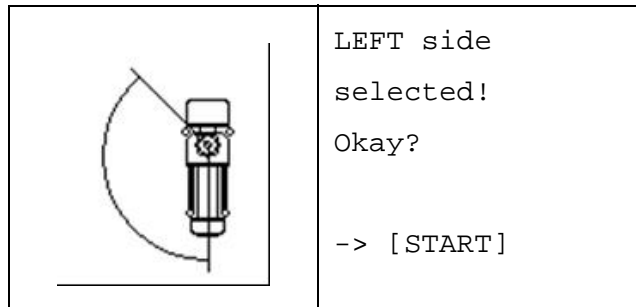
- Lift the placing boom of a normal folding-system and slew it into the desired working range.

## 6.1.6 EASy

### 6.1.6.1 Setup using the setup assistant

The machine is prepared as described at (**chap. 6.1.4**).

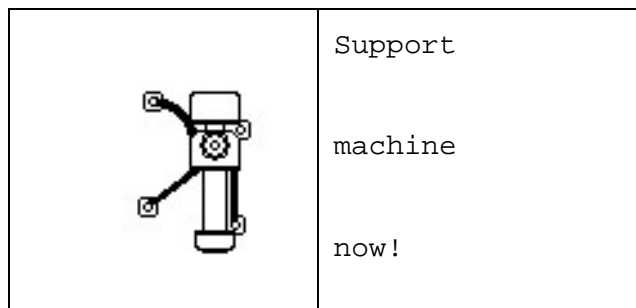
- Set selector switch 5 (**Fig. 410**) to the desired position, e.g. left.



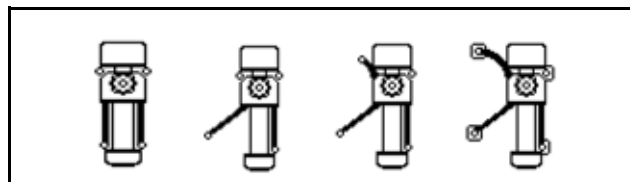
- Confirm your selection by pressing the “START” button (8).

The selection is confirmed by a short acoustic signal.

The assistant makes all internal preparations for the selected working range and shows the required support configuration on the display:



This prompt is supported by a short animation:



- Follow the instructions of the VECTOR control.

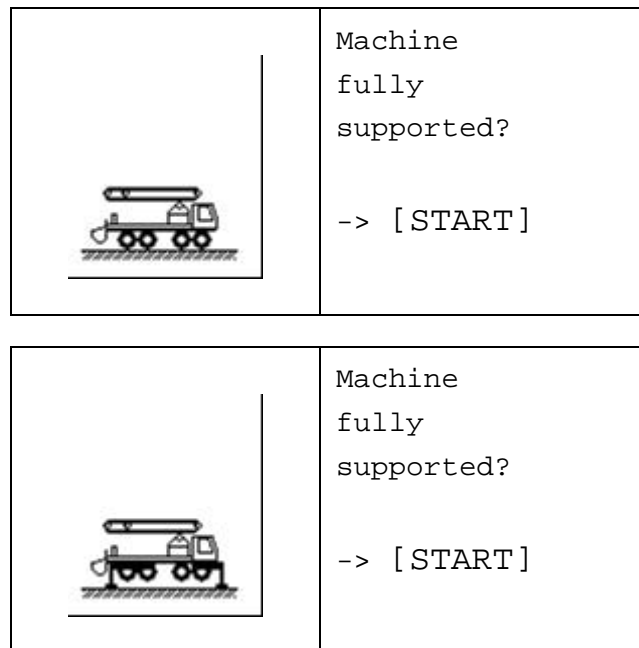


- In “LOCAL” operating mode, extend the horizontal outriggers according to the configuration shown on the display (1) (**Fig. 410**).

The horizontal position of the outriggers is queried by "end limit switches".

Once the outriggers are in their horizontal end position (short acoustic signal), the setup assistant indicates the next step.

The display alternately shows the following images:



The assistant indicates that the horizontal outriggers are correctly extended for the working range selected.

The vertical outrigger cylinders still need to be extended!

- Place the load-distributing pads under the outriggers as described in the operating instructions for the machine.



- Extend the vertical outrigger cylinders in "**LOCAL**" operating mode\*.
- Lift the machine until all wheels are off the ground\*.
- Always be sure to put the machine up as horizontal as possible. Never exceed an inclination of 3°.
- Ensure that the machine is set up correctly and confirm this by pressing the "START" button (8) (**Fig. 410**).

\* See operating instructions for the machine

As the transport position of the placing boom - if it is of the "normal folding-system" type - already is part of the monitored area of the EASy system, the display now shows the following:

```

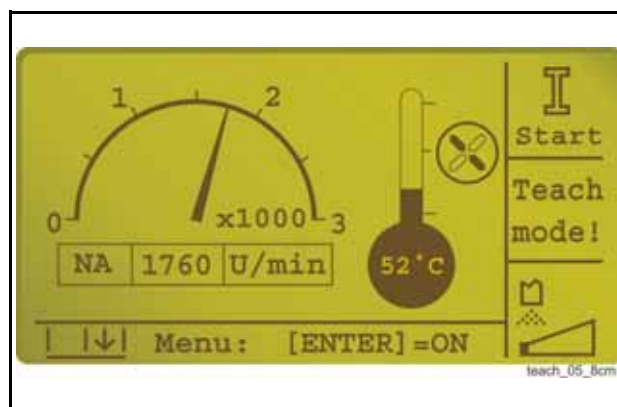
Work area
reached!

Release?-> [START]
  
```

- Release the work area by pressing the “START” button (8) (**Fig. 410**).

The setting up of the machine is complete.

The assistant is closed and the display returns to the start screen (**Fig. 414**).



**Fig. 414**

The yellow rotating beacon goes out.



### Information

As long as the yellow rotating warning light is on, the selected work area is not enabled.

- Lock the cover of the Vector control panel and remove the key.

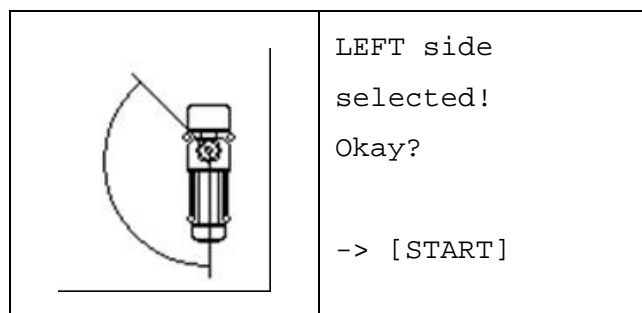
## 6.1.7 EASy Extend

### 6.1.7.1 Setup using the setup assistant

The machine is prepared as described at (**chap. 6.1.4**).

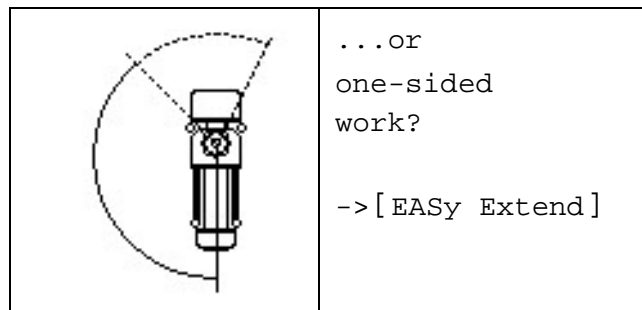
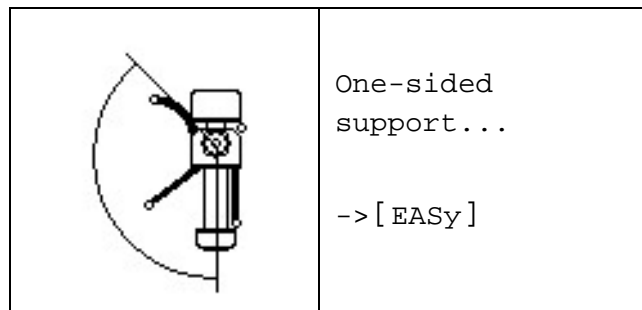
- Set selector switch 5 (**Fig. 410**) to the desired position, e.g. left.

The assistant detects the selected position and indicates the next step:



- Confirm the selection by pressing the "START" button (8), or select the other side.

The selection is confirmed by a short acoustic signal and the display alternately shows the following images:



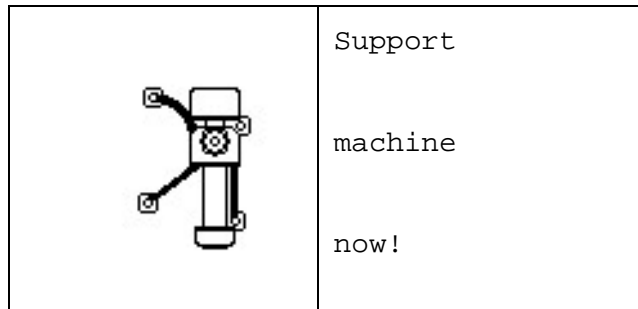
Select EASy mode using button (9) (**chap. 6.1.6**)



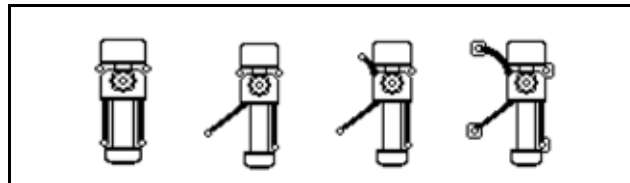


Or select EASy Extend mode using button (10) (**chap. 6.1.7**)

If EASy Extend is selected, then the assistant makes all internal preparations for the selected working range and shows the corresponding outrigger configuration on the display:



This prompt is supported by a short animation:



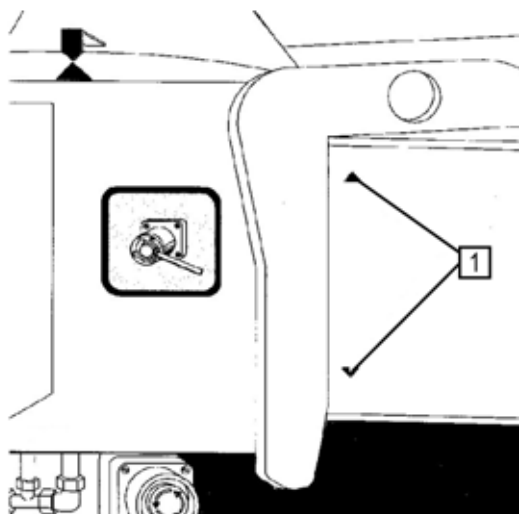
► Extend the horizontal outriggers in "LOCAL" operating mode according to the configuration shown\*.



### Information

To operate the machine in EASy Extend mode, the second front outrigger must be extended horizontally as far as possible.

Extend the outrigger at least far enough that the 1 markings on the inside (**Fig. 415**) are completely visible.



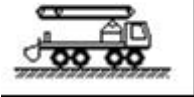
S00054

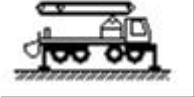
**Fig. 415**

End limit switches monitor the **horizontal** movements of the outriggers.

When these switches detect that the outriggers have reached their required positions, a short acoustic signal is given and the assistant indicates the next step.

The display alternately shows the following images:

	<p>Machine fully supported?</p> <p>-&gt; [ START ]</p>
---	--

	<p>Machine fully supported?</p> <p>-&gt; [ START ]</p>
---	--

The assistant indicates that the horizontal outriggers are correctly extended for the working range selected.

The vertical outrigger cylinders still need to be extended!

- Place the load-distributing pads under the outriggers as described in the operating instructions for the machine.



- Extend all vertical outrigger cylinders in "**LOCAL**" operating mode\*.

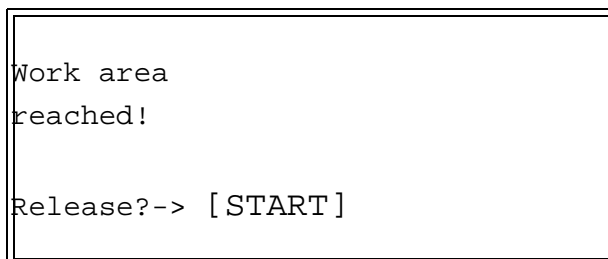
- Lift the machine until all wheels are off the ground\*.



- Make sure that the machine is set up correctly and confirm this by pressing the "START" button.

\* See operating instructions for the machine

As the transport position of the placing boom - if it is of the "normal folding-system" type - already is part of the monitored area of the EASy system, the display now shows the following:



- Release the work area by pressing the "START" button (8) (**Fig. 410**).

The setting up of the machine is complete.

The assistant is closed and the display returns to the start screen (**Fig. 414**).

The yellow rotating beacon goes out.



### Information

As long as the yellow rotating warning light is on, the selected work area is not enabled.

- Lock the cover of the Vector control panel and remove the key.

### 6.1.8 Normal operation with reduced working range

If - as described above - the working range was reduced, the placing boom can only be moved within specified limits.

The movement speed of the placing boom is reduced as it approaches a switch-off point.

In addition, an acoustic signal sounds (2x short, 1x long).

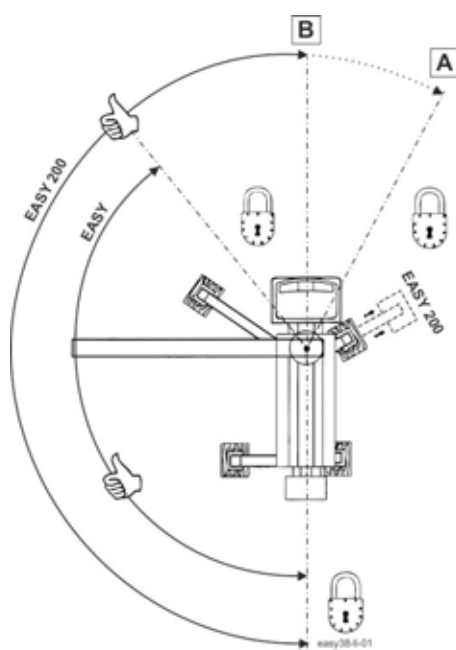


Fig. 416 Left working range

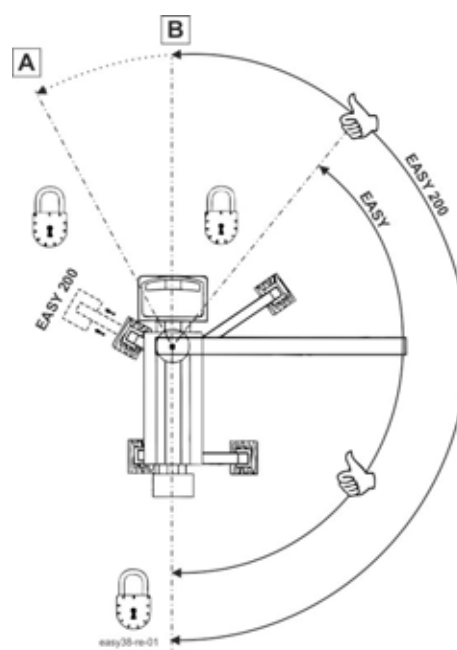


Fig. 417 Right working range

Placing boom switch-off points (Left working range (Fig. 416)) (Right working range (Fig. 417))	
A	Switch-off point for all machines except: S 43 SX III and S 38 SX
B	Switch-off point for the machines: S 43 SX III and S 38 SX



**Warning!**

**The machine may overturn!**

While pumping, the end hose must not be positioned “backwards” (behind the placing boom’s vertical line) (**Fig. 418**).

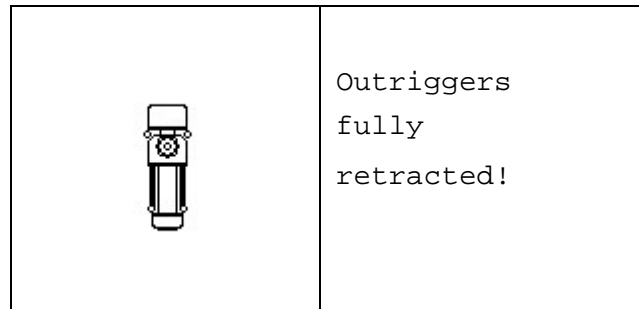


**Fig. 418**

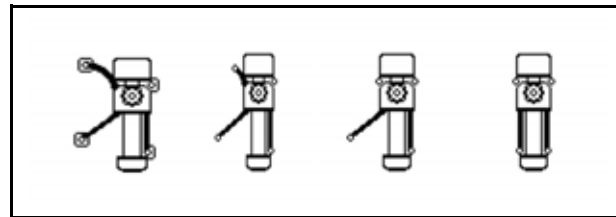
### 6.1.9 Dismantling with the disassembly assistant

- Fold the placing boom up and slew it into storage position.
- Place the boom package down in transport position.
- Switch the control from "REMOTE" to "LOCAL".

The assistant now prompts you to retract the outriggers:



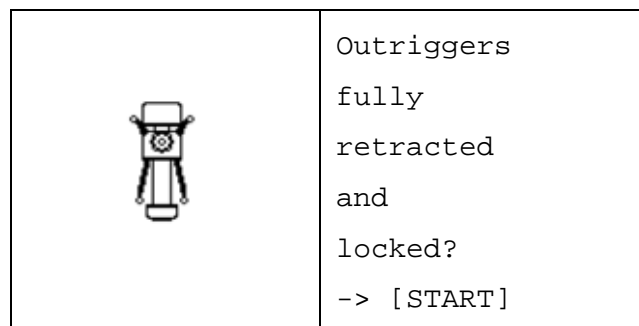
This prompt is supported by a short animation:

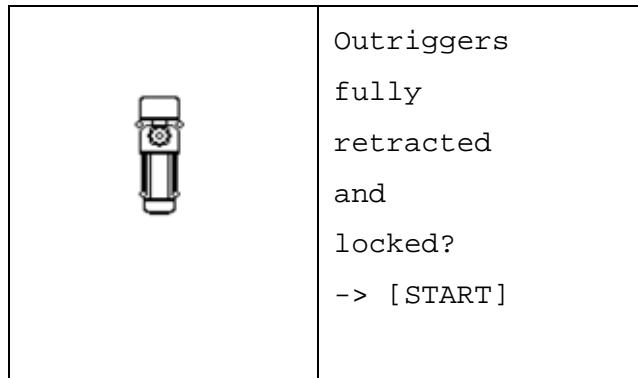


- First, retract the **vertical** outrigger cylinders, as described in the operating instructions for the machine.

After the horizontal outriggers have left their end positions and the outrigger release buttons are no longer pressed, the EASy assistant asks whether the outriggers are in the transport position.

The display alternately shows the following images:





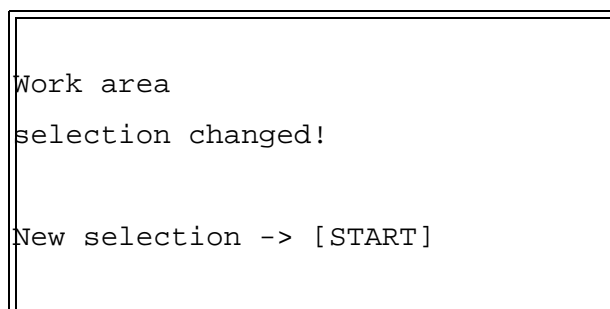
- Make sure that the outriggers are in the transport position and locked. Confirm this by pressing the "START" button.

After pressing the "START" button, the system is ready to be switched off or to select a new work area.

## 6.1.10 Changing the working range

### 6.1.10.1 Boom in the tray

If selector switch (5) (**Fig. 410**) is pressed during the installation of the machine, the following message will appear:



- Press the "START" button (8) if you actually want to change the work area and follow the menu prompts on the display of the VECTOR control switch cabinet.

### 6.1.10.2 Boom raised

If a different work area is desired while in EASy mode and while the boom is raised, the machine must be put up anew.

That is:

- Bring the boom and the outriggers into transport position.
- Set up the machine again, as described in (**chap. 6.1.6**).

## 6.1.11 Control of operations

### 6.1.11.1 Functional shutdown

When using remote control and with EASy activated, angle sensors monitor the permissible working range of your machine's placing boom ("functional shutdown").

To achieve "soft" stopping of the placing boom movement, the maximum possible movement speed is reduced just before reaching the switch-off points.

You move the placing boom out of the danger zone by steering in the opposite direction.


### 6.1.11.2 Safety shutdown in case of malfunction

If an end limit switch of your machine's automatic safety system is overrun, there is a serious fault in your machine's safety system and the EMERGENCY STOP is triggered automatically.

The placing boom stops!

The "Remote" operating mode is terminated and an acoustic signal sounds.

The VECTOR control system detects a serious fault and displays a corresponding message:

	<p>!Safety shutdown! EASy safety circuit activated! (E05H)</p>
---	--

- Acknowledge the serious fault at the control cabinet of the VECTOR control as described in the operating instructions of the VECTOR control. (The acknowledgement of serious faults is saved!).





**Danger!**

**Danger to life due to the machine toppling over!**

An EASy-flex failure can cause the machine to topple over and result in fatal injuries!

Using the emergency operation control station, immediately move the placing boom into the transport position. See section “**General: Emergency operation**” on page 618.

During repair work, EASy-flex must no longer be used.

The machine must be fully supported.

Inform SCHWING’s customer service and have the EASy system repaired.

**6.1.12 General: Operating error by the user**

1. If selector switch (5) (**Fig. 419**) is actuated while an outrigger is engaged on one side, the display will show the following message:

	AB selection changed inadmissibly! (E33M)
--	--


The previously selected work area / EASy variant remains active.

The above message is shown until the position of switch (5) and the active work area match again.

- Return switch (5) to its original position.

2. If selector switch (5) is switched to the centre position while an outrigger is engaged on one side and the entire work area has been confirmed with the "OFF" button (6), the VECTOR control will detect a serious error.

The display shows a corresponding message:

	Safety shutdown! Inadmissible change of the work area! (E35H)
---	--

Due to the serious fault the machine is placed in EMERGENCY STOP state.

The "Remote" operating mode is terminated and an acoustic signal sounds.

- Acknowledge the serious fault as described in the operating instructions of the VECTOR control. (The acknowledgement of serious faults is saved!).

EMERGENCY STOP is thereby cancelled, however, the boom remains blocked.  
The display shows the following message:

	Boom functions locked due to EASy malfunction! (E34M)
--	--

If necessary, the boom must be driven out of the danger area using the emergency controls. See section “**General: Emergency operation**” on page 618.

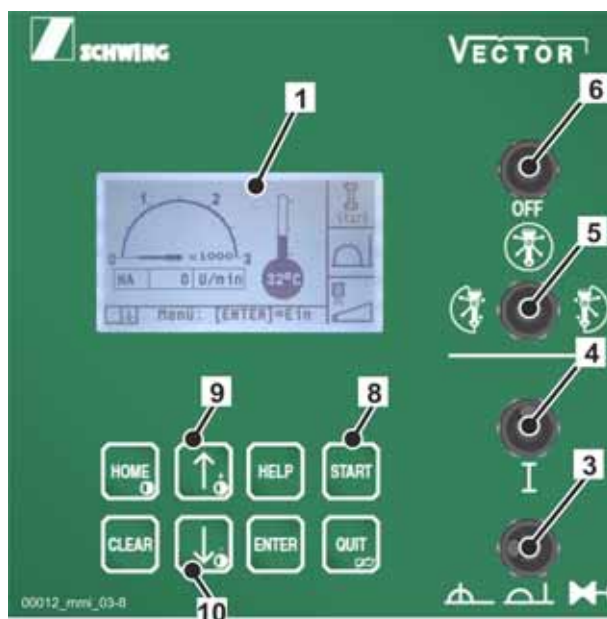


### Danger!

#### **Danger to life due to the machine toppling over!**

The machine can topple over when the placing boom is moved into an unsupported area.

Only move the placing boom within the supported area of the machine



**Fig. 419**

The block will be removed, if

- The position of switch 5 corresponds to the actual status of the machine and this work area has been enabled.
- The boom is in the support.

All four outriggers are extended.

## 6.1.13 General: Operating interruptions

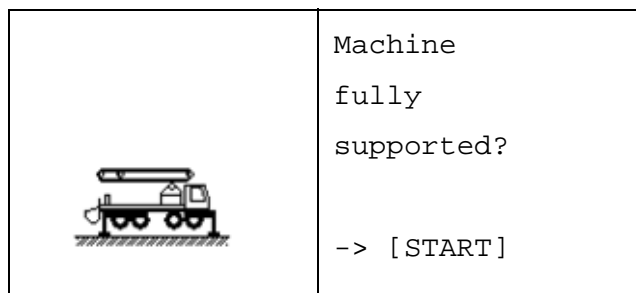
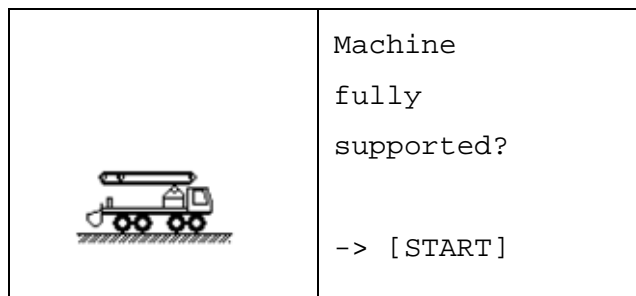
### 6.1.13.1 VECTOR control and (or) ignition switched off

If the power supply of the VECTOR control was switched off while EASy-flex was active, proceed as follows to recommission it:

- Switch ignition on.
- Start the VECTOR control.

The control recognises the current status.

The display alternately shows the following images:



At this point there is a system security check.

- Make sure that the machine is installed correctly and press down the button for the outrigger release on both outrigger control blocks for approx. 5 seconds:



- Then press the "START" button (8) (**Fig. 420**) to acknowledge the action and follow the menu prompts.

You can now resume operation.

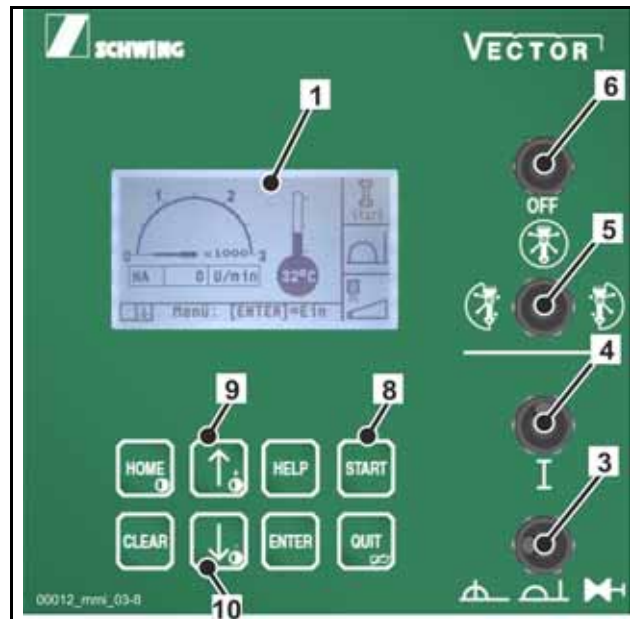


Fig. 420

#### 6.1.14 General: EMERGENCY STOP

If the EMERGENCY STOP button was pressed when EASy-flex was active, proceed as follows:

- Remedy the fault.
- Unlock the EMERGENCY-STOP button.
- Start the VECTOR control.
- Resume operation.

#### 6.1.15 General: Emergency operation

In the event of a radio remote control failure, you can use the optional cable remote control.

If this is not possible either, the placing boom must be moved immediately into the transport position using the emergency operation control station (example, (Fig. 421)).

The EMERGENCY STOP system may need to be bypassed.

See the “EMERGENCY STOP bypass” chapter.

**Danger!**

The **EMERGENCY STOP** system may only be bypassed in the event of an extreme emergency.

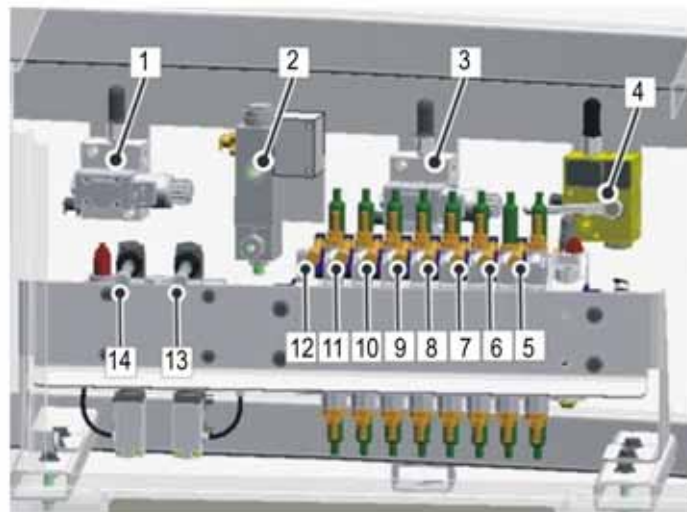
Make sure to read the chapter, see (“**Emergency operation**” on page 303).

### 6.1.15.1 Bypassing the EMERGENCY STOP system

- Insert the key into the key-operated switch (7) (**Fig. 422**) and turn it into locking position.

**Information**

The key cannot be removed in this position.



S00055

Fig. 421



Fig. 422

- If necessary, first move the placing boom back to the secure (supported) area (example: **(Fig. 423)**) using the emergency operation control levers.
- Clean the machine and place the placing boom into transport position (boom support).
- Inform SCHWING's Customer Service and have the control repaired immediately.

SCHWING expressly points out that a "bypassed machine" must not be used for working operation!

"Bypassed machines" must be repaired!

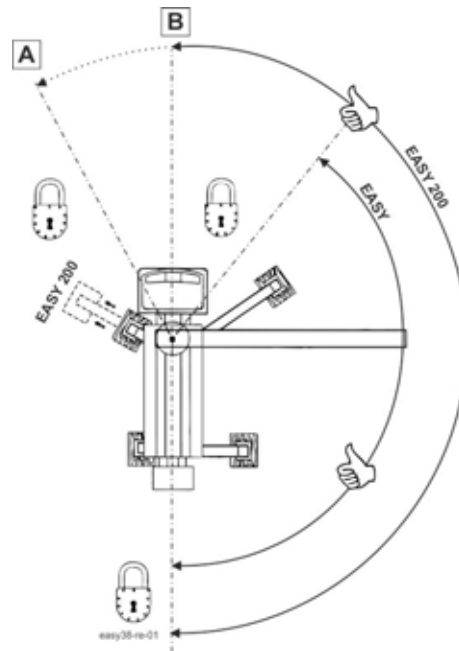


Fig. 423

Placing boom switch-off points	
A	Switch-off point for all machines except: S 43 SX III and S 38 SX
B	Switch-off point for the machines: S 43 SX III and S 38 SX

### 6.1.16 General: Error messages



#### Information

This list is not exhaustive.


Depending on the software version other (further) messages can be displayed.



#### Caution!


#### Danger due to failure to observe error messages!

The machine operator is responsible for ensuring that faults displayed once (Code "L" or "H") are repaired immediately. See operating instructions for the VECTOR control system. Contact SCHWING's customer service if no qualified personnel are available. Always inform customer service of the reported error code, e.g. E05H.

Code	International output	Text output (national)	Meaning: necessary action!
E05H		!Safety shutdown! EASy safety circuit activated!	See section " <b>Functional shutdown</b> " on page 614.
E06H		!Safety shutdown! EASy safety circuit faulty !	Move the placing boom into the secure area (see section " <b>Changing the working range</b> " on page 613)
E07L		EASy safety circuit faulty !	Move the placing boom into the secure area (see section (see " <b>Changing the working range</b> " on page 613))
E08M		CAN-EWB/EWB module failed!	Examine fuse F 19. EASy-flex operation not possible.
E09H		!Safety shutdown! CAN-EWB/EWB module failed!	Move the placing boom into the secure area (see section " <b>Changing the working range</b> " on page 613)
E10L		Selector switch "AB selection" faulty !	EASy-flex operation not possible. Inform SCHWING's customer service.
E12L **		Multiple absolute encoders with same CAN-ID available!	Switch control off and on again. If the error recurs, inform SCHWING's customer service.



Code	International output	Text output (national)	Meaning: necessary action!
E13L **		Configuration for absolute encoder slewing gear incorrect!	Switch control off and on again. If the error recurs, inform SCHWING's customer service.
E14L ** ***		Configuration for absolute encoder boom joint A incorrect!	Switch control off and on again. If the error recurs, inform SCHWING's customer service.
E15L **		Incorrect/New absolute encoder for detected for slewing gear!	Do not use EASy. Inform SCHWING's customer service.
E16L ** ***		Incorrect/New absolute encoder for detected for boom joint A!	Do not use EASy. Inform SCHWING's customer service.
E17L **		Electrical connection to absolute encoder for slewing gear faulty!	Switch control off and on again. If the error recurs, inform SCHWING's customer service.
E18L ** ***		Electrical connection to absolute encoder for boom joint A faulty!	Switch control off and on again. If the error recurs, inform SCHWING's customer service.
B18L		sensor for boom being supported faulty!	Although the boom is being supported, clear boom movements are detected by the system.
E19L **		absolute encoder for for slewing gear inoperable!	Switch control off and on again. If the error recurs, inform SCHWING's customer service.
E20L ** ***		absolute encoder for for boom joint A inoperable!	Switch control off and on again. If the error recurs, inform SCHWING's customer service.
E21L **		absolute encoder for for slewing gear has internal defect!	Switch control off and on again. If the error recurs, inform SCHWING's customer service.
E22L ** ***		absolute encoder for for boom joint A has internal defect!	Switch control off and on again. If the error recurs, inform SCHWING's customer service.
E23L **		External control absolute encoder for for slewing gear!	Boom was moved without electrical control, possibly emergency control.
E24L ** ***		External control absolute encoder for for boom joint A!	Boom was moved without electrical control, possibly emergency control.

Code	International output	Text output (national)	Meaning: necessary action!
E25L **		Zero point adjustment absolute encoder for slewing gear faulty!	Switch control off and on again. If the error recurs, inform SCHWING's customer service.
E26L ** ***		Zero point adjustment absolute encoder for for boom joint A faulty!	Switch control off and on again. If the error recurs, inform SCHWING's customer service.
E27L		Zero point adjustment of cam switch for slewing gear faulty!	Switch control off and on again. If the error recurs, inform SCHWING's customer service.
E28L		Switching point cam switch for slewing gear not set up correctly!	Switch control off and on again. If the error recurs, inform SCHWING's customer service.
E29M		of cam switch for for slewing gear faulty !	Switch control off and on again. If the error recurs, inform SCHWING's customer service.
E30L		Measured value offset for sensors on the slewing gear too large!	Do not use EASy-flex. Inform SCHWING's customer service.
E31L		Switching function of cam switch for slewing gear faulty!	Do not use EASy-flex. Inform SCHWING's customer service.
E32H *1		Zero point adjustment of cam switch for slewing gear faulty!	Attention! Slewing gear limits / cab protection no longer checked !!!
E33M		AB selection changed inadmissibly!	See section " <b>General: Operating error by the user</b> " on page 615.
E34M		Boom functions locked due to EASY malfunction!	See section " <b>General: Operating error by the user</b> " on page 615.
E35H		!Safety shutdown! Inadmissible change of the work area!	See section " <b>General: Operating error by the user</b> " on page 615.
E36L ** ***		Measurement change absolute encoder for for boom joint A too big!	Jump in the measured value on boom joint A occurred. Switch control off and on again. If the error recurs, inform SCHWING's customer service.
E37L		Function of sensor for slewing gear faulty!	No measured value, although the boom was moved. Switch control off and on again. If the error recurs, inform SCHWING's customer service.



Code	International output	Text output (national)	Meaning: necessary action!
E38L ** ***		Function of absolute encoder for boom joint A faulty!	No measured value, although the boom was moved. Switch control off and on again. If the error recurs, inform SCHWING's customer service.
E41M		Weight on the lifting device too high	Reduce weight on the lifting device! The system only allows the lowering of boom 1.
E42H		!Safety shutdown! Weight on the lifting device too high	In addition to E41M: Serious fault is shown when there is a risk of toppling and/or sensors have failed.
E43H		!Safety shutdown! Sensor failure on the lifting device	Serious fault is shown when sensors have failed.
E44M		Outriggers not fully extended!	Not all outriggers are extended when switching from LOCAL to REMOTE operation.
E45H		!Safety shutdown! Machine is not correctly supported !	When the REMOTE operation is released despite (E44M) and the boom leaves the boom support.
E46L		CAN Box CBO failed!	Sensor failure! The outrigger sensor system has failed.
E47L		Tilt sensor for boom 1 inoperable!	Sensor failure! Repair operation and cab protection without function.

Code	International output	Text output (national)	Meaning: necessary action!
E48L		Angle detection for slewing gear inoperable	<p>Sensor failure!</p> <p>EASy-flex is not possible!</p> <p>Slewing gear limits / cab protection no longer checked!</p> <hr/> <p>Manual deactivation of the VECTOR control and EASy system.</p> <p>Key-operated switch of the VECTOR control is switched off for longer than 30 seconds.</p> <p>Switch the key-operated switch for 10 seconds and raise the boom out of the boom support. Hose protection and cab protection immediately become active again.</p>
E49H		!Safety shutdown! Slewing gear limits reached!	Serious fault when the boom is kept moving with the hand lever despite having reached the slewing gear limits.
E50H		!Safety shutdown! External control for slewing gear!	Serious faults when during repair, it is not moved via remote control but rather via hand levers.
E51H		!Safety shutdown! External control for boom joint A!	Serious faults when during repair, it is not moved via remote control but rather via hand levers.
E52H		!Safety shutdown! Referencing for slewing gear faulty!	<p>Serious fault!</p> <p>When leaving the boom support, the automatic referencing detects a slewing gear angle of <math>\lt; 20^\circ</math>.</p> <p>Hose protection and cab protection are not active!</p> <p>The slewing gear must be referenced manually.</p>
E53M		Incorrect boom position for lifting device!	<p>When, for e.g., the telescope is extended and the load limitation system detects a load on the lifting device!</p> <p>Reduce the weight of the load.</p>
E54M		Lifting device active !	As soon as a load $\gt 35$ kg is detected on the lifting device!

Code	International output	Text output (national)	Meaning: necessary action!
E55M		Check outriggers!	Message of the cable pull sensor regarding:  Fully retract and extend outriggers with cable pull sensors.  If the error message continues to appear, please contact Customer Services.
E56L		Measured value offset for sensors on boom 1 too large!	Please inform SCHWING's customer service.
E57M		Check sensors for slewing gear reference!	Please inform SCHWING's customer service.

\*1 = only with S 42 SX

\*\* = faults with "absolute encoders" only apply to S24X and S28X.

\*\*\* = applies to overhead folding-systems and normal folding-systems with EASy-flex.

### 6.1.17 General: Repair / Updates

Repair work on the EASy system must only be carried out by persons authorised by SCHWING.

This also applies for the replacement of individual parts and software updates.



#### **Warning!**

#### **The machine can topple without calibration of the EASy mode!**

Various components (sensors, the cam switching system, etc.) must be calibrated following installation.

Should this be neglected or incorrectly carried out, this components will not carry out their intended purposes and (or) can be damaged.

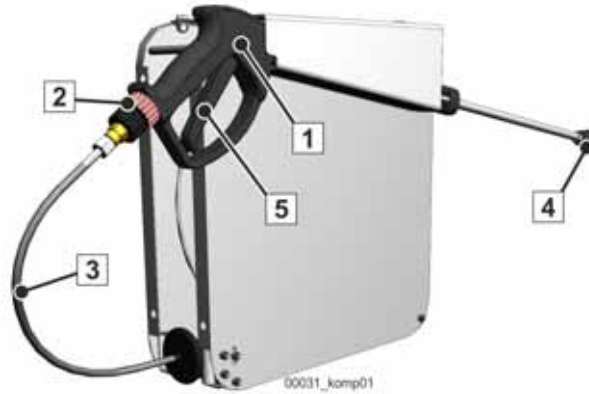
A possible consequence is the danger that the placing boom exceeds shutdown positions.

---

6.2 High-pressure cleaner (HPC)



### 6.2.1 General safety instructions for HPC system



**Fig. 424**

Also observe the manufacturer's instructions on high-pressure cleaning systems, which have been enclosed separately with your machine.

The operator of the machine is responsible for instructing the operating personnel in how to use the machine.

For special safety instructions, refer to the instructions provided by the manufacturer of the special equipment "High-pressure cleaner" and the system "VDMA safety manual [German Engineering Federation]".

- Before and during work, check the seal of the suction and pressure line.
- Make sure the spray lance trigger operates smoothly and resets on its own (5) (**Fig. 424**), and ensure that the pump shuts down automatically.



#### Warning!

#### **Severe injuries may be caused by liquid under pressure!**

Hydraulic oil escaping under high pressure can penetrate the skin and lead to death if not treated medically.

During operation of the high-pressure pump, no one may remain in the immediate vicinity.

If a malfunction occurs, hydraulic oil and water steam under high pressure can escape from the corresponding overpressure valves on the pump.

In case of danger, actuate an EMERGENCY OFF button on the machine.

All protective covers must be attached and in good working condition.





### Warning!

#### Risk of severe injury due to high-pressure water jet!

The high-pressure water jet can cause severe injuries.

Never leave the HPC's spray lance unattended while under operating pressure!

At the end of work, separate the connections on the oil and water side.

Never work with the high-pressure cleaning system from a ladder or the like.

Always provide sufficient stability.

- Always hold the spray lance with both hands and take into account the recoil from the HPC.
- Never work in the danger zones of vehicles, machines, jobsites, etc.
- Never direct the spray lance at people, animals, fragile or loose material.
- Interrupt operation if people or animals are approaching the vicinity.

The water jet of the HPC can damage hydraulic hoses, lubrication points and other machine components.

- Only use the HPC to clean machine components that are used to process concrete.
- Prevent the system from being switched on unintentionally or without proper authorisation by closing and locking the covers over the control devices on the machine.
- Do not twist, tear or bend high-pressure hoses, since the smallest damage to the hose can result in serious accidents.

Repairs may only be carried out by authorised personnel.

Unauthorised opening of the pump voids the guarantee!

Only use original spare parts.

Altering the factory-set pressure relief limit (2) (**Fig. 436**) is strictly prohibited!

The use of accessories or mounting parts not included in the scope of delivery is not permitted and will void the warranty, guarantee and general liability of the manufacturer.



**Danger!**

**Danger to life due to voltage transfer!**

Electrically live components may not come into contact with water. This may result in danger to life due to voltage transfer

Never hold the water jet of the HPC directly on or in the vicinity of electrical or electronic components.

---



**Danger!**

**Danger to life from inhalation or ingestion of dangerous substances!**

Do not clean any material containing dangerous substances (e.g. asbestos).

Do not use chemicals, detergents and hot water as spraying agent.

May be fatal if swallowed and entering the airways.

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## 6.2.2 Preface

SCHWING machines can be equipped as special equipment with a high-pressure cleaning system (hereinafter referred to as HPC).

The present operating instructions are based on the manufacturer's documentation and take into account the installation in SCHWING machines.

The position of the individual components of the high-pressure cleaner (high-pressure pump, hose reel, etc.) can vary depending on the model.

The images used in these instructions merely serve as an example.

The handling of the HPC system remains the same.

Should you have any queries or issues, please contact our Customer Service department or your SCHWING representative.

### 6.2.2.1 Operating interruptions

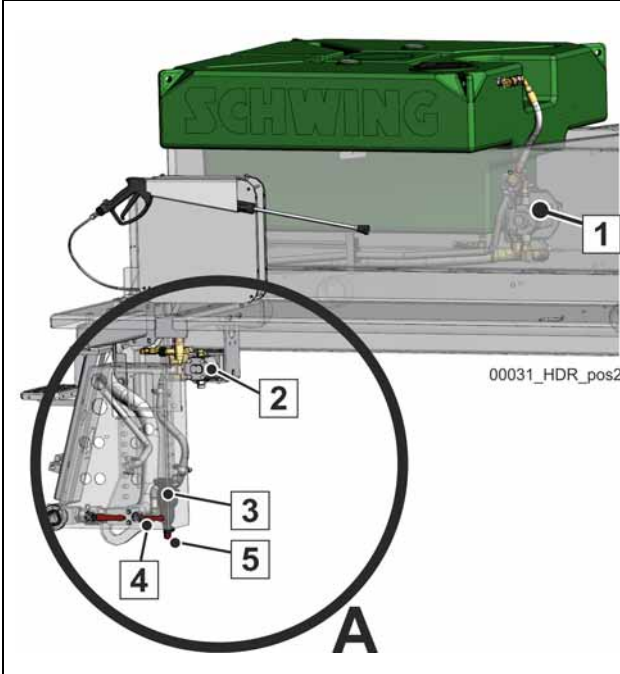
In the event of a malfunction, interrupt the operation as follows:

- Release the spray lance trigger immediately
- Stop the hydraulic drive of the high-pressure pump on the local or remote control unit
- Release pressure in the spray lance by squeezing the trigger

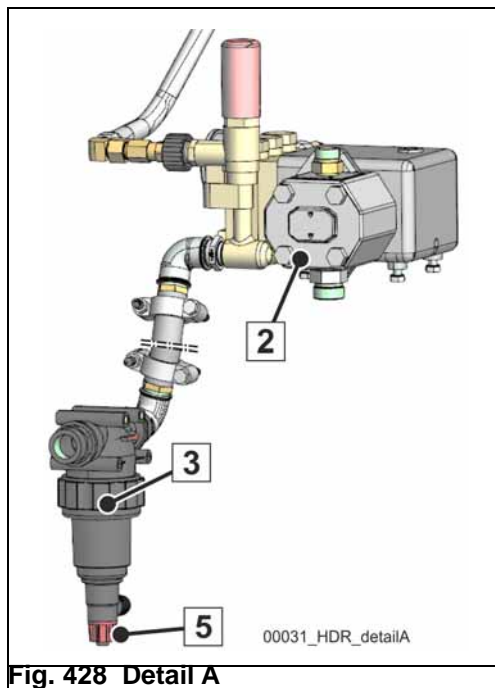


**6.2.2.3 Water system with HP pump**

(Example (Fig. 427) / (Fig. 428) / (Fig. 429))

 <p><b>Fig. 427</b></p>	Caption for <b>(Fig. 427)</b>	
	1	Water pump
	2	High-pressure pump
	3	HP suction socket with water filter
	4	Ball valve for high-pressure water system
5	Turn-lock fastener for suction pipe drainage	

 (The base frame and supply control are illustrated clearly in **(Fig. 427)**.)



Caption for (Fig. 428)	
2	High-pressure pump
3	HP suction socket with water filter
5	Turn-lock fastener for suction pipe drainage

Fig. 428 Detail A

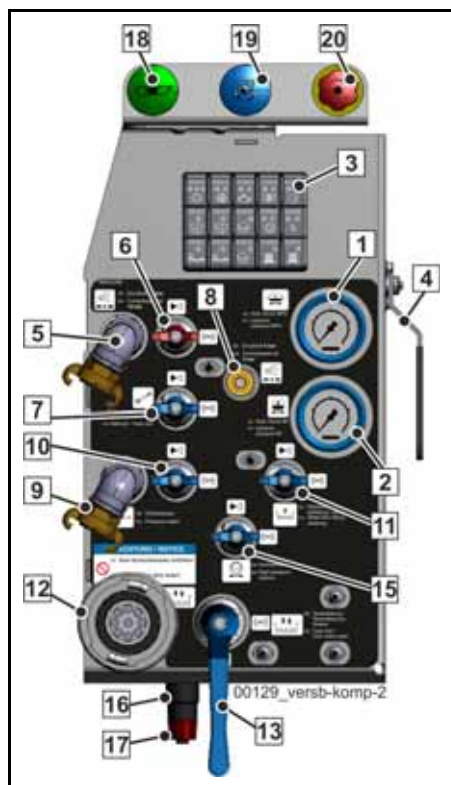


Fig. 429 (15) HPC ball valve

#### 6.2.2.4 Accessories

The high-pressure cleaning system delivered by SCHWING as special equipment is ready for use.

Any accessories available on the market will be neither tested nor approved by SCHWING.

Neither SCHWING nor the pump manufacturer can be charged with damages or accidents caused by unsuitable accessories.



#### Information

Any damages caused as a result of incorrect or negligent operation, maintenance and repair, or due to improper use, shall void all warranty and liability claims against the company SCHWING GmbH.

This also applies to expansions and retrofit parts, as well as other changes to the machine that were not approved by SCHWING!

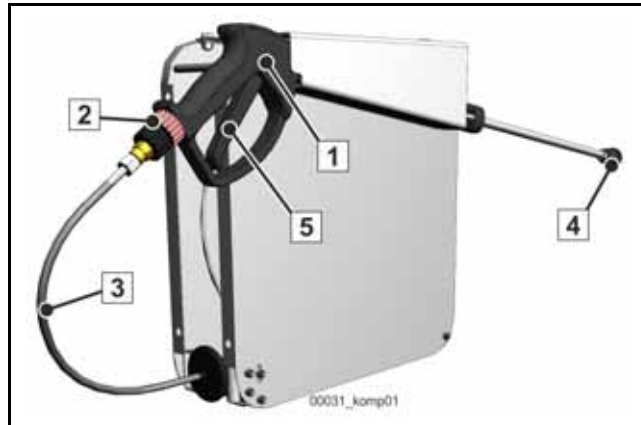
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### 6.2.3 Water supply

The high-pressure pump draws in water from the water case of machine.

Only use clean water to fill the water case of your machine.

Dirty water quickly wears down the water pumps and clogs the water filter insert (3) (**Fig. 427**) causing damage to the HP pump.



**Fig. 430**

Caption for (Fig. 430 )	
1	Handle of spray lance with trigger
2	Knurled nut (connects the spray lance to the high-pressure hose)
3	High-pressure hose
4	High-pressure nozzle
5	Spray lance trigger



## 6.2.4 Operation

### 6.2.4.1 Each time the device is started

- Check the water level in the water case.  
The HP pump does not start if too little water is in the water case. Clean the water filter insert (siehe **“Maintenance / Inspections”** auf Seite 648).
- Check the suction line of the water case to the HP pump for leaks. The permanent aspiration of air causes damage to the high-pressure pump.
- Always vent the system before the device is started (siehe **“Bleeding the spray lance”** auf Seite 642).



#### Attention!

#### Material damage caused by air in the system!

Vent the system on the water side before each commissioning.

Otherwise, damage to the high-pressure pump can occur, which is not covered by the manufacturer warranty.

- Opening the ball valve (15) (**Fig. 431**) directs water from your machine's water case to the high-pressure pump. See information sign on the supply control.

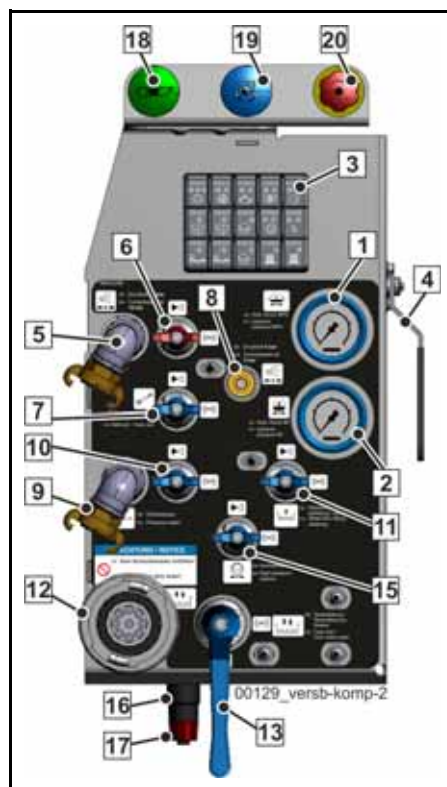


Fig. 431 Supply control

#### 6.2.4.2 Unrolling the hose



##### Warning!

##### **Severe injuries due to defective high-pressure hoses.**

The spray lance can detach from the hose like a projectile and cause severe injuries.

Only pull on the high-pressure hose when unrolling or rolling up the hose and never on the spray lance.

The system is equipped with rolling equipment (8) (**Fig. 432**) for the high-pressure hose.

The hose reel has a mechanical spring motor for rolling up the high-pressure hose.

- Unroll the hose from the hose reel under light traction and in a straight line. Unrolling the hose diagonally causes material wear and possible leaks in the high-pressure hose due to unnecessary abrasion.

Pulling out the high-pressure hose tensions the mechanical spring motor in the hose reel.

- When the required hose length has been unrolled, lock the hose by lightly tugging on it and then letting it slowly retract to the next "Snap-in point".
- Only switch on the HPC if you have unrolled the required hose length.

#### 6.2.5 Rolling up the hose

- Switch off the HPC.
- Clean the high-pressure hose from the outside before rolling it up.
- Disengage the lock on the high-pressure hose by pulling slightly on the hose.
- Guide the hose by hand while being rolled up onto the hose reel. The spring motor pulls the hose onto the hose reel.
- Ensure that the high-pressure hose is rolled up evenly.
- Do not allow the hose to spring back in an uncontrolled manner, as this could cause personal injury or material damage.

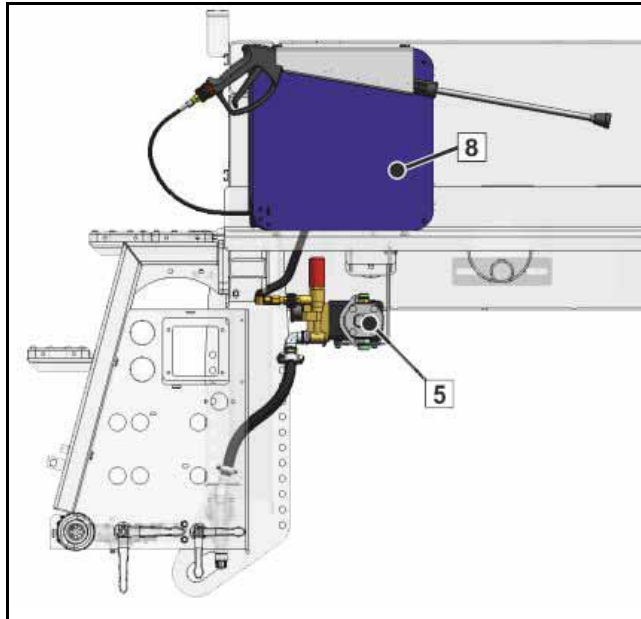



Fig. 432 Hose reel (8) fig. similar

### 6.2.5.1 Bleeding the spray lance

- Reduce the speed of the drive motor to idle.
- Hold the spray lance tightly and direct the spraying nozzle (4) (**Fig. 433**) such that the water can flow out freely.
- Actuate the trigger of the spray lance (1) (**Fig. 433**) until water no longer escapes from the spraying nozzle.
- If you switch on the HP pump using the local control (6)  (**Fig. 434**), the pump will draw its water from your machine's water case. If the trigger is not actuated, the HP pump cannot pump water to the spray lance.
- Switch off the HPC in the event of malfunctions.
- Carry out trouble shooting (siehe "**Troubleshooting**" auf Seite 653). Only start cleaning up if you are convinced that the HPC is functioning properly.

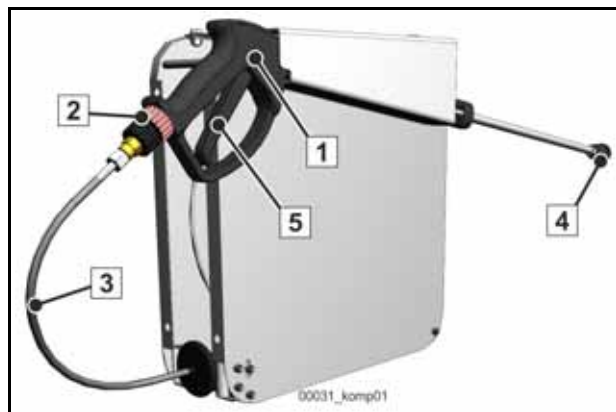


Fig. 433 Hose reel and spray lance

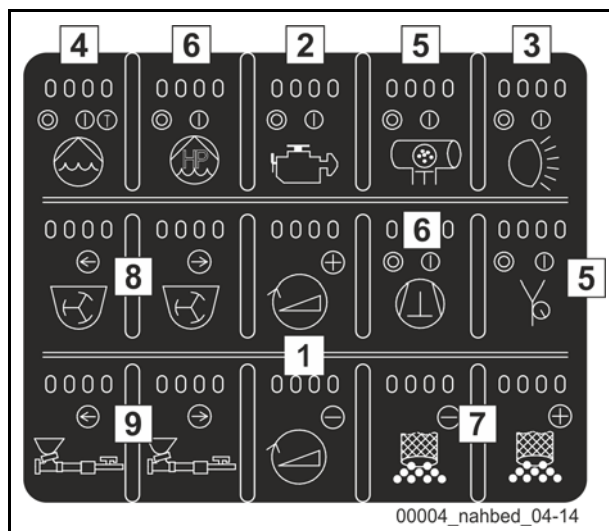


Fig. 434 Local control keypad

### 6.2.6 Cleaning operation

- Begin the cleaning work by actuating the spray lance trigger.
- Always pay attention for leaks on your machine.
- Interrupt work immediately if leaks occur and carry out troubleshooting according to Section Troubleshooting.

The speed of the vehicle engine affects the water pressure.

- Increase the drive speed of the vehicle engine only so far that an increase in the water pressure is still detectable.
- If an increase in the water pressure is detected, slightly reduce the speed of your vehicle engine again!
- Ensure that the automatic operation is working properly by squeezing and releasing the spray lance trigger several times.

If the trigger is not actuated, the HP pump cannot pump water to the spray lance.

### 6.2.7 End of operation and interruptions

- Release the spray lance trigger
- Switch off the HP pump using the selector switch on the local control of the machine.

Depressurise the HPC by actuating the trigger of the spray lance once more until water stops flowing out!

#### Key points:

1. Release spray lance trigger
2. Switch off HP pump
3. Actuate spray lance trigger again

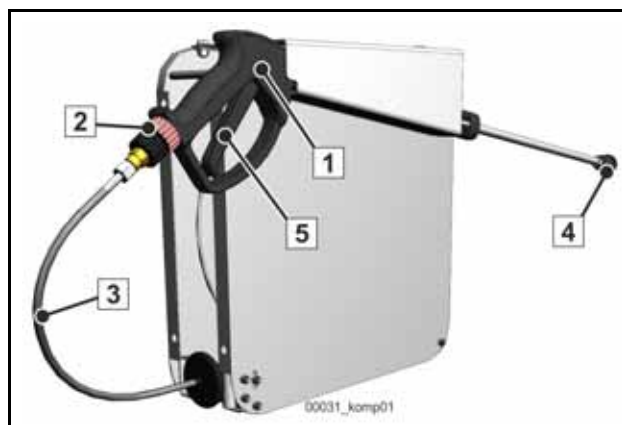


Fig. 435

### 6.2.8 Operating faults



#### Warning!

#### Severe injury may be caused by systems under pressure!

If a malfunction occurs, hydraulic oil and water steam under high pressure can escape from the corresponding overpressure valves on the pump.

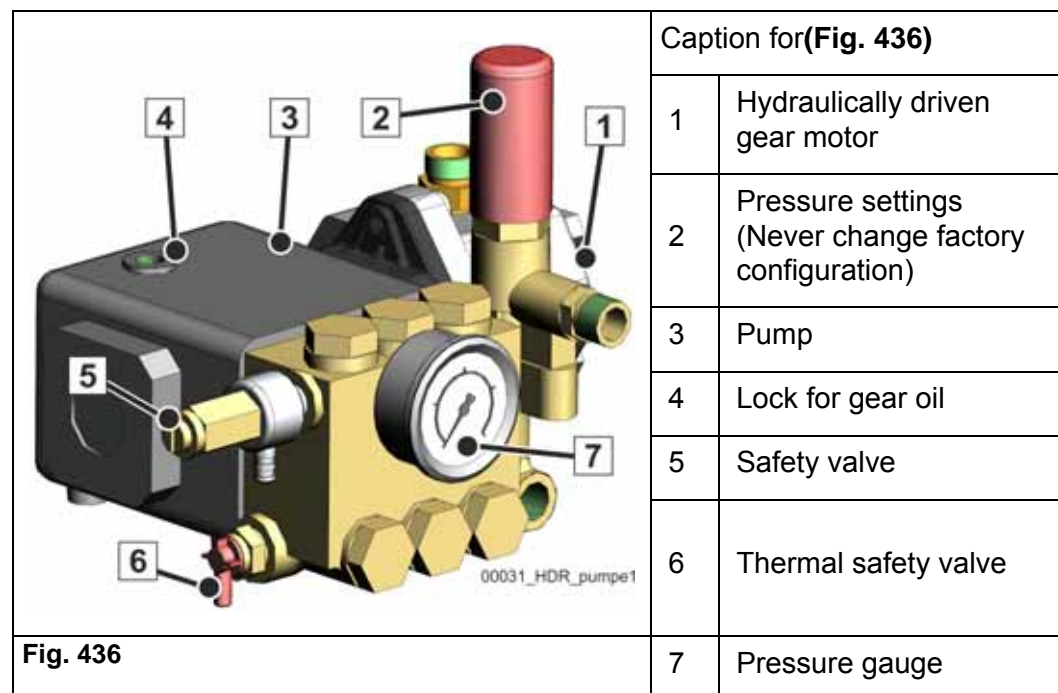
This can result in severe injuries.

During operation of the high-pressure pump, no one may remain in the immediate vicinity.

In case of danger, actuate an EMERGENCY OFF button on the machine.  
All protective covers must be attached and in good working condition.

The diffuser in the thermal safety valve on the "water side" (6) (**Fig. 436**) can be rotated.

- Ensure that the opening is aligned so that any vented steam cannot injure persons or damage the machine!



### 6.2.9 Winter operation (below 5°C)

Only switch on a system that is free of ice!

This can be achieved by carefully draining the system after the last use (siehe **“Draining the system”** auf Seite 645).

- Run the HP system without pressure for approx. one minute before starting cleaning work.
- Set a low engine speed.



#### Attention!

##### Material damage due to frost!

Switching on a frozen HPC system can result in severe material damage.

Never operate the HP pump in high-pressure mode if the oil is cold!

Never begin operating the high-pressure pump if parts of the pump are still frozen.

Do not attempt to thaw the high-pressure pump in a different manner (e.g. with a blowtorch).

Allow the pump to “warm up” by letting it idle for approx. 1 minute!

#### 6.2.9.1 Draining the system

In order to avoid freezing, the system must be carefully drained after every operation.

Please proceed as follows:

- Loosen the fuse (5.1) (**Fig. 438**) on the water case and lock the connection to the water case by switching the ball valve (5) (**Fig. 438**).
- Open the ball valve (4) (**Fig. 437**) and the turn-lock fastener (6) (**Fig. 437**) on the supply unit.

Leave the ball valves open during drainage.

The suction line runs dry.

- Set a low drive speed.



### Attention!

#### Material damage due to “running dry”!

The high-pressure pump will be destroyed if it is switched on while the suction pipe is closed!

Do not under any circumstances operate the pump without water!

Switch on the pump until the system is completely drained, which will take at most 5 seconds.

- Switch off the pump after the 5 seconds.
- After draining the pump, close the ball valve (15) (**Fig. 437**) and the turn-lock fastener (17) (**Fig. 437**) on the supply unit.
- Before restarting the HPC, do not forget to switch the ball valve (5) (**Fig. 438**) on the water case to the “Operating position”.

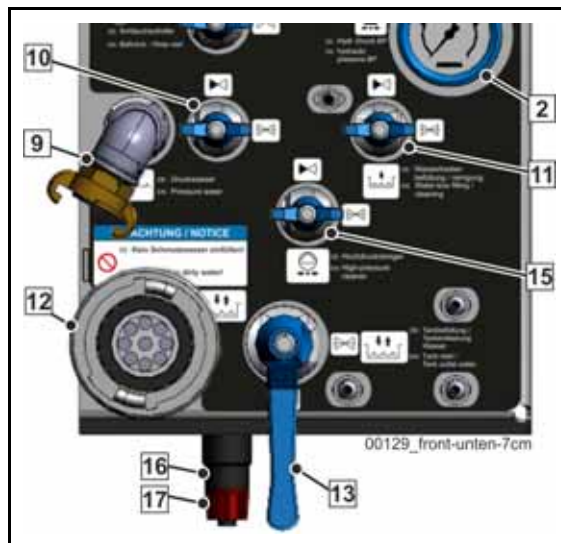


Fig. 437 Supply control



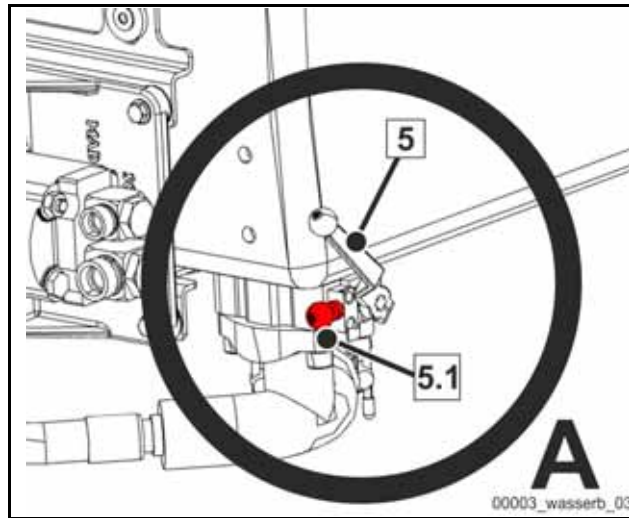


Fig. 438

## 6.2.10 Maintenance / Inspections

### 6.2.10.1 Cleaning the suction filter

Check the suction filter before each commissioning and clean it, if necessary.

Set cleaning intervals according to the operating conditions.

Clean the filter as follows:

- Lock the connection to the water case by switching the ball valve (15) (**Fig. 439**) on the supply control.
- Loosen the housing (5) (**Fig. 440**) by hand.
- Remove the screen (2) (**Fig. 440**) from the housing of the suction filter.
- Rinse the screen and housing of the suction filter under running water. Do not use any cleaning agents or objects.
- Replace heavily soiled or damaged screens.
- Do not operate the HP pump without a sieve element.
- Check and replace the O-rings (1+3) (**Fig. 440**), if necessary.

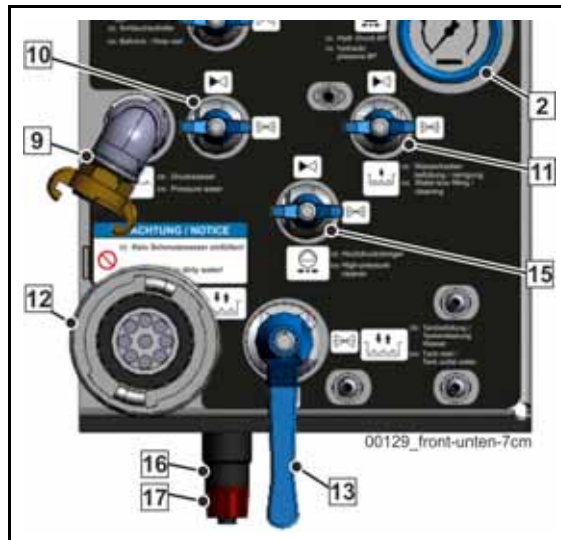


Fig. 439

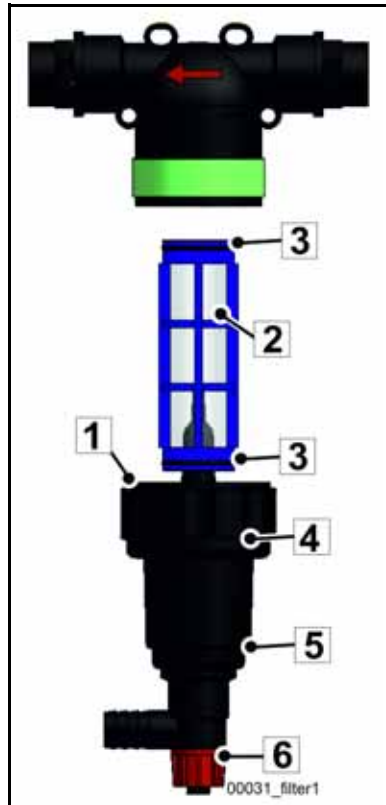


Fig. 440 Suction filter

Caption for suction filter (Fig. 440)			
Pos.	Description	Pos.	Description
1	O-ring	4	Ring
2	Screen	5	Housing
3	O-rings	6	Turn-lock fastener for draining

### 6.2.11 Functional testing

Under normal operating conditions, the water pressure is at approx. 170 bar.

The highest value is thereby reached when the spray lance is closed.

When the spray lance trigger is squeezed, water is pumped again and the pressure decreases.

- Regularly check that the pump switches off when the spray lance is closed. See section: "Troubleshooting".

### 6.2.12 Changing the oil in the pump

Before changing the oil, you must have read and understood the instructions of the manufacturer "INTERPUMP GROUP s.P.a."

In particular, the required torque for the oil drain screw (3).

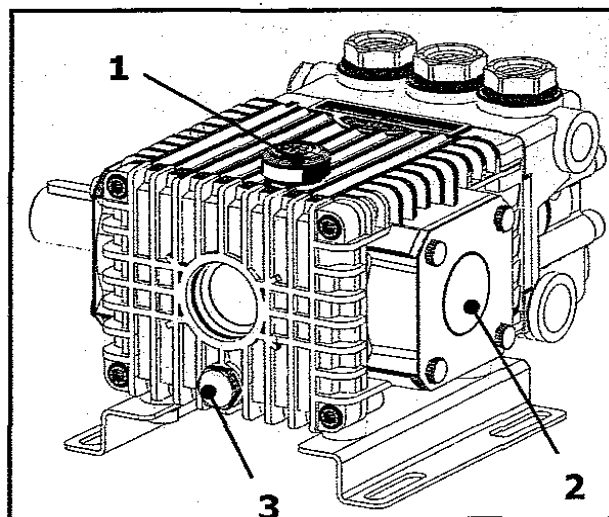


Fig. 441

Caption for (Fig. 441 )	
Pos.	Description
1	Lock with rod
2	Sight glass (oil level indicator)
3	Oil drain screw

Table 29

The oil must be at operating temperature for the oil change.

- Place a reservoir under the oil drain screw (3) that can hold all of the old oil.
- Remove the lock with the rod (1).

- Then remove the oil drain screw (3).
- Let all of the oil drain out.
- Screw on the oil drain screw (3) with a torque of 20 Nm once all of the old oil has drained out.
- Pour in the fresh oil through the lock (1).
- Fill the fresh oil up to the middle line of the oil level indicator lock (2).
- Reattach the lock (1) once you have finished topping up the oil.

### 6.2.12.1 Recommended oil type for the pump

The manufacturer recommends the following oil for a temperature range between -10 °C and 40 °C:

SAE 15 W-40 Mineral — ISO VG100DIN 51524 – Interpump X 9.9

The manufacturer recommends the following oil for a temperature range between 0 °C and 50 °C:

SAE 80 W-910 - ISO VG220 DIN 51524



#### Attention!

#### **Environmental damage!**

Old oil must be collected in containers and disposed of according to the applicable regulations at centres intended for that purpose.

Under no circumstances may it be disposed of in a way that is harmful to the environment.

### 6.2.13 Maintenance intervals for the pump

When:	What:
After the first 50 hours	Oil change
Every 500 hours	Oil change
Every 100 hours (Reduce intervals for large-scale assignments)	Inspection/Replacement: Valve set, pump seals

### 6.2.14 Prolonged downtime

For prolonged periods of disuse, we recommend filling the high-pressure pump with antifreeze (glycol) or a pump preservation oil on the water side.

### 6.2.15 Repair

- In the event of a malfunction, try to localise the error with the help of the “Troubleshooting” section.



#### Warning!

#### **Do not dismantle the high-pressure pump!**

Improperly assembled high-pressure pumps can cause severe injuries on failure.

---

If you cannot remedy a fault, please contact SCHWING customer service or send the high-pressure pump to the manufacturer for repairs.

For proper repairs, special tools are required.

Repair attempts invalidate the guarantee.



#### Information

Any damages caused by incorrect or negligent operation, maintenance and repair or by improper use result in the expiration of all warranty and liability claims against the company SCHWING GmbH.

This also applies to expansions and retrofit parts, as well as other changes to the machine that were not approved by SCHWING!

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<b>6.2.16 Troubleshooting</b>	(not exhaustive)
<b>HIGH-PRESSURE PUMP DOES NOT RUN:</b>	
Water case empty	• Top up
Switching error	• Switch hydraulic directional valve • Acknowledge electrical control
<b>SPRAY PRESSURE FLUCTUATES:</b>	
Insufficient water supply	• Ball valve in the water suction line not switched properly • Clean suction filter • Relay the suction line without kinks
Air is sucked in	• Check the hydraulic system for leaks
Spraying nozzle blocked	• Clean
<b>HIGH-PRESSURE PUMP SHUTS DOWN DURING SPRAYING OPERATIONS:</b>	
Spraying nozzle blocked or too small	• Clean nozzle or use prescribed nozzle
<b>HIGH-PRESSURE PUMP DOES NOT SHUT DOWN WHEN THE SPRAY LANCE IS CLOSED OR SWITCHES ON BY ITSELF:</b>	
Water leak in the high-pressure line	• Check O-rings, couplings and connections
<b>HIGH-PRESSURE PUMP OR HYDRAULIC SYSTEM BECOMES TOO HOT:</b>	
Cross-sectional narrowing in the hydraulic system	• Check pipe work

<b>HIGH-PRESSURE PUMP RUNS, BUT DOES NOT BUILD UP ANY PRESSURE:</b>	
Pump sucks in air	• Switch ball valve in the water suction line
Oil flow insufficient	• Increase the drive speed
Drive hydraulics defective	• Switch ball valve and check other functions (water pump)
<b>PUMP MAKES NOISES</b>	
Pump sucks in air	• Check water suction line
Cavitation	• Suction line interior destroyed • Suction filter dirty
<b>WATER LEAKING BETWEEN PUMP HEAD AND PISTON HOUSING</b>	
O-ring defective	• Repair by customer service
<b>OIL SPRAYS FROM THE SAFETY VALVE</b>	
dynamic pressure too high in the return pipe	• Check hydraulic system



### Caution!

#### **Do not dismantle the high-pressure pump.**

If you cannot remedy the fault with the help of the table above, please contact SCHWING customer service or send the high-pressure pump to the manufacturer for repairs

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Interpump Group

VIA E. FERMI, 25 - 42049 S. ILARIO - REGGIO EMILIA (ITALY)

TEL. +39- 0522 - 904311 - FAX + 39- 0522.- 904444

Email: [info@interpumpgroup.it](mailto:info@interpumpgroup.it)

Web: <http://www.interpumpgroup.it>

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#### **6.2.17 Technical data**

- Pump type: UL 1716 IV
- max. drive volume (oil): approx. 17 l/min
- max. output volume (water): approx. 13 l/min
- max. operating pressure: approx. 170 bar
- Spraying nozzle: 0.4 mm
- Pressure settings (oil): see switching diagram for the machine

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Recommended oil type for the HPC pump:

In a temperature range between -10 °C and 40 °C =

SAE 15 W-40 Mineral

ISO VG100DIN 51524 – Interpump X 9.9

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In a temperature range between 0 °C and +50 °C =

SAE 80 W-910

ISO VG220 DIN 51524

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## 6.3 End hose stop valve



### Information

As of August 2006, the electro-pneumatic control of the system was changed.

The solenoid valve for the end hose stop valve is now open in its de-energised state, contrary to the previous version.

This change was made because with the previous version that closed when de-energised, there was a risk that the end hose stop valve would close in the event of a defect (e.g. loss of power to the solenoid valve).

When the concrete pump was switched on, this would then pump against the closed end hose stop valve. This can lead to a dangerous blockage and the end hose striking out.

Older systems can be converted to the new version. Please ask our customer service!

If the solenoid valve is de-energised in the new system, residual concrete can fall from the end hose, as if no non-return valve were installed.

Please consider this in your work and switch on the machine controls only when a dry running of the end hose has been made as safe as possible.

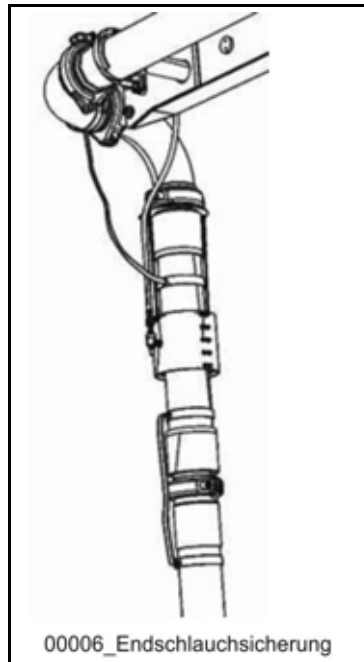
During an EMERGENCY STOP, the non-return valve closes as before.

### 6.3.1 General functional description

SCHWING truck-mounted concrete pumps can be equipped with a pneumatically operated non-return valve as a piece of special equipment.

The non-return valve prevents the pumping line from running dry.

It is placed over the end hose below the fixing and mounted on the pumping pipe (**Fig. 442**).



**Fig. 442**

The non-return valve consists of a tube with an inflatable hose on the inside.

By filling the inner hose with compressed air, this expands and presses the end hose together. The flow is blocked (**Fig. 443**).

After venting the inner hose, the end hose regains its original form and releases the concrete flow (**Fig. 444**).

The compressed air for the non-return valve is taken from vehicle air system.

During pumping operation, the activated non-return valve opens and closes automatically, depending on the concrete pump.

Automatic operation is activated via a selector switch.

Manual emergency control is possible.

## 6.3.1.1 End hose - non-return valve

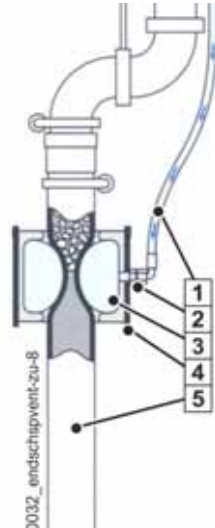
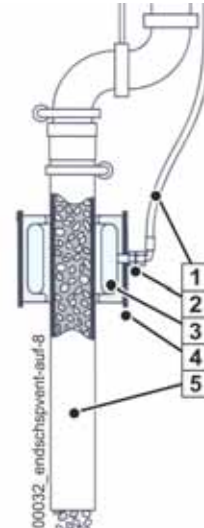
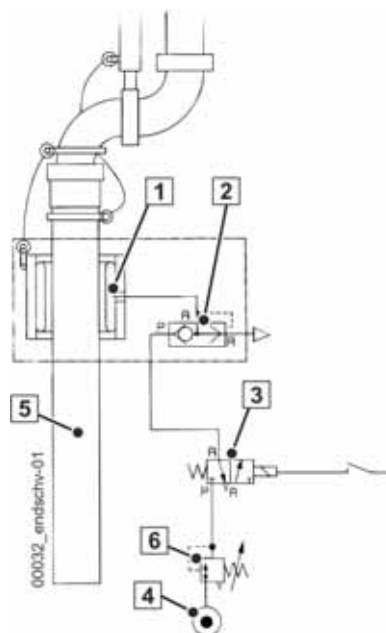

 Fig. 443  
closed

 Fig. 444  
opened


Fig. 445

Legend (Fig. 445)

Pos.	Description
1	Non-return valve with inner hose
2	Shuttle valve (quick breather valve)
3	3/2-way solenoid valve
4	4-circuit protection valve on the vehicle
5	End hose
6	Pressure release valve

### 6.3.1.2 Selector switch

0 The selector switch (4) (**Fig. 446**) is located in a separate housing next to the switch cabinet with the machine controls.



1 For truck mixer concrete pumps (FBP) as of series 02, a selector switch (11) on the local control unit (**Fig. 447**) serves the same purpose.

In the "1" position, the selector switch automatically opens and closes the non-return valve, depending on the concrete pump.

In the "0" position, the system is not active. The non-return valve stays permanently open.

Control	Switch	Non-return valve
on	"0"	to
off	"0"	to
on	"1"	Automatic
off	"1"	to
on	"1" EMERGENCY STOP	closed



#### Warning!

#### Risk of severe injuries due to shearing!

Never reach into the non-return valve or hold onto any objects inside.

Do not connect the non-return valve - for example for test purposes - to the compressed air supply without the end hose. The inner hose can be damaged.

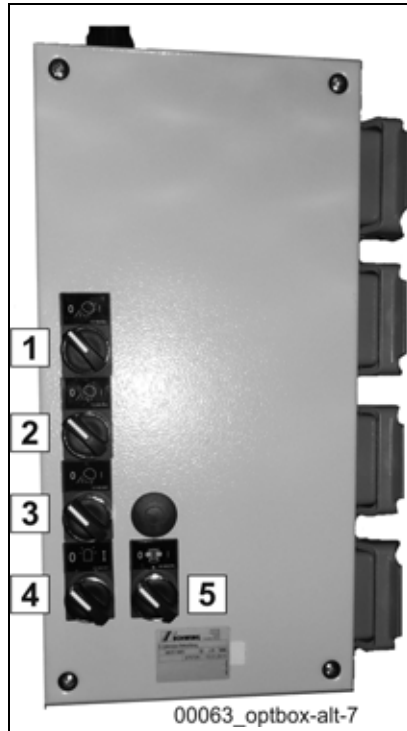


Fig. 446 E-option box on a truck-mounted concrete pump

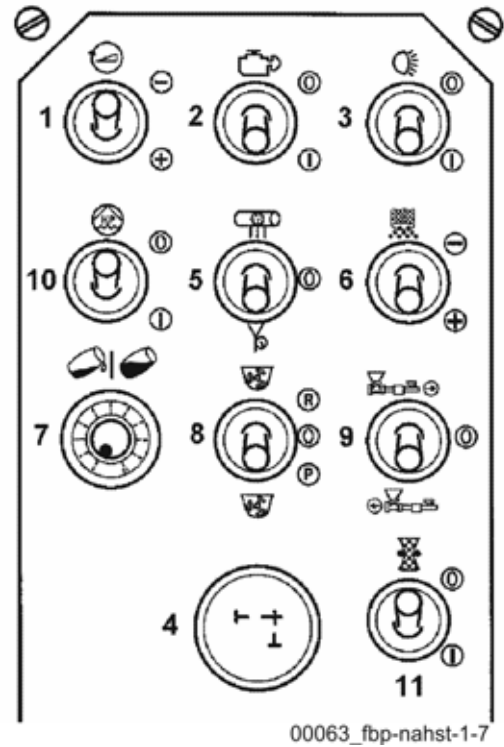


Fig. 447 Local control unit for a truck mixer pump

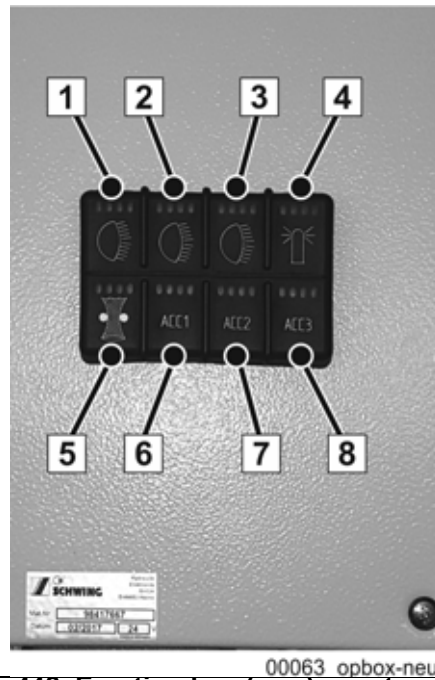


Fig. 448 E-option box (new) on a truck-mounted concrete pump

### 6.3.2 Automatic operation

Start the vehicle engine and switch on the machine controls.

In its default position, the solenoid valve (3) (**Fig. 449**) is de-energised. The compressed air supply to the shuttle valve (2) is interrupted.

The inner hose of non-return valve (1) is vented via shuttle valve (2) and releases the end hose.

- Switch the selector switch on the machine to position "I".



The solenoid valve (3) (**Fig. 450**) is energised and switches.

The compressed air is supplied to shuttle valve (2), which also switches.

The compressed air is further supplied to the inner hose of non-return valve (1).

The inner hose is inflated and blocks off the end hose (5).

- Close the top cover of the toolbox in which the switch is located in order to prevent unauthorised switching.

#### 6.3.2.1 Switching on the concrete pump

- Switch on the concrete pump (suction or pump).

The solenoid valve (3) (**Fig. 449**) is de-energised and switches to the default position: "Vent".

It simultaneously blocks the compressed air supply.

Shuttle valve (2) is relieved and also switches.

The inner hose is vented and the non-return valve opens.



#### Information

In order to ensure that the concrete pump only starts once the non-return valve is completely open, the start is delayed by approx. 5 seconds during pumping operations.

In order to reduce "dripping" from the end hose, the concrete pump starts in suction operation without delay.

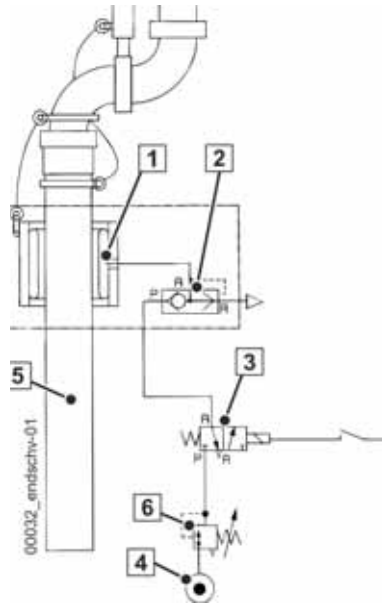


Fig. 449 Non-return valve open

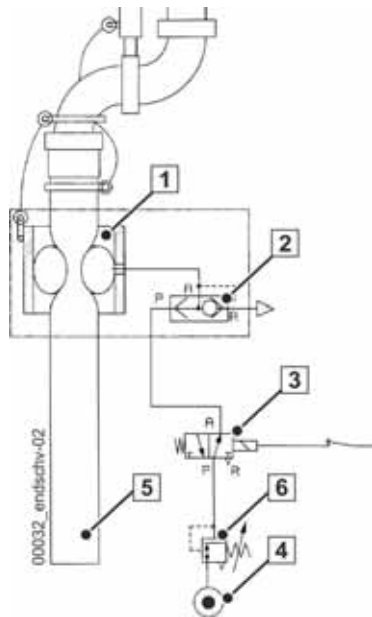


Fig. 450 Non-return valve closed

If the non-return valve is activated when the concrete pump is switched on, then it stays open for the time being.

It closes after switching off the concrete pump.

Concrete pump off:

After shutting down the concrete pump, solenoid valve (3) is re-energised and switches.

The inner hose contains compressed air and blocks off the end hose.

Because the solenoid valve (3) switches to "vent" when de-energised, the non-return valve is open when

- The machine controls are switched off
- The selector switch is set to "0"
- Or the solenoid valve is de-energised due to an error

Residual concrete can fall from the end hose!

### 6.3.3 EMERGENCY STOP

If an EMERGENCY STOP button is pressed when in automatic operation, then the non-return valve closes.

It only reopens if after unlocking the EMERGENCY STOP button and restarting the VECTOR control system; the concrete pump is switched on as previously described.

#### 6.3.3.1 Remote control

Automatic operation can be switched off via remote control.

- Flip the selector switch on the remote control unit to the position: "Automatic off":



The non-return valve opens.

This function allows for the targeted deposition of concrete residues with a stationary concrete pump, for example.

When the selector switch is in position "0" on the remote control, the non-return valve is controlled as described under AUTOMATIC OPERATION.



### 6.3.3.2 Emergency control

In the event the electrical control system fails, the solenoid valve (4) (**Fig. 451**) can be switched using an emergency release (3) (**Fig. 451**).

The compressed air module (pressure-reducing valve + solenoid valve) are located near the boom control block in the switch cabinet of the machine.

### 6.3.4 Adjusting the pressure release valve

- Start the vehicle engine and fill the air reservoir up to the maximum value on the pressure gauge in the cab.
- Read the pressure gauge (2) for the pressure release valve (**Fig. 451**).
- Set the pressure to 5 bar by turning the set screw (1).

### 6.3.5 Daily maintenance

- Functional inspection
- Seal of pneumatic components
- Suspension of the non-return valve
- Visual inspection of the end hose

Due to the increased load, the end hose in the area of the non-return valve must be inspected more frequently (also on the inside).

Alongside daily visual inspection, we recommend intensively inspecting new end hoses (also on the inside) for the first time after having conveyed 1000 m<sup>3</sup> of concrete.

Depending on the inspection results, schedule additional inspections.

### 6.3.6 Retrofitting

Usually, the non-return valve is installed at the factory.



#### Information

Retrofitting may only be carried out by SCHWING representatives according to the guidelines from SCHWING.

A shorter end hose may need to be installed due to the additional weight.  
If the end hose must be replaced, ensure that it is the correct length.

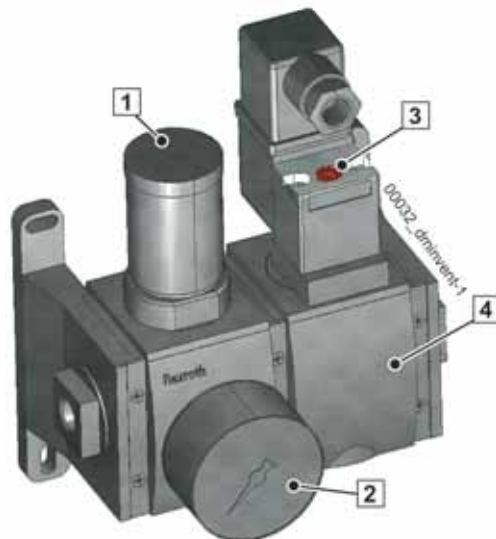


Fig. 451

## 6.4 Chamber valve

The chamber valve enables the cleaning of the pumping line by blow-out in the pumping direction.

The residual concrete can be placed at the construction site.

Overflow of the concrete filling-in hopper, as during re-suction, is avoided.

For cleaning, a cleaning ball is inserted into the filled concrete pumping line by means of a hydraulically powered chamber.

Then, compressed air is supplied to the chamber.

When a chamber valve is ordered, the compressor is included in the scope of delivery.

As the chamber blocks the pumping line in "suction direction", the compressed air pushes the cleaning ball and the concrete column through the pumping line in the pumping direction.



### **Danger!**

#### **Danger to life when cleaning with compressed air!**

Compressed air released uncontrollably may cause fatal injuries.

Compressed air may only be used for cleaning under supervision of a competent person.

- Only authorised persons (experts) must operate the chamber valve. This also applies to all other compressed-air operated cleaning devices of SCHWING GmbH.
- Persons not involved must leave the danger area of the chamber valve.
- During the cleaning process, no one may be at the end of the pressure line around the concrete outlet.
- Make sure to read the safety manual and the "Cleaning" chapter in the concrete pump operating instructions.
- Use caution when opening the ball valve (7) (**Fig. 454**). Residual concrete can be ejected from the blow valve opening.
- The pumping line must only be opened when pressure free. This also applies for extending the chamber.

Do not use the chamber valve under any circumstances in order to prevent clogging!

Do not supply compressed air to the extended chamber. Residual concrete can be ejected from the chamber.

### 6.4.1 Location of the components of the chamber valve

The chamber valve is installed in the pumping line for the boom outlet on the rear of the machine (2) (Fig. 454).

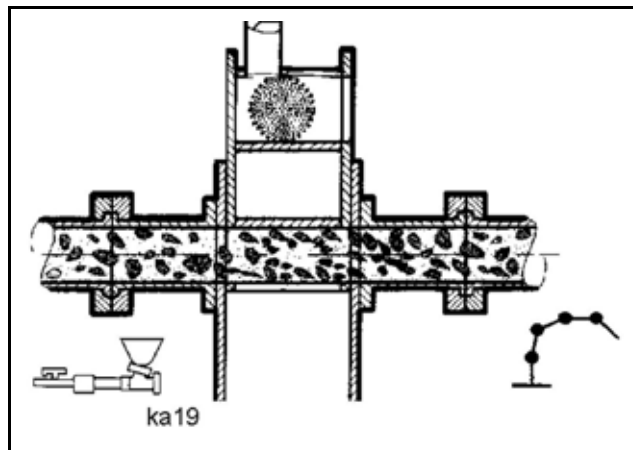


Fig. 452 Chamber extended - concrete is pumped as per normal

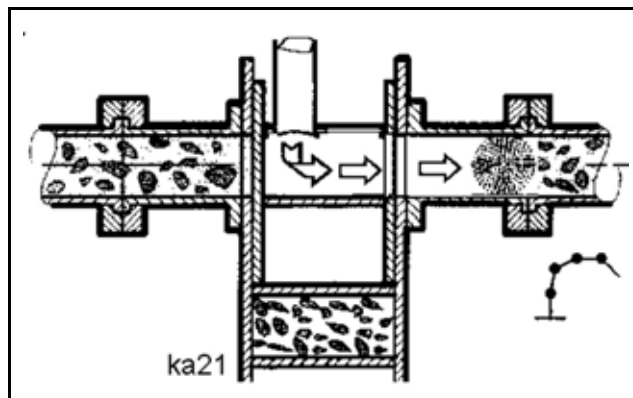


Fig. 453 Chamber retracted - cleaning mode



#### Information

The control devices for the system are located on the rear of the machine, on the right (1) (Fig. 454).

The location of the control elements can vary depending on the machine type.

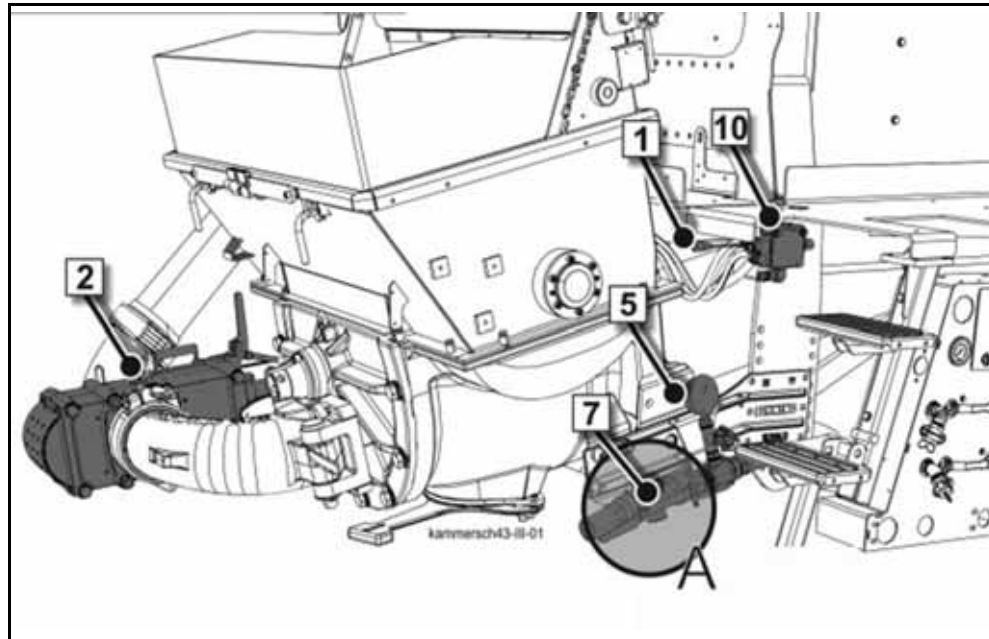


Fig. 454 Complete chamber valve

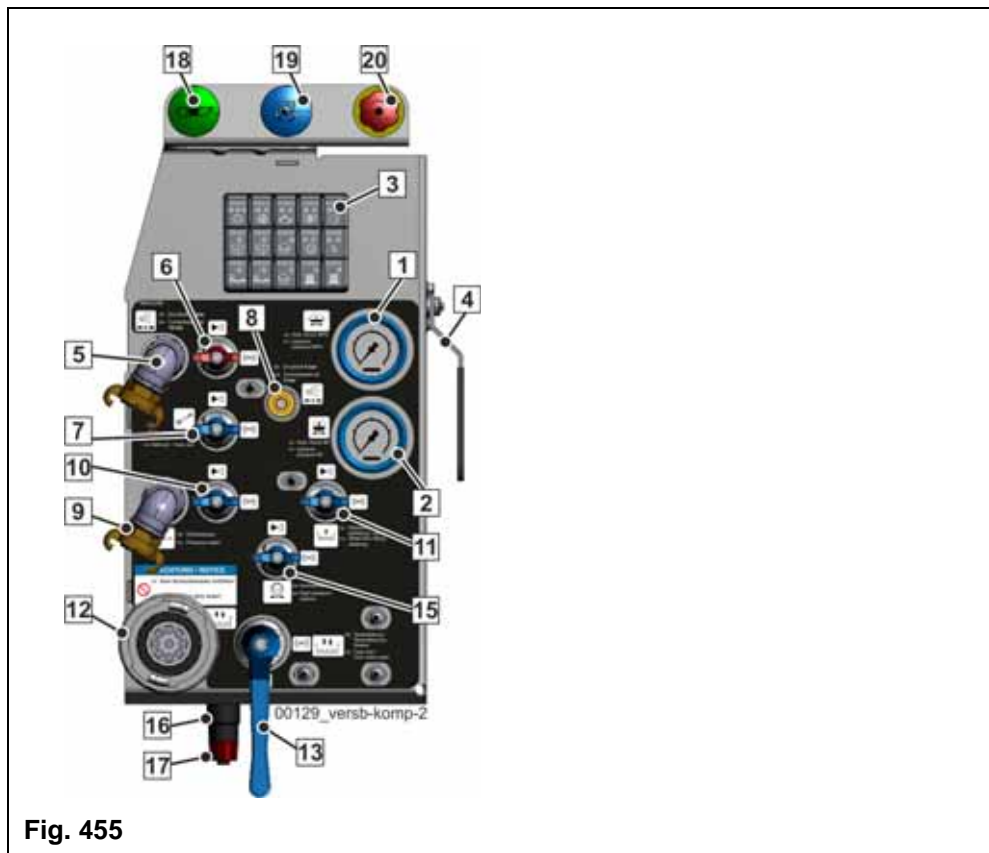
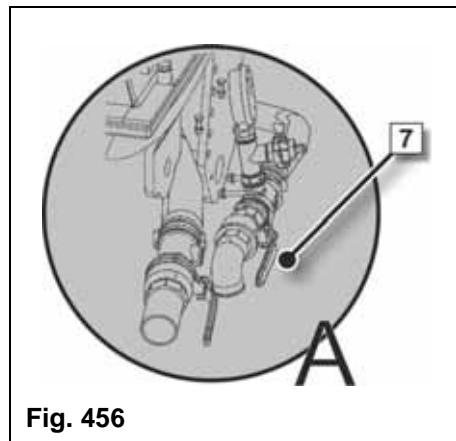


Fig. 455



Caption for (Fig. 454), (Fig. 455)	
Pos.	Description
1	Control lever chamber: RETRACT - 0 - EXTEND
2	Chamber valve
5	Pressure gauge
6	Ball valve: Compressed air supply
7	Ball valve: Discharge compressed air
10	Pressure settings: Chamber valve



### 6.4.2 Preparation

Align the placing boom so that the concrete can be discharged without danger.

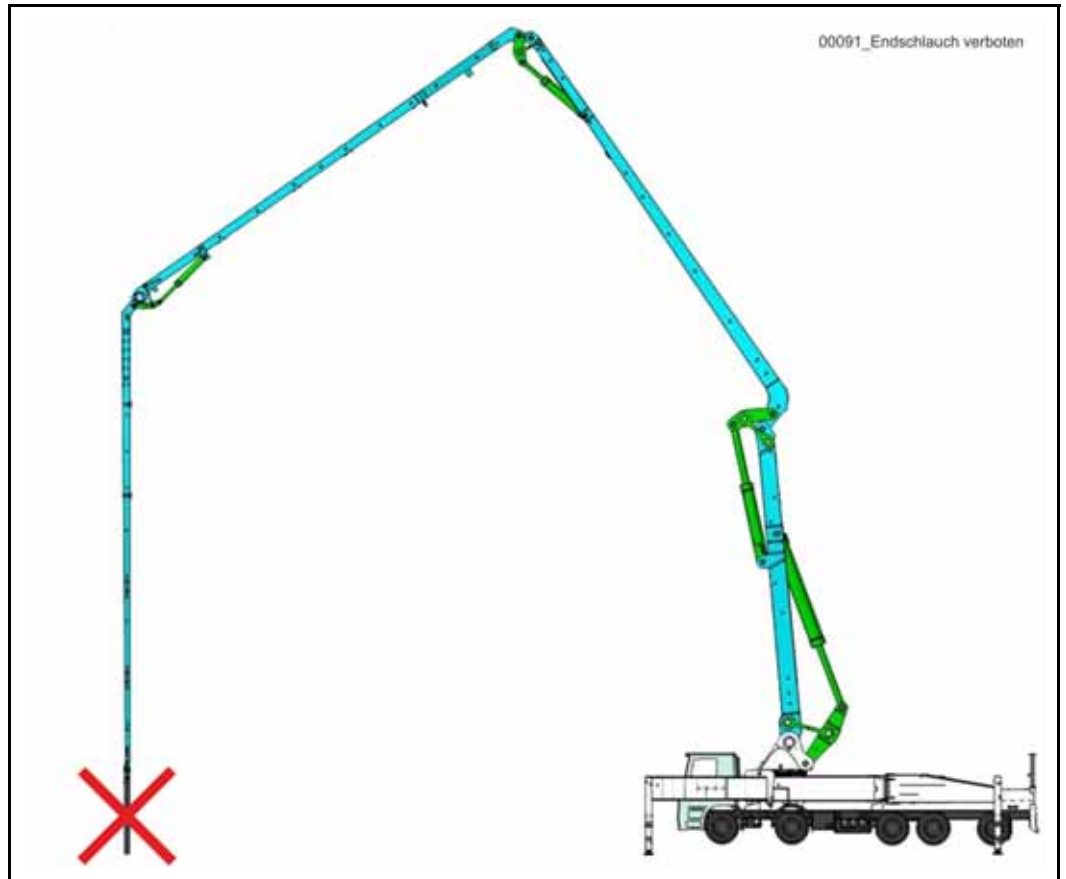


Fig. 457 End hose forbidden in compressed-air cleaning operation



### Danger!

#### Risk of the machine toppling over during compressed-air cleaning!

The machine may topple over with an installed end hose.

The end hose must be removed for compressed-air cleaning.



Fig. 458 Signs and labels on the machine



### Danger!

#### Danger to life due to compressed air in the pumping line!

Severe or even fatal injuries due to material being ejected.

Remaining in the danger zone at the end of the pumping line is forbidden.

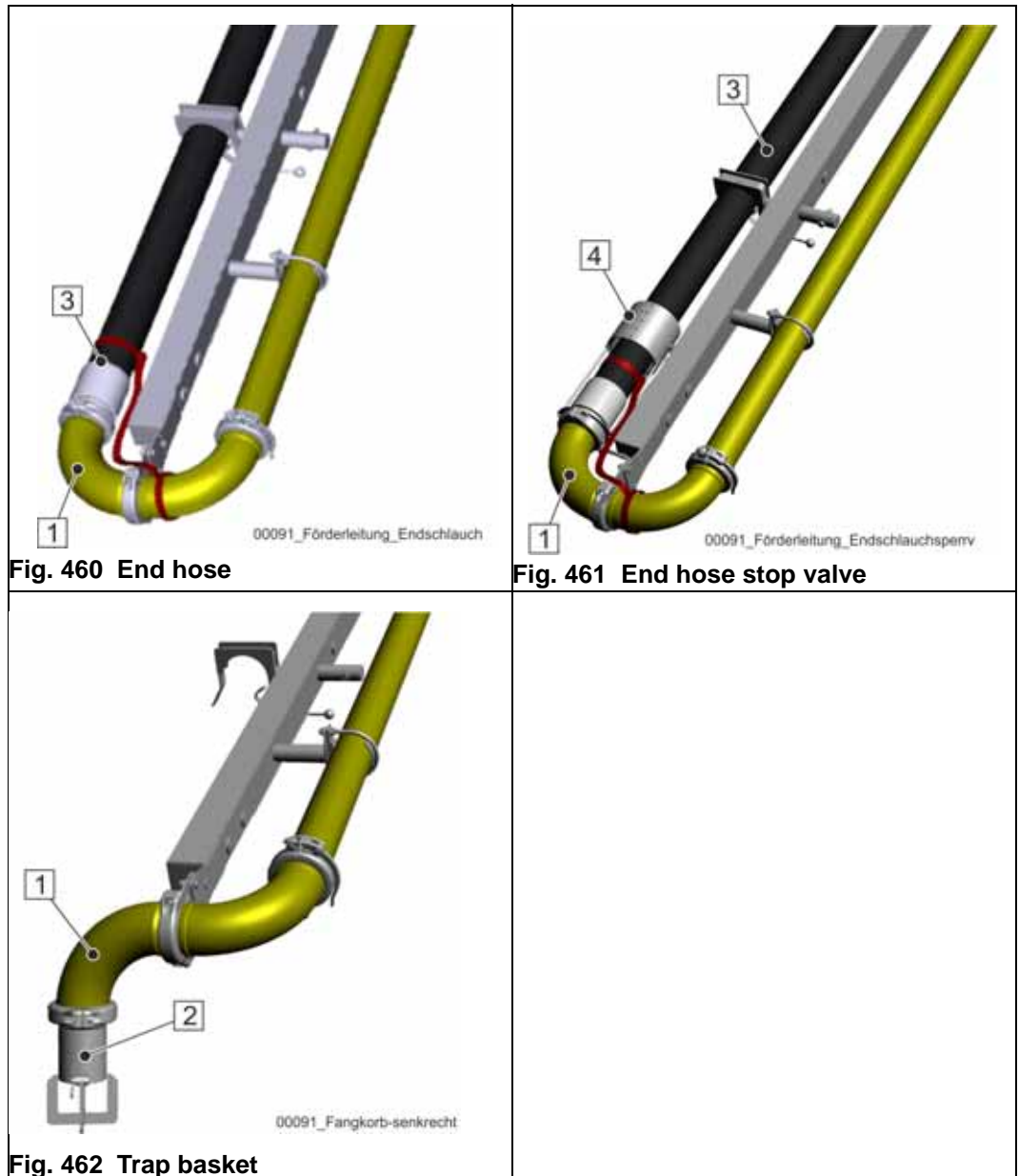


Fig. 459 Signs and labels on the machine

1. Empty the filling-in hopper of the concrete pump as far as possible by pumping.
2. Switch off the concrete pump.
3. Remove the end hose (3) and possibly additionally installed components at the end of the pumping line (1), see example (4) (Fig. 460) (Fig. 461).
4. Mount the trap basket (2) (Fig. 462) at the end of the pumping line (1). The trap basket must be aligned vertically.
5. Assign a competent person with specialist knowledge to oversee the concrete discharge point. No one must stay in the danger zone where the concrete exists!



6. Agree on clear communication signals with the overseer.



**Caption for (Fig. 460) - (Fig. 461)**

Pos.	Description
1	End of pumping line (last component of pumping line)
2	Trap basket (not part of the pumping line)
3	End hose (not part of the pumping line)
4	End hose stop valve (not part of the pumping line)

### 6.4.3 Cleaning the pumping line

#### 6.4.3.1 Inserting the cleaning ball

- Shut the ball valves for the air system (6) (**Fig. 455**) and (7) (**Fig. 454**).
- Shut the ball valve by pulling the lever (4) (**Fig. 463**) up 90° so that the hydraulic cylinders cannot be actuated and the ball flap can be opened.
- Open the flap of the chamber valve using the handle (8) and lock it in place with the toggle (9) (**Fig. 463**).



#### Warning!

#### Danger of crushing and shearing injuries caused by valve!

Parts of the body may be crushed or severed.

Pay attention to the safety function.

The flap can only be opened if the lever (4) (**Fig. 463**) is turned (ball valve closed).

If the ball valve is closed, the chamber cannot be run.

- Push a damp, hard cleaning ball into the chamber (**Fig. 464**).
- Release the toggle (9) (**Fig. 464**) again so that the flap (8) can be closed.
- Close the flap (8).
- Open the ball valve (4) (**Fig. 465**), lever (4) is engaged - ball valve is open.

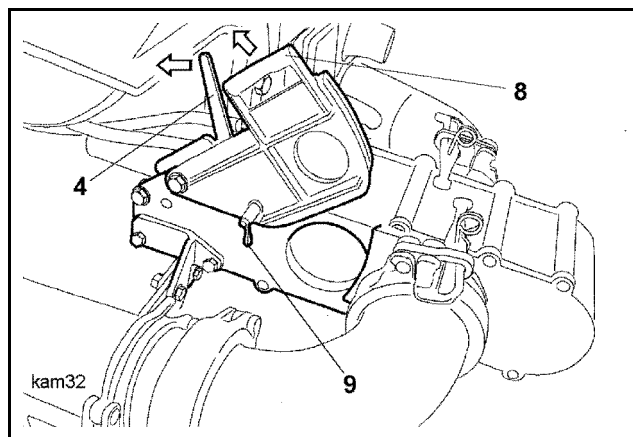


Fig. 463

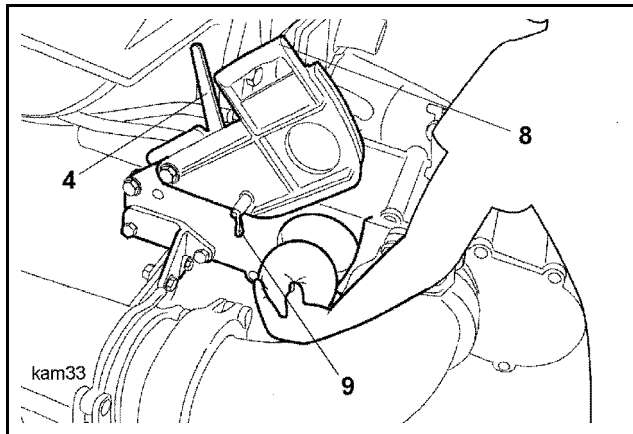


Fig. 464

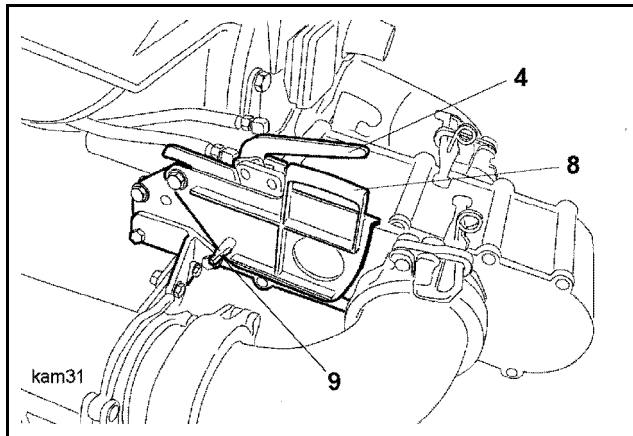

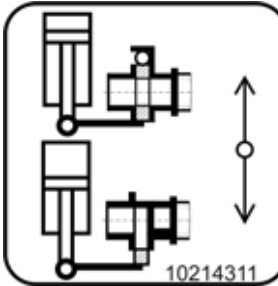
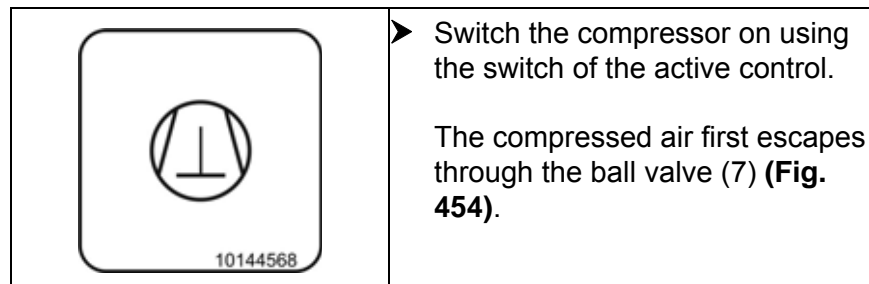


Fig. 465

### 6.4.3.2 Blowing out the pumping line

 <p>Symbol-Kam-elekt-V01</p>	<p>Press the switch on the currently active control in the direction of this symbol to make the chamber valve ready for operation.</p>
 <p>10214311</p>	<p>Actuate the control lever (1) (<b>Fig. 454</b>) until the chamber with the ball is completely inside the gate valve housing (<b>Fig. 466</b>).</p> <p>The connection between the concrete pump and boom pumping line is then interrupted. When the spring-centred control lever (1) (<b>Fig. 454</b>) is released, it returns to the "Neutral position".</p>

- Open the ball valves for the air system (6) (**Fig. 455**) (7) (**Fig. 454**).



- Slowly shut the ball valve (7) (**Fig. 454**).

The compressed air which then gets into the chamber pushes the cleaning ball and the concrete column out of the pumping line in pumping direction (**Fig. 467**).

- During the cleaning process, monitor the compressed-air pressure gauge continuously (5) (**Fig. 454**).

**An increase in pressure means = blockage!**

Immediately open the ball valve (7) (**Fig. 454**)!

The pressure in the pumping line is reduced.

**A decrease in pressure means that the concrete column is becoming lighter and speeding up.**

Immediately open the ball valve (7) (**Fig. 454**)!

This prevents the residual concrete at the end of the pumping line from shooting out.

- Completely open the ball valve (7) (**Fig. 454**) when the ball has come out of the pumping line.
- Switch off the air compressor.

Stop the compressed air supply to the chamber valve using the ball valve (6) (**Fig. 455**) on the supply line.

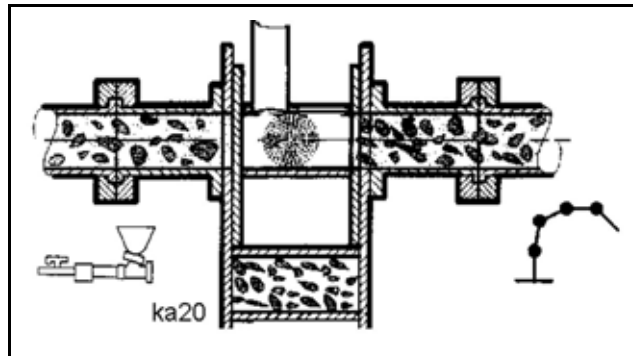


Fig. 466

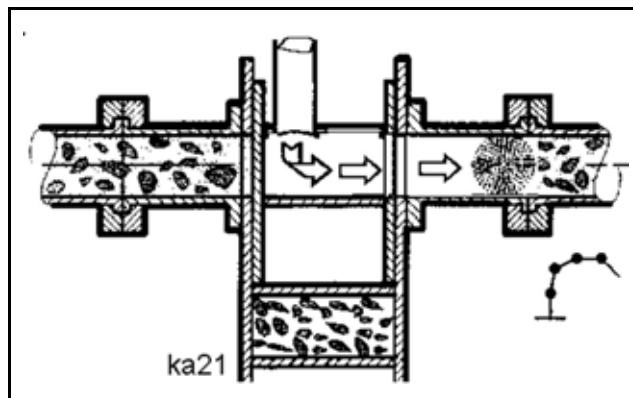


Fig. 467

### 6.4.3.3 Reverse pumping residual concrete



#### Danger!

#### **Danger caused by systems under pressure!**

If pressure is present, residual concrete may shoot out of the chamber and cause severe injury.

The pumping line must only be opened when pressure free.

This also applies for extending the valve chamber.

Extend the valve chamber only while the compressor is off and the pressure gauge (5) (**Fig. 454**) displays "0 bar".

- Place a soft cleaning ball into the chamber as described above (**Fig. 468**).
- Retract the chamber and move the ball into the pumping line with a short blast of air (**Fig. 469**).
- Switch the compressor off and shut the ball valve (6) (**Fig. 455**).
- Depressurise the pumping line by opening the discharge ball valve (7) (**Fig. 454**).
- Extend the chamber once more (**Fig. 470**).
- Switch the concrete pump to "Suction" and suck the ball back into the filling hopper together with the residual concrete.
- Afterwards, switch off the concrete pump.

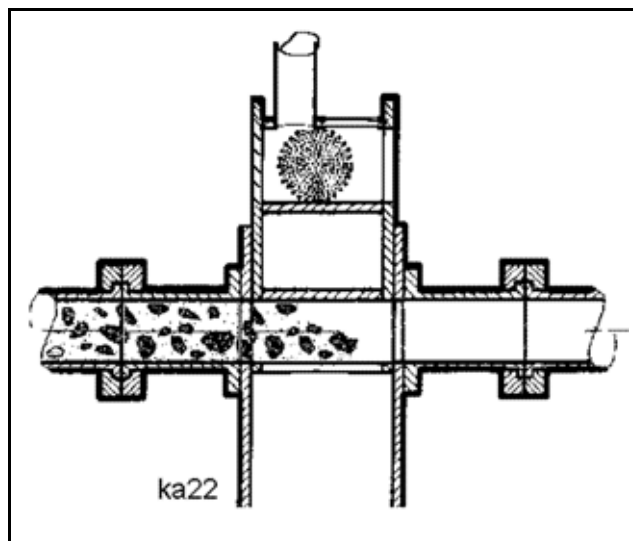


Fig. 468

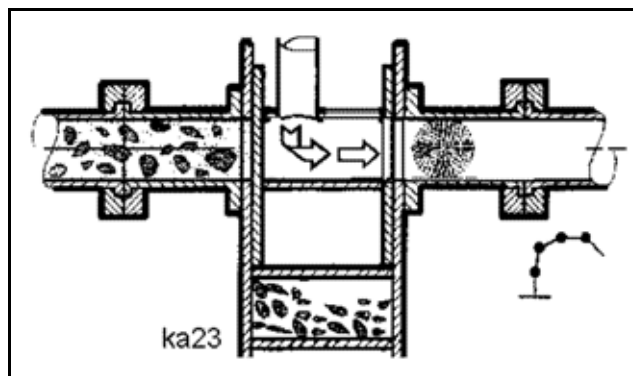


Fig. 469

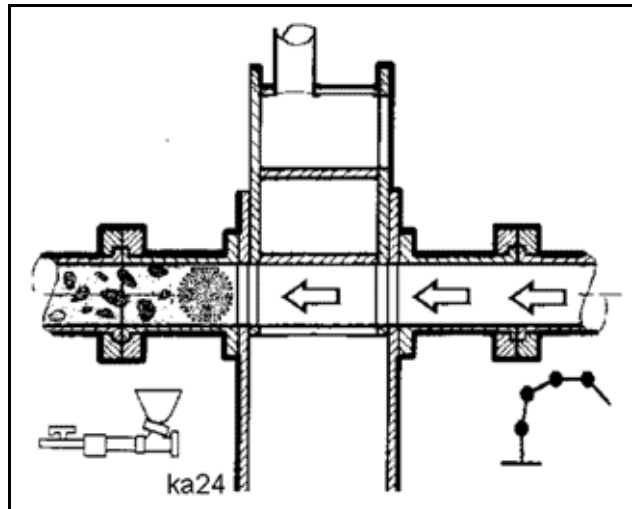


Fig. 470

#### 6.4.4 Cleaning the truck-mounted concrete pump

- Switch off the concrete pump.
- Clean the chambers (1+2) (Fig. 471) and the exterior of the chamber valve with water.
- Clean the machine as described in the operating instructions for the concrete pump.
- Lubricate all grease nipples (pos. 1-8) (Fig. 472) (Fig. 473) on the chamber valve.



#### Warning!

##### Risk of being crushed and sheared!

Parts of the body may be crushed or severed.

If the "outlet" (1) (Fig. 474) is folded up, the chamber valve (3) and the rock valve (2) can be accessed.

Moving one of the two valves can pose a danger of being crushed or sheared (Fig. 475).

Do NOT reach into the chamber valve or the rock valve.

For this reason:

- Prior to opening the outlet, switch off the drive motor of the machine and secure the machine against being switched on without authorisation.
- Do not reach into the openings of the rock valve or the chamber valve and do not insert any objects into them.
- While cleaning with the water hose, do not insert any objects into the openings

of the rock valve or the chamber valve.



### Information

Should the concrete pump need to be switched on for cleaning, use the local control unit.

The machine operator is responsible for ensuring that during cleaning no unauthorised persons get near the rock valve or the chamber valve and the control elements belonging to them.

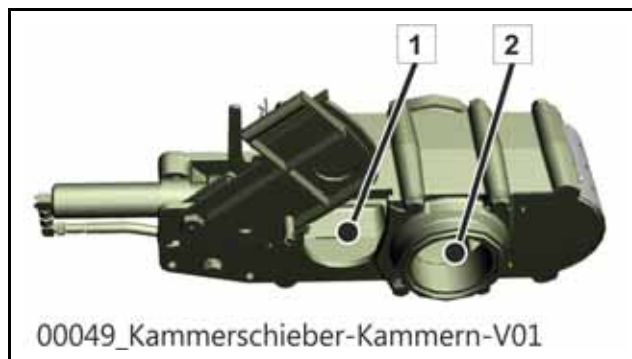


Fig. 471

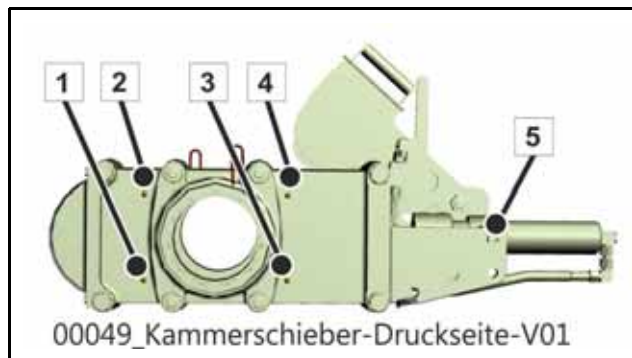


Fig. 472

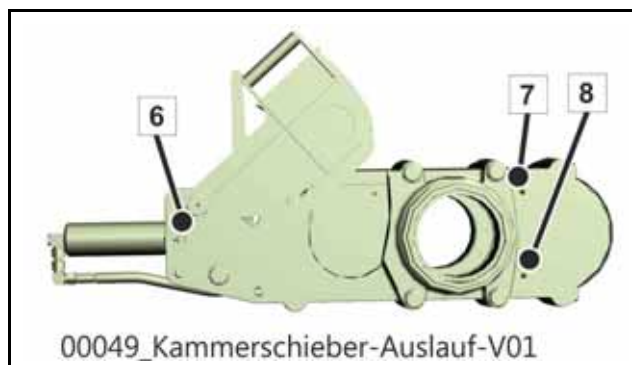


Fig. 473



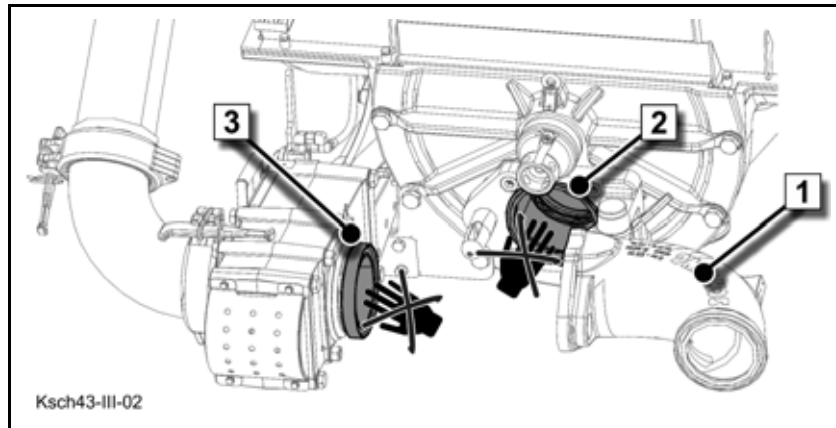


Fig. 474

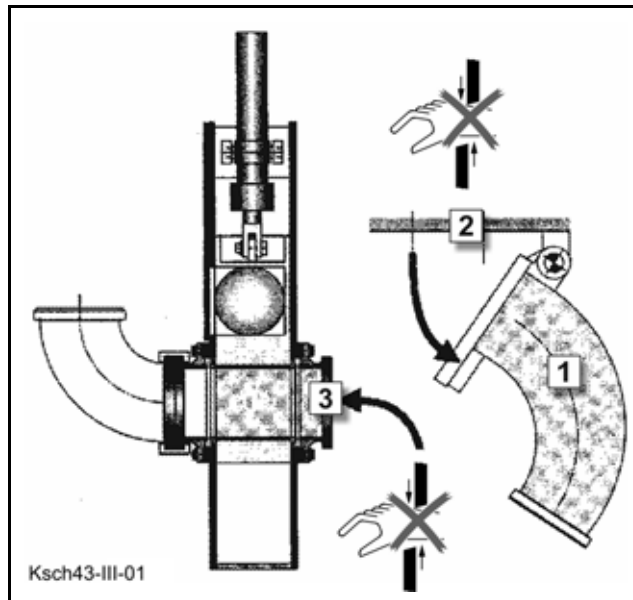


Fig. 475



## 6.5 Central lubrication system (special equipment)

SCHWING machines can be equipped with a central lubrication system as special equipment.

The electrically powered piston pump, reservoir and electronic control part are combined into a single unit (**Fig. 476**). This unit supplies the lubrication points of the machine via distributors and lines (**Fig. 477**).

Any other use is deemed improper.

The amount of grease and lubricating intervals are set at the factory.

On truck-mounted concrete pumps, the settings can only be implemented on the control part of the piston pump. The lubrication only occurs during pumping operations (pump kit ON).

For stationary machines (SP 3800/4800), the settings can be configured on the machine control system and on the display of the piston pump.



### Information

Please note that the settings in the machine control system and those on the electronic control unit of the piston pump interact.

Should an adjustment to special operating conditions appear necessary, please contact the SCHWING customer service for the purpose of reprogramming.



Fig. 476

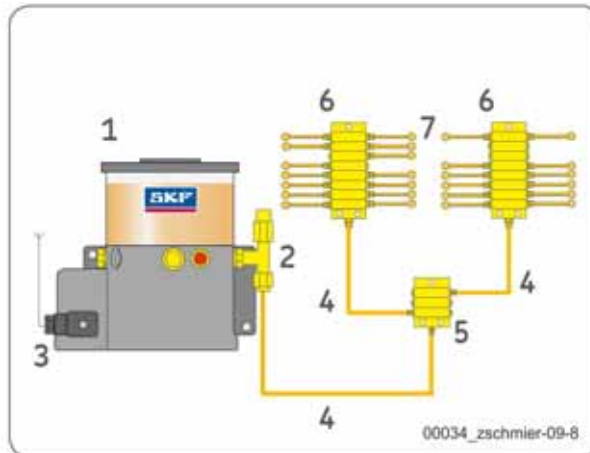


Fig. 477 Example of a progressive system

### 6.5.1 Safety



#### Information

Supply documentation.

In addition to these operating instructions, the supplier documentation and any other legal provisions and related regulations on accident prevention and environmental protection must be observed and applied.

### 6.5.2 Instructions for filling with lubricant

Only use clean lubricant with a suitable filling device. Contaminated lubricants can lead to system faults.

- Use a lubricating grease as indicated in our lubricant recommendations (**chap. 4.3**):  
(KP 2 K according to DIN 51502 without solid lubricant, NLGI class 2).

The central lubrication system can operate at up to approx.  $-25\text{ °C}$  when using the lubricating grease prescribed for our machines.

### 6.5.2.1 Filling with lubricant

The machine is filled with lubricant via the cone-type lubricating nipple DIN 71412-AM10x1 (1) (**Fig. 478**) using a conventional grease gun. The cone-type lubricating nipple can be repositioned to position (2) (**Fig. 478**), e.g. in order to provide improved access.

The filling of the reservoir must be carried out correctly (observe the filling level monitoring).



**Danger!**

**Risk of explosion due to an explosive atmosphere!**

Filling via the "reservoir lid" is not permitted.

### 6.5.2.2 Filling level check on the pump unit

The transparent lubricant reservoir enables a visual filling level check. This check must be carried out regularly for safety reasons. If the reservoir has been drained to below the "min" mark, the entire system must be vented.



**Fig. 478**

### 6.5.2.3 Vent system

- Fill reservoir with lubricant
- Remove the main lines (1) (**Fig. 480**) from the male connector (2) (**Fig. 480**) on the pump elements (3) (**Fig. 480**)
- Let the pump run until lubricant emerges from the male connector on the pump elements without any air bubbles
- Reattach the main lines
- Let the pump run until grease emerges from all lubrication points.

Furthermore, “emergency grease nipples” (4) (**Fig. 480**) are available on the male connectors of the pump elements.

Through these, the separate lubricant circuits of the lubrication system can be amply supplied with lubricant manually via hand-operated grease guns in the case of power failures or pump faults.

### 6.5.2.4 Pressure relief valve

A pressure relief valve (5) (**Fig. 481**) protects the entire lubrication system against excessive system pressures. It is mounted directly on the pump element.

The configured opening pressure is 300 or 200 bar, depending on the valve.

If a clogged distributor or lubrication point causes an operating pressure of over 300 or 200 bar, the valve opens and grease will visibly emerge from the escape point (6) (**Fig. 481**).

At the same time this also acts as an optical system monitoring.

As such, the pump unit is protected against damage.

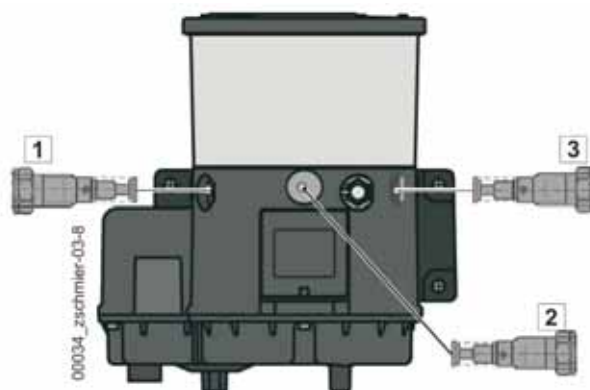
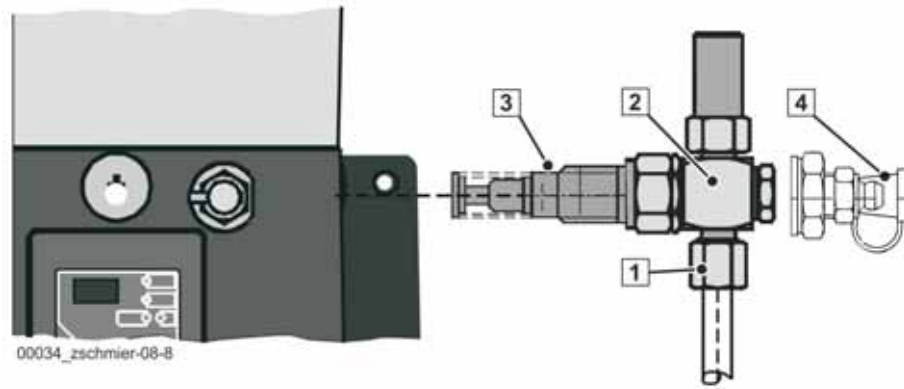
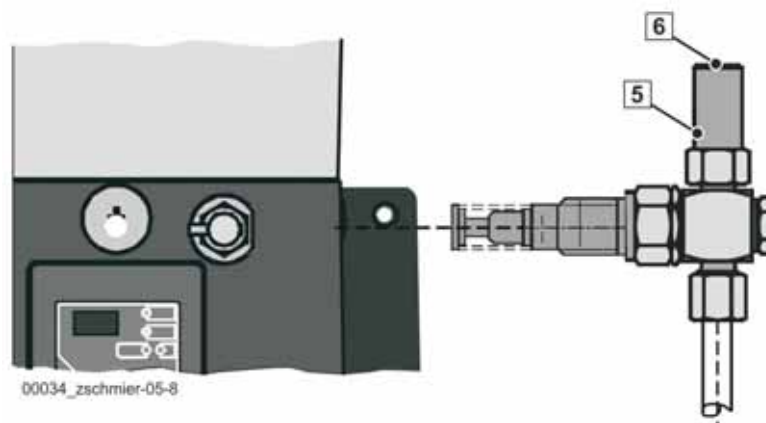


Fig. 479 Arrangement of the pump elements



**Fig. 480**

Pump element (3) with male connector (2) and emergency grease nipple (4)



**Fig. 481**

Pressure relief valve with discharge opening









### 6.5.3 Configuring the system

The pump units of the KFGS series are equipped with integrated control part type IG502-2-I with an operating display (**Fig. 482**). Operating parameters such as pause times (Timer) and pump runtimes (Contact) can be parameterised via the control part.

The display and operating unit is protected from spray water and mechanical damage by a transparent plastic cover. For programming, the cover must be removed and then reinstalled.



**Fig. 482 Operating display**

Display elements and controls on the KFGS operating display ( <b>Fig. 482</b> )		
Depiction	Designation	Function of
	Three-digit LED display	Values and operating status
	PAUSE LED	Pause time
	CONTACT LED	Contact time display (pumping operation)
	1 = CS LED 2 = PS LED	CS=Cycle Switch: monitors the function with an external cycle switch PS=Pressure Switch: monitors the function with an external pressure switch
	FAULT LED	Fault message
	UP or DOWN button	Switch on display Display values and parameters Set values and parameters
	SET button	Switch between programming and display mode Confirm values
	DK button	Trigger in-between lubrication Erase fault message

As lubrication of the lubrication points is only necessary at given intervals, the lubrication cycle or lubrication procedure is divided into a pump runtime and a pause time. A lubrication cycle always begins with a pump runtime.





After the pump runtime, the lubrication cycle is interrupted and then resumed after the configured pause time.

This means, a lubrication cycle always starts with the "residual lubrication time" or "residual pause time".

Even a power failure cannot erase the integrated data memory.

### 6.5.3.1 Pump runtime

The pump runtime corresponds to the time in which the pump conveys the lubricant.

In the case of a division into lubrication segments, one of the segment valves will be opened at the same time and closed again at the end of the pump runtime.

The duration of the pump runtime can be configured as a time value in hours, minutes and seconds.

### 6.5.3.2 Pause time

In the pause time, also referred to just as pause, the pump rests or in the case of a division into lubrication segments, the valve for the affected lubrication segment is closed.

The duration of the pause time can be configured.

In automatic operating mode, the pause time is determined by specifying a time value (Pause timer).

When configuring the lubrication scenario, the pause time thus corresponds to a delay time, by which the valves of the individual lubrication segments are opened successively once a lubrication cycle has been started. This therefore prevents all valves from opening at the same time.

### 6.5.3.3 Intermediate lubrication

If an additional lubrication appears to be necessary under certain operating conditions, you can trigger an intermediate lubrication by pressing the (1) (**Fig. 483**) button during a pause.

The piston pump runs for 4 minutes after being pressed once. You can actuate the button again after 4 minutes of runtime.

The pause time is set to "0" after the intermediate lubrication. The lubrication then continues to run as configured.



Fig. 483

### 6.5.4 Checking the system

- Check the system of lines (visual inspection) daily for leaks and external damages
- Check the supplied bearing points (visual inspection) daily

There must be clearly visible traces of lubricant.

- If any faults are detected during the check, have SCHWING's customer service repair the system immediately in order to prevent any consequential damages caused by a lack of lubrication.



#### Attention!

**The drive line bearings of the concrete pump cannot be connected to the central greasing.**

These lubrication points must be supplied "manually" according to the maintenance schedule.

If some lubrication points were not connected to the central greasing at customer request, they must also be lubricated using a grease gun.

## 6.6 Hydraulically lowerable stowing box



### **Danger!**

#### **Danger of crushing!**

Switch off the drive motor before working between stowing box and vehicle.

---

### 6.6.1 Preface

The truck-mounted concrete pumps S 24 X BR03 and S 28 X can be equipped with a hydraulically lowerable stowing box as special equipment on the left side of the vehicle.

The structure of positive testing thereby depends on the relevant machine data.

The stowing box (1) (**Fig. 484**) is fitted with sleeves to receive 3-m-long pumping pipes or hoses.

You can choose between DN 125 or DN 160 sleeves.

DN 125 for hoses/tubes DN 65

DN 160 for hoses / tubes DN 100

As an additional accessory, the stowing box can be closed at the top with an enclosure or supplemented with an additional box (2) (**Fig. 484**).

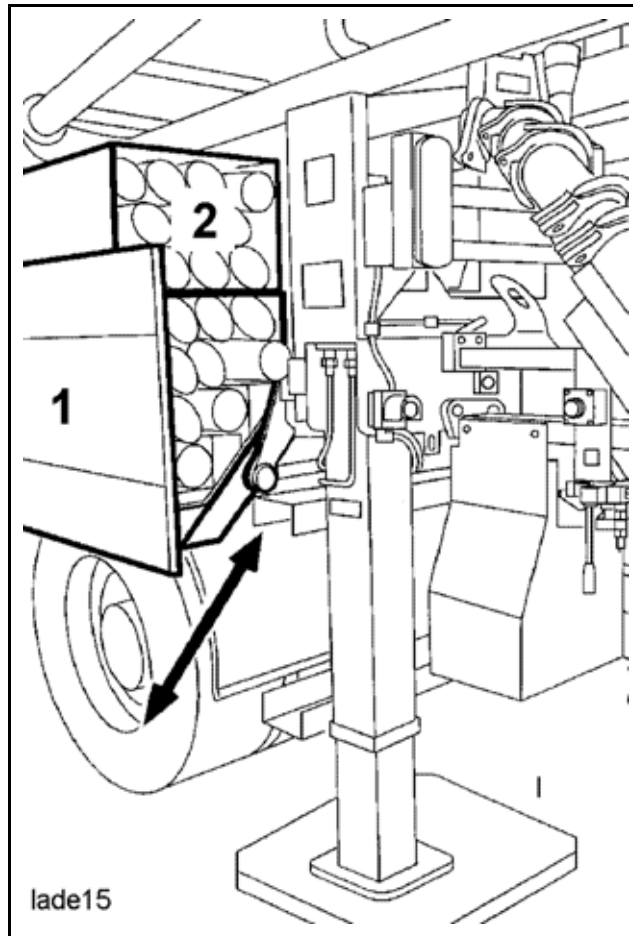


Fig. 484

### 6.6.1.1 Personnel

In order to ensure that the device is used safely, the operating personnel must:

1. Be authorised and trained
2. Have received specific training regarding the potential dangers
3. Observe the special warning and information signs on the machine and replace them in the event of damage
4. Monitor the danger area during operation

**Warning!****Remaining in the danger zone is forbidden!**

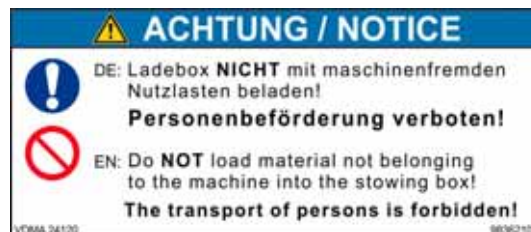
The entire room taken up by the stowing box while being lowered or raised is considered as danger zone.

Do not reach into moving machine parts.

**6.6.1.2 Stowing box**

The stowing box may only be loaded with the hoses and tubes provided.

Transporting or lifting other loads or persons with the stowing box is prohibited.

**6.6.1.3 Truck-mounted concrete pump**

- The machine must be operationally supported on all four outriggers\* before lowering or raising the stowing box.
- Driving with lowered stowing box is prohibited.
- The concrete pump must be shut down.

\* See operating instructions for the truck-mounted concrete pump.

**6.6.1.4 Testing**

An expert must test the lifting device and stowing box as required, however, at least once every year in accordance with the operating conditions and operational circumstances.

Repairs may only be carried out by experts.

### 6.6.2 Functional description

The stowing box is guided at both ends with spline ends on inclined ramps.

Both spline ends are connected by means of a lever system with a torsional wave.

A hydraulic cylinder drives the torsional wave. The hydraulic cylinder receives pressure oil from the outrigger's hydraulic system through a manually operated directional valve.

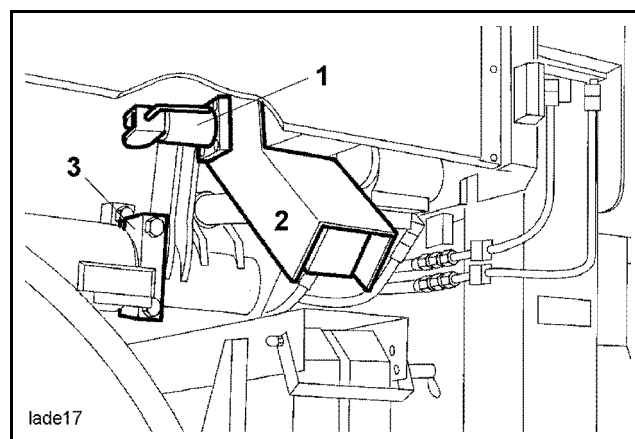
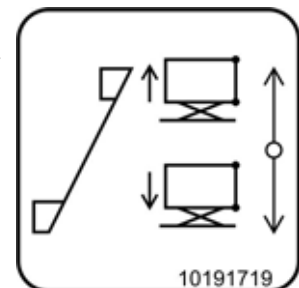
Upon actuating the directional valve, the piston rod of the cylinder retracts or extends, and rotates the torsional wave.

The lever system transfers the rotation of the torsional wave onto the spline ends, and converts it into a sliding movement.

The stowing box slides up or down on the sloping ramps.

### 6.6.3 Lowing / Raising the stowing box

- Support the machine operationally on all four outriggers.
- Pay attention to the space required for the stowing box and remove any obstacles, if necessary.
- Loosen the transport safety devices on both spline ends, example (1) (**Fig. 485**), (**Fig. 486**).
- Press and hold the release button (1) (**Fig. 487**).
- Move the stowing box up or down with the control lever (2) (**Fig. 487**) until the respective limit stop is reached.



**Fig. 485**

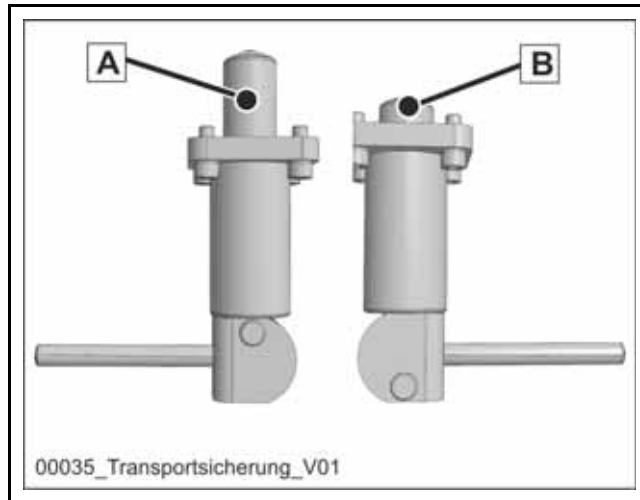


Fig. 486 "A" = secured / "B" = unlocked

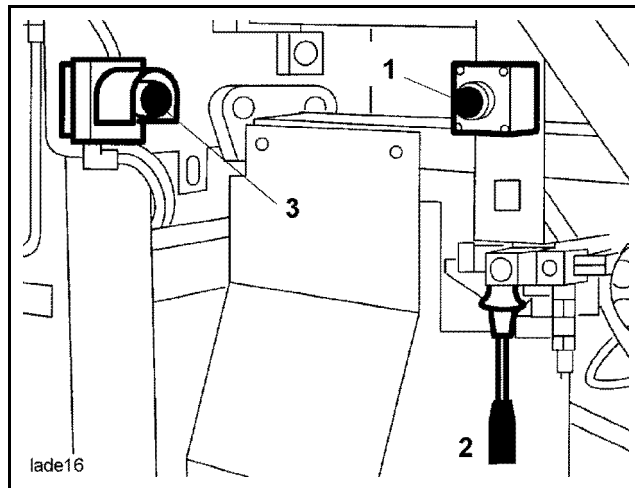


Fig. 487

**Information**

The control lever (2) is spring-centred. After releasing, it returns to the centre position and the movement of the stowing box stops.

In case of faults or danger, pressing the EMERGENCY OFF button (3) (**Fig. 487**) interrupts the movement of the stowing box.

To restart the device after an "EMERGENCY OFF", see the operating instructions for the truck-mounted concrete pump.

**Danger!****Danger to life caused by lost cargo or by lowering the stowing box!**

Do not forget to close the box with the removable door after loading it.

Do not forget to secure the stowing box in the transport position with the transport safety devices.

**6.6.4 Maintenance**

- Lubricate both pillow blocks (3) (**Fig. 485**) of the torsional wave according to the operating conditions, at least once every month with a grease gun (one grease nipple each).
- Grease the slipway of the sliding pieces with a brush according to the operating conditions.  
We recommend using an adhesive and pressure resistant grease.

Proceed as follows:

- Remove the access cover plates (2) above the ends of the slipways in the transport position.
- Grease the free ends and reattach the access cover plates.
- Lower the stowing box.
- Grease the upper parts of the slipways.



## 6.7 Water heater

Make sure to observe the following safety instructions.



### Warning!

#### **Risk of burns due to hot surfaces!**

Touching the heater and exhaust pipes during operation can lead to severe burns.  
Allow the heater to cool before working on it!

---



### Danger!

#### **Asphyxiation due to exhaust fumes!**

Diesel exhaust fumes are harmful to health and can lead to death by asphyxiation.  
Do not turn the heating on in enclosed spaces!  
Always ensure adequate ventilation.

---



### Caution!

#### **Risk of burns and explosion!**

Caution when handling fuel!

- No open flames
  - No sparks
  - No hot surfaces
  - Turn off the heater before refuelling!
- 



### Information

During operation the heater takes fuel and electrical power from the automotive system.

Always ensure that the starter batteries are in good condition and that there is sufficient fuel if using the heater.

---

The water heater **(1) (Fig. 488)** is a piece of special equipment.

The water heater is mounted onto the water case and runs on diesel fuel.

The diesel fuel is taken from the vehicle fuel tank.

An electrically driven water pump pumps the heat transfer medium through the heating coil of the heater.

The heating is turned on separately on the switch cabinet (situated in the system's tool compartment by default).

A temperature sensor in the water case turns the heating off at  $> 35\text{ }^{\circ}\text{C}$  and on again at temperatures below  $35\text{ }^{\circ}\text{C}$ .

A level switch controls the water level in the water case and turns the heating off if the water level is too low or prevents the heating from being turned on, in order to avoid overheating.

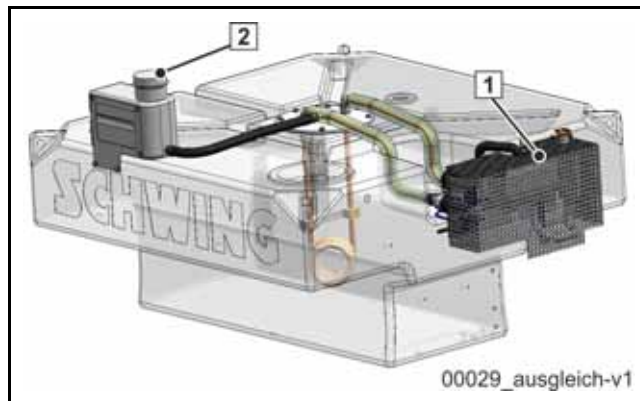


Fig. 488

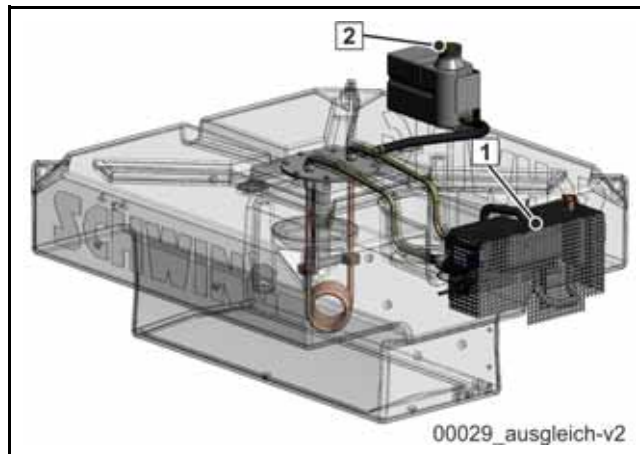


Fig. 489

### 6.7.1 Preparations for operation

- Before commissioning, check the levels of diesel fuel and water.



#### Warning!

##### Risk of scalding!

The closed system may be under pressure!

Never open pressurised reservoirs.

Allow the heater to cool before opening.

There are two possible installation points for the expansion tank: (2) (**Fig. 488**) or (**Fig. 489**).

- Make sure there is enough fluid in the heating circuit's expansion tank (2).

The equalising reservoir should only be filled halfway - do not overfill!

Loss of fluid indicates the presence a leak.

When topping up the equalising reservoir, use the antifreeze utilised by SCHWING.

See the antifreeze packaging for the required mixing ratio.

### 6.7.2 Turning the heating on

- Turn the heater on using the selector button (**Fig. 490**) on the electronic terminal box for the water heater.

The selector button will light up to indicate that the system has started.



Fig. 490

**Information**

Note the water level!

The heater will not switch on if the temperature is too high or the water level is too low.

At water temperatures below 35 °C in the reservoir, the heater starts to heat the water.

At a temperature of over 35 °C, the heating is turned off by a temperature sensor.

Through automatically turning the heating on and off, a constant temperature of 35 °C is maintained.

### 6.7.3 Turning the heating off

- Use the selector button (**Fig. 490**) to turn the heating system off.

The light in the push-button goes out and the pump continues running briefly to equalise the temperature.

### 6.7.4 Winter operation

The heating system was not designed to thaw out a frozen water case.

**Attention!****Damage to property due to freezing water!**

The water case and water system can be damaged by frost.

Use the heating to prevent freezing while working! Empty the water case at the end of the shift.

## 6.8 Fall arresters for truck-mounted concrete pumps

Various truck-mounted concrete pumps from Schwing have a lowerable railing for the left and/or right machine side in order to increase safety when working on the machine near the boom column.

Thus the risk of falling is reduced during work on the placing boom or near the slewing gear.

If work is to be carried out on the machine, the machine and vehicle motor must be switched off.

This railing is a special equipment and must be ordered separately.

### 6.8.1 Safety

If the machine needs to be entered to carry out maintenance work, safe climbing aids (hoists, ladders, etc.) must be used.

For accessing and installing the railing, a fall arrester in accordance with DIN EN 361 (personal protective equipment (PPE) against falling, category III) must be used.

Machines without a railing must generally only be accessed with personal protective equipment (PPE). Follow the operational health and safety regulations of your company.



#### Warning!

##### Risk of falling!

Severe injury, in particular to the head, may occur if you fall due to vibration, slippery surfaces or movements of the machine.

It is prohibited to enter the machine during operation!

Prior to carrying out any work at the machine, always switch off the machine and the vehicle motor.





### Caution!

#### **Danger of crushing!**

There is a danger of crushing of limbs when disassembling the railing.

During the disassembly process, only hold onto the railing using the handle provided for that purpose.

---



### Attention!

#### **Damage to the placing boom and the railing!**

The placing boom and installed railings may collide.

Lower the railings before moving the placing boom.

---

This section applies mainly to the following machine types:

- S 20
- S 24 X
- S 28 X
- S 31 XT
- S 36 X

#### **6.8.1.1 Reasonably foreseeable misuse**

If the railing is not operated as intended, SCHWING is not liable for any resulting damage to the machine, other assets or private goods, or for consequential damages in the event of injury or death of persons or animals.

- Do not use the installed railing as a transport safety device.
- Do not use the railing as a climbing aid.

#### **6.8.1.2 To be observed in the case of lowerable stowing boxes**

The machine models S 24 X and S 28 X can be equipped with hydraulically lowerable stowing boxes on request.

In order to move this stowing box, the railing must be installed.

The position of the railing is obtained by an end limit switch. The stowing box cannot be driven with the railing lowered.

### 6.8.1.3 To be observed in the case of stowing troughs!

Your machines can be equipped with stowing troughs on request.

Locking bolts for railings are located behind the stowing troughs for machines with stowing troughs.



#### **Caution!**

#### **Danger of crushing due to stowing troughs!**

Fingers and other limbs can get caught between handrails and stowing troughs and can be badly crushed.

When installing and removing railings, always use the handle provided for that purpose.

---

### 6.8.1.4 Securing the foldable railing



#### **Caution!**

#### **Danger of crushing due to the railing dropping!**

If the installed railing is not secured by the locking bolt, it may drop under load and crush parts of the body.

Never forget to correctly secure the railing with the locking bolt!

---

The railing is secured in the installed position by two bolts.

The locking bolts for locking the railing in place are located at the top on the railing girders on all machine models.

When folded up, the railing is secured by its own gravity.

### 6.8.1.5 Raising the foldable railing

Only lift the railing using the handle (2; **(Fig. 491)**).

- Insert the locking bolts (1) when the railing is installed.

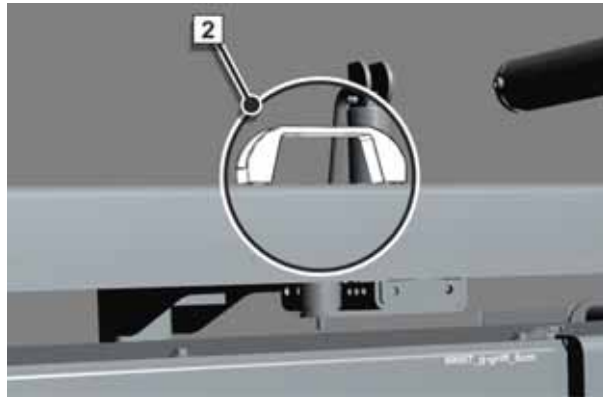


Fig. 491

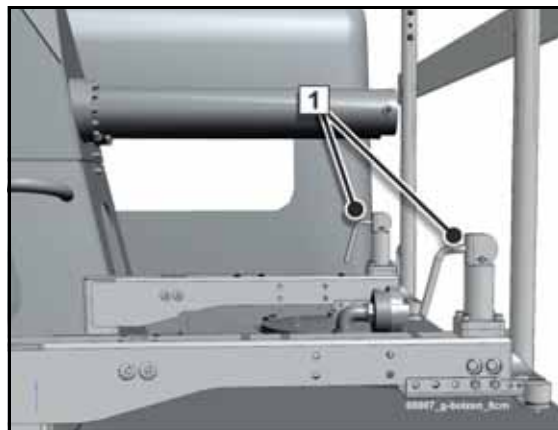


Fig. 492 ; Locking bolts



Fig. 493



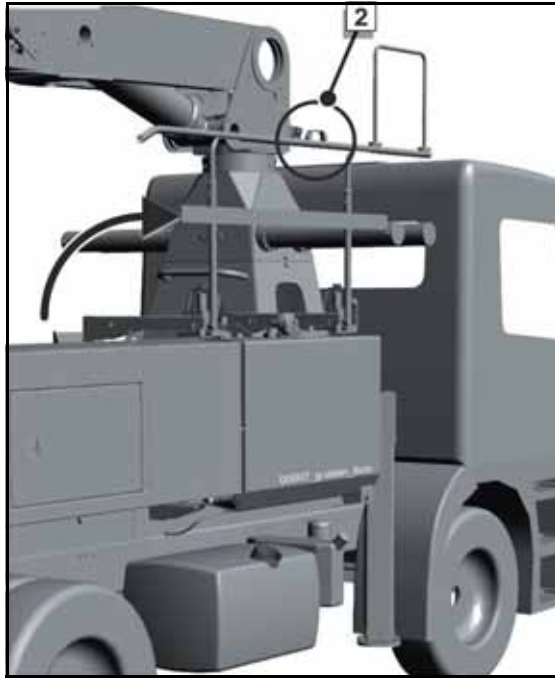


Fig. 494

### 6.8.2 Remove the railing

Proceed in the reverse order of assembly.

- Loosen the locking bolt (if present).



#### Caution!

#### Danger of crushing!

There is a danger of crushing of limbs when disassembling the railing.

During the disassembly process, only hold onto the railing using the handle provided for that purpose.

- Put the railing together with the necessary care.

The folding rail has no lock when lowered.



## 6.9 Release agent sprayer (special equipment)

The release agent sprayer made by Birchmeier, offered by SCHWING as special equipment, combined with Total Biomoldol S demoulding oil helps to prevent concrete from adhering to the hopper walls of your SCHWING machine and to clean the hopper better after each pumping operation.

Prior to each pumping operation, spray the Biomoldol S demoulding oil onto the dry walls of the hopper using the release agent sprayer.

After each pumping run, clean the hopper with water in the normal way.

### 6.9.1 Safety



#### Warning!

##### **Improper handling of release agents can cause severe injury!**

Severe damage to skin, eyes and respiratory tract may result from improper handling of the release agent sprayer.

- Whenever using release agents, wear personal protective equipment (protective clothing, protective glasses, rubber gloves, protective mask)!
- Avoid contact with skin and eyes and inhalation of spray.
- Use the sprayer only outdoors!

Observe the safety data sheet and the release agent manufacturer's instructions regarding accident prevention and health protection!

SCHWING accepts no responsibility for accidents or damage resulting from the use of inappropriate material!



#### Warning!

##### **Fire hazard!**

The release agent may ignite if sprayed onto hot surfaces, ignition sources or open flames.

Severe burns may occur!

Never spray onto hot machine parts or in the vicinity of sources of ignition!

Cigarettes and naked flames are prohibited in the vicinity of the sprayer.

Do not use water to extinguish fires!

It is essential to observe the release agent manufacturer's safety data sheet!



### Attention!

#### Damage due to wrong release agent!

The use of other release agents may damage painting or rubber parts of the SCHWING machine and the release agent sprayer itself!

Strongly corrosive or explosive media must not be used!

Only use the release agent recommended by SCHWING or a release agent with an identical composition.

Be sure to wear personal protective equipment (safety goggles, protective clothing, rubber gloves, protective mask) whenever using the release agent sprayer!



The release agent sprayer may only be used by trained personnel.

SCHWING recommends Total Biomoldol S exclusively as the release agent.

The release agent sprayer is equipped with a pressure relief valve.

The safety valve is set to 6 bar.

It is expressly indicated that any modification to the device is impermissible. In such a case, no warranty claims can be asserted against BIRCHMEIER Sprühtechnik AG and SCHWING GmbH.

Repair work must only be carried out by the manufacturer or by qualified personnel.

Prior to cleaning, always cut off the compressed air supply and release the pressure by lifting the pressure relief valve.

If available, interrupt the compressed air supply by closing the ball valve (3) (**Fig. 495**). If there is no ball valve, shut down the vehicle.

Never transport the release agent in the pressure tank of the release agent sprayer.

The action of frost can damage the release agent sprayer.

Do not spray the release agent in strong winds or against the wind.

Do not apply more release agent than necessary for the surface to be treated.

Take particular care to ensure that persons or animals are not exposed to the escaping release agent!

- Never blow through clogged nozzles and valves with your mouth (danger of poisoning!).
- The release agent sprayer must be cleaned after use. Ensure that you do not contaminate bodies of water.

Do not fill chemicals into other containers (bottles, cans etc.).

- When passing the device on to third parties, it is absolutely necessary to provide this user manual as well!

### 6.9.2 Technical data

Permissible operating pressure:	max. 6 bar
Max. admissible temperature:	50 °C
Min. admissible temperature:	5 °C
Tank capacity:	4.8 l
Volume filled in:	10 l
Delivery rate:	
At 6 bar jet:	1.73 l/min.
Regulating nozzle mist:	0.65 l/min.
Fan nozzle at 6 bar:	2.2 l/min.

### 6.9.3 Location of the release agent sprayer on your machine

The special equipment "release agent sprayer", consisting of a pressure tank (1) spray gun(2) and a ball valve (3) (**Fig. 495**) is generally located at the rear of your SCHWING machine.

The compressed air for the pressure tank of the release agent sprayer is supplied from the vehicle's air system.

When you start the vehicle's engine, compressed air is supplied to the release agent sprayer.

As of September 2019, the release agent sprayer can be disconnected on some machines from the permanent compressed air supply by using the ball valve (3), e.g. to prevent slight leaks in the spray gun. Step by step, all SCHWING machines will be equipped with this ball valve.

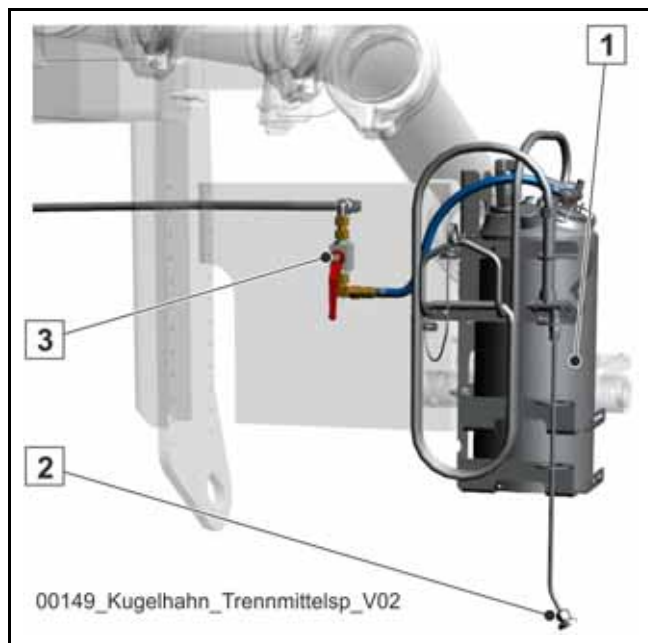


Fig. 495

Caption (Fig. 495)	
Pos.	Designation
1	Pressure tank
2	Spray gun
3	Ball valve

#### 6.9.4 Filling the pressure tank with release agent



#### Warning!

**Severe injury may be caused by systems under pressure.**

Prior to opening the pressure tank, always depressurise it.

Only open the pressure tank if the pressure gauge on the pressure tank (1) (Fig. 496) is pointing to "0".

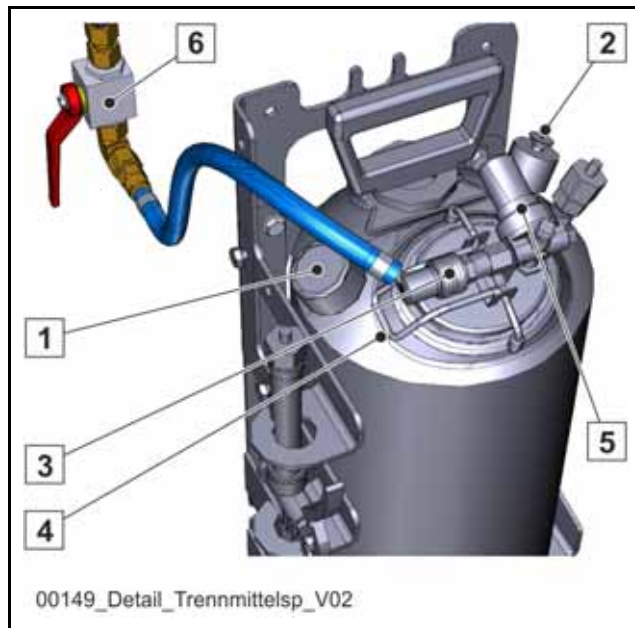


Fig. 496

Caption (Fig. 496)	
Pos.	Designation
1	Pressure gauge
2	Pressure relief valve (6 bar)
3	Quick-acting coupling - compressed air hose
4	Clamp of the top cover
5	Pressure release valve
6	Ball valve separation vehicle compressed air system

- Switch off the vehicle engine to switch off the compressed air supply or close the ball valve (6), if available.
- Lift the pressure relief valve (2) until no compressed air exits from the pressure reservoir.
- Disconnect the quick-acting coupling (3) of the compressed air supply from the pressure tank.
- Flip the clamp (4) over.
- Hold on to the top cover and press it towards the pressure tank.
- Once the top cover is released, turn it one quarter.

The top cover is captive.

- Fill a maximum of 5 litres of the release agent into the pressure tank. The remaining volume is required to act as an air cushion.
- When closing the top cover, ensure that the O-ring is supported evenly on the tank opening and the clamp is completely closed.



### Attention!

#### **Damage may occur due to exiting release agent!**

Release agent may exit without control if the pressure tank is too full!

Fill the release agent up to max. 50% of the tank volume.

The remaining volume is necessary as an air cushion.

- Put the top cover back on and lock it with the clamp.

When closing the top cover, ensure that the O-ring is supported evenly on the tank opening and the clamp is completely closed.

## 6.9.5 Operation / Cleaning



### Attention!

#### **Before each use, make sure that the release agent sprayer is:**

1. Correctly assembled;
2. not damaged;
3. properly functioning!

In particular, ensure that the hose connections are tight and the pressure relief valve is functioning correctly.

The release agent sprayer must be operated only in upright position (pressure gauge/plastic handle at top).

1. Wear your personal protective equipment.
2. Connect the quick-acting coupling (3) (**Fig. 496**) to the compressed air supply of the pressure tank.
3. If available, open the ball valve (6) (**Fig. 496**).
4. Start the vehicle engine.
5. Disperse the release agent with the spray gun.



**Information**

When the vehicle engine is started, compressed air is immediately supplied to the release agent sprayer.

**Warning!**

**Injury and/or damage may occur due to improper setting of the pressure release valve.**

The pressure tank may burst!

Valves and hoses may tear off!

Release agent may exit with high pressure.

The pressure release valve (5) (**Fig. 496**) is set to the optimal value in the factory and may only be changed by a SCHWING representative.

### 6.9.6 End of operation / Cleaning

**Warning!**

**Injury may be caused by systems under pressure!**

Explosive / implosive release of pressure from the device can cause severe injuries.

Prior to cleaning the pressure tank, cut off the compressed air supply and release the pressure still in the tank by lifting on the pressure relief valve!

Empty the release agent sprayer after each use.

Never store the release agent in the sprayer.

To completely empty the pressure tank, it can be dismantled.

- Disconnect the compressed air supply from the pressure tank, if available, by closing the ball valve (6) (**Fig. 496**) or by switching off the vehicle and disconnecting the quick-acting coupling (3) (**Fig. 496**).
- Open the pressure relief valve (2) until compressed air no longer exits the pressure tank.
- Relieve the spray gun by actuating the trigger.
- Remove the pressure tank from the vehicle.
- Open the filler cap and empty the pressure tank.

- Collect the release agent in a suitable receptacle.
- Fill the pressure tank with clean water.



### Information

#### **Properly dispose of release agent.**

See safety data sheet from the manufacturer of the release agent.

### 6.9.7 Rinsing

Do not use hot water!

- Tightly close the cap of the pressure tank.
- Reinstall the pressure tank on the vehicle.
- Reconnect the compressed air supply to the pressure tank.
- Start the vehicle engine.
- Pull trigger of the gun and rinse the system until no more water comes out.

### 6.9.8 Maintenance

Give special attention to the wearing parts such as nozzle, filter and seals.

Clean nozzle and filter periodically.

The nozzle and the filter are easy to replace.

Do not use hard objects to clean the nozzle.

Never try to clean the nozzle by blowing it through with your mouth (danger of poisoning).

Preferably, use a hand brush or a toothbrush.

- We recommend opening the pressure tank to dry it.

### 6.9.9 Winter operation

The release agent sprayer must be operated only at a temperature of 5°C or higher.

Depending on the release agent employed, the system must be emptied if there is a risk of frost. For additional information, see the product information from the release agent manufacturer.

- Clean the system as described above and allow it to dry.

### 6.9.10 Disposal

Dispose of release agent that can no longer be used as described in the manufacturer's safety data sheet.

### 6.9.11 Measures in the event of failures

Cause	Troubleshooting
<b>Pressure in the pressure tank drops:</b>	
Air pump, pressure gauge, hose pipes not tightly connected or seals defective	Tighten air pump, pressure gauge, hose pipes or replace defective seals
Hose is ruptured or punctured	Replace hose
Pressure tank defective or severely dented	Replace device Repair work is forbidden
<b>Hand valve is stiff</b>	
Valve is dirty	Disassemble the hand valve, clean carefully, grease valve stem and put back together again
Valve spring is stuck	Replace valve spring
Hand valve leaks	Replace seals
<b>Nozzle sprays unevenly</b>	
Nozzle is blocked	Clean nozzle
Nozzle bore is eroded	Replace nozzle

### 6.9.12 Spare parts and repairs

Immediately replace any part that is worn or damaged. Only use original parts. For further information on handling and maintaining the sprayer, please contact your specialist dealer or our customer service department.



## 6.10 SoftShift

“SoftShift” is a special piece of equipment that optimises the pumping of concrete with a low viscosity and cleaning tasks with water.

In doing so, SoftShift reduces:

- a) The spraying of concrete from the concrete filling hopper, since the rock valve no longer strikes with as much force.
- b) The striking of the differential cylinders when switching from “suction” mode to “pressure” mode in addition to the Mini Pause Switch (MPS).

Both functions can be used independently of one another.

The special “SoftShift” function can be enabled at any time, regardless of the machine’s current operating mode.

Please remember that the rock valve turns with reduced force in this case.



### Information

Unsuitable concrete!

Normal concrete or viscous concrete with a normal or maximum grain size should not be pumped while SoftShift is enabled, since there is a risk that the rock cannot turn correctly.

### 6.10.1 Function a) Rock valve damping

- Move the ball valve (1) (**Fig. 498**) into a vertical position in order to enable Soft-Shift function a).

A sign near the ball valve indicates the correct position (**Fig. 497**).

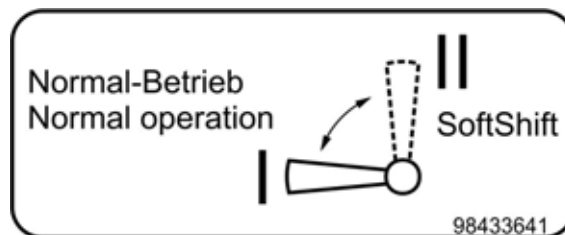
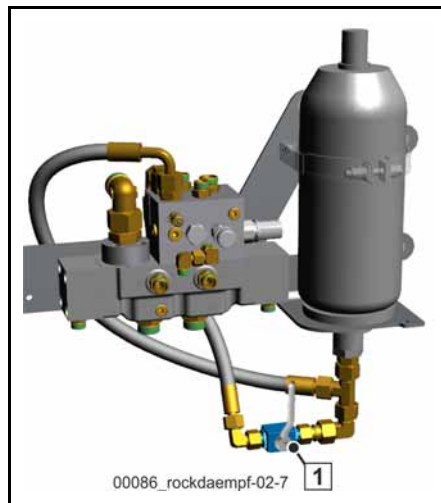


Fig. 497 Pressure accumulator sign



**Fig. 498 Rock valve damping**

The flow of hydraulic oil through the lower line is blocked.

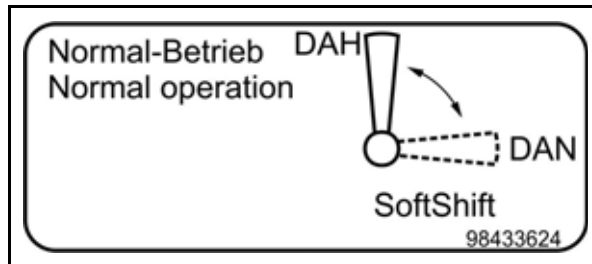
Less hydraulic oil flows.

The rock no longer turns with as much force.

### 6.10.2 Function b) differential cylinder damping

- Move the ball valve (1) (**Fig. 499**) into the “SoftShift” (DAN) position in order to enable SoftShift function b).

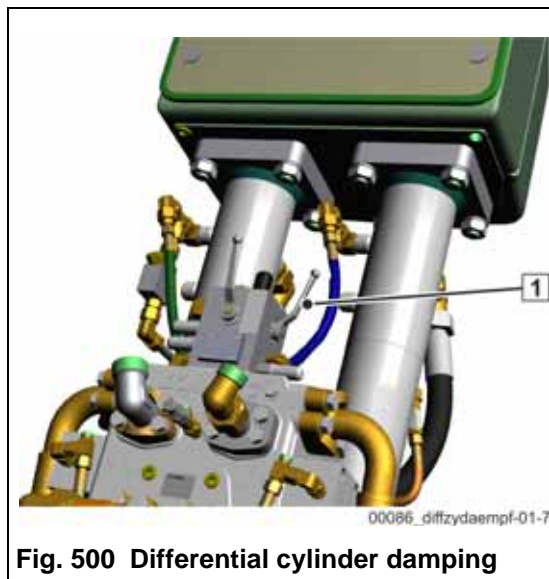
The second ball valve (1) (**Fig. 500**) provides extra damping for the differential cylinders in addition to the MPS (Mini Pause Switch).



**Fig. 499 Pump kit sign**

HPD = High Pressure Drop

LPD = Low Pressure Drop



**Fig. 500 Differential cylinder damping**

Switch back to normal operation (DAH) for hydraulic pressures of approx.  $\geq 150$  bar as shifting problems can occur otherwise.





## 6.11 Ultra-fine filtration



### Caution!

#### Pressure equipment!

For all work on the pressure equipment, ensure that the affected pressure space (filter housing) is depressurised.

Disconnect the power supply to the optional motors.

Make sure that the device has cooled down.

SCHWING truck-mounted concrete pumps can be equipped with an additional ultra-fine filtration (**Fig. 501**).

The ultra-fine filter is integrated into the agitator circuit and constantly passed through when the pump drive is switched on (bypass flow).

The filtration also occurs when the agitator is switched off.

The pressure relief valve, ball valve and pressure gauge (**Fig. 502**) form a single unit that is located near the filter housing or in the control cabinet of the emergency control unit.



Fig. 501

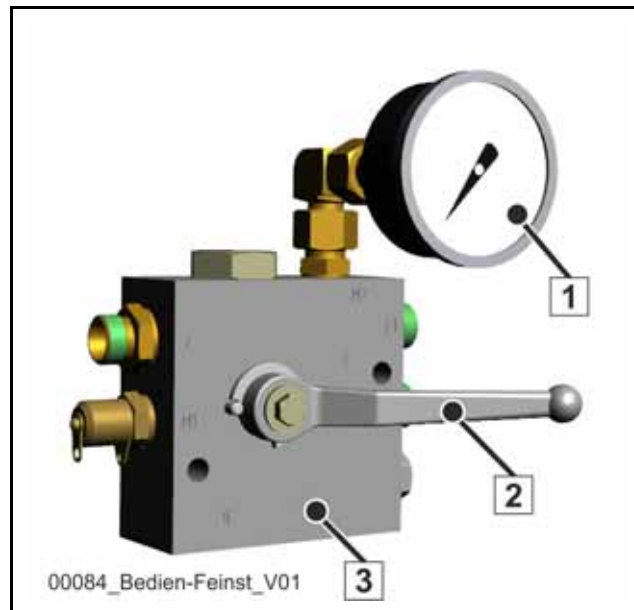


Fig. 502 Pressure gauge (1), ball valve (2), pressure relief valve (3)

### 6.11.1 Maintaining the ultra-fine filter

The best filter performance is achieved when the pressure gauge (1) (**Fig. 502**) displays a pressure between 2.0 bar and 4.0 bar.

Catching particles of dirt and water causes the pressure indicator to increase and the return flow volume to decrease.

We recommend replacing a filter at the latest after:

- 2000 operating hours
- 6 months of use
- In the event of frequent downtimes
- Pressure indicator is above 4.0 bar



#### Attention!

#### Material damage due to high pressure!

The pressure must under no circumstances exceed 5.5 bar. The filter bracket would be destroyed.

At 5.0 bar, the upstream pressure relief valve (3) (**Fig. 502**) opens and the oil flows unfiltered back into the tank. The filtration occurs in this case but always via the system filter.

Ensure the correct function and setting of the pressure limit valve.

### 6.11.2 Design of the ultra-fine filter

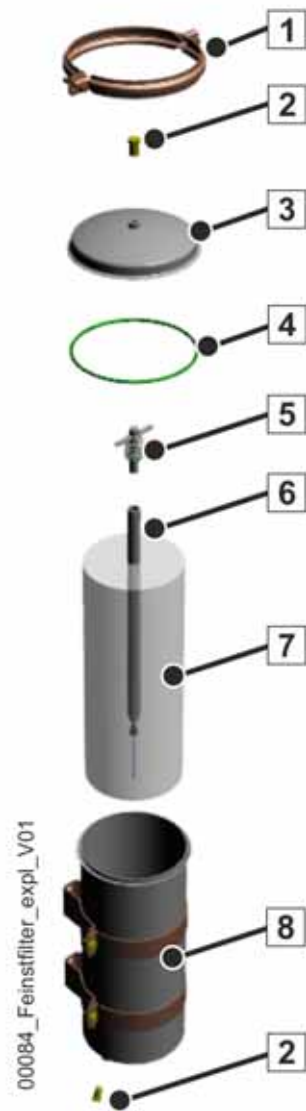


Fig. 503 Design of the ultra-fine filter

Caption (Fig. 503)			
Pos.	Designation	Pos.	Designation
1	Cover retaining clamp	5	Retaining bolts with seal
2	Stopper	6	Drain pipe
3	Filter cover	7	Filter element
4	Filter cover seal	8	Filter housing

### 6.11.3 Replacing the ultra-fine filter element

- Switch the pump drive off and secure the machine against being started by un-informed persons.
- Close the ball valve (2) (**Fig. 502**).



#### Information

Closing the ball valve allows the filter to be separated from the system in the event of malfunctions.

This prevents the agitator's functions from being impaired.

- Open the drain screw (1) (**Fig. 501**) and drain the filter housing completely into a container placed below it.
- Carefully remove the screw connection on the cover retaining clamp (1) (**Fig. 503**). Only remove the cover (3) if the oil level has gone down as the oil will overflow otherwise.



#### Caution!

#### Risk of injury due to systems under pressure.

The filter housing can be under pressure in the case of serious contamination.

Oil can spray out and lead to injuries.

Be extremely careful when loosening the screw connection and loosen the screw connection only when the pressure gauge shows 0 bar.

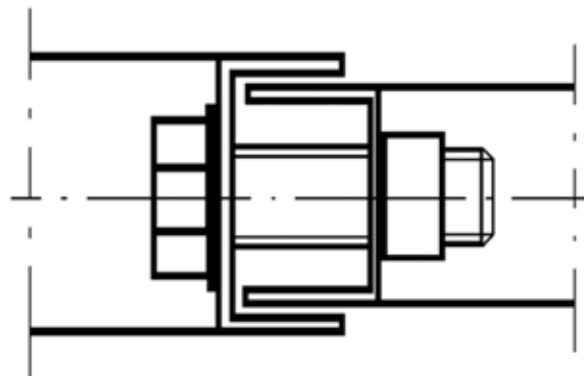
- Remove the cover retaining clamp (1) and the filter cover (3) (**Fig. 503**).
- Loosen and remove the retaining bolt (5) for the filter element (7). Replacing the retaining bolt seal is part of replacing the filter.
- Tighten the filter element (7) on the specially-provided stirrups of the drain pipe (6).
- Allow the filter element to drip dry, placing it in a separate container so as to prevent contamination caused by leaking oil. The worn-out filter element must be properly disposed of later on (special waste).
- Remove the coarse contamination in the filter housing (8) (**Fig. 503**).
- Reattach the drain screw to the filter housing with Teflon tape.
- Mount the new filter element in a straight and vertical position above the drain pipe.
- Screw the retaining bolt into the drain pipe and ensure the filter element is fit tightly.
- Inspect the cover seal (4) for damage and replace it if necessary.

- Seal the filter housing with the filter cover. The pivot of the retaining bolt must sit in the guide in the filter cover provided for the purpose.
- Fasten the filter cover with the cover retaining clamp and tighten the screw connection.



### Information

The ends of the cover retaining clamp are U-shaped and must interlock (**Fig. 504**). Ensure the correct installation without fail.



Deckelhalteklammern\_V01

**Fig. 504 Cover retaining clamps**

The ultra-fine filtration is operational once more.



## 6.12 VarioPressure

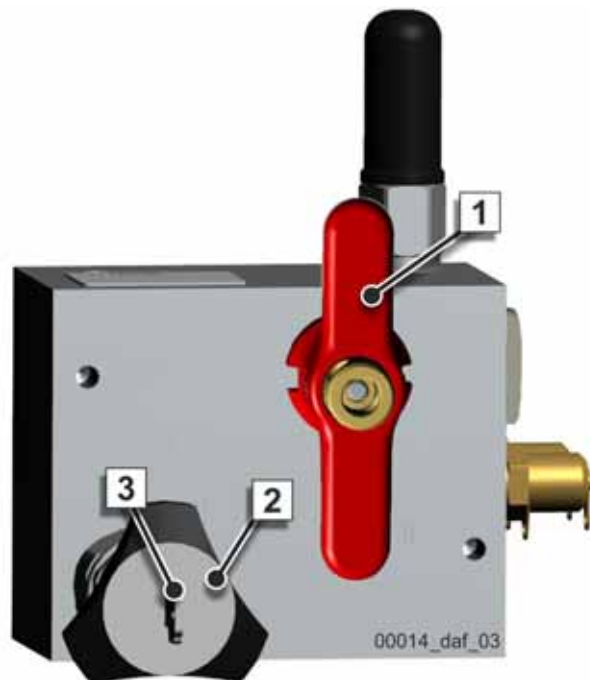


Fig. 505

Caption (Fig. 505)	
1	Ball valve
2	Hand-wheel
3	Key for locking/securing

### 6.12.1 Intended use

The “VarioPressure” accessory can be used to adjust the pumping pressure of the SCHWING pump at any time to the situation at hand, thus ensuring that no critical pumping pressure builds up in the pumping pipes connected to the SCHWING pump that could exceed the bursting pressure of your tubes and lines.

“VarioPressure” can also be used in other use cases to protect equipment connected to the SCHWING pump, such as concrete pumping hoses.

### 6.12.2 Improper use. Foreseeable misuse

Any type of use other than or beyond that described in “**Intended use**” is considered improper.

If VarioPressure is not operated as intended, SCHWING shall not be held liable for any resulting damage to the machine, other assets or private goods, or for consequential damages in the event of injury or death of persons or animals.

### 6.12.3 Delivery condition

When delivered, the ball valve (1) (**Fig. 505**) is situated in an upright position (=max. pumping pressure).

The hand-wheel (2) (**Fig. 508**) is locked. The key is located in the right-hand control cabinet for truck-mounted concrete pumps.

Always store the key in a secure location in order to prevent unauthorised adjustments.

### 6.12.4 Step-by-step instructions

Proceed as follows in order to use the VarioPressure.

#### Situation:

You have acquainted yourself with the prevailing conditions on the jobsite beforehand and need to configure VarioPressure accordingly.

Adjust the pressure of your SCHWING pump in accordance with the requirements:

1. First proceed as described for the pressure control (in the "Pressure control" chapter of your operating instructions).
2. Move both ball valves (1+2) (**Fig. 506**) on the pump kit, for example, into the "pressure control" position (**Fig. 507**) so that the pistons come to a standstill.



#### Attention!

#### Material damage may be caused by switching during pumping operations!

Only change the position of the ball valve (1) (**Fig. 508**) if your SCHWING pump is set to the minimum delivery rate!

3. Move the ball valve (1) (**Fig. 508**) into the "I variable pumping pressure" position.
4. Start the SCHWING pump as per usual.
5. Now observe the pressure gauge on the VarioPressure accessory (4) (**Fig. 508**).
6. Unlock the hand-wheel using the key (3) (**Fig. 508**).
7. If the hydraulic pressure on the VarioPressure pressure gauge remains constant, the reduced hydraulic pressure that was last configured has been reached.
8. Now set the new maximum pressure using the hand-wheel (2) (**Fig. 505**).



- a) To do this, please refer to the sign on the VarioPressure hydraulic block containing the required conversion factor for the respective pump (e.g., P2023-110/75 RB) [ $P_{concrete} = P_{hydraulic} \times 0.25$ ].
- b) In the example, the value displayed on the VarioPressure pressure gauge has to be multiplied by 0.25 in order to obtain the desired pumping pressure.
- c) The BP pressure gauge for SP/TP machines is equipped with a scale on the outside, siehe Tab. 30 auf Seite 729. The corresponding scales indicate the configured pumping pressure depending on the configured hydraulic oil pressure. A conversion is not necessary. The various colours indicate the corresponding pumping pressure for piston-side or rod-side application.
4. After configuring the pressure, lock the hand-wheel again using the key / (secure it against being changed without authorisation) and remove the key.
5. Move the ball valves on the pump kit of your SCHWING pump back to the “operating position”. To do this, carefully follow the descriptions in the “Pressure control” chapter of your operating instructions.

If you would like to switch your SCHWING pump back to maximum pressure, move the ball valve (1) (**Fig. 508**) from VarioPressure back to the “II max. pumping pressure” position.

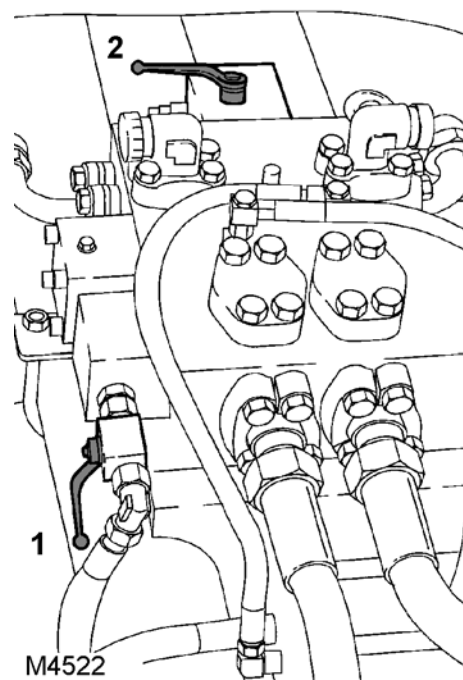


Fig. 506 Move ball valves into position

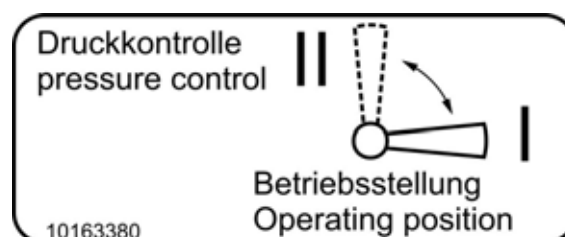


Fig. 507



Fig. 508

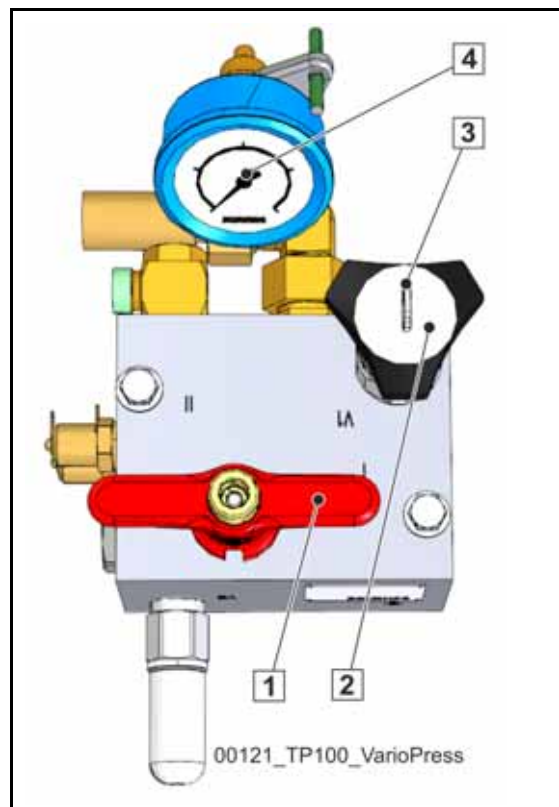


Fig. 509 VarioPressure TP100

Caption for (Fig. 509)	
Pos.	Designation
1	Ball valve
2	Hand-wheel
3	Hand-wheel key

Caption for (Fig. 509)

Pos.	Designation
4	Pressure gauge

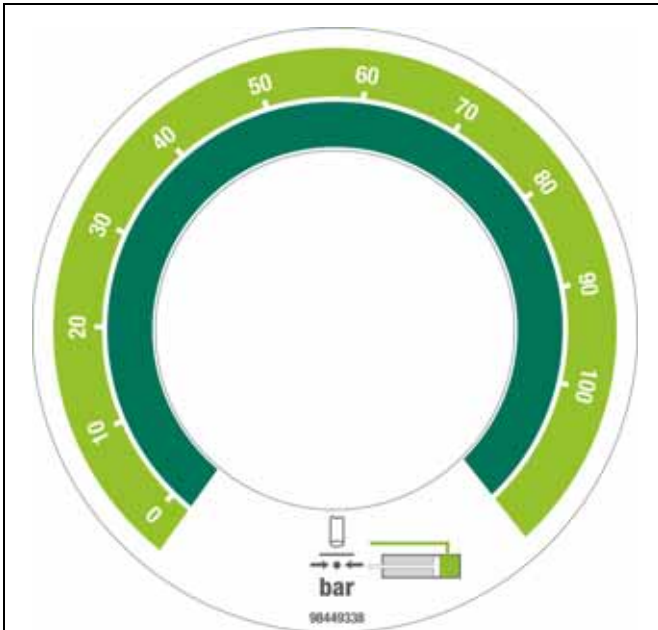


Fig. 510 TP 100 (98449338+98449340)

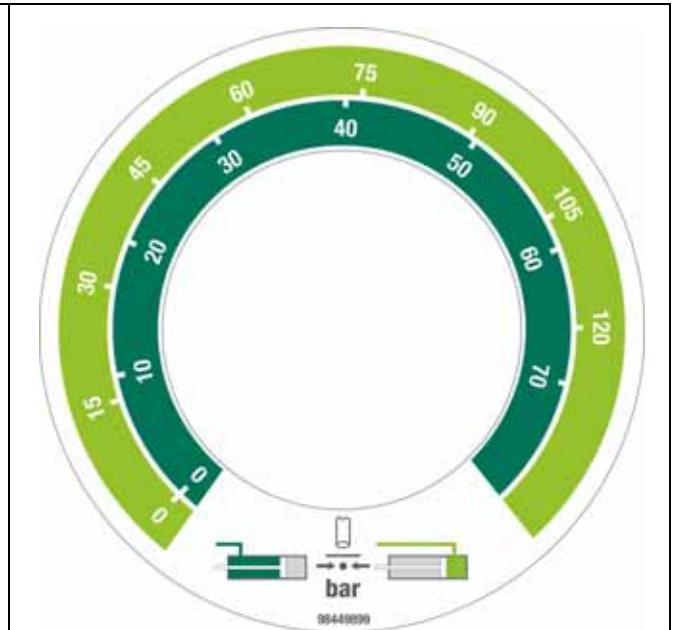


Fig. 511 SP 1800/2800 (98449899)

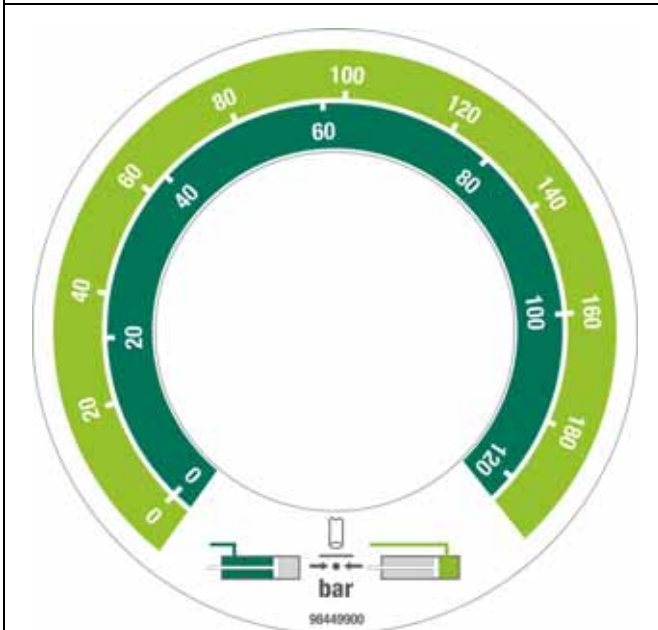


Fig. 512 SP 3800/7000/9000 (98449900)

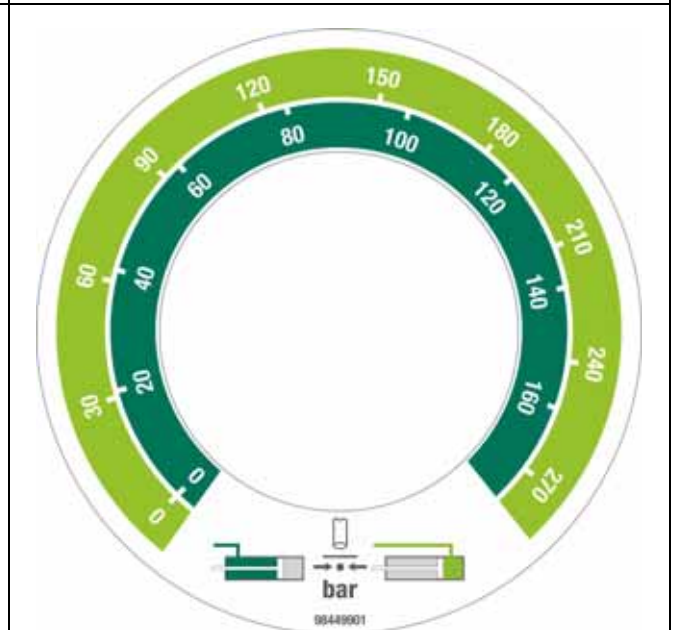


Fig. 513 SP 7500/9500 (98449901)

Table 30 Scales for pumping pressure with VarioPressure



## 6.13 Rotatable stowing box

Optionally, SCHWING machine types S20 and S24X can be equipped with the “rotatable stowing box” accessory. If interested, please contact your nearest SCHWING representative.

These stowing boxes can be folded down hydraulically when loading and unloading, which makes it possible to load and unload the machine from the ground.

### 6.13.1 General safety instructions for the stowing box



#### Warning!

##### **Risk of being crushed or rammed by rotatable stowing box!**

Body parts, especially the head, can be seriously injured.

The danger area around the stowing boxes must be kept free of people and objects.



#### Warning!

##### **Risk of collision when loading and unloading!**

Serious accidents due to unsecured danger area.

Always secure the danger area according to regulations when loading and unloading your machine.



#### Attention!

##### **Material damage to stowing box and placing boom!**

The placing boom can collide with the stowing boxes when folded up.

A higher level of attention is required when moving the placing boom in connection with the “rotatable stowing box” accessory.

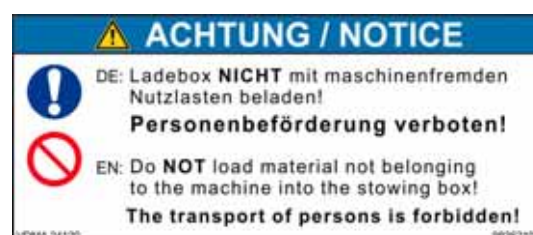


Fig. 514 Identification plate: Loading



Fig. 515 Identification plate: Risk of being crushed



Fig. 516 Identification plate: Suspended load



Fig. 517 Identification plate: Climbing

### 6.13.2 General information

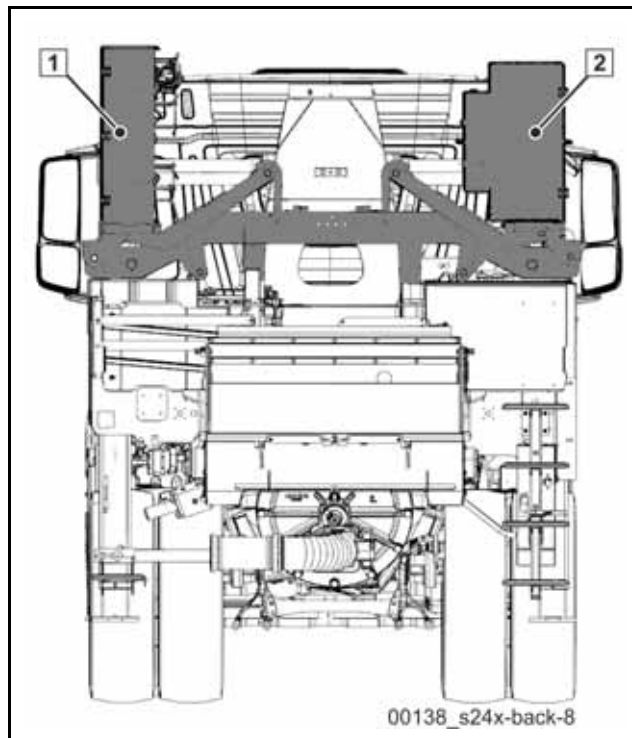
Hoses with a maximum length of 5 metres can be stored in the stowing boxes.

For the machine type S24X, you can order stowing boxes for hoses with a maximum length of 5 metres for the left-hand side of the machine.

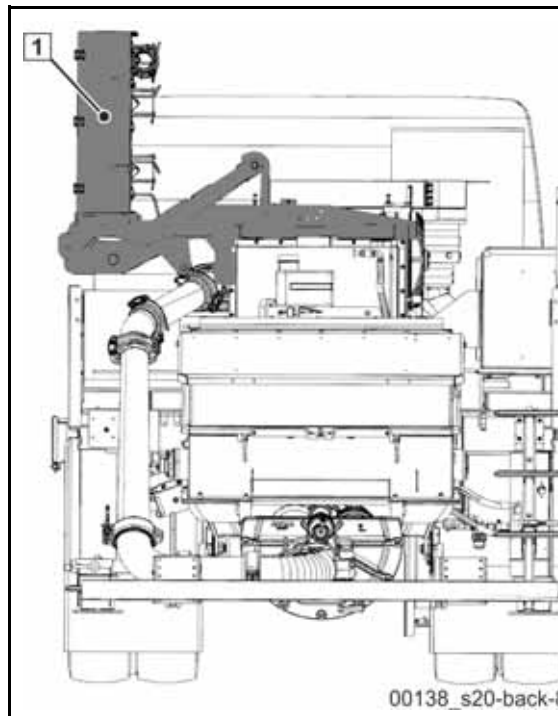
For the right-hand side of the machine, you can order stowing boxes for hoses with a maximum length of 3 metres.

For the machine type S24X, both sides of the machine can be outfitted with stowing boxes at once or individually (**Fig. 518**).

For the machine type S20, you can order stowing boxes for hoses with a maximum length of 5 metres without exception for the left-hand side of the machine (**Fig. 519**).



**Fig. 518 S24X: Both stowing boxes. (1) Left-hand stowing box; (2) Right-hand stowing box**



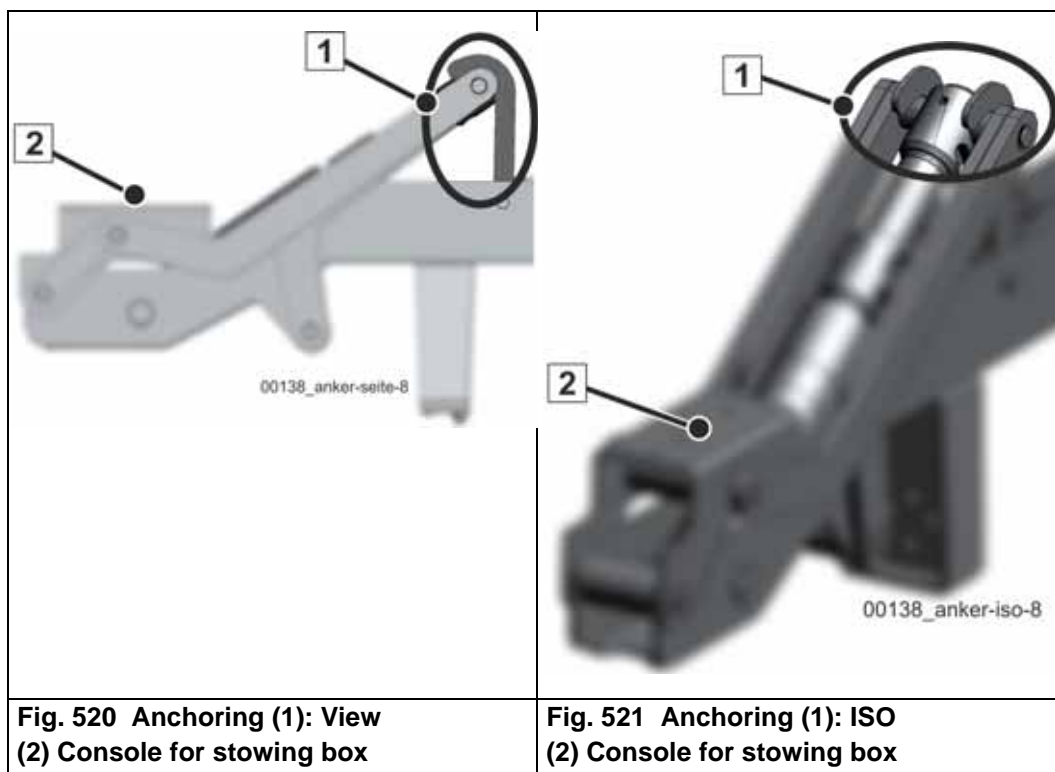
**Fig. 519 S20: Stowing box only possible on left. (1) Left-hand stowing box**

The function is activated via the hydraulic pump for the chamber valve.

This means that you must decide between the accessories “chamber valve” or “rotatable stowing box”. Using both accessories at the same time is not possible.

Likewise, it is not possible to combine the accessories “rotatable stowing box” and “fall arrester” on the same side of the machine.

The stowing boxes are automatically anchored in the transport position (for anchor, see **(Fig. 520)** and **(Fig. 521)**).



### Information

Always support your machine completely vertically before moving the stowing boxes.

This avoids, among other things, placing excessive stress one side of the machine and thus prevents the associated wear on the machine.



### Information

SCHWING recommends always folding down the stowing boxes before moving the placing boom.

This prevents collisions between the placing boom and the stowing boxes.



### 6.13.3 Intended use

The rotatable stowing boxes represent an extension of the hose reel system, making it possible to load and unload at ground level.

A maximum hose length of 5 metres can be stored.

The boxes must be folded up while driving.

The boxes must be folded down in order to operate the placing boom.

The boxes are only suited for storing concrete hoses and pumping lines from the company SCHWING.

### 6.13.4 Improper use

- No additional material may be fastened onto the stowing boxes.
- The stowing boxes are not suited for lifting loads.
- Climbing onto the stowing boxes is prohibited.
- The maximum load weight must be observed.
- Anything not in line with the intended use is prohibited.

### 6.13.5 Operating via remote control

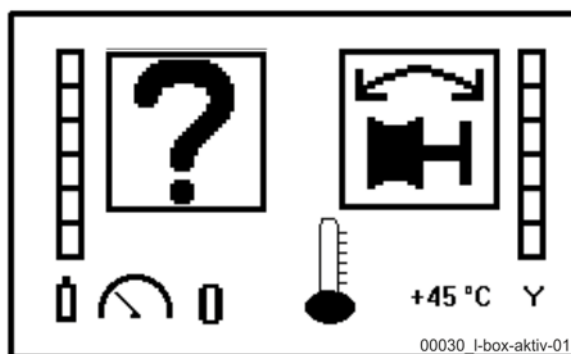
Three switches on the radio control are used to activate the stowing box control system.

1. The hare / snail switch (S11) must always be in the centre position
2. The “Control release” switch (S3) must be held down
3. Move the switch (S2) into the “Chamber valve” position



**Fig. 522 Designation of SC30 buttons.**

Now the joysticks are switched to the stowing box control system and the remote control displays the following screen (**Fig. 523**).



**Fig. 523 SC30 display: Stowing box active**

- In order to operate the stowing boxes, position yourself behind the concrete filling hopper looking towards the driver's cab.

The stowing boxes can be controlled using the joysticks in the same manner as the placing boom.

Joystick (J1) (**Fig. 522**) is responsible for controlling the left-hand stowing box.

Joystick (J2) (**Fig. 522**) is responsible for controlling the right-hand stowing box.

The stowing boxes remain active until the selector switch (S2) is moved into a different position.

After an emergency stop, the stowing box control system is disabled and must be reactivated.


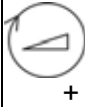



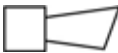






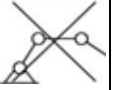






S 1	Selector push-button: I -0- I	S 4	Selector push-button: I -0- I
 0 Vehicle engine (0) = off (stop) (I) = on (start) / <b>open EHP</b>		 - + Speed of the vehicle engine (-) = reduce (+) = increase	
S 2	Selector switch: I -0- I	S 5	Push-button: I - 0
 End hose stop: Automatic of / <b>VarioPressure on</b> 0 End hose stop: Automatic on  Activate chamber valve / <b>rotate stowing boxes</b>		 Browse display	
S 3	Selector push-button: I -0- I	S 6	Potentiometer: min - max
 Signal horn on vehicle on 0 Acknowledge control release or diagnosis horn (switch off) 		 Adjust the delivery rate of the concrete pump proportionally	
		S 7	Selector switch: I -0- I
		 Concrete pump on forwards (pump operation) 0 Concrete pump on backwards (suction operation) 	

Table 31

S 8	Selector switch: I -0- I	S 11	Selector switch: I -0- I
 nahbed3_sym-08 0	Compressor on	 	Boom speed slow (concreting work)  Placing boom control off
	Agitator automatic operation on		Boom speed fast (installation and removal)
S 9	Selector switch: I -0- I	S 12	Push-button: I - 0
 0 	Water pump on  Concrete vibrator automatic operation on		Transmitter on
S 10	Push-button: I - 0	S 13	EMERGENCY STOP button: I - 0
	Display lighting on / off		Transmitter off / EMERGENCY STOP

### 6.13.6 Maximum load capacity



#### Attention!

#### Material damage due to overload!

The machine structure can be damaged and the vehicle handling can change dangerously.

Never exceed your vehicle's maximum permitted axle load and load capacity.

The maximum load capacity must never be exceeded as this could seriously impair the structure and the vehicle handling of your SCHWING machine.

Use table 32 on page 739 to calculate the weights.

Always distribute the loads evenly.

Comply with your vehicle's permitted axle load. The respective limits can be found in the operating instructions of your vehicle's manufacturer.

Tare weights incl. supports						
S24X, right	Incl. sleeves	22 x 3m; DN 75				<b>407kg</b>
S24X, right	Incl. sleeves	13 x 3m; DN 100				<b>400kg</b>
S20 / S24X, left	Incl. sleeves	14 x 5m; DN 75				<b>456kg</b>
Load capacity for 3-metre box				Number	Subtotal	Grand total
Hose	3 m	DN 75	20.4kg			
Hose	3 m	DN 100	33.5kg			
Load capacity for 5-metre box						
Hose	5 m	DN 75	29.6kg			
Hose	10 m	DN 75	52.6kg			
					<b>Total</b>	

Table 32 Weight table

### 6.13.7 Emergency operation for stowing boxes

In the event of a power outage, an electronic malfunction or something similar, the stowing boxes must be moved into the transport position in order to drive in open traffic.



#### Warning!

##### Risk of machine falling down!

If the machine falls, it can cause serious or even fatal injuries.

Secure it with safety harnesses to prevent it from falling.

During emergency operation, the machine must be entered in order to access the valve block on the stowing box bracket (**Fig. 526**), (**Fig. 528**).

Only fasten the safety harness to appropriate machine components.



#### Warning!

##### Risk of accidents as a result of stowing boxes being folded down!

Serious or even fatal injuries.

Moving the machine while the stowing boxes are folded down is prohibited!

Two people are required to move the stowing boxes into the transport position (**Fig. 518**) during an emergency.

In such situations, one person must actuate the valves for upward and downward movements while secured to the top of the machine.

### 6.13.8 Operating the S20 stowing box during emergencies

- Unscrew valve block (1) (**Fig. 524**) in order to actuate valve (4) (**Fig. 525**).
- Screw in the control lever on control block (5) (**Fig. 524**) and hold down the control lever in order to activate the “Chamber valve” function.
- Actuate the valves on stowing boxes (1) and (2) (**Fig. 526**) for upward and downward movements (on top of the machine).

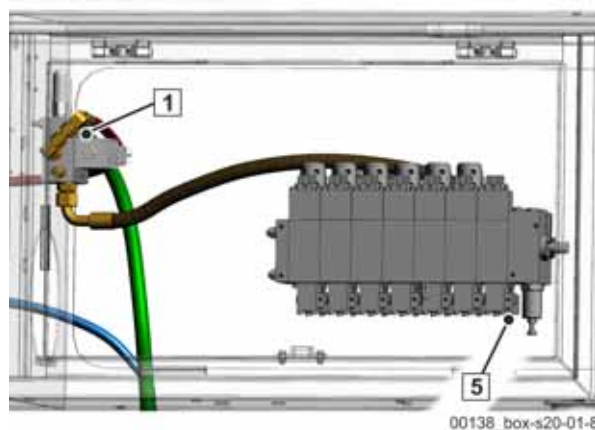


Fig. 524 S20 control cabinet

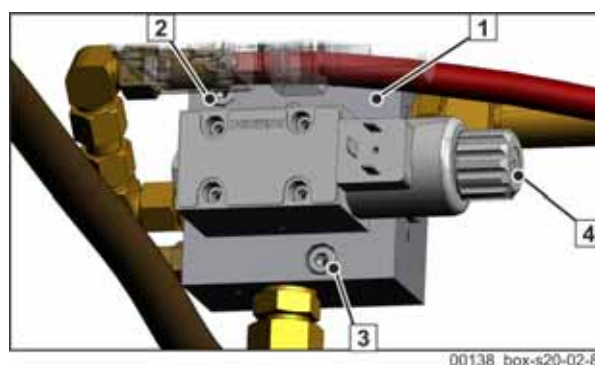


Fig. 525 Valve in control cabinet

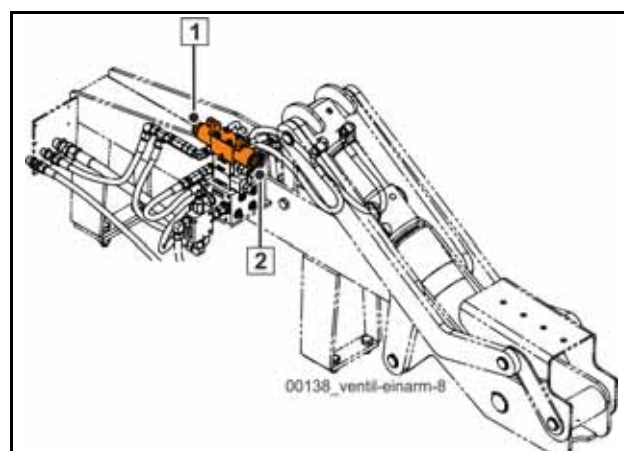
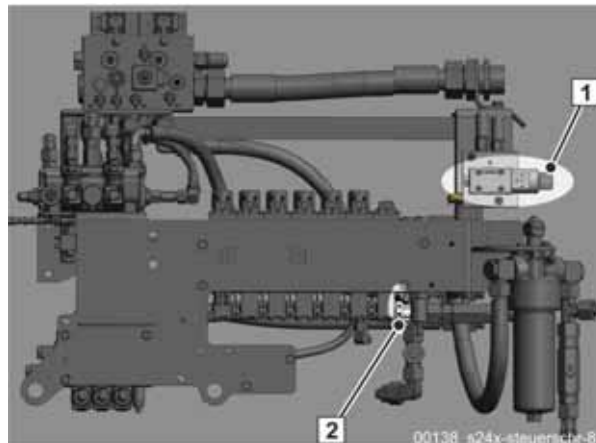


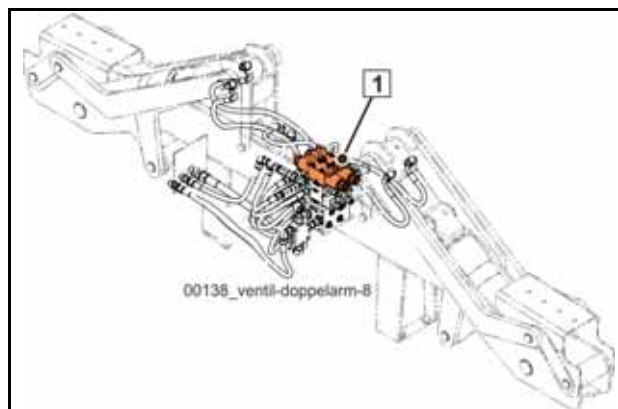
Fig. 526 Valve block on stowing boxes

### 6.13.8.1 Operating the S24X stowing boxes during emergencies

- Press valve (1) (**Fig. 527**) for the oil flow.
- Screw in control lever (2) (**Fig. 527**) on the control block and hold down the control lever in order to activate the “Chamber valve” function.
- Actuate valves (1) (**Fig. 528**) on the stowing boxes for the correct lever arm (right- or left-hand side) for upward and downward movements.



**Fig. 527 S24X control cabinet**



**Fig. 528 Valve block on stowing boxes**





## 7 Appendix





## 7.1 Information service

Are you already using our information service? - 5 minutes that are worth it!

Dear Customer,

With the purchase of your SCHWING machine, you have acquired a high quality product.

Of course, we are constantly working to improve our products and would like to inform you when new findings become available. This service is completely free of charge, because we highly value customer support and product monitoring!

Our offer also expressly applies when the SCHWING machine was obtained second-hand!

In order to send you our information, we need your address.

Please complete the following questionnaire and send it to

SCHWING GmbH

Service

PO Box 20 03 62

D-44647 Herne

Of course you can also fax us this page or reply by email:

Fax: +49 (0)2325 74674

Email: [service@schwing.de](mailto:service@schwing.de)

We look forward to your response!

Please complete in block letters:

Customer no.:	
Address:	
Country:	
Contact person:	
Telephone:	
Fax:	
Email:	
Machine type:	
Machine no.:	

SCHWING GmbH  
Heerstrasse 9 - 27  
D-44653 Herne  
Phone 02325 / 9 87-0  
Fax 02325 / 7 29 22  
Email: info@SCHWING.de

## **Attention: Important additional information on the safe operation of your SCHWING concrete pump!**

Dear customer,

As a reputable and responsible manufacturer of truck-mounted concrete pumps we continuously strive to increase safety on jobsites by, for example, improving the recommended maintenance procedures for our machines.

### **I. Computational design of truck-mounted concrete pumps**

Truck-mounted concrete pumps are modelled mathematically according to the criteria for operational stability. In addition to static loads – the load generated by the tare weight and concrete – various dynamic loads (e.g. oscillations caused by pumping procedures, folding equipment in and out) influence the pump's components. As part of the operational stability calculation, a **theoretical** service life is determined for truck-mounted concrete pumps based on projected load spectra.

### **II. Theoretical service life of boom cylinders**

The theoretical service life of a truck-mounted concrete pump and its components, including the hydraulic cylinders, is calculated based on numerous factors. However, it can vary from machine to machine in accordance with the expected use. Among other things, it depends on the actual use, the operating conditions and compliance with the prescribed operating instructions / maintenance procedures.

Although regular boom inspections are considered an industry standard today, not all boom components are examined thoroughly during a standard inspection conducted according to the latest technical standards. The boom cylinders in particular are merely submitted to a visual inspection of their exterior during the boom inspection, which can be extended from a safety standpoint (**Appendix 2**).

In light of this, SCHWING provides notes regarding the theoretical service life (design calculation) of SCHWING boom cylinders. This service life largely depends on the number of cylinder cycles (one cycle equates to one extension and retraction, which generally corresponds to the number of construction jobs), as well as the delivery rate.

Applying the latest technical standards with respect to calculating the theoretical service life of hydraulic cylinders for machines that were constructed after 1995 reveals the following:

At the very latest, after your truck-mounted concrete pump has exceeded the number of construction jobs or the volume of pumped material specified in **Appendix 1** of this letter, the boom cylinders must be inspected immediately by a certified inspector according to the procedure described in **Appendix 2** and replaced / repaired based on his or her recommendations. If no problems or defects are detected during the inspection, SCHWING requires subsequent inspections of the cylinder or cylinders every three years at the latest from then on.

SCHWING GmbH · Headquarters and Factory: Heerstraße 9-27 · D-44653 Herne  
Amtsgericht Bochum, HRB 9680 · Managing director: Dr.-Ing. Gunther Abolins, Xianliang Sha · Chief executive officer: Dipl.-Kfm. Gerhard SCHWING  
VAT ID no.: DE 126 686 632, Organträger XS Holding GmbH VAT ID no.: DE 286 528 704

HSBC Trinkhaus & Burkhardt AG  
(BLZ 300 308 80) Konto-Nr. 30/2109/001  
SWIFT TUBDDEDD  
IBAN: DE73 3003 0880 0302 1090 01

Commerzbank AG Herne-Wanne  
(BLZ 430 400 36) Konto-Nr. 246 898 100  
SWIFT COBA DE FF XXX  
IBAN: DE84 4304 0036 0246 8981 00

### III. Additional factors that influence the service life of boom cylinders

Please note that, in addition to the number of construction jobs and the volume of pumped material, other factors can also significantly reduce the theoretical service life of a cylinder under specific circumstances, such as:

- Not operating the machine in accordance with its intended purpose as described in the operating manual
- Misuse (e.g. using the boom as a lifting device)
- Improper extension of the distribution hoses on the end
- Failure to follow the maintenance guidelines
- Operating a pump in extreme conditions, e.g. in excessive heat or cold
- Improper operation by machine operators without adequate training or instruction
- Using concrete delivery lines that are not approved by SCHWING
- Not performing the boom inspections and corresponding repairs on time
- In the event of damages of any kind, the entire machine must be examined, including an inspection as described in Appendix 2

### IV. This letter is considered part of your operating manual

Please enclose this letter, along with Appendices 1 and 2, in your operating manual as a supplement. This letter supersedes all information regarding the theoretical service life of boom cylinders in your operating manual. This letter applies to all truck-mounted concrete pumps manufactured or sold by SCHWING.

### V. SCHWING's warranty and/or guarantee conditions do not change

SCHWING is providing the information above in order to support you in using your concrete pump safely and properly. The specifications contained in this letter and its Appendix 1 represent values based on the computational design. This information does not relieve the customer of his or her own due diligence to regularly inspect all components of the concrete pump, including the cylinders. The content in this letter does not constitute any explicit or implicit warranties/guarantees. Likewise, this letter does not change or modify any written warranty conditions / guarantee conditions offered by SCHWING when you bought the concrete pump.

**Attention:** If you are no longer in possession of the truck-mounted concrete pump, we would kindly ask you to inform us of its whereabouts.

Kind regards,

**SCHWING GmbH**

Dipl. HTL - Ing. Horst Johann Jöbstl, MSc  
Ltg. Production & Quality

Dipl.- Ing. Siegfried Trümper  
Ltg. Construction & Development

## APPENDIX 1

### Additional maintenance information on the boom cylinders

Theoretically, the cylinders in your truck-mounted concrete pump have a service life of approx. 15 years (reference table), based on an estimated number of construction jobs and the delivery rate ("volume of pumped material"). After exceeding the number of construction jobs for your concrete pump and/or the volume of pumped material specified below, an inspection has to be performed immediately as described in Appendix 2. Repairs and replacements are to be performed based on the recommendations of the inspector.

If an inspection is required and no problems or defects are detected, SCHWING requires subsequent inspections to be carried out every three years as described in Appendix 2.

#### Reference table:

Machine type	Number of construction jobs <sup>2)</sup>	Volume of pumped material/m <sup>3</sup>
S20 <sup>1)</sup>	6,800	430,000

**1) The following cylinders have to be inspected once the specified number of construction jobs or the volume of pumped material has been reached:**

Machine type	Cylinder	Number of construction jobs	Volume of pumped material/m <sup>3</sup>
S20	A cylinder	6,800	430,000
S20	B cylinder	5,000	316,000
S20	C cylinder	6,800+++*	430,000+++*
S20	D cylinder	6,800+++*	430,000+++*

(\*):

- + approx. 30% more theoretical service life available
- ++ approx. 50% more theoretical service life available
- +++ approx. 80% more theoretical service life available

**2)** One construction job is generally defined as one extension and retraction cycle.

### Ultrasonic testing instructions:

#### 1. Purpose:

Testing piston rods in accordance with the operating instructions.

#### 2. Exemption:

These testing instructions merely serve as a means of assessing all of the indicators that could be identified using the testing procedure specified here. All assertions regarding the tested components solely refer to the condition at the time of the testing.

#### 3. Identifying (or rather localizing) welding seams:

- Use a wall thickness measuring device or a dual-element transducer (MSEB 4 MHz) to determine the wall thickness of the piston rod.
- As illustrated in Fig. 1, use the measuring equipment (chequered rectangle) to determine the wall thickness of the piston rod in the direction of the arrow. Find the centre of the welding seam as specified in the drawing (light-grey area).

#### 4. Conducting the test:

- The area to be tested must be easily accessible – the piston rod has to be removed for the examination.
- Any potential discontinuities typically begin at the root and are often circumferential.
- For a schematic illustration of determining the discontinuity, see Fig. 2.
- Before conducting the test, the bottom of the transducer has to be sanded into shape (Fig. 3). This transducer can be used for all Schwing boom cylinder piston rods.
- The sensitivity adjustment or the intake of the baseline should be carried out based on the calibration block 98431052 shown in Fig. 4. This calibration block can be purchased from SCHWING or must be produced yourself.
- Tests that have been conducted should be documented using the enclosed form (Page 4), making sure to label the tested piston rods. The labels depend on the results of the test:
  - ➔ Test result “Acceptable”: the piston rod can be used further in accordance with the operating instructions. Label the rod as shown in Fig. 5b.
  - ➔ Test result “Unacceptable”: the piston rod needs to be replaced. Any potential reworking may only be performed by SCHWING. Documentation of the new label (Fig. 5a).
- The testing devices used during the examination have to be inspected and calibrated in accordance with the relevant standards.

#### 5. Assessing the indicators (see Fig. 6a and Fig. 6b, Page 3):

- The maximum total length permitted for individual indicators above the recording level must not come out to more than 20 % of a given assessment segment (6xt for wall thickness  $t = 8 - <15$  mm or 100 mm for wall thickness  $t = 15-100$  mm).
- All indicators that are 14dB (observation level) below the reference level (RL) have to be evaluated. The acceptance level and recording level are determined as shown in Fig. 6a and Fig. 6b.
- Any approved linear indicators positioned in a row that are above the recording level have to be assessed as an individual unit if the distance between two flaws is less than twice the length of the longer individual flaw. The new flaw length is determined as follows:  $L1 + \text{gap} + L2$
- Individual indicators with gap in between one another in a non-linear direction are considered an indicator unit if the gap is less than  $t/2$  or max. 10 mm.
- In order to assess the echo height of the entire indicator, the maximum echo height is taken as the basis.

#### 6. Qualification of the inspector:

The examination must be conducted by trained experts, e.g. inspector as per ISO 9712, ultrasonic testing UT Level 2 or equivalent.

#### 7. Reference to standards:

- DIN EN ISO 11666: Non-destructive testing of welds - Ultrasonic testing - Acceptance levels
- DIN EN ISO 17640: Non-destructive testing of welds – Ultrasonic testing – Techniques, testing levels, and assessment
- DIN EN ISO 16811: Non-destructive testing – Ultrasonic testing – Sensitivity and range setting
- DIN EN 12668-3: Non-destructive testing – Characterization and verification of ultrasonic examination equipment – Part 3: Combined equipment



# Appendix 2: Ultrasonic testing instructions for boom cylinder piston rods incl. form for testing documentation



## 8. Technical data

Device (or equivalent)	USM 35X S (Krautkramer)	Calibration block	K2
Transducer	MWB 70 – 4 MHz	Test sensitivity	See point 5, page 1
Adjustment range	100 mm SW	Coupling medium	Paste

## 9. Figures:

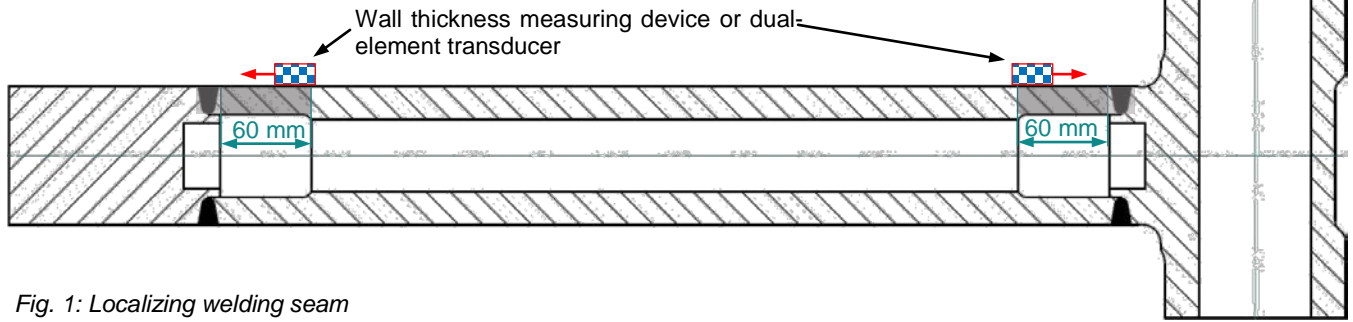


Fig. 1: Localizing welding seam

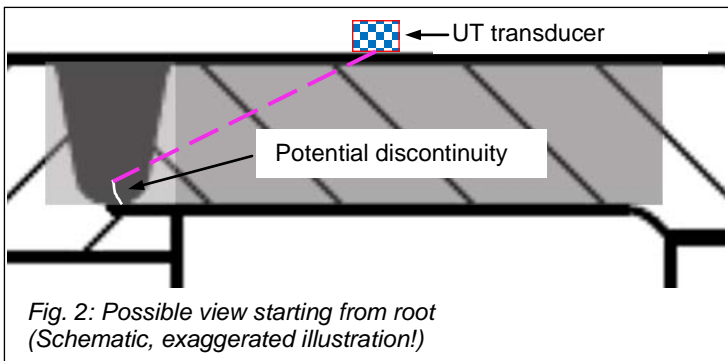


Fig. 2: Possible view starting from root (Schematic, exaggerated illustration!)

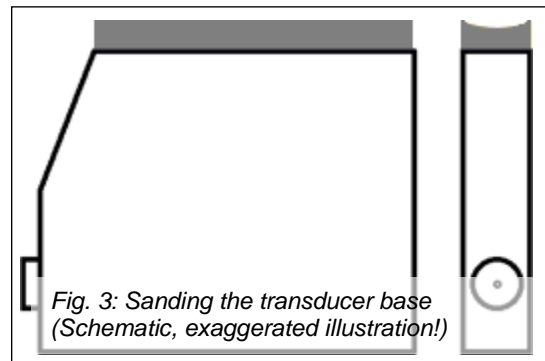


Fig. 3: Sanding the transducer base (Schematic, exaggerated illustration!)

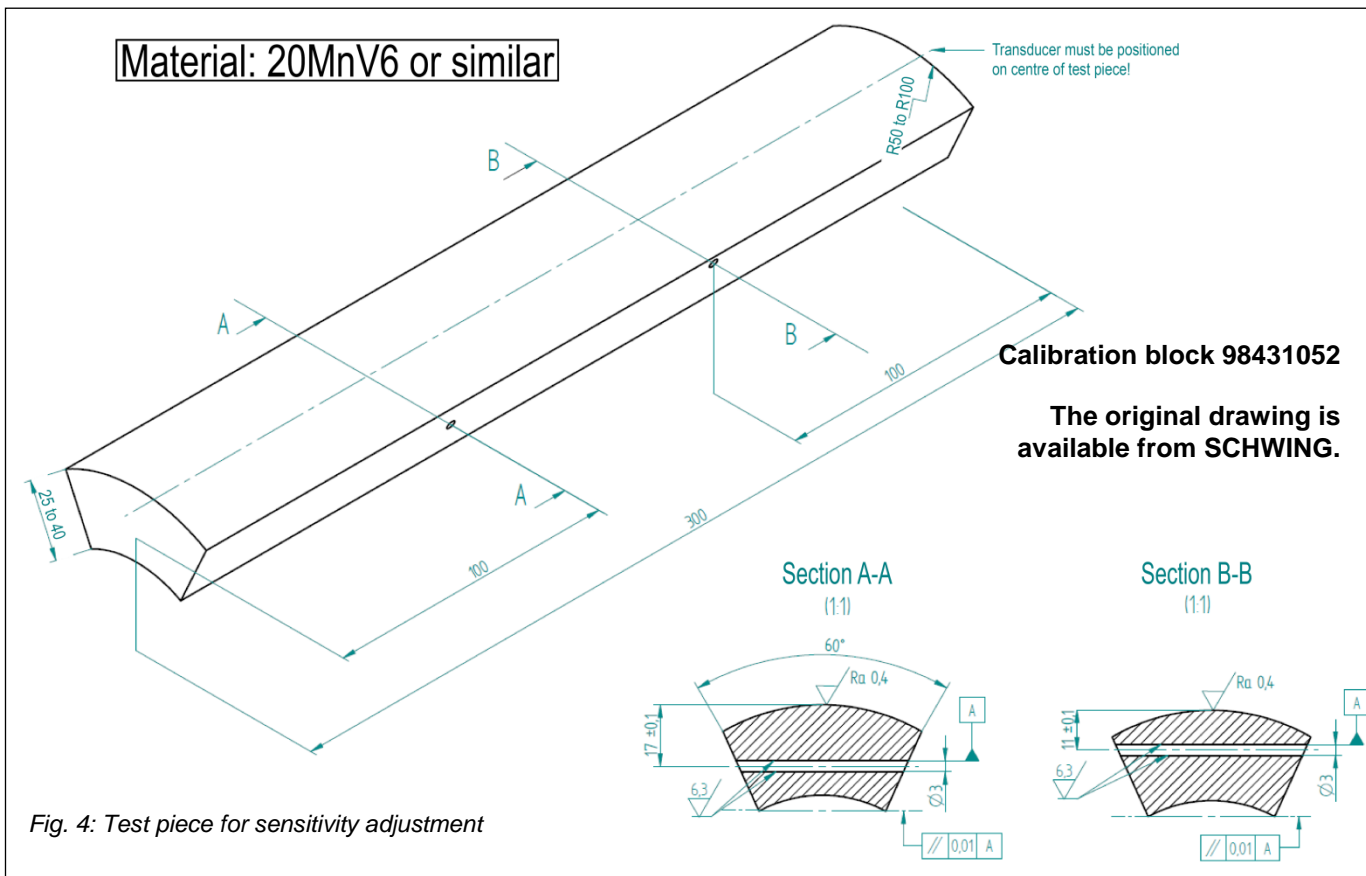
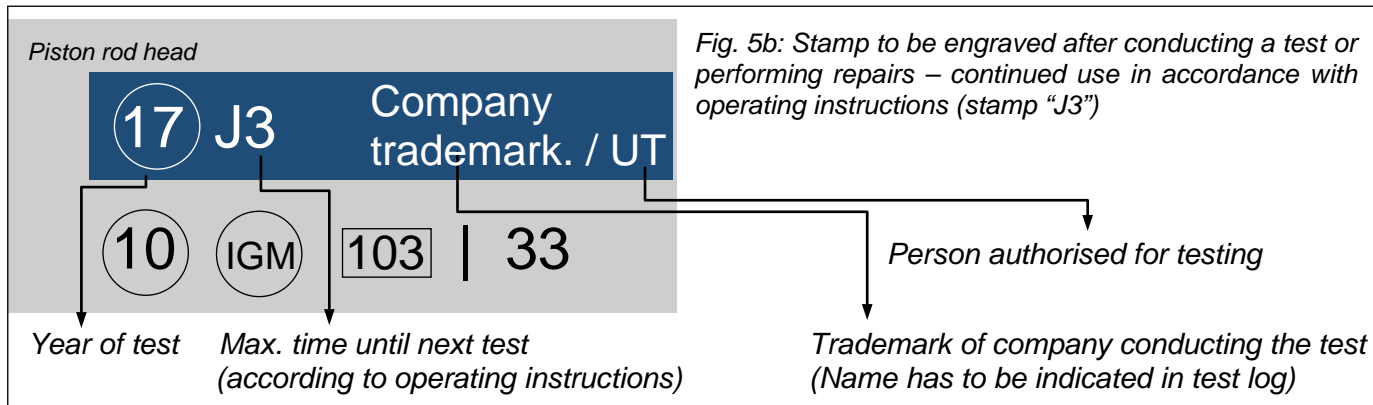
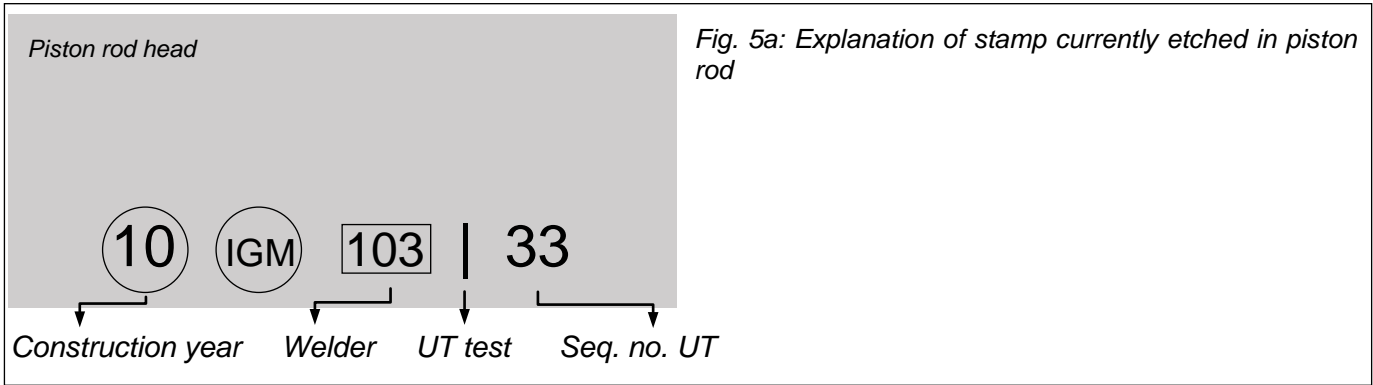


Fig. 4: Test piece for sensitivity adjustment

# Appendix 2: Ultrasonic testing instructions for boom cylinder piston rods incl. form for testing documentation



Acceptance level (AL)		
t = 8 - < 15 mm	up to flaw length 1 x t	4 dB below RL
	Flaw length > t	10 dB below RL
t = 15 - 100 mm	up to flaw length 0.5 x t	= RL
	up to flaw length 1 x t	6 dB below RL
	Flaw length > t	10 dB below RL

Fig. 6a: Selection of acceptance level according to DIN EN ISO 11666

Recording level		
t = 8 - < 15 mm	up to flaw length 1 x t	8 dB below RL
	Flaw length > t	14 dB below RL
t = 15 - 100 mm	up to flaw length 0.5 x t	4 dB below RL
	up to flaw length 1 x t	10 dB below RL
	Flaw length > t	14 dB below RL

Fig. 6b: Selection of recording level according to DIN EN ISO 11666

## Appendix 2: Ultrasonic testing instructions for boom cylinder piston rods incl. form for testing documentation



### Form for testing documentation:

Machine number:	
Machine type:	
Construction year:	

Cylinder		Year of construction	Manufacturer stamp in piston rod (see Fig. 5a)
Link	Article number		
A			
B			
C			
D			
E			

Tested on:	
Operating hours for CP:	
Operating hours for boom:	
Concrete throughput in m <sup>3</sup> :	

Cylinder (joint)	Results on piston side		Results on eye side		UT certificate				Result "Acceptable"	Result "Unacceptable" (Replace piston rode)
	Acceptable	Unacceptable	Acceptable	Unacceptable	Document no. (page 5)	Company	Tested by	Date	Stamp (see Fig. 5b)	Label for new piston rod (Fig. 5a)
A										
B										
C										
D										
E										

# Appendix 2: Ultrasonic testing instructions for boom cylinder piston rods incl. form for testing documentation



Document no.:	
---------------	--

## Information regarding object / component

Manufacturer		Test specification, rev.	ISO 17640:2010
Component identification		Specification, rev.	Appendix 2, pages 1 – 3
Component / assembly group	Piston rod	Test object	Test on impermissible indicators
Material		Scope of test	100 % of welding seam
Dimensions			

## Technical data

Device		Test sensitivity	
Transducer		Surface quality	
Adjustment range		Coupling medium	
Calibration block			

## Results of UT test

Designation	Article number	Page	Sound path SP	Depth of discontinuity t/mm	Discontinuity / flaw size KSR	Half-amplitude length	Note	Date
Cylinder A-joint		Piston						
Cylinder A-joint		Rod						
Cylinder B-joint		Piston						
Cylinder B-joint		Rod						
Cylinder C-joint		Piston						
Cylinder C-joint		Rod						
Cylinder D-joint		Piston						
Cylinder D-joint		Rod						
Cylinder E-joint		Piston						
Cylinder E-joint		Rod						

<b>Notes:</b>	<b>The requirements were:</b> <input type="checkbox"/> Met, no indicators subject to reporting were identified <input type="checkbox"/> Met, indicators subject to reporting were documented. <input type="checkbox"/> Not met.
---------------	--

Tested by		Test supervisor		Depiction of component
Qualification		Qualification		
Signature		Signature		
Location		Location		
Date		Date		

## 7.2 Always nearby



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### 7.3 Always Ready


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## 7.4 VDMA safety manual

This chapter serves as the safety manual and contains basic safety instructions regarding the operation of pumping, spraying and spreading machinery for concrete.

The safety manual is prepared jointly by leading manufacturers of concrete pumping and spreading machines under the auspices of the VDMA (Verband Deutscher Maschinen- und Anlagenbau/Mechanical Engineering Industry Association). It is applicable to our machines in full.

For this reason, the safety manual has a chapter of its own and separate page numbers.

Specific warnings can always be found before each description of a dangerous activity.



Bau- und Baustoffmaschinen



# Safety Manual

Concrete delivery and placing machines



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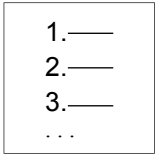
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## Changes in this revision

- Retest: Inspection of delivery line components and accessories added  
*(Retesting (safety inspection) P. 21)*
- End hose: End hose must not impede placing boom  
*(End hose P. 47)*





## Foreword

This Safety Manual contains important information on how to operate concrete delivery and placing machines safely, properly and economically. Observing these instructions helps to avoid danger, to reduce repair costs and downtimes and to increase the reliability and service life of the machine.

This Safety Manual must not be considered a substitute for knowledge of legal regulations, but should supplement and explain this knowledge in a practical way. The manufacturer's Operating Instructions that may be supplemented by this Safety Manual must also be observed. There has been no classification of the hazards according to the degree of injury or amount of damage to be expected.

Infringements of the rules laid down in this Safety Manual may lead to accidents and/or machine failures, even if not expressly described. Significant damage may be caused and persons in the vicinity of the machine could be injured or killed.

This Safety Manual must be read and applied by anyone who is tasked with working with/on the machine, and with the following in particular:

- Operation, including setting up, fault rectification in the course of work, maintenance, disposal of functional fluids and consumables
- maintenance (servicing, inspection, repair) and/or
- transport.

This Safety Manual is revised periodically. The current version can be obtained at any time from the publisher.





## **1 Terms, definitions, requirements**





## 1.1 Definition of terms

The terms used in this Safety Manual are explained below, along with descriptions of the requirements placed on specific groups of people.

### 1.1.1 Machine

For the purposes of this Safety Manual, concrete delivery and placing machines are defined as:

- Truck-mounted concrete pumps (an ensemble of truck and concrete pump with and without placing boom). The safety regulations issued by the truck manufacturer also apply to the truck.
- Truck mixer concrete pump (an ensemble of truck mixer, concrete pump and placing boom). The safety regulations issued by the truck mixer manufacturer and by the truck manufacturer also apply to truck mixer concrete pumps.
- Stationary concrete pumps
- Stationary placing systems (an ensemble of placing boom and base structure)

### 1.1.2 Concrete pump

For the purposes of this Safety Manual, concrete pumps are defined as devices which are designed to deliver concrete to placement sites via pipes or hoses.

### 1.1.3 Arm assembly

Arm assembly is a synonym for placing boom and can be used interchangeably.

### 1.1.4 Placing boom

For the purposes of this Safety Manual, placing booms are defined as powered, slewable devices consisting of one or more swinging or folding sections for guiding the delivery line.

### 1.1.5 Base structure

For the purposes of this Safety Manual, base structures are defined as equipment which is designed to hold a stationary placing boom to give the latter the required stability.



# Safety Manual

## Concrete delivery and placing machines

### 1.1.6 Truck mixer

For the purposes of this Safety Manual, truck mixers are defined as vehicles with mixing equipment for transporting concrete.

### 1.1.7 Delivery line systems

For the purposes of this Safety Manual, delivery line systems are defined as self-contained pipes or hoses in which concrete is pumped from the concrete pump to the placement site. Devices for shutting off, diverting or cleaning delivery lines can be integrated into delivery line systems.

### 1.1.8 End hose

For the purposes of this Safety Manual, end hose is defined as the hose that is fitted on the placing boom at the end of the delivery line for distributing the concrete. There must be no couplings, spouts, discharge stops or other items fixed to the outlet end of the end hose unless they are approved by the manufacturer.

### 1.1.9 Manufacturer

Any natural or legal person that markets a machine or incomplete machine that is dealt with in this Safety Manual.

### 1.1.10 Operator

Authorised representative of the owner of the concrete pumps and/or placing booms. The operator is responsible for the use of these machines.

### 1.1.11 Machine operator

Persons trained in and charged with the operation of concrete pumps and placing booms.

### 1.1.12 Hoseman

Persons instructed by the site management in how an end hose is guided. Hosemen must be able to independently evaluate all dangerous situations which may occur in the area of the end hose and react according to the situation.





## **1.1.13 Signaller and other auxiliary personnel**

Persons instructed by the site management to help the machine operator in his work if the latter is unable to observe all areas of operation and danger zones. Signallers must be able to independently evaluate all dangerous situations which may occur when working with a concrete pump and/or placing boom and react according to the situation. The signaller must have a suitable means of communication with the machine operator.

## **1.1.14 Truck mixer driver**

Persons who supply the concrete pump with concrete from a truck mixer. Truck mixer drivers must be instructed by the machine operator to operate the operating elements on the concrete pump provided for their use. Truck mixer drivers must be able to independently evaluate all dangerous situations which may occur when working in the area of the hopper of a concrete pump and react according to the situation.

## **1.1.15 Subject expert**

For the purposes of this Safety Manual, a subject expert is defined as a person who, through their professional training, their professional experience and their recent professional activity, has the required specialist knowledge to inspect the tools.

## **1.1.16 Qualified personnel**

Persons who have completed specialist training for a particular activity which qualifies them to carry out their roles.

## **1.1.17 After Sales Service personnel**

Qualified personnel employed by the manufacturer who are responsible in particular for maintenance of the machine.

## **1.1.18 Maintenance**

Maintenance includes all measures required to inspect, maintain and repair a machine.



# Safety Manual

## Concrete delivery and placing machines

### 1.1.19 Place of work, working area, danger zone

#### 1.1.19.1 Mobile machines

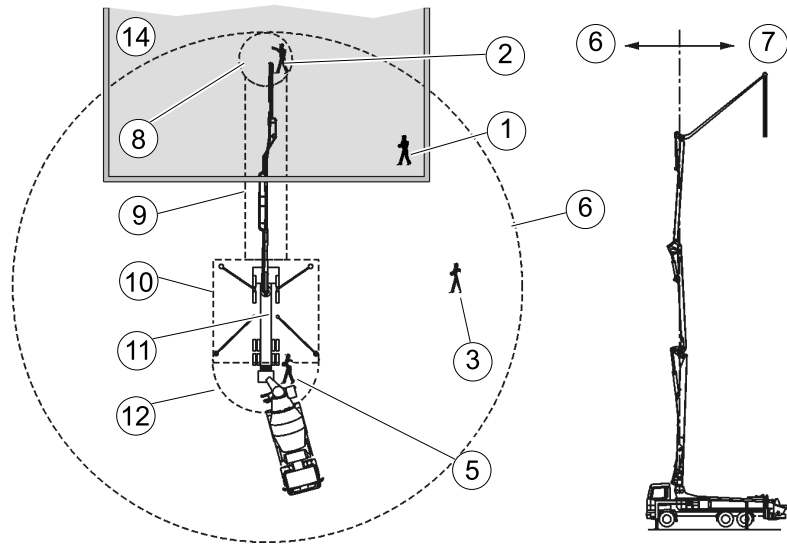


Figure 1: Example

#### 1.1.19.2 Stationary machines

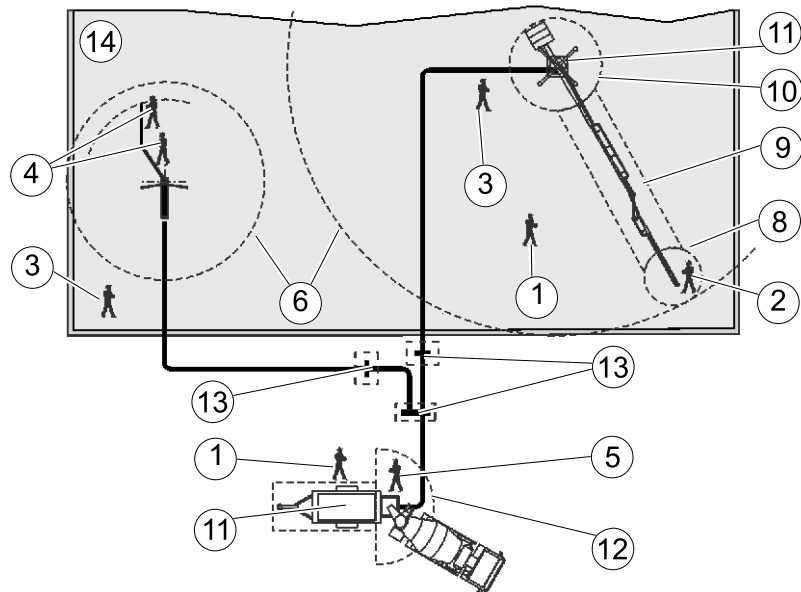


Figure 2: Example



Pos.	Designation		Explanation
1	Place of work (during pumping operations)	Machine operator	In normal operation, with the remote control
2		Hoseman	At the end hose in the danger zone
3		Signaller	In the machine operator's range of vision
4		Auxiliary personnel	As machine operators of the manual placing system
5		Truck mixer driver	At the hopper in the danger zone
6	Working area	Permitted	Area with a radius of the reach of the placing boom + end hose length
7	Working area	Impermissible	The end hose must not be moved backwards beyond the vertical of the placing boom.
8	Danger zone	At the end hose	Risk of injury when pumping is started, during pumping operations, when removing a blockage and during cleaning procedures. The diameter of the danger zone is twice the end hose length.
9	Danger zone	Beneath the placing boom	Risk of injury from falling items
10	Danger zone	Area of the support legs and feet or area of the base structure	Risk of crushing when setting up or dismantling the machine
11	Danger zone	On the machine	Any presence on or below the machine when the pump is in operation is prohibited
12	Danger zone	On the hopper	Risk of injury during cleaning procedures and when the hopper is being filled using a truck mixer
13	Danger zone	Area of the delivery line systems	Hazard posed if lines burst, risk of injury from crushing or shearing, particularly with gate valves
14	Structure or area being concreted		Example



# Safety Manual

## Concrete delivery and placing machines

### 1.1.19.3 Place of work

The place of work is the area in which people must remain in order to carry out the work.

#### Place of work – machine operator

The machine operator's place of work is with the remote control when the pump is in operation. The place of work must be selected so as to allow visual contact with the placement site and the truck mixer driver, and so that the working area can be observed at the same time. A signaller must otherwise be used.

The machine operator's place of work is with the machine when this is being set up or prepared for driving.

#### Place of work – hoseman

The hoseman's place of work is within the danger zone of the end hose, but not beneath the placing boom. This requires a greater level of caution. The hoseman and machine operator must have visual contact.

#### Place of work – truck mixer driver

The truck mixer driver's place of work is in the danger zone of the hopper and at operating elements for the agitator and truck mixer. This requires a greater level of caution. The truck mixer driver and machine operator must have visual contact.

### 1.1.19.4 Working area

The working area is the area in which work is carried out with or on the machine. Parts of the working area can become danger zones depending on the operation being carried out and the position of the placing boom.

The working area must be secured and clearly identified. Suitable personal protective equipment is required in the working area. The machine operator is responsible for safety in the working area of the machine whilst the machine is in use.



### Impermissible working area

Because of their high manoeuvrability, some placing booms can also be shifted into positions for which they are not designed. This may overload or damage the placing boom. Placing booms must therefore only be moved within the permitted working area. (*Impermissible working area P. 24*)

#### 1.1.19.5 Danger zone

The danger zone is the area surrounding the machine, in which people may be at risk of injury from movements required by the work.

The danger zone varies within the working area and depends on the activity being carried out and the position of the placing boom, if one is present. Danger zones must be secured and clearly identified. The machine operator must be capable of seeing the danger zone at all times and under all circumstances. If necessary, he must appoint a signaller to supervise the danger zone.

Depending on the working situation, places of work may occasionally fall within the danger zone, especially the place of work of the hose-man and the truck mixer driver. If a place of work falls within the danger zone, increased caution is required and suitable personal protective equipment is prescribed. Persons who are authorised to be present in such a place of work must use their own discretion to assess dangerous situations and be able to react according to the situation.

The machine operator is responsible for safety in the danger zone of the machine whilst the machine is in use.

The machine operator must stop work immediately and press the EMERGENCY STOP button if an unauthorised person enters the danger zone.

### Support legs and support feet

There is a risk of crushing in the swingout and extension zone for the supports.

### Placing boom

The danger zone when working with the placing boom is the zone over which the placing boom is slewed. In this area there is a risk of injury from falling concrete and delivery line components.



# Safety Manual

Concrete delivery and placing machines

## Machine

All the time the vehicle is in operation, there is a risk of injury on and below the machine from moving parts and bursting delivery lines or hydraulic hoses, as well as a risk of falling on slippery surfaces or steps.

## End hose

The danger zone when pumping is started, during pumping operations, when removing a blockage and during cleaning procedures is the area around the end hose in which the end hose may swing out. The diameter of the danger zone is twice the end hose length.

## Hopper

In the area of the hopper, there is a risk of becoming trapped between the truck mixer and the hopper and of being sprayed with concrete. There is a risk of being crushed and of injury by shearing from the transfer tube. There is a risk of becoming caught in the rotating agitator.

## Delivery line systems

In the area around the delivery line systems there is a risk of injury from the delivery line bursting if there is an abrupt rise in pressure. There is a risk of crushing and injury by shearing with devices integrated in delivery line systems.

## 1.2 Designated use

The machine must only be operated as intended and in technically perfect condition. All protective and safety-oriented devices, particularly removable protective devices and EMERGENCY STOP devices, must be available and fully functional.

The machine is designed exclusively for the delivery and placing of concrete up to a bulk density of  $2400 \text{ kg/m}^3$ . It must only be used for pumping operations on construction sites. The maximum delivery pressure must not exceed that specified on the rating plate or in the check book.



You must also observe the Operating Instructions and comply with the intervals and conditions for inspections (particularly retesting) and maintenance work in order to operate the machine within the limits of its proper use.

## 1.2.1 Retesting (safety inspection)

After initial commissioning of the machine, the operational safety of the machine must be checked regularly by a subject expert. The inspection intervals depend on the age of the machine. The older the machine, the greater the probability of damage. For this reason, regular retesting of the machine, appropriate to its age, must be carried out in order to detect damage in good time. Retesting should be carried out in accordance with the inspection intervals listed below.

Retesting must consist of the following:

- Retesting of the condition of the components and equipment with regard to the formation of cracks, damage, wear, corrosion and other changes;
- Retesting of the completeness and effectiveness of the safety equipment;
- Retesting to find out whether any defects which are found during the tests mentioned above and which could affect safety have been adequately rectified.

Retesting must include components which are used in conjunction with the machine (in particular, delivery line components and accessories).

Furthermore, information provided by the manufacturer to the operator with reference to special instructions for maintenance and inspection must be observed.

## 1.2.2 Inspection intervals for retesting

The inspection intervals are fixed as follows:

- Machines up to and including 5 years old:  
Inspect after every 1000 operating hours or 1 year, whichever is soonest. The interval is repeated after every retest.
- Machines more than 5 years old:



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Inspect after every 500 operating hours or 1 year, whichever is soonest. The interval is repeated after every retest.

- Machines more than 10 years old:

Inspect after every 250 operating hours or 1 year, whichever is soonest. The interval is repeated after every retest.

The day of initial commissioning in accordance with the handover report and the machine's operating hours meter are definitive for the intervals. This operating hours meter records the hours of pumping operations. The operating hours meter must always be kept in good working order. It must not be tampered with. For machines without an operating hours meter, the operating hours must be recorded in a traceable form in writing.

Retesting must be arranged by the operator. The results of retesting must be entered in the check book and signed. The check book must always be kept with the machine and must be produced upon the request of the national supervisory bodies.

Notwithstanding national legislation, the operator can be liable in the event of damage, if it is proved that the damage has arisen as a consequence of regular retesting not being properly carried out.

If retesting is not carried out, the manufacturer will assume that the machine has been shut down. When the machine is restarted, retesting must be carried out.

## 1.3 Improper use

Improper use is defined as use which is not described in or goes beyond that described in the "Designated use", (*Designated use P. 20*) section. The manufacturer accepts no liability for damage resulting from such use. Some examples of conceivable improper uses are given below.

### 1.3.1 Transporting goods

The machine must not be used for the transport of goods, except for carrying the accessories used for the machine, such as pipes, hoses, etc. The maximum permissible gross weight may not be exceeded.





## 1.3.2 Lifting loads

The placing boom must never be used for lifting loads.



## 1.3.3 Removing obstacles

The placing boom must not be used under any circumstances to remove obstacles. This would overload the placing boom, causing damage and endangering people.

## 1.3.4 Extending the reach

It is forbidden to attach an extension to the end hose or boom tip of the placing boom (e.g. freely suspended transition liner) in order to extend the reach or in order to be able to pump “around corners”. Since the placing boom and the lifting equipment for the extension have differing pivot points and modes of control, it is not possible to co-ordinate their movements.

## 1.3.5 Extending the placing boom and end hose

Extension of the placing boom and end hose beyond the length specified on the rating plate is forbidden.

If the manufacturer defines the weight rather than the length of the end hose, you can use a reducer pipe with a longer end hose, for example. The quoted gross weight must not be exceeded. (*End hose P. 47*)

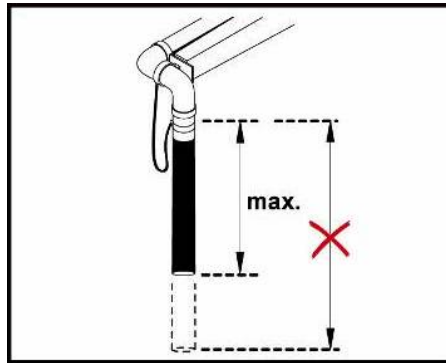
When using a longer end hose, the diameter of the danger zone also increases. (*End hose P. 47*)

End hoses with a length of more than 4 m must not be guided by hand.



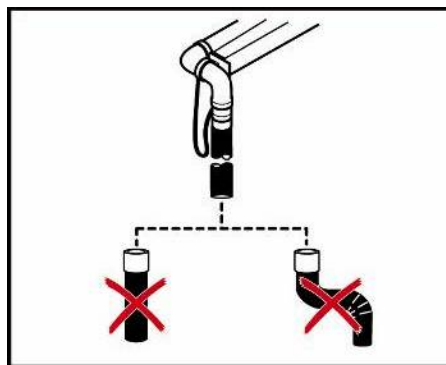
# Safety Manual

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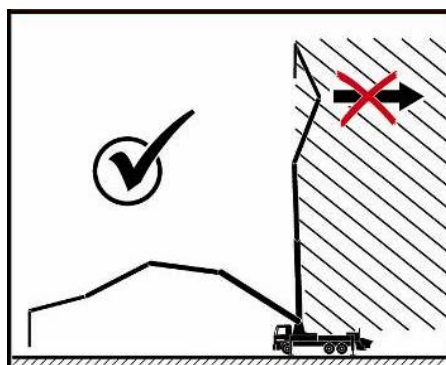
## 1.3.6 Impermissible end hose

There must be no couplings, spouts, discharge stops or other items fixed to the outlet end of the end hose unless they are approved by the manufacturer.



## 1.3.7 Impermissible working area

During pumping operations, the end hose must not be moved backwards beyond the vertical axis of rotation of the placing boom.

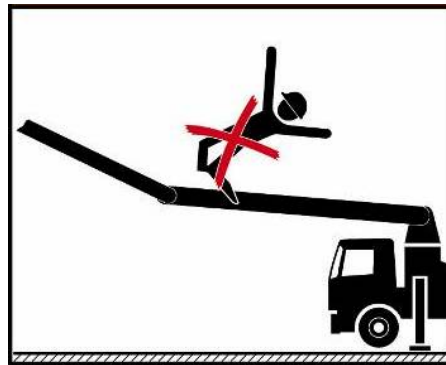




In addition to this, additional impermissible working areas exist, depending on the machine model and manufacturer, which are described in the Operating Instructions.

### 1.3.8 Climbing the placing boom

It is prohibited to climb the placing boom, to stand on top of it or to misuse it as a working platform or climbing aid.



### 1.3.9 Highpressure delivery

It is prohibited to deliver concrete at high pressure (delivery pressure greater than 85 bar) through the delivery line of the placing boom. Delivery line elements are marked with the maximum permissible delivery pressure. The delivery line and end hose are only suitable for delivery pressures of up to 85 bar until the wear threshold is reached. For the wear threshold, refer to the Operating Instructions for the machine.

### 1.3.10 Accessories and attachments

It is prohibited to fit accessories and attachments to the machine if they have not been expressly approved for use on this machine by the manufacturer.

### 1.3.11 Changes to the machine

You are not allowed to carry out your own changes to the machine. Changes must always be approved by the manufacturer.



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## 1.4 Exclusion of liability

Where the manufacturer's delivery conditions are agreed, liability will be as described in the provisions there. The manufacturer is not liable for damage in cases specified there.

Unless the responsibility of the manufacturer, the warranty will be invalidated in the following situations in particular:

- use contrary to designated use.
- incorrect operation, maintenance and repair.
- use of spare parts or accessories other than original manufacturer's spare parts and accessories or their equivalents.
- conversions, alterations or modifications to the machine.
- fitting of accessories and attachments not approved by the manufacturer.
- adjustment of safety pressures, speeds of movement, power outputs, speeds of rotation and other settings to values other than those set in the works.

## 1.5 Personnel

The operator must ensure that only persons who are qualified or have received the necessary instruction work on or with the machine. It is the responsibility of the operator to carry out regular (e.g. annual) safety briefings for their employees. Suitable training can be requested from the machine manufacturer. The operator must clearly define who is responsible for operation and maintenance of the machine. The operating company must also ensure that only persons commissioned to work on the machine do so. In addition, the operator should provide the necessary personal protective equipment.

### 1.5.1 Requirements

Persons operating or carrying out maintenance work on the machine must meet the following requirements:

- They must be aged 18 years or over.
- They must be physically and mentally capable.
- They must be physiologically capable (rested and not under the influence of alcohol, drugs or medication).
- They must have been instructed in the operation and maintenance of the machine.



- They must have demonstrated their competence to the operator.
- They can be expected to reliably execute the tasks with which they are charged.

The operating personnel must not wear loose garments or jewellery, including rings. Long hair which is not tied back must be covered by a hair net. There is a risk of injury, in particular from being caught or trapped by moving parts.

All persons working on or with the machine must concentrate on the task at hand and not be distracted, particularly by smartphones and music played through headphones.

## 1.5.2 Qualifications

Persons who are being trained, introduced and instructed in the use of the machine are only permitted to operate the machine under the constant supervision of experienced personnel.

If you do not have qualified personnel, suitable workshop equipment, etc. available, you should commission the manufacturer's After Sales Department with the maintenance of your machine.

## 1.5.3 Responsibility of the machine operator

The operator must define the responsibility of the machine operator (including in respect to national road traffic regulations) and empower the machine operator to reject instructions from third parties prejudicial to safety. The machine operator must be able to reject the site of operations in the event of doubts regarding technical safety.

## 1.6 Operating Instructions, operating procedures and other regulations

### 1.6.1 Operating Instructions

Personnel that are authorised to work on the machine must have read the Operating Instructions, particularly the "Safety Regulations" section, and the Safety Manual before working with the machine. Reading the instructions after work has begun is too late. This applies especially to persons working only occasionally on the machine, e.g. during setting up or maintenance.



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As the operator, you must always make sure that the Operating Instructions are available. The Operating Instructions and check book must always be kept to hand at the site of use of the machine (in the tool compartment or container provided for this purpose).

As the operator, you must have personnel working on the machine confirm in writing their knowledge, understanding and application of the Operating Instructions and Safety Regulations and Safety Manual. At regular intervals of at least once a year, check that personnel are conscious of safety and the hazards involved in their work and are taking account of the Operating Instructions.

Personnel entrusted with work on the machine must observe all safety instructions and hazard warnings, and must be familiar with the machine itself. You must practice all the operating procedures described in the Operating Instructions (extending the supports, operating the placing boom, shifting the placing boom into the driving position, preparing the vehicle for moving, etc.) under the supervision of a subject expert until you are certain you can execute them safely. Ask questions if there is something you have not understood. Begin operating the machine only once you are fully and explicitly familiar with the layout and significance of all the control and monitoring devices and the method of operation of the machine.

### 1.6.2 Operating procedures

The operator must produce operating procedures for their personnel in accordance with national regulations. These operating procedures must also contain instructions (including the obligation to provide supervision and reports) concerning the observance of special operational features, particularly in respect of work organization, working procedures or personnel deployment. Furthermore, reference must be made to other generally valid legal and otherwise mandatory regulations relating to accident prevention and environmental protection. Such regulations may also deal with handling hazardous substances, the issuing and wearing of personal protective equipment or with national road traffic regulations. You should familiarise yourself with the site of operations and with how to use fire extinguishers. Observe the firealarm and fire-fighting procedures.



### 1.6.3 Other regulations



The current regulations for concrete delivery and placing machines as issued by:

- The legal authorities in your country
- The national supervisory bodies
- The responsible commercial liability insurance company.

## 1.7 Personal protective equipment

In order to reduce risks to personnel, the operating personnel must use personal protective equipment insofar as this is necessary or deemed to be so by regulations. All personnel working on or with the machine must wear safety helmets, protective gloves and safety footwear.




Personal protective equipment must, as a minimum, comply with the requirements of the specified standards.

Symbol	Meaning
	<p>Safety helmet</p> <p>The safety helmet protects your head, e.g. from falling concrete or parts of delivery lines if lines burst.</p> <p>(DIN EN 397; Industrial safety helmets)</p>
	<p>Safety footwear</p> <p>Safety footwear protects your feet from falling objects and any protruding nails.</p> <p>(EN ISO 20345; Safety footwear for professional use; category S3)</p>





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Symbol	Meaning
	<p>Hearing protectors</p> <p>Hearing protectors protect your ears when in the vicinity of the machine against any noise that arises there.</p> <p>(DIN EN 3521; Hearing protectors - General requirements - Part 1: Earmuffs or DIN EN 352-3; Hearing protectors - General requirements - Part 3: Earmuffs attached to industrial safety helmets)</p>
	<p>Protective gloves</p> <p>Protective gloves protect your hands from aggressive or chemical substances, mechanical effects (e.g. impact) and from cuts.</p> <p>(DIN EN 388; Protective gloves against mechanical risks; Class 1111)</p>
	<p>Protective goggles</p> <p>Protective goggles protect your eyes from injuries associated with concrete spatter and other small particles.</p> <p>(DIN EN 166; Personal eyeprotection - Specifications)</p>





Symbol	Meaning
	<p><b>Safety harness</b></p> <p>When working at height, use the climbing aids and working platforms provided for reasons of safety or wear a safety harness. The relevant national regulations must be complied with.</p> <p>(DIN EN 361; Personal protective equipment against falls from a height - Full body harnesses; Category III)</p>
	<p><b>Respiratory protection and face mask</b></p> <p>The respiratory protection and face mask protect you against particles of building materials that can enter the body via the respiratory passages (e.g. concrete admixture).</p> <p>(DIN EN 149; Respiratory protective devices - Filtering half masks to protect against particles - Requirements, testing, marking; Class FFP1)</p>





## **2 Setting up and working with the machine**





## **2.1 Before working with the machine**

### **2.1.1 Checking that the machine is ready for operation**

As machine operator, it is your responsibility to check the machine for external damage and defects before any use of the machine. You must immediately report any changes (including changes in the working characteristics) to the organisation or person responsible. If necessary, shut the machine down immediately and secure it.

### **2.1.2 Rendering the machine ready for operation**

As machine operator, you are responsible for rendering the machine ready for operation. This also includes topping up the functional fluids. Do not fill with fuel in enclosed spaces. Switch off the engine and the heating. Wipe up spilt fuel immediately. Do not smoke or use a naked flame when handling fuel.

Set all the control and monitoring devices to the zero position before you change the mode of control (control block, control console or remote control).

Never put the remote control down when the machine is ready for operation. If this is unavoidable in exceptional cases, you must switch off the remote control, disconnect it and lock it away.

Never leave the machine when the engine is running or when the engine could be started by an unauthorised person. If you need to leave the machine, proceed as follows:

- Switch off the remote control.
- Disconnect the remote control and lock it away.
- Switch off the ignition or the main switch.
- Lock the control cabinet.

## **2.2 Danger due to high voltage**

### **2.2.1 High-voltage lines**

Whenever you touch a high-voltage line, there is a risk of death for all persons either on the machine or in its vicinity or who are connected to it (via the remote control, end hose, etc.). A spark can jump across from a highvoltage line even if you just approach it and this will energise the machine and the surrounding area.



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### 2.2.2 Discharge voltage pattern

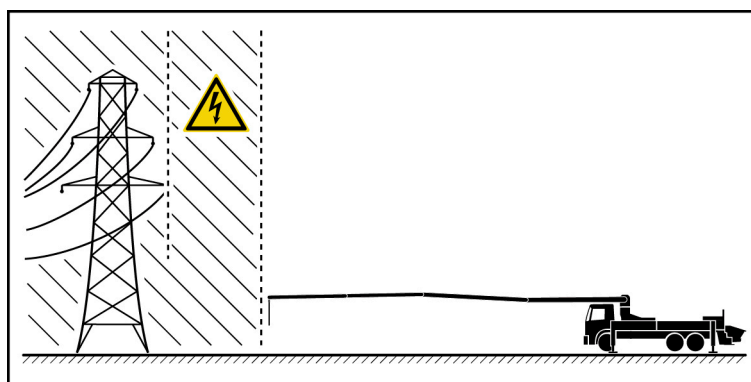
In the event of a flash over, what is known as a “discharge voltage pattern” is formed in the vicinity of the machine. The voltage decreases from the inside to the outside in this discharge voltage pattern. If you step inside this discharge voltage pattern, you will bridge different potentials. This will cause a voltage corresponding to the potential difference to flow through your body.

### 2.2.3 Clearances

Maintain a minimum clearance from high-voltage lines in accordance with the following table. The minimum clearance is measured in the horizontal when the placing boom is fully extended.

Rated voltage [V]	Minimum clearance [m]
up to 1 kV	1,0
1 kV up to 110 kV	3,0
110 kV up to 220 kV	4,0
220 kV up to 380 kV	5,0
unknown rated voltage	5,0

The specified clearances are minimum requirements. You must observe any greater clearances that may be specified in the country of use.



When you set a minimum clearance, the possibility of the high-voltage lines and the placing boom swaying in the wind must also be taken into consideration. You should further note that where air humidity is high, clearances greater than the minimum clearances shown above are always necessary.



You must stand as close as possible to the unfolded placing boom if you wish to correctly estimate the movements of the boom and, above all, the clearance between the placing boom and obstacles or high-voltage lines.

The same minimum clearances are necessary when driving under overhead cables.

In the event that this minimum clearance cannot be maintained under all possible working positions, the power station responsible must be contacted and you must have the high-voltage line switched off.

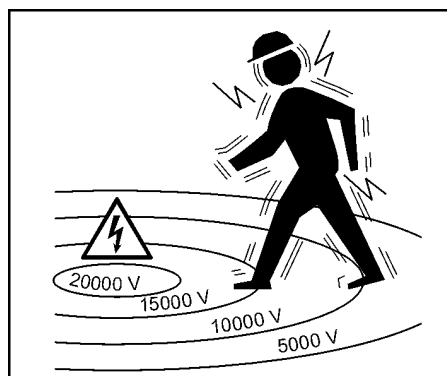
Should you have any doubts, it is better to forgo the use of the placing boom and to lay a separate delivery line, for instance.

## 2.2.4 Highvoltage warning devices

According to the current rules of engineering, highvoltage warning devices do not meet a safety standard which enables minimum clearances to highvoltage lines that are smaller than the required minimum clearances to be used. Previous experience has shown that highvoltage warning devices cannot make all situations in working procedures safe. Flash overs and fatal accidents can occur despite the use of a highvoltage warning device. You must therefore always maintain the minimum clearances mentioned above.

## 2.2.5 Procedure in the event of a flash over

If, despite all precautions, a flash over occurs, stay calm and do not move (potential differential) or touch anything.





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If your machine comes into contact with high-voltage lines:

- Warn people standing outside the area not to approach or touch the machine.
- Have the power switched off.
- Only leave the machine once you are sure that the line you have touched or damaged has been deenergised.

Electricity generator works are always equipped with automatic start-up systems. If a circuit breaker trips, the short-circuited line will be switched back on again after a brief interval. Brief intervals where the voltage is absent create a false sense of safety.

You must not move or rescue injured persons until a representative of the power station has notified you that the line has been switched off.

A radio remote control system only protects the machine operator if he is standing outside the discharge voltage pattern.

### 2.2.6 Earthing in the event of electrostatic charging

Working in the vicinity of transmitters (radio transmitter, etc.) can result in faults in the radio remote control system and dangerous electrical charges in the machine. Persons who bridge the charged parts to the earth are heavily charged on contact.

Machines in use in the vicinity of transmitters must be earthed. This earthing may be carried out by trained personnel.

Even with an earthed machine, the safe clearances to high-voltage lines (*Clearances P. 36*) and the instructions relating to storms and bad weather (*Procedure in storms P. 49*) must be complied with.

If you have any further questions about earthing the machine, please contact site management or the operator of the machine.

### 2.2.7 Earthing on construction sites with special equipment

When carrying out work in the area of special installations (particularly overhead lines for railways or substations), it may be the case that the machine needs to be earthed upon request and in consultation with the operator of the special installation. This earthing must only be carried out by qualified personnel.

Even with an earthed machine, the safe clearances to high-voltage lines (*Clearances P. 36*) and the instructions relating to storms and bad weather (*Procedure in storms P. 49*) must be complied with.





## **2.3 Stationary machines**

### **2.3.1 Setup site**

Stationary machines are generally used on a construction site for a lengthy period. For this reason, site management should prepare the setup site carefully. Site management must deliver the necessary documents in good time in order to be able to prepare the foundations, base plates or similar on time.

When selecting the setup site, remember that the machine must be dismantled and transported away again at the end of its use on site. The ambient conditions may change as construction work progresses.

Please also observe the (*Setup site P. 40*) section.

### **2.3.2 Stationary placing booms**

Stationary placing booms can be erected on tubular columns, lattice booms or other base structures. The base/structural elements to which the base structure is fixed must be able to withstand the forces and moments transferred via the base structure, as specified in the manufacturer's information. The base frame of the base structure must be fastened in place so that it is level on the base/structural elements in every direction. Check the documentation provided by the manufacturer in this regard and the corresponding notes in the operating instructions.

### **2.3.3 Lifting machines and components**

Machines which are transported to the setup site in individual parts or not under their own power must only be lifted with suitable lifting equipment in accordance with the specifications in the Operating Instructions. The lifting gear on the machine must be capable of accepting the lifting equipment and lifting the load. No one should stand under suspended loads. Before work is started, a subject expert must check that the assembled machine is working properly.

### **2.3.4 Loading and transporting**

Only use suitable means to load and transport stationary machines. Ensure that no one can be injured by the machine tipping over or slipping.



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If there are transport fixtures provided for the machine or its individual components, only these should be used. The machine/components must be properly secured during transport. The transport vehicle and machine must be marked to conform with the road traffic regulations in the country concerned if they are to use the public highway.

Please also observe the (*Driving P. 43*) section.

## 2.4 Mobile machines

### 2.4.1 Setup site

Site management must prepare and assign the set-up site. It is the machine operator who takes responsibility for setting up the machine safely. The machine operator must inspect the setup site proposed by site management and must refuse to set the machine up at the site of operations if there are any doubts regarding safety.

As machine operator, you must familiarise yourself with the working area and surroundings before work is begun. The working area and surroundings include, in particular, obstacles in the work and travelling areas, the load-bearing capacity of the supporting ground and any barriers separating the construction site from public roads.

The setup site must have sufficient lighting to ensure safe operation of the machine. Ensure that the setup site is adequately lit.

Do not set up the machine in areas where equipment may fall down.

Incidents of overlapping with the working areas of other machines (particularly cranes, other placing booms, etc.) should be avoided as far as possible. If this is not possible, special care and attention is required when setting up and operating machinery. If necessary, you must use a signaller.

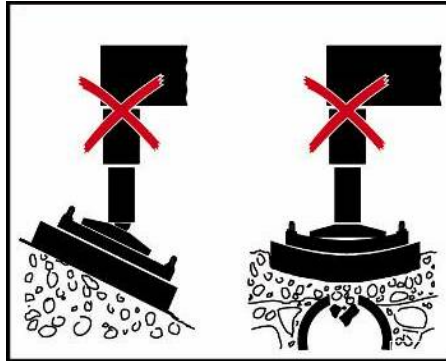
You must also check the approach route to the site where the machine will be set up. If you are unsure whether the approach route is suitable, prepare the route before work is started. It is especially necessary to walk the approach route once in darkness and at dusk or dawn. You should repeat this exercise again before leaving the construction site.

Always ask for a signaller if you need to reverse. If necessary, have the approach route closed off or secured by signallers. Have any materials or equipment that hinder your approach removed.



### 2.4.2 Supporting ground

Find out the load-bearing capacity of the supporting ground. The site management will be able to state the permitted ground pressure. If the load-bearing capacity is unknown, assume the that worst case scenario applies.



The supporting ground must be level and even. If necessary, set up a level surface on top of the uneven ground. There must be no voids or other ground irregularities under the support feet. Asphalt, concrete slabs, etc. may have been washed out underneath. Never set the machine up on backfilled ground, obvious or known voids or uneven ground.

The support area must be enlarged as required. Support plates and timber blocks may be used to increase the support area. The supports must be undamaged and free from ice, oil, grease, etc. The support blocks and timber blocks must be laid under the support plates such that the load is distributed uniformly and the support leg cannot slip off the side of the support.

Check the stability of the machine regularly during operation. Interrupt the pumping operation if the machine becomes unstable.

Factors which reduce stability include, for instance:

- Modifications to the ground conditions, particularly caused by rain water or the thawing of frozen ground
- The support sinking on one side
- Fluid losses through leaks in the support hydraulics

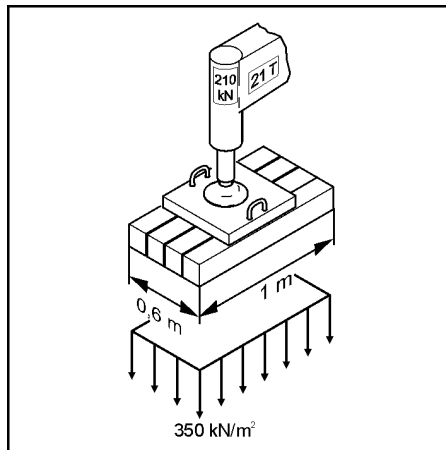


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## 2.4.3 Corner bearing loads

The corner bearing load is stated on each support leg. This value must always be legible.



The load supported by each support leg is conically diffused in the ground at an angle of  $45^\circ$ . Safe clearance to the pits and slopes must be maintained, and such clearance must be determined in accordance with the nature of the ground. The safe clearance is measured from the foot of the pit.

On undisturbed, compacted ground, the safe clearance corresponds to the pit depth, but must be at least 2 m.

On loose or backfilled ground, the safe clearance corresponds to double the pit depth, but must be at least 2 m.

## 2.4.4 Supports

The placing boom must not be raised until the machine has been supported in accordance with the Operating Instructions. There is otherwise a risk of the machine toppling over.

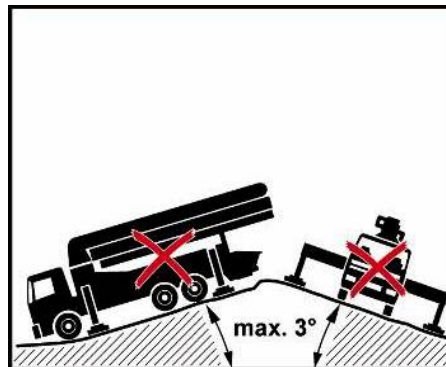
Swing out and telescope the support legs to their end positions in sequence. Intermediate positions are prohibited to guarantee stability. Exceptions are machines which have been equipped by the manufacturer with a device which allows secure erection with a reduction in support. Check the corresponding notes in this regard in the operating instructions.



Do not carry out more than one movement at a time. If a movement is stopped, the entire volume of fluid is available for the remaining movements, and can increase their speeds. Depending on the design, it may be the case that carrying out several movements at once (as opposed to carrying out a single movement at maximum speed at any one time) does not bring any advantage in terms of time. Carrying out several movements at once requires an increased level of attentiveness.

Lock all supports mechanically, if this is provided for in the design. Close all shut-off valves in the support hydraulics. Leaks can cause the supports to sink on one side.

The machine must be made level in all directions. Provided the manufacturer does not state otherwise, the maximum permissible deviation from the horizontal is 3°. Greater deviations from the horizontal overload the slewing gear for the placing boom as well as its overall support structure, jeopardising the stability of the machine.



Check stability regularly during operation. The elastic distortions to the machine frame occasionally occurring under extreme positions of the placing boom (one support foot lifts from the ground) must be compensated for by resetting the support cylinders until all support feet are firmly placed on the ground.

## 2.4.5 Driving

When preparing the machine for driving, you must perform the following tasks in particular:

- The placing boom must be folded in fully and positioned on the placing boom support provided.
- The support legs and support feet must be fully retracted and secured.
- Raised or locked axles must be lowered and released.



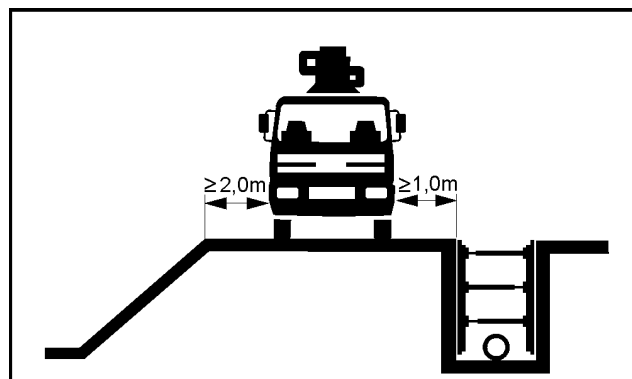
# Safety Manual

## Concrete delivery and placing machines

- Accessories and moving parts belonging to the machine must be safely stowed/secured.
- The maximum permissible gross weight must not be exceeded.

While the vehicle is being driven, the delivery line, pump and hopper must be empty. If there is concrete residue in the hopper, there is a risk of injury from the concrete residue, which may be thrown out while the vehicle is in motion. This also affects the centre of gravity of the machine. Observe the road traffic regulations and specifications of the machine manufacturer.

Maintain a distance of at least 1 m to the secured edges of the pit and a distance of at least 2 m to slopes.



Always make sure that there is sufficient clearance when driving under underpasses, over bridges and through tunnels or when passing under overhead cables. The same minimum clearances apply when driving under high-voltage lines as when working with the placing boom. Be aware of the height of the truck. Only drive over arches, bridges or other supporting structures if their load-bearing capacity is sufficient.

Do not drive across uphill or downhill gradients. Be aware of the elevated position of the truck's centre of gravity when travelling on a slope and on ascending or descending routes. Always adapt your travelling speed to the prevailing conditions on sloping terrain.

Observe national road traffic regulations. If necessary, clean the tyres, lights and number plate. Before travelling with the machine, check that the braking, steering, signalling and lighting systems are fully functional.

Persons accompanying the driver must be seated on the passenger seats provided for this purpose.



For truck mixer concrete pumps, only turn the mixer drum at the maximum specified speed of rotation whilst the truck is in motion. The truck is at risk of toppling over, particularly when travelling round corners.

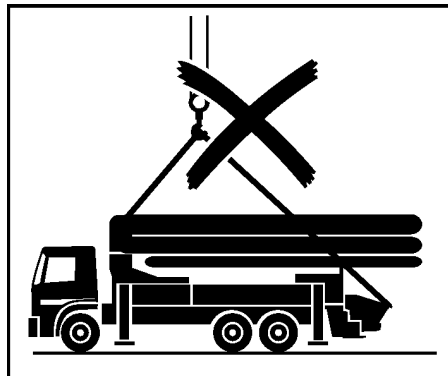
## 2.4.6 Towing

The machine must only be towed, loaded and transported in accordance with the Operating Instructions. Only use existing towing hitches for towing and observe the truck manufacturer's regulations.

You must comply with the prescribed driving position, permitted speed and itinerary when towing.

## 2.4.7 Loading

Many lifting points fitted to the machine are provided for assembly purposes only. They are not suitable for lifting the complete machine. The lifting points for lifting the entire machine are specially marked.



Use only appropriate means of transport and lifting equipment of adequate load-bearing capacity. Lifting equipment, lifting tackle, support trestles and other auxiliary equipment must be reliable and safe in operation.

Use only stable loading ramps of adequate load-bearing capacity for loading. Ensure that no one is at risk from the machine tipping over or slipping.

Secure the machine on the transport vehicle to prevent it rolling away, slipping and toppling over.



# Safety Manual

Concrete delivery and placing machines

## 2.5 Placing booms

### 2.5.1 Unfold placing boom

Only raise a mobile placing boom from the driving position once the machine has been supported in accordance with the Operating Instructions. Stationary placing booms may only be raised after the proper set-up has been checked by a subject expert.

Only raise the placing boom in the sequence described in the Operating Instructions. The correct sequence depends on the “Folding system” (roll-and-fold system, Z fold system, etc.).

Do not carry out more than one movement at a time. If a movement is stopped, the entire volume of fluid is available for the remaining movements, and can increase their speeds. Depending on the design, it may be the case that carrying out several movements at once (as opposed to carrying out a single movement at maximum speed at any one time) does not bring any advantage in terms of time. Carrying out several movements at once requires an increased level of attentiveness.

The range of a radio remote control is long enough for the machine to receive control commands (e.g. from a great distance, from inside enclosed spaces) even without visual contact. If there is no visual contact, for example, because you are changing workplace, you must switch off the remote control. If there is no visual contact, for example, because the construction site is unclear, signallers **MUST** be used, and must remain in contact with the machine operator using suitable means, and have visual contact with the site of concrete placement, work areas and danger zones, and the machine.

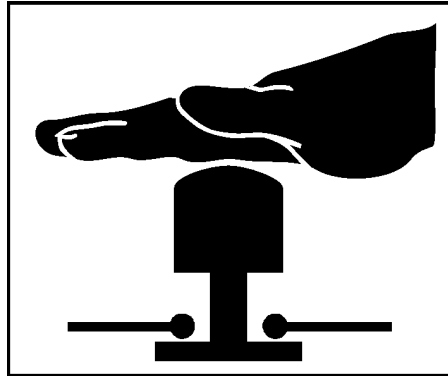
Always ask the site management to provide you with an assistant to act as a signaller. Agree clear hand signals or other signals with the signaller so that you can communicate with each other. You should position the signaller such that he can always observe the whole of the placing boom. Your primary duty as the machine operator is to observe the site of concrete placement.

Only slew the placing boom over persons when the delivery line and end hose are empty. There is a risk of concrete falling out of the end hose.





Press the EMERGENCY STOP BUTTON immediately if the placing boom moves unexpectedly. If this should occur, you must cease working and have the cause of the fault rectified by your qualified personnel or our After Sales Service personnel.



Placing booms with placing boom hinges which allow considerable flex angles have a very large potential working area. This high manoeuvrability means different placing booms can also be moved into dangerous positions. Prohibited areas can be found in the Operating Instructions.

There is a risk that you will damage the truck, truck superstructure or obstacles on the construction site with the placing boom. Under certain circumstances it is even possible to overload or cause damage to the placing boom. Uncontrolled movements may result from the sudden, violent release of the placing boom after collisions. This may also result in (possibly fatal) personal injury.

The manufacturer has indicated such impermissible working areas by the use of warning signs and information plates on the machine and appropriate notes in the Operating Instructions.

## 2.5.2 End hose

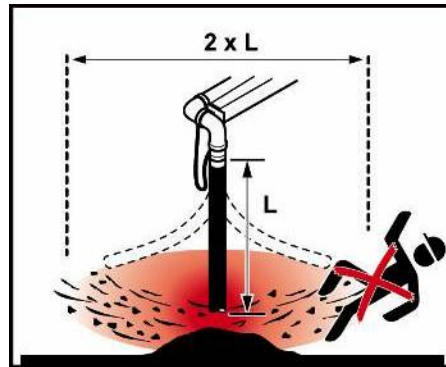
The end hose must hang freely each time you start pumping, when you start pumping again after blockages, and during cleaning procedures. No one should stand within the danger zone of the end hose.



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## Concrete delivery and placing machines

The diameter of the danger zone is twice the end hose length. Do not guide the end hose when pumping is started. There is a risk of accident from the end hose swinging out or stones being ejected.



When using a longer end hose, the diameter of the danger zone also increases. (*Extending the placing boom and end hose P. 23*)

End hoses with a length of more than 4 m must not be guided by hand.

The end hose must not impede the movement of the placing boom; in particular, the end hose must not catch on the reinforcement or formwork. There is a risk of death if the machine topples over or the end hose shoots out on further movement of the placing boom.

Never bend the end hose over. Never attempt to straighten a bent end hose by increasing the pressure. The end hose must not be submerged below the surface of the concrete being delivered, otherwise the concrete may spray upwards.

The concrete may also spray from the end hose due to the presence of air in the delivery line. To prevent this from occurring, the hopper must be filled with concrete at least as far as the agitator shaft so that no air can be sucked in.

The end hose must be secured against falling.

### 2.5.3 Guiding the end hose ergonomically

The hoseman must guide the end hose in such a way that prevents excess spraying of concrete, and so that concrete is directed precisely into the site of concrete placement.



Control the placing boom so that the hoseman can guide the end hose without power consumption. The hoseman must not carry the end hose by hand, because the weight of it may cause permanent personal injury.

### 2.5.4 Connecting drills

If a drill is connected to the delivery line for the placing boom, it must not place any further strain on the placing boom. The placing boom must be connected to the drill in such a way that the placing boom does not require adjustment. There should be 1-2 delivery hoses between the placing boom and the drill; these must be secured so that they cannot move in an uncontrolled manner. If the drill is moved on the construction site, the placing boom must not be connected.

### 2.5.5 Procedure in storms

Return the placing boom to the driving position or rest position in the event of storms or bad weather.

- Placing booms with a vertical reach of 42 m or more must only be operated in winds of up to wind force 7 (wind speed 51 km/h).
- Placing booms with a vertical reach of less than 42 m may only be operated in winds of up to wind force 8 (wind speed 74 km/h).

The definitive wind speed is measured at the height of the boom tip.

Wind speeds in accordance with the Beaufort scale are average wind speeds measured over a period of 10 minutes. Higher speed gusts of wind may occur briefly during the measuring period.

Higher wind speeds jeopardise the stability and safety of structural elements. There is a risk of lightning strike in a thunderstorm.

Lightning strikes pose a risk of death. The machine and the surrounding area will be charged with electricity. Earthing the machine does not reduce this risk. For this reason, you should fold in the placing boom if there is a risk of lightning strike.



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## Concrete delivery and placing machines

Tower cranes on construction sites generally have wind speed measuring equipment, enabling you to find out the wind speed at any time. If no wind speed measuring equipment is available, you can ask the nearest meteorological office what the wind speed is, or estimate the wind speed using the following rule of thumb:

- In winds of force 7 and greater, green leaves break from the trees and there is perceptible resistance when walking against the wind.
- In winds of force 8 and greater, small branches break from trees and walking outside is significantly impeded.

### 2.5.6 Concreting in cold weather

Placing booms must not be used at temperatures of below minus 15 °C (+5 °F) except with the express approval of the manufacturer. There is a danger of damage to the steel (brittle fracture) and the seals throughout the system at such extreme minus temperatures.

In addition, such minus temperatures should be considered the realistic lower limit for concrete placement, as it is no longer possible to prepare concrete such that it can achieve its strength without the use of special additives.

## 2.6 Delivery line systems

### 2.6.1 Suitable delivery lines

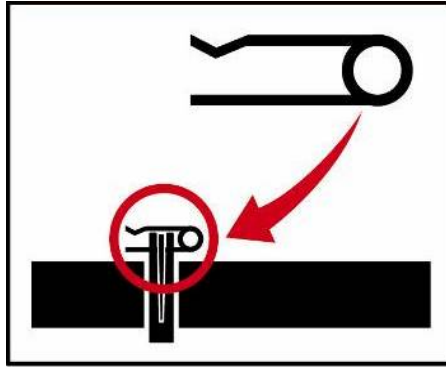
Use only delivery lines, end hoses, couplings, etc. which are in perfect condition and suitable for the delivery job and have been approved by the machine manufacturer. Delivery lines are subject to wear which varies according to the delivery pressure, concrete composition, the material from which the delivery line is made, etc.

If you are not responsible for the separate delivery lines, the permissible operating pressures of these should be confirmed by the operating company.



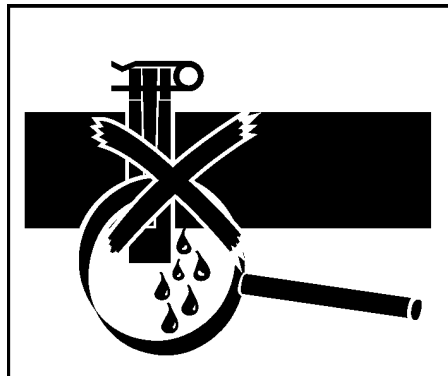
## 2.6.2 Securing delivery lines

Delivery lines, delivery hoses, end hoses and couplings must be securely fastened and secured to prevent spontaneous opening.



## 2.6.3 Leak tightness and blockages

Regularly force water through the delivery line under operating pressure to check that the system is watertight.



A properly cleaned delivery line is the best insurance against the formation of blockages. Blockages increase the risk of accidents. Never attempt to push through a blockage (e.g. by increasing the delivery pressure, using compressed air, etc.). There is a risk of death from the delivery line bursting or from concrete being ejected from the end of the delivery line.

Prevent blockages by adjusting the operating conditions. Remove blockages by reverse pumping and then restarting forward pumping. Repeat this process several times if necessary. If the blockage is not removed, relieve the pressure on the delivery line before removing the section of delivery line concerned.



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## Concrete delivery and placing machines

### 2.6.4 Opening delivery lines

Delivery lines must not be opened or tapped off while they are pressurised. Concrete exiting under pressure can cause injury. The concrete column must be depressurised by reverse pumping before the delivery line is opened. Never bend over the coupling when you are working.



### 2.6.5 Clearance to delivery lines

No one should remain in the vicinity of separate delivery lines during pumping operations. Cordon off the danger zone. If it is not possible to place a large enough cordon around the danger zone, the delivery line must be covered by suitable means.

### 2.6.6 Securing the delivery lines

Delivery lines, in particular riser lines which are not laid along placing booms, must be securely fastened in order to transfer the forces generated in them into the structure or other structural members. The lines must be laid so as to avoid kinks, sharp bends, stresses and damage during pumping operations.

### 2.6.7 Continuation delivery lines

If a continuation delivery line is connected to the placing boom, it must not place any further strain on the placing boom.

While you connect, use and disconnect a continuation delivery line, you must switch off the placing boom control system to prevent unintended movements of the placing boom. There is a risk of accident posed by jerky movements of the boom tip.



## 2.6.8 Devices for shutting off, diverting and cleaning

During operation, there is a risk of being crushed and of injury by shearing. Hydraulically driven devices are generally supplied with power by the hydraulic system of a machine. For this reason, there must always be a line of sight between the devices and the machine fitted with the control unit. Observe the safety regulations for the machine and the device when connecting and operating a device. Before operating devices, ensure that no persons are present in the danger zone.

Use only devices that are suitable and in perfect working order to shut off, divert and clean the delivery line. Defective and unsuitable devices can lead to damage to the entire delivery system and injure people in the vicinity if they fail.

## 2.7 Pumping operations

### 2.7.1 Place of work

The machine operator's place of work is with the remote control when the pump is in operation. If you operate the machine using the remote control, all operating and control devices on the machine must be closed to prevent unauthorised access.

In the case of stationary placing booms, platforms or similar equipment are only provided for assembly and maintenance work. Use of these platforms as a place of work during operation is prohibited.

It is forbidden to climb onto the machine during operation. In the case of stationary placing booms, it is forbidden to climb ladders during operation.

### 2.7.2 Safety

Before switching on or restarting the machine or individual machine functions, you must ensure that doing so will not endanger anyone's safety.

Refrain from any procedures that may impair the stability of the machine or are prejudicial to safety in any other way.



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## Concrete delivery and placing machines

### 2.7.3 Remote control

You must always carry the remote control on your person when the machine is ready for operation. Only in this way can it be guaranteed that you can press the EMERGENCY STOP BUTTON in the event of an emergency situation. The EMERGENCY STOP BUTTON may only be unlocked once the cause/emergency has been remedied.

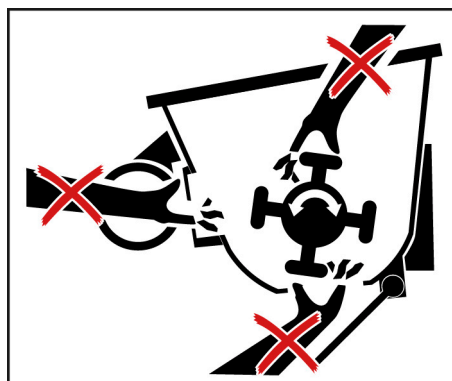
As a general rule, you must carry the remote control so that no control elements are activated unintentionally. If your attention is drawn away from the machine (particularly when changing place of work), you must switch off the remote control.

During breaks in pumping, interruptions, maintenance work, or before you leave the machine, you must secure it to prevent unintended movements and unauthorised use. Switch off the remote control and lock it away.

### 2.7.4 Moving machine components and hot surfaces

Keep all access covers, maintenance flaps, guards, etc. closed and locked during operation. This also applies in particular to the grille, water box cover and covers over cylinders. There is otherwise a risk of injury from moving machine components and a risk of burning on hot surfaces. In particular, there is a risk of burning from the engine, attached parts and the exhaust.

Never start work unless the grille is closed and bolted down or otherwise secured.



Do not touch moving parts of the machine, whether the machine is running or switched off. Always switch off the engine first, and dump the accumulator pressure where an accumulator is fitted.





Do not insert any objects (shovel handle, trowel, etc.) into moving machine components. Such objects could become trapped and dragged into the machine. They might then hit you or be torn from your hands and cause you injury.

## **2.7.5 Constant observation of the machine**

You should be constantly observing the machine for any damage or faults while it is in use. In the event of faults or malfunctions that impair safety at work, shut the machine down immediately and secure it. Have the faults rectified immediately. If it is not possible to rectify faults which jeopardise the safe operation of the machine, you must suspend operations until the defects are rectified.

## **2.7.6 Truck mixer**

As the machine operator, it is your role to instruct the truck mixer drivers who deliver the concrete to you, so that they are able to operate the operating elements on the concrete pump provided for their use. Only allow the truck mixer drivers to work alone once you are certain that they have understood your instructions.

Make sure that no-one stands between the approaching truck mixer and the machine. There is a risk of crushing between the truck mixer and the machine.

## **2.8 Cleaning**

### **2.8.1 General**

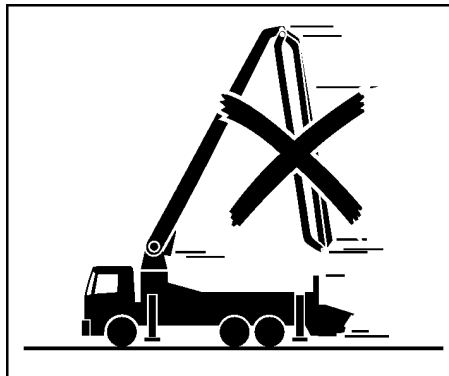
You must drain the delivery line, pump and hopper completely. Concrete residue in the hopper, in particular, may be thrown out whilst the truck is moving.

The machine must not be driven with the placing boom unfolded or the support legs extended, even over short distances. This rule also applies when you have to drive the machine to a different site for cleaning. The placing boom and support legs must be fully retracted and secured.



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Concrete delivery and placing machines



The preferred methods for cleaning the delivery line are reverse pumping or forced cleaning with water. The agitator must be switched on during reverse pumping. Otherwise, the concrete flowing back into the hopper can bend the agitator shaft. Use a catch basket, pipe cleaning head and wash-out ball for forced cleaning to prevent any water from flowing into the formwork.

Never spray remote controls or control cabinets with barrier agents (mould oil or similar) to protect them against contamination. This causes significant corrosion damage to the electrical system.

There is a risk of injury at all points on the machine from slipping, tripping, bumping into things, etc. Use the handles and steps to climb into and out of the machine. It is forbidden to stand on the grille. Do not jump from the machine.

Do not reach into the hopper or any other moving machine components. This rule must also be followed when you are opening the outlet on the bottom of the hopper. Do not remove the grille.

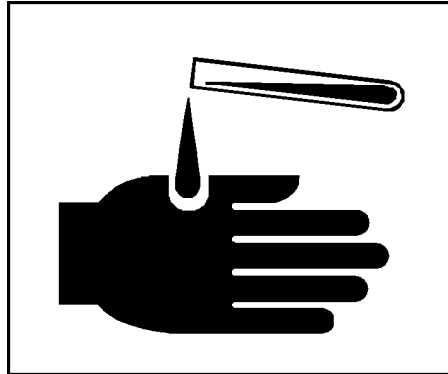
Only point the water jet into the hopper or other moving machine components. Do not insert the hose. It could become entangled with moving machine components.

## 2.8.2 Cleaning agents

Take care when using aggressive cleaning agents. Aggressive cleaning agents may attack materials (e.g. rubber) and painted surfaces. You can use commercially available paint cleaning and care agents, as long as these have a pH value of between 4 and 9. Ask the manufacturer of the cleaning agent to confirm its suitability. Observe the



manufacturer's instructions regarding use and safe handling. Wear protective clothing. Always rinse off cleaning agent thoroughly with clean water; do not allow puddles to form.



Do not use sea water or other water containing salt for cleaning purposes.

Do not use any highly flammable agent for cleaning; there is a risk of fire.

### 2.8.3 Cleaning with compressed air

When the delivery line is being cleaned with compressed air, there is an increased risk of accidents caused by compressed air escaping explosively, spurting concrete, and delivery or end hoses moving uncontrollably if they have not been removed.

Compressed air should only be used for cleaning purposes under the supervision of a subject expert. All persons participating in the cleaning procedure must be instructed in the safety regulations.

The manufacturer accepts no liability for damage caused by incorrectly performed compressed air cleaning. You must observe the following rules without fail when you use compressed air to clean out the delivery line:

- Individual pipes and short pipe runs up to 10 m in length must not be blown through with compressed air. There is a risk of accident from rebound.
- Only blow out delivery lines that have the same nominal diameter throughout their length. Reducer pipes must be drained and flushed out by hand.
- No bends, delivery or end hoses may be fitted at the end of the delivery line.



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## Concrete delivery and placing machines

- A catch basket must be fastened at the end of the delivery line and a wash-out adaptor must be fitted on the head of the delivery line. The catch basket and washout adaptor must fit the delivery line system.
- The concrete must be able to flow freely from the end of the delivery line.
- There must be no persons present within an area of 3 m around the delivery line, at the end of the delivery line and, in particular, in front of the opening in the catch basket.
- Care must be taken to ensure that any concrete that might be expelled from the catch basket cannot injure anybody or cause any damage.
- The wash-out adaptor must be fitted with a separate, large dump cock and a pressure gauge.
- The pressure gauge must be kept under constant observation during the cleaning process. The pressure in the delivery line must be rapidly dumped via the dump cock in the event of a sudden drop in pressure (concrete column exiting from the end of the line) or increase in pressure (risk of blockage).
- The sponge ball or the plug used to push the concrete out must be sufficiently dense that the air does not pass through it into the concrete. In addition, the delivery line must be sealed to the rear when the sponge ball or plug is caught in the catch basket.
- Only work on the delivery line (particularly when opening the delivery line) if it has been depressurised. Make sure that the compressed air has been dumped completely.
- The dump cock must be opened in such a way that no-one can be injured by concrete residue that might be expelled from the dump cock.
- Separate delivery lines that are cleaned with compressed air must be securely fastened so that they cannot move uncontrollably.
- If continuing distribution systems (e.g. rotary distributors), gate valves or other delivery line elements are connected to the delivery line, they must be secured in such a way that they cannot move uncontrollably.

### 2.8.4 Protection against water

Water spraying on the machine from random directions has no damaging effect. The electrical system is protected against spray water, but is not waterproof.



You must close/seal all openings into which water/steam/cleaning agent must not penetrate for safety or functional reasons before cleaning the machine with water or a steam jet (high-pressure cleaner) or other cleaning agents. Electric motors and control cabinets are particularly at risk.

## 2.8.5 Post-cleaning procedure

After the machine is cleaned, the covers/tapes must be completely removed and the machine must be checked to ensure that it is ready for operation (*Before working with the machine P. 35*).

Look out for leaks, loose connections, chafe marks and damage during the cleaning procedure. Any identified defects must be rectified immediately. The machine must be greased after it has been cleaned using a highpressure cleaner.





### **3 Maintenance and special work**







## 3.1 Requirements for special work

As the operator, it is your responsibility to provide all the necessary information to the personnel involved before special work or maintenance work is carried out. Someone should be nominated as the person responsible for this.

Carry out the maintenance and inspection operations and comply with intervals specified in the Operating Instructions, including specifications for the replacement of parts and equipment. These tasks may only be carried out by qualified personnel.

Workshop equipment appropriate to the task in hand is absolutely necessary for the execution of maintenance work.

If changes have been made to the machine, it must be checked by a subject expert before recommissioning.

Secure a wide area around the maintenance area as far as is necessary.

A machine that has been completely shut down for maintenance and repair work must be secured to prevent it being restarted inadvertently:

- Lock the main control devices and remove the key.
- If a main switch is fitted, attach a warning plate to it.

Only carry out maintenance work if the machine is parked on level and sufficiently supporting ground and is secured to prevent it rolling away.

Use specially designed or otherwise suitable climbing aids and working platforms when carrying out assembly work above head height. Never use machine parts as climbing aids. Keep all handgrips, steps, railings, platforms and ladders free from dirt, snow and ice.

Carefully secure individual parts and large assemblies to lifting equipment when carrying out a replacement operation. Use only suitable and technically perfect lifting equipment and suspension systems with adequate lifting capacity. Never stand under suspended loads.

Attachment of loads and signalling to crane operators should only be entrusted to experienced personnel. The signaller must be within visual range of or in voice contact with the crane operator.

Observe national regulations when working with lifting equipment.



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## Concrete delivery and placing machines

Work on chassis, braking and steering systems must only be carried out by qualified personnel trained for such work.

Clean any traces of oil, fuel or preservatives from the machine, especially connections and threaded unions, before carrying out maintenance or repair work. Do not use aggressive cleaning agents. Use lint-free cleaning rags.

Bolted connections that you have loosened for carrying out maintenance and repair work must always be replaced or retightened in accordance with manufacturer specifications.

Do not open gas-filled spring elements, as used on maintenance flaps, for instance. The spring elements are filled with gas under high pressure which can escape explosively if you attempt to open them. Relieve the tension on systems under mechanical stress.

Be aware of hot functional fluids and surfaces (hydraulic fluid, hydraulic fluid radiator, etc.).

Ensure that all functional fluids, consumables and replaced parts are disposed of safely and with minimum environmental impact.

### 3.2 Welding

Only carry out welding, flame cutting and grinding operations on the machine once this has been expressly approved by the manufacturer.

Only qualified personnel may carry out welding work in line with manufacturer specifications, especially on the placing boom, on the supports, on load-bearing parts, on fuel and oil tanks or other components which are important for industrial safety. This work must be inspected by qualified welding personnel. The operator must document the evidence of the formal qualifications of the welder and the qualified welding personnel.

Always attach the earth cable of the welding unit directly to the component which is being welded. The welding current must not flow through hinges, cylinders, etc. Significant damage may be caused in the event of a flash over.



Electronic components can be destroyed by stray voltage during arc welding processes. For this reason:

- Disconnect the remote control cable from the control console.
- Disconnect all cables leading to the receiver of the radio remote control system.
- Close connector sockets with caps.
- Disconnect the positive and negative leads from the battery.

Clean the machine and its surroundings of dust and flammable substances and make sure that the premises are adequately ventilated before carrying out welding, flamecutting and grinding operations, otherwise there is a risk of explosion.

### 3.3 Working on the placing boom

Only carry out maintenance and repair work on the placing boom if the placing boom is folded or properly supported, the engine is switched off and the support legs are secured.

Support the placing boom arms before starting work on the valves, cylinders or hydraulic lines on the boom.

The delivery line was installed without tension with the placing boom in the driving position and can only be replaced without difficulty in this condition. Stresses may be generated on folding if the delivery line is replaced when the placing boom is unfolded.

Do not remove the entire delivery line but rather replace the delivery line boom arm by boom arm, for example. Otherwise, the pivot points of the new delivery line will have to be redetermined using special equipment.



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Concrete delivery and placing machines

## 3.4 Safetyrelevant components

Work on safety-relevant components requires particular specialist knowledge.

The following activities in particular must only be carried out by qualified personnel that have been authorised by the manufacturer:

- Repairing, replacing or adjusting safety-relevant components and adjustable devices (pressure limiting valves, potentiometers, fluid flow limiters, hydraulic cylinders, sensors, etc.)
- Removing lead seals

Modifications to the machine data (in particular, increasing pressures, modifying speeds, etc.) are not permitted.

## 3.5 Software

If a machine is equipped with software, the software may only be used as is provided for in the manufacturer's Operating Instructions.

Only persons authorised by the manufacturer may intervene in the machine's software. This also applies to updates.

Unauthorised interventions in the machine's software may lead to severe damage and accidents.

## 3.6 Protective and safety equipment

Any safety equipment removed for maintenance purposes must be refitted and checked immediately upon completion of this work.

All equipment required for safety and accident prevention (warning signs and information plates, grilles, guards, etc.) must be in place. Such equipment must not be removed, modified or damaged.

Keep all warning signs and information plates on the machine complete and in a perfectly legible condition.

It is your responsibility as operator to ensure that any warning signs and information plates that have been damaged or rendered illegible are replaced without delay.



## 3.7 Electrical power

### 3.7.1 General

Work on electrical systems or operating equipment must only be carried out by qualified personnel. For further information on machines that are operated using the site power supply, see also the (*Power at the construction site P. 68*) section.



Machine components which are to undergo maintenance work must be deenergised. Ensure that disconnected machine components cannot be restarted. First of all, you must check that deenergised parts are indeed deenergised, then earth and shortcircuit them and isolate adjacent live parts.

Disconnect the negative lead from the battery before starting any work on the electrical system of machines with an internal combustion engine. When reconnecting, connect the positive terminal first, and then the negative terminal.

Before starting work on highvoltage assemblies and after cutting the power supply, you must connect the supply cable to earth and short-circuit the components, particularly the capacitors, with a rodtype earth electrode.

If work is to be carried out on live parts, the presence of a second person is required who can switch off the power supply to the machine in the event of an emergency. Secure the working area with a red-and-white safety chain and a warning plate. Use insulated tools only.

### 3.7.2 Electrical components

Control cabinet, motor and control elements are protected as standard in accordance with degree of protection IP 54.



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## Concrete delivery and placing machines

IP 54 means:

- Complete protection against contact with live components or internal moving parts. Protection against damaging dust deposits.
- Water spraying on the equipment from random directions must not have a damaging effect.

Use only original fuses with the specified voltage rating. Bridging or the use of fuses with too high a rating can irreparably damage the electrical system. You must switch off the machine immediately if a fault occurs in the power supply.

### 3.7.3 Power at the construction site

The power on the construction site must be supplied from a special feed point (construction site power distribution point). Machines with an electric motor must not be connected to the mains power supply.

Only trained and qualified personnel are permitted to work on electrical systems with an operating voltage of more than 25 volts alternating voltage or 60 volts direct current. Only such qualified personnel may install, connect, disconnect and open electrical control cabinets.

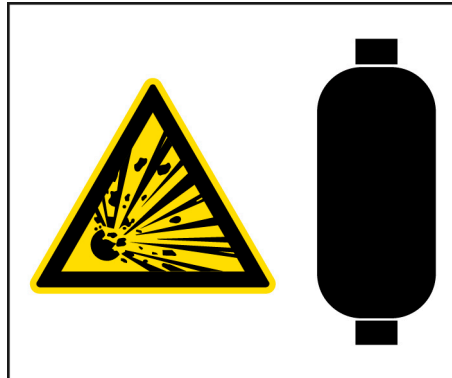
An electric shock (possibly with fatal consequences) may be the result of touching machines with electric motors or contact with other electrical cables if the electrical connection has not been made properly or the supply cable is damaged.

## 3.8 Hydraulic systems

### 3.8.1 General

Work on hydraulic systems must only be carried out by qualified personnel.

Always wear your personal protective equipment when carrying out work on the hydraulic system. Escaping fluid is toxic and can penetrate the skin.



Injection through the skin is a major medical emergency. In the event of injuries caused by pressurised fluid, inform the company medical officer and call a medical specialist immediately. This also applies for injuries which may seem only slight. Hydraulic fluid which has penetrated underneath the skin must be removed immediately. Otherwise, there is a risk of death due to impaired blood circulation and infections.

Before starting repair work, depressurise the system sections and pressure lines (hydraulic system, pneumatic system, delivery line) that are going to be opened in accordance with the assembly descriptions.

Never work on systems that are still under pressure. Switch the hydraulic pump drive and the engine off. Otherwise there is a risk of injury caused by functional fluids escaping under pressure. If there is a hydraulic accumulator, open the accumulator dump valve to prevent any machine movements caused by residual pressure. Modifications to the hydraulic accumulator are prohibited.

Be aware that enclosed hydraulic fluid can remain pressurised for a certain length of time. Do not open any hydraulic systems if they are under load from an external force (particularly from a raised placing boom).

Lay and install hydraulic lines in accordance with the current rules of engineering. Connections must be fitted at the appropriate points. Fittings and the length and quality of the hoses must comply with requirements.

The hydraulic system must be properly vented after all maintenance work. Otherwise there is a risk of injury caused by swinging and telescopic support legs extending rapidly, the placing boom lowering, etc.



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Open vent valves very carefully until hydraulic fluid starts to escape. You should on no account open vent valves further than necessary or go so far as to remove them.

Damaged hydraulic lines must be replaced rather than repaired. You must replace damaged or saturated hydraulic hoses immediately. Hydraulic fluid spray escaping under pressure can cause injuries and fires.

### 3.8.2 Replacing hydraulic hoses

During retesting, hydraulic hoses must be checked by a subject expert for external damage. The retest must be recorded in the check book. The operator must have hydraulic hoses replaced if they show signs of external damage.

## 3.9 Noise emissions

The place of work in normal operation is with the remote control. For this reason, it is not possible to specify a particular place of work for the machine operator. Take the values for the sound pressure level and sound power level from the machine Operating Instructions.

Wear suitable personal protective equipment in the vicinity of the machine.

As the operator, you must instruct your personnel to always wear their personal hearing protectors. You are responsible for ensuring that your personnel comply with this regulation.

All soundproofing equipment must be fitted and in perfect condition. All soundproofing equipment must be closed during operation. A high sound level can cause permanent hearing damage.

## 3.10 Exhaust fumes

Vehicle exhaust gases contain constituents that can be deadly or carcinogenic. Operate internal combustion engines and fuel-operated heating systems only in adequately ventilated premises. Before starting up the engine in enclosed spaces, make sure that there is adequate ventilation and direct the exhaust gases away from the place of work.



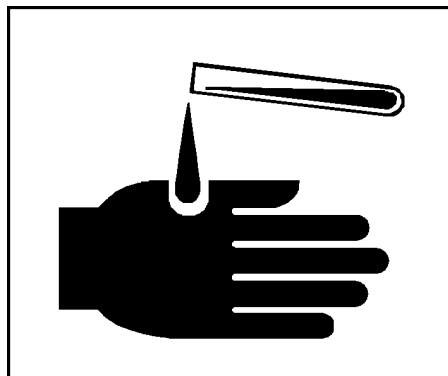


Wear personal protective clothing and equipment for all work in which exhaust gases or particles of building material can enter the body through the respiratory passages. Comply with the information issued by the manufacturer of the building material.

## 3.11 Functional fluids

When handling oils, greases and other functional fluids, observe the safety regulations applicable to the product concerned (see the safety data sheet).

Oils, fuel and other functional fluids may be hazardous to health upon contact with the skin, etc. You must therefore always wear personal protective clothing and equipment when you are handling toxic, caustic or other functional fluids that are hazardous to health and always take note of the manufacturer's information.



Take care when handling toxic and caustic functional fluids (brake fluid, battery acid, water glass, concrete set accelerating admixtures, cement, etc.). Building materials containing cement have a highly alkaline effect when they react with water (and also with perspiration). Admixtures are toxic and caustic.

Cleaning agents, concrete release agents, preserving agents etc. propelled by compressed air can cause very serious damage to the respiratory tract if a respiratory protection mask is not worn. Spray mist enters the lungs very easily.

Frequent injuries are eye injuries caused by concrete spatter, water glass or other chemical substances.

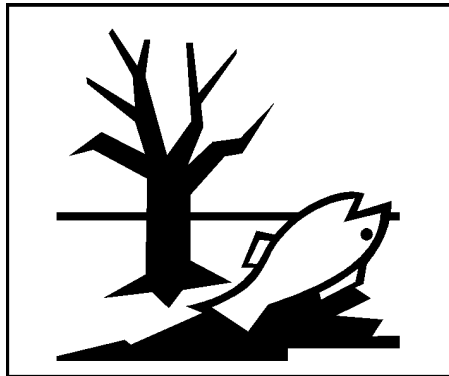
Take care when handling hot functional fluids and consumables (risk of burning or scalding).



# Safety Manual

Concrete delivery and placing machines

Have used operating equipment and functional fluids such as filters, batteries, oil, brake fluid, etc. disposed of properly. Used cleaning rags should also be disposed of properly.



## 3.12 Disposal of the machine

To dispose of the machine, you must proceed in accordance with all points in the disposal regulations which apply in your country.

During the disposal operation, you must observe the following in particular:

- Remove the functional fluids, particularly hydraulic fluids, engine oils, fuel, brake fluid, concrete admixtures, any environmentally hazardous functional fluids or functional fluids which are hazardous in any other way, and dispose of these correctly.
- Remove the operating equipment, particularly the hydraulic fluid reservoir, hydraulic cylinder, hydraulic fluid radiator, hydraulic lines and hoses and other components which may contain residual functional fluids, and dispose of these correctly.
- Remove the steel structure and dispose of it correctly, e.g. by recycling.
- Dispose of the truck or the drive unit correctly.



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