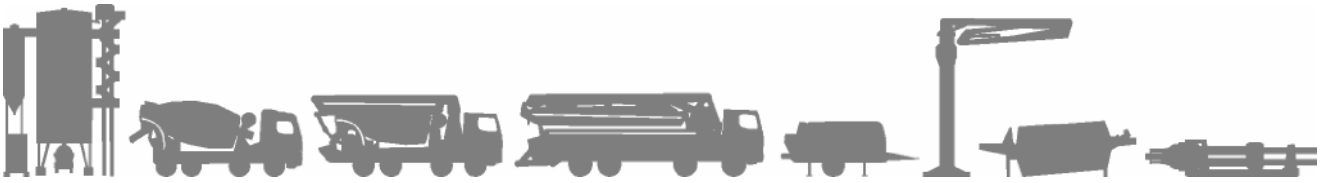
SCHWING

Original operating instructions

Stationary concrete pump

EN

SP 1800-D
SP 2800-D



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.
When placing an order, please specify the machine type and the machine number stamped on the type plate.

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

Editor:	SCHWING GmbH Department: TDS 1 Heerstr. 9-27 44653 Herne
Art. no.:	98373676 Series 02
Caterpillar motor	129, 151, 168 kW
printed on the:	19. September 2018
Version:	3.12

* Special equipment
** Optional

SCHWING TABLE OF CONTENTS

* Special equipment
** Optional

Presentation 1

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STRUCTURE OF THE OPERATING INSTRUCTIONS

The present operating instructions have a modular structure and consist of seven chapters. The operating instructions are numbered by chapter title, as individual chapters are interchangeable and partially (e.g. safety manual) have their own, individual numbering.

For ease of use, the beginning of each new chapter is identified by a green page.

As some chapters may also be issued separately, they are identified by their own cover sheets.

THE SEVEN CHAPTERS OF THE OPERATING INSTRUCTIONS

CHAPTER 1: INTRODUCTION

The first chapter of these operating instructions is about familiarising yourself with the machine. Here you will find - For example - The technical data, a brief description, an overview of the control and check devices, as well as a description of the control systems used.

CHAPTER 2: SAFETY

In the second chapter you will find our SAFETY MANUAL. The safety manual is prepared jointly by leading manufacturers of concrete pumping and placing machines under the auspices of the VDMA (Verband deutscher Maschinen- Und Anlagenbauer/Association of German Machinery and Equipment Constructors). It is applicable without restrictions to our machines and an integral part of these operating instructions.

The safety manual contains **essential** safety notices for the operation of the above-mentioned machines and is used by all collaborating companies.

Special safety and warning notices for your SCHWING machine are provided in the individual chapters of these operating instructions.

CHAPTER 3: OPERATION

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

CHAPTER 4: MAINTEANCNE

In the fourth chapter you will find essential information on when and how the machine must be serviced, as well as information on filling quantities and lubricants and operating materials used.

CHAPTER 5: RADIO REMOTE CONTROL

In chapter 5, you will find operating instructions for the remote control used. If alternative remote controls are available for your machine, all up-to-date variants are shown here. With machines for which no radio remote control was offered, this chapter is empty.

CHAPTER 6: SPECIAL EQUIPMENT

Chapter 6 provides information about special equipment for your machine.

CHAPTER 7: APPENDIX

In the appendix you will find topics such as organisation and administration.

THE INDIVIDUAL CHAPTERS OF THE OPERATING INSTRUCTIONS

Description of the header:

The individual pages of each chapter are continuously numbered. The page number is given in the header.

Example: 1.1-**2**

1.	1-	2	
1.			= Main chapter 1
	1-		= Sub-chapter 1
		2	= **Page 2**

Description of the footer:

In the footer is an identification number from our text processing. In all languages these measures are supplemented by the corresponding abbreviation used in the ISO language code.

Example: 005.008.04-EN

005.008			= Identification number
	04		= Amendment index
		- EN	= ISO language code (EN = English)

Please indicate the complete footer and header should any questions arise regarding particular chapters in your operating instructions.

TERM DEFINITION

Special equipment:
is equipment that can be opted for in addition but is not absolutely necessary. Example: additional lighting
Optional:
is absolutely necessary equipment where you can choose a variant. Example: Water pump, supplied by either manufacturer A or B

STRUCTURE OF SAFETY NOTICES

In these operating instructions, safety notices are provided in places where persons may be in danger.
The described measures for hazard prevention must be adhered to.

Safety notices are structured as follows:

	SIGNALWORD
	TYPE OF HAZARD CONSEQUENCES OF NON-OBSERVANCE * HAZARD PREVENTION

- WARNING SIGN: draws attention to the hazard

- SIGNAL WORD: indicates the severity of the hazard, see the hazard classes of the signal words used

- TYPE OF HAZARD: designates the type of hazard or source of the danger

- CONSEQUENCES *: describes the consequences of non-observance

- PREVENTION: indicates how the hazard can be avoided

HAZARD CLASSES OF THE SIGNAL WORDS USED

 **DANGER**
Identifies a high risk: Persons can be immediately injured or killed. Description of the measures for avoiding risks .

 **WARNING**
Identifies a moderate risk: This could cause injuries and death of persons. Description of the measures for avoiding risks .

 **CAUTION**
Identifies a risk: Persons can be injured. Description of the measures for avoiding risks .

* - Optional information

WARNING OF MATERIAL DAMAGE

In this documentation you will find safety notices relating to the existence of a risk of material damage. The described measures for the prevention of material damage must be adhered to.

SYMBOLS AND KEY WORDS USED

This notice draws your attention to possible risks to your machine.

Please note: if, due to damage to the machine, components or functions fail, this can lead to accidents resulting in personal injury.

ATTENTION

ATTENTION identifies measures for the prevention of material damage.

ADDITIONAL INFORMATION

The following symbol identifies information which is not related to safety, but increases the clarity of the documentation.

INFORMATION

Additional information for a better understanding; not a safety notice.

PREFACE

These operating instructions are intended for all persons entrusted with the operation and the maintenance of the

SCHWING MACHINE

described below, as well as owners or operators of the machine.

The operating instructions are intended to help you

- Become familiar with the machine, learn to use its application possibilities,

- Safely operate it, prevent danger,

- Use it properly and efficiently and save costs.

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 attention of the operating instructions.

Read these operating instructions carefully and retain them for future reference.
Familiarise yourself with the machine.

Do not wait until work shifts!

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 responsible for any damage resulting from the non-observance of these regulations!

In case of faults, any questions and for ordering spare parts, please contact your local representative or:

SCHWING GmbH

Postfach 20 03 62

D - 44647 Herne

Telephone: +49 (0) 2325 / 987-0

Fax: +49 (0) 2325 / 72922

Email: info@schwing.de

Our departments:

- SPARE PARTS SALES
- CUSTOMER SERVICE

- WARRANTY

you can contact us at

Telephone: +49 (0) 2325 / 987-231 / 232

Fax: +49 (0)2325 / 74674

Email: service@schwing.de

Please only use these connections when corresponding with these departments.

For all questions, always indicate the

Type and machine no.

of your machine.

ADDITIONAL OPERATING INSTRUCTIONS

SCHWING builds truck-mounted concrete pumps on chassis frames by different manufacturers.

These manufactures provide their own operating instructions about their products.

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

It is also possible that different special equipment of your SCHWING machine disposes of their own operating instructions.

Please observe these documents, because their contents are not subject to these operating instructions.

In order to use the machine safely, properly and efficiently and maintained, precise knowledge of these operating instructions are necessary.

We would like to point out, in particular, to the safety instructions given therein!

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

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 the "CE" marking to the machine. See also chap. 1.3.

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 show each a sample of the declaration of conformity for truck-mounted concrete pumps (S) and construction concrete pumps (SP).

IMPORTANT INFORMATION

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

This does not apply when the machines are placed on the market outside the European Economic Area.

If the design of a machine 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 within the European Economic Area!

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.

By making changes to the machine without the approval of SCHWING, as well as the use of accessories without admission by SCHWING, both shall 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.

EC declaration of conformity
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.	

CE

complies with the following relevant provisions:

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

Applied harmonised standards[1)], especially:	DIN EN 12001, DIN EN ISO 12100, DIN EN 982, DIN EN 1088, 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[2)], especially:	DIN 24117, DIN 24118

[1)] Complete list of the applied harmonised standards, see »Normative references in DIN EN 12001 hoisting-, 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 hoisting, spraying and placing machines for concrete and mortar — safety requirements«, as well as Schwing factory standard.

Noise emission			
Installed effective output	$P_{hydraulic}$	=	kW (diesel-hydraulic drive)
Measured sound power level	$L_{WA\ measured}$	=	dB
Guaranteed sound power level	$L_{WA\ guaranteed}$	=	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 looses its validity with any unauthorised changes to the machine.

Date/Signature by manufacturer

Information about signatory Management

EC declaration of conformity
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.	

CE

complies with the following relevant provisions:

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

Applied harmonised standards[1)], especially:	DIN EN 12001, DIN EN ISO 12100, DIN EN 982, DIN EN 1088, 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[2)], especially:	DIN 24118

[1)] Complete list of the applied harmonised standards, see »Normative references in DIN EN 12001 hoisting-, 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 hoisting, spraying and placing machines for concrete and mortar — safety requirements«, as well as Schwing factory standard.

Noise emission				
Installed effective output	$P_{hydraulic}$	=	kW (	-hydraulic drive)
Measured sound power level	$L_{WA\ measured}$	=	dB	
Guaranteed sound power level	$L_{WA\ guaranteed}$	=	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 looses its validity with any unauthorised changes to the machine.

Date/Signature by manufacturer

Information about signatory Management

MACHINE CHARACTERISTICS

The designation of the concrete pump means, for example:

SP 1800

SP ..... = **S**CHWING **P**UMP

1800 ..... = Technical parameters (minimum value)

Additional designations:

SP 2800 200 120 D 147 kW

200..... = ∅ Pumping cylinder (mm)

120..... = ∅ Piston of the diff. cylinder (mm)
.....

D..... = Diesel engine

147 kW... = Drive power in kW

TYPE PLATE

The type plate of the concrete pump (Fig. 1) is located on the machine frame. The machine number is stamped into the frame under the type plate.

Fig. 1

CE LABELLING

Machines brought into circulation after 01.01.1995 in states of the **E**uropean **E**conomic **A**rea (EEA) must comply with the basic health and safety requirements of the relevant EC regulations.

The machine manufacturers confirm this by applying a mark (Fig. 2) to the machine and displaying a “declaration of conformity”.

Fig. 2

The CE mark is located next to the concrete pump type plate on the machine frame.

CE means: **C**ommunauté **E**uropéenne
(European Community)

Please note the machine number of your machine here:

.....

1.3.1 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:

Truck-mounted concrete pump S 17 - S 43 SX	**Reference value** [1]
Delivery rate [m³] / per year	30 000
Construction jobs per year [2]	850
Truck-mounted concrete pump S 45 SX - S 65 SXF	**Reference value** [1]
Delivery rate [m³] / per year	30 000
Construction jobs per year [2]	500
Truck mixer pumps	**Reference value** [1]
Delivery rate [m³] / per year	15 000
Construction jobs per year [2]	250
Stationary concrete pump / Separate placing booms	**Reference value** [1]
Delivery rate [m³] / per year	20 000
Construction jobs per year [2]	280

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

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.

[1] See "Maintenance" chapter for restrictions
[2] One construction job is generally defined as one extension and retraction cycle

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.

1.3.2 CONTACT SCHWING IN THE EVENT OF OPERATIONS OUTSIDE OF THE INDICATED REFERENCE VALUES

The following applies to all SCHWING machines:

Fresh concrete tempera-	+15 °C
Operating site:	Outdoors / in rooms with sufficient ventilation
Operating temperature:	-15 °C / +45 °C
Maximum operating alti-	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.

1.3.3 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 hazardous properties, which have a negative impact on health or the environment.

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, the authorities responsible for environmental protection, for example, can provide appropriate information.

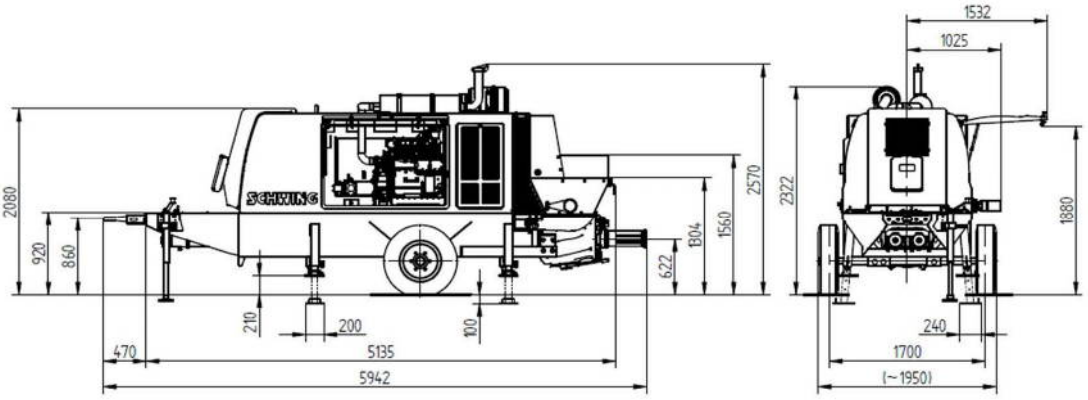
1.4 Technical data (diesel engine)

Notice: Output data is theoretical max. value.

TBS,
März 2017

Technische Daten/Technical Data
SP1800 Stage IIIA / Tier3

SCHWING Stetter

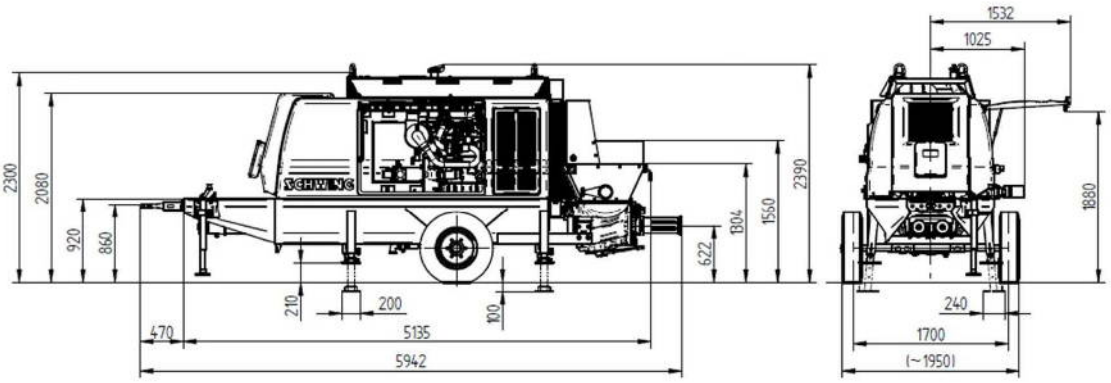


Pumpenbatterie Pump kit	P1620 -120/80
Motorhersteller und Typ Engine	Deutz TCD2013 L04
Abgasstufe Emission standard	Diesel Stage IIIA/Tier3
Motorleistung Engine power	126kW/169hp
max. Motordrehzahl max. engine speed	2300min^{-1}
Tankinhalt Diesel Fuel tank capacity	250ltr
Tankinhalt Hydrauliköl Hydraulic tank capacity	400ltr
max. Betondruck stangenseitig/kolbenseitig max. concrete pressure rod side/piston side	60bar/108bar 870psi/1566psi
max. Fördervolumen stangenseitig/kolbenseitig max. concrete pressure rod side/piston side	84m³/h / 48m³/h 110cu yd/h / 63cu yd/h
Abgang Rock Outlet Diameter	DN150
Füllinhalt Trichter Hopper capacity	570ltr
Verschleißschutz beidseitig Wear parts both sides	Hartmetall carbide metall
max. Einzelstützkraft statisch max. single outrigger load	xxxkN
Gesamtgewicht Gross weight	5.400kg/11.904lb
max. Schalleistung max. sound level	123dB (A)

⚠ WARNING

The specified concrete pressures require suitable pumping line material, see the “Pumping line” chapter

TBS, März 2017	**Technische Daten/Technical Data** **SP1800 Stage IIIB / Tier4i**	SCHWING Stetter

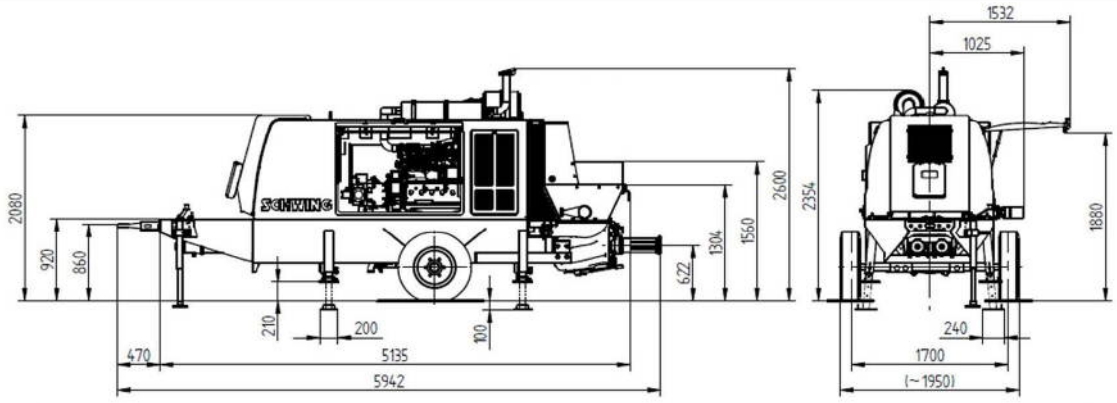


Pumpenbatterie Pump kit	P1620 -120/80
Motorhersteller und Typ Engine	Caterpillar C4.4
Abgasstufe Emission standard	Diesel Stage IIIB/Tier4i
Motorleistung Engine power	129kW/173hp
max. Motordrehzahl max. engine speed	2200min^{-1}
Tankinhalt Diesel Fuel tank capacity	250ltr
Tankinhalt Hydrauliköl Hydraulic tank capacity	400ltr
max. Betondruck stangenseitig/kolbenseitig max. concrete pressure rod side/piston side	60bar/108bar 870psi/1566psi
max. Fördervolumen stangenseitig/kolbenseitig max. concrete pressure rod side/piston side	80m³/h / 46m³/h 105cu yd/h / 60cu yd/h
Abgang Rock Outlet Diameter	DN150
Füllinhalt Trichter Hopper capacity	570ltr
Verschleißschutz beidseitig Wear parts both sides	Hartmetall carbide metall
max. Einzelstützkraft statisch max. single outrigger load	xxxkN
Gesamtgewicht Gross weight	5.400kg/11.904lb
max. Schalleistung max. sound level	123dB (A)

⚠ WARNING

The specified concrete pressures require suitable pumping line material, see the “Pumping line” chapter

TBS, März 2017	**Technische Daten/Technical Data** **SP2800 Stage IIIA / Tier3**	SCHWING Stetter

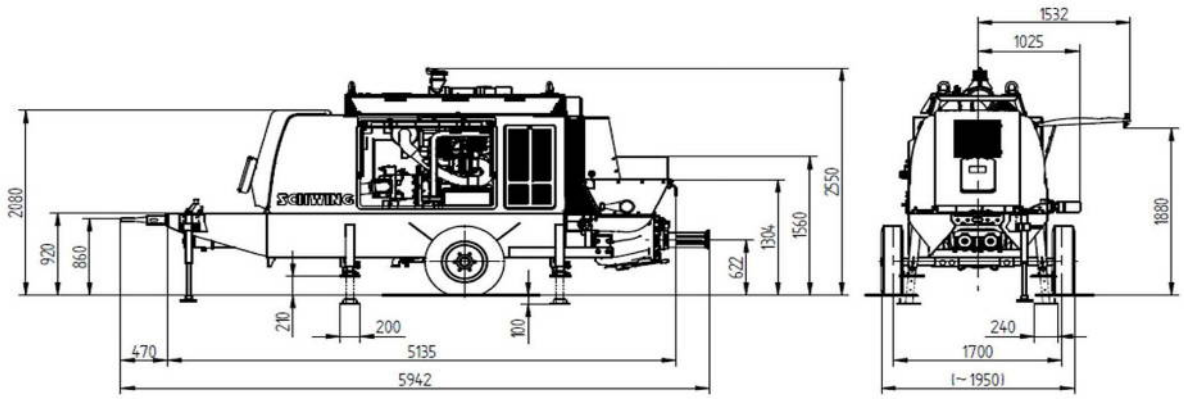


Pumpenbatterie Pump kit	P1620 -120/80
Motorhersteller und Typ Engine	Deutz TCD2012 L06
Abgasstufe Emission standard	Diesel Stage IIIA/Tier3
Motorleistung Engine power	147kW/197hp
max. Motordrehzahl max. engine speed	2300min^{-1}
Tankinhalt Diesel Fuel tank capacity	250ltr
Tankinhalt Hydrauliköl Hydraulic tank capacity	400ltr
max. Betondruck stangenseitig/kolbenseitig max. concrete pressure rod side/piston side	60bar/108bar 870psi/1566psi
max. Fördervolumen stangenseitig/kolbenseitig max. concrete pressure rod side/piston side	112m^3/h / 64m^3/h 146cu yd/h / 84cu yd/h
Abgang Rock Outlet Diameter	DN150
Füllinhalt Trichter Hopper capacity	570ltr
Verschleißschutz beidseitig Wear parts both sides	Hartmetall carbide metall
max. Einzelstützkraft statisch max. single outrigger load	xxxkN
Gesamtgewicht Gross weight	5.200kg/11.464lb
max. Schalleistung max. sound level	123dB (A)

⚠ WARNING

The specified concrete pressures require suitable pumping line material, see the “Pumping line” chapter

TBS, März 2017	**Technische Daten/Technical Data** **SP2800 Stage IIIB / Tier4i**	SCHWING Stetter

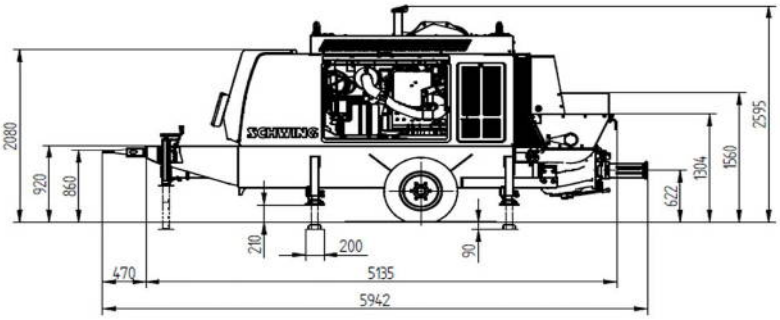


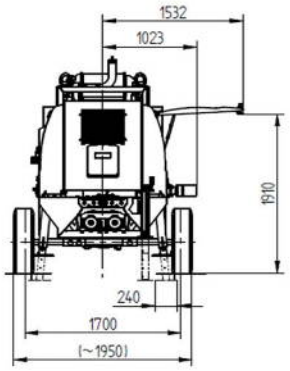
Pumpenbatterie Pump kit	P1620 -120/80
Motorhersteller und Typ Engine	Caterpillar C7.1
Abgasstufe Emission standard	Diesel Stage3B/Tier4i
Motorleistung Engine power	151kW/203hp
max. Motordrehzahl max. engine speed	2200min^{-1}
Tankinhalt Diesel Fuel tank capacity	250ltr
Tankinhalt Hydrauliköl Hydraulic tank capacity	400ltr
max. Betondruck stangenseitig/kolbenseitig max. concrete pressure rod side/piston side	60bar/108bar 870psi/1566psi
max. Fördervolumen stangenseitig/kolbenseitig max. concrete pressure rod side/piston side	112m³/h / 64m³/h 146cu yd/h / 84cu yd/h
Abgang Rock Outlet Diameter	DN150
Füllinhalt Trichter Hopper capacity	570ltr
Verschleißschutz beidseitig Wear parts both sides	Hartmetall carbide metall
max. Einzelstützkraft statisch max. single outrigger load	xxxkN
Gesamtgewicht Gross weight	5.700kg/12.566lb
max. Schalleistung max. sound level	123dB (A)

⚠ WARNING

The specified concrete pressures require suitable pumping line material, see the “Pumping line” chapter

TBS, März 2017	**Technische Daten/Technical Data** **SP2800 Stage IV / Tier4f**	SCHWING Stetter





Pumpenbatterie Pump kit	P1620 -120/80
Motorhersteller und Typ Engine	Caterpillar C7.1
Abgasstufe Emission standard	Diesel Stage IV /Tier4f
Motorleistung Engine power	168kW/225hp
max. Motordrehzahl max. engine speed	2200min^{-1}
Tankinhalt Diesel Fuel tank capacity	250ltr
Tankinhalt Hydrauliköl Hydraulic tank capacity	400ltr
max. Betondruck stangenseitig/kolbenseitig max. concrete pressure rod side/piston side	60bar/108bar 870psi/1566psi
max. Fördervolumen stangenseitig/kolbenseitig max. concrete pressure rod side/piston side	112m³/h / 64m³/h 146cu yd/h / 84cu yd/h
Abgang Rock Outlet Diameter	DN150
Füllinhalt Trichter Hopper capacity	570ltr
Verschleißschutz beidseitig Wear parts both sides	Hartmetall carbide metall
max. Einzelstützkraft statisch max. single outrigger load	xxxkN
Gesamtgewicht Gross weight	5.700kg/12.566lb
max. Schalleistung max. sound level	123dB (A)

⚠ WARNING

The specified concrete pressures require suitable pumping line material, see the “Pumping line” chapter

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NOISE INFORMATION FOR SCHWING CONCRETE HOISTING AND PLACING MACHINES WITH THE EXCEPTION OF TRUCK-MOUNTED CONCRETE PUMPS

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

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 for any conclusions to be reached on the noise level in the workplace (of the pump operator).

In the EC, a sign must be affixed to the above machines, informing of the sound power level of the respective machine. See example Fig. 1.

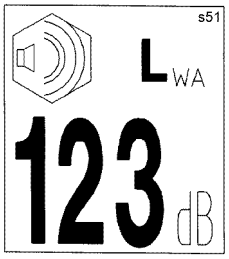


Fig. 1

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.

THE HIGHEST SOUND PRESSURE LEVEL (L_{pA}) *

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

Machines equipped with remote control as standard have no defined workplace.

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

For machines without a remote control, the highest sound pressure level in the workplace is measured as above and given in the operating instructions.

CAUTION

Hearing can be damaged!

Personal hearing protection must always be worn where the sound pressure level exceeds 80 dB(A).

Close all hoods, covers etc. that are provided to insulate the noise!

* individual machine values see next page

INFORMATION

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

Machine type	Highest measured sound pressure level (L_{pAmax})	Measuring point L_{pAmax} *	L_{pA} in the workplace (control station)	guaranteed sound power level (L_{WA})
SP 305, 500, 750	95 dB(A)	4 m from the front, on the right in the driving direction	95 dB(A)	123 dB(A)
SP 1400 D				123 dB(A)
SP 1800 D	92 dB(A)	4 m from the front, on the left in the driving direction	90 dB(A)	123 dB(A)
SP 1800 E				123 dB(A)
SP1800 D CAT 129 kW	101 dB(A)	4 m from the front, on the right in the driving direction	98 dB(A)	123 dB(A)
SP 2800 D	96 dB(A)	4 m from the front, on the left in the driving direction	95 dB(A)	123 dB(A)
SP 2800 E	97.1dB(A)	5 m from the front, on the left in the driving direction	98.5 dB(A)	107.8 dB(A)
SP2800 D CAT 151 kW	105 dB(A)	4 m from the front, on the right in the driving direction	101 dB(A)	123 dB(A)
SP 2800 D Tier4f 168 kW	115.2 dB (A)	at the front of the machine	101.7 dB(A)	123 dB(A)
SP 3800 D Tier3	119.1 dB(A)	at the front of the machine	98.4 dB(A)	123 dB(A)
SP 3800 D Tier4f	115.7 dB (A)	at the front of the machine	98.4 dB(A)	123 dB(A)
SP 3800 E				123 dB(A)
SP 9500 D Tier3	116.4 dB(A)	at the front of the machine	99.7 dB(A)	123 dB(A)
SP 9500 D Tier4f	119.3 dB(A)	at the front of the machine	105.4 dB(A)	123 dB(A)
SPB 25-32	85 dB(A)	at the drive	/	117 dB(A)
SPB 35	85 dB(A)	at the drive	/	117 dB(A)
TSR 30/10 E				123 dB(A)

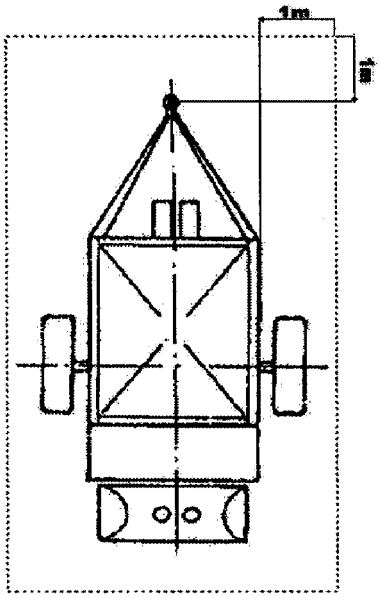
* see table on next page

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 drive motor used. For this reason we have attributed the highest measured value to each type of our construction concrete pumps.

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MACHINE DESCRIPTION

The concrete pumps of the type series SP 1800/SP 2800 are designed for the pipe delivery of standard concrete.

A delivery of other means, such as, e.g. heavy concrete, lightweight concrete, screed and mortar, etc. is only permitted after consultation with Schwing.

Both types differ essentially only by the installed driving power and corresponding hydraulic pumps.

TRANSPORT POSSIBILITY

The pump is mounted onto a universally designed construction chassis frame with pneumatic tires. Other chassis frames are available on request.

DRIVE MOTOR

The drive motor drives, without the intermediate gear, the pumps of the hydraulic system directly.

There are alternative diesel or electric motors available.

HYDRAULIC SYSTEM

The hydraulic system operates in an open circuit.

An adjustable hydraulic pump is available for the drive of the concrete pump.

A fixed displacement pump is available for the standard agitator.

On request, this pump also drives special equipment, such as hydraulic outrigger, compressor, water pump and shut-off assembly

Oil filter and oil cooler are arranged in the return pipe of the fixed displacement pump.

CONCRETE PUMP

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

The most important assembly groups (Fig. 1) are:

1- Rock valve

2- Pumping cylinder and piston

3- Water box

4- Hydraulic drive cylinder

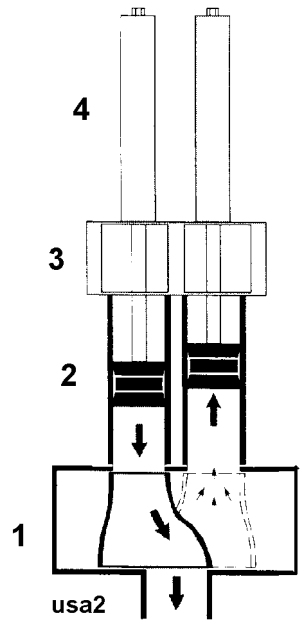


Fig. 1

ROCK VALVE

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

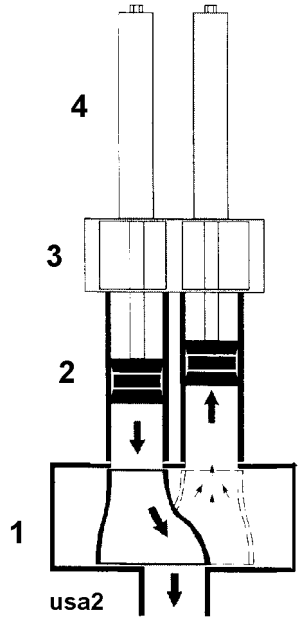
The two pistons run counter to one another.

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

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

By switching to "DRAW" (reverse operation), 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.



Textless pictographs

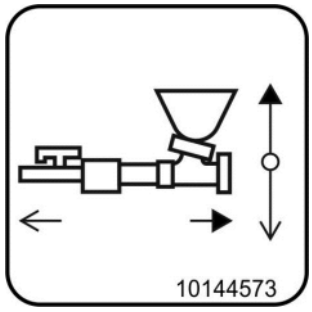
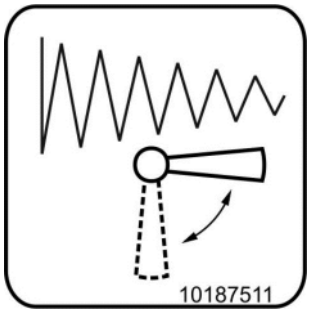
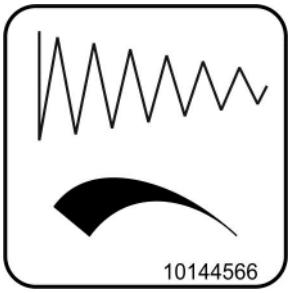
Different warning- And information signs in the national language are located on your SCHWING concrete pump, as well as textless pictographs.

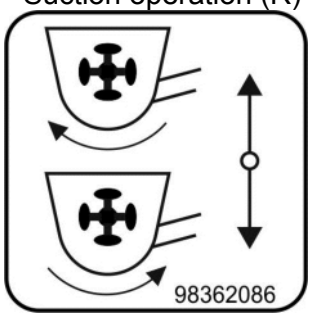
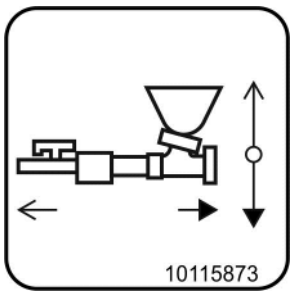
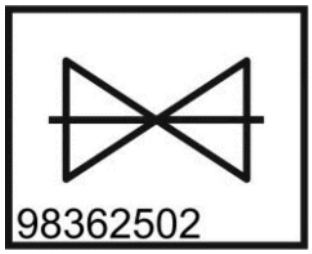
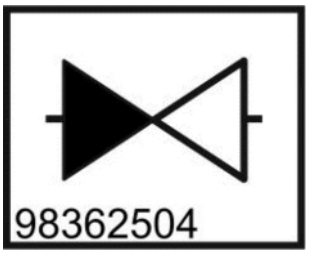
INFORMATION
All signs and pictographs are important components of your machine! Should the machine be used in another language area than initially planned, the signs and labels must be exchanged for a national language version. Please ensure good condition and renew signs immediately that have become damaged or rendered illegible. The appropriate material number is specified under each sign.

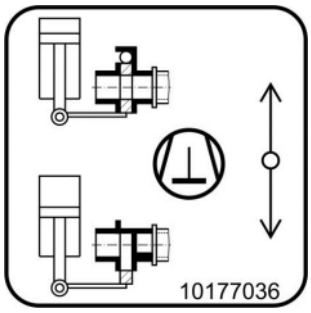
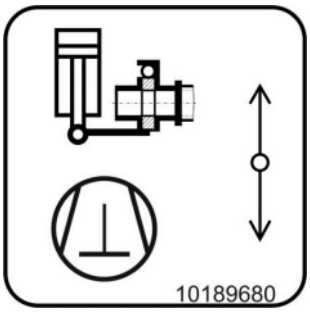
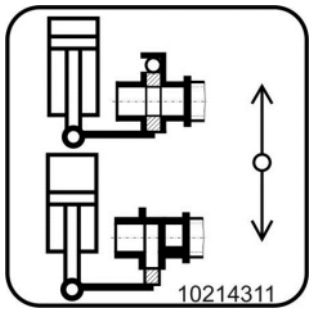
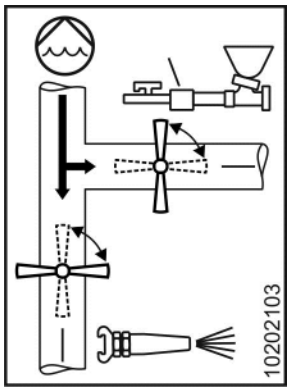
INFORMATION
Some of the signs indicated are not available on each machine. The scope of the signs and labels depends on the type and design of your machine.

1. PICTOGRAPHS

Textless pictographs are located at various control elements of the machine.

Concrete pump Pumping - 0 - Sucking	Starting damping on / off	Starting damping	Delivery rate adjustment
			
10144573*	10187511*	10144566	98362082

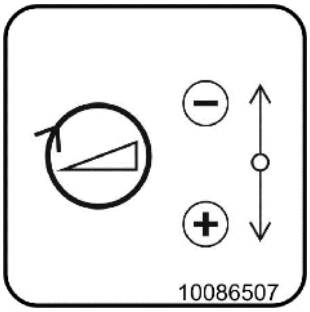
Agitator Pump operation (P) - 0 - Suction operation (R)	Concrete pump Sucking - 0 - Pumping	Open isolation valve	Close isolation valve
			
98362086	10115873*	98362502	98362504

Chamber valve open Compressor Chamber valve closed	Chamber valve 0 - Compressor	Chamber valve Open - 0 - Closed	Switching water box/spray hose
			
10177036*	10189680*	10214311*	10202103

* Only use with appropriate machinery

Textless pictographs are located at various control elements of the machine.

Speed adjuster

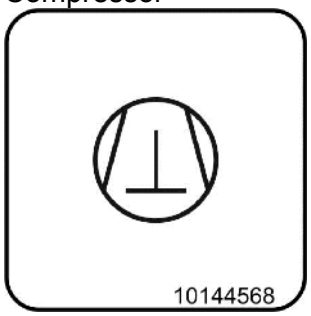


10086507

Water pump

10158389*

Compressor

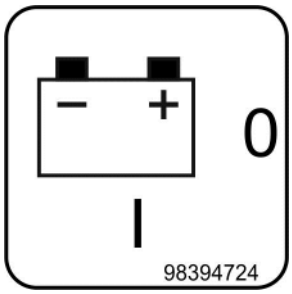


10144568*

CE signs

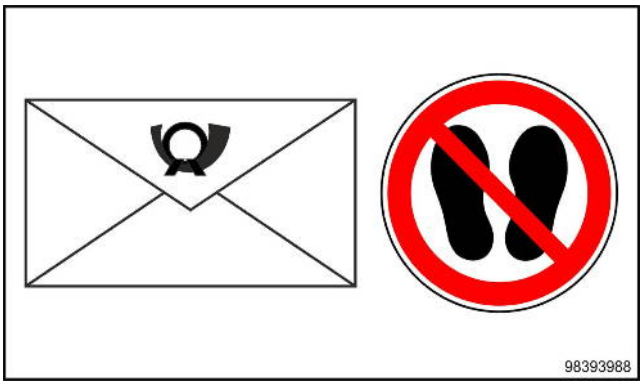
10148919

Main switch battery
on - Off



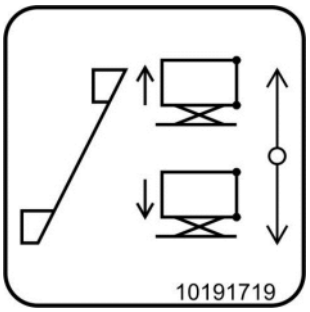
98394724*

Delivery note box - No tread surface



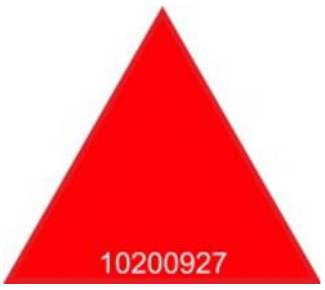
98393988

Stowing box
Up - 0 - Down



10191719*

EASy 200 display



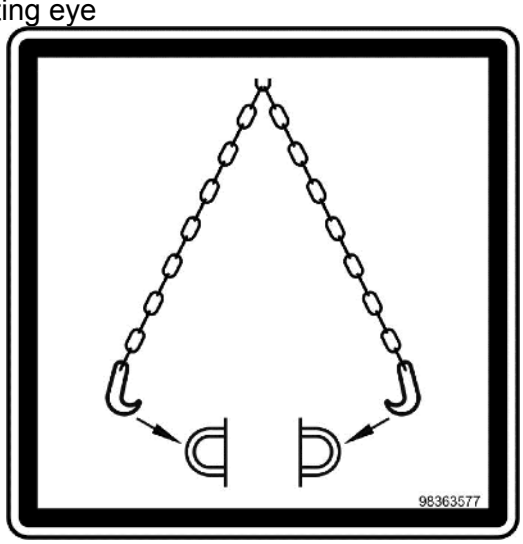
10200927*

Underride protection device

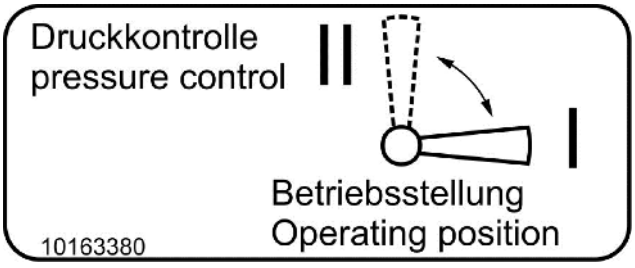
98361549

* Only use with appropriate machinery

Lifting eye

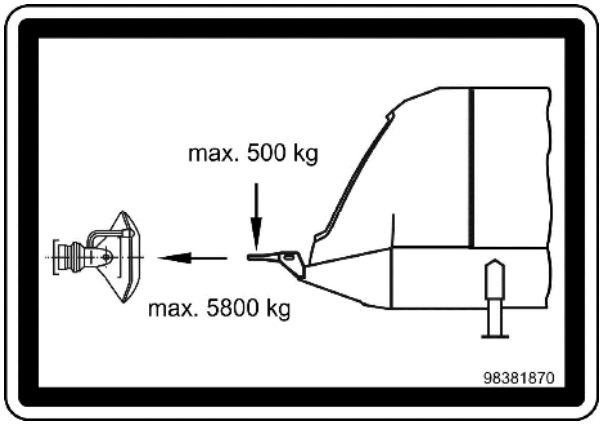


98363577

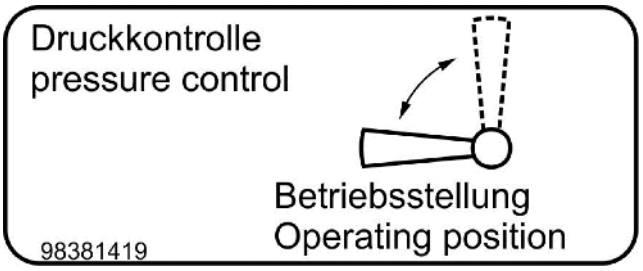


10163380

Attention! Exemplary values for:
Horizontal trailer load
Vertical trailer load



98381870



98381419[1]

* Only use with appropriate machinery

[1] = For stationary concrete pumps only

1.7 Control, warning and steering elements (Diesel engine)

Fig. 1

Description of (Fig. 1)

1- Control panel

Description of (Fig. 2)

2- Pressure gauge: Hydraulic oil pressure - agitator (auxiliary drive)

3- Shut-off valve to pos. 4

4- Pressure gauge: Hydraulic oil pressure - concrete pump

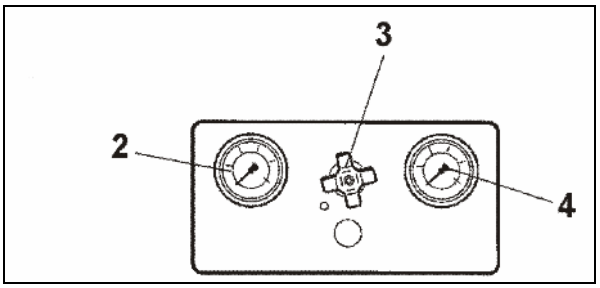


Fig. 2

1.7.1 Control panel (Fig. 3)

1- Fuel level warning light

2- Agitator suction operation on/off illuminated button

3- Agitator pumping operation agitator on/off illuminated button

4- Concrete vibrator on/off illuminated button

5- Concrete pump suction operation illuminated button

6- Concrete pump off illuminated button

7- Concrete pump pumping operation illuminated button

8- EMERGENCY STOP

9- Water pump

10- Compressor

11- Power outlet for remote-control cable, dummy plug

12- Hydraulic oil temperature indicator

Fig. 3

1.7.2 Cable remote control (Fig. 5)

1- Light: Remote control active

2- Emergency Off button

3- Illuminated button: Concrete pump, suction

4- Button: Concrete pump off

5- Illuminated button: Concrete pump, pumping

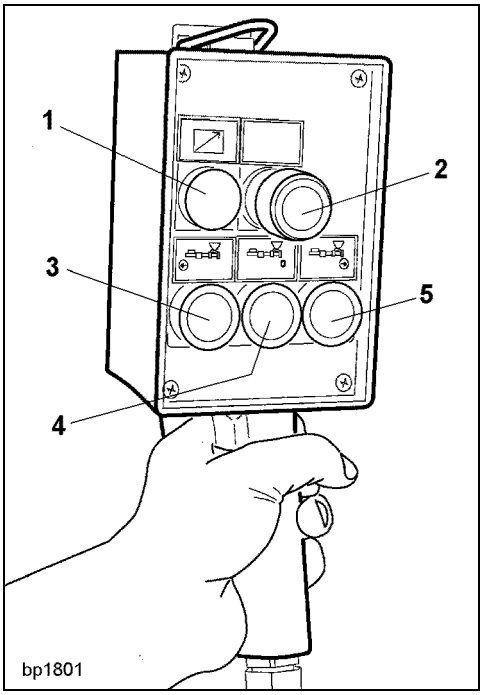


Fig. 5

1.7.3 Control panel arrangement (Fig. 6)

1- CAT control

INFORMATION

The SP 2800 with 168 kW is delivered with the CAT control system (Fig. 4).

00028_cat-cpanel-tsc-8

Fig. 4

Fig. 6

1.7.4 IOPU TIER 4 CONTROL PANEL (Fig. 7); (Fig. 8)

1. Yellow "fault/warning indicator" light indicates errors reported via the CAN bus.

2. Red "fault/warning indicator" light indicates a shutdown reported via the CAN bus.

3. "Regeneration request" button: The operator can use this button to send a regeneration request to the motor for the purpose of carrying out an active regeneration, see chapter 1.7-5.

> **INFORMATION**
>
> Note that regeneration occurs automatically with the SP 1800 CAT TIER 4i and 2800 TIER 4f.

4. "Regeneration suppression" button: The operator can use this button to send a signal to the motor to instruct it to suppress an active regeneration, see chapter 1.7-5.

5. "Enter" button: The operator can use this button to select settings in the settings screen for adjustments and saving.

6. "Right arrow" button: The operator can use this button to scroll through error lists in measurement display screens and through settings in the settings screen.

7. IOPU control station connector: Connects the IOPU control station to the motor wiring harness.

8. "Left arrow" button: The operator can use this button to scroll through error lists in measurement display screens and through settings in the settings screen.

9. "Back" button: The operator can use this button to move between various screens and to quit the displayed settings without saving.

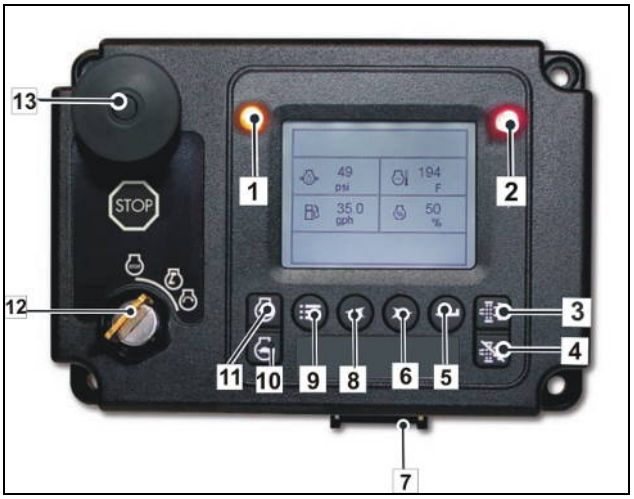


Fig. 7; IOPU Tier 4i, Stage IIIB, control panel

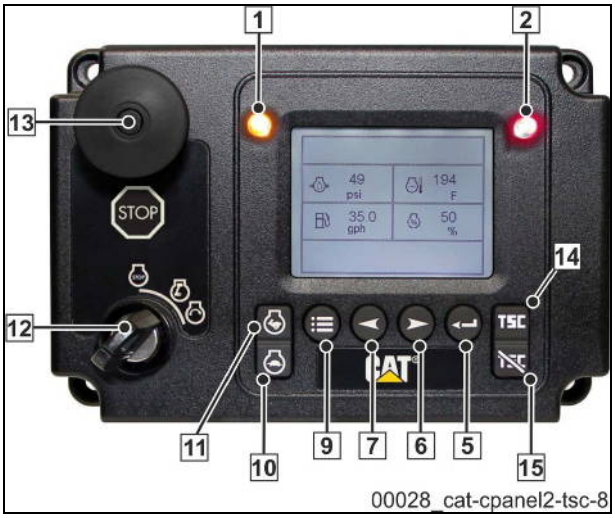


Fig. 8; IOPU Tier 4f, Stage IV, control panel

10. The “Speed reduction” button : The operator can use this button to reduce the speed of the motor via the CAN bus by using TSC1. Pressing the button displays the desired motor speed screen to the operator. ("Reduction step" = 25 rpm, adjustable standard value; return time "Hold" = 200 rpm, adjustable standard value)

11. The “Speed increase” button : The operator can use this button to increase the speed of the motor via the CAN bus by using TSC1. Pressing the button displays the desired motor speed screen to the operator. ("Increase step" = 25 rpm, adjustable standard value; ramp-up

time "Hold" = 200 rpm, adjustable standard value)

12. Key-operated switch: The operator starts the motor by turning the key to the "Start" position.

13. "Motor shutdown via control panel" button. Switch actuation by the operator. To shut down the motor, the switch must be pushed in. Pulling out the switch causes the release for starting via the key-operated switch.

Only applies to Fig. 8:

14. Switches on the TSC function

15. Switches off the TSC function

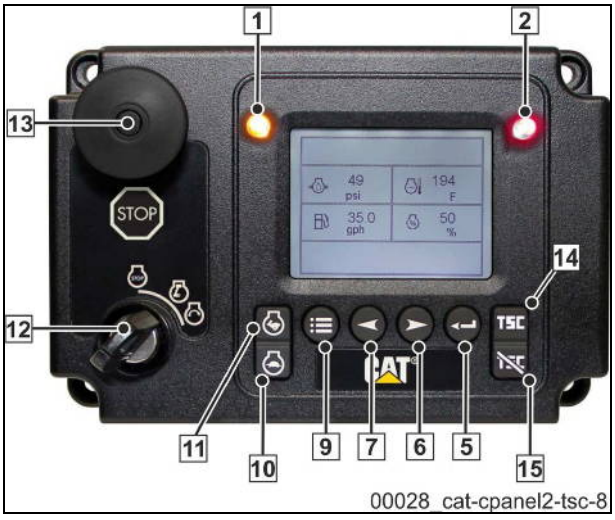


Fig. 9; IOPU Tier 4f, Stage IV, control panel

1.7.4.1 Explanation of the TSC function

The TSC function allows you to change and save the motor's rotational speed on the control panel.

The function is the equivalent of a cruise control in a passenger vehicle.

As long as the control is active, the configured value will remain saved and can be restored after any potential interruptions by using the "TSC" button (14).

As soon as the control is switched off using the key-operated switch (12) (Fig. 9) that saved value is deleted.

- ☛ To configure the rotational speed, enable the TSC function by pressing button 14 once,
- ☛ The current rotational speed is then shown on the display,
- ☛ Change the rotational speed with the help of buttons 10 and 11 (snail and hare) see 10. The "Speed reduction" button and 11 The "Speed increase" button .

1.7.5 "Regeneration" work instruction

INFORMATION

Engine power failure!

Observe the possible automatic regenerations of the diesel engine.

The motor speed can be lowered automatically or the diesel engine will be switched off in pumping operation.

Carry out the regeneration in due time according to the motor manufacturer regulations.

ATTENTION

Machine parts or the entire machine can be destroyed.

Follow the following description carefully for the manual “regeneration”.

Implementation of regeneration for Caterpillar motor CAT C7.1 Acert Tier 4i.

1. The degree of clogging is displayed on the Caterpillar display, item 0 (Fig.; 10)

(Bar diagram or percentage)

(Example, 50% clogging in this case)

2. Automatic regeneration of the diesel particle filter (DPF) can already be carried out from a degree of clogging of 30%.

3. Automatic regeneration of the diesel particle filter (DPF) is required from a degree of clogging of 80%; a control light appears on the display.

4. At a degree of clogging of 100%, the following lights up on the display:

 and  .

5. Further use without regeneration will result in the motor performance being independently reduced.

6. If the degree of clogging increases further, then a warning buzzer sounds in addition to the indicators.

7. After the warning buzzer has been sounding for 5 minutes, the motor switches to idling speed.

8. Within the next 10 minutes of idling, regeneration must be carried out.

9. If generation is not carried out, then the motor is automatically locked and shuts down. On restarting, the motor shuts down again after 30 seconds and can only be unlocked again by authorised service technicians.

10. If, despite these locks, the motor continues to be run, then this can lead to the DPF being replaced.

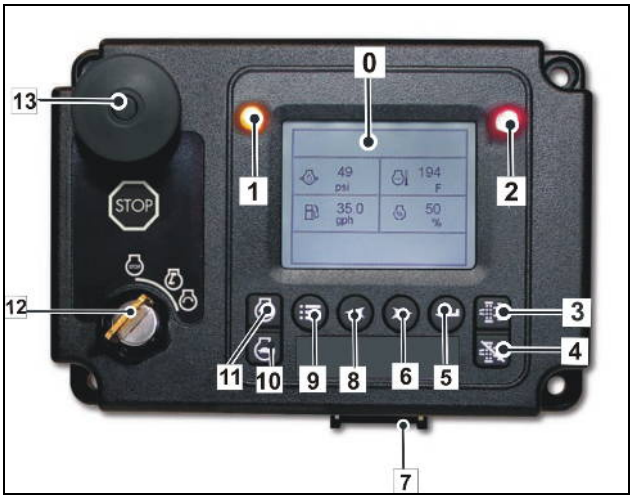


Fig.; 10; control panel

11. Start of regeneration (from point 3 at the latest).

    a. Allow the machine to idle unencumbered.
    b. Switch on the upgraded key-operated switch (1) (Fig. 12).
    c. Press  button for at least 3 seconds.
    d. Regeneration starts within the next 10 minutes (the motor may still have reach operating temperature, for example).

12. Carrying out regeneration

    a. The motor carries out regeneration independently.
    b. Do not attempt to carry out any machine functions during regeneration.
    c. Regeneration must not be interrupted.
    d. The process can last up to approx. 30 minutes.
    e. The motor independently adjusts its speed.

13. End of regeneration

    a. The indicator goes out. Attention, sometimes the indicator goes out on starting regeneration.
    b. The clogging indicator is set to "0", this means that the black bar is no longer visible on the display.
    c. Any increases in motor speed return to idling.
    d. Turn back the key-operated switch.
    e. Start working operation.

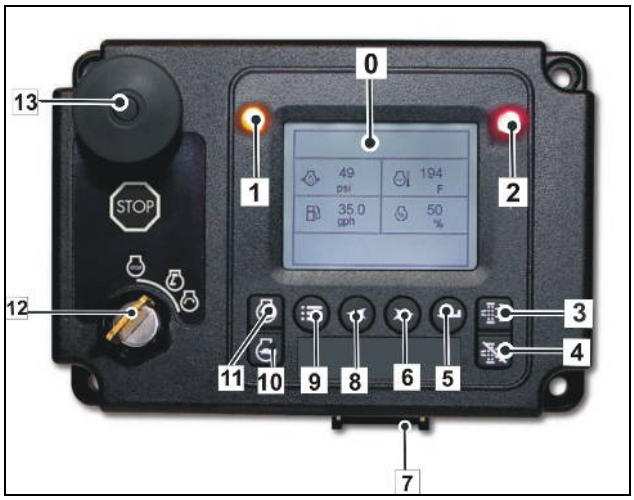


Fig. 11; control panel

Fig. 12; the “Regeneration” key-operated switch

Descriptions of Fig. 13

1- Locking bar for grid assembly filling-in hopper

2- Cleaning cover of the rock valve

3- Lubrication point

4- Locking bar for outrigger

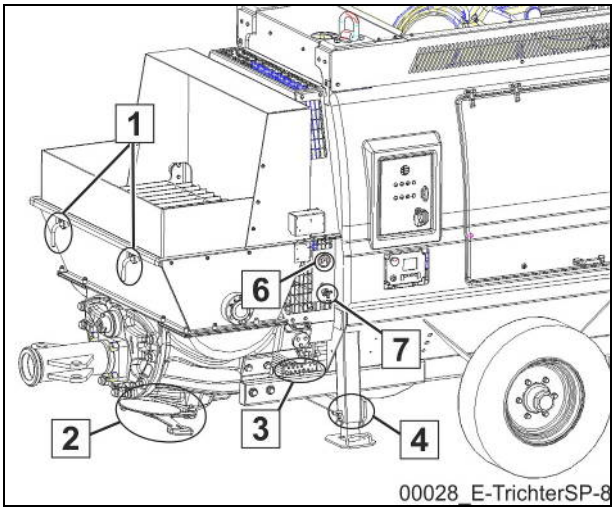


Fig. 13

Descriptions of Fig. 14

1- Hydraulic oil filter

Descriptions of Fig. 15

2- Breather screw on the water separator

A warning is issued when the water level in the fuel/water separator is too high.

Drain water from the fuel system:

- Connect a suitable hose to the draining device
- Open the drain valve
- Turn the drain valve anti-clockwise.
- Loosen the breather screw 2
- Drain the fuel from the reservoir
- Remove the hose from the drain valve
- Tighten the breather screw
- The reservoir must be drained daily.

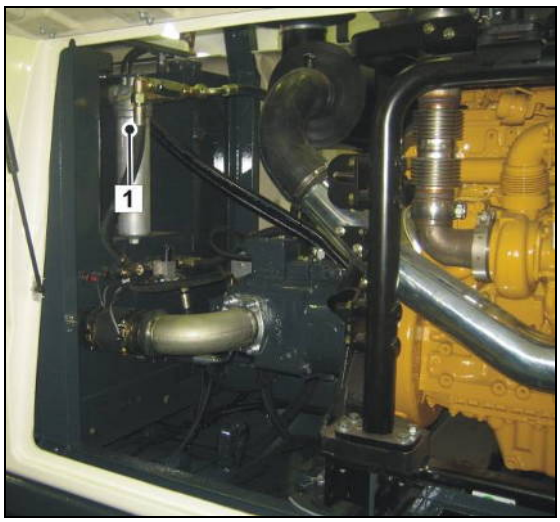


Fig. 14

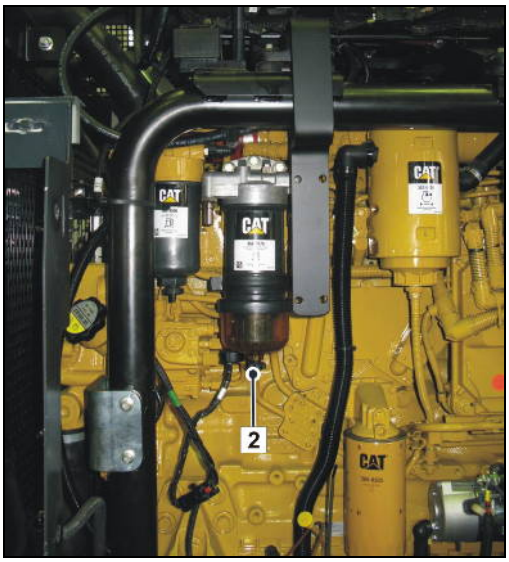


Fig. 15

Description of Fig. 16

3- Output regulation of the concrete pump

Description of Fig. 17:

1- Output regulation of the concrete pump

2- Fuel fine filter

3- Fuel coarse prefilter

Descriptions of Fig. 18

4- Fuel coarse prefilter in detail

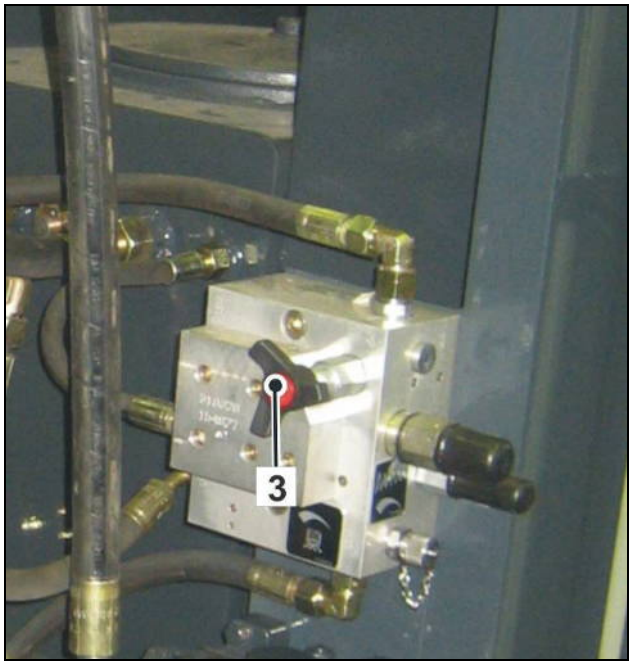


Fig. 16

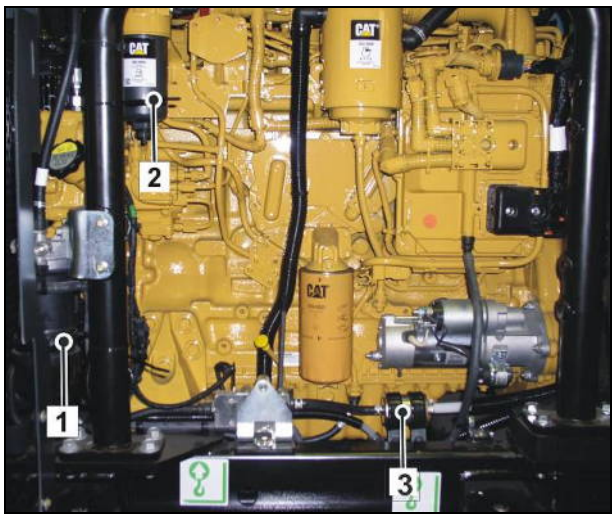


Fig. 17

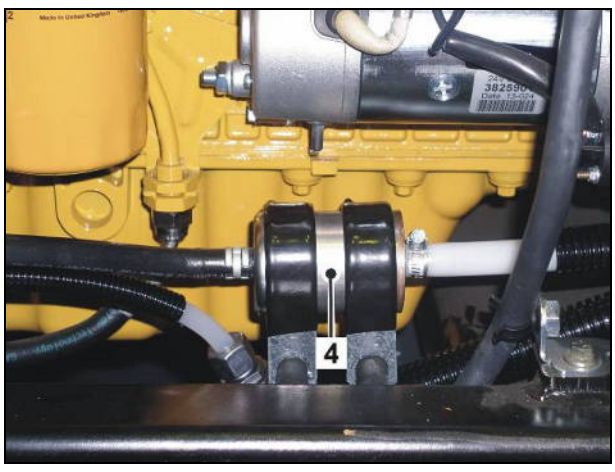


Fig. 18

1.7.6 Main switch for starter batteries

The main switch for the starter batteries is located on the left in the direction of travel for the machines described in these operating instructions.

When working on the electrical system, performing maintenance and conducting repairs, your machine's power supply must always be switched off via the main switch (2) (Fig. 19) for the starter batteries.

To do this, turn the main switch for the starter battery (1) (Fig. 21) towards the right to the "0" position.

1.7.7 Forced switch-off of motor

Interruption of the run-on function!

The motor can be switched off immediately via a forced switch-off in case of an emergency.

To do so, actuate the button (2) (Fig. 20).

The button is located to the left in the direction of travel, next to the starter battery.

Only use the interruption of the run-on function (forced switch-off of motor) in case of emergency.

ATTENTION

Severe material damage to motor!

Repeatedly forcing the motor to switch off at short intervals can cause severe motor damage.

If it is not an emergency, do not shut down the diesel engine at full load but rather run it at idle for a few minutes to equalise the temperature.

Failure to observe these instructions may cause severe motor damage from overheating, especially with turbo-charged motors.

For certain motors, switching off the motor may be delayed at operating temperatures that are too high; motors will continue running for several minutes!

This automatic run-on function shown on the display. The run-on function must not be interrupted during normal operation (no emergency).

Observe operating instructions of the motor manufacturer!

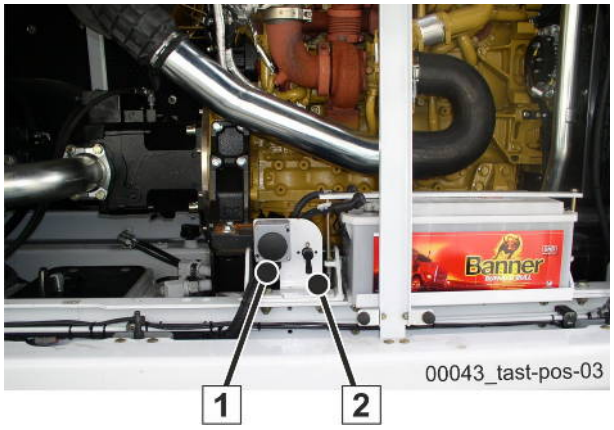


Fig. 19; position of the main switch (similar to illustration)

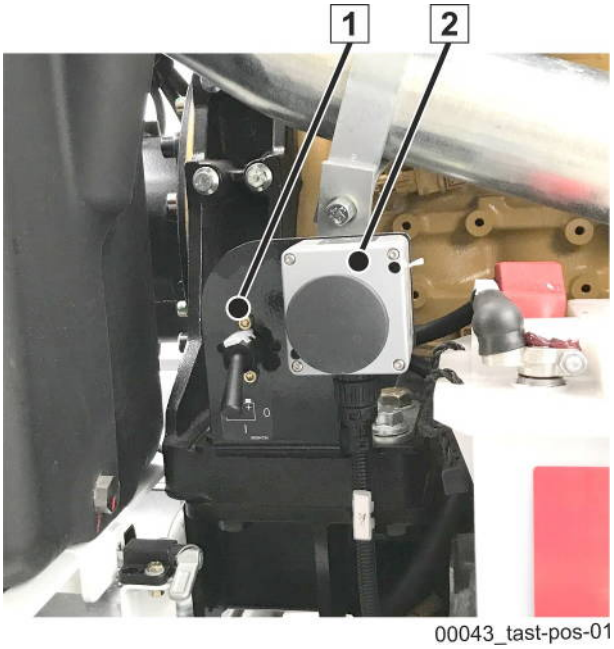


Fig. 20; main switch for starter batteries and button for forcing motor to switch off.

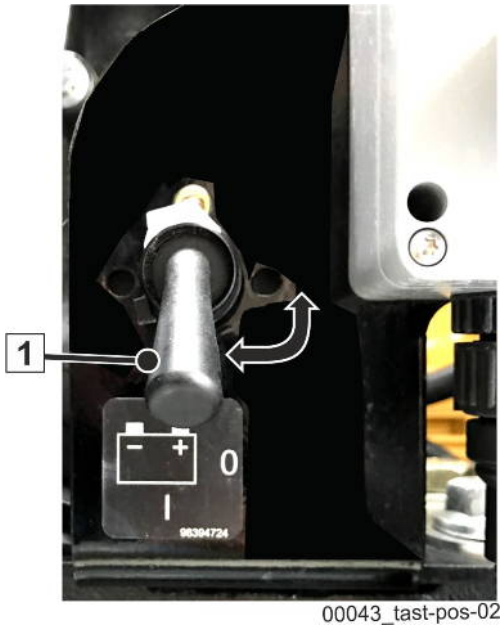


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Fig. 21; turn main switch for starter batteries to the right.

Presentation 1

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Radio remote control 5

Special equipment 6

Appendix 7

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Bau- und Baustoffmaschinen

Safety Manual

Concrete delivery and placing machines

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Concrete delivery and placing machines

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Table of contents

Concrete delivery and placing machines

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.

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.

1.1.19 Place of work, working area, danger zone

1.1.19.1 Mobile machines

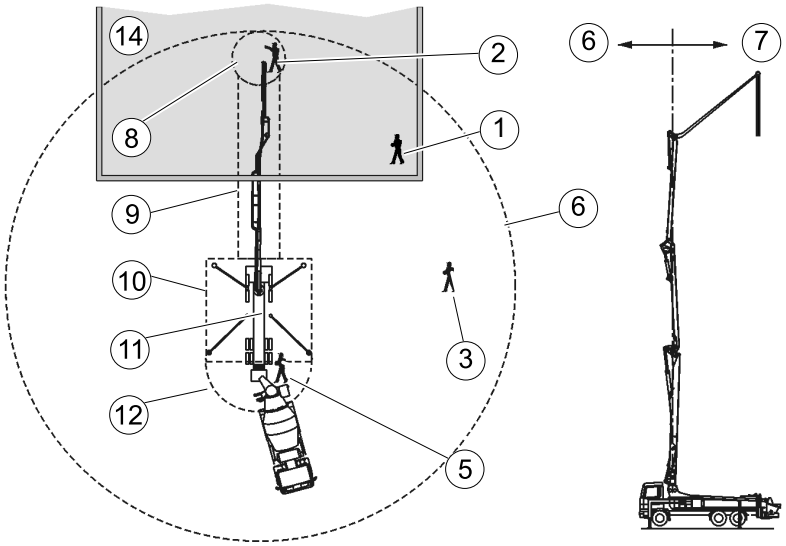


Figure 1: Example

1.1.19.2 Stationary machines

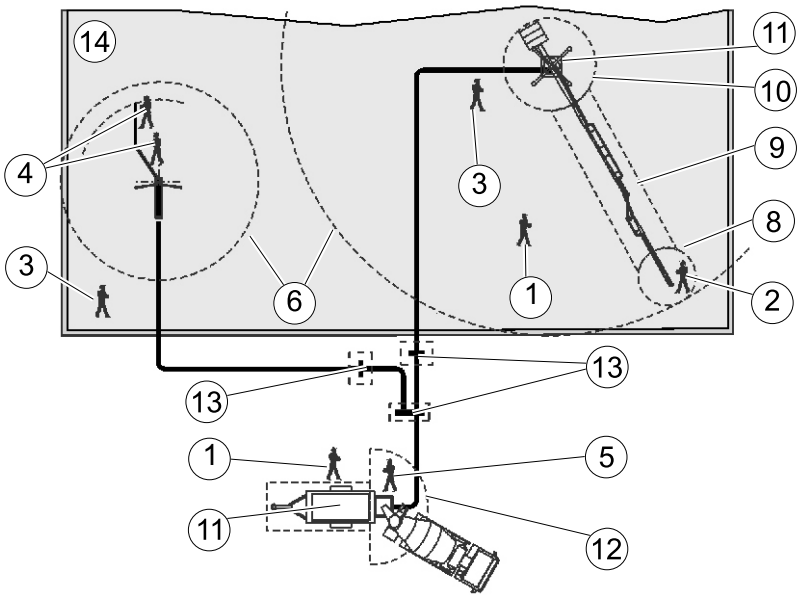


Figure 2: Example

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

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. 22)*

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 hoseman 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.

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 safetyoriented 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 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.

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:

  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

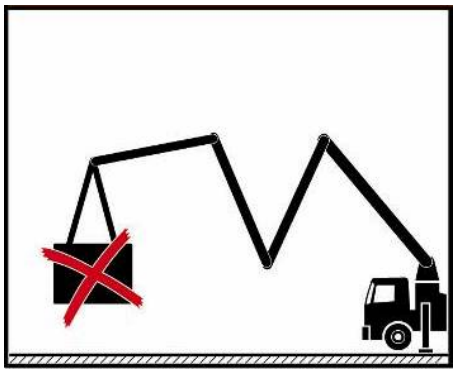
Improper use is defined as use which is not described in or goes beyond that described in the “Designated use”, *(Designated use P. 18)* section. The manufacturer accepts no liability for damage resulting from such use. Some examples of conceivable improper uses are given below.

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.

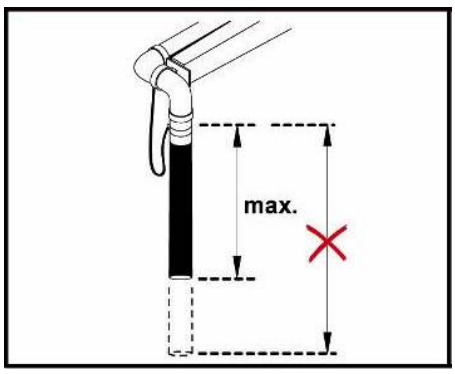
1.3.5 Extending the placing boom and end hose

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. 43)*

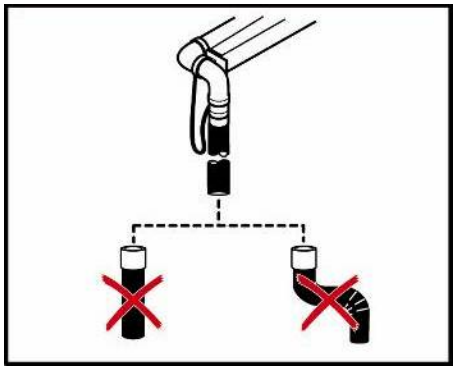
When using a longer end hose, the diameter of the danger zone also increases. *(End hose P. 43)*

End hoses with a length of more than 4 m must not be guided by hand.



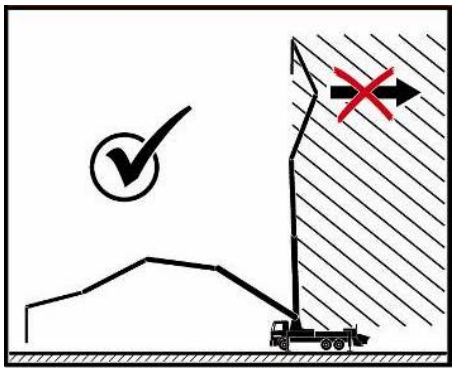
1.3.6 Impermissible end hose

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

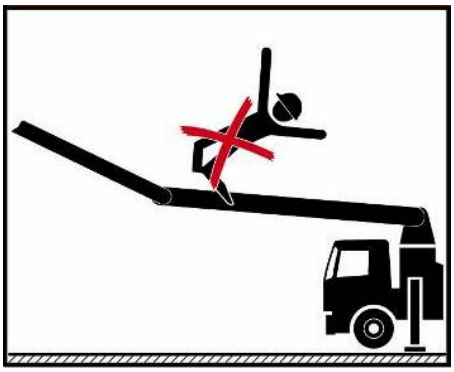
During pumping operations, the end hose must not be moved backwards beyond the vertical axis of rotation of the placing boom.



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 (concrete 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 concrete 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.

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.

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
	Safety helmet The safety helmet protects your head, e.g. from falling concrete or parts of delivery lines if lines burst. (DIN EN 397; Industrial safety helmets)
	Safety footwear Safety footwear protects your feet from falling objects and any protruding nails. (EN ISO 20345; Safety footwear for professional use; category S3)
	Hearing protectors Hearing protectors protect your ears when in the vicinity of the machine against any noise that arises there. (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)

Symbol	Meaning
	Protective gloves Protective gloves protect your hands from aggressive or chemical substances, mechanical effects (e.g. impact) and from cuts. (DIN EN 388; Protective gloves against mechanical risks; Class 1111)
	Protective goggles Protective goggles protect your eyes from injuries associated with concrete spatter and other small particles. (DIN EN 166; Personal eyeprotection - Specifications)
	Safety harness 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. (DIN EN 361; Personal protective equipment against falls from a height - Full body harnesses; Category III)
	Respiratory protection and face mask 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). (DIN EN 149; Respiratory protective devices - Filtering half masks to protect against particles - Requirements, testing, marking; Class FFP1)

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.

2.2.2 Discharge voltage pattern

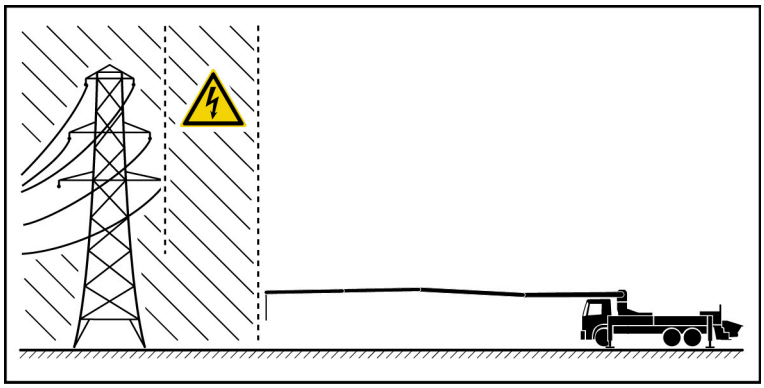
In the event of a flash over, what is known as a “discharge voltage pattern” is formed in the vicinity of the machine. The voltage decreases from the inside to the outside in this discharge voltage pattern. If you step inside this discharge voltage pattern, you will bridge different potentials. This will cause a voltage corresponding to the potential difference to flow through your body.

2.2.3 Clearances

Maintain a minimum clearance from highvoltage 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 highvoltage line switched off.

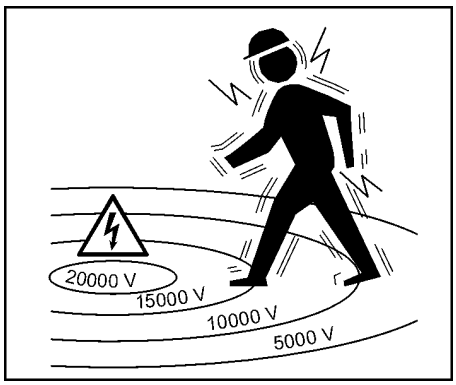
Should you have any doubts, it is better to forgo the use of the placing boom and to lay a separate delivery line, for instance.

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.



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. 32)* and the instructions relating to storms and bad weather *(Procedure in storms P. 45)* 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. 32)* and the instructions relating to storms and bad weather *(Procedure in storms P. 45)* 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. 36)* 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. Noone 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 noone can be injured by the machine tipping over or slipping.

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. 39)* 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.

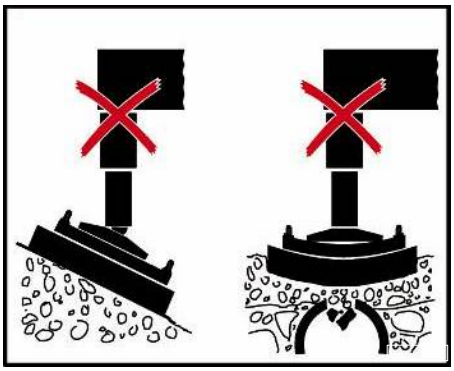
Incidents of overlapping with the working areas of other machines (particularly cranes, other placing booms, etc.) should be avoided as far as possible. If this is not possible, special care and attention is required when setting up and operating machinery. If necessary, you must use a signaller.

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.

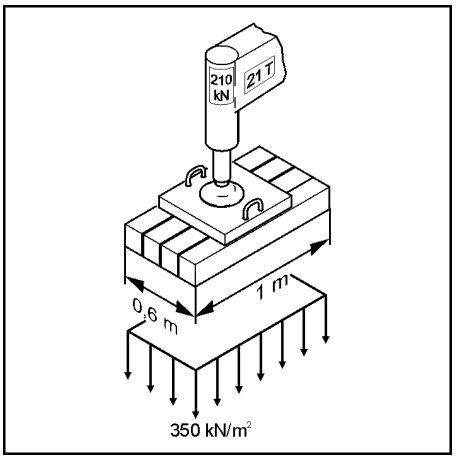
Check the stability of the machine regularly during operation. Interrupt the pumping operation if the machine becomes unstable.

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

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 °. 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

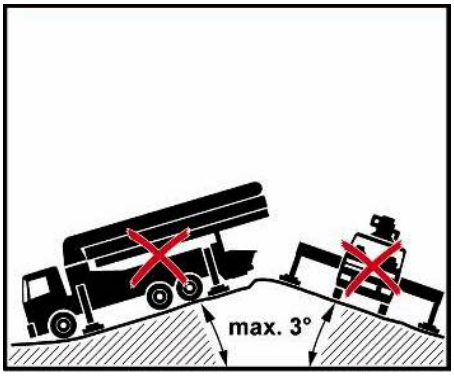
The placing boom must not be raised until the machine has been supported in accordance with the Operating Instructions. There is otherwise a risk of the machine toppling over.

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

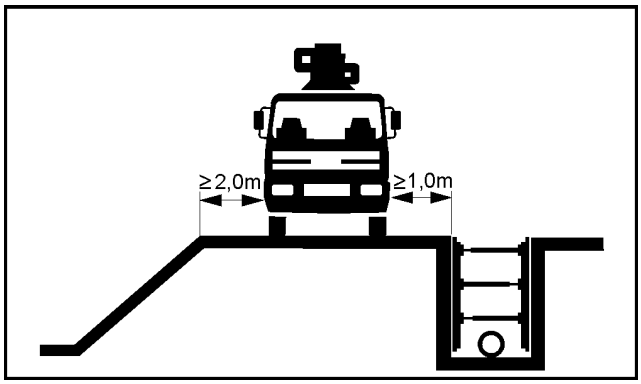
When preparing the machine for driving, you must perform the following tasks in particular:

- 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.

- 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.

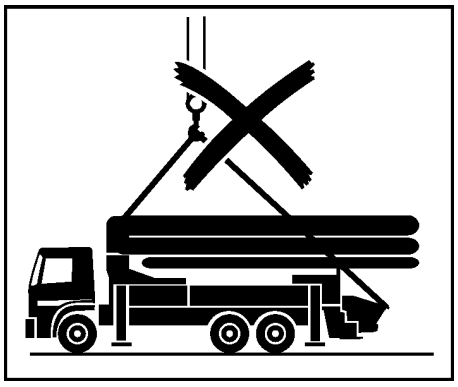
2.4.6 Towing

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 noone 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.

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.).

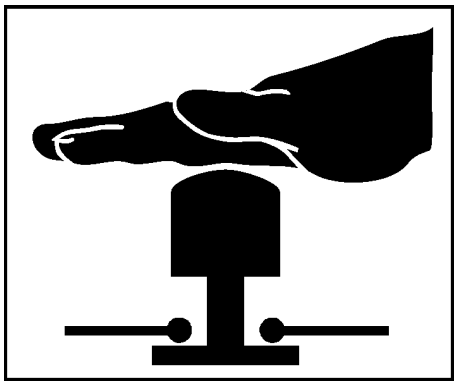
Do not carry out more than one movement at a time. If a movement is stopped, the entire volume of fluid is available for the remaining movements, and can increase their speeds. Depending on the design, it may be the case that carrying out several movements at once (as opposed to carrying out a single 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.

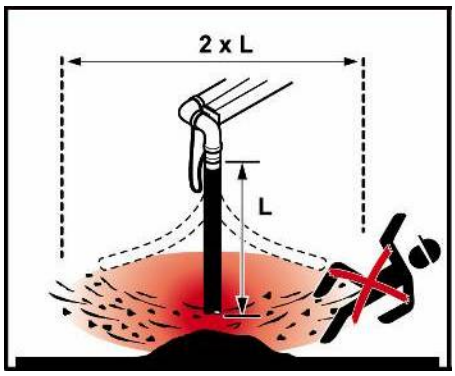
There is a risk that you will damage the truck, truck superstructure or obstacles on the construction site with the placing boom. Under certain circumstances it is even possible to overload or cause damage to the placing boom. Uncontrolled movements may result from the sudden, violent release of the 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. Noone should stand within the danger zone of the end hose.

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 *(Extending the placing boom and end hose P. 21)* also increases.

End hoses with a length of more than 4 m must not be guided by hand.

There is a risk of injury to the hoseman if the end hose becomes caught in the reinforcement and suddenly jumps 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.

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

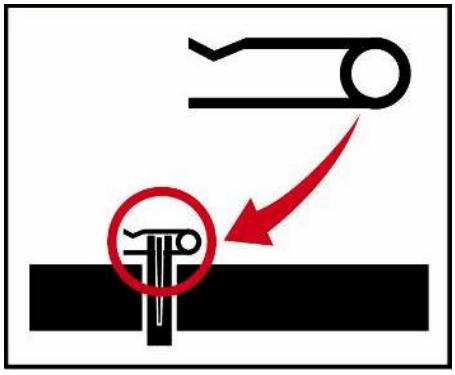
2.6.1 Suitable delivery lines

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 pressure and composition of the concrete, 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.

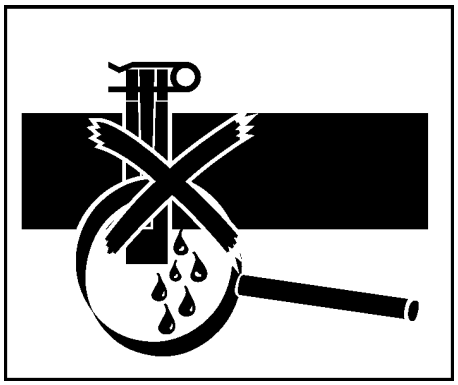
2.6.2 Securing delivery lines

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.

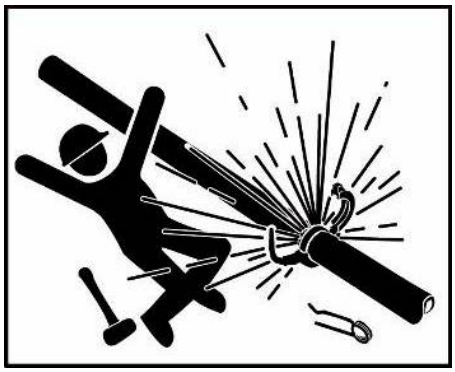


A properly cleaned delivery line is the best insurance against the formation of blockages. Blockages increase the risk of accidents. Never attempt to push through a blockage (e.g. by increasing the delivery pressure, using compressed air, etc.). There is a risk of death from the delivery line bursting 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.

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

Noone 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.

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.

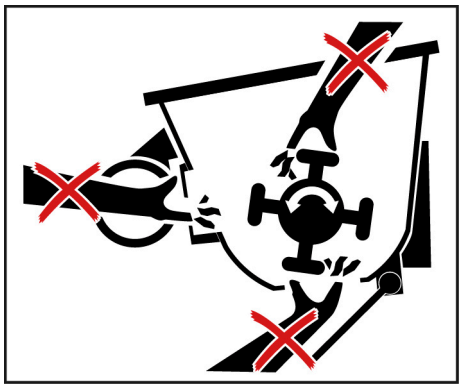
As a general rule, you must carry the remote control so that no control elements are activated unintentionally. If your attention is drawn away from the machine (particularly when changing place of work), you must switch off the remote control.

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.

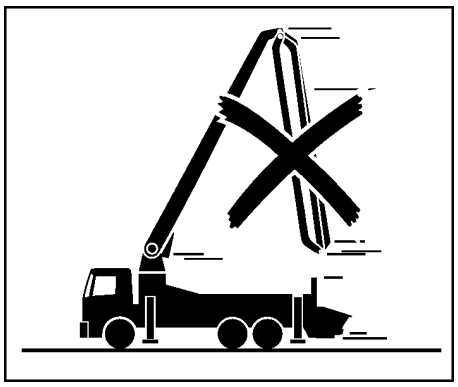
Make sure that no-one stands between the approaching truck mixer and the machine. There is a risk of crushing between the truck mixer and the machine.

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.



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.

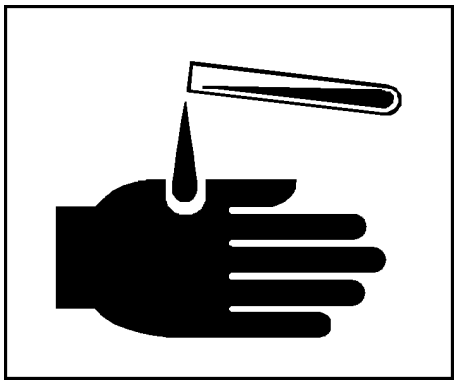
Do not reach into the hopper or any other moving machine components. This rule must also be followed when you are opening the outlet on the bottom of the hopper. Do not remove the grille.

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.

- 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. 31)*.

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.

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.

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. 64)* 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 shortcircuit 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.

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.

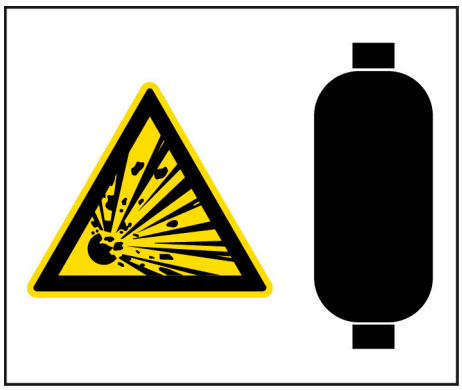
An electric shock (possibly with fatal consequences) may be the result of touching machines with electric motors or contact with other electrical cables if the electrical connection has not been made properly or the supply cable is damaged.

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.

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

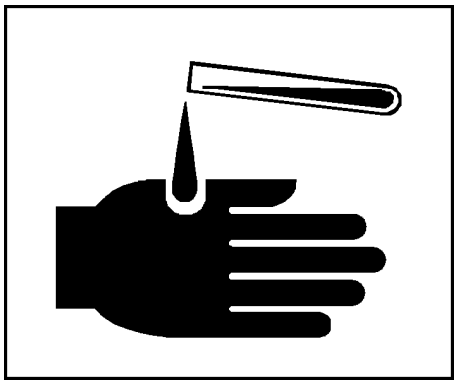
Vehicle exhaust gases contain constituents that can be deadly or carcinogenic. Operate internal combustion engines and fuel-operated heating systems only in adequately ventilated premises. Before starting up the engine in enclosed spaces, make sure that there is adequate ventilation and direct the exhaust 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.



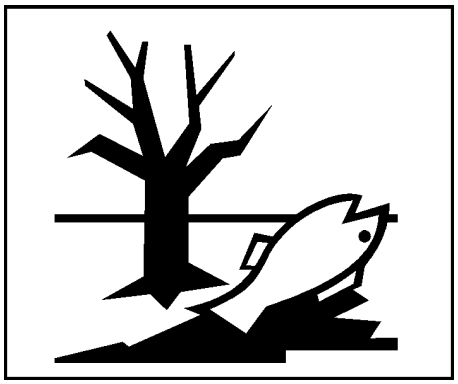
Take care when handling toxic and caustic functional fluids (brake fluid, battery acid, water glass, concrete set accelerating admixtures, cement, etc.). Building materials containing cement have a highly alkaline effect when they react with water (and also with perspiration). Admixtures are toxic and 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).

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.

Index

In this chapter, you will find the most important keywords and the number(s) of the page(s) on which they appear. This index of key words is in alphabetical order.

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DRIVING OPERATION

⚠	**OBSERVE SAFETY MANUAL**

INFORMATION

Trailer concrete pumps may only be driven in open road traffic with the relevant permission.

The features of the concrete pump with a chassis frame approved for road traffic requires a supplement of the operating instructions, if necessary.

This supplement is provided as separate publication, in case of need.

- The driver of the tractor must have the necessary driving licence. Observe the regulation in the country of use.

- Check the driving safety of the machine before each set-off.

  This includes:

  - Tyre pressure according to table

  - Function of the lighting

  - Function of the brake system

  - Perfect chassis frame maintenance

- Stow equipment and accessories safely.

ENVIRONMENTAL AND ACCIDENT PREVENTION

- Check the tightness of the reservoirs.

  Empty fuel tank and oil box, if necessary.

- Secure the outrigger against independent extension.

* = at 80 km/h chassis frame

AIR PRESSURE TABLE

Tyre size	Air pressure (bar/psi)
6.50 R 16 C	5.0 / 70
7.00 R 16	6.0 / 85
7.50 R 16	6.5 / 90
8.25 R 16	7.0 / 95
8.50 R 17.5	6.0 / 85
9.00-20.14 PR	7.75 / 110
10 R 22.5	7.0 / 95
275 / 70 R 22.5	7.0 / 102
445 / 45R 19.5	9.0 / 130

TRANSPORTING PEOPLE AND GOODS

Mobile concrete pumps and placing booms are work machines.

They may not be used for the transport of people and goods.

This also applies for the transport of concrete in the filling-in hopper of the concrete pump.

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.

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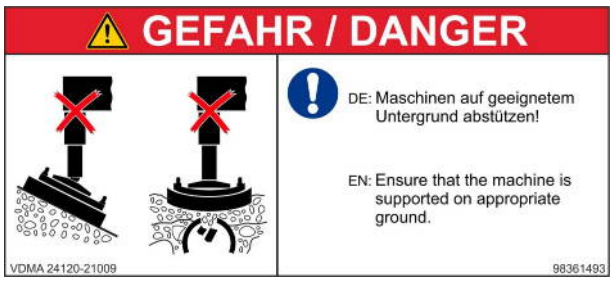
SELECTION OF THE INSTALLATION SITE

⚠	**OBSERVE SAFETY MANUAL**

The machine operator must select the site so that:

- Stability is ensured;



- The truck mixer can reach the concrete filling hopper without difficulty;

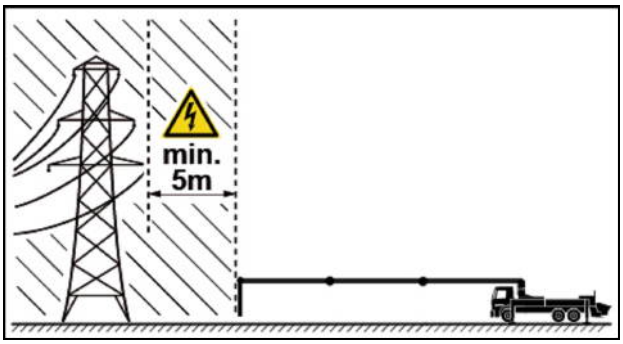
- The range of the placing boom can be optimally deployed;

- Moving the machine is preferably not required;

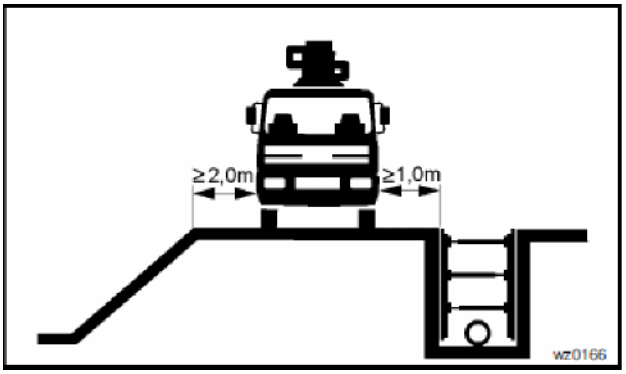
- Sufficient ventilation is provided (exhaust fumes, overheating, fire hazard);

- Collisions with other construction equipment (cranes, diggers, etc.) are not possible;

- The prescribed safety distance from overhead transmission lines is adhered to under all placing boom positions;



- The prescribed safety distance of the machine from excavations is adhered to;



- Construction site traffic or road traffic is not hindered.

Secure the installation site according to regulations if the machine protrudes into the traffic area (example, Fig. 1).

Fig. 1

If construction site concrete pumps are deployed with high-rise or downwards pumping, a certain amount of "run-up track" should be provided with horizontally laid tubes.

EARTHING THE CONCRETE PUMP WHEN IN PROXIMITY TO TRANSMITTERS

DANGER

Danger to life!

The necessary work may only be carried out by a qualified electrician!

After connecting the earthing cable, the electrician must check the efficacy of the measures by measuring the resistance. If necessary, this test can be repeated during prolonged use.

The earthing of the machine does not offer any protection against a voltage transfer, such as would occur through direct contact with a live conductor or by arc transfer due to impermissible proximity to a transmission line!

Likewise, it does not protect against a lightning strike!

As described in our SAFETY MANUAL, the prescribed safety distance must absolutely be adhered to when working in proximity to transmission lines, or otherwise the line must be taken down.

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

OBSERVE SAFETY MANUAL

Concrete pumps must be earthed when in proximity to transmitters, in order to dissipate electrostatic charge.

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

As a rule, a stainless steel screw M12 with nut is located on the left-hand vertical spar 1 (Fig. 1) of the rock valve support (screw inside, bolt outside). See example Fig. 1.

Depending on the respective design of the machine, this screw can be located either above or below the horizontal spar 2, or be installed at the right-hand side of the machine.

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

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

INFORMATION

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

The earthing is carried out as described in our SAFETY MANUAL.

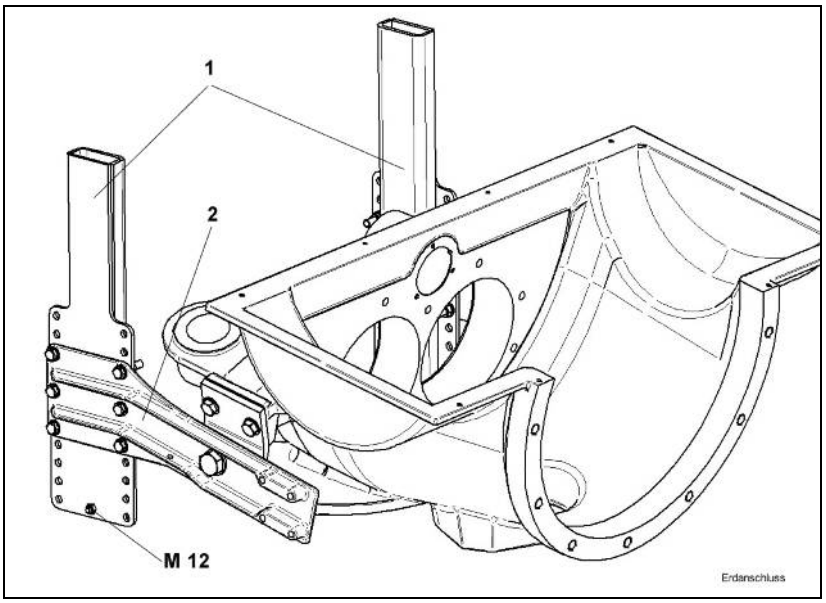


Fig. 1

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ELECTRIC JUNCTION*

OBSERVE SAFETY MANUAL!

DANGER

Only authorised personnel may connect, commission and disconnect electrically driven machines.

Only these authorised personnel may open the switch cabinet.

The operator must initiate the CORRECT connection of the machine.

In Germany, a special feed point is required according to VDE 0100 § 55 (e.g. construction site power supply distributor with ground fault interrupt).

Observe regulations in the country of use.

INSTRUCTIONS FOR ELECTRICAL TECHNICIANS

1. STANDARD EQUIPMENT

Protection class: IP 54

Operability during mains voltage fluctuations: ISO Class B

When connecting to the supply line, ensure that a right rotating field is present.

Protection against radio and television reception disturbances: No disturbances with asynchronous squirrel-cage motors

Hydraulic switching diagrams: see sign in terminal box

Other protection classes, voltage tolerances, etc. available on request.

2. SAFEGUARD AND CONDUCTOR CROSS-SECTION:

ELECTRIC MOTOR			SUPPLY LINE max. 100M	
kW	V	A	mm²	Fuse (A)
30	400	55	4x 16	63
45	400	80	4x 25	100
55	400	100	4x 35	125
75	400	135	4x 50	160
90	400	160	4x 70	200
110	400	195	4x 95	224
132	400	230	4x120	250
160	400	280	4x185	315
200	400	350	4x240	400
250				

* = optional

3. CHECK ROTATIONAL DIRECTION OF THE ELECTRIC MOTORS (CONTROL WITHOUT PHASE SEQUENCE MONITORING)

Check rotational direction of the electric motors prior to commissioning the machine.

This is marked on new machines by arrows on the fan blowers of the motor.

The rotational direction is always clockwise on the ventilators (clockwise direction). See Fig. 1.

- Switch on motor briefly.

- Check rotational direction by looking at the fan wheel.

- Switch phases if in the wrong direction.

DANGER

ELECTRIC SHOCK

It is imperative to switch main switch into 0-position and pull mains plug.

- Recheck rotational direction.

The rotational direction should always be checked:

- After the connection,

- After repairs to the electrical system,

- After changing the supply cable or parts of the cables,

- After an extension of the supply line by additional cables.

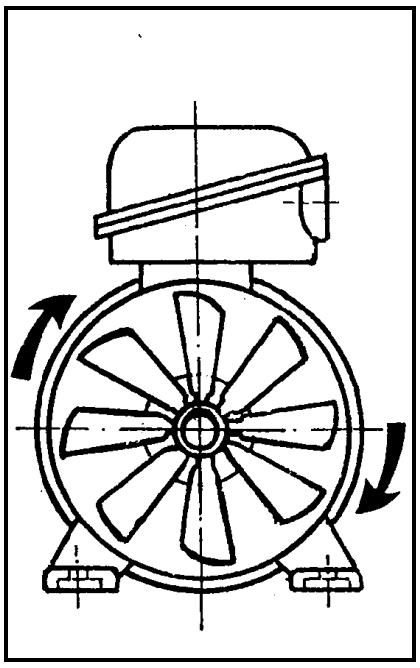


Fig. 1

4. CHECK ROTATIONAL DIRECTION OF THE ELECTRIC MOTORS (CONTROL WITH PHASE SEQUENCE MONITORING)

For machines with a control whereby the phase sequence is monitored, it is not necessary to check the rotational direction.

If the phase sequence is incorrect, the motor will not start.

Have authorised personnel replace the phase sequence.

Repeat the start-up procedure.

EMERGENCY STOP SYSTEM

⚠	**OBSERVE SAFETY MANUAL**

⚠ DANGER

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

Operating with defective EMERGENCY-STOP switch is prohibited.

The machine is equipped with EMERGENCY STOP buttons on the machine and remote control (Fig. 1).

In the event of an emergency or fault, the most important machine functions are immediately interrupted by pressing one of the EMERGENCY STOP buttons.

⚠ WARNING

The motor is not switched off.

Such special equipment having locked control levers also continues to run.

- Switch off the motor or special equipment, if necessary, such as described in the corresponding chapters.

RECOMMISSIONING AFTER EMERGENCY STOP

- Switch all locked selector switches and control levers into the centre or 0 position.

- Remedy the fault.

- Unlock the EMERGENCY STOP button by turning into the direction of the arrow.

- Start the motor, if necessary, and set the (diesel) operating speed.

- Start the desired functions with the corresponding control elements.

The tarnish protection prevents the concrete pump and agitator from starting by simply unlocking the actuated EMERGENCY STOP button.

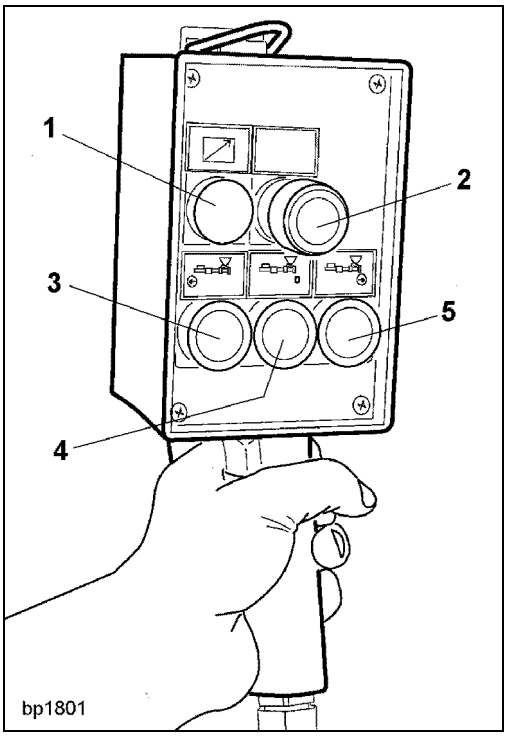


Fig. 1

⚠ CAUTION

Do not hesitate to press the nearest EMERGENCY-STOP switch immediately, if this helps to prevent an accident.

If the machine carries out unwanted movements, directing the machine in the opposite direction can be ineffective if the corresponding hydraulic control valve jams, for example.

Therefore, press the nearest EMERGENCY-STOP switch immediately, if the machine carries out unwanted movements or does not react or reacts incorrectly to control commands.

Please inform potential assistants (e.g. the mixer driver) of the function, task and position of the EMERGENCY-STOP switches on the machine if you leave with the remote control.

3.10 Preparing operational readiness

- Check the hydraulic oil level in the reservoir (1) (Fig.: 1).

The oil box is located at the front left in the direction of travel.

The oil level must be visible at the top of the sight glass (1) (Fig.: 1).

- Top up hydraulic oil, if necessary (See the “Hydraulic fluid and filter” chapter).

The filling neck is located at the top of the reservoir and can be accessed after loosening the upper machine cover (4) (Fig.: 2).

ATTENTION

Material damage caused by hydraulic oil in fuel tank!

The machine can be severely damaged if the tanks for fuel and hydraulic oil are mixed up.

Do not mix up the filling neck for hydraulic oil with the fuel filling neck on the opposite side!

- Ensure that all oil-filled aggregates are tight.
- Check oil levels and top up with oil, if necessary.
- Ensure that the screw joints of the hydraulic system are tight and tighten them, if necessary.
- Fill the water box (1) (Fig.: 3) to the top edge of the pumping pistons.

In case of danger of frost, only fill water immediately before concreting.

WARNING

Only open water box with drive at a standstill and while pressure accumulator is discharged (if present).

Then close the water box and secure it with a wedge (2) and clip pin (3).

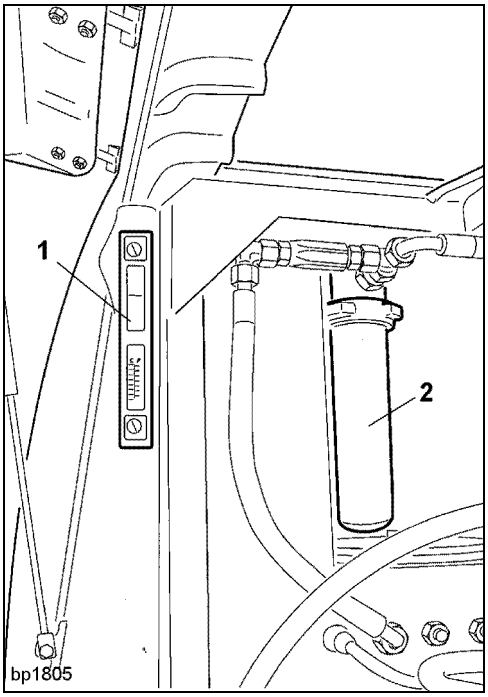


Fig.: 1

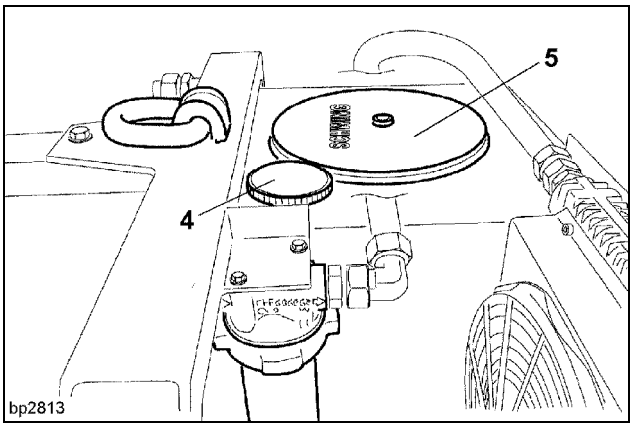


Fig.: 2

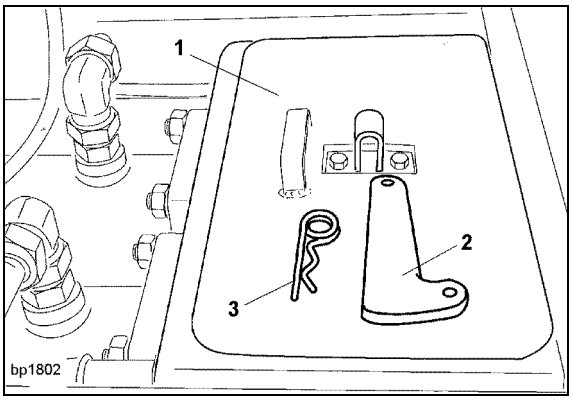


Fig.: 3

- Check whether the ball valve (1) (Fig.: 4) on the concrete pump control block is in the operating position.

The ball valve is **opened** when in operating position (notch in the plug in flow direction).

The ball valve is used to block the concrete pump during repair work.

- Check the grid assembly in the concrete filling hopper.

Two locking bars (1) (Fig.: 5) are used to secure the grid assembly:

Insert **both** locking bars. Otherwise, the concrete would bent or push up the grid assembly. An end limit switch shuts down the agitator and concrete pump when the grid assembly is raised.

DANGER

Danger to life due to open shaft!

The machine may only be commissioned with tightly closed grid assembly.

Shutdowns caused by the end limit switch on the grid assembly are not considered EMERGENCY-OFF shutdowns.

The agitator and concrete pump restart after closing the grid assembly.

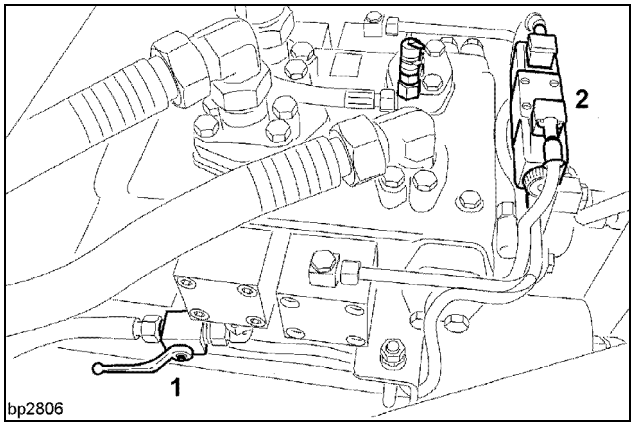


Fig.: 4

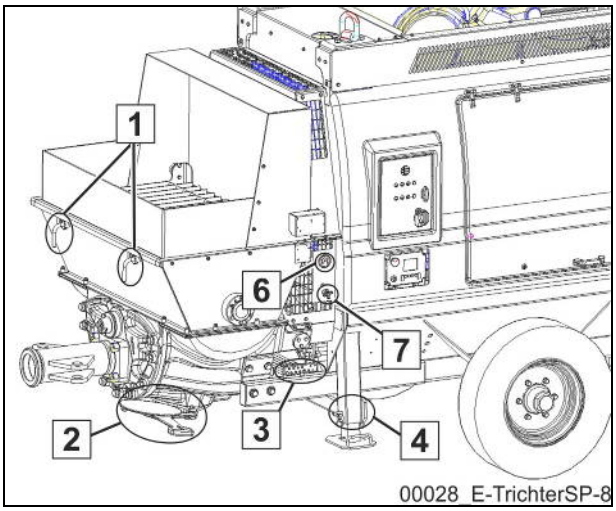


Fig.: 5

3.10.1 Diesel engine

- Carry out the necessary work in accordance with the **motor operating instructions** prior to commissioning the drive motor (check oil level, etc.).

DANGER

Danger to life due to explosion!

Spilled fuel can cause fatal explosions and fires.

Ensure absolute cleanliness!
Only refuel when motor is not running!
Do not spill fuel!

Observe the safety regulations for handling fuel!

- Check the fuel supply and AdBlue filling level.

The fuel tank is located at the front right in the direction of travel.

The level indicator is located directly on the tank (1) (Fig.: 8).

- Open the right-hand maintenance flap of your stationary concrete pump (SP).

INFORMATION

When the "ignition" is on, warning light (1) (Fig.: 6) lights up starting at a remaining volume of approx. 38 l. This quantity is sufficient for an operating time of approx. 45 minutes.

- Top up diesel fuel, if necessary. (For fuel quality, see motor operating instructions).

- The fuel tank holds approx. 250 l.

The filling-in socket is located at the top of the reservoir and can be accessed after loosening the top machine cover.

ATTENTION

Material damage caused by hydraulic oil in fuel tank!

The machine can be severely damaged if the tanks for fuel and hydraulic oil are mixed up.

Do not mix up the filling neck for hydraulic oil with the fuel filling neck on the opposite side!

- Any water present must be drained daily from the settling vessel of the fuel prefilter (3) (Fig.: 7).

Water collects in the lower part of the vessel.

- Position a suitable collection container below the drain cock (3) (Fig.: 7)

- Open the drain cock (3) (Fig.: 7) and collect the escaping water.

Collect fuel mixture and dispose of properly!

- Close the drain cock when pure fuel begins to pour out.

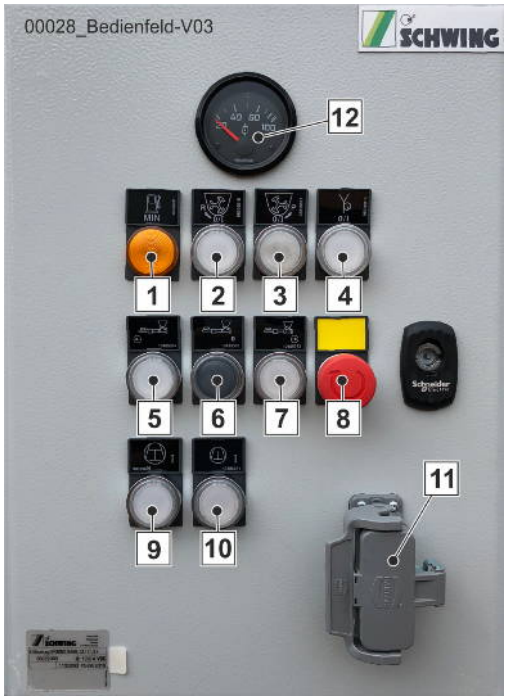


Fig.: 6

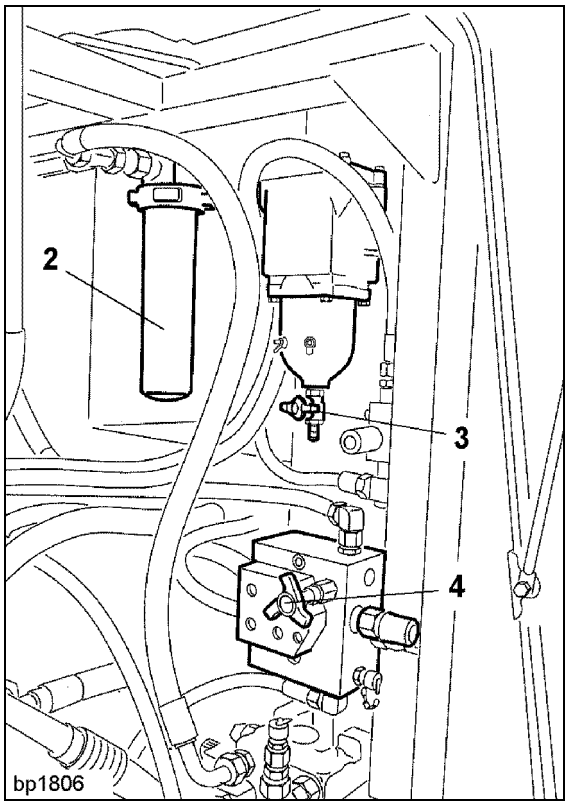


Fig.: 7

The AdBlue tank is installed on the left-hand side in the direction of travel and can be swung out (1) (Fig.: 9).

- In order to access the AdBlue tank, open the left-hand maintenance flap (Fig.: 9),
- Disengage the safety on the slewing arm (2; Fig.: 10 / detailed view 1; Fig.: 11,
- Swing the AdBlue tank out of the machine frame (Fig.: 12),
- Secure the extended AdBlue tank with the split pin provided for that purpose (1; Fig.: 13 / detailed view Fig.: 14).

Proceed in reverse order to swing the tank back in.

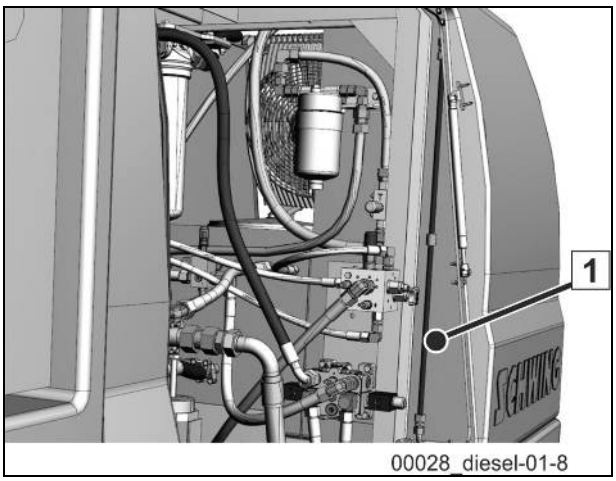


Fig.: 8

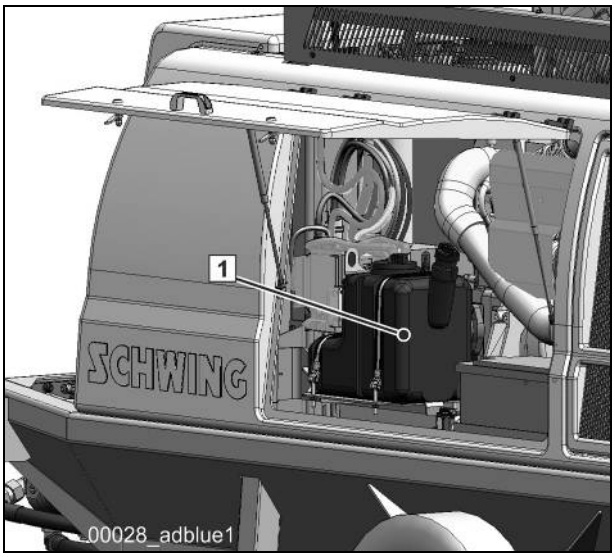


Fig.: 9

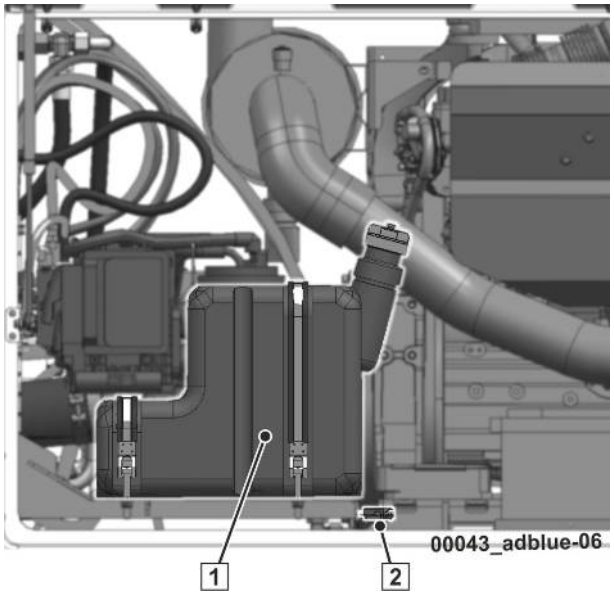


Fig.: 10

Fig.: 11; locked release

Fig.: 12

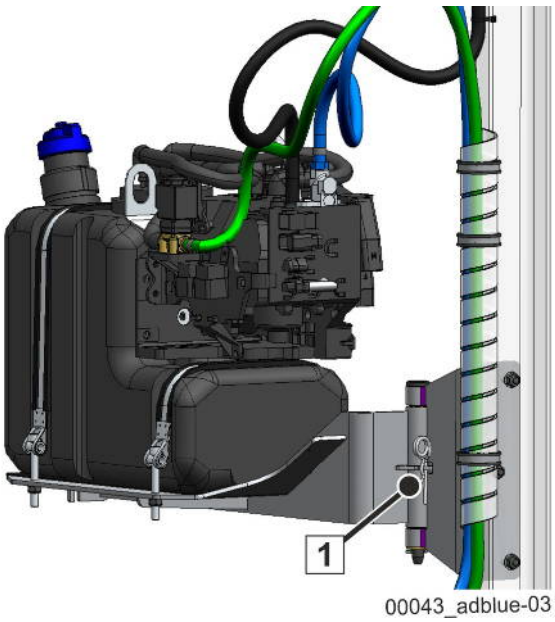


Fig.: 13

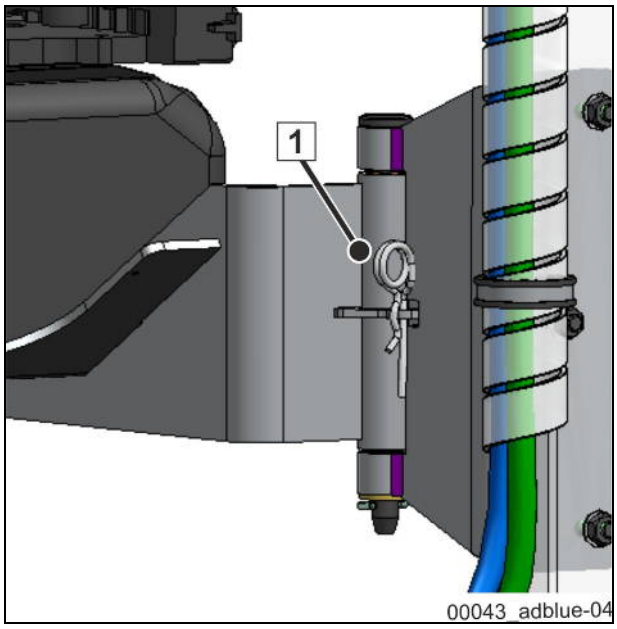


Fig.: 14

3.10.2 Theoretical operating time

Theoretically, the following operating times apply for each full tank with an average fuel consumption of approx. 220 g per kW and hour:

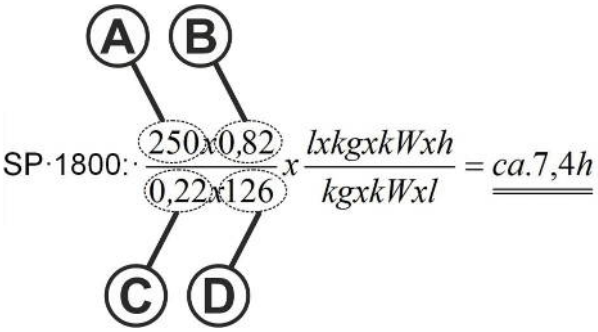


Fig.: 15; explanation of formula

To A) Max. diesel filling volume in (L) (tank contents)

To B) Viscosity of diesel fuel at 15°C

To C) Fuel consumption in kg / kW

To D) kW of the motor

SP 1800: $\frac{250x0,82}{0,22x126} x \frac{lxkgxkWxh}{kgxkWxl} = \underline{\underline{ca.7,4h}}$

SP 2800: $\frac{250x0,82}{0,22x147} x \frac{lxkgxkWxh}{kgxkWxl} = \underline{\underline{ca.6,4h}}$

3.11 Drive circuit

3.11.1 Starting the diesel engine

⚠ CAUTION

Unintentional start-up!

After starting the drive motor, the hydraulic pumps immediately deliver oil.

In order to prevent the unintentional start-up of a function, switch all engaged steering elements to the "0 position" prior to starting.

- Prepare the machine as described in the "*Establishing operational readiness*" chapter.
- Insert the key into the key starter switch 12 (Fig. 1/Fig. 2).
- Press the key in slightly and turn it clockwise to the first locking position.

The warning lights (1 + 2) light up during a short automatic check (Fig. 1/Fig. 2)

If no faults are detected, the lights go out after approx. 2 seconds.

- If light 1 (Fig. 3) does not go out, check the fuel supply.
- Actuate the starter by turning the key further clockwise.

If the motor fails to start up immediately, do not continue trying to start it for more than 10 seconds.

After each start-up procedure, take a one-minute break. Observe cold-start information in the motor operating instructions.

- Once the motor has started, let go of the starter key immediately.

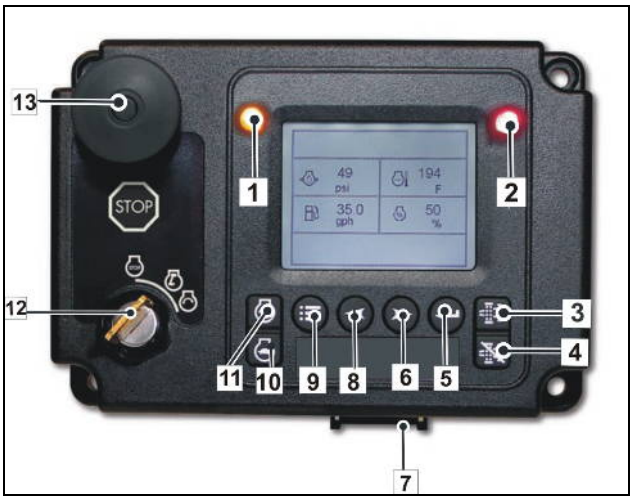


Fig. 1; control panel with regeneration.

Fig. 2; control panel with TSC.

Fig. 3

- Increase the motor speed slightly using the button (11) (Fig. 4/Fig. 5) and let the diesel engine warm up at a moderate speed without a load. Pay attention to irregularities.

- Once the diesel engine has warmed up, check the nominal output (operating speed).

To do this, increase the rotational speed with the button (11) and make sure the adjustable maximum speed does not exceed the nominal speed (revolution counter 1).

- If the nominal speed ("*Technical data*" chapter) is exceeded, lower the rotational speed immediately with the button (10),
  - Have the engine timing checked,
- If the nominal speed is not reached,
  - Have the engine timing checked,
- Reduce the motor speed to idle until the concrete pump is placed into operation.

Fig. 4; control panel with regeneration.

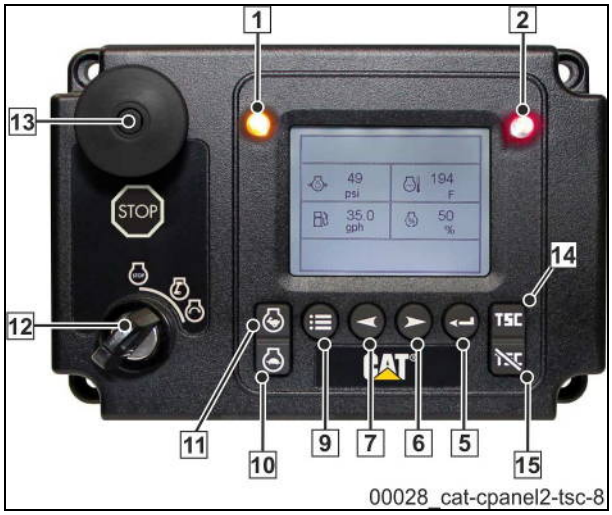


Fig. 5; control panel with TSC.

3.11.2 Switching off the diesel engine

Allow the engine to idle for a few minutes to equalise the temperature.

Only switch off the engine at full load in an absolute emergency.

ATTENTION

Motor damage caused by overheating!

Switching off the engine at full load can cause severe motor damage from overheating, especially with turbo-charged motors.

For certain motors, switching off the motor may be delayed at operating temperatures that are too high; motors will continue running for several minutes!

This automatic run-on function is indicated by a symbol on the display. The run-on function must not be interrupted during normal operation (no emergency).

Observe MOTOR OPERATING INSTRUCTIONS!

- Reduce the stroke rate of the concrete pump as far as possible using the pressure reducing valve (4) (Fig. 6).
- Switch off the concrete pump and agitator.

3.11.3 Forced switch-off of motor (Fig. 9)

The motor can be switched off immediately via a forced switch-off in case of an emergency.

To do so, actuate the button (2) (Fig. 9). The button is located to the left in the direction of travel, next to the starter battery.

CAUTION

Motor damage caused by forced switch-off!

Only use the interruption of the run-on function (forced switch-off of motor) in case of emergency.

Repeatedly forcing the motor to switch off at short intervals can cause severe motor damage.

- In order to prevent a function from starting up unintentionally after switching the machine back on, switch all engaged steering elements to the "0 position".
- Reduce motor speed to idle.
- Turn the key of the starter switch (12) (Fig. 7) anti-clockwise.

The motor is shut down electronically.

Turn key further and remove.

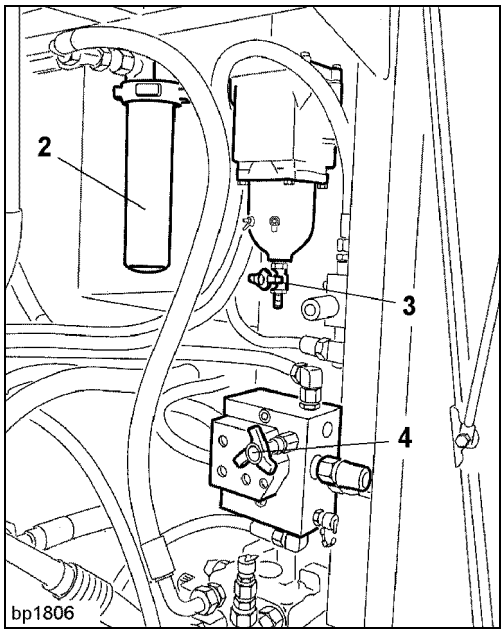


Fig. 6; maintenance flap on the right in the direction of travel.

Fig. 7; control panel with regeneration.

Fig. 8; control panel with TSC.

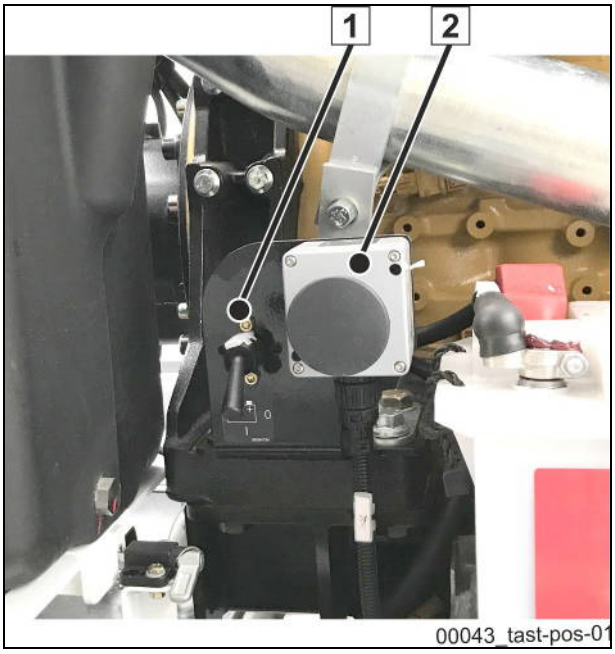


Fig. 9; pos. 2 - “Forced switch-off of motor” button

INSTALLING THE MACHINE

⚠	**OBSERVE SAFETY MANUAL**

The installation site must be set up so that the transport vehicles can reach the concrete filling hopper without problem and the machine is accessible for maintenance and cleaning.

- Inquire about the permissible ground pressure at the construction site. The maximum ground pressure of the ready-to-operate machine, including 500 l of concrete without underlay support, per supporting stand is:

front approx.	$3\frac{daN}{cm^2}$	$(3\frac{kg}{cm^2})$
rear approx.	$6\frac{daN}{cm^2}$	$(6\frac{kg}{cm^2})$

Deviations are possible due to different equipment versions.

- If necessary, use load-distributing underlay supports beneath the supporting dish.

⚠ DANGER

Loss of stability!

The machine must not be installed when its maximum ground pressure exceeds the permissible value.

If necessary, the support surface must be extended using suitable means until the permissible ground pressure is reached.

Depending on the dwelling time of the machine, we recommend the use of our spacers (item no.: 1095646) or the implementation of a suitable concrete surface.

ATTENTION

Extend hydraulic supporting stands evenly.

Do not drive a cylinder to the limit stop before the next one has been driven. The frame and outrigger were put under unnecessary strain.

If load-distributing underlay supports are used, they must be suitable and undamaged, as well as free of ice, oil, grease etc.

STOPPAGE TIMES

- Secure the machine against unintentional changes of position, even during short stoppage times.

INFORMATION

Brake wedges are not included in the scope of delivery of your machine. Machines without a chassis frame for road traffic have no brakes.

If the machine remains for a longer time at an installation site, we recommend that the wheels are removed (prior to lifting, loosen the wheel nuts).

Store the wheels and cover the wheel hubs.

1. OUTRIGGER VARIANTS

The machine can be delivered with a mechanical or semi-hydraulic outrigger.

On request, delivery without axle is possible.

In this case, the machine must be installed using a crane.

- Use a suitable sling/lifting tackle and only attach it to the lifting eyes on the machine (Fig. 1,2).

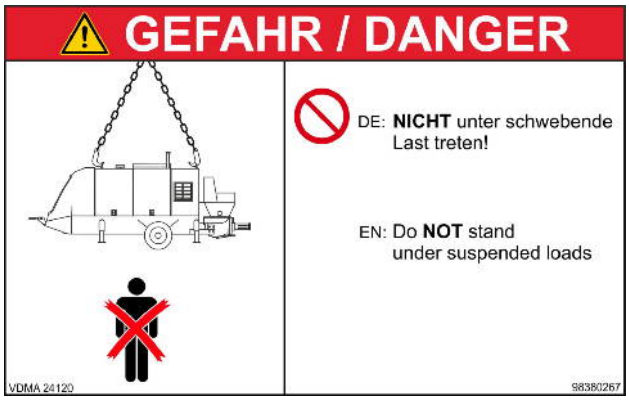


Fig. 1

DANGER

Falling loads!

Do NOT exceed load capacity of lifting eyes due to additional weight of accessories and remnants of pumping medium!

Determine weight of loads prior to raising.

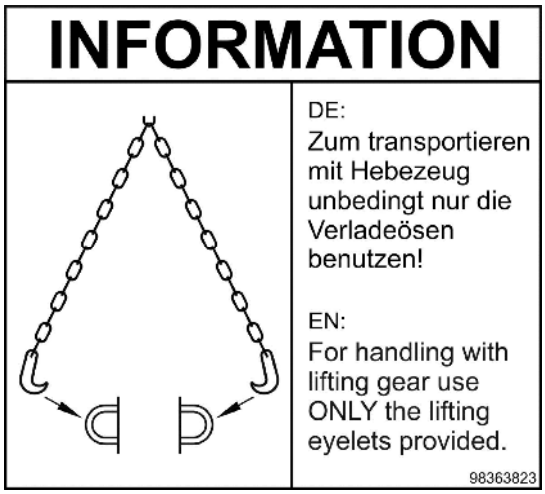


Fig. 2

ATTENTION

Chain lengths that are too short lead to serious strain on the straight frame.

When transporting the machine with chain slings, the individual chain lengths must be a minimum of 2.5m!

- Set up a suitable, even surface.

- Set the machine down in the prepared place and check its horizontal position.

- If necessary, lift the machine up again in order to be able to reposition the connection pieces.

2. MACHINE WITH CHASSIS FRAME

- Drive the machine to the prepared installation site.

- Lay a suitable spacer (e.g. item no.: 1095646) under the supporting dish of the support winch (Fig. 1).

- Before the concrete pump is uncoupled from the towing vehicle, loosen the toggle 1 (Fig. 1) and lower the protective tube 2.

- Tighten the toggle 1.

Hold bolt 3. Actuate the crank 4 and lower the supporting dish until the trailer coupling is released.

- Lower rear connection pieces 2 (Fig. 2+3) and secure with bolts and split pins.

- Secure the machine using the wheel wedge 1 (wheel wedges are not included in the scope of delivery) (Fig. 3).

- Uncouple the towing vehicle.

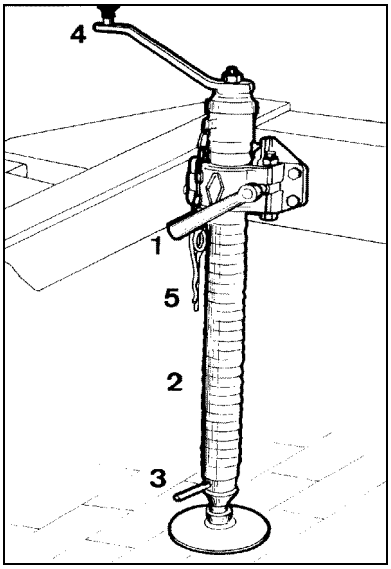


Fig. 1

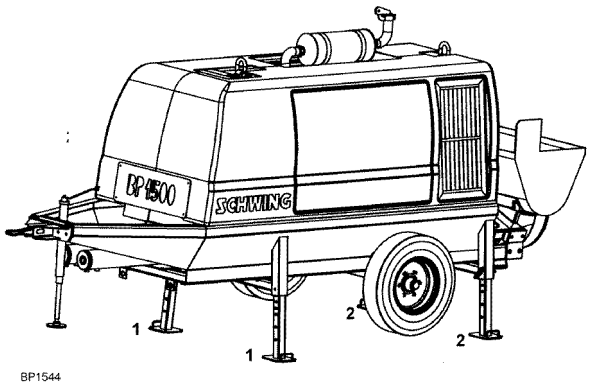


Fig. 2

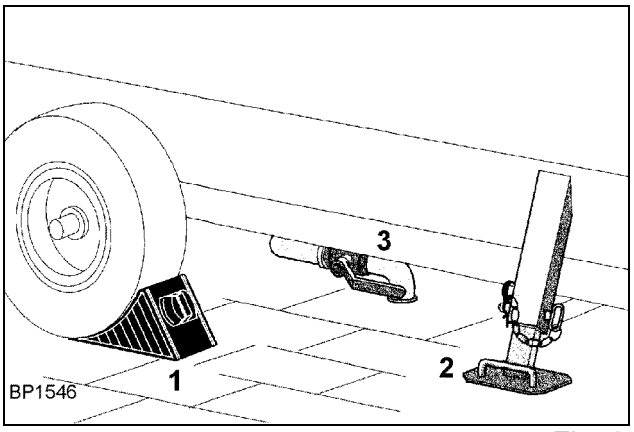


Fig. 3

2.1 MECHANICAL OUTRIGGER

- Lower the machine at the front using the crank 4 (Fig. 1).

- Lower rear connection pieces 2 (Fig. 2+3) and secure with bolts and split pins.

- Raise the machine at the front using the crank 4 (Fig. 1) and ensure it is horizontal.

- Lower front connection piece and secure with bolts and split pins.

- Insert the supporting bracket using the crank 4 (Fig. 1).

The machine is correctly supported when

- The machine is horizontal,

- The axle is released and the wheels are free.

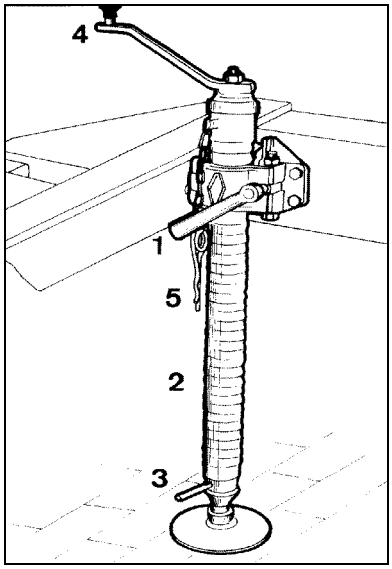


Fig. 1

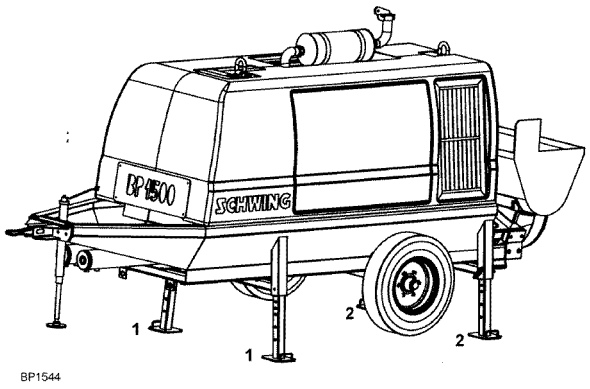


Fig. 2

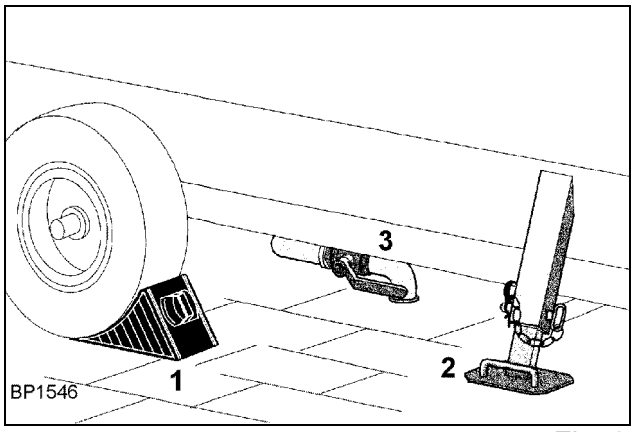


Fig. 3

2.2 SEMI-HYDRAULIC OUTRIGGER

(Special equipment)

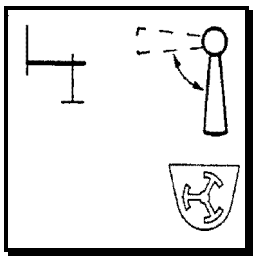
For the semi-hydraulic support, the oil flow of the "agitator pump" is conducted to the control blocks of the outrigger using a ball valve.

- Lower the machine at the front using the crank 4 (Fig. 1).

- Lower rear connection piece 2 (Fig. 2) and secure with bolts and split pins.

- Switch the ball valve to the

  "Outrigger" position.



- Start the motor.

- Drive the front, hydraulic supporting stand 1 (Fig. 2) to both machine sides using the control levers.

  The control levers are spring-centred and return to the central position once they have been released.

  Extend the hydraulic supporting stands evenly until the machine is horizontal.

- Insert the supporting bracket using the crank 4 (Fig. 1).

The machine is correctly supported when

- The machine is horizontal,

- The axle is released and the wheels are free.

- Switch the ball valve back into basic position (agitator).

DANGER

Danger of crushing!

Do NOT remain in the danger area during actuation of the support legs!

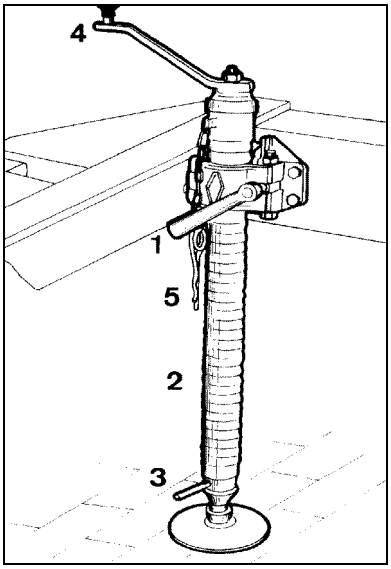


Fig. 1

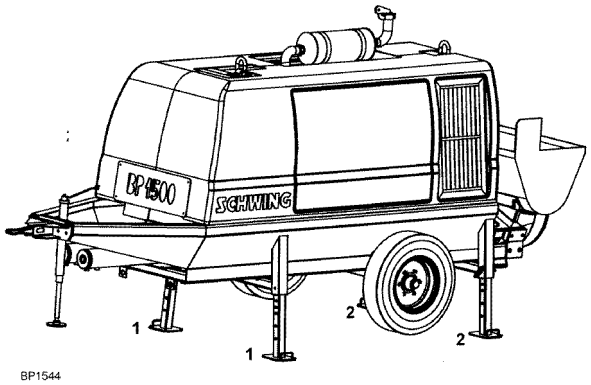


Fig. 2

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3.22 OPERATION OF THE PUMPING LINE

⚠	**OBSERVE SAFETY MANUAL**

3.22.1 MARKING OF DELIVERY TUBES AND ELBOWS

All SCHWING delivery tubes and elbows are marked as follows (for example, Fig.: 1 - Fig.: 4).

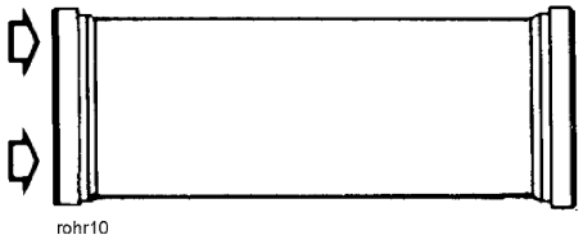

Fig.: 1
Marking up to approx. 2017

The marking for delivery tubes will be stamped/engraved on the top side of a flange.

Image legend (Fig.: 1)	
Designation	**Meaning**
SH	Manufacturer SCHWING HERNE
DN	Nominal size in mm (inner)
PN	permissible operating pressure in bar
s	Wall thickness

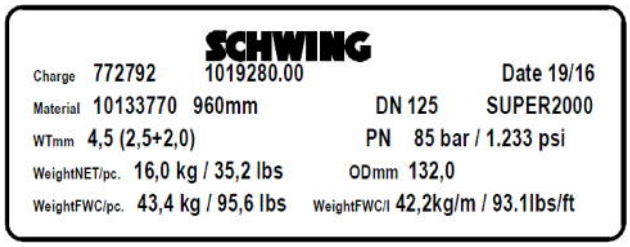

Fig.: 2
Delivery tube marking as of approx. 2017

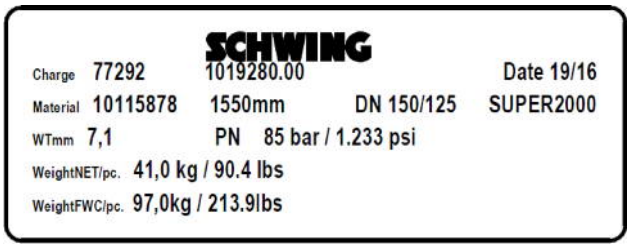

Fig.: 3
Tapered tube marking as of approx. 2017

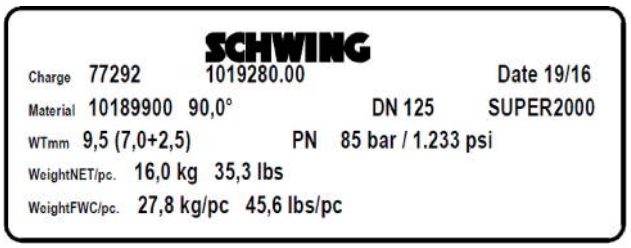

Fig.: 4
Elbow marking as of approx. 2017

Caption (Fig.: 2 - Fig.: 4)	
Designation	**Meaning**
Charge	Order no., customer no.
Date	Production week (MM/yy)
Material	SCHWING item no.
--	Dimensions mm/degree
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
WeightFWC/pc.	Tube, elbow and tapered tube weight per unit, filled with concrete
WeightFWC/l	Tube weight per metre without flange, filled with concrete

3.22.2 MARKING OF THE PUMPING LINE ON THE PLACING BOOM

A distinctive type plate is located on the placing boom (Fig.: 5) for the placing boom pumping line. The type plate for 4-section placing booms has the same structure. 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 tubes and elbows.

With truck-mounted concrete pumps, the concrete pressure for rod and piston-side pressure is also indicated on the type plate of the concrete pump Fig.: 6.

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! See chapter 1.4!

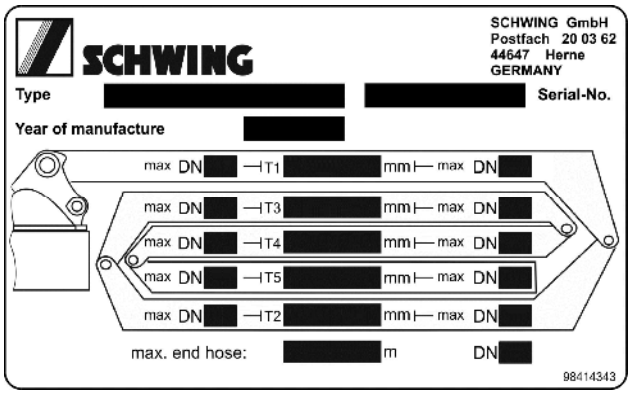

Fig.: 5

Example: 5-section boom type plate

Caption, Fig.: 5	
Designation	**Meaning**
max. DN	max. nominal size Inlet side
T	Length of the pipe on the corresponding boom
max. DN	max. nominal size Outlet side

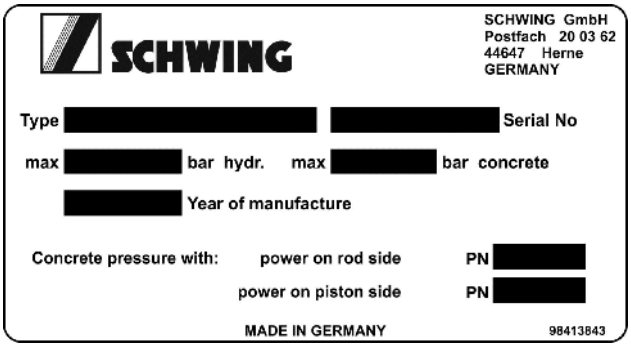

Fig.: 6

3.23 PUMPING LINE ON THE PLACING BOOM

Normally, a truck-mounted concrete pump pumps the concrete directly via the pumping line of the constructed placing boom.

A separate placing boom is supplied by a stationary concrete pump.

DANGER

Loss of stability due to unsuitable pumping lines!

Delivery pipes with excessive tare weight (thicker wall thicknesses) and delivery tubes with larger nominal sizes can overload the placing boom.

Unsuitable pumping lines cause damage (especially broken tube holders, cracks in boom profiles, etc.).

In an extreme situation, the increased tipping force may cause the machine to topple over.

The concrete pumping line installed on the placing boom is an integral part of the machine and may only be changed in strict accordance with the manufacturer's instructions.

Due to changes to the pumping line, other safety-relevant adjustments of the machine may be mandatory.

After significant changes that are not carried out by SCHWING, placing booms must be inspected by an expert before recommissioning.

See "3.23.3 DISCLAIMER".

3.23.3 DISCLAIMER

Independent changes of the machine and use of spare- And additional parts that have not been approved by SCHWING, meet the definition of "improper use".

This also applies to the use of individual parts, such as: Tubes, elbows, couplings, 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!

3.23.4 INTERCHANGEABLE CONCRETE PUMPS

In the interest of a high concrete delivery rate, interchangeable concrete pumps are always supplied with rod-side pressure.

DANGER

Danger to life due to pipe breakage!

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.: 6.

These concrete pumps may not pump through end hose and boom pumping line with piston-sided pressure.

Separately installed pumping lines are an exception.

With piston-side pressure, only use suitable pumping line material.

The concrete pressure that can be determined by the hydraulic pressure must not exceed the maximum permissible concrete pressure of the pumping line components used.

The machine must only be modified by SCHWING customer service.

DANGER

Danger to life due to moving parts!

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.: 7.

Fig.: 7

3.23.5 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 clip pin 1 (Fig.: 8)
- Loosen the wedge (2)
- Disassemble the coupling (3)
- Pull the clip pin (4) out of the wedge (5)
- Remove the wedge (5) and keep it ready to use as a chock for the hinge (7).
- Open the foldable outlet (6).
- At an open angle of approx. 100°, the wedge (2) can be wedged into the notch of the hinge, see (Fig. :9)

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 foldable pipeline outlet and mount to the pumping line of the truck-mounted concrete pump.

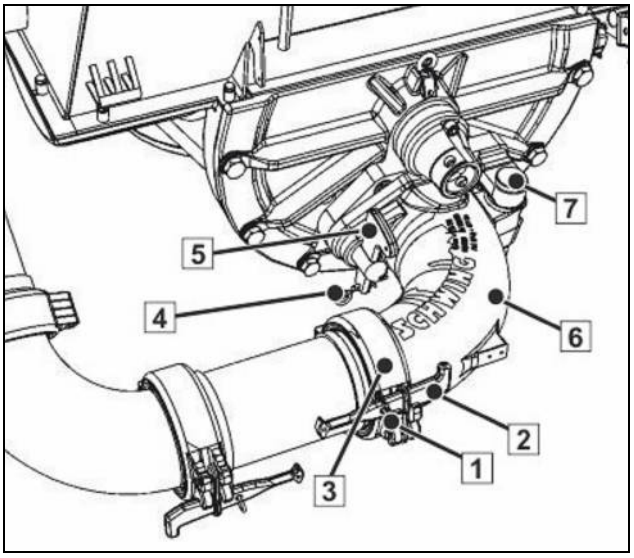

Fig.: 8

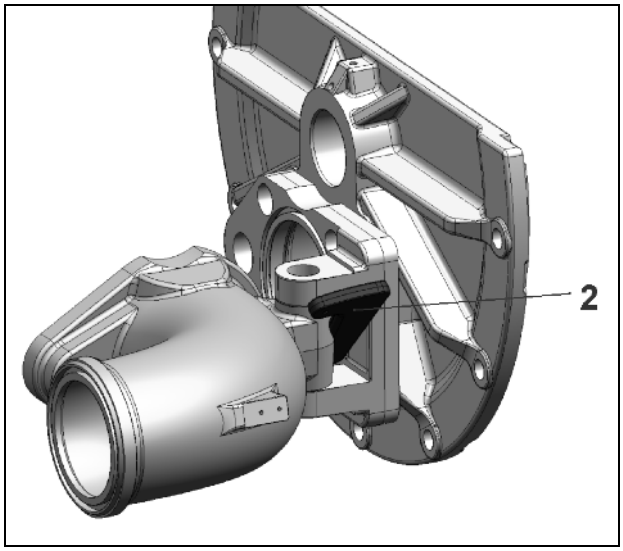

Fig. :9

3.23.6 SHORT OUTLET[1] (CAN BE FOLDED AND ROTATED)

For a simplified connection of a separate pumping line, certain SCHWING truck-mounted concrete pumps can be optionally equipped with a foldable and rotatable outlet (6; Fig.: 10).

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 wedge 1 and coupling 5 first.

- Pull the clip pin and remove 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.: 10) and fold it back.

- Reinsert wedge 2, but do not yet hammer it down.

- If necessary, correct the position of the foldable and rotatable outlet and then hammer wedge 2 down.

  Secure wedge with clip pin.

- Retighten 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.

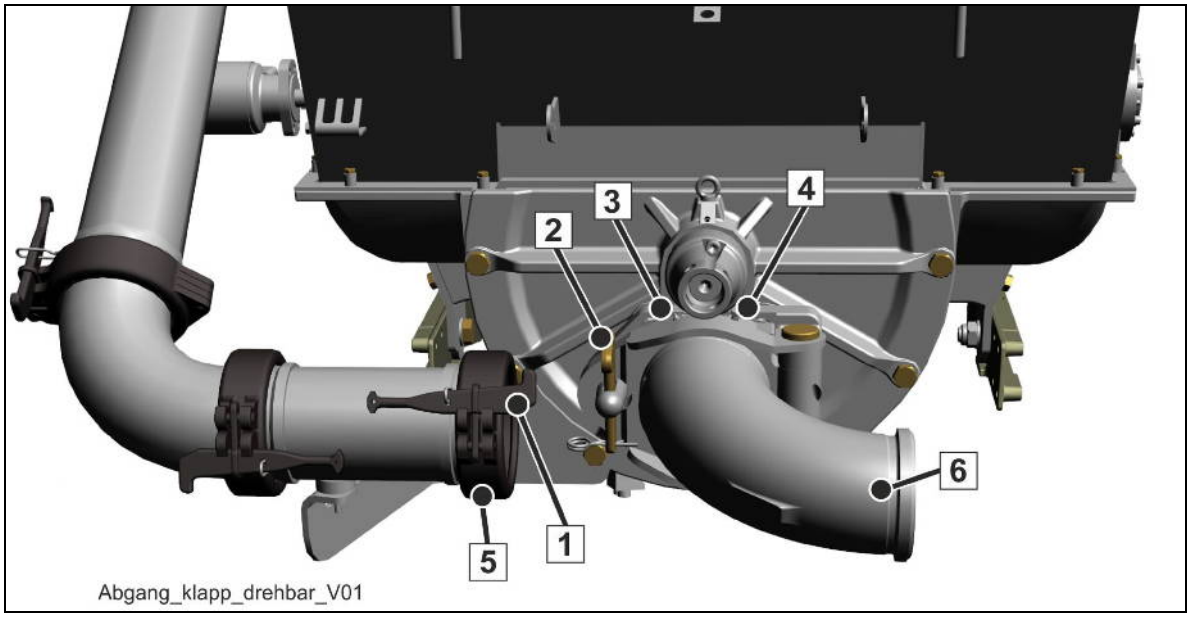

Fig.: 10

[1] optional, only with truck-mounted concrete pumps

.

3.23.7 LARGER 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 larger outlet when you wish to pump concrete that is hard to pump.

The larger outlet 180/180/150 also has a 14 degree elbow mounted on the rock valve, see 1; Fig.: 11.

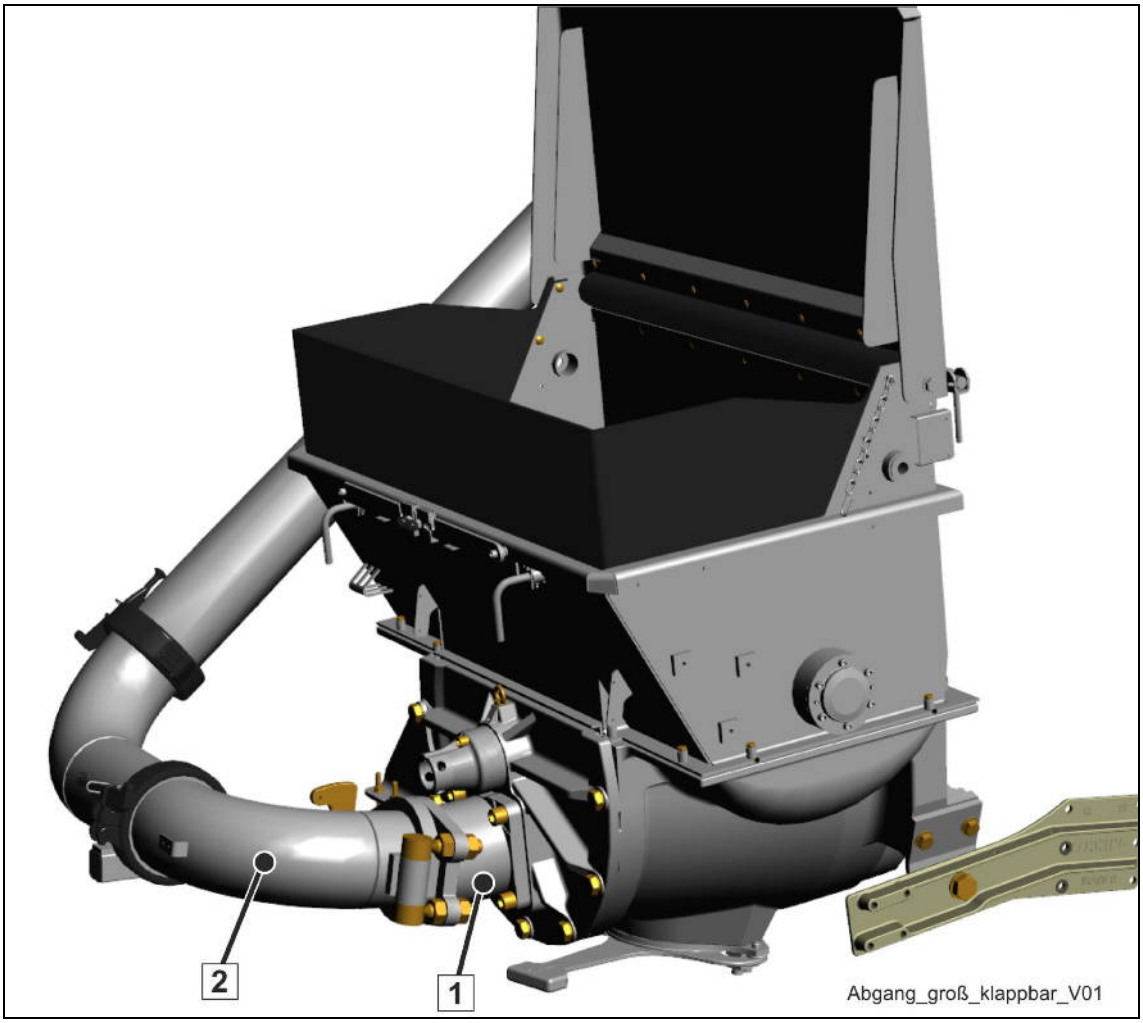

Fig.: 11

3.23.7.1 MAINTENANCE OF THE FOLDABLE AND ROTATABLE OUTLET

About once a week, squeeze some grease into the grease nipple (3; Fig.: 10) and into the second grease 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.

3.23.8 SEPARATE PUMPING LINE

The insertion of a separate pumping line 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.

If you have any queries about the pumping line, get in touch with SCHWING customer service.

When selecting the pumping lines, observe the maximum possible concrete 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, produce a concrete pressure of over 200 bar!

See "Technical data", chapter 1.4.

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 clog is under maximum pressure, the complete pumping line must be able to tolerate these values.

Separate pumping lines are available in different versions:

⚠ WARNING

Injury caused by springing open of the cocking lever!

When mounting split couplings, there is a risk of injury from unexpected springing open of the cocking lever.

Injuries such as bone fractures to concussions are possible.

Secure the cocking lever of the split coupling immediately after closing the cocking lever with the "Safety for split couplings" (clip pin).

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.

1. Delivery tubes for split couplings (Fig.: 12)

These correspond to the system used in 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 separate pumping line is not as economically applicable as the following:

2. Delivery tubes with male- And female face flange for cup expansion couplings (Fig.: 13).

The following versions are available:

2a. Standard tubes up to 4.5 mm wall thickness (depending on the nominal size) are suitable up to max. 110 bar.

2b. Thick-walled tubes with wall thickness of 7.1 mm are suitable up to max. 160 bar.

These tubes are used when mid to high concrete pressures or very high stoppage times are required.

3. Extreme pressure tubes with wall thickness's of 7.1 to 10 mm (depending on the nominal size) are suitable up to 200 bar concrete pressure.

These tubes are fitted with special high-pressure nozzles (Fig.: 14). They are highly required for the usage of 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.

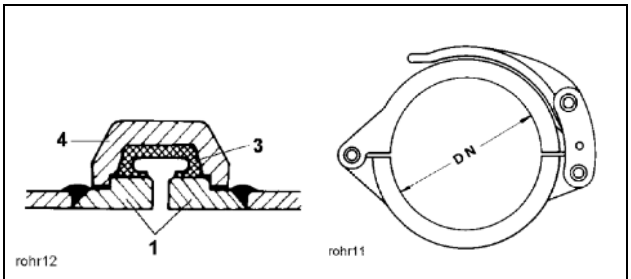

Fig.: 12

1 - Flange	
3 - Seal	
4 - Split coupling	

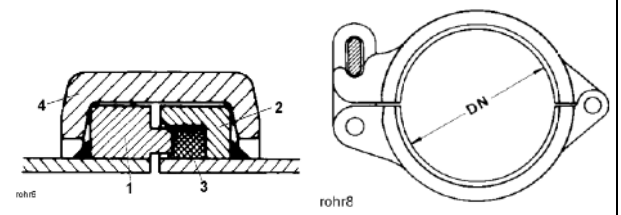

Fig.: 13

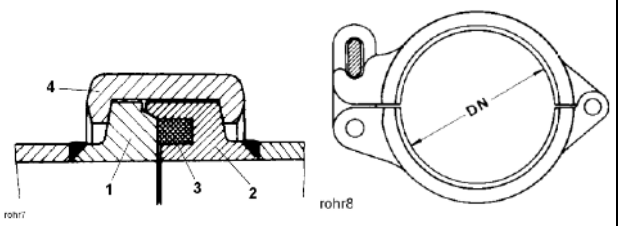

Fig.: 14

to Fig.: 13+ Fig.: 14
1 - Flange with male face
2 - Flange with female face
3 - Seal
4 - Cup expansion coupling

Fig.: 15

3.23.9 CONCRETE DELIVERY HOSES

3.23.9.1 END HOSES

⚠	**OBSERVE SAFETY MANUAL**

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 accident due to flapping end hose, spraying concrete and stones shooting out!

The following points must be observed.

- When you start pumping, when you start pumping again and after blockages, the end hose must hang freely. 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 a double-sided fixing are not permitted for use as end hoses!

- Do **NOT** use longer end hoses!

  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 table "End hose modification options" 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.: 16 - Fig.: 18.

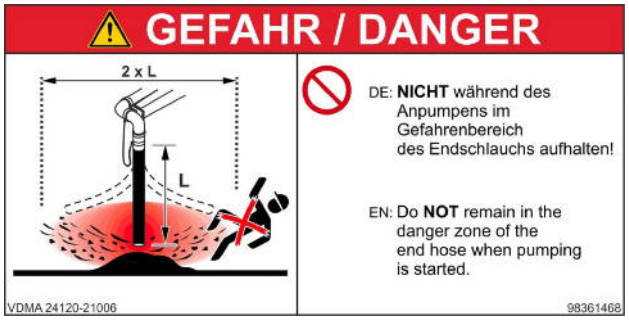

Fig.: 16

Fig.: 17

Fig.: 18

3.23.9.2 CONNECTING HOSES

Connecting hoses with double-sided fixing can be used according to their permissible concrete pressure as flexible intermediate pieces in rigid pumping lines.

3.23.9.3 HOSE PIPES

Multiple connecting hoses are often connected with hose pipes in the mobile restoration operation.

The hoses are usually carried on a specially equipped truck-mounted concrete pump, laid before use and removed again after use.

3.23.9.4 INSTALLATION AND OPERATION OF 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 flawless, clean hoses, couplings, seals, etc. of the same system to structure a hose.

- The maximum possible concrete pressure may not exceed the max. permissible concrete pressure of the pumping line parts.

- The concreting personnel at the placement site must be informed about possible dangers and be familiar with all necessary work.

- Place hoses with widest possible radius - Do not bend.

Too narrow radii cause a one-sided abrasion, bends will destroy the hose in no time.

Narrow radii and bends favour 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 beat on 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 person may remain near the hose pipe during pumping operation.

- Moisten hose with water, then pump with flow mixture.

- It is imperative to observe the maximum aggregate size, depending on the nominal sizes of the hose.

- Pump with lower delivery rate, hose must not be disrupted.

3.23.9.5 CLEANING OF THE HOSE PIPE

DANGER

Direct danger to life due to flapping hoses!

It is prohibited to blow out pumping hoses with compressed air, see safety manual.

Hoses must be carefully cleaned after each use.

A careful internal cleaning is thereby especially important!

Dirty hoses wear out faster and cause clogging.

Suck back the cleaning ball, then remove individual hoses and rinse thoroughly with water.

If it cannot be sucked back, remove individual hoses, tip out and rinse thoroughly with water.

- Always ensure impeccable cleanliness of the hose system.

A clean hose helps prevent clogging.

Dried-up concrete can coalesce with rubber.

This means that not only the remaining concrete, but also possibly a piece of rubber may be pulled out during the next pumping.

3.23.10 OBSERVATION DURING OPERATION

Prior to operation, it must be ensured that the pumping line is in flawless condition.

Check the safety devices of the pumping line, see Fig.: 19.

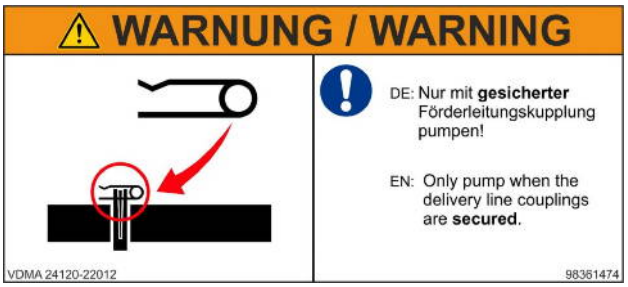

Fig.: 19

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 case of any leaks, stop operation immediately and remedy the leak.

DANGER

Danger to life due to pipe breakage!

If liquid is leaking from a pumping line component (e.g. a coupling or a pipe or elbow wall), there is a very high risk of accident due to the pipe breaking.

A single inappropriate coupling can cause failure of the pumping line and accidents.

Stop operation immediately and release pumping line through back siphonage!

Check the pumping line frequently with a suitable wall thickness measurement device according to the operating conditions.

See chapter 4.44 "Pumping line maintenance".

The SCHWING customer service can mention suitable measurement devices depending on the pumping line material used.

We strongly recommend to build the pumping line exclusively with suitable SCHWING material.

This is an important contribution to high operational safety and efficiency.

In the event of damages caused by inappropriate material, SCHWING will disclaim any liabilities!

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WORKING OPERATION - GENERAL INFORMATION

⚠	**OBSERVE SAFETY MANUAL**

SPECIAL EQUIPMENT

Outrigger, compressor, water pump and shut-off assembly are supplied by the agitator pump and activated with engaged control elements (see hydraulic switching diagram).

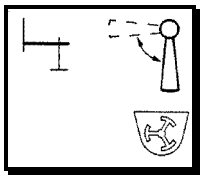
⚠ CAUTION

Unintentional start-up!

After starting the drive motor, the hydraulic pumps immediately deliver oil.

In order to prevent the unintentional start-up of a function, switch all engaged steering elements to the "0 position" prior to starting.

- Switch the upstream ball valve to the base position:



"Agitator",

if the machine is equipped with a hydraulic outrigger.

CP REMOTE CONTROL

The remote control controls the concrete pump during operation.

- Insert the plug of the remote control cable into power outlet 11 (Fig. 1) and secure it.

Light 1 (Fig. 2) flashes on the remote control while the motor is running, indicating that the remote control is active.

Fig. 1

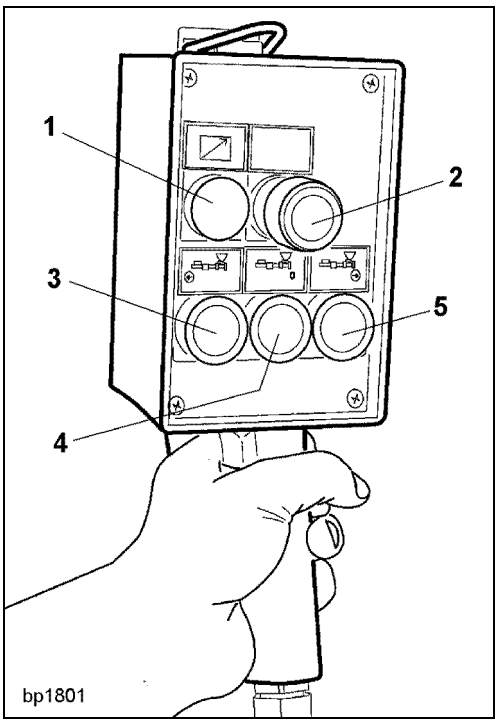


Fig. 2

CP LOCAL CONTROL

In the event that the machine has to be operated in case of an emergency or test operation, a bypass plug has to be inserted into the power outlet 11 (Fig. 3).

Without this plug, no electrical power is available to control the machine and the EMERGENCY STOP valve remains open. The concrete pump cannot be operated.

The plug is included in the tool set of the machine.

EMERGENCY OPERATION, see chap. 3.39.

Fig. 3

CLOSE MAINTENANCE FLAPS

⚠ CAUTION	
	Hearing can be damaged! Personal hearing protection must always be worn where the sound pressure level exceeds 80 dB(A). Close all hoods, covers etc. that are provided to insulate the noise! See noise information chap. 1.4.

Furthermore, the flaps must be closed, in order to protect the machine from clogging and complicate unauthorised access to the machine.

WORKING OPERATION: AUXILIARY POWER UNITS

⚠	**OBSERVE SAFETY MANUAL**

The hydraulic pump of the agitator provides various special equipment, if necessary, for example:

- Hydraulic outrigger

- Water system (water pump)

- Air system (compressor)

- Hydraulic shut-off assembly

Prepare the respective installations prior to each commissioning. See chapter

- 3.20: INSTALL MACHINE
- 3.33: WATER SYSTEM
- 3.34: AIR SYSTEM

- 3.35: HYDRAULIC SHUT-OFF ASSEMBLY

Suitable switching of the corresponding directional valve ensures that either agitator or special equipment can be operated. See hydraulic switching diagram.

The simultaneous operation of agitator and special equipment, as well as various special equipment, is not possible.

⚠ CAUTION

Unintentional start-up!

After switching on the drive motor, the auxiliary pump (agitator pump) pumps oil immediately.

However, the agitator only starts when switching the corresponding buttons on the control station of the agitator control block electrically.

Any special equipment can start, because their control valve is located in the oil flow in front of the agitator control block.

See hydraulic switching diagram

For this reason:

- Always switch off the agitator electrically prior to start special equipment.

- Switch off each special equipment immediately after use with the hydraulic control element (base position: agitator).

This will prevent the aggregates from running unintentionally when starting the motor or switching functions. Unnecessary oil heating is prevented.

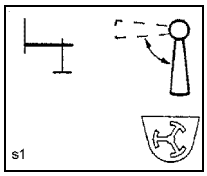
The following description only applies to SP 1800/2800 types.

For equipment with a hydraulic outrigger, a ball valve selects between the outrigger and additional functions.

In the position: Outrigger, only it can be driven.

In the position: "Agitator", the oil flow is conducted to other control valves of the special equipment and agitator. See hydraulic switching diagram.

"Outrigger"



"Agitator"

NORMAL OPERATION: WATER SYSTEM

(Special equipment)

⚠	**OBSERVE SAFETY MANUAL**

The machine can be quipped with different water systems, e.g. 80/8.

80/8 means that the water pump provides theoretically 80l of water per minute against an 8 bar pressure.

PREPARATION

The hydraulically powered water pump is self-priming (2; Fig. 1). We recommend setting up a water case with clean water next to the pump.

The water must be free of solids, as they cause a rapid wear of the water pump.

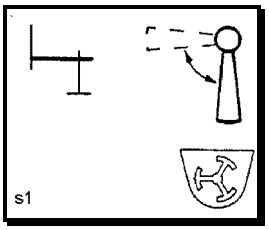
- Connect suitable hoses to the suction socket (5) and delivery connection (3).

OPERATION

- Start the drive motor and regulate the speed of the diesel engine to idle.

Regulation is not possible with the electric version.

- Switch the upstream ball valve to the base position:



"Agitator",

if the machine is equipped with a hydraulic outrigger.

- Open the spraying nozzle of the water hose and hold the hose tightly.

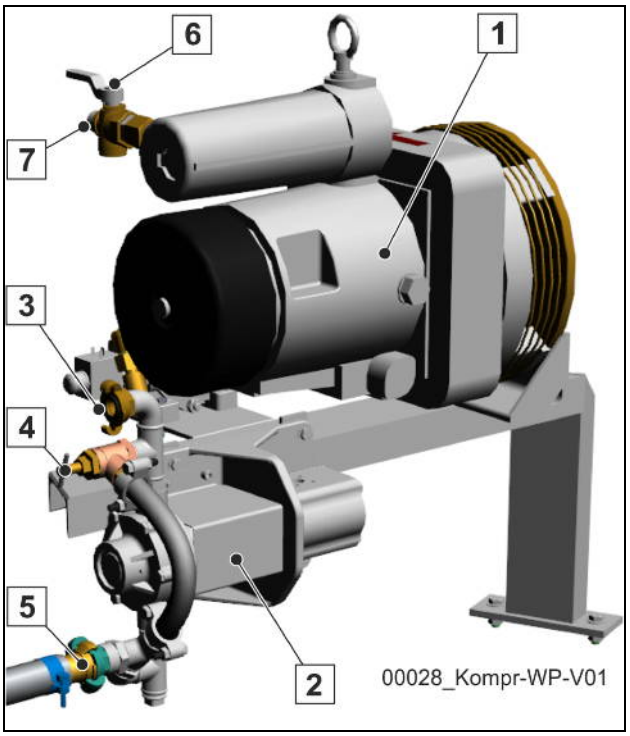


Fig. 1

Caption Fig. 1	
Pos.	**Designation**
1	Compressor
2	Water pump
3	Water suction socket
4	Pressure relief valve
5	Water delivery connection
6	Stopcock for pos. 7
7	Air delivery connection

- Switch on the water pump using the button (9; Fig. 2).

Water pump

- Regulate the water flow rate by adjusting the engine speed (only diesel engine).

⚠ CAUTION

Do not switch on water pump with increased engine speed. Hose can pulsate.

The pressure relief valve (4; Fig. 1) is set at the factory and may only be adjusted by SCHWING's customer service.

If the water pump is used to clean the pumping line, observe chap. 3.40!

END OF OPERATION

- Switch off the water pump using the button (9; Fig. 2).

WINTER OPERATION

If there is danger of frost, the water pump must be drained after each operation.

- Remove the suction and pressure hose and drain them.

- Switch on the water pump **briefly** to remove residual water.

ATTENTION

Dry run!

Water pump may not run dry.

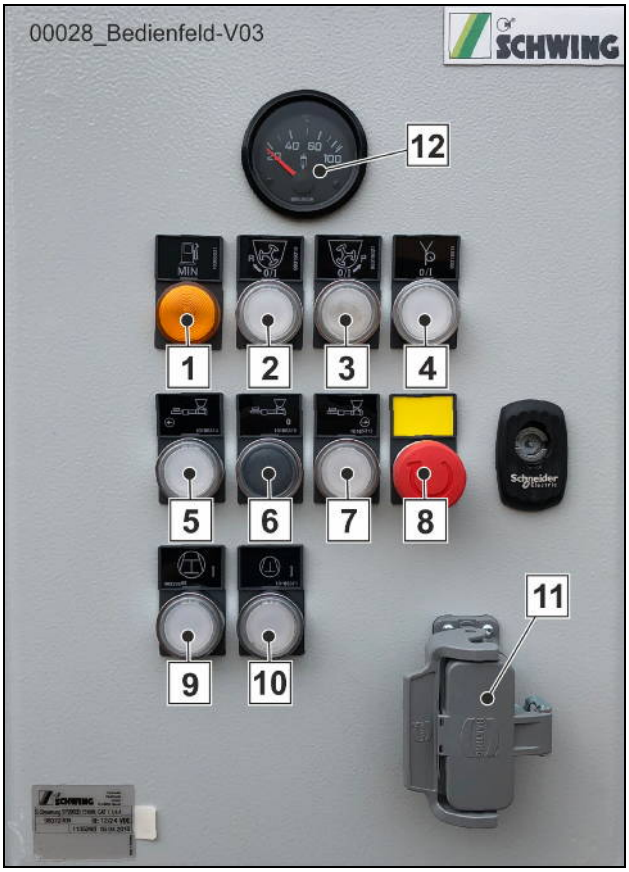


Fig. 2

NORMAL OPERATION: AIR SYSTEM

(special equipment)

⚠	**OBSERVE SAFETY MANUAL**

The machine can be fitted with a rotation compressor 1 (Fig. 1).

Theoretically, the compressor provides 900 l of air per minute against a pressure of 10 bar.

PREPARATION

⚠ CAUTION

If the compressor is used to clean the pumping line, observe chap. 3.40.

- Attach a suitable pressure hose to the delivery connection (7) on the compressor.

- Connect the pressure hose, for example, to the junction (1; Fig. 2) of the pumping line cleaning nozzle.

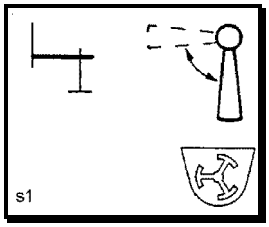
- Open the air drain cock (3) in order to prevent pressure peaks when switching on the compressor.

OPERATION

- Start the drive motor and regulate the speed of the diesel engine to idle.

  Regulation is not possible with the electric version.

- Switch the upstream ball valve to the base position:



"Agitator",

if the machine is equipped with a hydraulic outrigger.

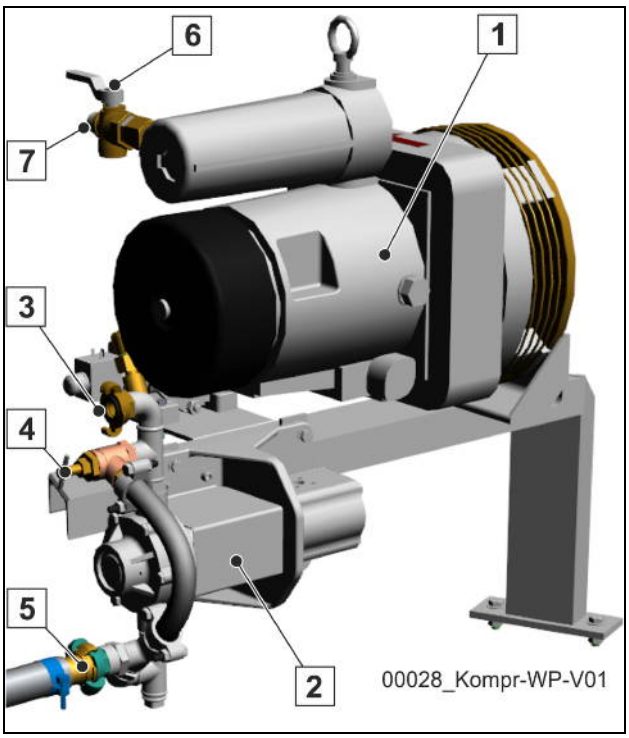


Fig. 1

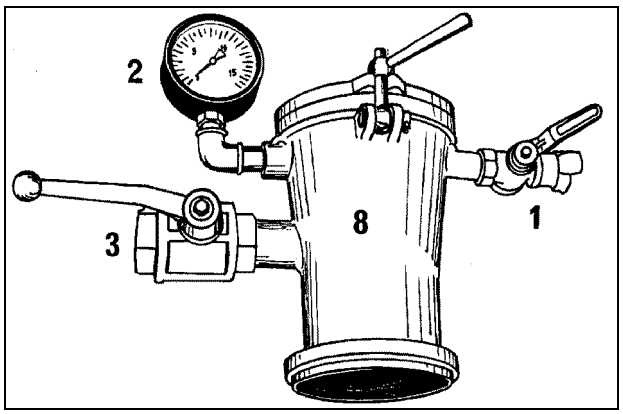


Fig. 2

- Switch on the compressor using the button (10; Fig. 4).

Compressor

- Set the operating speed of the diesel engine and regulate the air flow rate by opening and closing the air drain cock in the pressure line (e.g. 3; Fig. 1).

END OF OPERATION

- Open the air drain cock in the pressure line.

- Switch off the compressor using the button (10; Fig. 4).

WINTER OPERATION

The rotation compressor can be used up to temperatures of -15°, with proper maintenance (chap. 4.55).

For lower temperatures, please contact us.

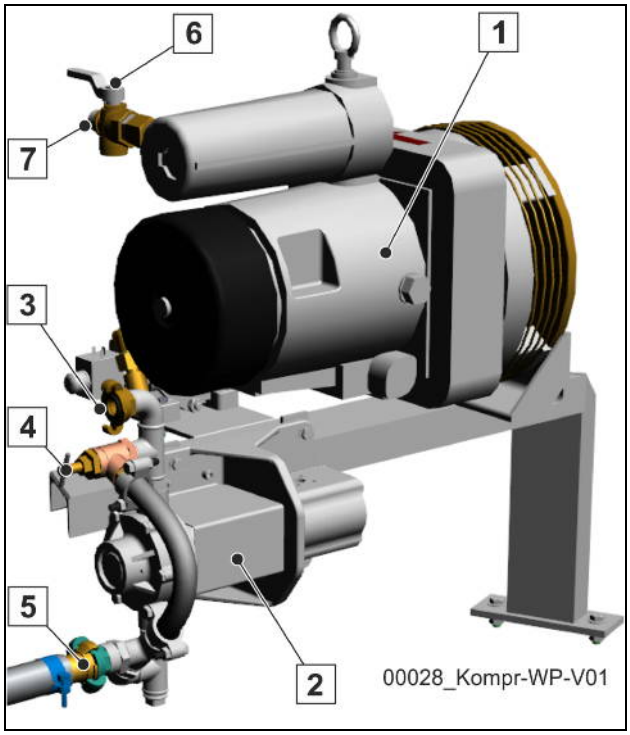


Fig. 3

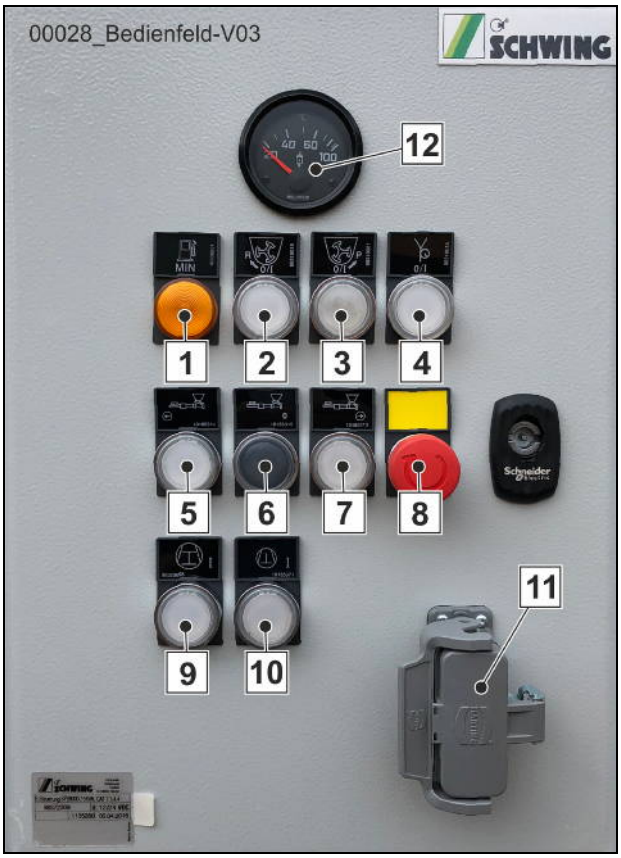


Fig. 4

ATTENTION

Avoid corrosive damage!

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 (1; Fig. 5) and cause damage.

For this reason, we recommend:

- Switch on the compressor once a week for at least 30 minutes continuously.

- Adhere to the maintenance interval of the compressor.

- Only use original spare parts and the prescribed compressor oil for the maintenance of your compressor.

  Our maintenance packages

  10170389 (standard maintenance) and

  10170388 (oil separator cartridge)

  contain all the spare parts necessary for the maintenance of your compressor including the compressor oil.

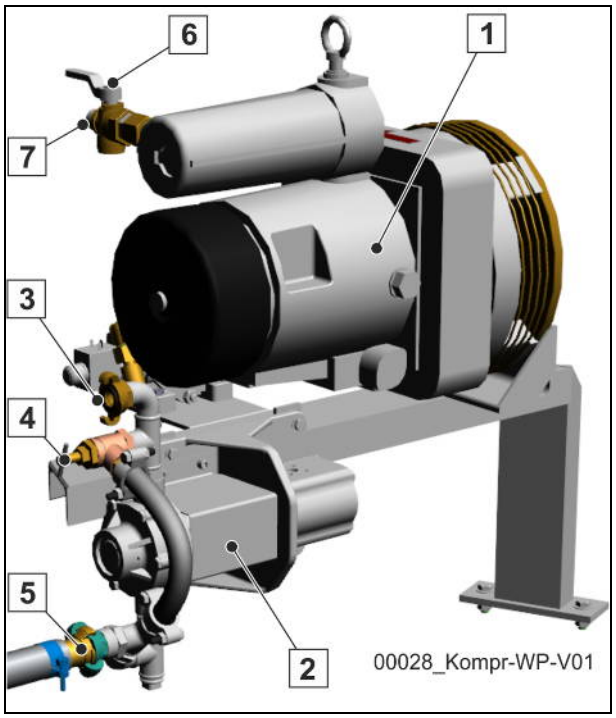


Fig. 5

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WORKING OPERATION: HYDRAULIC SHUT-OFF ASSEMBLY

(Special equipment)

⚠	**OBSERVE SAFETY MANUAL**

The machine can be provided with a control valve for a separate, hydraulically driven SCHWING shut-off assembly.

Hydraulically driven shut-off assembly are required, such as to prevent a backflow of the concrete column to the concrete pump in high-rise pumping.

PREPARATION

⚠ CAUTION

Switch off hydraulic downstream aggregates prior to commissioning the shut-off assembly.

Otherwise, these aggregates would stop after switching on the shut-off assembly and restart after switching off the shut-off assembly!

See hydraulic switching diagram.

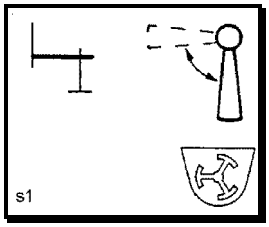
- Have a hydraulics technician connect the hydraulic junctions of the shut-off assembly with the junctions A1 and B1 of the control valve.

OPERATION

- Start the drive motor and regulate the speed of the diesel engine to idle.

  Regulation is not possible with the electric version.

- Switch the upstream ball valve to the base position:



"Agitator",

if the machine is equipped with a hydraulic outrigger.

- Open or close the shut-off assembly with the control lever:

Shut-off valve

- Switch the control lever of the shut-off assembly into neutral position after use in order to avoid oil heating and operate downstream functions.

INFORMATION

SCHWING provides the connectivity for a shut-off assembly.

The operator is responsible for the selection and installation of suitable materials.

We recommend using SCHWING shut-off assembly (example, Fig 1) and pumping line material.

When using unsuitable materials, SCHWING is not liable for any damages!

We recommend hydraulic hoses DN 12 of up to a 15 m line length (for A and B lines) for the junction.

A separate aggregate and hoses with larger diameter may need to be used for greater distances.

Please ask our customer service!

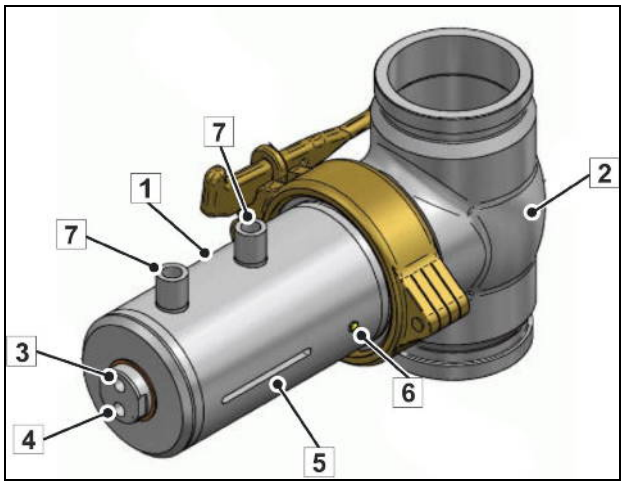


Fig. 1

RELEASE OF BLOCKAGES

⚠	**OBSERVE SAFETY MANUAL**

⚠ DANGER

Danger to life!

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. The following must be observed in the process:

- Only work on unpressurised hydraulic systems. Although pressure relief valves help prevent an overload of the machine, the hydraulic system is under pressure when tripping the pressure relief valve.

  Switch off the drive and secure it against being switched back on. Release the hydraulic system. This can be done, for example, by opening manual relief valves or also by repeated manual switching of the appropriate directional valve in both directions.

In contrast to a pressure test, an uncontrolled blockage of the machine occurring during operation is a severe fault.

If the energy stored during blockage is suddenly released, it can cause serious accidents by independent movements of the machine or failure of components.

Even the use of inappropriate measures to release such blockages can suddenly release the stored energy and cause serious accidents.

⚠ DANGER

Danger from uncontrolled movements!

Proceed as follows during an uncontrolled blockage:

- In case of danger, immediately actuate an EMERGENCY-STOP switch!

- Remain calm!

- Try to locate the blockage!

The following blockages are likely to occur:

1. BLOCKAGE IN THE PUMPING LINE

In the event of a blockage (blockage) of the pumping line, the pressure rises in the hydraulic system of the concrete pump until the pressure relief valve (PRV) opens. The concrete pump stops, the drive motor runs under heavy load and the hydraulic oil flowing via the PRV causes a loud flow noise.

A rapid pressure rise points to a blockage directly behind the concrete pump (reduction?). 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 well cleaned, dense pumping lines and conveying standardised quality concrete.

See chap. 3.80:

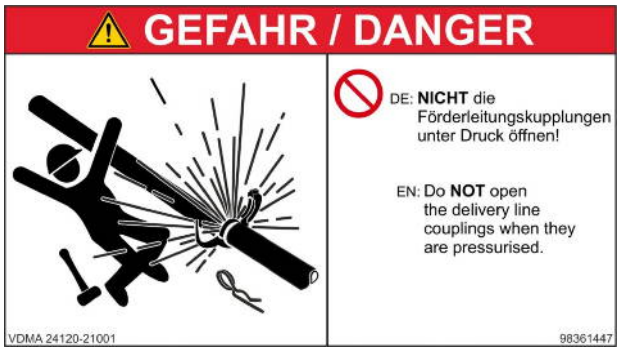
CONCRETE TECHNOLOGY CONDITIONS

- Release the blockage by reverse pumping the concrete with a concrete pump.

- Then pump again carefully.

- Repeat the process, if necessary, until the blockage releases.

- If reducing the blockage is not possible this way, the pumping line must be released and the concerned component removed.



DANGER

Pumping line under pressure!

Never open a pumping line under pressure and do not tap it.

If concrete emerges under high pressure, persons can be seriously injured by pulsating of the pumping line or also at some distance by flying stones and debris of the pumping line.

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.

Relieve the pumping line by reverse pumping the concrete with the concrete pump.

Never work while directly bent over the line.

2. MECHANICAL BLOCKAGE

Mechanical blockages of the machine may occur - Usually as a result of damage - In all systems.

If no blockage exists as described above, try to locate the blockage:

2.1 BLOCKAGE OF MOTOR, GEAR, DRIVE SHAFT

In most cases, blocking of the drive system cannot be eliminated on site.

If necessary, the machine has to be placed into transport stand and towed.

2.2 BLOCKAGE IN THE CONTROL SYSTEM

Blockages of the hydraulic pilot control are often caused by dirt in the hydraulic oil.

This dirt causes the control piston to jam and thus not execute or execute control commands 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.

If control commands are carried out improperly

- Actuate an EMERGENCY STOP button immediately.

- Use the emergency operation device to bring the machine into transport stand.

See chapter 3. 39

EMERGENCY OPERATION

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3.38 Control of operations

The main hydraulic functions are interrupted by pressing an EMERGENCY STOP button. See chap. 3.5

- Pay attention to unusual noises, vibrations, etc. caused by the machine.

There may be a damage that could be localised through timely repair.

- Check the stability and horizontal position of the machine and correct its position if necessary.

All supporting dishes must be constantly, firmly on the ground.

- Ensure that the delivery tube connections are tight:

Fix any leaks as quickly as possible.

"Bleeding" of the concrete results in clogging.

3.38.1 Concrete pump

⚠ 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 may be injured through pulsating of the end hose and flying parts.

To avoid this, the hopper must be filled up to the agitator shaft with concrete so that no air is drawn in.

- Otherwise, drawn-in air causes the concrete to spatter and dry run increases the wear on the pumping pistons and kidney seal.

- Check the hydraulic oil level:

The oil level must be visible at the top of the sight glass (1) (Fig. 2) when the drive is not running.

- Check the hydraulic oil temperature on the thermometer:

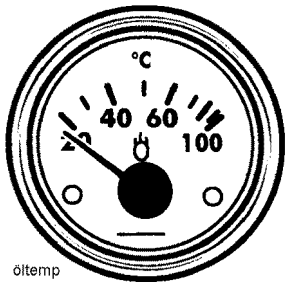

Fig. 1

If the temperature rises above 80° C, pumping must be slower. Shut down machine, top up oil or check cooling, if necessary.

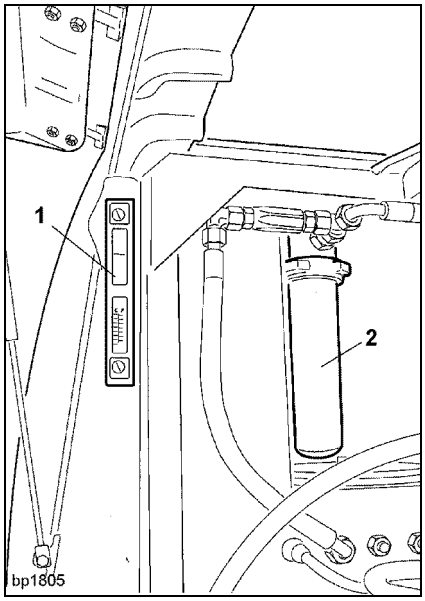

Fig. 2

- Monitor the water level and check for clogging of the water box (Fig. 3).

Drain any polluted water with the drain valve (3) (Fig. 4) on the bottom and fill with clean water up to the top edge of the pumping pistons.

⚠ WARNING

Danger of crushing!

Before opening the water box, always switch off the drive motor and release pressure accumulator (if available) in order to prevent unwanted working movements of the concrete pump!

After filling up, mount cover for water box properly and secure with wedge and clip pin.

The water box must always be closed during operation!

- Depending on the wear condition of the pumping pistons and cylinders, rinse the water box regularly.

Check the water box weekly for deposits that could not be removed by normal flushing process.

See the “Cleaning” chapter.

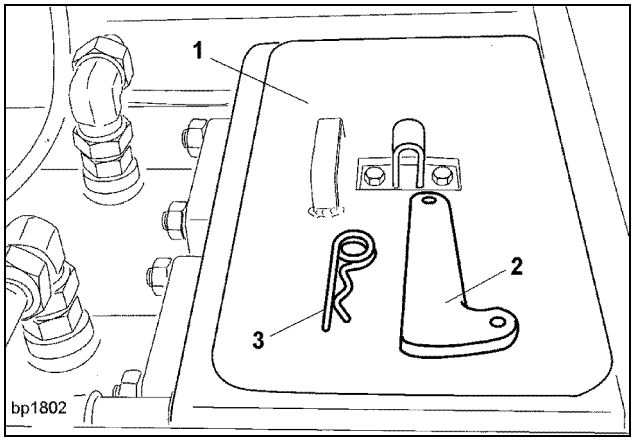

Fig. 3

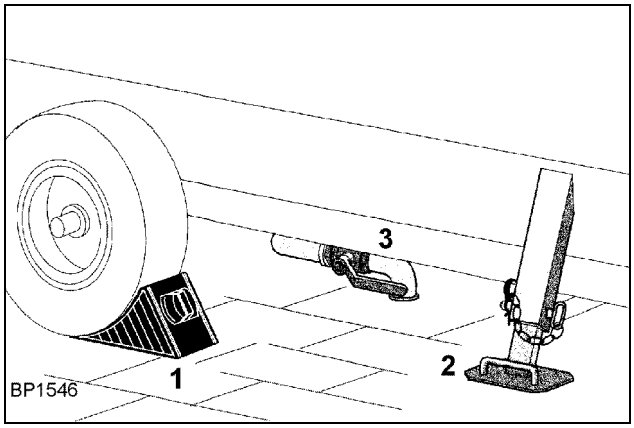

Fig. 4

- Check the operating pressure of the concrete pump while pumping concrete.

INFORMATION

The hydraulic pump of the concrete pump system is equipped with a pressure cut-off. This swivels the pump back before the maximum operating pressure set on the pressure relief valve (PRV) is reached. Also see the “Check pressure settings” chapter.

- Open the shut-off valve (7) (Fig. 5) and release the operating pressure on the pressure gauge (6).

If the operating pressure reaches the setting values of the pressure cut-off, pumping must be slower, a pumping line must be laid with larger cross section or the pumpability of the concrete must be improved.

For "P_{max}", see hydraulic switching diagram or data sheet.

The pressure relief valves set in the factory may not be altered.

Reconnect the concrete pump to rod-sided application, when higher performance is required. See the “Working operation concrete pump” chapter.

In order to protect the pressure gauge from spikes in pressure, close the shut-off valve (7) immediately after the test.

- Immediately prevent clogging at the base by pumping the concrete in reverse:

- Stop the agitator and concrete pump.

- Set the agitator to "reverse" and the concrete pump to "suction".

Do not forget to switch the agitator. The returning concrete could otherwise damage the agitator.

Should the clogging not be resolved with reverse pumping, switch off concrete pump and fix the problem.

- Monitor the agitator.

In the event of, for example, jamming caused by rocks (maximum pressure), switch agitator briefly to reverse running.

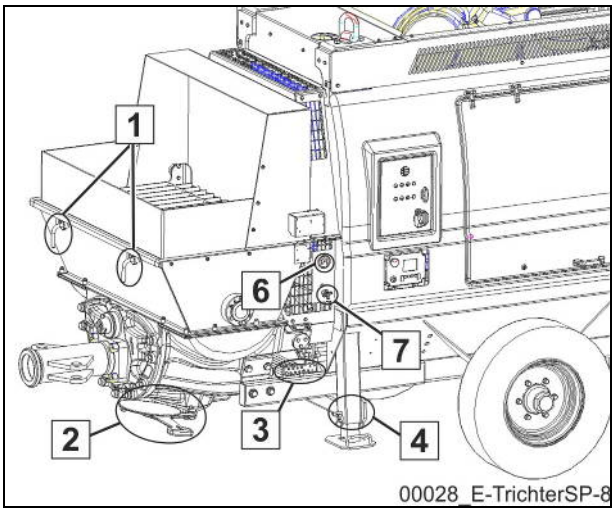

Fig. 5

3.38.2 Switching damping

The machine is equipped with a rock valve switching damping. It prevents a hard stop of the slewing cylinder in the end positions.

The switching damping is set at the factory and should only be changed for compelling reasons.

If hard, loud switching noises from the rock valve become apparent during operation, screwing in the adjustment spindle (2) (Fig. 6) can dampen the limit stop further.

However, this is associated with a stroke rate reduction.

If the rock valve incorrectly connects through, e.g. due to a rigid concrete consistency, reduce the damping by removing the spindle.

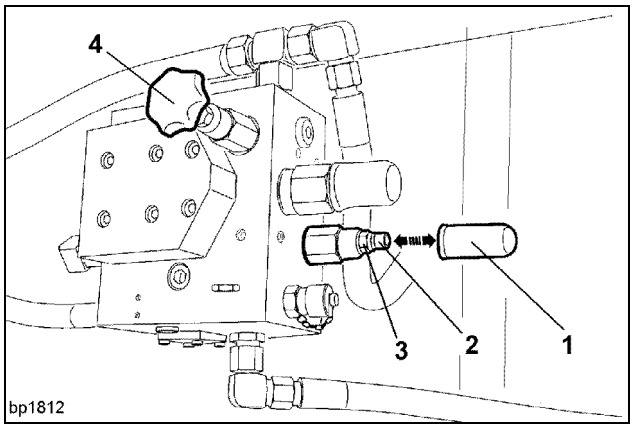

Fig. 6

Set damping:

- Remove the protecting cap 1 above the adjustment spindle 2.
- Loosen the lock nut 3 on the adjustment spindle.
- Adjust the spindle. Remember and note rotations.
- Tighten lock nut and attach protecting cap.
- Reset the spindle to the starting position once the operating conditions have normalised.

3.38.3 Diesel engine

- Check the fuel supply on the level indicator.

Open the right maintenance flap. The level indicator has been designed as a riser pipe and is located on the right next to the fuel prefilter (3) (Fig. 7).

Refill within due time.

Do not run dry fuel tank, otherwise fuel system must be vented.

See MOTOR OPERATING INSTRUCTIONS

WARNING

Observe the safety regulations for handling fuel!

- Observe the warning lights on the control station (Fig. 8). They must not light up while the motor is running.

For certain failures (e.g.: "motor oil pressure is too low"), the motor must be shut down immediately in order to prevent serious motor damage.

For other failures, it is possible, if necessary, to continue working with reduced performance (e.g.: "Air filter is dirty")

INFORMATION

Become familiar with the MOTOR OPERATING INSTRUCTIONS so that you can respond appropriately in the event of an engine failure.

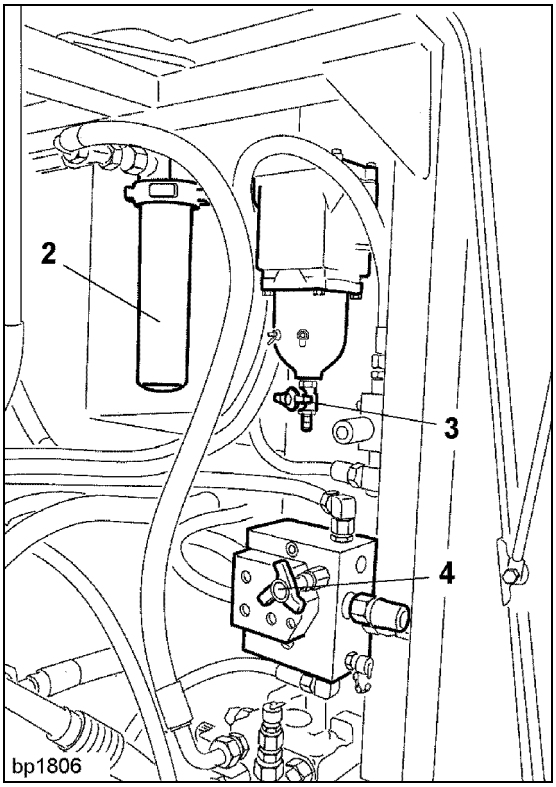

Fig. 7

Fig. 8

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3.39 Troubleshooting/emergency operation

3.39.1 Control failure

If a functional failure occurs, first check whether

- An EMERGENCY STOP button has been actuated.
- The grid assembly in the filling hopper is raised.
- A fuse has been triggered.
- * The magnets of the competent control valves are supplied with voltage.

*** INFORMATION**

The plugs of the control valve magnets are equipped with light-emitting diodes for troubleshooting, which must light up when voltage is present.

3.39.2 Electrical fuse protection for the machine control system

Depending on the type of machine, the system can be secured in several places:

- A main safety fuse located near the starter.
- Safety fuses in the switch cabinet or operator station of the concrete pump (Fig. 1).

Also see electric circuit diagram.

Check fuses:

- Switch off the motor and remove the ignition key.
- Open the top cover of the control station using the special key.

Commercially available vehicle fuses are used.

Only insert newly equivalent fuses.

ATTENTION

Material damage caused by overrated fuses!

The electrical system is destroyed due to overrated and overridden fuses

- Close the cover of the control station and begin operating the machine.

If the error occurs again:

- Stop the machine and
- have an electrician inspect the system.

Fig. 1

3.39.2.1 Main fuse

A 30A main fuse (1) (Fig. 2/Fig. 3) is located near the starter batteries on all machines with a diesel engine.

- Check this fuse when the entire electrical system has failed.

In addition to the main fuse (1), a large 80A fuse (2) (Fig. 3) is located at the same position for the preheating system, provided the motor is equipped with such system.

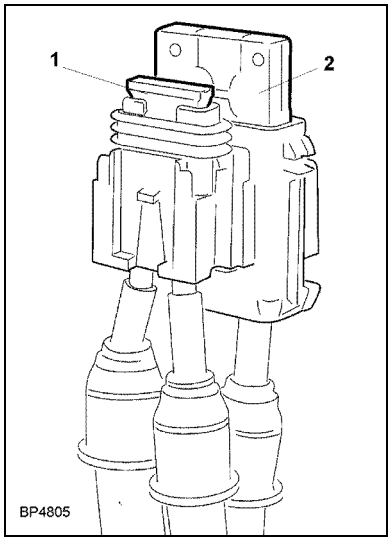


Fig. 3

3.39.3 Bypass

In the event that the machine has to be operated during an emergency or test operation, a bypass plug has to be inserted into the power outlet (11) (Fig. 4).

Without this plug, no electrical power is available to control the machine and the EMERGENCY STOP valve remains open. The concrete pump cannot be operated.

The plug is included in the tool set of the machine.

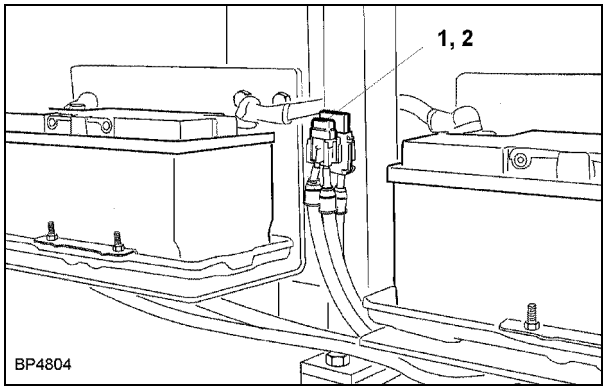


Fig. 2

Fig. 4

3.39.4 Directional valve emergency actuation

A small control lever is available in the tool set for testing the concrete pump pilot control.

The control lever (5) (Fig. 6) may only be installed for testing on the directional valve of the pilot control unit.

In order to complicate an unintentional or unauthorised switching on of the concrete pump, the control lever must be disassembled immediately after completion of the test.

The control lever can switch the concrete pump into the "pump" or "suction" direction.

After releasing the control lever, it return to the centre position and the pump stops.

- Insert the bypass plug into the power outlet (11) (Fig. 5).

- Switch on the concrete pump with the control lever (5) (Fig. 6).

⚠ WARNING

It is prohibited to block the control lever.

Wear your personal protective clothing, as well as hearing protection, during the control, and stay away from moving and hot machine parts.

Fig. 5

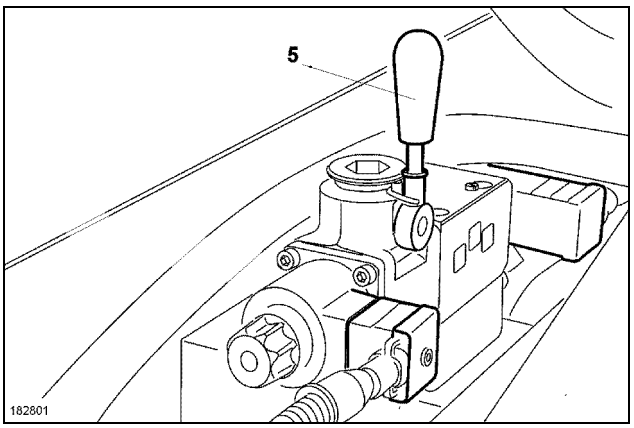


Fig. 6

3.39.5 Emergency stop valve

The EMERGENCY STOP valve 14 (see hydraulic switching diagram or Fig. 7) is located at the front of the hydraulic oil reservoir and can be reached after removing the plastic cover.

The valve is opened without current and, in open state, directs the pilot control oil of the pressure relief valve (PRV) of the concrete pump to the hydraulic oil box. The PRV opens and the concrete pump stops.

If the concrete pump stops unexpectedly, it is possible that the EMERGENCY STOP valve is open.

Check first if voltage is present at the valve. In this case, the light-emitting diode lights up in the plug of the magnet.

If this is not the case, perform troubleshooting on the electrical system.

If the diode lights up, the EMERGENCY STOP valve is defective and must be replaced.

In order to react quickly in the event of damage, we always recommend keeping an emergency unit ready.

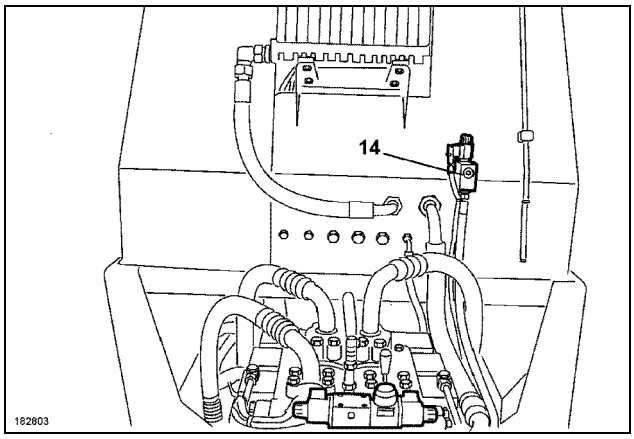


Fig. 7

CLEANING

⚠	**OBSERVE SAFETY MANUAL**

After concreting, pumping line and concrete pump must be cleaned thoroughly.

- 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 the occasional hosing down with a water hose during breaks to prevent the concrete setting

1. CLEANING DEVICES

SCHWING delivers as standard suitable equipment for cleaning machine and pumping line suitable as special equipment or accessories. For example:

- Compressor (Fig.: 1)
- Water pump 1 and high-pressure cleaning system 3 (Fig.: 2)
- Cleaning head and trap basket (Fig.: 3)

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.

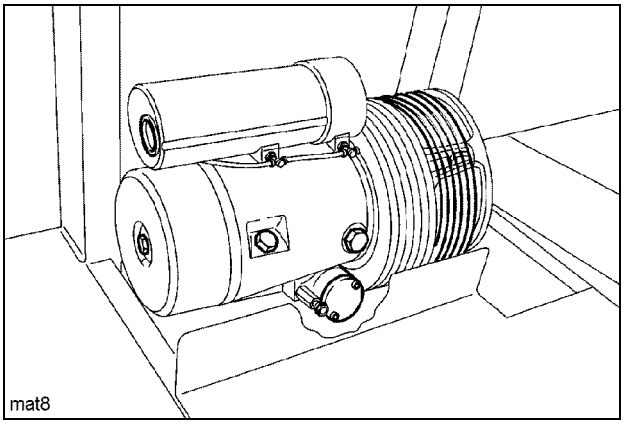


Fig.: 1

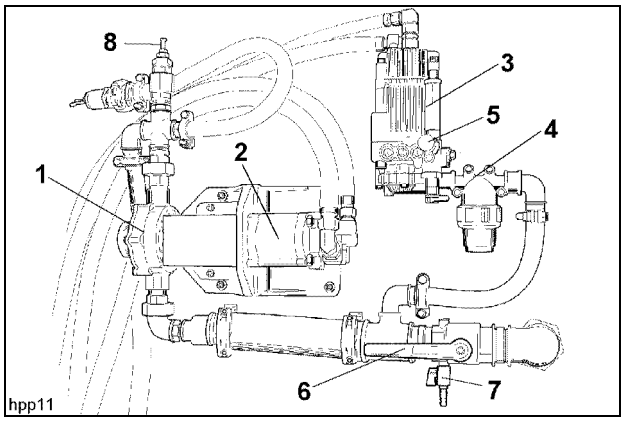


Fig.: 2

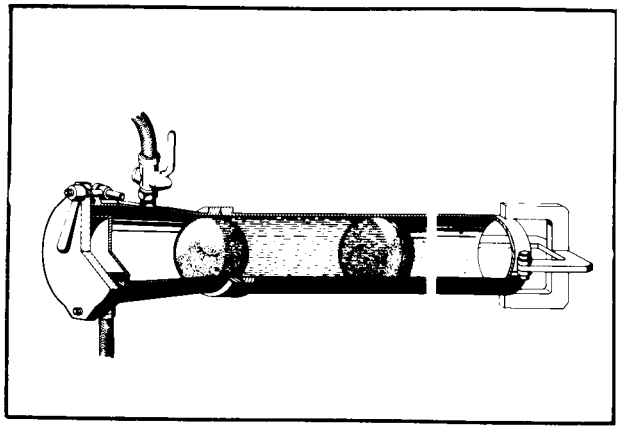


Fig.: 3

INFORMATION

For the high-pressure cleaning system available as special equipment, refer to the separate operating instructions in the appendix.

2. CLEANING PUMPING LINE

- After the work assignment, clean the pumping line first since this is where the concrete setts 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!

Before opening the pumping line, the concrete column must be released by pumping backwards.

Various methods are applied to clean a pumping line:

2.1 REVERSE PUMPING OF 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 folding covering for hopper when machine is equipped accordingly.

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.: 4) releases the overpressure through the rear, lowered hopper rubber border.

Ensure the good condition of the safety device, and do not make any modifications!

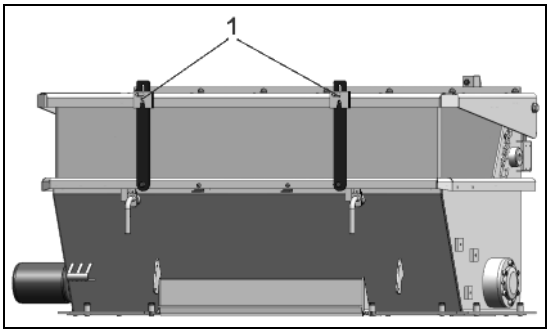


Fig.: 4

- Slowly pump hopper empty as far as possible.
- Position the placing boom as shown in (Fig.: 5).
- A delivery tube with cleaning cover 2 (Fig.: 6) 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 VECTOR control switch automatically.

- Push the damp sponge rubber ball into the end hose (Fig.: 7), then switch the concrete pump with a lower stroke rate to "suck" (reverse running).

ATTENTION

Failure to observe this information can cause deposits in the pumping line and subsequent clogging, as well as damages to the agitator.

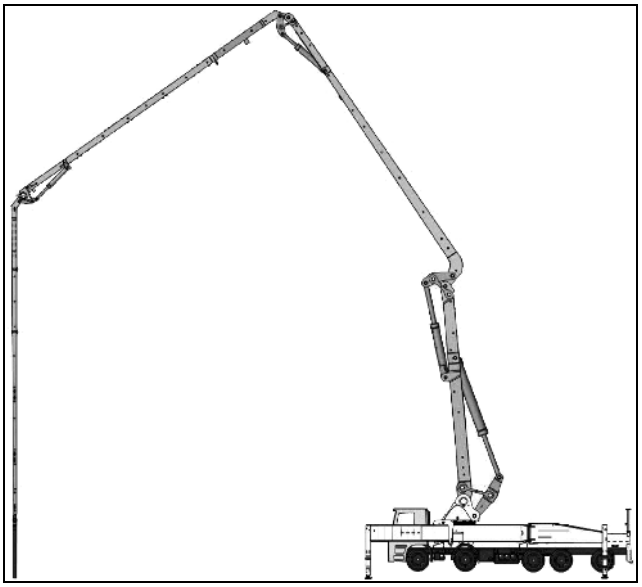


Fig.: 5

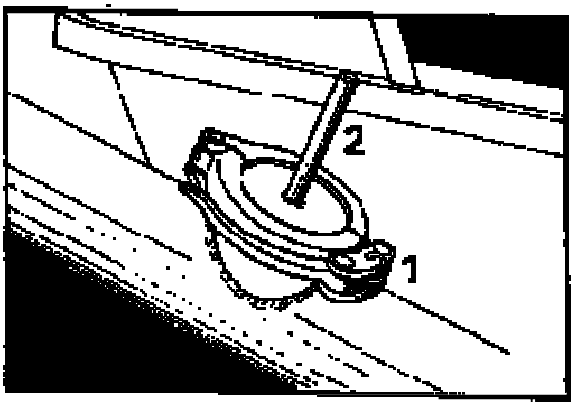


Fig.: 6

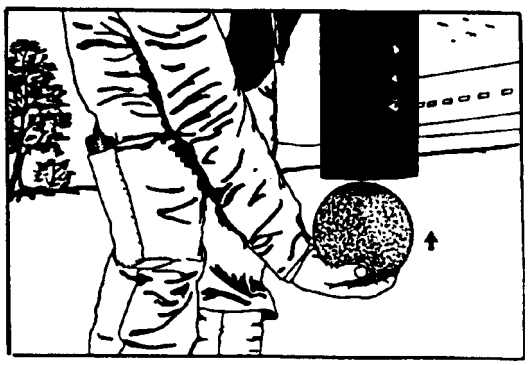


Fig.: 7

- Briefly tap the delivery tube with the handle of a hammer in front of the cleaning aperture.

If there is still concrete in the line at this point, the tapping produces deep, dull sounds (Fig.: 8).

If concrete and sponge rubber ball have passed the tapping point, the tapping produces high-pitch tones (Fig.: 9).

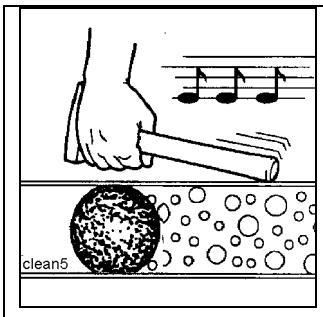


Fig.: 8

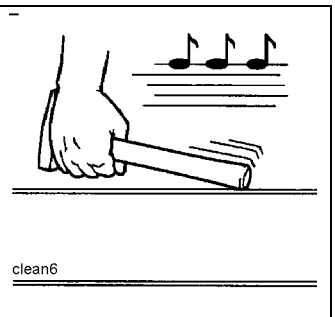


Fig.: 9

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 delivery tube!
- The inner hardened layer of highly wear-resistant tubes can spall.

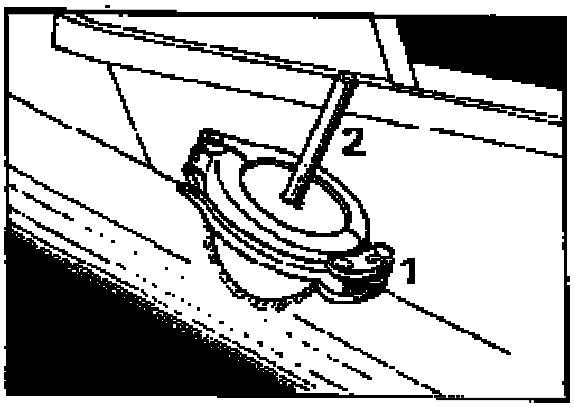


Fig.: 10

- Loosen top cover 2 (Fig.: 10) and remove cleaning ball.
- Mount 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.

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.

We, therefore, recommend to interrupt the back siphonage process at the latest after 4 strokes and empty 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 our chamber valve (Fig.: 11) for cleaning the pumping line, especially for larger machines.

See separate operating instructions in the appendix.

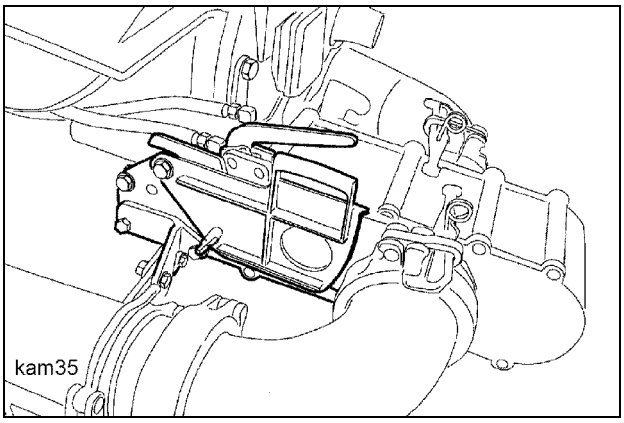


Fig.: 11

2.2 BLOW OUT PUMPING LINE WITH WATER

This method is ideal for separately laid, long pipelines, vertical lines and lines with 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.: 12):

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.

2.3 RINSE 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 delivery tube (Fig.: 13).

- Mount cleaning head with inlaid, soft sponge rubber ball to the pipeline.

- Fill with water between both balls.

Use water cushion to press both balls through the line, as in blow out with air. Se 2.4.e

ATTENTION

Frost damage!

In case of danger of frost, remove water from the pumping line.

Erect placing boom, if necessary.

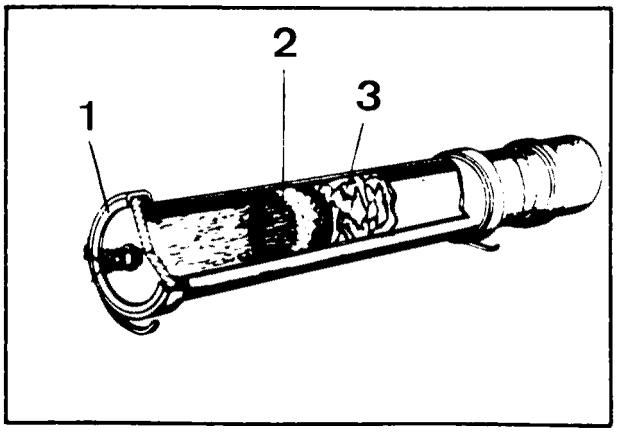


Fig.: 12

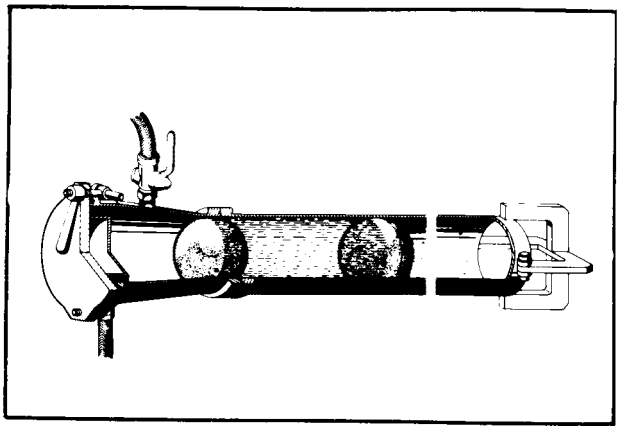


Fig.: 13

2.4 FORCE OUT (BLOW OUT) PUMPING LINE WITH COMPRESSED AIR

⚠ WARNING

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 output (Fig.: 14).
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 valve 3 (Fig.: 15).
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 valve 3 (Fig.: 15). 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 made paper plug, as referred to above, a hard sponge rubber ball is used for blowing out.

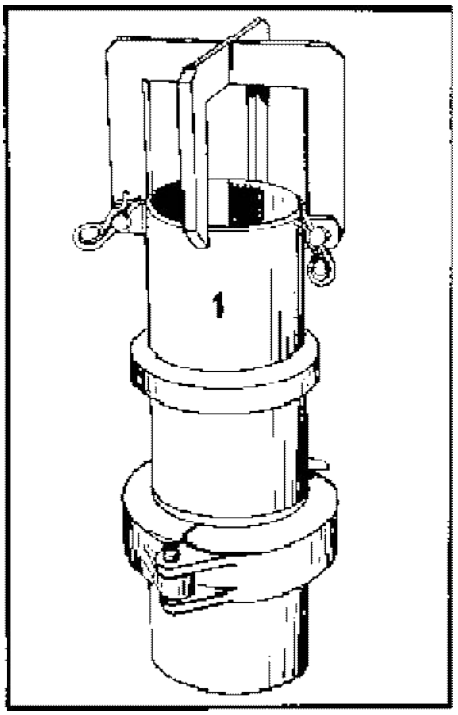


Fig.: 14

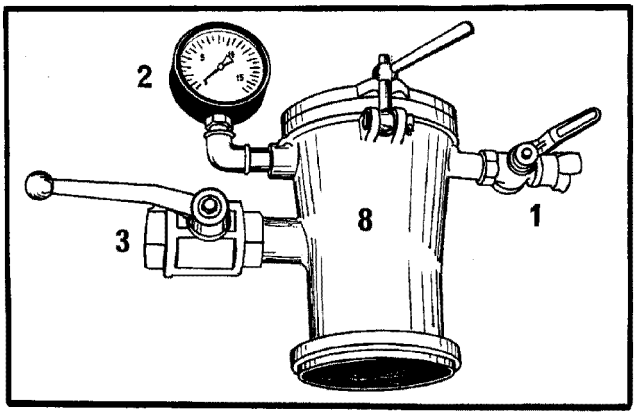


Fig.: 15

3. CLEAN CONCRETE PUMP

WARNING

The following must be observed.

- Do not remove the grid from the concrete filling hopper or enter the grid.
- Do not reach into the machine whilst the drive motor is running or pressure accumulator is charging, or keep objects in openings.

DANGER

Danger to life by electric shock!

- - Do not direct water jets or the jet of a pressure cleaner towards the electrical components of the machine.

* In the "CE" equipment, an end limit switch stops the concrete pump and agitator when the grid is opened.

This is not an EMERGENCY STOP function!

The interrupted functions restart after closing the grid.

3.1 SECURE MACHINE

- Remove the remote control cable.
- Connect the radio remote control transmitter.
- Use the local control.

WARNING

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.

3.2 INSIDE CLEANING

- Have the drip pan for concrete residue ready before beginning cleaning.
- Remove the tapered tube from the pipeline outlet of the stationary concrete pump or remove the pipeline outlet from the boom of the truck-mounted concrete pump by pivoting it to the side and securing it with wedge 2 (Fig.: 17).
- 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 construction site.
- Connect the water hose and hose out the filling hopper (Fig.: 16).

The concrete pump sucks in water and cleans the pumping cylinders.

- Switch off the concrete pump and the vehicle engine!

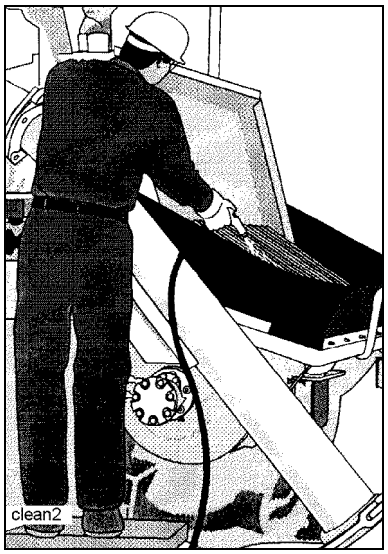


Fig.: 16

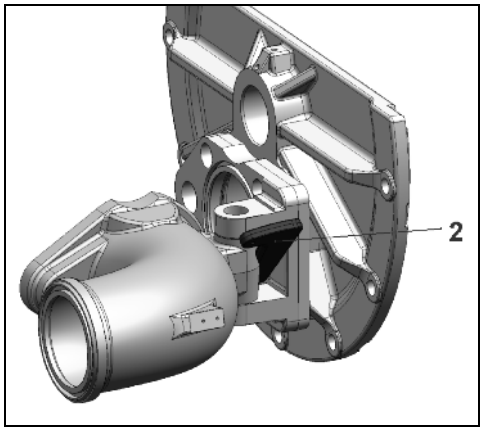


Fig.: 17

- Open the cleaning flap (Fig.: 18) under the rock valve housing
- Flush out the rock valve housing.
- Clean the agitator, gate valve housing, pipeline outlet, etc. with a strong water jet.

  Only hold the water jet and not the hose nozzle into the opening of the gate valve housing (Fig.: 19).
- Rinse the water box by switching on the concrete pump briefly with the lowest stroke rate with open drain valve.

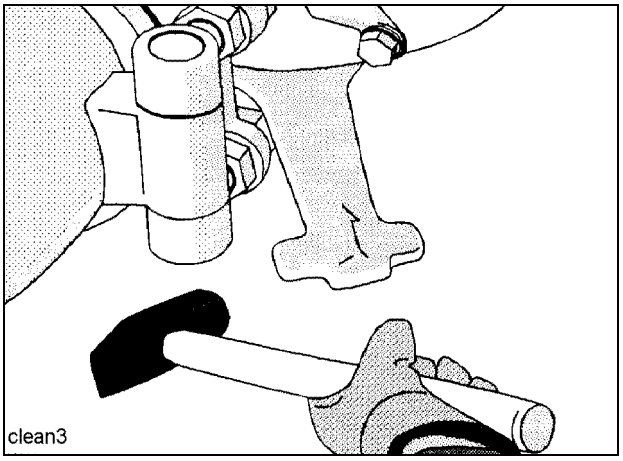


Fig.: 18

ATTENTION

Material wear!

Switch off concrete pump immediately if water no longer comes out

- Hose out the water box with pressure water (Fig.: 20). Do not remove grid from 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.

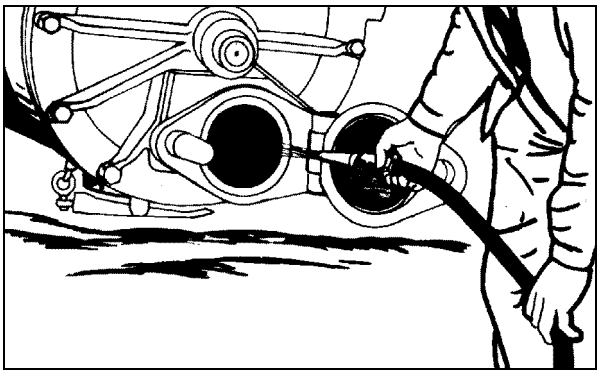


Fig.: 19

WARNING

Danger of crushing!

Always switch off the drive motor and relieve any existing pressure accumulators before opening top covers of 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.

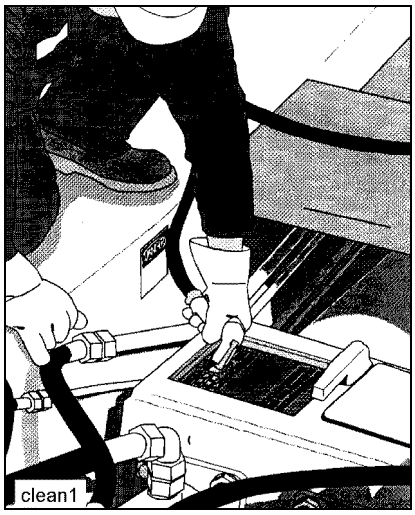


Fig.: 20

- Close and secure the cleaning cover of the rock valve (Fig.: 21).

This is done with a few hammer blows in the axial direction on the end of the slewing lever.

Whereby jamming the flap in the wedge-shaped constructed guides.

INFORMATION
Do not forget to secure!

Vibrations can cause the flap to open.

INFORMATION
Let flat gate valve machines run a few more strokes, so that the flushing oil coats the gate valve bars with a lubricating film.

ATTENTION
Material damage! Never let rock valve machines run "dry". The kidney seal can be damaged

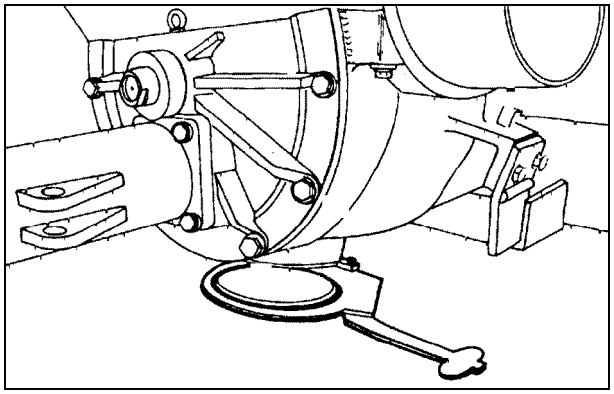
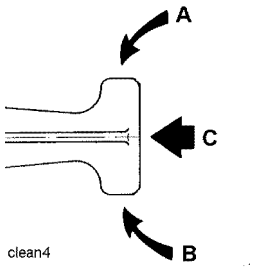


Fig.: 21

A = opening

B = closing

C = securing



3.3 OUTSIDE 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.

3.4 USE OF HIGH-PRESSURE CLEANERS (HD 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.

During this time, do not clean the machine with an HP cleaner.

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 100 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.

3.4 USE OF CLEANING AGENTS

DANGER

Fire hazard!

Do not use highly flammable agents.

- Do not use aggressive cleaning agents. They can affect different materials (e.g. rubber) and painted surfaces.
- Commercially available paint-cleaning 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 cleaning agent with clean water. Do not leave puddles.

3.5 AFTER CLEANING

- Lubricate all lubrication points after cleaning.
- We recommend spraying the dry machine with a wax-based preservative for protection against corrosion.

3.6 WATER BOX FLUSHING (Special equipment)

Our truck-mounted concrete pumps can be equipped with a pressure flushing of the water box as special equipment.

With this device, the usual manual cleaning of the water box is omitted to a large extent.

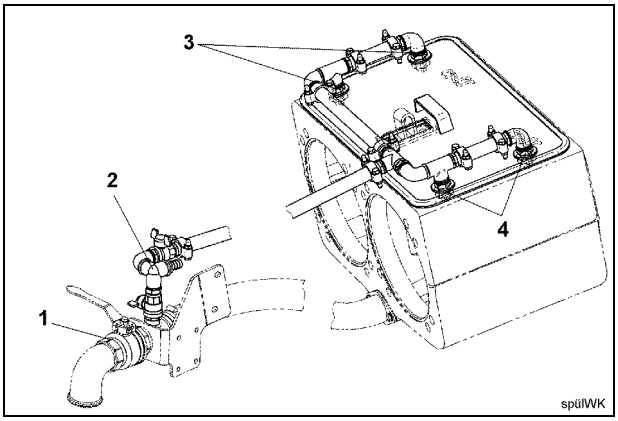
Four spraying nozzles in the top cover of the water box rinse the inside of the water box and piston rods of the differential cylinder.

Application:

- Open the drain cock 1 (Fig.: 22) of the water box at the rear of the machine.
- Start the water pump and route pressurised water to the spraying nozzles 3 of the water box by switching the corresponding ball valves 2 at the rear of the machine
- Start the concrete pump at a lower stroke rate.
- Finish 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 check the cleanliness at least once a week through visual inspection.



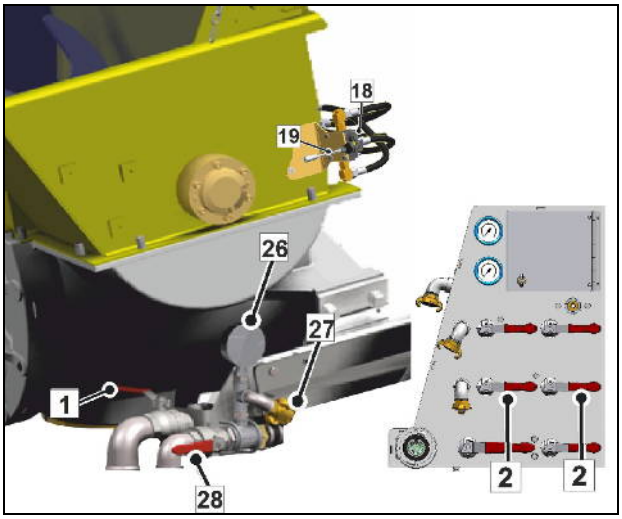


Fig.: 22

HAZARD PREVENTION FOR THE CONCRETE FILLING HOPPER

HOPPER GRATE

During the intended use of our concrete pumps, the hopper grate in the concrete filling-in hopper is tightly screwed in closed position or coupled with an end limit switch.

When you open the hopper grate, this switch closes the drives of the rock valves and agitator.

WARNING

Check the cut-off every day and have it repaired immediately if necessary.

Arrangement and design of the hopper grate according to EN 12001.

Assuming normal behaviour of the personnel, in all appropriate operating conditions, for example:

- Working operation

- Cleaning

- Maintenance and repair

the required safety at work is ensured.

DANGER

It is forbidden to turn the machine on when the hopper grate is removed or opened, or to manipulate the end limit switch.

With the hopper grate being removed or opened, there is a risk of fatal injury, e.g. from falling in, catching, squeezing, and rolling.

Even if the hopper grate is closed, improper action may give rise to residual hazards,

e.g. getting caught, being crushed or being taken in.

Improper actions include for example:

- Reaching through the hopper grate

- Passing items (e.g. water hose, rod, etc.) through the hopper grate.

Clean the concrete filling-in 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 any fixed concrete residues that cannot be removed with a pressure water jet can be taken out by appropriate tools:

- Stop the machine.

- Switch off the drive motor and prevent it from starting up.

- Discharge the pressure accumulator - If present.

CLEANING FLAP AND PIPELINE OUTLET

DANGER

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.

To more clearly illustrate the above-mentioned risks our machines can be fitted with danger signs.

In older machines, we ask you to read the signs (Fig. 1) left and right of the agitator hopper or in its proximity.

Other signs can be ordered.

The adhesive areas must be clean and free of grease.

Ensure the good condition of the signs, and renew damaged labels immediately.

DANGER

DO NOT reach into the hopper and do not hold ANY objects in it.

98361446, Fig. 1

WARNING

DO NOT climb the hopper.

*98380002, Fig. 2

* = Additional label for stationary concrete pumps

RESTORE TRANSPORT READINESS

⚠	**OBSERVE SAFETY MANUAL**

- Clean the machine and switch off concrete pump, auxiliary drive and drive motor.

- Disconnect the remote control cable from the machine.

- Mount wheels, if necessary.

- Secure machine with wheel wedges.

- Lay a suitable spacer (e.g. item no.: 1095646) under the supporting dish of the crank support (Fig. 1).

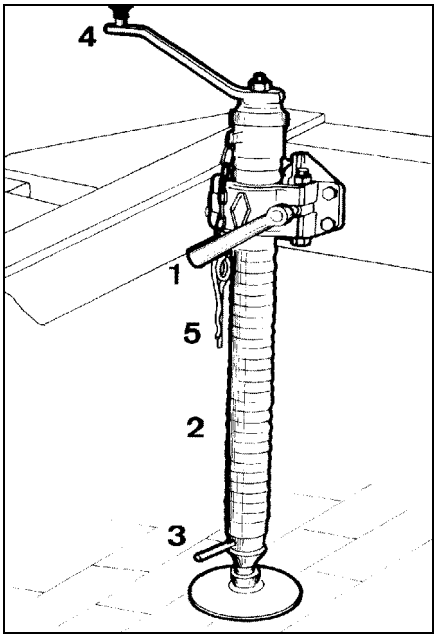


Fig. 1

MECHANICAL OUTRIGGER

- Lift the machine at the front somewhat with the crank support (Fig. 1) until the front supports 1 (Fig. 2) are unburdened.

- Retract the front supports and secure them with socket pins and split pins.

- Unburden the rear supports 2 (Fig. 2) by lowering the machine somewhat at the front with the crank.

- Retract the rear supports and secure them with socket pins and split pins.

- Place the machine with the crank support in a horizontal position.

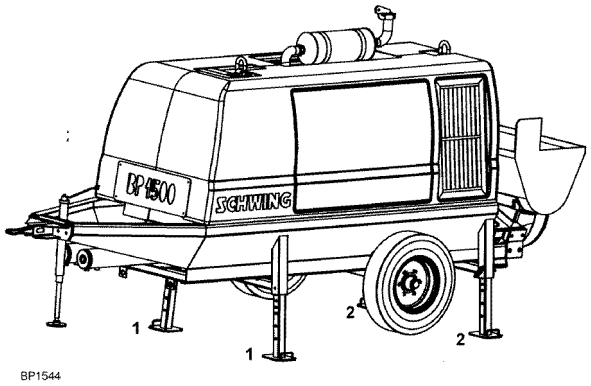


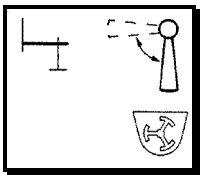
Fig. 2

SEMI-HYDRAULIC OUTRIGGER

(Special equipment)

- Lower the crank support (Fig. 1) until the supporting dish touches the ground.

- Switch the ball valve into the position

"Outrigger" 

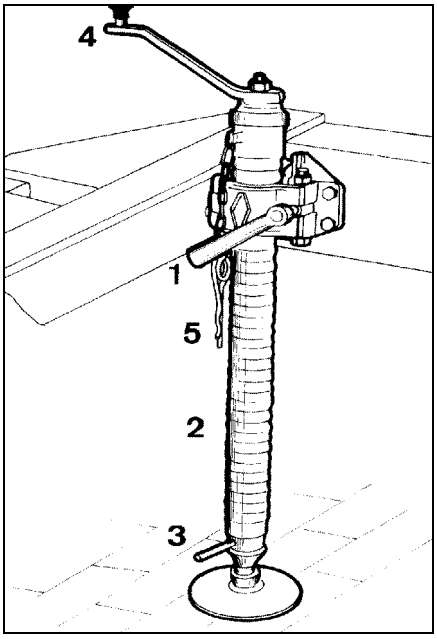


Fig. 1

INFORMATION

The entire oil flow of the auxiliary pump is conducted to the outrigger, in the "Outrigger" position of the ball valve. The auxiliary pump may not drive any other aggregates.

- Start the drive motor.

- Retract the front, hydraulic supports 1 (Fig. 2) with the control levers on the machine.

- Shut down the drive motor.

- Unburden the rear mechanical supports 2 by lowering the machine somewhat at the front with the crank (Fig. 1).

- Retract the rear supports and secure them with socket pins and split pins.

- Place the machine with the crank support in a horizontal position.

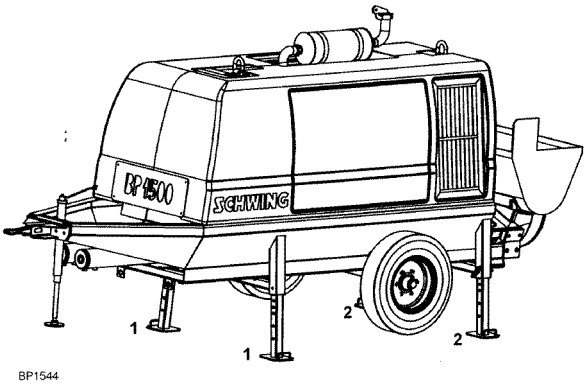


Fig. 2

⚠ CAUTION

Danger of crushing!

When lowering the machine, ensure that no unauthorised person is in the vicinity of the machine and no one will be crushed by the machine or machine parts.

- Have a qualified electrician disconnect the supply cable of the e-machine.

- Drain the operating materials, if necessary.

- Close and lock maintenance flaps.

COUPLING

⚠ CAUTION

Danger of crushing!

No one may remain between concrete pump and towing vehicle during coupling.

The guide for the driver must be within the field of vision (rear mirror).

- Set height of the draw bar with the crank 4 (Fig. 1) and couple the machine to the towing vehicle.

- Loosen toggle 1, insert protective tube 2 and tighten toggle.

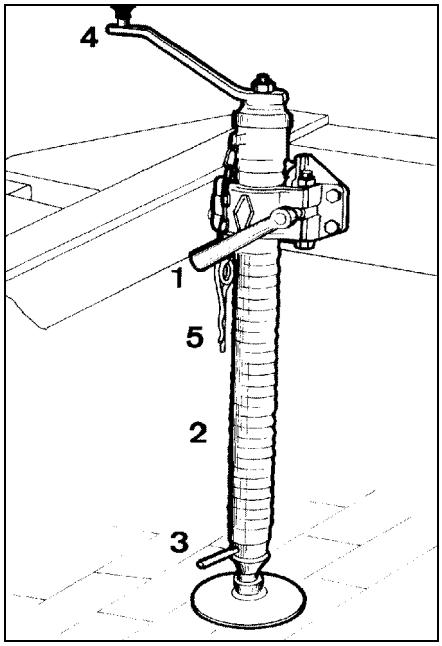


Fig. 1

CRANE LOADING

- Use suitable slings and only attach them to the lifting eyes on the machine (Fig. 1,2).

DANGER

Falling loads!

Do NOT exceed load capacity of lifting eyes due to additional weight of accessories and remnants of pumping medium!

Determine weight of loads prior to raising.

ATTENTION

Chain lengths that are too short lead to serious strain on the straight frame.

When transporting the machine with chain slings, the individual chain lengths must be a minimum of 2.5m!

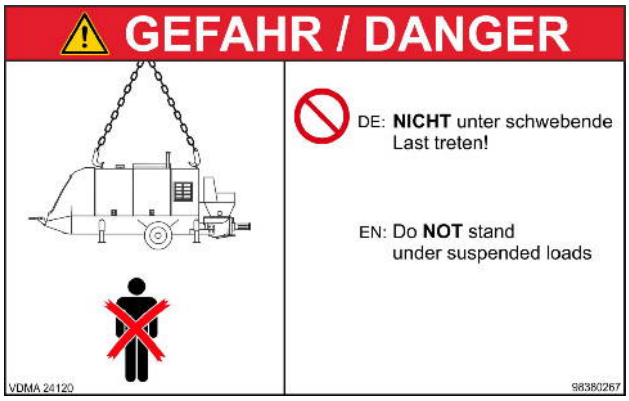


Fig. 1

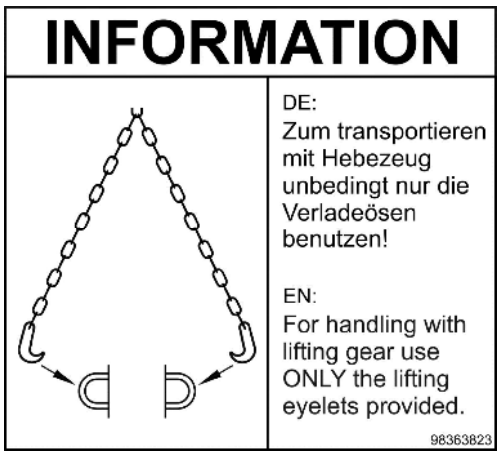


Fig. 2

SEVERE OPERATION CONDITION

⚠	**OBSERVE SAFETY MANUAL**

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". See also chapter 1.3:

THEORETICAL LIFE OF THE MACHINE

Our machines are usable as standard at ambient temperatures of -15° C to +30° C when operating materials are used according to our recommendations (chapter 4.4).

ATTENTION

At ambient temperatures below -15° C, placing booms may not be used (Fig.: 1). There is a danger that it may cause brittle fractures to steel components. In addition, extreme cold can destroy rubber- And plastic parts.

In case of frost, danger of frost, and in extreme heat, special measures are required summarised under the following headings

1. **LOW AMBIENT TEMPERATURES**

or

2. **HIGH AMBIENT TEMPERATURES**

.

1. LOW AMBIENT TEMPERATURES (up to -15° C)

1.1 GENERAL

- Place the machine overnight in a closed hall, if possible.

1.2 VEHICLE or 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 used.
- Check frost protection.
- Convert frost protector of air system.
- Refuel with winter diesel fuel.
- Ensure good condition of the electrical system. See 1.8

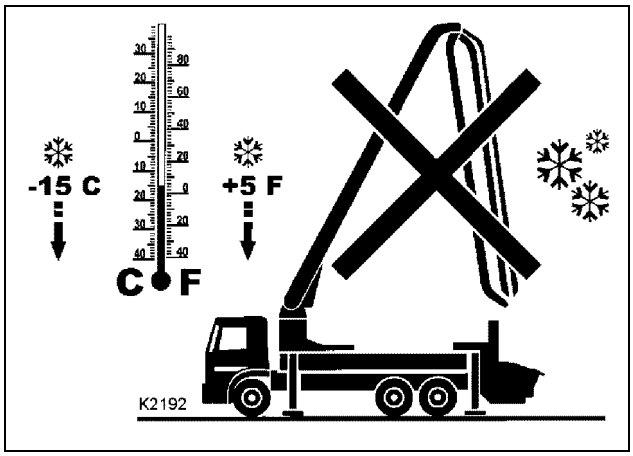


Fig.: 1

1.3 WATER SYSTEM

ATTENTION

Danger of ice and frost damage!!

Frozen aggregates (e.g. do not switch on water pump.

Do not heat with a flame or pour hot liquid over
over.

Slowly thaw machine in a closed hall.

- Fill the water immediately before the first application in the water box and water case.

ATTENTION

ATTENTION: No ice layer must form on the inside walls of the water box and pumping cylinder. 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!

- Empty the entire water system (water pipes and -pump, water box, reservoir) after application. Switch on concrete pump briefly to remove the water from the pumping cylinder.

1.4 HYDRAULIC SYSTEM

SCHWING recommends appropriate hydraulic fluids for different climates and applications. See chapter 4.4

The multi-purpose hydraulic oil filled in at the Herne plant can remain in the system, insofar as the starting temperature does not drop below -10° C.

Should work be carried out at temperatures ranging between -10° C and
-15° C, changing 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 mm²/s) is also at an oil temperature between approx. 30 and 55° C for a hydraulic oil of viscosity class VG 32.

INFORMATION

The system may only be fully loaded in the area of the optimum operating viscosity.

The highest permissible temperature for a VG 32 is, however, below that of a VG 46 or VG 68.

See diagram on next page:

(a) = Cold start limit in °C

(b) = Oil temperature in °C

(c) = Viscosity in mm²/s

(d) = Optimum operating temperature and viscosity

* Viscosity = Resistance to flow

Viscosity-temperature diagram:

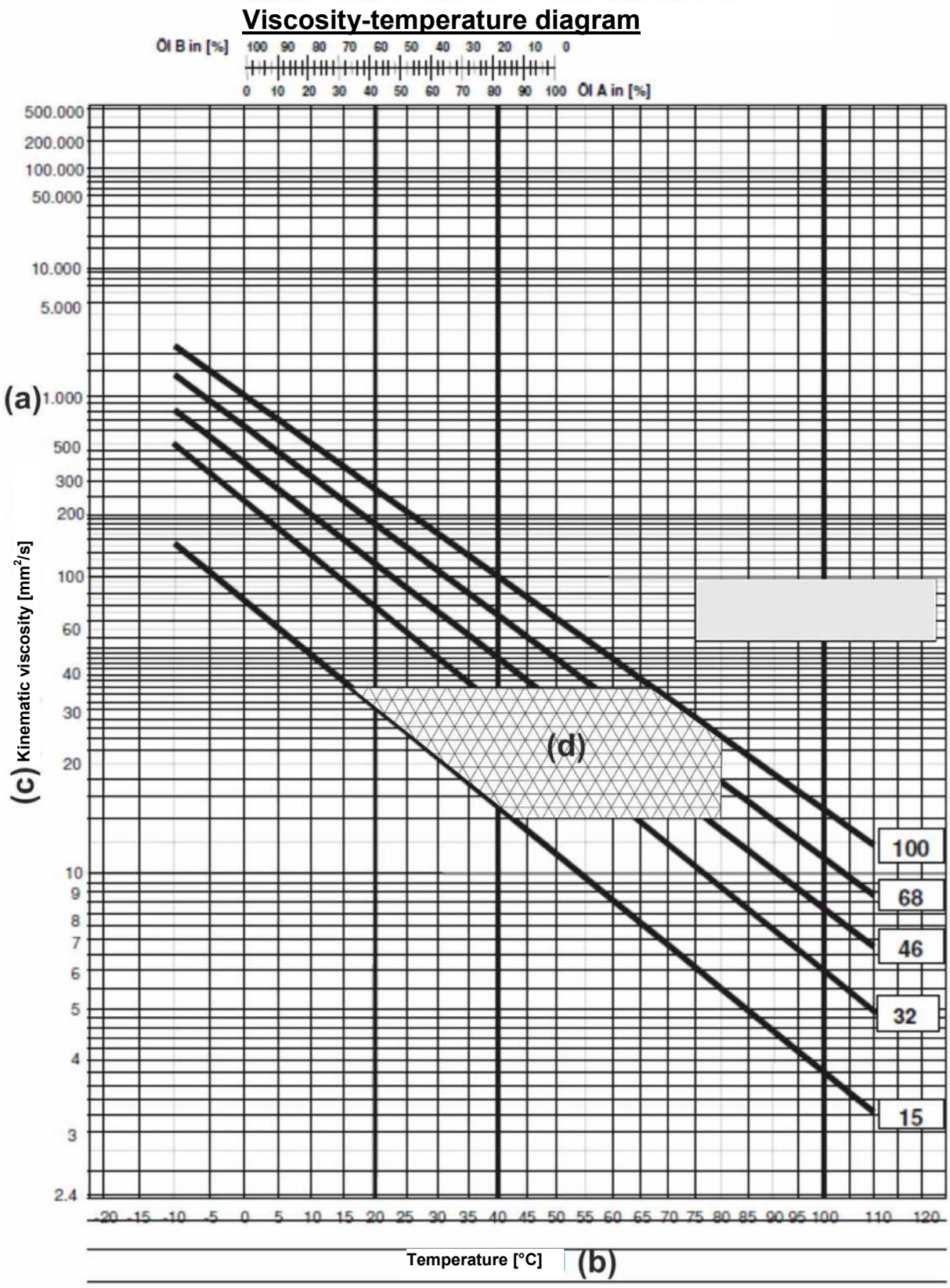


Fig.: 2

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 it was filled in 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 point, there is the possibility to warm the hydraulic oil using the sturdier gear pump of the agitator circuit.

- In addition, close the ball valve 1 (Fig.: 3) 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 vector control.

If the optimum hydraulic oil temperature is reached according to diagram (Fig.: 2), reopen the ball valve.

1.5 AIR SYSTEM

Due to its constructions, piston compressors may not be commissioned at ambient temperatures under +1° C (risk of damage caused by frozen water).

Rotation compressors are usable up to -15° C, with appropriate maintenance.

Since the vehicle air system provides the electro-pneumatic pilot control for some truck-mounted concrete pumps, it is, therefore, 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 keep water from freezing.

1.6 GEAR

A gear oil change is only required at continuous temperatures below -10° C.

It is also possible to use a multi-purpose oil.

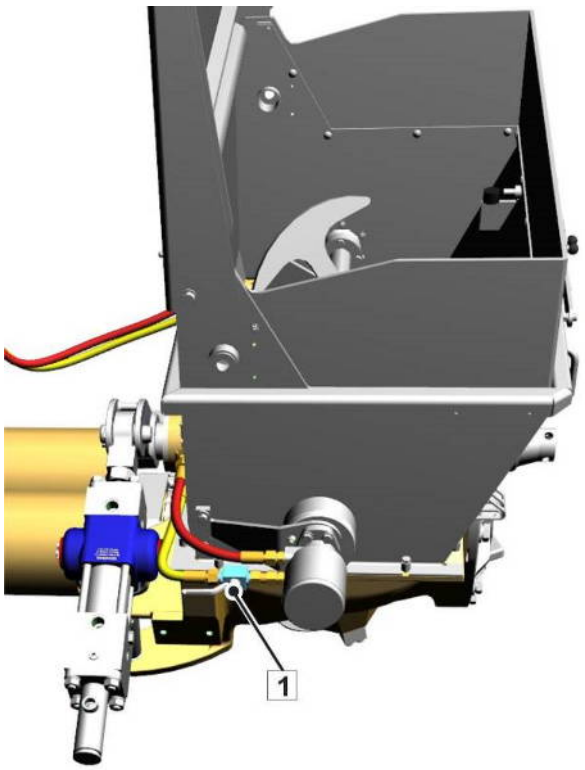


Fig.: 3

Should such oil not be available, please use an oil with a viscosity level "thinner" than the recommended gear oil (see gear type plate) thus

VG 150 instead of VG 220 (industrial gear oil)

or

SAE 80 instead of SAE 90 (vehicle gear oil)

Comparison of viscosity classes

Industrial standard	Vehicle standard	
e.g. hydraulic oil	Motor oil	Gear oil
ISO-VG	SAE	SAE
22	5W	
32	10 W	75
46	15 W	
68	20 W / 20	
100	30	80
150	40	
220	50	90
320		
460		140
680		140
1000		250

"thin"

"thick"

1.7 GREASE LUBRICATION POINTS

The KP2K lubricating greases listed in chapter 4.4 are suitable for temperatures up to -20° C.

1.8 ELECTRICAL SYSTEM

The initial capacity of the batteries depends on the battery status and ambient temperature.

- Ensure good battery status. 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 battery status of the generator.

1.9 RADIO CONTROL

The radio control is usable up to -20° C.

INFORMATION

Charging the battery becomes problematic with temperatures below +10° C.

Please heat the driver's cab or use a separate charger, if possible, at a room temperature of +20° C.

1.10 SETTING UP THE MACHINE

Frost, thaw, rain, etc. can cause extreme changes to the load of the bottom.

- Before start of work, check the bottom conditions and observe them during the operation.

1.11 COLD START

- Place the machine overnight in a closed hall, if possible.

- After a cold start, operate the hydraulic system without load at low speed for some minutes.

  This will cause aggregates and oil to heat and build up a stable lubricating film. See also chapter 3.12.

- Extend the connection pieces with low pump speed.

- Set the placing boom with low pump speed and run all boom cylinders.

- Run the concrete pump with reduced stroke count until the hydraulic system reaches operating temperatures.

1.12 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.

1.13 DECOMMISSIOING

- Clean the machine after working operation.

  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 (could freeze) when the machine can be otherwise secured effectively from rolling away.

2. HIGH AMBIENT TEMPERATURES

2.1 GENERAL

In principle, it is useful to "keep an eye" on the temperatures of the pumping line, individual aggregates and fluids at high ambient temperatures.

It is also possible to place the machine such as to protect it from direct sunlight.

Machine and pumping line should be painted brightly.

Relocate separate pumping lines preferably in the shade, cover, if necessary.

Make sure that the VECTOR control of our truck-mounted concrete pump monitors the hydraulic oil temperature and reduces the power of the concrete pump as of +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, as well as the coolant up to the max. marking.

INFORMATION

Do not fill too much! Liquid expands during heat and the reservoirs overflow.

- Keep the slats of the motor- And hydraulic fluid clean.

  Clean more often with high dust accumulation.

- Change the insert of the motor air filter, if necessary.

- Do not open the maintenance flaps in order to improve the cooling effect.

  This could interfere with the air circulation and have the opposite effect.

- Ensure correct adjustment of the hydraulic system. For example, a too low setting of a pressure relief valve 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 when it warms up excessively.

- Sprinkle the differential cylinders of the concrete pump with a water hose.

INFORMATION

Do not spray water onto the hydraulic oil box.

This would cause strong water condensation in the box.

- Do not feed 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.

CAUTION

Sucking in air increases the risk of an accident caused by a troubled boom and pounding of the end hose!

Reduce the stroke rate and make sure that the filling hopper is always filled by 2/3.

- 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.

2.2 VEHICLE or 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 used.

- Convert frost protector of air system.

2.3 WATER SYSTEM

- Also make sure the water case is well filled, because water must be used for the cooling of the concrete pump, if necessary.

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 chapter 4.4.

If a single-grade oil VG 46 is used, the oil must be changed to VG 68. When changing the oil, also replace the filters.

Should these oils be insufficient despite perfect application of the hydraulic system and optimum cooling (see item 2.1), please contact us.

Please make sure that a "thicker" hydraulic oil of the viscosity class VG 100 has a cold start limit of +3° C, and the optimum operating viscosity is significantly above.

This could cause difficulties in areas with highly variable temperatures (night/day).

See diagram below:

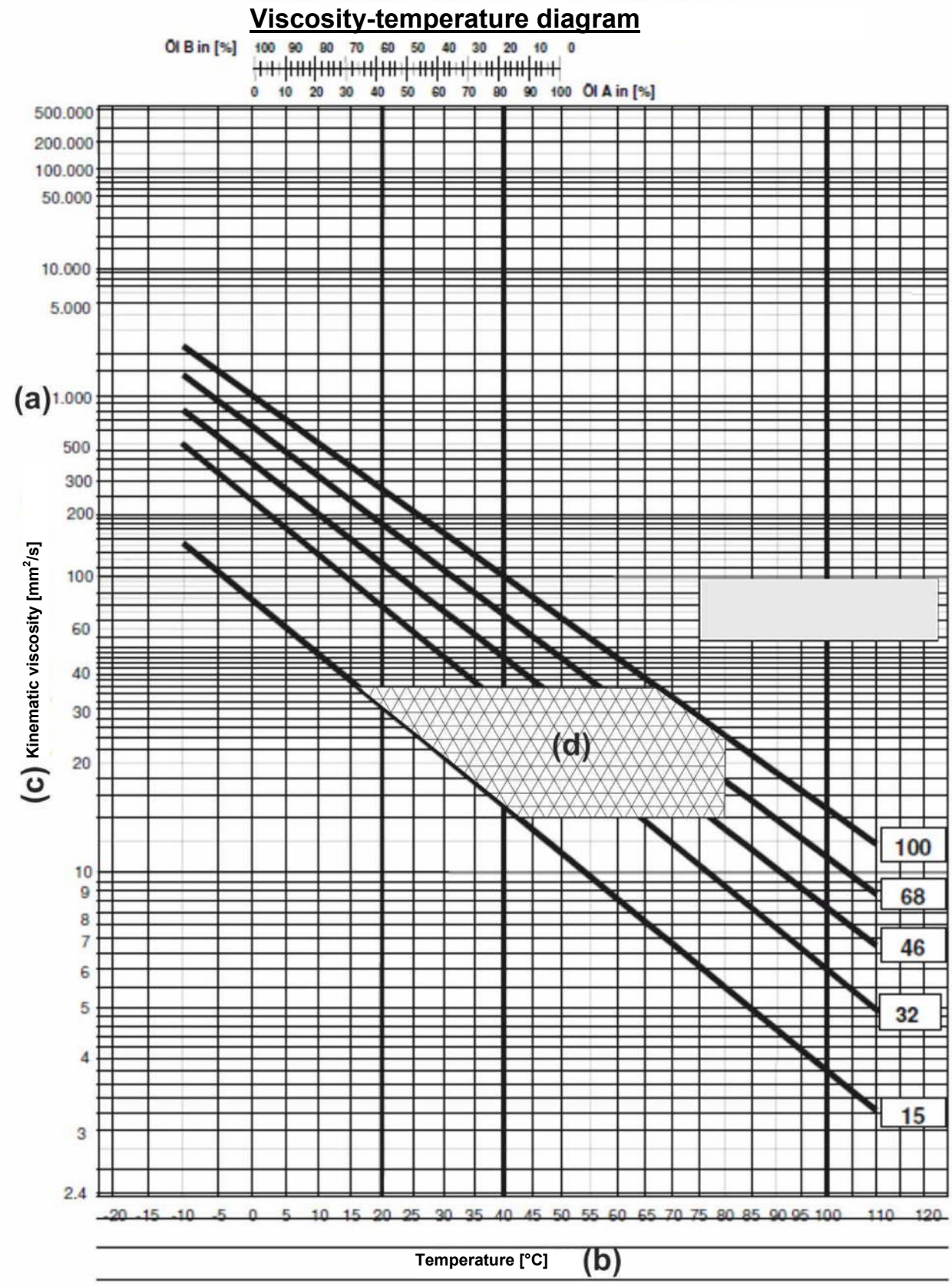
(a) = Cold start limit in °C

(b) = Oil temperature in °C

(c) = Viscosity in mm²/s

(d) = Optimum operating temperature and viscosity

Viscosity-temperature diagram:



2.5 AIR SYSTEM

Use a compressor oil for the reciprocating compressor of viscosity class VG 150.

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 nevertheless cause the machine to shutdown due to overheating, please contact us.

2.6 GEAR

The gear oils proposed in chap. 4.4 are suitable for continuous ambient temperatures of approx. -10° C up to approx. +40° C.

INFORMATION
A gear oil change is only required at continuous temperatures above +40° C.

It is also possible to use a multi-purpose oil.

Should such oil not be available, please use an oil with a viscosity level "thicker" than the recommended gear oil (see gear type plate) thus

VG 320 instead of VG 220 (industrial gear oil)

or

SAE 140 instead of SAE 90 (vehicle gear oil)

Comparison of viscosity classes

Industrial standard	Vehicle standard	
e.g. hydraulic oil	Motor oil	Gear oil
ISO-VG	SAE	SAE
22	5W	
32	10 W	75
46	15 W	
68	20 W / 20	
100	30	80
150	40	
220	50	90
320		
460		140
680		140
1000		250

"thin" ↕ "thick"

2.7 GREASE LUBRICATION POINTS

The KP2K lubricating greases listed in chapter 4.4 are suitable for temperatures of -20° to +140°C.

2.8 ELECTRICAL SYSTEM

- Check the acid level of the battery cells more frequently at high ambient temperatures.

INFORMATION
Only refill with distilled water!

2.9 RADIO CONTROL

The radio control is usable up to +60° C.

2.10 SETTING UP THE MACHINE

The load-bearing capacity of heat-sensitive subsoils, such as asphalt, decreases as the ambient temperature rises.

- Ensure a firm underground.

2.11 COLD START

- Pay particular attention to a gentle start of the system when equipping the machine with special lubrication for high-temperature range.

  Lubricants of high viscosity (viscous) only reach their maximum optimum operating viscosity later on.

  The hydraulic pumps can be damaged, as described under item 1.11.

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.

- Ensure good pumpability of the concrete.

- Avoid longer breaks.

  During pumping breaks, cover the concrete in the filling hopper of the concrete pump, for example, with wet bags.

- Start cleaning immediately after pumping.

2.13 DECOMMISSIOING

- 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 being pumped through the radiator.

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DECOMMISSIONING

⚠	**OBSERVE SAFETY MANUAL**

If the machine is to be decommissioned for a longer time:

- Clean and lubricate the machine thoroughly.
- Check the antifreeze concentration of liquid-cooled motors and top up if required.
- Drain condensation water from fuel, hydraulic and air system reservoirs.

  Fill fuel tank and oil box to the brim.

  If the oil is in poor condition, change it.
- Fill all gearboxes with the prescribed amount of oil.

  If the oil is in poor condition, change it.
- Apply acid-free grease to bare machine parts or spray them with preserving oil.
- Preserve concrete delivery tubes by pushing a cotton waste plug soaked with preserving oil through the pumping line.
- Retract all hydraulic cylinders.
- Set all control elements to position 0.
- Relieve pressure accumulators.
- Preserve motor according to the motor operating instructions.
- Drain water from the reservoir, water box and water pump.
- Spray water box with a rust-protective agent.
- Close all openings and waterproof.
- Jack up the vehicle in order to let down the tyres.
- Check tyre pressure.
- Release parking brake.
- Remove starter batteries (lead-acid batteries) and store in a cool (5-15°C), clean and dry location.

Permanently connect batteries to a charger with trickle charging or charge at monthly intervals (no quick charging). Then check the fluid level.

❗	**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, as well as the operating instructions from the motor or chassis manufacturer.

RECOMMISSIONING

- Remove preservation.

- Check all oil levels.

  Empty hydraulic oil box to inspection glass level, when full to the brim.

- Check batteries and install.

- Check fixing elements.

- Completely lubricate machine.

- Carry out function testing.

INFORMATION
For storage of the machine under difficult conditions, special regulations apply. For example, difficult conditions are: - Storage time over 6 months, - High air humidity, - Sea air, etc. Ask SCHWING customer service.

CONCRETE TECHNOLOGY CONDITIONS

⚠	**OBSERVE SAFETY MANUAL**

INFORMATION
Pumped concrete is not a special concrete, but a standardised quality concrete.

It is, for example, characterised by:

- A minimum fine grain content of approx. 400 kg per m³ (with a maximum grain size of 32 mm)

- A minimum cement content of approx. 240 kg per m³ (with a maximum grain size of 32 mm)

- A water/cement value of 0.42 - 0.65

- A grain structure according to grading curve

- A consistency of K 2 to K 3

The following faults could result in the inability of pumping the concrete:

- Incorrect concrete composition (see above)

- Poor upkeep of the machine and pumping line (cleaning!)

- Insufficient mixing quality

- Segregation caused by improper transport

- Wrong selection of maximum aggregate size measured at the diameter of the pumping line

- "Bleeding" the fresh concrete

- Incorrect use of additives.

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SCHWING

Presentation 1

Safety 2

Operation 3

Maintenance 4

Radio remote control 5

Special equipment 6

Appendix 7

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1 GENERAL MAINTENANCE INSTRUCTIONS

⚠	**OBSERVE SAFETY MANUAL**

Carry out the maintenance on time and with care.

We recommend copying the maintenance report (chap. 4.11).

The maintenance personnel can then acknowledge the work carried out on the copies.

⚠ CAUTION

Should you not have TRAINED personnel and adequate workshop equipment, commission the SCHWING Customer Services to service your machine.

INFORMATION

Information about maintenance work on special equipment is provided in chapter 6.

1.1 CLEANLINESS

- Clean all units located in working range before starting work.

ATTENTION

The use of high-pressure cleaners can damaged sensitive parts!

Do not use a steam jet to clean rubber and electrical parts.

- Avoid penetration of dirt, especially into the hydraulic system.
- Completely lubricate the machine after high-pressure cleaning.

1.2 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.

1.3 CHECK OIL LEVEL

Unless otherwise specified, the oil level must be checked as a rule:

- With the machine in horizontal position,
- After a standstill of approx. 10 min.,
- In the case of mobile machines in transport position (outrigger in driving position).

1.4 OIL CHANGE

- To better flush out contaminants, drain the oil when the units are at operating temperature.

⚠ CAUTION

Hydraulic fluid can cause irritation to the skin and eyes!

Always wear suitable protective clothing.

- Fill hydraulic fluid from clean vessels through the tank's filling hole provided for the purpose.

If possible, use a flushing filtration unit.

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 filling hose loosely in the reservoir. On no account, screw together hermetically!

- Do not overfill the reservoir.
- Check the oil level after a test run.
- Do not store hydraulic oil barrels outdoors and store them horizontally if possible.

Prior to removal, the barrel must be stationary for a longer period of time. Contaminants can deposit easily.

Do not roll barrel to the filling site.

Do not suck from the bottom of the barrel (dirt).

INFORMATION

We recommend with every oil change to examine an oil sample for discolouration and containing solids in order to initiate appropriate measures of preventive maintenance.

1.5 DRAINING CONDENSATION

Humidity and changing temperatures form condensation in oil boxes, which mixes with the oil. This mixture can no longer meet the requirements for a quality oil with increasing water content.

After several days of standstill of the machine, the water separates from the oil. It collects at the bottom of the reservoir and can be drained there.

As far as our experience goes, the hydraulic oil used by us requires a standstill period of at least 2 days in order to achieve good results.

1.6 SEALS, FUSE ELEMENTS

- Pay attention to seals, spring washers etc. when removing top covers, closing screw plugs etc.
- Clean sealing surfaces; do not damage.
- Renew seals, split pins, spring washers etc.

1.7 LUBRICATE

- Clean grease nipples before and after lubrication.
- Remove excess grease from the lubrication points.

1.8 TIGHTNESS

- Regularly check reservoirs, hoses, screw connections etc.

ATTENTION

Environmental damage caused by flowing out oil!

Check the system for oil leaks and eliminate their causes.

- Immediately replace damaged tubes and damaged or moist hydraulic hoses.

WARNING

Danger of injury!

Bursting lines or equipment emerging under pressure endanger persons.

1.9 REPAIR, EXCHANGE

- It may be less expensive to exchange complete units instead of repairing them.

  Contact SCHWING customer service.
- Only use SCHWING spare parts.

INFORMATION
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.
- After failure of a unit (pump, motor etc.), rinse the entire hydraulic system and replace the filters to prevent consequential damage due to rubbed-off metal parts.

Suitable flushing filtration units are available from SCHWING (Fig.: 1).

Request information material.

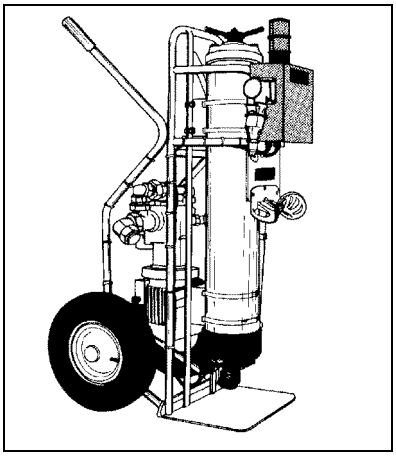

Fig.: 1

- Test-run the machine after repair and check the oil level.

Mind unusual noises, temperatures and leaks.

- Carry out maintenance work on repaired or replaced units in the same way as for new machines.

1.10 WELDING

Welding work may only be carried out according to manufacturer regulations.

See chap. 4.70.

1.11 MECHANICAL WORKING PROCESSES

Cover devices, cables etc. when drilling or grinding work etc. is to be carried out on the machine.

1.12 PAINTING AND WORKING WITH AGGRESSIVE SUBSTANCES

Cover devices, cables etc. to protect them against paint mist and aggressive substances.

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.

1.13 ELECTRICALLY DRIVEN MACHINES

- Have an electrician disconnect the power supply of such machines prior to carrying out repair work on the machine.

⚠ WARNING

Danger caused by electric shock!

Always switch off and secure main switch.

Only qualified electrical personnel may work on the electrical system itself!

1.1 AMOUNTS OF FUEL (IN LITRES)

Machines	Fuel tank (Diesel engine)	Hydraulic oil box	Water case[1.3]	Standard agitator gear	Reinforced agitator gear	Piston compressor[1]	Rotation compressor[1]	Grease lubrication points	Drive motor
SP 1800 BR02	250	400							
SP 2800 BR02	250	400							
SP 3800 BR02	2 x 195	630							
SP 8800 BR02 Container	1000	1500							
SP 7000	2 x 195	630							
SP 7500	2 x 195	630							
SP 900	2 x 330	985							
SP 9500	2 x 330	985							
					1.00	1.00	Rotor oil 8000 F2[2]		see motor operating instructions

Variety examples, see chapter 4.4 and motor operating instructions

[1] Special equipment

[2] Contained in maintenance package 10170389

[3] Clean water

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1 GREASE AND FUEL RECOMMENDATIONS

⚠	**OBSERVE THE SAFETY MANUAL**

⚠ 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).Work only on unpressurised systems. The entrapped oil can also be under pressure when the drive is at standstill and pressure accumulator is unpressurised.
- If, for example, systems under pressure have to be opened when venting, mount a breather valve first in unpressurised condition or use the existing mini-measurement connection.
- If this is not possible, for example, for reasons of space, make sure that no persons 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!

1.1 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 means can be used in accordance with the specified STANDARD MARK.

Can also be used. Selection and sequence of the products listed do not include qualitative assessment.

1.2 EXPLANATION OF THE ABBREVIATIONS USED

1.2.1 GENERAL		
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
VG	=	Viscosity degree in mm²/s at 40° C

1.2.2 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

1.2.3 INDUSTRIAL GEAR OIL		
CLP	=	a circulating lubricating oil according to DIN 51517 with agents designed to improve anti-corrosion, durability, wear protection in the mixed friction range and increase of 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.

1.2.4 VEHICLE GEAR OIL		
G0 90	=	BI normal lubricant, a gear oil according to API-GL 5
MIL-L 2105 B	=	Hypoid gear oil for highest demands in gears and axles corresponds to about API-GL 5

1.2.5 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

1.2.6 LUBRICATING GREASE		
KP 2 K	=	a lubricating grease according to DIN 51502 for high pressure 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 normal lubricant, a lubricating grease according to KP 2 N covering KP 2 K and K 2 K
MLE2N-40	=	Special lubricants for material pairing: Plastic/metal for prolonged lubrication of the slider in the telescopic arms
Art. no.: 10197297	=	SCHWING drive line grease. Only use this grease to lubricate the SCHWING drive lines.

2 HYDRAULIC OIL RECOMMENDATIONS

Viscosity (ISO):	VG 32		VG 46		VG 68	
Type (DIN):	**HLP**	**HVLP**	**HLP**	**HVLP**	**HLP**	**HVLP**
BP Energol	HM 32		HM 46		HM 68	
Fuchs Renolin		B 32 HVI		B 46 HVI		B 68 HVI
Fuchs Renolin		Xtreme Temp 32		Xtreme Temp 46		
Klüber Lamora	HLP 32		HLP 46		HLP 68	
Liqui Moly				HVLP 46		
Mobil DTE	24		25		26	
Mobil Nuto	H 32		H 46		H 68	
Mobil Univis		N 32		N 46		N 68
Q8 HVLP Hydraulic Oil				46		
Shell Tellus	S2 MX 32	S2 VX 32	S2 MX 46	S2 VX 46	S2 MX 68	S2 VX 68
SRS Wiolan	HS 32	HV 32	HS 46	HV 46[1]	HS 68	HV 68

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

INFORMATION

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.

[1] Standard filling SCHWING GmbH Herne

3 GEAR OIL RECOMMENDATIONS (SEE GEAR TYPE PLATE)

3.1 INDUSTRIAL GEAR OIL	
Viscosity according to ISO:	VG 220
Quality according to DIN:	CLP
ARAL	Degol BG 220/Degol BMB 220
CP	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	/

3.2 VEHICLE GEAR OIL	
Viscosity according to SAE:	90 (85w-90)
Quality according to MIL-L:	2105 B
ARAL	Gear oil HYP
CP	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 mentioned above are suitable for continuous ambient temperatures of approx. -10° C up to approx. +40° C. For extreme operating conditions, please contact us. The viscosity class ISO VG 220 corresponds to about SAE 90.

3.3 INDUSTRIAL GEAR OIL (POLYGLYCOL BASE)	
Viscosity according to ISO:	VG 220
Quality according to DIN:	PG
ARAL	Degol GS 220
AVIA	Avilub VSG 220
CP	Energol SG - XP 220
ELF	Syntherma P 270
FUCHS	Renodiol PGP 220
MOBIL	Glygoyle 30
SHELL	Tivela WB
TEXACO	Synlube CLP 220
BI	/

ATTENTION

The above synthetic lubricating oils on polyglycol base must not be mixed with oils of another base.

3.4 INDUSTRIAL GEAR OIL (POLY-ALPHA-OLEFIN BASE)	
Viscosity according to ISO:	**VG 220**
Quality according to DIN:	**PAO**
ADDINOL	CKT 220
TOTAL	CARTER SH 220
CP	Enersyn 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 COMPRESSOR OIL RECOMMENDATIONS

4.1 RECIPROCATING COMPRESSOR		
Viscosity according to ISO:	**VG 100**	**VG 150**
Quality according to DIN:	**VDL**	**VDL**
ARAL	Motanol HE 100	Motanol HE 150
CP	Energol RC 100	Energol RC 150
SHELL	Corena oil H 100 D	Corena Öl H 150 D
SUNOCO	Sunvis 9100	Sunvis 9150
TEXACO	Compr. Alphasyn EP 100	Compr. Oil EP 150
MOBIL	Rarus 427	Rarus 429
WINTERSHALL	Wiolan CD 100	Wiolan CD 150
BI	/	/

4.2 ROTARY COMPRESSOR
ATTENTION
Only synthetic ROTOR OIL 8000 F2 may be used for our rotary compressors. See chapter 4.55

5 LUBRICATING GREASE RECOMMENDATIONS

5.1 SCHWING DRIVE LINE GREASE	
Only use this grease to lubricate the SCHWING drive lines.	
SCHWING art. no.: 10197297	400g cartridge for hand grease gun

5.2 LITHIUM-SAPONIFIED HIGH-PRESSURE GREASE KP 2 K ACCORDING TO DIN 51502 WITHOUT SOLID LUBRICANT	
ARAL	Aralub HLP 2
CP	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

5.3 SPECIAL LUBRICANTS FOR SEVERE OPERATING CONDITIONS
Under severe operating conditions, we recommend, for the SLIDING BEARING OF THE BOOM COLUMN and SLIDING PIECES OF THE ROTARY DRIVE, to use a particularly adhesive and pressure resistant grease, 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 the SCHWING spare parts service.

5.4 SPRAY-ON RECOMMENDATIONS	
Sprayable EP lubricating grease for open gears with MOS_2 and graphite additive	
ARAL	Sinit FZ 2
CP	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

5.5 SPECIAL LUBRICANTS FOR THE PLASTIC SLIDERS IN THE TELESCOPIC TUBE	
Designation according to DIN: MLE2N-40	
SCHWING art. no.: 10194658	10 kg tin

5.6 SPECIAL LUBRICANTS FOR COUPLINGS AND SEALS OF THE PUMPING LINES	
OPTIMOL OLIT CLS Schwing art. no.: 10149905	 10 kg tin
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 5.2 SHELL Alvania EP grease 2 can also be used. When switching between these two types, remove old grease residues carefully.	

EXCERPT FROM THE SAFETY DATA SHEET FOR HYDRAULIC OIL

This is an excerpt from the safety data sheet of the manufacturer according to the Directive 91/155/EC.

Please request in your country of operation the complete safety data sheet of your oil supplier.

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 under running water for 15 minutes keeping 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: Wear protective gloves made of PVC or nitrile rubber, insofar as

safety permissible.

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:

Pour point	: -45°C
Flashpoint	: 190°C
Aqueous solubility	: insoluble

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!

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TIGHTENING TORQUES

CAUTION

Observe correct tightening torques!

Only torque wrenches tested (e.g. biannually) regularly may be used.

The maximum permissible tolerance for torque wrenches is +/- 4% of the respective tightening torque (MA).

Use a torque wrench, otherwise screws are usually overtightened, screws are overstretched, threads are damaged causing the screws to tear off! A secure connection no longer ensured with the wrong torque.

WARNING

Danger of confusing similar fitting series and units!

Defective connections cannot resist operating pressures and are therefore ripped out suddenly. This can lead to severe injury from parts being blown away and hydraulic liquid leaking out.

The minor difference between lightweight (L) and heavy (H) fitting series, for example, or different units, e.g. metric or imperial, can result in incorrect connections being made in tube and hose systems.

Please check the types of connections used.

Only use original spare parts!

If you have any questions, please contact SCHWING Customer Service.

WARNING

Faulty mounting!

High-strength screw-type connections must be pre-stressed with a specific tightening torque.

Tightening torques depend, among other things, on the screw and nut type, thread, surface treatment and lubrication.

INFORMATION

The tightening torques indicated in the following tables are standard values. They contain a safety factor (0.9 x MA) to avoid over-stretching of the screw-type connection.

The values must be set precisely on the tool. They are only valid insofar as no other values are mentioned in the individual chapters of the SCHWING maintenance- And repair manuals, as well as in assembly drawings.

The tables apply to hexagonal and cylinder screws, as well as hexagonal nuts (DIN) with A different surface treatment.
They cannot be applied to other types (e.g. expansion bolts).
It is also not possible to use them when means are used which increase the friction (e.g. liquid screw lock).

Depending on the coating and lubrication, total friction values arise, which are important for determining the tightening torques.

Lubrication is carried out on the thread and rotating head or nut support. Thread and support must be clean.

The total friction values are estimated as follows:

	SURFACE	COLOUR	TOTAL FRICTION VALUE $\mu_{tot.}$
1.	Phosphatised (PHO)	Black	0.14
2.	Yellow chromated (A2C, A3C)	Yellow-gold	0.14
	Galvanised (galv.)	Shiny silver	0.14
3.	Dacromet (DT320/DT500)	Matt silver	0.10
	Geomet (GT320/GT500)	Matt silver	
4.	As 1+2 with fitting lubricant*		0.10

* e.g. copper paste or MOS_2

1. SCREWS AND NUTS ACCORDING TO DIN 912 – 931 – 933 – 934 – 6914 – 6915

VALID for:	1.	Geomet 320/500 coating (GT320/GT500)
	2.	Black (PHO), yellow chromated (A2C, A3C) and galvanised (galv.) screws and nuts mounted with assembly paste, such as Cu or MOS_2.

For this, the friction value μ = 0.10 is assumed!

Coarse-pitch thread

Thread designation	* Mounting tightening torque (Nm, ft lb) Strength class 8.8		10.9		12.9	
	Nm	ft lb	Nm	ft lb	Nm	ft lb
M 4 X 0.7	2.2	1.6	3.2	2.4	3.8	2.8
M 5 X 0.8	4.3	3.2	6.4	4.7	7.5	5.5
M 6 X 1	7.5	5.5	10.8	8	12.6	9.3
M 8 X 1.25	18	13	27	20	31	23
M 10 X 1.5	36	27	53	39	62	46
M 12 X 1.75	62	46	90	66	108	80
M 14 X 2	100	74	140	103	170	125
M 16 X 2	150	111	225	166	260	192
M 18 X 2.5	220	162	310	228	365	269
M 20 X 2.5	300	221	440	324	510	376
M 22 X 2.5	420	310	590	435	700	516
M 24 X 3	530	391	750	553	880	649
M 27 X 3	780	575	1120	826	1300	958
M 30 X 3.5	1080	796	1530	1128	1750	1290
M 36 X 4	-	-	**2000	**1475	-	-

Fine-pitch thread

Thread designation	* Mounting tightening torque (Nm, ft lb) Strength class 8.8		10.9		12.9	
	Nm	ft lb	Nm	ft lb	Nm	ft lb
M 8 X 1	20	15	28	21	33	24
M 10 X 1	40	29	57	42	68	50
M 10 X 1.25	37	27	55	41	64	47
M 12 X 1.25	67	49	100	74	115	85
M 12 X 1.5	65	48	95	70	110	81
M 14 X 1.5	105	77	155	114	180	133
M 16 X 1.5	160	118	235	173	280	206
M 18 X 1.5	240	177	345	254	400	295
M 20 X 1.5	335	247	475	350	560	413
M 20 X 2					590	435
M 22 X 1.5	460	339	650	479	750	553
M 24 X 2	560	413	810	597	940	693
M 27 X 2	820	604	1170	862	1390	1025
M 30 X 2	1170	862	1660	1224	1930	1423

* The mounting tightening torque corresponds to the axial force in the screw, upon which its yield strength is used at 90% by traction and torsion.

** For octagonal tube boom column

2. SCREWS AND NUTS ACCORDING TO DIN 912 – 931 – 933 – 934 – 6914 – 6915

VALID for:	1.	Black (PHO), yellow chromated (A2C, A3C) and galvanised (galv.) screws and nuts

For this, the friction value μ = 0.14 is assumed!

Coarse-pitch thread

Thread designation	* Mounting tightening torque (Nm, ft lb) Strength class 8.8		10.9		12.9	
	Nm	**ft lb**	**Nm**	**ft lb**	**Nm**	**ft lb**
M 4 X 0.7	2.7	2	4	3	4.6	3
M 5 X 0.8	5.3	4	7.8	6	9	7
M 6 X 1	8	6	13.5	10	16.2	12
M 8 X 1.25	22	16	32	24	38	28
M 10 X 1.5	44	32	64	47	75	55
M 12 X 1.75	76	56	112	83	130	96
M 14 X 2	120	89	180	133	210	155
M 16 X 2	185	136	275	203	325	240
M 18 X 2.5	270	199	385	284	450	332
M 20 X 2.5	380	280	550	406	640	472
M 22 X 2.5	520	384	740	546	870	642
M 24 X 3	650	479	940	693	1095	808
M 27 X 3	990	730	1390	1025	1620	1195
M 30 X 3.5	1300	959	1890	1394	2200	1623
M 36 X 4	-	-	**2000	**1475	-	-

Fine-pitch thread

Thread designation	* Mounting tightening torque (Nm, ft lb) Strength class 8.8		10.9		12.9	
	Nm	**ft lb**	**Nm**	**ft lb**	**Nm**	**ft lb**
M 8 X 1	24	18	35	26	41	30
M 10 X 1	50	37	70	52	85	63
M 10 X 1.25	46	34	65	48	80	59
M 12 X 1.25	83	61	120	89	145	107
M 12 X 1.5	80	59	115	85	140	103
M 14 X 1.5	130	96	190	140	230	170
M 16 X 1.5	200	148	295	218	350	258
M 18 X 1.5	300	221	435	321	510	376
M 20 X 1.5	425	313	610	450	680	502
M 20 X 2					710	524
M 22 X 1.5	580	428	825	608	940	693
M 24 X 2	720	531	1030	760	1210	892
M 27 X 2	1030	760	1480	1092	1750	1291
M 30 X 2	1480	1092	2110	1556	2470	1822

* The mounting tightening torque corresponds to the axial force in the screw, upon which its yield strength is used at 90% by traction and torsion.

** For octagonal tube boom column

STAINLESS STEEL SCREWS AND NUTS

The following tables for the material classes A2 and A4 observe a coefficient of friction of μ = 0.12 for standard screws and nuts without lubrication.

Additional lubrication of the thread changes the coefficient of friction significantly and leads to indeterminable torque ratio!

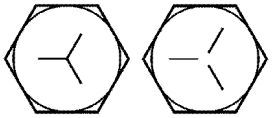
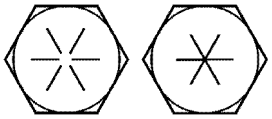
- Class 50: for A2-50 and A4-50 without depth limitation (usually turned parts)
- Class 70: for A2-70 and A4-70 (standard) but only for lengths with 8 x thread diameter
- Class 80: for A2-80 and A4-80 (highly strain-hardened) but only for lengths with 8 x thread diameter

Stainless steel screws and nuts - Coefficient of friction μ=0.12									
Thread	Mounting tightening torque (Nm, ft lb)								
	Strength class 50 (e.g. turned parts)			**Strength class 70 (Standard A2-70, A4-70)**			**Strength class 80 (e.g. A4-80)**		
	Preload force in **N**	Tightening torque in **Nm**	**ft lb**	Preload force in **N**	Tightening torque in **Nm**	**ft lb**	Preload force in **N**	Tightening torque in **Nm**	**ft lb**
M5	750	1.7	1.3	3,000	3.5	2.6	4,750	4.7	3.5
M6	1,900	3	2.2	6,200	6	4.4	6,700	8	5.9
M8	4,900	7.1	5	12,200	16	12	13,700	22	16
M10	7,800	14	10	16,300	32	24	22,000	43	32
M12	11,400	24	18	24,200	56	41	32,000	75	55
M16	21,400	59	44	45,000	135	100	60,000	180	133
M20	34,400	114	84	71,000	280	207	95,000	370	273
M24	48,300	198	146	105,000	455	336	140,000	605	446
M30	75,800	393	290	191,000	1050	774	255,000	1400	1033

MOUNTING TIGHTENING TORQUE UNC/UNF

GENERAL TIGHTENING TORQUES FOR SAE SCREWS

The values listed are to be used when no other specific torque values are indicated. The values cannot be applied when graphite MoS_2 or other lubricants are used for very high pressures.

SAE class	5		8	
Screw head designation *				
Screw size	**ft lb**	**Nm**	**ft lb**	**Nm**
1/4"	9-11	12-15	12-15	16-20
5/16"	17-20.5	23-28	24-29	33-39
3/8"	35-42	48-57	45-54	61-73
7/16"	54-64	73-87	70-84	95-114
1/2"	80-96	109-130	110-132	149-179
9/16"	110-132	149-179	160-192	217-260
5/8"	150-180	203-244	220-264	298-358
3/4"	270-324	366-439	380-456	515-618
7/8"	400-480	542-651	600-720	814-976
1"	580-696	787-944	900-1080	1220-1464
1 1/8"	800-880	1085-1193	1280-1440	1736-1953
1 1/4"	1120-1240	1519-1681	1820-2000	2468-2712
1 3/8"	1460-1680	1980-2278	2380-2720	3227-3688
1 1/2"	1940-2200	2631-2983	3160-3560	4285-4827

***** The screw head designations specified apply to the respective class code.
Markings of the manufacturer may differ thereof.

MOUNTING GUIDELINES FOR CUTTING RING FITTINGS

Controlled final assembly			
Tube AD [mm]	Series	Min. tube wall thickness [mm]	Mounting torque [Nm]
6	**L**	6x1	30
8		8x1	45
10		10x1	60
12		12x1.5	85
15		15x1.5	125
18		18x1.5	200
22		22x2	200
28		28x2	340
35		35x3	460
42		42x3	600
6	**S**	6x2	45
8		8x1.5	60
10		10x1.5	80
12		12x1.5	130
14		14x2	140
16		16x1.5	190
20		20x2	240
25		25x2.5	260
30		30x3	420
38		38x4	760

MOUNTING OF BULKHEAD FITTINGS

Torque-related mounting

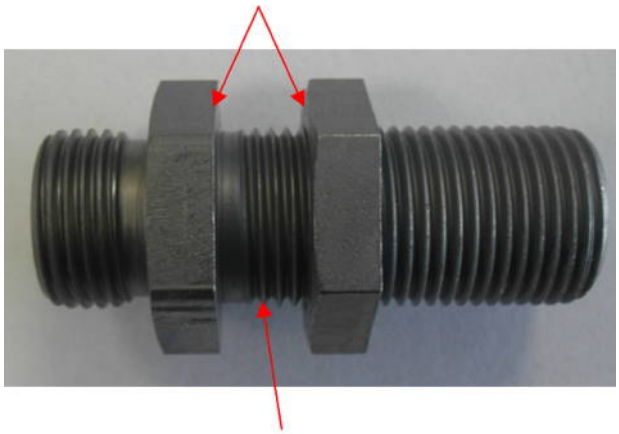
Prerequisite: The component (plate, flat plate, etc.) between the lock nuts and hexagon of the bulkhead nozzle is suitable to include the applied assembly forces without deformation or yielding!

- Disassemble lock nut.
- Loxeal 8654 (art.: 10206549) apply as described below.
- Insert screw-joint connections into through-hole.
- Mount lock nut manually.
- Final assembly of the lock nut with suitable torque wrench and mounting torque of the respective screw-joint system (see table, page 2).
- Mount screw-joint system to the tube junction according to the respective installation instructions.

IMPORTANT: Hold screw-joint connections with suitable assembly tool!

Example:

Apply adhesive to abutting face (Loxeal 8654, art.: 10206549)



Only apply a small amount of adhesive to the thread (drops)

TORQUE TABLE FOR BULKHEAD FITTINGS:

Series	Size	Md [Nm]	Md [ft lb]
L	6	**25**	18
	8	**35**	26
	10	**40**	30
	12	**50**	37
	15	**70**	52
	18	**110**	81
	22	**150**	111
	28	**190**	140
	35	**300**	221
	42	**400**	295

Series	Size	Md [Nm]	Md [ft lb]
S	6	**35**	26
	8	**55**	41
	10	**70**	52
	12	**75**	55
	14	**100**	74
	16	**150**	111
	20	**170**	125
	25	**220**	162
	30	**330**	243
	38	**450**	332

Tightening torques for screw-in spigots
e.g.: GES-M-WD, EGESD-M-WD
Mating material: **Steel**

Tightening torques for screw-in spigots DIN3852, metric thread Threaded bore according to DIN3852-T1 Form X, ISO9974-1						
Series	**Tube AD**	**Thread M**	**Form B with sealing edge Md [Nm]**	**Form B with sealing edge Md [ft lb]**	**Form E with soft seal Md [Nm]**	**Form E with soft seal Md [ft lb]**
L	6	M 10x1	**25**	18	**18**	13
	8	M 12x1.5	**35**	26	**25**	18
	10	M 14x1.5	**55**	41	**50**	37
	12	M 16x1.5	**80**	59	**70**	52
	15	M 18x1.5	**100**	74	**90**	66
	18	M 22x1.5	**170**	125	**130**	96
	22	M 26x1.5	**230**	170	**180**	133
	28	M 33x2	**400**	295	**310**	229
	35	M 42x2	**700**	516	**450**	332
	42	M 48x2	**900**	664	**540**	398
S	6	M 12x1.5	**60**	44	**50**	37
	8	M 14x1.5	**90**	66	**60**	44
	10	M 16x1.5	**120**	89	**80**	59
	12	M 18x1.5	**190**	140	**90**	66
	16	M 22x1.5	**300**	221	**135**	100
	20	M 27x2	**420**	310	**200**	148
	25	M 33x2	**600**	443	**310**	229
	30	M 42x2	**700**	516	**500**	369
	38	M 48x2	**900**	664	**600**	443

Notice: All screw joints are mounted unoiled.

Tightening torques for screw-in spigots
e.g.: GES-R-WD, EGESD-R-WD
Mating material: **Steel**

Tightening torques for screw-in spigots DIN3852, pipe threads Threaded bore according to DIN3852-T2 Form X, ISO1179-1						
Series	**Tube AD**	**Thread G**	**Form B with sealing edge Md [Nm]**	**Form B with sealing edge Md [ft lb]**	**Form E with soft seal Md [Nm]**	**Form E with soft seal Md [ft lb]**
L	6	G 1/8 A	**25**	18	**20**	15
	8	G 1/4 A	**55**	41	**50**	37
	10	G 1/4 A	**55**	41	**50**	37
	12	G 3/8 A	**95**	70	**80**	59
	15	G 1/2 A	**185**	136	**100**	74
	18	G 1/2 A	**100**	74	**100**	74
	22	G 3/4 A	**250**	184	**180**	133
	28	G 1 A	**400**	295	**310**	229
	35	G 1 1/4 A	**670**	494	**450**	332
	42	G 1 1/2 A	**800**	590	**540**	398
S	6	G 1/4 A	**95**	70	**60**	44
	8	G 1/4 A	**95**	70	**60**	44
	10	G 3/8 A	**180**	133	**90**	66
	12	G 3/8 A	**180**	133	**90**	66
	16	G 1/2 A	**160**	118	**150**	111
	20	G 3/4 A	**350**	258	**200**	148
	25	G 1 A	**700**	516	**310**	229
	30	G 1 1/4 A	**850**	627	**500**	369
	38	G 1 1/2 A	**1000**	738	**600**	443

Notice: All screw joints are mounted unoiled.

Tightening torques for screw-in spigots
e.g.: GES-M-WD, EGES-M-WD
Mating material: **Aluminium F 38**

Tightening torques for screw-in spigots DIN 3852, metric thread Threaded bore according to DIN 3852-T1 Form X, ISO 9974-1						
Series	**Tube AD**	**Thread M**	**Form B with sealing edge Md [Nm]**	**Form B with sealing edge Md [ft lb]**	**Form E with soft seal Md [Nm]**	**Form E with soft seal Md [ft lb]**
L	6	M 10x1	**15**	11	**15**	11
	8	M 12x1.5	**25**	18	**25**	18
	10	M 14x1.5	**40**	30	**40**	30
	12	M 16x1.5	**55**	41	**55**	41
	15	M 18x1.5	**70**	52	**70**	52
	18	M 22x1.5	**120**	89	**120**	89
	22	M 26x1.5	**140**	103	**140**	103
	28	M 33x2	**300**	221	**230**	170
	35	M 42x2	**450**	332	**330**	243
	42	M 48x2	**500**	369	**500**	369
S	6	M 12x1.5	**25**	18	**25**	18
	8	M 14x1.5	**40**	30	**40**	30
	10	M 16x1.5	**55**	41	**55**	41
	12	M 18x1.5	**70**	52	**70**	52
	16	M 22x1.5	**120**	89	**120**	89
	20	M 27x2	**140**	103	**140**	103
	25	M 33x2	**300**	221	**250**	184
	30	M 42x2	**450**	332	**330**	243
	38	M 48x2	**500**	369	**500**	369

Notice: All screw joints are mounted unoiled.

Tightening torques for screw-in spigots

e.g.: **GES-R-WD, EGESD-R-WD**

Mating material: **Aluminium F 38**

Tightening torques for screw-in spigots DIN 3852, pipe threads Threaded bore according to DIN 3852-T2 Form X, ISO 1179-1						
Series	**Tube AD**	**Thread G**	**Form B with sealing edge Md [Nm]**	**Form B with sealing edge Md [ft lb]**	**Form E with soft seal Md [Nm]**	**Form E with soft seal Md [ft lb]**
L	6	G 1/8 A	**15**	11	**15**	11
	8	G 1/4 A	**20**	15	**20**	15
	10	G 1/4 A	**20**	15	**20**	15
	12	G 3/8 A	**70**	52	**70**	52
	15	G 1/2 A	**90**	66	**90**	66
	18	G 1/2 A	**90**	66	**90**	66
	22	G 3/4 A	**180**	133	**180**	133
	28	G 1 A	**300**	221	**230**	170
	35	G 1 1/4 A	**450**	332	**330**	243
	42	G 1 1/2 A	**550**	406	**500**	369
S	6	G 1/4 A	**20**	15	**20**	15
	8	G 1/4 A	**20**	15	**20**	15
	10	G 3/8 A	**70**	52	**70**	52
	12	G 3/8 A	**70**	52	**70**	52
	16	G 1/2 A	**90**	66	**90**	66
	20	G 3/4 A	**180**	133	**180**	133
	25	G 1 A	**300**	221	**250**	184
	30	G 1 1/4 A	**450**	332	**450**	332
	38	G 1 1/2 A	**550**	406	**540**	398

Notice: All screw joints are mounted unoiled.

Tightening torques for straight screw-in connections,
e.g.: **GES-UN/UNF**
Mating material: **Steel**

Tightening torques for straight screw-in connections, UN/UNF thread Sealing by O-ring				
Series	**Tube AD**	**UN/UNF thread**	**Md [Nm]**	**Md [ft lb]**
L	6	7/16-20 UNF-2A	**25**	18
	6	9/16-18 UNF-2A	**30**	22
	8	7/16-20 UNF-2A	**25**	18
	8	1/2-20 UNF-2A	**28**	21
	8	9/16-18 UNF-2A	**30**	22
	8	3/4-16 UNF-2A	**55**	41
	10	7/16-20 UNF-2A	**25**	18
	10	9/16-18 UNF-2A	**30**	22
	10	3/4-16 UNF-2A	**55**	41
	10	7/8-14 UNF-2A	**60**	44
	12	7/16-20 UNF-2A	**25**	18
	12	1/2-20 UNF-2A	**28**	21
	12	9/16-18 UNF-2A	**30**	22
	12	3/4-16 UNF-2A	**55**	41
	12	7/8-14 UNF-2A	**60**	44
	15	9/16-18 UNF-2A	**30**	22
	15	3/4-16 UNF-2A	**55**	41
	15	7/8-14 UNF-2A	**60**	44
	15	1 1/16-12 UN-2A	**110**	81
	15	1 5/16-12 UN-2A	**165**	122
	18	3/4-16 UNF-2A	**55**	41
	18	7/8-14 UNF-2A	**60**	44
	18	1 1/16-12 UN-2A	**110**	81
	18	1 5/16-12 UN-2A	**165**	122
	22	7/8-14 UNF-2A	**60**	44
	22	1 1/16-12 UN-2A	**110**	81
	22	1 5/16-12 UN-2A	**165**	122
	22	1 5/8-12 UN-2A	**220**	162
	28	7/8-14 UNF-2A	**60**	44
	28	1 1/16-12 UN-2A	**110**	81
	28	1 5/16-12 UN-2A	**165**	122
	28	1 5/8-12 UN-2A	**220**	162
	35	1 3/16-12 UN-2A	**140**	103
	35	1 5/16-12 UN-2A	**165**	122
	35	1 5/8-12 UN-2A	**220**	162
	35	1 7/8-12 UN-2A	**260**	192
	42	1 5/8-12 UN-2A	**220**	162
	42	1 7/8-12 UN-2A	**260**	192

Notice: All screw joints are mounted unoiled.

Tightening torques for straight screw-in connections,
e.g.: **GES-UN/UNF**
Mating material: **Steel**

Tightening torques for straight screw-in connections, UN/UNF thread Sealing by O-ring				
Series	**Tube AD**	**UN/UNF thread**	**Md [Nm]**	**Md [ft lb]**
S	6	7/16-20 UNF-2A	**30**	22
	8	7/16-20 UNF-2A	**30**	22
	8	1/2-20 UNF-2A	**45**	33
	8	9/16-18 UNF-2A	**75**	55
	10	9/16-18 UNF-2A	**75**	55
	10	3/4-16 UNF-2A	**100**	74
	12	9/16-18 UNF-2A	**75**	55
	12	3/4-16 UNF-2A	**100**	74
	12	7/8-14 UNF-2A	**160**	118
	14	9/16-18 UNF-2A	**75**	55
	14	3/4-16 UNF-2A	**100**	74
	16	3/4-16 UNF-2A	**100**	74
	16	7/8-14 UNF-2A	**160**	118
	16	1 1/16-12 UN-2A	**270**	199
	20	3/4-16 UNF-2A	**100**	74
	20	7/8-14 UNF-2A	**160**	118
	20	1 1/16-12 UN-2A	**270**	199
	20	1 5/16-12 UN-2A	**430**	317
	20	1 5/8-12 UN-2A	**450**	332
	25	1 1/16-12 UN-2A	**270**	199
	25	1 5/16-12 UN-2A	**430**	317
	30	1 1/16-12 UN-2A	**270**	199
	30	1 5/16-12 UN-2A	**430**	317
	30	1 5/8-12 UN-2A	**450**	332
	38	1 5/8-12 UN-2A	**450**	332
	38	1 7/8-12 UN-2A	**520**	384

Notice: All screw joints are mounted unoiled.

Tightening torques for swivel-type fittings

e.g.: **RSWS-R/M-WD**

Mating material: **Steel**

Series	Tube AD	Thread G	Md [Nm]	Md [ft lb]
L	6	G 1/8	**25**	18
	6	G 1/4	**50**	37
	8	G 1/4	**50**	37
	10	G 1/4	**50**	37
	12	G 1/4	**50**	37
	12	G 3/8	**80**	59
	15	G 1/2	**140**	103
	18	G 1/2	**140**	103
	22	G 3/4	**210**	155
	28	G 1	**400**	295
	35	G 1 1/4	**600**	443
	42	G 1 1/2	**850**	627
S	6	G 1/4	**50**	37
	8	G 1/4	**50**	37
	10	G 3/8	**80**	59
	12	G 3/8	**80**	59
	14	G 1/2	**160**	118
	16	G 1/2	**160**	118
	20	G 3/4	**250**	184
	25	G 1	**410**	302
	30	G 1 1/4	**650**	479
	38	G 1 1/2	**850**	627

Series	Tube AD	Thread M	Md [Nm]	Md [ft lb]
L	6	M 10x1	**25**	18
	-	-	**-**	-
	8	M 12x1.5	**60**	44
	10	M 14x1.5	**60**	44
	12	M 16x1.5	**85**	63
	12	M 18x1.5	**100**	74
	15	M 18x1.5	**100**	74
	18	M 22x1.5	**140**	103
	22	M 26x1.5	**215**	159
	28	M 33x2	**400**	295
	35	M 42x2	**600**	443
	42	M 48x2	**850**	627
S	6	M 12x1.5	**60**	44
	8	M 14x1.5	**60**	44
	10	M 16x1.5	**85**	63
	12	M 18x1.5	**110**	81
	14	M 20x1.5	**-**	-
	16	M 22x1.5	**150**	111
	20	M 27x2	**310**	229
	25	M 33x2	**410**	302
	30	M 42x2	**650**	479
	38	M 48x2	**850**	627

Notice: All screw joints are mounted unoiled.

Mounting the RSWS with sealing edge ring

The version with seal-edge ring should always be mounted by turning 90° from the fixed point (no more or less).

The edges of the DKR must be pressed into the housing and mating material. The ingress and thus the torque are highly dependent on the strength/hardness of the mating material.

The torque specified for the RSWS...-**WD** may **by no means** be used for mounting.

The connection would be heavily undermounted.

Tightening torques for swivel-type fittings

e.g.: **RSWS-WD**

Mating material: **Aluminium F38**

Series	Tube AD	Thread G	Md [Nm]	Md [ft lb]
L	6	G 1/8	**15**	11
	6	G 1/4	**30**	22
	8	G 1/4	**30**	22
	10	G 1/4	**30**	22
	12	G 1/4	**30**	22
	12	G 3/8	**50**	37
	15	G 1/2	**90**	66
	18	G 1/2	**90**	66
	22	G 3/4	**140**	103
	28	G 1	**260**	192
	35	G 1 1/4	**390**	288
	42	G 1 1/2	**550**	406

Series	Tube AD	Thread G	Md [Nm]	Md [ft lb]
S	-	-	-	-
	6	G 1/4	**30**	22
	8	G 1/4	**30**	22
	10	G 3/8	**50**	37
	12	G 3/8	**50**	37
	14	G 1/2	**100**	74
	16	G 1/2	**100**	74
	20	G 3/4	**160**	118
	25	G 1	**270**	199
	30	G 1 1/4	**420**	310
	38	G 1 1/4	**550**	406
	-	-	-	-

Notice: All screw joints are mounted unoiled.

Mounting the RSWS with sealing edge ring

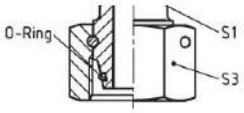
The version with seal-edge ring should always be mounted by turning 90° from the fixed point (no more or less).

The edges of the DKR must be pressed into the housing and mating material. The ingress and thus the torque are highly dependent on the strength/hardness of the mating material.

The torque specified for the RSWS...-**WD** may **by no means** be used for mounting.

The connection would be heavily undermounted.

Tightening torques for taper couplings with O-ring, e.g. (EWSD)



Series	Tube AD	Md [Nm]	Md [ft lb]
L	6	**25**	18
	8	**38**	28
	10	**50**	37
	12	**60**	44
	15	**85**	63
	18	**120**	37
	22	**155**	114
	28	**220**	162
	35	**330**	243
	42	**420 ***	310

Series	Tube AD	Md [Nm]	Md [ft lb]
S	6	**35**	26
	8	**50**	37
	10	**60**	44
	12	**75**	55
	14	**95**	70
	16	**120**	89
	20	**190**	140
	25	**260**	192
	30	**400**	295
	38	**440 ***	325

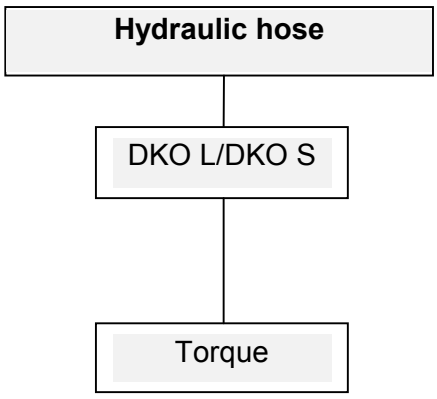
Notice: All screw joints are mounted unoiled.

***Exception:**: The O-ring must be oiled with hydraulic oil before mounting!

HYDRAULIC HOSES

- Mounting instructions
  on tightening the union nut manually.
  Tighten the union nut according to the required torque.

- Torques



Torque for hose fitting (DKOL/DKOS)			
Designation	Spanner size SW	**Type**	Torque MA (Nm) Tolerance = +10%
DKO 10 L	17	Hose DN 6*	20 Nm
DKO 12 L	22	Hose DN 8**	40 Nm
DKO 16 S	30	Hose DN 12	70 Nm
DKO 20 S	36	Hose DN 16	100 Nm
DKO 25 S	46	Hose DN 19	160 Nm
DKO 28 L	41	Hose DN 25	140 Nm
DKO 30 S	50	Hose DN 25	210 Nm
DKO 38 S	60	Hose DN 31	300 Nm
* According to Schwing company standard 3.2.001.003 injection nipple of the series S with nut 14x1.5.			
** According to Schwing company standard 3.2.001.003 injection nipple of series S with nut 18x1.5 of series L.			
Tolerance of the torque + 10% listed in the table			
The thread of the screw connection and hose fitting are coated and are not oiled!			

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SPARE PARTS AND ACCESSORIES

⚠	**OBSERVE SAFETY MANUAL**

INFORMATION

Please observe the special information on safety components in chapter 4.65!

Spare parts and accessories must comply with the requirements defined by SCHWING.

This is guaranteed by the use of original SCHWING spare- And additional parts.

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- And additional parts in non-compliance with the above requirements.

It is possible that, by using unsuitable or unauthorised accessories, the definition of "improper use" is met.

We recommend our customer service for installing our original spare parts and accessories, as well as for all maintenance and repair work on your SCHWING machines.

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.

See also our "Delivery-, performance- 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.

It should also be observed that, in addition to the soundness, this accessory is suitable and approved by SCHWING.

"WEARING 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 of various components of your SCHWING machine can vary greatly depending on their operating conditions, there are no universal rules to be applied for testing and replacing these parts.

However, there are signs indicating the need for an early review.

Here are some examples:

- Sand in the water box of the concrete pump:

If an increasing clogging of the water through concrete fine particles is determined during the regular cleaning of the water box, the pumping pistons are worn.

If the same error occurs again in the short term, the pumping cylinders must also be replaced.

- Hydraulic oil in the water box of the concrete pump

If oil streaks are determined on the water surface or a milky emulsion in the water box when the concrete pump is upright, the sealing of the differential cylinder can 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.

A worn sealing of the differential cylinder can also be assumed here.

- Dirt in the hydraulic oil

If external contamination (e.g. refilling from an unclean container) can be ruled out, you should first analyse the oil. See page 4.20-2.

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 clogging through concrete fine particles is determined, the sealing for the differential cylinder 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.

In case of need, please ask our Customer Service for the optimal solution to your wear problem.

MAINTENANCE SCHEDULE

Symbols in the following maintenance schedule:

❶ = CHECK ❷ = LUBRICATE ❸ = CLEAN ❹ = CHANGE

① ② ③ ④ = ditto, after the **first** 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!

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MAINTENANCE SCHEDULE

Maintenance of chassis frame, motor, special equipment, etc. according to manufacturer's instructions!

	GENERAL:	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**CHAP:**
A1	Technical safety inspection by experts. Intervals according to time, operating hours or m³ concrete pumped, whichever occurs first.								**SHB*** 4.65
A2	Visual and functional test by machine operators	❶							4.65
A3	Check hydraulic oil level (before every commissioning)	❶							4.20
A4	Change hydraulic oil (oil can be changed every 2 years after an oil inspection)						❹	❹	4.20
A5	Drain condensation from the hydraulic oil box		❸						4.20
A6	Clean cooling vanes of the hydraulic oil cooler, as well as those of the radiator		❸						4.22
A7	Check operating pressures	❶							4.21
A8	Grease joints of the operating levers			❷					- -
A9	Check that the hydraulic and water systems do not leak, check aggregates, reservoirs, pumping lines, etc.		①	❶					4.44
A10	Check the fastening of the construction, outrigger, reservoirs, aggregates, CP battery, etc.		①	❶					4.42
A13	Check the oil level of the pump distributor gear**			❶					4.35
A14	Oil change in the pump distributor gear**			④		❹			4.35
A15	Check the oil level of the agitator drive**		❶						4.37
A16	Oil change in the agitator drive**			④	❹				4.37
A17	Lubricate support jack			❷					3.20

**** = if available**

SHB* = see SAFETY MANUAL

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 whichever comes first!
F = annually or 2000 operating hours
G = every 2 years

❶ = CHECK ❷ = LUBRICATE ❸ = CLEAN ❹ = CHANGE / After initial commissioning: ① ② ③ ④

SUPPLEMENTARY EQUIPMENT**:** ROTARY COMPRESSOR		**A**	**B**	**C**	**D**	**E**	**F**	**G**	**CHAP:**
Z3	Check oil level (before every commissioning)	❶							4.55
Z4	Oil change with **ROTOR OIL 8000 F2**			④			❹		4.55
Z5	Renew oil filter			④			❹		4.55
Z6	Renew oil return valve			④			❹		4.55
Z7	Clean/renew air suction filter			❸		❹			4.55
Z8	Clean oil cooler			❸					4.55
Z9	Renew oil separator cartridge							❹	4.55

CONCRETE PUMP**:**		**A**	**B**	**C**	**D**	**E**	**F**	**G**	**CHAP:**
B1	Flush water box	❸							3.35
B2	Check water box for deposits, clean as required		❸						3.35
B3	Change hydraulic oil filter every six months or after 15000 m³ of pumped concrete, whichever comes first!				④	❹			4.20
B4	Check fixing of pumping pistons			❶					4.43
B5	Lubricate grease nipple on rock valve, slewing cylinder, agitator and filling hopper	❷							4.40
B6	Check clamping screws of the rock valve swivel head for tightness		❶						4.40
B7	Check screws of the rock valve cover for tightness		❶						4.40
B8	Check axial play of the rock valve slewing shaft		❶						4.40
B9	Check seal of the rock valve slewing shaft						❶		4.40
B10	Check cutting ring of the rock valve		❶						4.40
B11	Check pressure accumulator**		①	①	❶				4.23
B12	Technical safety inspection of the pressure accumulator**						❶		4.23

**** = if available**

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 whichever comes first!
F = annually or 2000 operating hours
G = every 2 years

❶ = CHECK ❷ = LUBRICATE ❸ = CLEAN ❹ = CHANGE / After initial commissioning: ① ② ③ ④

	DIESEL ENGINE:	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**CHAP:**
D1	Check fuel supply and AdBlue every **4 hours**	❶							3.10
D2	Check starter batteries			❶					4.61
D3	Check fuel prefilter daily or after maintenance indicator**	❶							3.10
	Air-filter system:								
D4	Check air filter contamination (maintenance indicator)	❶							3.35
D5	Check dust discharge valve of the air filter for damages and clean		❶ ❸						4.30
D6	Check clean air pipe for damage and tightness			❶					4.30
D7	Check filter element after maintenance indicator, renew at least after one year						❹		4.30
D8	Check filter housing and bracket for damages (cracks)	for each filter maintenance							4.30
D9	Function testing of maintenance indicator						❶		4.30
D10	Empty fuel/water separator daily	❶							1.7-4
D11	Check soot level monitor (start manual regeneration) for C 7.1 Tier 4 i motors		❸						1.7-3

**** = if available**
For more information on engine maintenance, see manufacturer's operating instructions

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!

❶ = CHECK ❷ = LUBRICATE ❸ = CLEAN ❹ = CHANGE / After initial commissioning: ① ② ③ ④

TEST INTERVALS ACCORDING TO DELIVERY RATE

The amount of wear on concrete delivery components strongly depends on the operating conditions (concrete type, concrete pump stroke rate, etc.).

We therefore recommend testing new components after having pumped a specified amount of concrete.

Then - According to the wear and tear - Plan further dates:

		First test after m³	Further tests after	Further information chapter
P1	Concrete pumping line	5000	Demand	2.34 / 4.44
P2	"Rock" swivel head	5000	Demand	4.40

✂.....

4.11

MAINTENANCE REPORT

Maintenance: **A,B,C,D,E,F,G** (please enter)	**Date:**	**Signature:**	**Notes:**

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✂.....

4.11

MAINTENANCE REPORT

Maintenance: **A,B,C,D,E,F,G** (please enter)	**Date:**	**Signature:**	**Notes:**

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4.20 Hydraulic fluid and filter

4.20.1 Checking the fill level of the reservoir

The reservoir is equipped with an oil level indicator 1 (Fig. 1).

ATTENTION

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.

Observe the oil level!

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 so, the machine must be level.

When the oil is cold, the oil level must be shown between "min." and "max." of the oil level indicator. Ensure that adhesive label is in good condition and replace it, if required.

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

If necessary, top up with hydraulic oil via the filling cap 4(Fig. 2).

Only use the same type.

ATTENTION

Ensure absolute cleanliness!

To top up, we recommend our rinse and filtration unit (see chapter "General maintenance instructions).

Request information material.

4.20.2 Topping up the oil box

- Top up the hydraulic oil box as described above.
- Wait approx. 10 minutes until the oil is free from air bubbles and fill in more oil if necessary.
- Run all functions.
- Check the oil level again with cold oil and when the machine is in a horizontal position.
- Top up hydraulic oil if necessary.

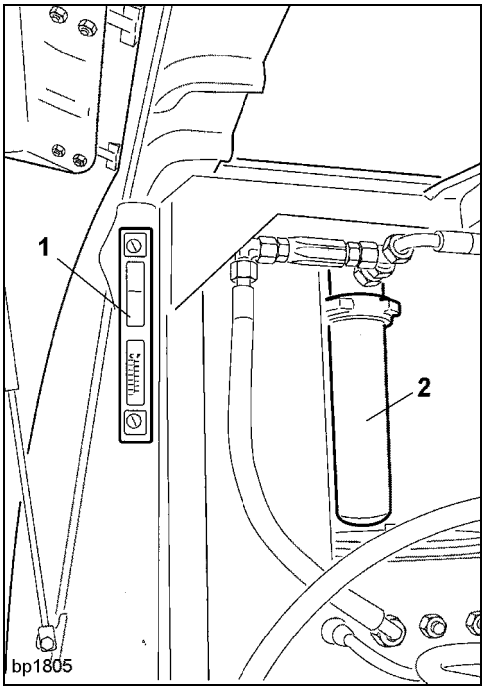

Fig. 1;Oil level indicator (1), hydraulic oil box, Fig.:

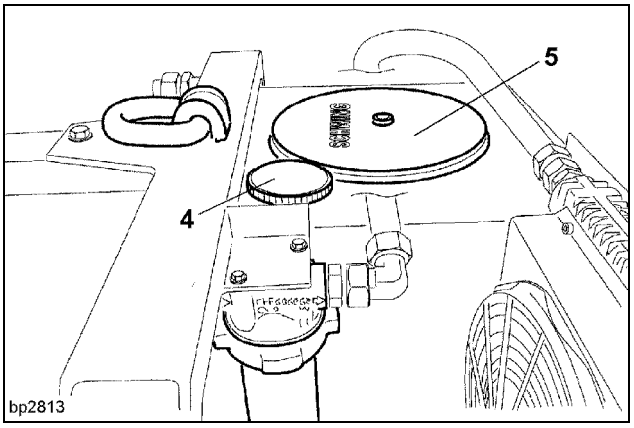

Fig. 2;Filling cap (4) hydraulic oil

4.20.3 PURITY OF HYDRAULIC OIL

The purer the hydraulic oil is, the smoother the hydraulic systems and greasing units 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 according to the manufacturer's specifications is required that is at least 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.

ATTENTION

Adhere without fail to the recommended purity classification values of SCHWING GmbH, as a minimum those of the component manufacturer.

4.20.4 What does the purity classification mean?

Contaminations cannot be convincingly detected through a visual inspection.

The classification of solid contamination in lubrication and hydraulic fluids occurs according to ISO 4406.

To determine the oil purity classification, solid particles are counted in 100ml of fluid, arranged according to size and quantity and divided into particle areas, (Fig. 3).

Depending on the procedure for the particle counting, there will be 2 or 3 areas.

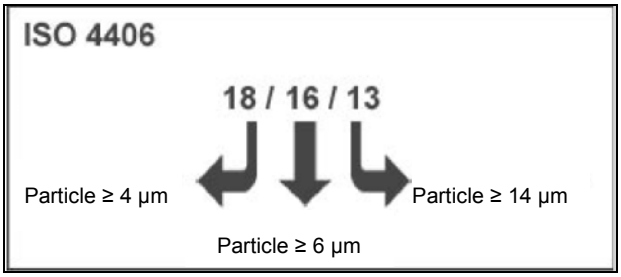

Fig. 3

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.

4.20.4.1 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.

4.20.5 Extended hydraulic oil change interval

Through diligent oil care and regular changing of the oil filter, the oil change interval can be extended.

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.

4.20.6 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

4.20.7 Draining condensation water

After a long standstill period, drain any water from the hydraulic oil box. To do this, use the drain valve 1 (Fig. 4) at the underside of the box.

- Remove the lock nut 1 (Fig. 4) from the drain valve.
- Screw the drain hose 2 onto the valve socket.
- The valve opens automatically.

If pure hydraulic fluid leaks, remove the hose immediately and mount lock nut.

ATTENTION

Danger of unintentional draining!

- Check the fluid level.

4.20.8 Changing the hydraulic fluid

- Warm the hydraulic system up.
- Provide a waste oil receptacle.
- Due to the large quantity to be changed, you should first pump out as much fluid as possible via the upper cleaning opening.

To do this, we recommend that you use our FLUSHING AND FILTRATION UNIT.

- Drain residual oil using the drain valve as described above.
- Clean the box and replace the filter inserts whenever you change the oil.

4.20.9 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 bottom.

DANGER

Risk of explosion!

Do not use naked light!

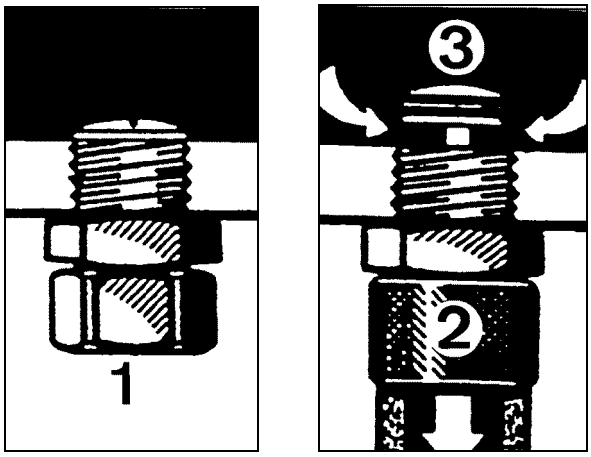

Fig. 4

Clean the oil reservoir as needed.

- Clean the area around the cleaning cover (5) and remove cleaning cover 5 (Fig. 5).
- Remove the suction hoses of the hydraulic pumps from the box and close them to prevent dirt from getting into the pumps.

ATTENTION

Pumps can be destroyed!

- Clean the inside with flushing oil and a lint-free cloth.
- Textile fibres and solvents are

enemies of the hydraulic system. Therefore, do not use steel wool, diesel oil, petrol, etc. for cleaning purposes.

- Wipe the inside surfaces of the box dry.
- Check the seal and mount the cleaning cover.

ATTENTION

Pumps can be destroyed!

- After removing the suction hoses and prior to commissioning, vent the pumps in question while the drive is standing still!

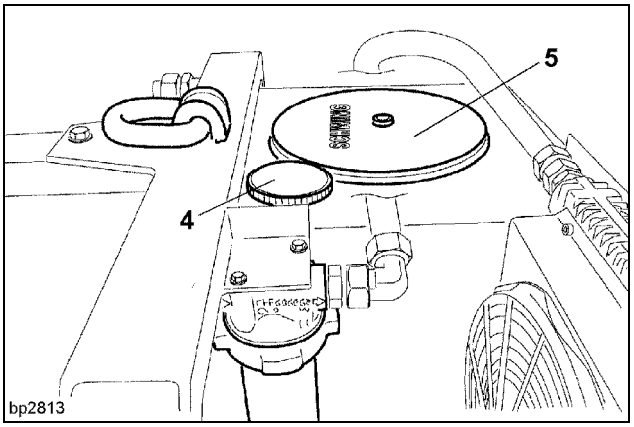

Fig. 5

4.20.10 Changing the filter insert

The machine is equipped with a filter in the agitator circuit.

The filter 2 (Fig. 6) is located on the interior of the machine.

Replace the filter insert rather than cleaning it.

Never operate the hydraulic system without a filter insert.

Old filter inserts belong in special waste.

Clean and check all individual parts. Pay attention to any metallic abrasion in the filter. (indication of damage).

4.20.11 Dismantling

- Unscrew the filter bowl 3 (Fig. 7) at the bottom hexagon 4 using a ring wrench.
- Collect the fluid in a suitable receptacle and clean it or dispose of it in an environmentally responsible way.
- Screw (pre-2011 models: "Pull") the old filter insert 2 off the filter head.
- Clean the filter bowl and the filter head, in particular ensuring that the thread is clean!
- Inspect the O-rings and back-up rings, replace if necessary.

4.20.12 Mounting

- Apply clean operating fluid to the thread and the sealing surfaces of filter bowl and filter head and to the O-ring.
- Screw (pre-2011 models: "Plug") the new filter insert 2 into the filter head.
- Screw the filter bowl 3 in as far as it will go and then loosen it by one quarter turn.

INFORMATION

The sealing effect is not improved through tightening.

- Vent the hydraulic system.

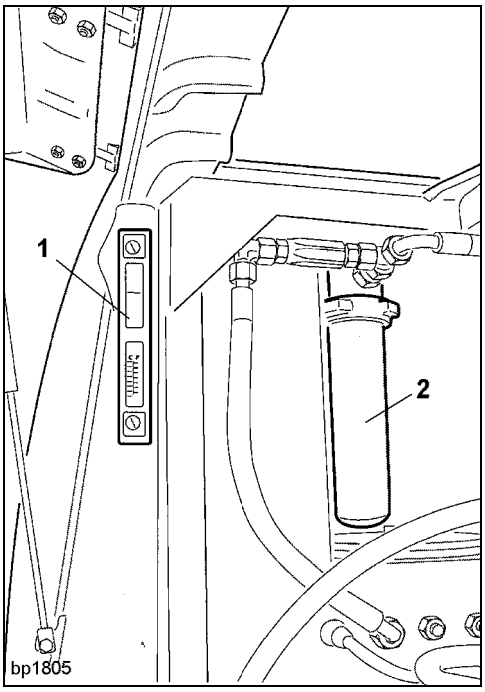

Fig. 6

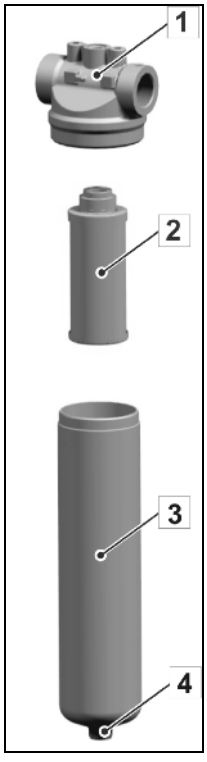

Fig. 7; Filter

- Document the changes of oil and filters using the appropriate SCHWING tags, (see Fig. 8/Fig. 9.

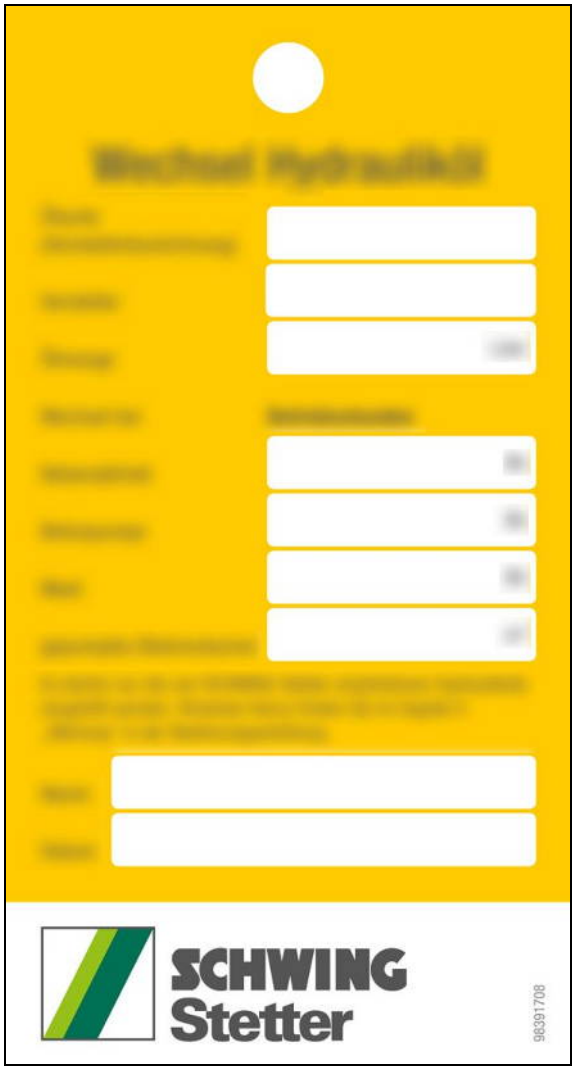

Fig. 8; item no.: 98391708

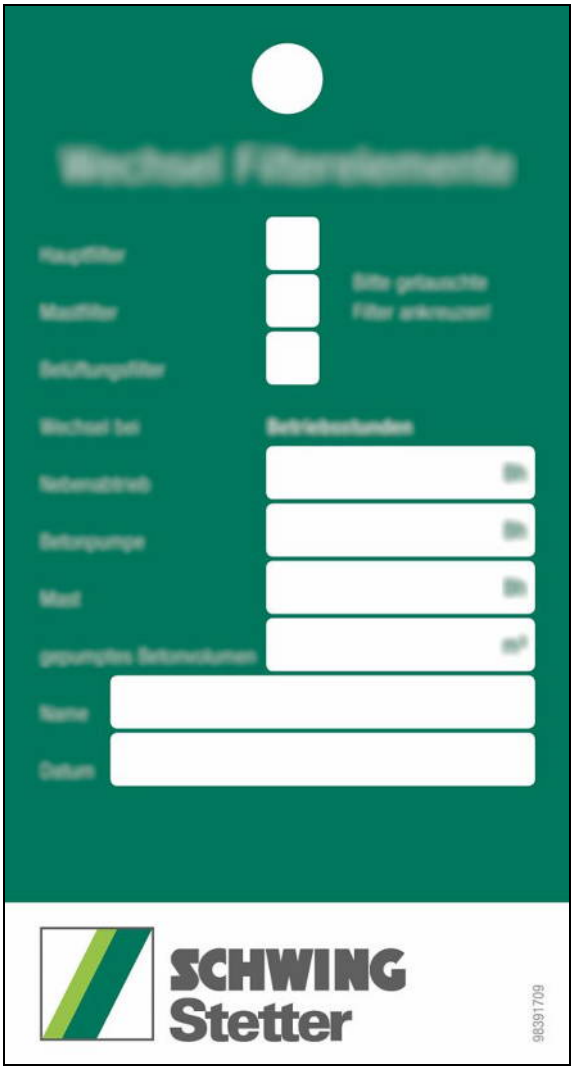

Fig. 9; item no.: 98391709

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4.21 CHECK PRESSURE SETTINGS

All hydraulic consumers are secured by pressure relief valves (PRV).

These valves are set at the factory. Readjustment is as a rule only necessary after replacement or repair of the hydraulic systems.

Nevertheless, the setting should be checked regularly in order to detect possibly errors early.

Check the settings when the machine is running and at operating temperatures.

The factory-set pressures must not be altered. Alteration of settings may only be carried out by specially qualified workshop personnel.

DANGER

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.

After the pressure test, first switch off the concrete pump, then turn the ball valve. This is to prevent uncontrolled running of the concrete pump.

ATTENTION

For pressure tests of the concrete pump hydraulic system, be sure to set the direction to “Pumping”.

In the direction "draw", the seals of the concrete pump control block can be pushed out.

4.21.1 CONCRETE PUMPS SYSTEM

The hydraulic pump of the concrete pump system is equipped with a "pressure cut-off". This swings the pump back before the maximum operating pressure set on the pressure relief valve (PRV) is reached.

The pressure cut-off prevents the loss of performance and heating of oil which occur when hydraulic oil is sprayed out of the pressure relief valve.

The value displayed on the pressure gauge during the pressure test must be lowerthan the setting of the pressure relief valve. See hydraulic switching diagram.

Appropriate settings are carried out on the hydraulic pump and pressure relief valve.

If, during checks, the prescribed values are clearly exceeded or fallen short of, leave the requisite setting adjustment work to SCHWING customer service.

Take the machine out of service and transmit the measured values to customer service.

4.21.2 Checks:

- Close the ball valve 1 (Fig. 1) on the concrete pump control block.

Notches in the plug against flow direction.

- - Set the maximum delivery rate (stroke rate) of the concrete pump and open the shut-off valve (7) (Fig. 2).

- Switch the concrete pump on.

The pumping pistons are brought into the final position and remain there.

The concrete pump pressure gauge 6 display must increase up to the set value of the pressure cut-off.

- Take down setting values and switch off concrete pump.

- Close shut-off valve 7 and switch ball valve 1 (Fig. 1) into the operating position.

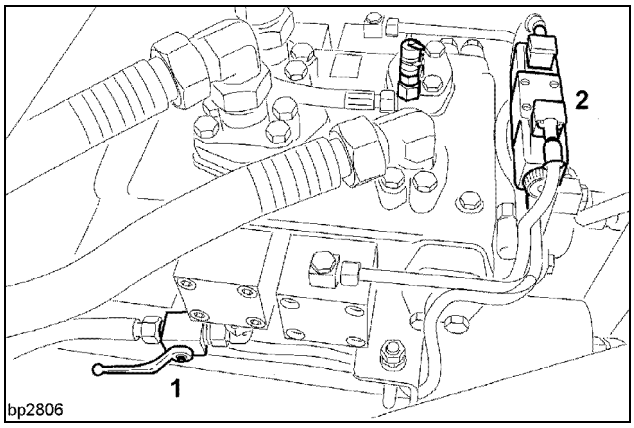


Fig. 1

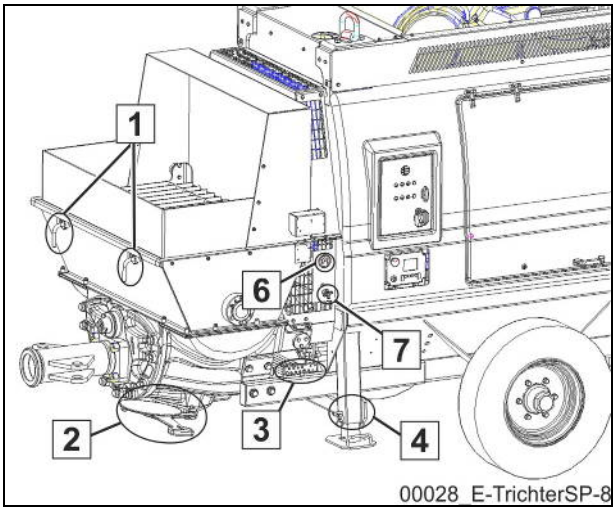


Fig. 2

COOLER

OBSERVE SAFETY MANUAL

CAUTION

Risk of injury due to rotating fan blades and hot machine parts.

Before working on radiators:

-Switch off all controls.

-Switch off the motor and ignition.

-Allow the radiator to cool down.

Wear work gloves, helmet and safety glasses.

Remount all safety devices after finishing the cleaning work.

Only then, recommission the machine.

HYDRAULIC OIL COOLER

The hydraulic oil system can be equipped with an oil cooler.

Dusty precipitation on the fins of the oil cooler 1 (Fig.: 1) reduces the cooling efficacy.

Clean outside of hydraulic oil cooler:

Soiling on the radiator fins of the oil cooler (Fig.: 1) 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 not affecting aluminium,
- Use water- And steam jet carefully.

Clean inside of hydraulic oil cooler:

- Remove the radiator.
- Connect radiator to a flushing system with filters.
- Flush for at least 30 minutes.
- After cleaning, remove the flushing medium completely.
- Then, flush the radiator with the type of oil intended for the hydraulic system.

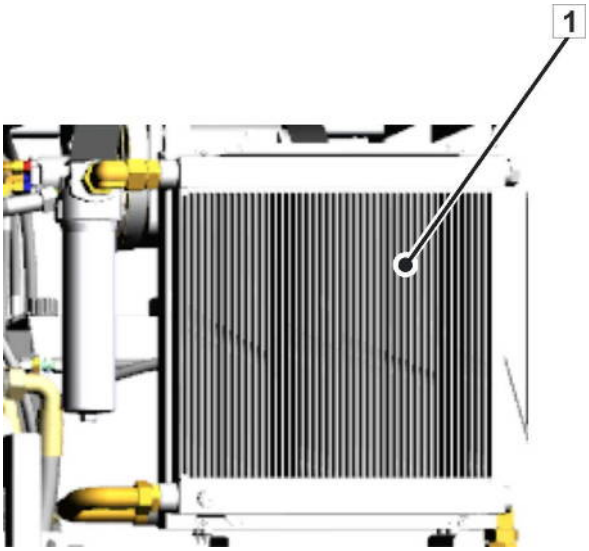


Fig.: 1

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.

- Please make sure that, for applications on dusty construction sites, the cooling fins of the motor cooler are cleaned from time to time.

  Otherwise, this may 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.

AIR-FILTER SYSTEM

⚠	**OBSERVE SAFETY MANUAL**

Only service air filter when motor is not running. Do not start with removed filter element.

Assess condition and tightness of suction line for each filter maintenance. Repair leaky suction line immediately.

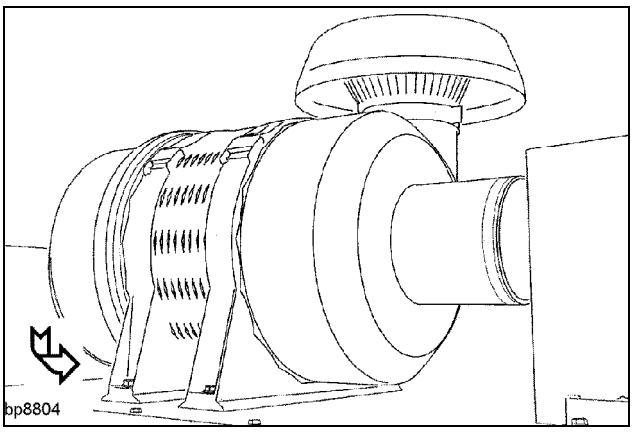


Fig. 1

DUST DISCHARGE VALVE

Check condition and function of the automatic dust discharge valve (arrow, fig. 1).

The valve must not be restricted. Remove any dust incrustations. Renew damaged valve.

The valve must point down when in installed condition.

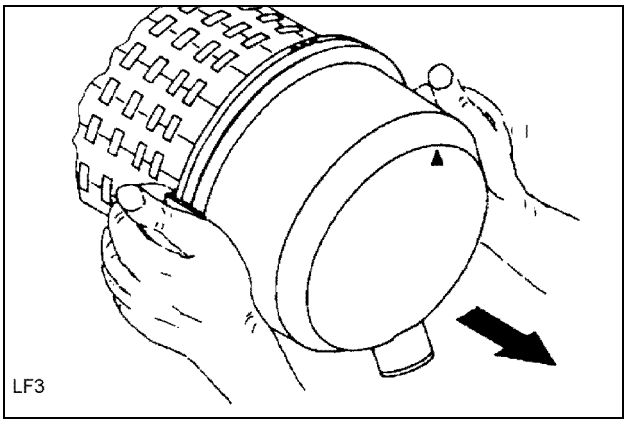
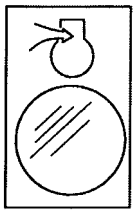


Fig. 2

REMOVE FILTER ELEMENT



If the machine is equipped with an air filter monitoring system, then **only** service the air-filter element when the warning light signals on the control station.

Intermediate cleaning is not necessary.

- Release snap-in hooks and remove top cover (fig. 2).

- Remove filter element with slight rotations (fig. 3).

- Clean filter mounting particularly on the sealing surfaces with a damp cloth.

  Ensure no dust enters into the clean air pipe to the motor.

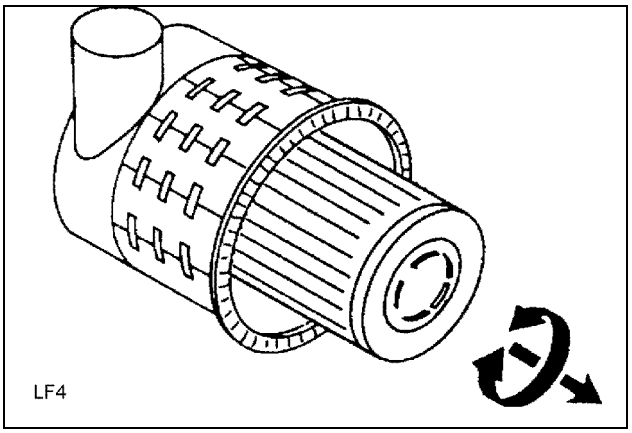


Fig. 3

CLEAN FILTER ELEMENT

Renew element after 3 cleanings or no later than after one year.

ATTENTION

Never wash or brush filter element or clean by slamming.

Cleaning is done with clean and dry compressed air (max. 5 bar). Dust may not get to the inside of the element when blowing out dust.

- A tube, whose end is bent by approx. 90°, should be placed onto the compressed air gun. It must extend to the bottom of the element (fig. 1).

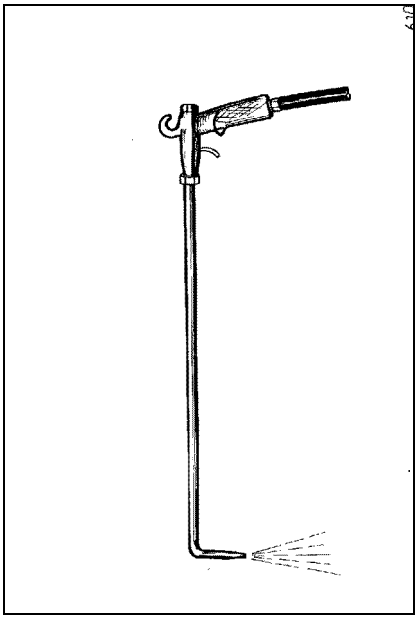


Fig. 1

- Blow out element from the inside out by up and down movements until dust no longer escapes (fig. 2).

  Do not damage element.

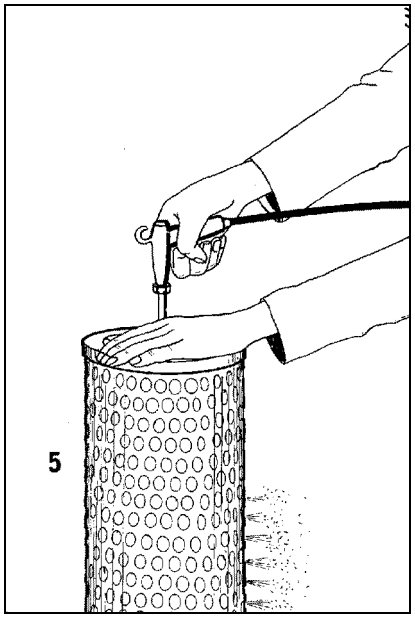


Fig. 2

CAUTION

Health hazard!

Do not inhale dust! Wear respiratory protection (dust mask)!

- Inspect the cleaned element for damages (paper bellows, seals) before re-installation.

  Cracks and holes in the paper bellows can be detected with a flashlight (eg. 3).

ATTENTION

Motor damage!

Do not continue to use damaged element. Replace with original spare part, if in doubt

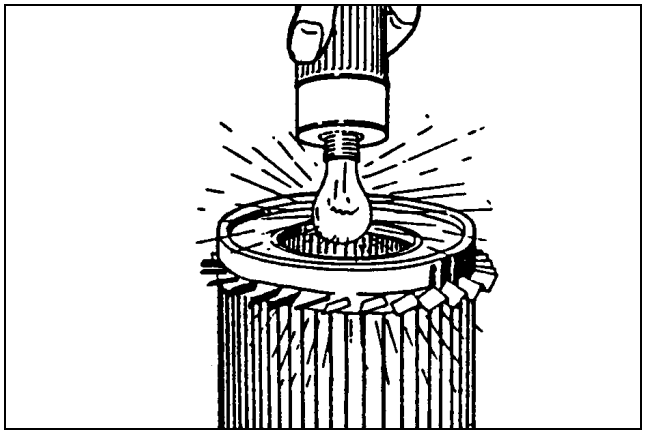


Fig. 3

INSTALL FILTER ELEMENT

- Insert filter element carefully into the housing.

- Mount cover of housing. Ensure that the dust discharge valve does not point downwards.

  When closing the top cover, the filter element is pressed automatically into the correct direction.

STORAGE

Store filter element upright in the original packaging protected from dust, moisture and damage.

DISPOSAL

The filter element consists of filter paper and polyurethane foam.

All filter elements are hazardous waste and must be disposed of according to the local provisions.

FUNCTION TESTING OF THE MAINTENANCE INDICATOR

- Reduce the suction intake of the air-filter system (e.g. with a strong plate or cardboard) when motor runs at idle until the maintenance indicator reacts.

ATTENTION

Do not, by no means, close suction intake completely.

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ROCK VALVE

⚠	**OBSERVE SAFETY MANUAL**

⚠ DANGER

To prevent unwanted working movements prior to working on the rock valve, always:

- Switch off concrete pump and agitator,
- Do not reach into the gate valve while the drive motor is running (danger of crushing and injury)
- Switch off the drive motor and prevent it from starting up,
- Discharge the pressure accumulator, if present.

LUBRICATE BEARING POINTS

Concrete pumps without central greasing have a central greasing strip.
See examples, (Fig.: 1 - Fig.: 2).

The grease nipples on this ledge are connected to the bearing points of the rock valve.

These are:
- Slewing shaft,
- Slewing cylinder,
- Agitator.

INFORMATION

Depending on the type of rock valve, the number of grease nipples can vary.

Additional grease nipples are located on the lubrication point for the mixer bearing cpl. in truck mixer concrete pumps.

Lubricate all grease nipples daily on the ledge. Lubricate more frequently during continuous operation, at least every 8 hours:

.

Lubrication procedure:
1. Clean the lubrication point.
2. Remove the protection caps from the grease nipples.
3. Press grease into each grease nipple until the old grease emerges from the bearing point.
4. Wipe off old grease with cleaning rags. Dispose of grease and cleaning rags properly.
5. Reinstall the protection caps

Lubrication point "X" on stationary concrete pump:

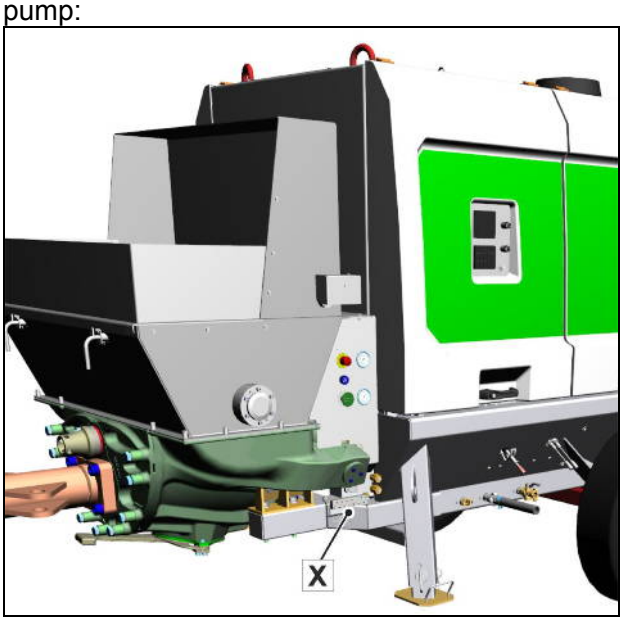

Fig.: 1

Lubrication point "X" on truck-mounted concrete pump:

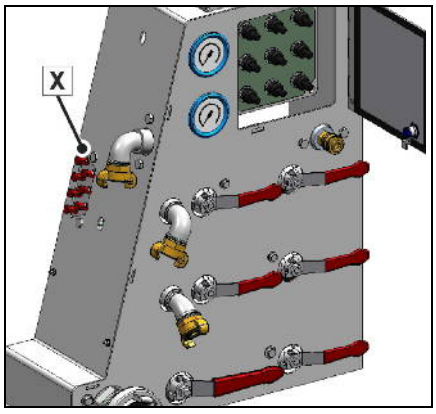

Fig.: 2

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 additionally existing grease nipples, e.g. 1 (Fig.: 3) do not have to be lubricated!

They are used to press out the ball socket during repair work.

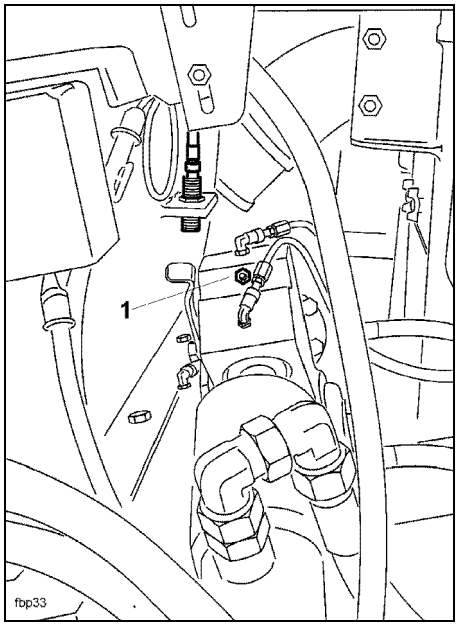

Fig.: 3

CHECKING SCREW-TYPE CONNECTIONS

- Check the tightness of the cover screws 14 (Fig.: 4) regularly and clamping screws of the swivel head 15 (only "large rock") according to maintenance schedule.

  Tighten screws, where appropriate, with a torque wrench according to table in chap. 4.5.

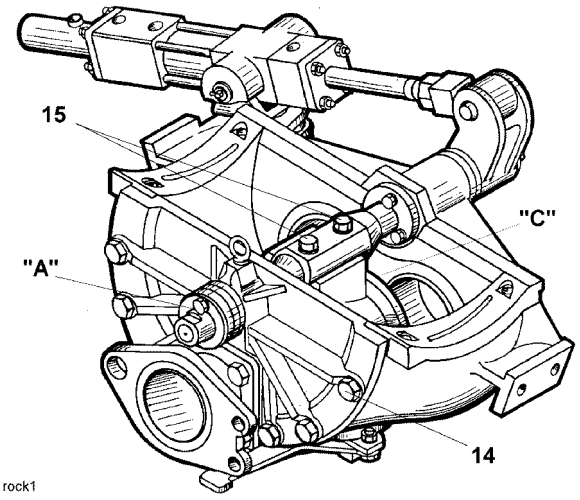

Fig.: 4

CHECK AXIAL PLAY OF THE SLEWING SHAFT

No air gap may be visible - Also during operation - Between bearing bushing 4 (Fig.: 5), locking wheel 2 and adjusting nut 1.

A distance of 1.5 to 3 mm must be measurable between swivel head (rock) 5 and housing lining 6, while the kidney seal 7 is in contact with the housing lining (Fig.: 6).

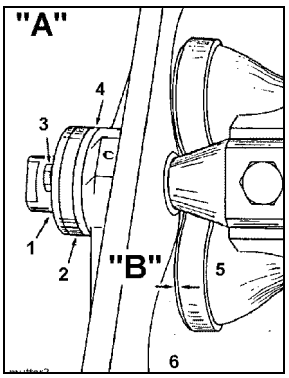

Fig.: 5

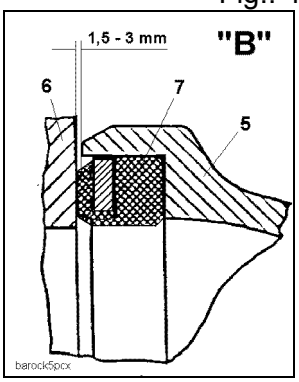

Fig.: 6

Metallic contact between rock 5 and housing lining 6 (Fig.: 7 - Fig.: 8) indicates an error. For example:

- Kidney seal 7 defective

- Adjusting nut 1 too tight

- Cutting ring jammed

- During assembly, too much grease used or parts not carefully cleaned.

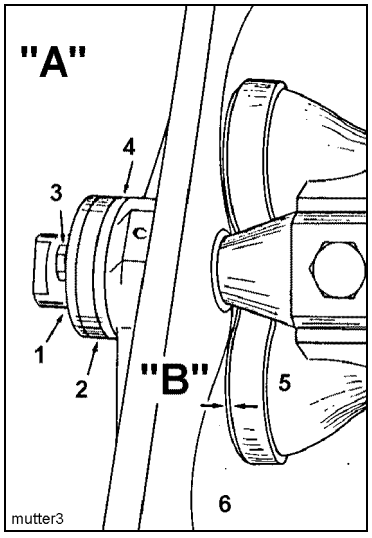

Fig.: 7

SET AXIAL PLAY OF THE SLEWING SHAFT

- Remove safety screw 3 (Fig.: 7) with disc.

- Set distance "B" = 1.5 to 3 mm with the adjusting nut 1.

- Align bore in the collar of the adjusting nut with the nearest threaded bore of the locking disc 2 (advance and turn back the nut).

- Mount safety screw 3 with disc.

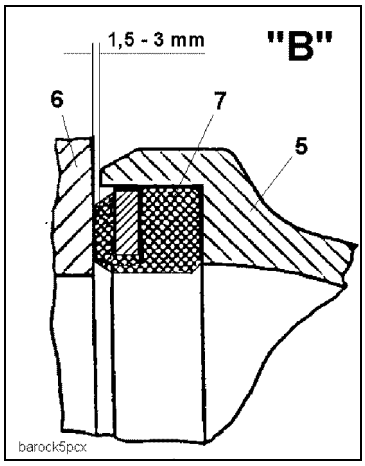

Fig.: 8

CHECK CUTTING RING

The cutting ring and wearing insert of the housing lining are worn unevenly by external influences (e.g. several types of concrete) and different stresses in sub-areas (area "C", Fig.: 9).

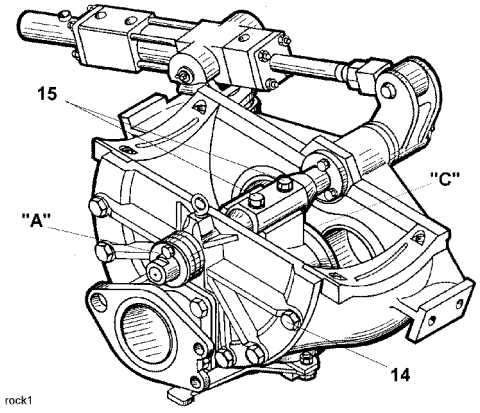

Fig.: 9

Grooves are caused primarily by friction and breaking of stones.

INFORMATION

They are irrelevant as long as the wearing insert is not worn comprehensively.

A single-piece wearing insert 9 (Fig.: 10) made of white iron is used as standard.

A two-piece wearing insert 9 (Fig.: 11) made of white cast iron with 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 thorough cleaning, bring the rock into left and right final position and check the condition of the cutting ring and wearing insert according to maintenance schedule.

  Check the overall scope of the cutting ring.

- The cutting ring should be rotated by 90° in visible gap formation between cutting ring 10 and wearing insert 9 (max. allowed 1 - 1.5 mm).

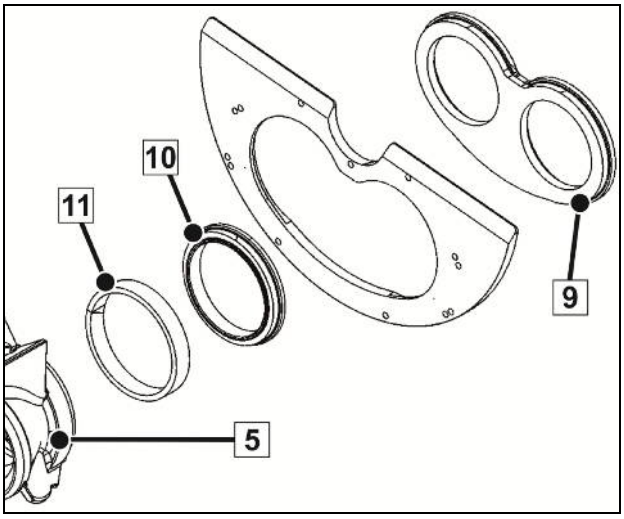

Fig.: 10

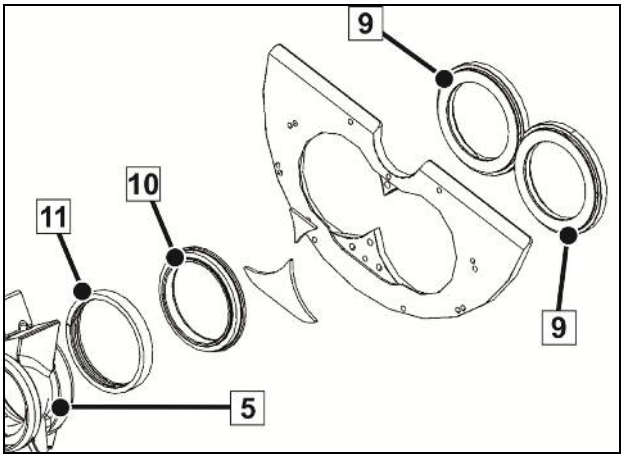

Fig.: 11

ROTATE CUTTING RING

In order to be able to rotate the cutting ring, proceed as follows:

- Disconnect the pumping line from the pipeline outlet of the rock valve. In addition...

  - Remove the tapered tube for construction concrete pumps.

  - Remove the wedges 1+2, as well as the coupling 3 (Fig.: 12) for truck-mounted concrete pumps.

  - Swivel the pipeline outlet to the boom 4 to the side and secure with wedge 1.

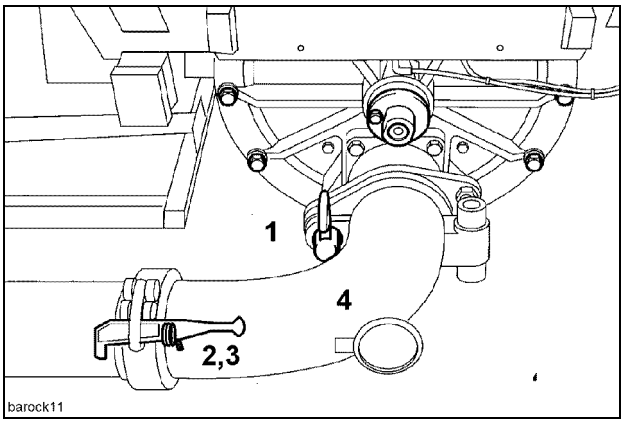

Fig.: 12

- Loosen the adjusting nut 1 (Fig.: 13) by two to three turns.

- Loosen the cover screws 14 evenly by approx. two to three turns to release the pressure spring of the cutting ring.

CAUTION

Danger of crushing and breakage!

After unscrewing the cover screws, the heavy steel cover would come off.

Personal and property damage are possible!

Do not unscrew the cover screws completely!

- Press off the cover of the housing by using two assembly levers until it strikes the loosened screws.

  Press off areas (arrow, Fig.: 13) are thereby located on the top cover.

- Retract the swivel head (rock) until the cutting ring is released.

  Should the cutting ring be released, then loosen the cover screws some more and repeat the process.

- Loosen the cutting ring, if necessary, by tapping lightly.

- Rotate the cutting ring by 90°.

INFORMATION

Always rotate the cutting ring into the same direction!

- Make sure that the cutting ring is securely guided by the rock and prevented from falling out or tilting.

- 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.

- Tighten all cover screws 14 in several stages cross-wise with a torque wrench. Observe the proper tightening torque for these screws.

- Set the axial play of the slewing shaft roughly in order to switch through the rock valve for "setting" the parts.

Abut adjusting nut 1 into position and loosen by ½ turn.

- Dampen the kidney seal with water and switch through the rock valve several times in order for all parts to set.

ATTENTION

Do not switch through when dry - Risk of damage!

- Set the axial play of the slewing shaft as described on page 4.40-2.

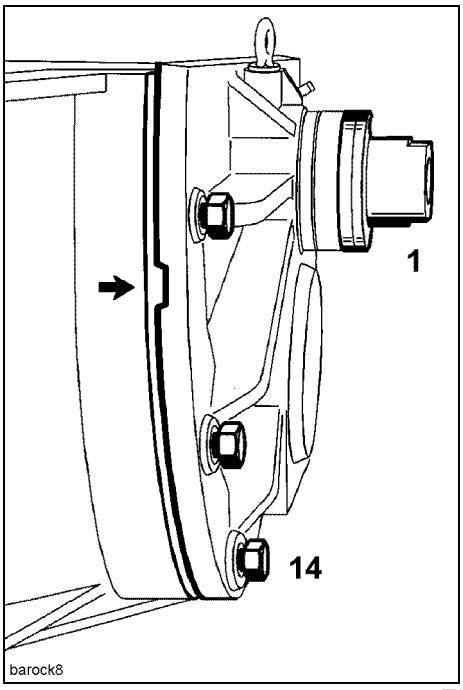

Fig.: 13

- After each turn of the cutting ring, check the distance between cutting ring 10 and rock 5 (Fig.: 14 - Fig.: 15).

If it is above 8 mm, the cutting ring is no longer guided securely in the rock and must be exchanged.

- When exchanging the cutting ring, check the condition of wearing insert 9 and pressure spring 11.

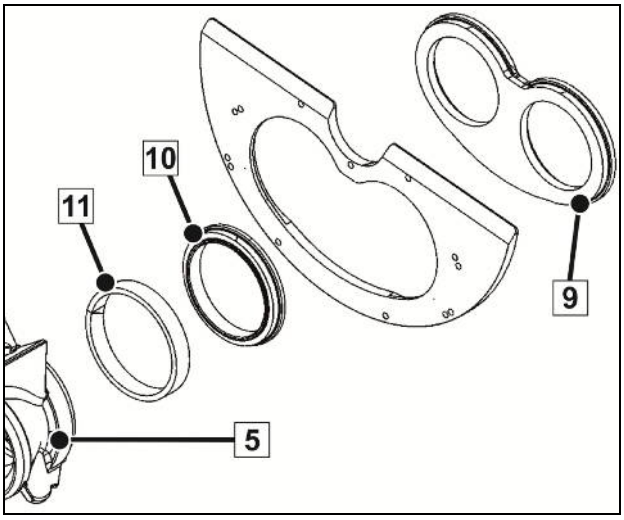

Fig.: 14

CHECK SEALING OF THE SLEWING SHAFT

The bearings of the slewing shaft are sealed with 0-rings (Fig.: 16) against transfer liquid.

In the event of leaks, replace the 0-rings (concrete super-fine components penetrate through the bearing cpl. outward) immediately before destroying the bearing cpl.

The slewing shaft must be removed thereto. See:

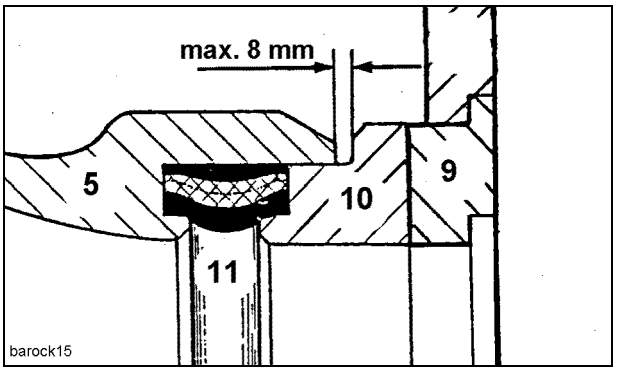

Fig.: 15

ROCK VALVE REPAIR INSTRUCTION

PROLONGED STANDSTILL

Should the rock valve not be used for a longer 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).

These means prevent the seal from "caking".

ATTENTION

Spray may affect rubber parts!

- Do not use spray

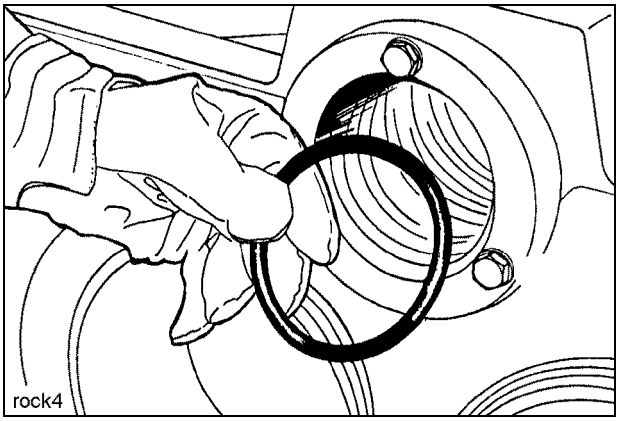

Fig.: 16

CHECK WEAR OF THE ROCK

Most of our rocks are armoured on the outside and inside by welding to reduce wear.

The way of armouring depends thereby on the rule of thumb from main fields of application of the individual rocks.

See example Fig.: 17:

1 = inner armouring

2 = outer armouring

PREVENTIVE MAINTENANCE

Since the wear largely depends on the operating conditions, we recommend checking a new rock for the first time after about 5000 m³ conveyed concrete:

- To do so, clean the concrete pump as usual.

- Bring the rock into a final position.

DANGER

Danger of crushing and injury caused by switching rock valve!
Switch off the drive motor and empty pressure accumulator to prevent the rock from moving independently.

- Loosen the pipeline outlet and check the inner side of the rock with a torch.

- Bring the rock into the other final position and repeat the inspection.

Further inspection intervals can now be determined depending on the condition.

The rock must be exchanged when the basic material "shows through" in individual places.

The inner armouring usually wears faster than the outer armouring.

The exterior should be checked no later than when detecting significant wear on the inside.

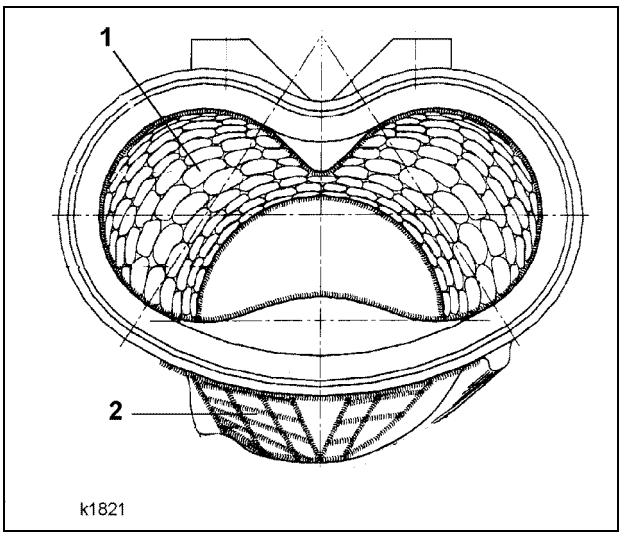

Fig.: 17

INFORMATION

A regeneration through renewed hardfacing 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, as well as replicas.

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PUMPING AND DIFFERENTIAL CYLINDERS

⚠	**OBSERVE SAFETY MANUAL**

Check the fastening screws of the differential and pumping cylinders for tight fit.

Tighten loose fastening screws crosswise in three steps with a torque wrench (Fig. 1).

Tightening torque according to table chap. 4.5.

PUMPING PISTON

Work on the pumping pistons is carried out in the water box.

⚠ WARNING

Danger of crushing!

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. Rock can switch!

In case of danger, actuate the Emergency-Stop button.

⚠ WARNING

Different water boxes can be available depending on the installed concrete pump kit.

The covers are designed correspondingly.

The basic principles are:

- If the top cover of the water box can be opened without tools, bolted protective grids are located under the top cover.

- If a tool is required for opening, no grids are available.

Always ensure that the grids are present and bolted down tightly. Place top cover correctly and secure, if necessary (e.g. with a wedge).

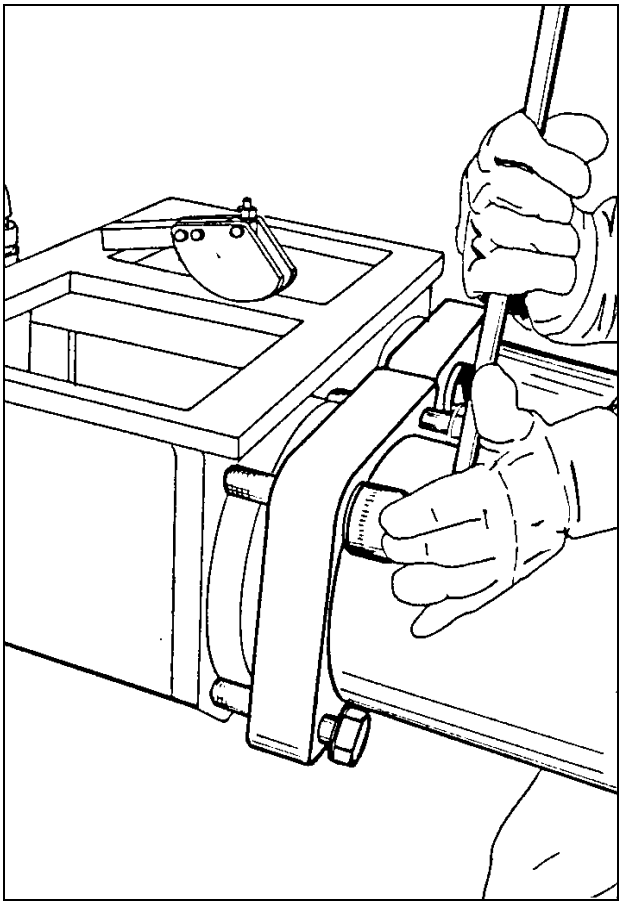

Fig. 1

DRIVE CONCRETE PUMP IN REPAIR MODE

- Remove the top cover of the water box (Fig. 1).

- Drain the water.

- Close the ball valve 1 (Fig. 2) on the concrete pump control block in order to prevent switching of the piston rods in the final position.

- Start the motor and select an increased idling speed.

- Set the lowest concrete pump stroke rate.

- Drive the concrete pump with the remote control.

CHECK FASTENER

- Bring an intermediate piece into the water box.

- Check the fastening screws for tightness (Fig. 3).

  While doing so, hold distance piece on the continuous hexagon.

- Bring the second intermediate piece into he water box and repeat the inspection.

REPLACE PUMPING PISTON

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.

Always renew both pistons together.

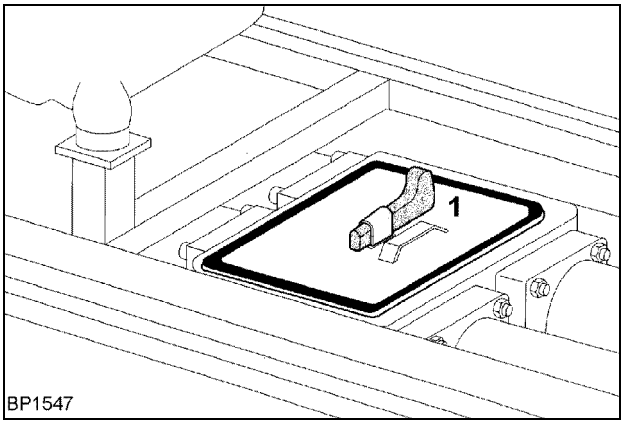

Fig. 1

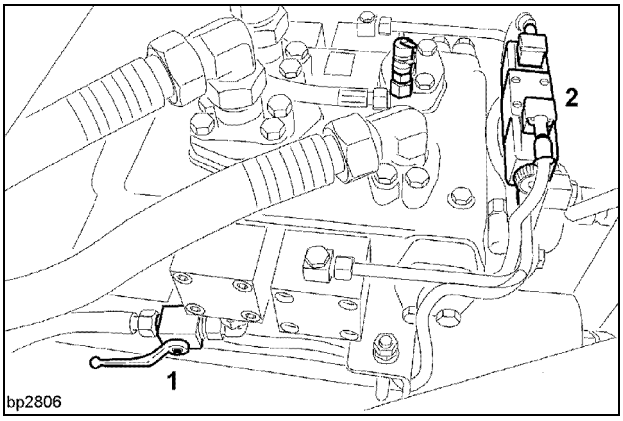

Fig. 2

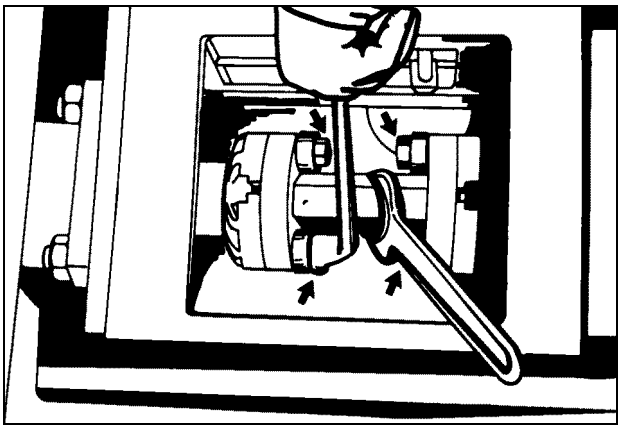
Fig. 3

⚠ CAUTION

Heavy loads!

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.

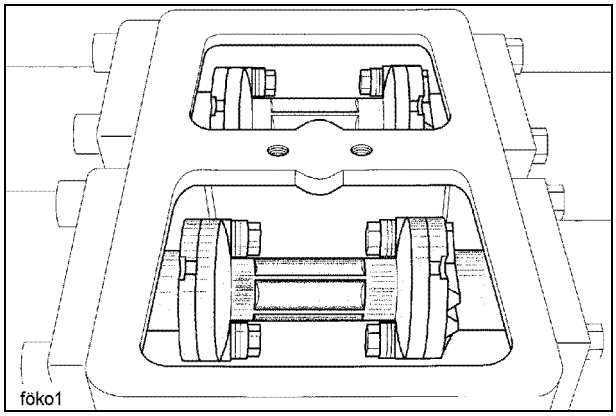

Fig. 1

REMOVAL

- Bring piston until just before the rear final position. The distance piece (Fig. 1) must be fully visible in the water box.

- Loosen and unscrew fastening screws of the distance piece.

  While doing so, hold distance piece on the continuous hexagon (Fig. 2).

- Bring piston rod into the rear final position.

- Remove distance piece (Fig. 3).

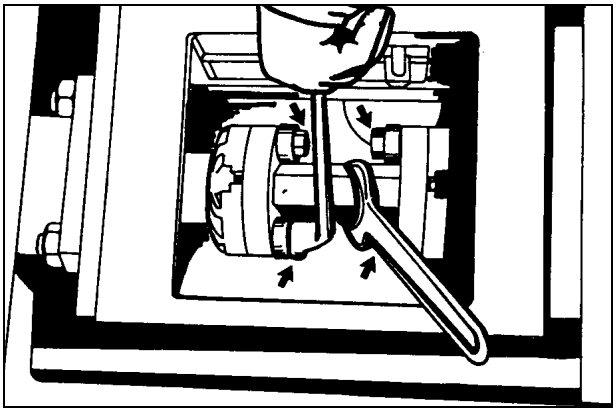

Fig. 2

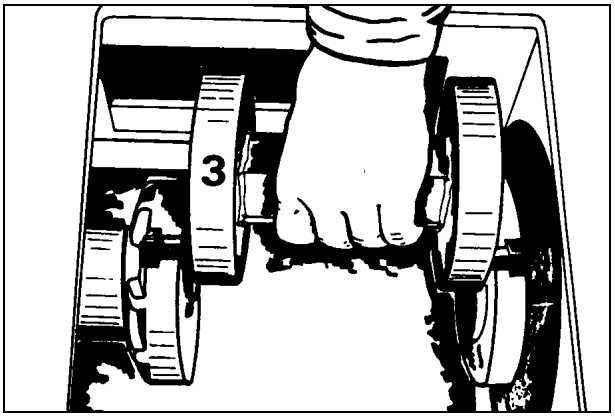

Fig. 3

- Slowly bring piston rod to the pumping piston.

- Connect piston rod flange 1 and piston rod flange 2 with suitable screw and nut (Fig. 1).

  - Manually tighten screw.

- Slowly return the piston rod and pull the piston out of the cylinder (Fig. 2).

- Loosen screw joint.

- Remove pumping piston from the water box.

- Clean and check all parts.

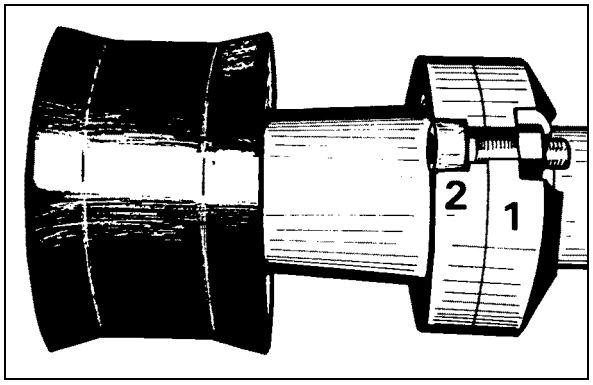

Fig. 1

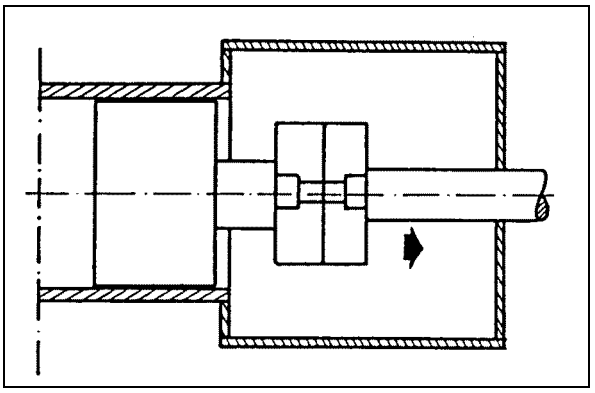
Fig. 2

INSTALLATION

- Apply a thick coat of grease to new piston and cylinder wall.

- Mount new pistons to the piston rod flange by means of screw and nuts.

- Drive pumping piston into the cylinder so that the screw joint can still be loosened (Fig. 3).

- Remove screw joint.

- Return piston rod.

- Insert distance piece and screw together with pumping piston. (Fig. 4)

- Bring piston rod to the distance piece.

- Align distance piece, if necessary, and screw together with the piston rod.

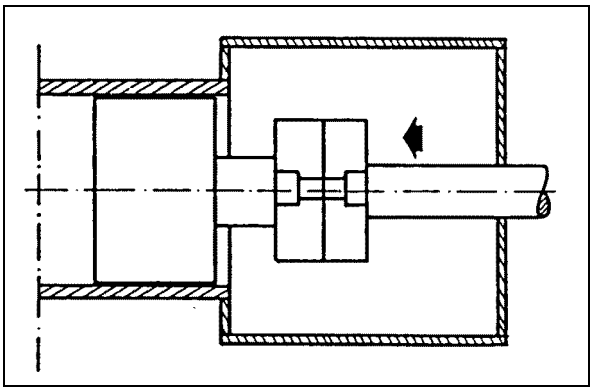
Fig. 3

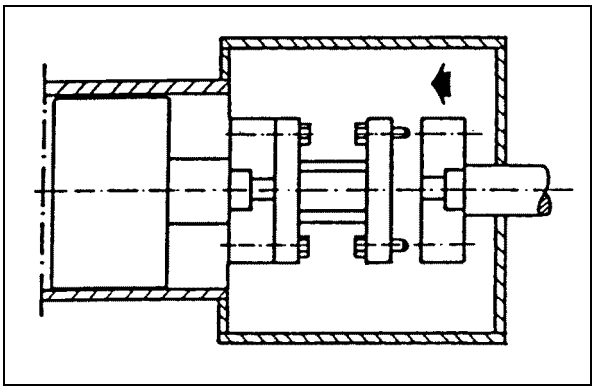
Fig. 4

- Fill with water. Mount top cover (Fig. 1) and secure with wedge and clip pin.

- Open stopcock 1 (Fig. 2) on concrete pump control block.

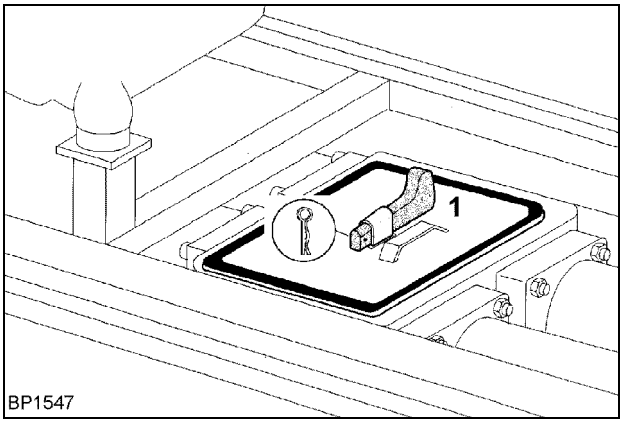

Fig. 1

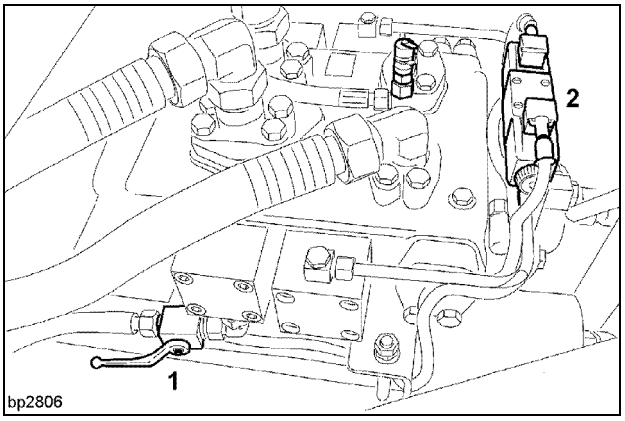

Fig. 2

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MAINTENANCE OF THE PUMPING LINE

OBSERVE SAFETY MANUAL

DANGER

Risk of explosion due to tube breakage!

Pumping lines are wearing 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 tubes and elbows.

Under extreme conditions, daily checks may be necessary.

The SCHWING customer service can mention suitable measurement devices depending on the pumping line material used.

The minimum permissible wall thickness is dependent on the maximum possible concrete 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 through back siphonage!

ATTENTION

Knocking off with a hammer is not recommended, as

- Resulting dents lead to accelerated wear,

- The hardened layer of highly-wear resistant tubes can be damaged.

INFORMATION

According to each 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 so-called "impact elbows" on the last boom section (see page 4.44-5) wear more quickly than the rest of the pumping line.

CAUTION

Injury caused by springing open of the cocking lever!

When mounting split couplings, there is a risk of injury from unexpected springing open of the cocking lever.

Injuries such as bone fractures to concussions are possible.

Secure the cocking lever of the split coupling immediately after closing the cocking lever with the "Safety for split couplings".

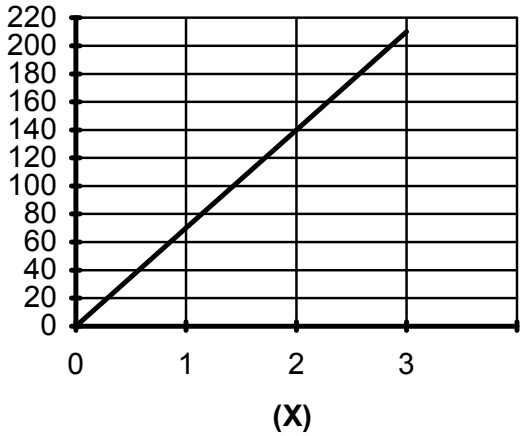
DIAGRAMS

for determining the required minimum wall strengths of concrete pumping lines from P 355 (with prescribed, twofold safety):

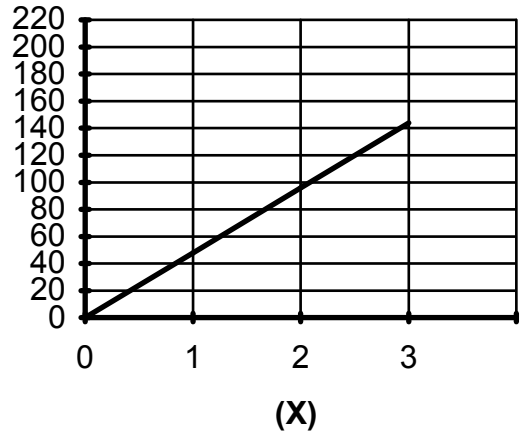
(Y) = concrete pressure PN in bar

(X) = minimum wall strength in mm

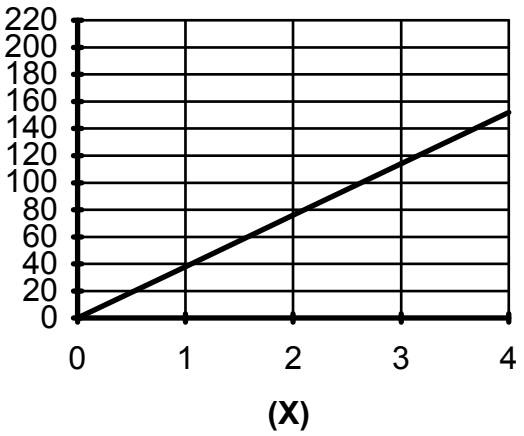
1) Tube 70x2.9



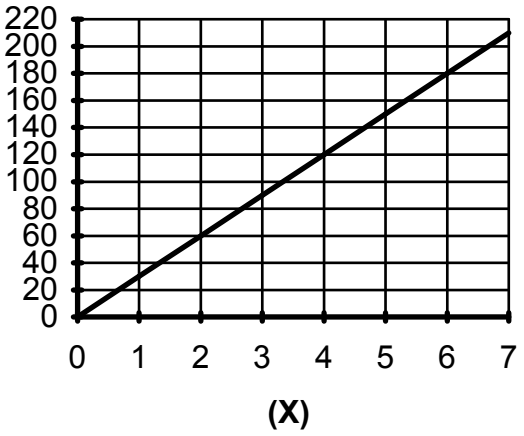
2) Tube 88.9x3.2



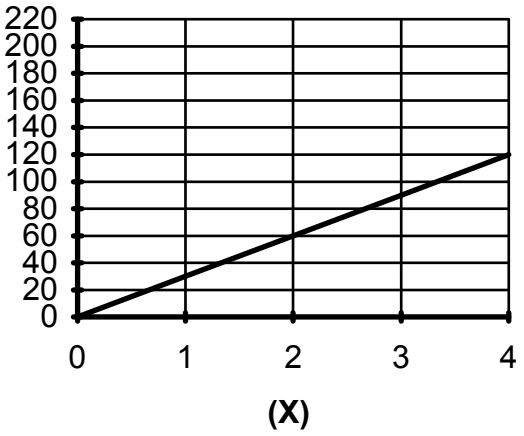
3) Tube 108x4



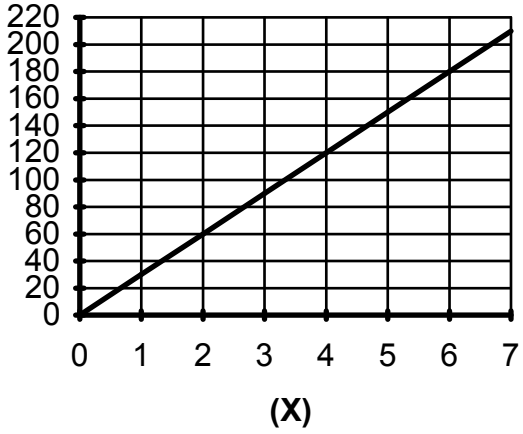
4) Tube 114.3x7.1



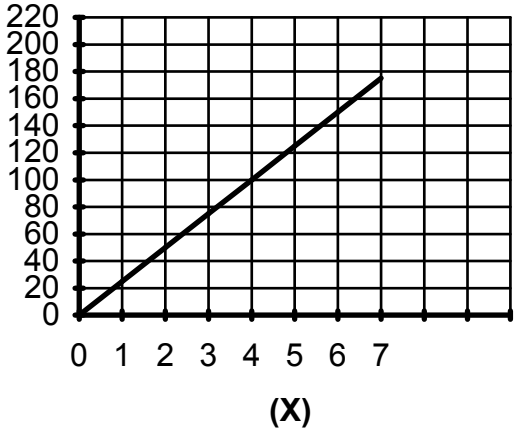
5) Tube 133x4



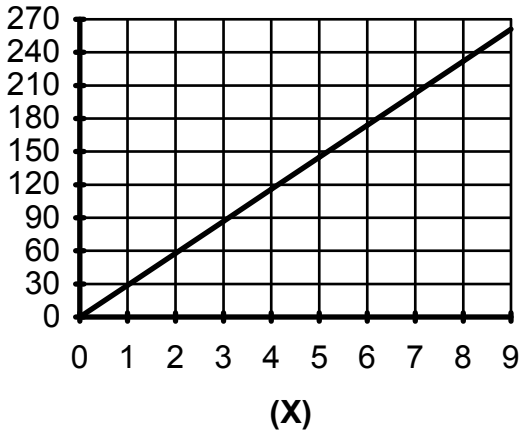
6) Tube 139.7x7.1



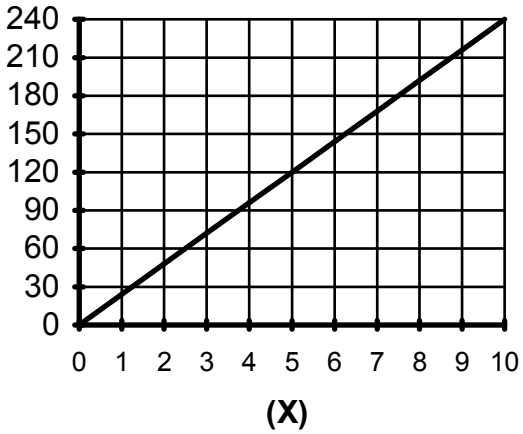
9) Tube 165.1x7.1



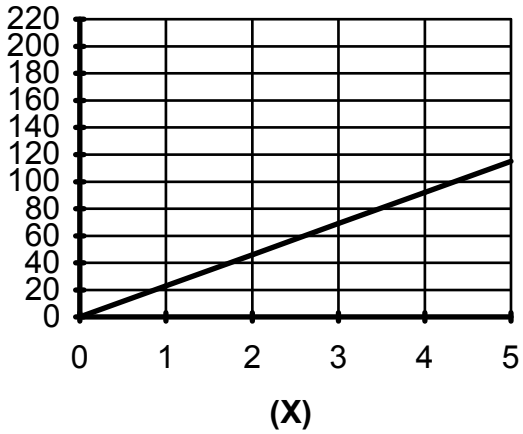
7) Tube 139.7x8.8



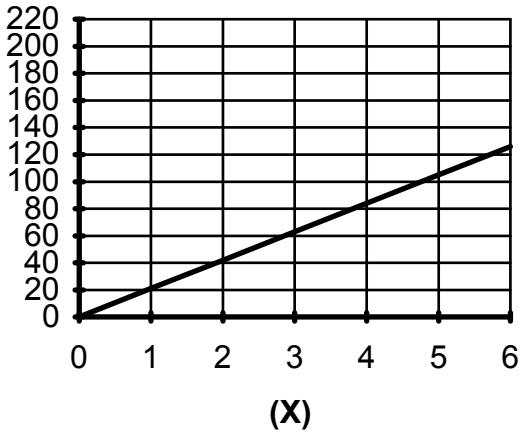
10) Tube 168.3x10



8) Tube 159x4.5



11) Tube 191x5.5



MAIN WEAR ZONES
(preferably test)

Delivery tubes

The main wear zone is located in the direction of concrete flow approx. 100 mm behind the flange (Fig.: 1).

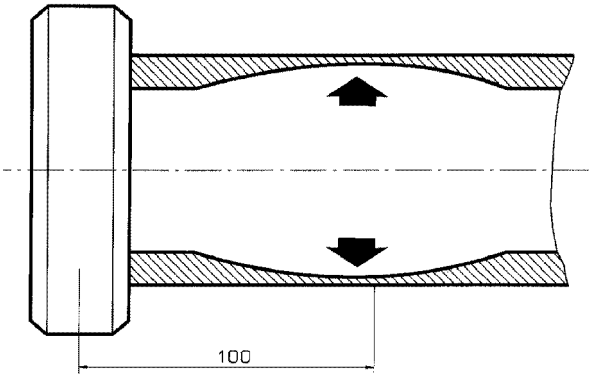


Fig.: 1

Pipe elbows

The main wear zone is located in the direction of concrete flow in the "inlet bend" (Fig.: 2).

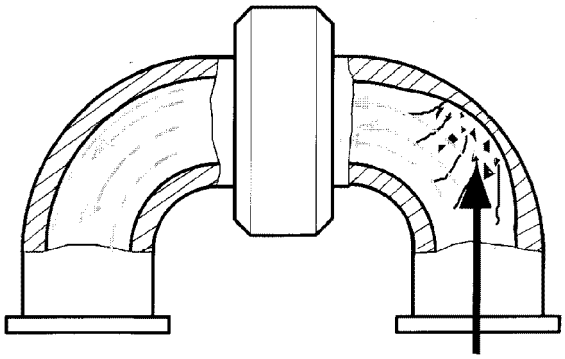


Fig.: 2

Two-layer materials

Two-layer materials must be exchanged at the latest when the inner hardened layer has worn away in places up to the outer layer (Fig.: 3).

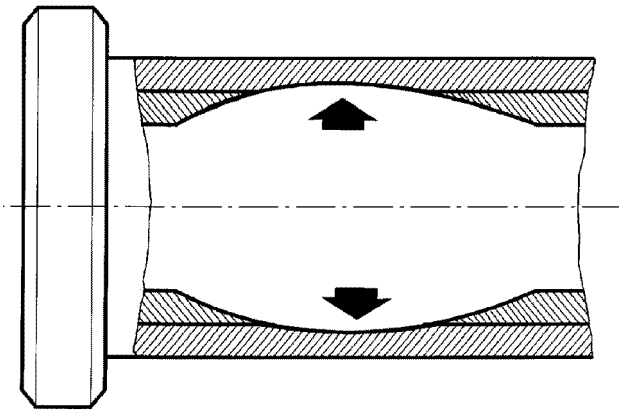


Fig.: 3

IMPACT BEND

The impact bend 1(Fig.: 4) is the penultimate bend of the boom pumping line.

The concrete frequently falls into this elbow and the impacting material causes so-called impact wear.

Impact wear can be mostly avoided if the last boom section assumes a horizontal position during the pumping procedure (Fig.: 5).

Position 1+2 = limited impact wear

Position 3 = higher 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 expanded individually by measurement shown, if necessary, (Fig.: 6).

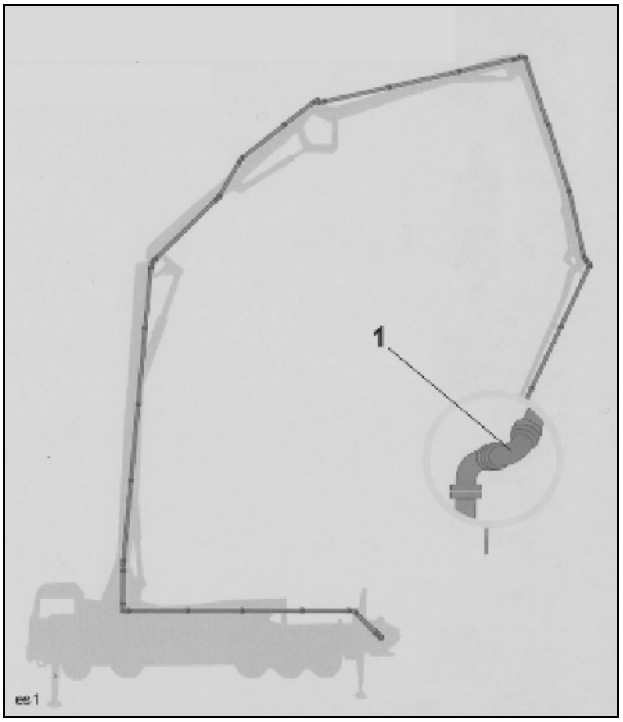


Fig.: 4

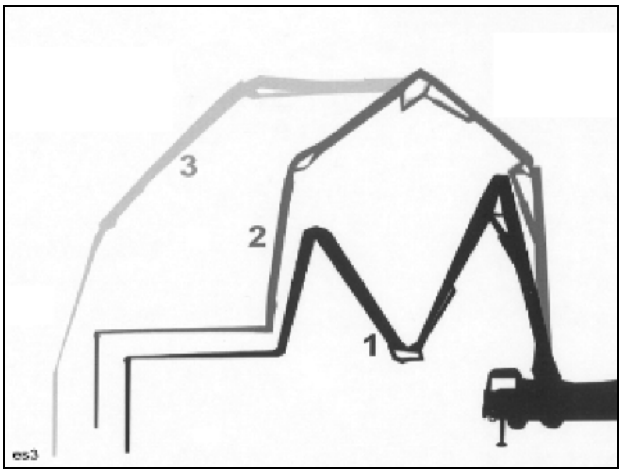


Fig.: 5

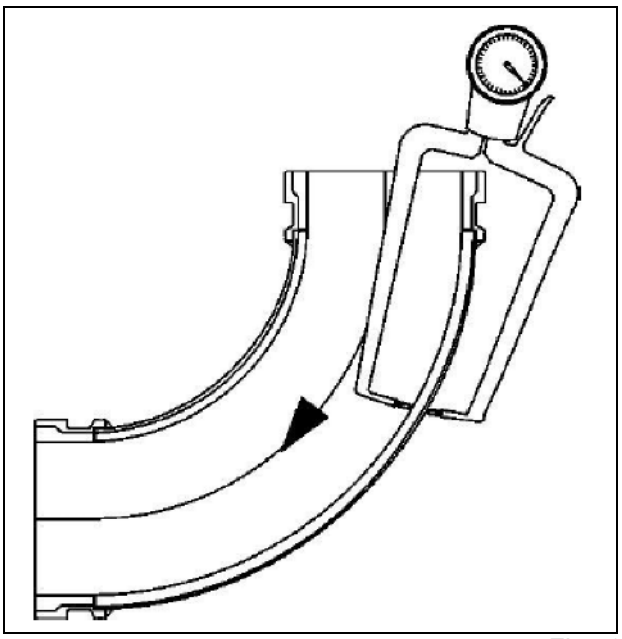


Fig.: 6

WALL THICKNESS MEASUREMENT*

The wall thickness of delivery tubes can be measured using a commercial wall-thickness sensor
(e.g. Fig.: 7 – Kroeplin GmbH). Observe the operating instructions from the manufacturer of the measuring device.

Double-walled delivery tubes cannot be measured using ultrasound.

Procedure:

1. Type specification of the pipeline component

Determine which type of which quality is available.

Depending on the type, the respective measurement sheet is selected. Should you have questions or be missing measurement sheets, please contact SCHWING 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 delivery tube has a remaining wall strength of 0.5 mm and must be replaced as soon as possible.

Summary

Fig.: 7
Wall-thickness sensor C3R30 supplied by Kroeplin GmbH

* Excerpt from Sales Booklet Esser ES4045

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in order to be able to read the descriptions and corresponding tables on the following pages!

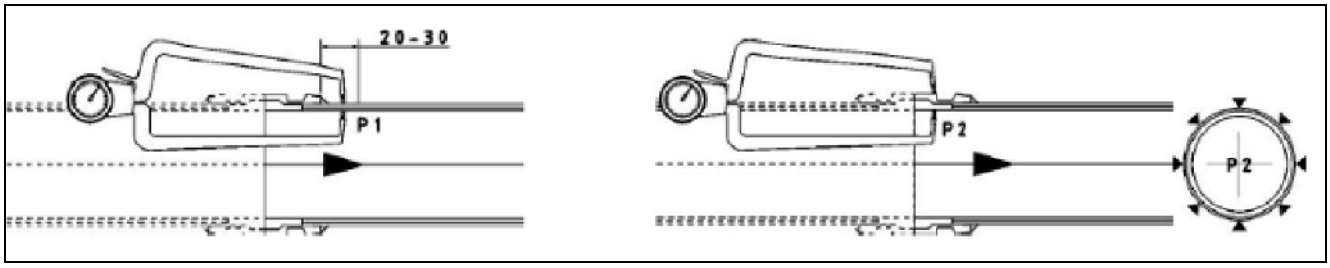
1. TUBE TYPE TUBES

1.1 Installation situation 1 - Tube after tube

Measuring points:

(P1) Approx. 20-30mm 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.

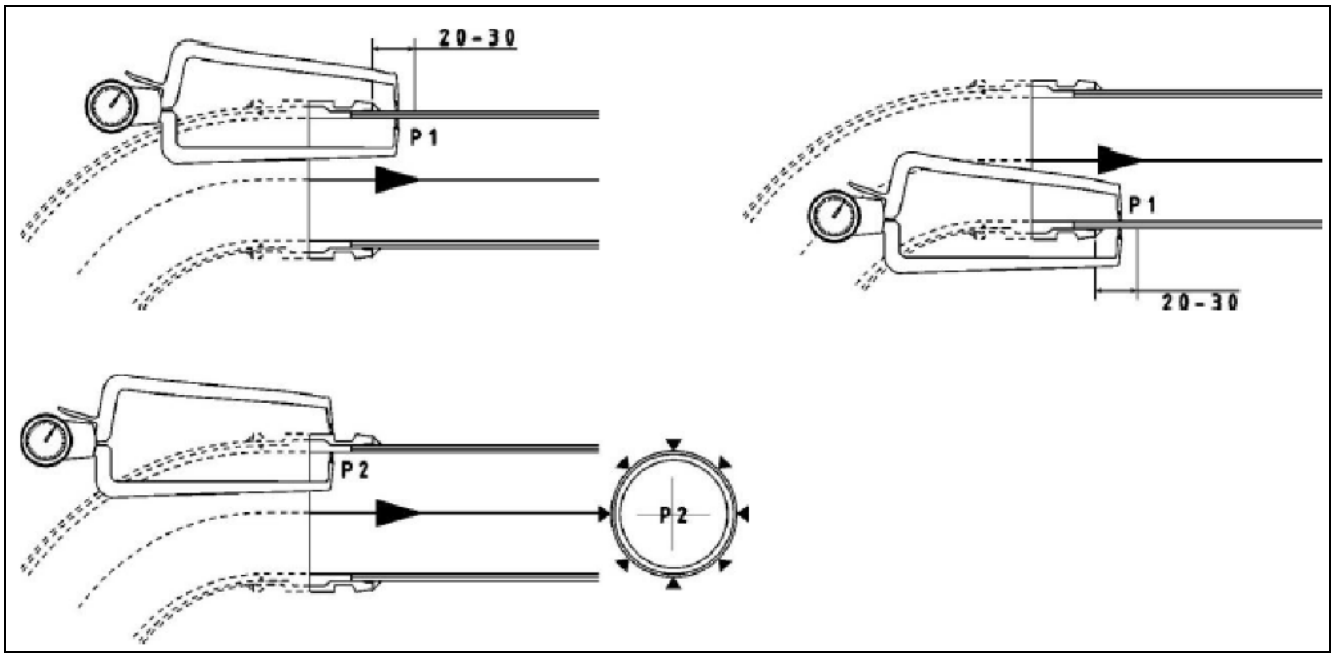


1.2 Installation situation 2 - Tube after elbow

Measuring 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.



MEASUREMENT SHEET TUBES
(As of 31.10.2012, excerpt from the 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

2. TUBE TYPE - ELBOWS

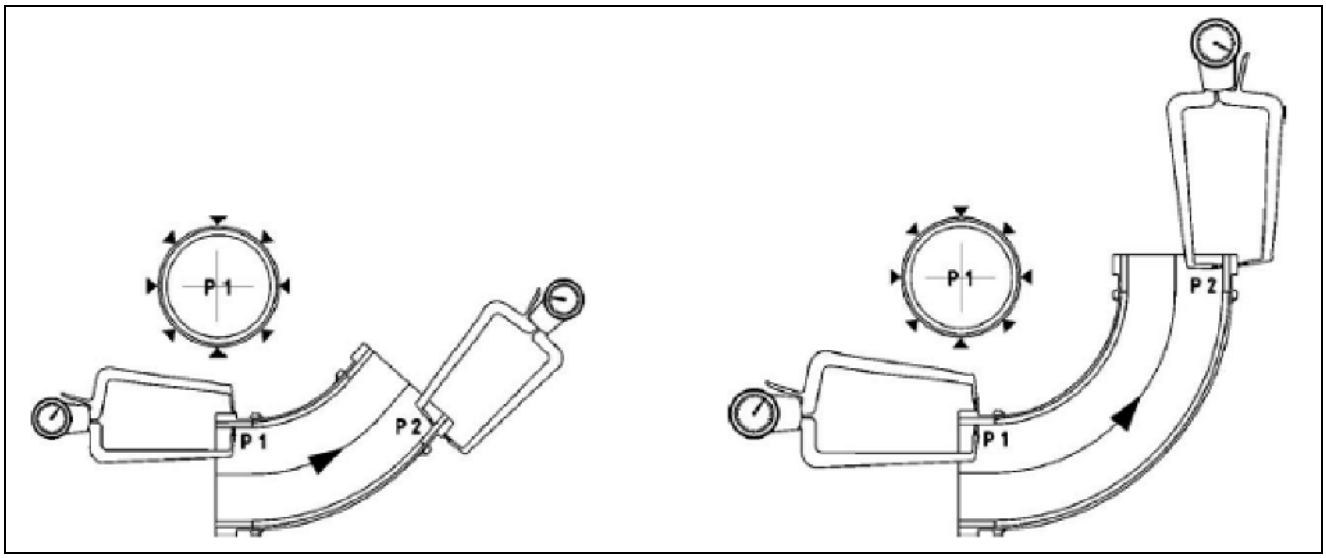
2.1 Installation situation 1, 2, 3 - Elbow after elbow/tube/tapered tube

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.



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!**

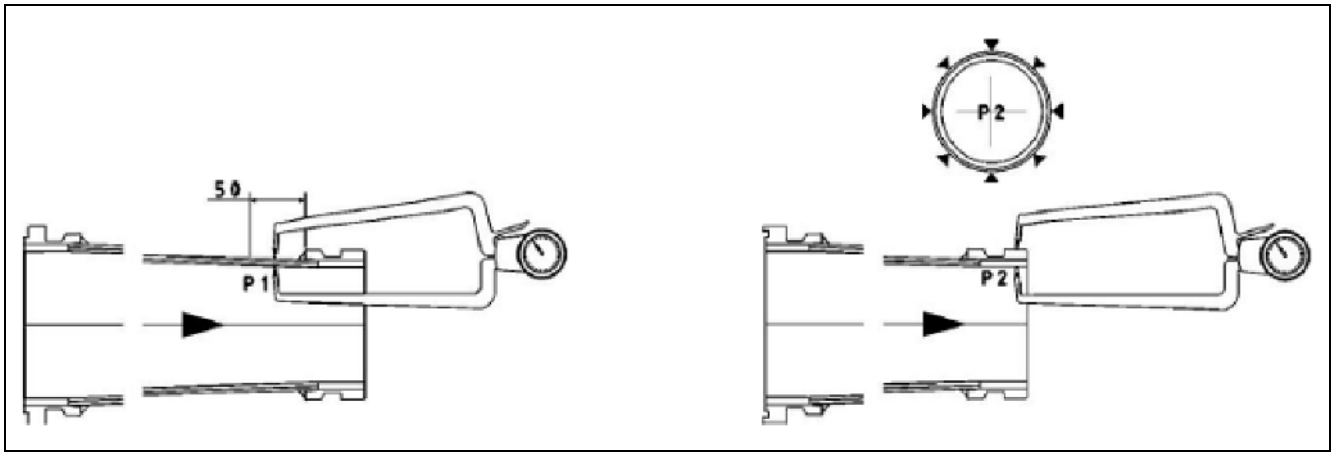
Type: SUPER 2000 ELBOWS (ESSER TWIN PIPE 700 ELBOWS)				
Nominal size DN [mm]	Quality type	Wall thickness [mm]	P1 [mm]	P2 [mm]
100	700	8.2 (5.0+3.2)	10.0	10.0
125	700	10.6 (7.0+3.6) 11.0 (7.0+4.0)	8.0	8.0

3. TUBE TYPE TAPERED TUBE

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.



MEASUREMENT SHEET TAPERED TUBE:
(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

DOWNTIME EXTENSION

INFORMATION

Does not apply for 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 lifetimes of conventional (non.directional) tubes and elbows can be extended if the parts are regularly rotated.

- Turn delivery tubes and bends 180° from the inlet side to the outlet side after 50 % of their expected lifetime (Fig.: 8).

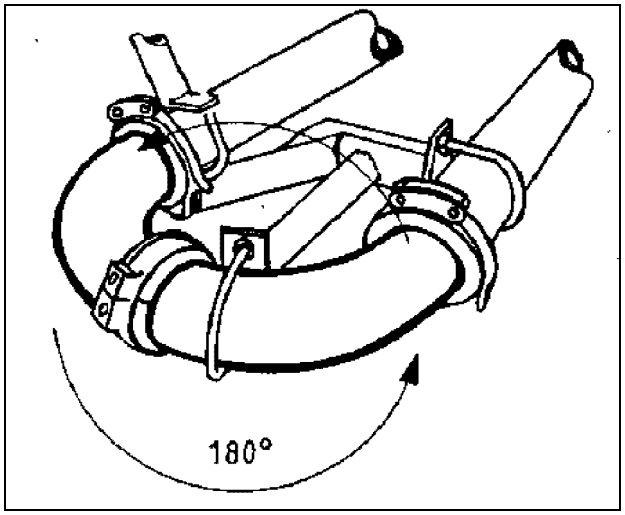


Fig.: 8

REPLACEMENT OF DELIVERY TUBES AND 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 replacement parts.

Only original SCHWING spare parts correspond exactly to the factory-installed parts.

- During the first assembly at the factory, the boom delivery tube 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 plate at the machine (Fig.: 9).

For later exchange of pumping line parts, another pipe length may potentially be required. For this reason, always give the required length when ordering.

WARNING

Delivery tubes and elbows can be very heavy: A 3 m long delivery tube DN 125 of Super 2000 quality weighs, for example, approx. 45 kg.

Before removing, attach tubes and elbows to lifting gear

- 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

During assembly in the factory, the pumping lines are fitted with special seals with web. In this way the required precision is achieved when first assembling the pumping line. The centres of rotation of the pumping lines are however fitted with simple seals without web. In the course of the future replacement of worn pumping line parts, the seals with web can be replaced by simple seals at all connection points.

If you would like to exchange multiple parts of the pumping line, exchange these parts individually and sequentially.

Do not disassemble the entire pumping line. In this case, on the assembly of the new line the centres of rotation would have to be redefined.

This work should only be carried out by specially trained persons using special equipment

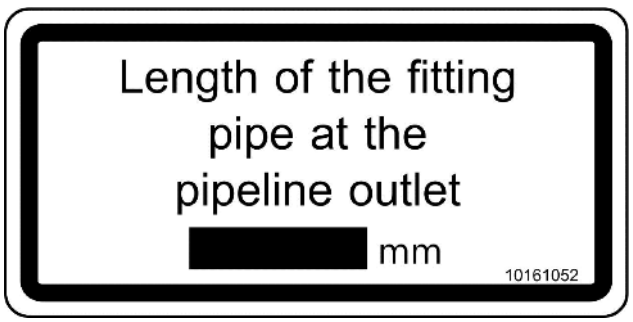


Fig.: 9

TESTING DELIVERY 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 superficially appear "okay".

For end hoses and connecting hoses, a daily, external visual inspection is prescribed.

Loose delivery 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 m³ of concrete:

Plan further tests on the basis of the test results.

VISUAL INSPECTION (EXTERNAL)

- Check the safety catch of a placing boom end hose for soundness.

- The outlet end of an end hose must not be "frayed".

- Check all delivery hoses for dents, kinks or other deformations which are suggestive of displaced or destroyed hose armouring (steel cord insert).

- Check the outer skin for cuts, ruptures or abrasions which entail damage to the hose armouring.

Hoses with damaged armouring must be replaced!

VISUAL INSPECTION (INTERNAL)

- Lay the cleaned hose out horizontally and use a pocket torch.

- Pay attention to points at which the hose armouring is exposed or protrudes.

- Also pay attention to areas of loose rubber coating, dents, cuts and areas of local wear.

- Especially check the main wear zones on the inlet side of the hose. The heaviest wear is located on the first 30 cm of the rubber coating (behind the fixing).

Hoses with damaged armouring or excessive wear must be replaced!

VISUAL INSPECTION OF THE FIXINGS

- Check the fixings for tightness.

  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 these of concrete residue.

Hoses with damaged or loose fixings (hose creeps out of the fixing) must be replaced!

INFORMATION

Due to the greater load, check end hoses equipped with a non-return valve (Fig.: 10) especially carefully in the pressure area of the non-return valve.

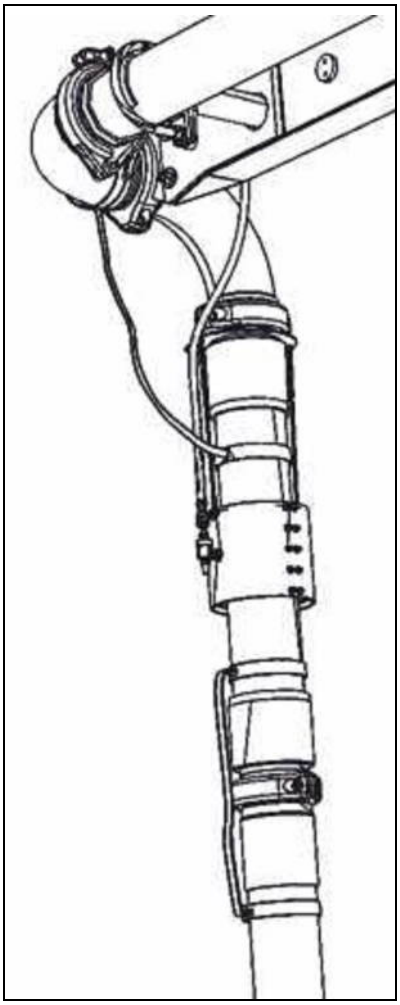


Fig.: 10

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ROTARY COMPRESSOR*

⚠	**OBSERVE SAFETY MANUAL**

MAINTENANCE PACKAGES

SCHWING provides two different packages of material for the maintenance of your compressor:

- Maintenance package 1 (standard maintenance)
  art. no.: 10197336

  This package contains all filters, seals and a reservoir with compressor oil for the maintenance described below.

  The oil quantity is sufficient for an oil change and possible refill between changes.

- Maintenance package 2 (oil separator cartridge)
  art. no.: **10170388**

  This package contains an oil separator cartridge and all seals necessary for the change thereof.

INFORMATION

In order to ensure a safe and undisturbed operation, please only use the above material.

SCHWING is not liable for any damages caused by improperly performed maintenance and/or unsuitable material.

INFORMATION

Read these instructions prior to starting work.

Do not use flammable substances and naked flames during cleaning work and maintenance.

CHECK OIL LEVEL

- Check oil level when drive is at a standstill and compressor is pressure free (set pressure gauge to "0").

- Place vehicle on level ground.

- The sight glass 4 serves for checking the oil level (Fig. 1).

  The oil level must exceed the upper edge of the sight glass.

INFORMATION

The oil level should reach about the centre of the sight glass with a running compressor.

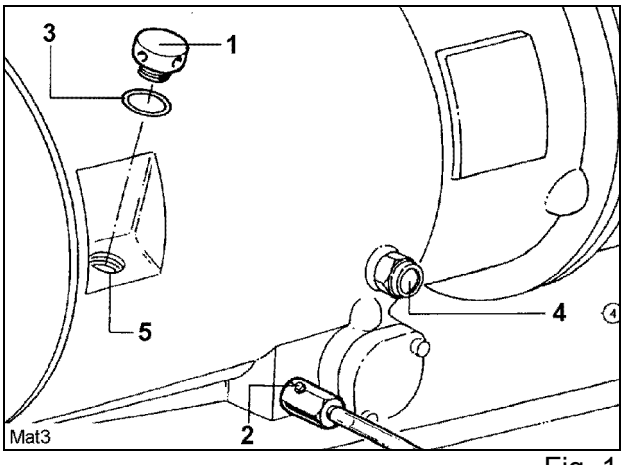

Fig. 1

* = Special equipment

CAUTION

Risk of burning!

The compressor can become very hot!

TOP UP OIL

- Check oil when drive is at a standstill and top up compressor (set pressure gauge to "0").

- Carefully open the filler plug 1 (Fig. 1) to produce a pressure compensation.

  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.

INFORMATION

The mixing of compressor oils is prohibited.

- Refill the oil to the opening 5 until it overflows.

- Replace the sealing ring 3 and mount the filler plug 1.

CHANGE OIL

Drain the oil at operating temperature for it to drain properly.

- Loosen the filler plug 1 first, as described above.

- Open the drain cock 2.

- Close drain cock after complete emptying.

- Fill new oil, as described above.

- Run compressor for a few minutes, then check leak tightness and oil level. Refill the oil, if necessary.

INFORMATION

New compressors are filled with a run-in oil. This oil must be replaced 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 **Rotoröl 8000 F2**included in maintenance package 1.

Rotor oil 8000 F 2 is a synthetic all-season oil to be used at an ambient temperature of -25 to 40°C.

It may not, under any circumstances, be mixed with other oils.

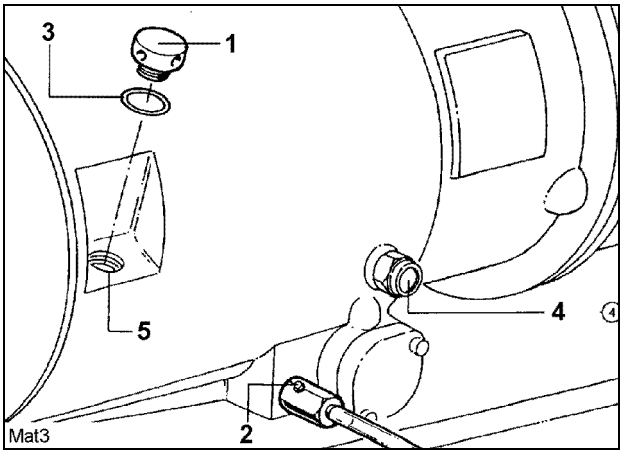

Fig. 1

CLEAN/RENEW AIR FILTER

- Loosen the knurled nut 1 (Fig. 1).

- Remove the sealing ring 2 and filter cover 3.

- Pull off the filter insert 4.

- Clean all parts with compressed air (max. 5 bar).

  Blow out filter insert from the inside to the outside by upward- And downward movements until dust no longer escapes.

- Renew filter insert after cleaning a few times according to maintenance schedule (page 4.10-4).

- Mount filter in reverse order.

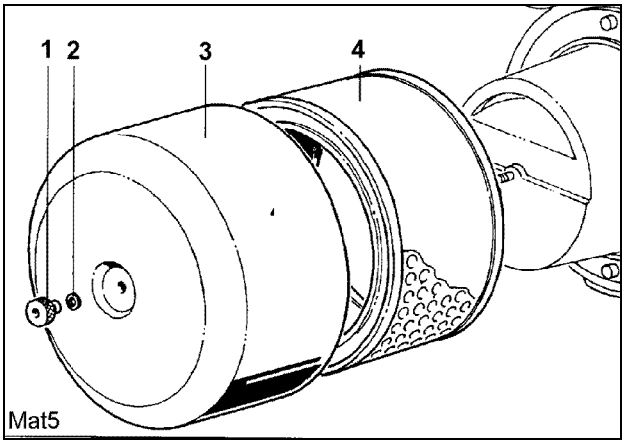

Fig. 1

CLEAN OIL COOLER

- Clean the cooling fins of the oil cooler with a compressed air gun (Fig. 2).

  A dirty cooler leads to greater heating of oil and shutdown due to overheating.

  If oil is too hot, it ages faster and loses its lubrication properties. This increases the wear of the compressor.

- Blow the compressed air against the normal flow direction of the cooling air.

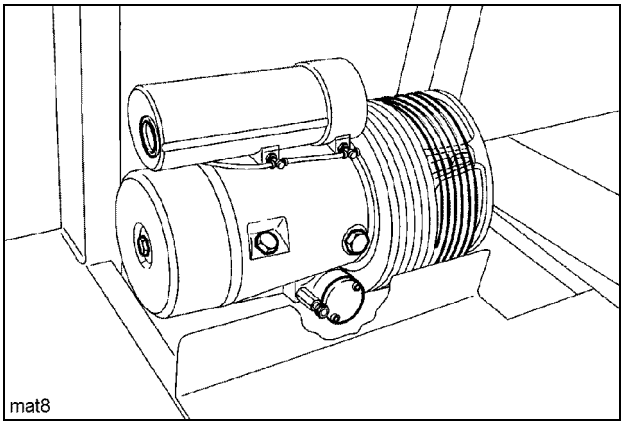

Fig.2

RENEW PRESSURE HOSES

Pressure hoses must be renewed after 3 years. The production data are engraved into the hoses.

RENEW OIL FILTER

- Drain the old oil as described above.

- Loosen the screws 1 of the filter cover 2 (Fig. 1).

- Rotate the top cover by 90° and remove the top cover with filter.

- Loosen 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.

- Mount a new filter to the top cover.

- Mount the top cover with a new sealing ring 4.

- Fill the compressor oil, as described above.

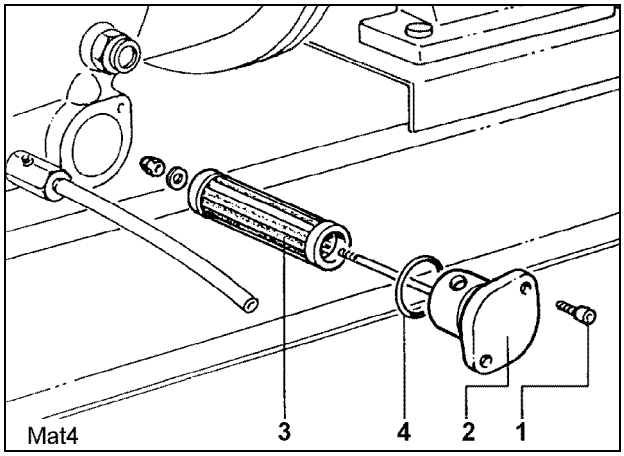

Fig. 1

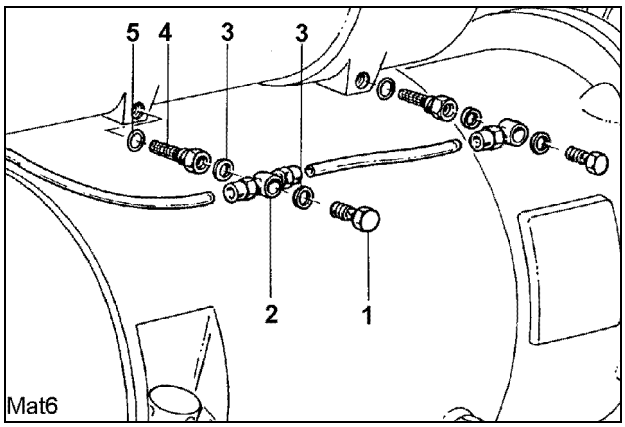

Fig. 2

RENEW OIL RETURN VALVE

- Loosen the hollow screws 1 (Fig. 2).

  Pay attention to the sealing rings 3!

- Unscrew the return valves 4 from the separator housing.

- Mount new valves with new O-rings 5.

- Mount the screw joints 2 with new sealing rings 3.

RENEW OIL SEPARATOR CARTRIDGE

Dismantling:

- Disconnect the plug of the solenoid valve 1 on the separator housing 2 (Fig. 1) and loosen the air hose 3.

- Loosen the oil return valve 4, as described above.

- Loosen the compressed air tube 5 from the separator housing.

- Loosen the radial groove nut 6.

INFORMATION

Observe a 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 from 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 from the housing.

- Loosen the nut 9 and remove the sealing disc 10 and top cover 11.

- Remove the old oil separator cartridge 12, together with O-rings 13.

Mounting:

- Mount the parts in reverse order.

- Always use a new oil separator cartridge and new seals 10, 13, 14, 15 and 16!

- Press the O-rings 13 with some grease into the seat pan of the oil separator cartridge.

- Make sure that

  - The separator cover 8 is mounted in the position (arrow) indicated,

  and

  - The connection tube 7 is mounted according to its marking.

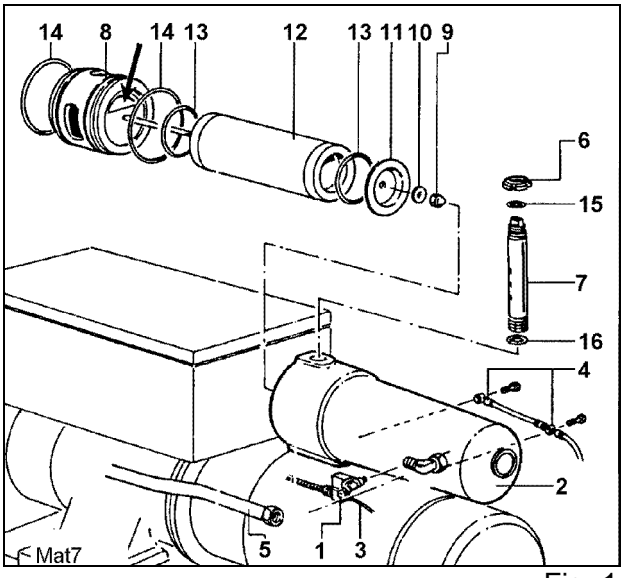

Fig. 1

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HYDRAULIC SHUT-OFF ASSEMBLY

OBSERVE SAFETY MANUAL!

Depending on the operating conditions, the shut-off assembly (Fig. 1) driven by the concrete pump hydraulic must be lubricated at least once a week, grease nipple 6 (Fig. 1).

As the lubrication requirement increases with progressive wear, the lubricating intervals must be shortened accordingly.

Use the universal lubricating grease KP 2 K according to our recommendations in chap. 4.4.

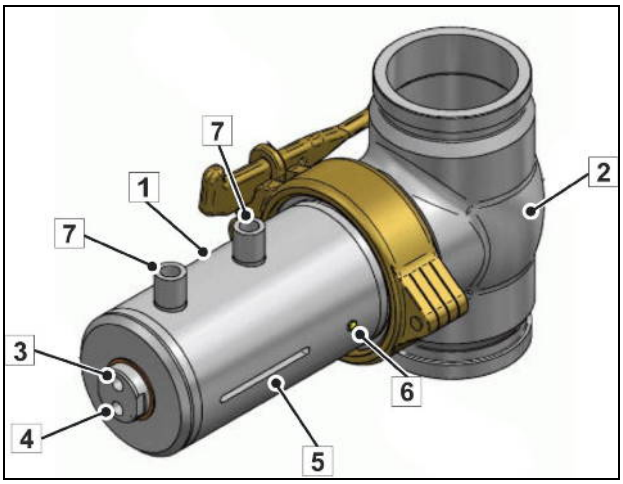

Fig. 1

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4.60 Electric/electronic system, software

4.60.1 Electrical system: Description

The electrical system of the SP 2800 D is supplied with 24V of power by two 12V batteries connected in series.

The following should be observed in terms of jump-starting and welding due to the spatial separation of both batteries (one on the right and one on the left side).

4.60.2 Jump starting:

A diesel engine uses considerably more power to start than a gasoline engine, which must be considered in the selection of the dispenser unit.

The jumper cable should be made of high-quality copper cables according to DIN 72553-25 and have a cross section of min. 35 qmm.

The positive terminal of the machine engine battery (-G12 right-hand side) and positive terminal of the dispenser unit are connected with the red cable.

First, the black cable is attached to the negative terminal of the donor unit and then to the negative terminal of the machine battery (-G13 on the left-hand side).

Make sure to observe the correct order!

Under no circumstances may the terminals of the batteries be connected the other way round.

The two batteries of the SP must remain connected electrically; an interruption can cause the alternator to be destroyed.

If the diesel engine of the SP has started, the cables can be removed again in the reverse order.

4.60.3 Welding:

ATTENTION

Welding work on the frame may only be carried out by qualified personnel!

Do not conduct welding work on the motor!

In order to protect the electronic components from surges during electric welding work, the following safety measures must be observed:

Positive terminal (on the battery -G12 right-hand side) and

minus terminals (on the battery -G13 left-hand side) should be removed from the batteries and covered.

The earth terminal of the welding device should be connected directly to the part being welded.

The housing of the electronic components (e.g. control parts) and electronic cables must not come into contact with the welding electrode or earth terminal of the welding device.

The earth terminal of the welding device may not be connected to the motor.

Do not conduct welding work on the motor!

4.60.4 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 operator station of the concrete pump (Fig. 2).
- Near the control panel (Fig. 3)

Also see electric circuit diagram.

4.60.5 Changing the fuses of Schwing components

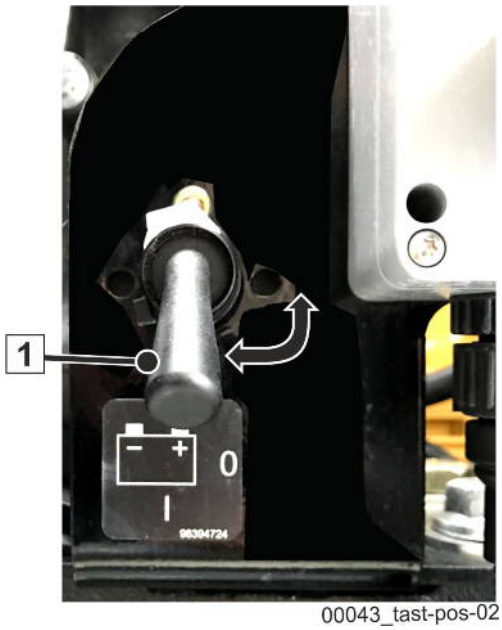
- Switch off the machine control and the drive motor.
- Turn the main switch of the starter battery (1) (Fig. 1) to the “0” position.
- Open the top cover of the switch cabinet or control station using the special key.
- The allocation of the fuses can be found in the diagram on the inside of the switch cabinet cover or in the electrical circuit diagram.

The fuses are marked with "F".

- Commercial vehicle fuses are used.
- Only replace the defective fuses with new equivalent ones.

ATTENTION

The electrical/electronic system can be destroyed due to overrated or bypassed fuses.



00043_tast-pos-02

Fig. 1; main switch for the starter battery

Fig. 2; example of an operator station for a jobsite concrete pump

Fig. 3; panel with regeneration.

- If triggered again, there is a short circuit.

Stop the machine and have an electrician check the system.

4.60.6 Working on electrical / electronic components

WARNING

Only suitably qualified personnel may work on the electrical control and electronics.

Unqualified interventions endanger the operational safety and lead to the termination of the operating license and CE certification.

- Before working on electrical or electronic components, disconnect:
- first the negative lead (-),
- 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 are required, if applicable, for the electronics of the vehicle (e.g. for the anti-lock braking system ABS).

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.

4.60.7 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.

4.60.8 Electrically powered machines

- Have an electrician disconnect the power supply of such machines prior to carrying out repair work on the machine.

DANGER

Danger caused by electric shock!

Only qualified electrical personnel may work on the electrical system.

4.60.9 The arc welding process

See the "*Repair welding*" chapter

4.60.10 Jump starting

Connect the jumper cable as described in the operating instructions for the vehicle or the motor.

4.60.11 Mechanical processes

Cover devices, cables etc. when drilling or grinding work etc. is to be carried out on the machine.

4.60.12 Painting and working with aggressive substances

Cover devices, cables etc. to protect them against paint mist and aggressive substances.

4.60.13 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.

4.60.14 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's instructions!

4.60.15 Checking the acid level

- Clean battery surface. Open locking cap.
- The fluid should typically be 10 to 15 mm above the plates or at the level of the control device. Observe the instructions from the battery manufacturer!
- Refill with distilled water (not acid!), if necessary.
- Mount locking caps.

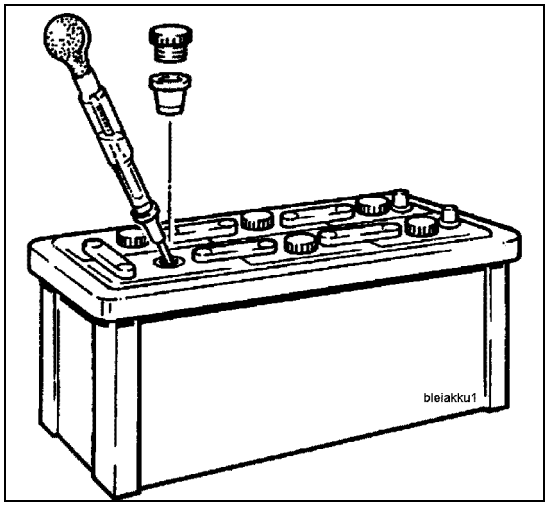


Fig. 4

4.60.16 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 shows at least 12.5 volts, then the battery is ok. The battery must be charged immediately once below 12.5 volts.

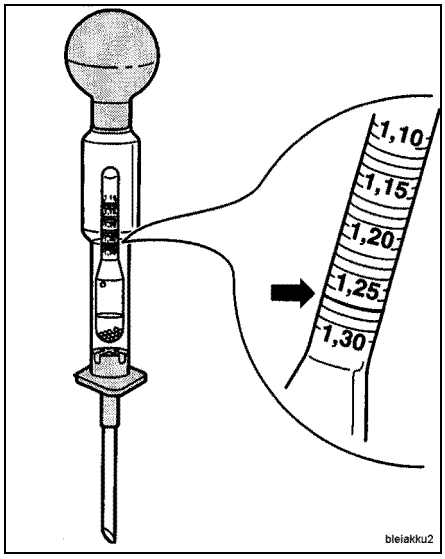


Fig. 5

4.60.17 Checking the acid density

Using a hydrometer (Fig. 4/Fig. 5) 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 0.03kg/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 tables, Tab. 1.

Acid density (kg/l)		Charging status	Measure
Normal	Tropics		
1.28	1.23	good	-
1.20	1.12	half	charged
1.12	1.08	empty	immediately charge!

Tab. 1

4.60.18 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.

4.60.19 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.

4.60.20 Disposal

- Turn in old batteries at a collection point. Observe regional regulations for disposal of batteries and sulphuric acid.

INFORMATION

Please see the operating instructions from the vehicle or engine manufacturer for further information on the starter batteries!

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SAFETY INSPECTIONS

	**OBSERVE SAFETY MANUAL**

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:

MACHINE OPERATOR

The machine operator is responsible for the visual and functional inspections of "his/her" machine, including accessories, before and during use.

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.

COMPETENT PERSON (SPECIALIST)

A competent person must carry out the technical safety inspections required at regular intervals and enter the results into the test book.

The definition of a competent person is given in the SAFETY MANUAL.

We recommend having the inspection done only by employees of SCHWING.

EXPERT

An expert must be consulted in case of significant changes and extensive repairs (if e.g. welding is carried out on load-bearing parts).

The definition of an expert is given in the SAFETY MANUAL.

ADDITIONAL INSPECTIONS

For certain units relevant to safety, such as accumulators, the relevant inspection regulations in the country of use must be observed.

We recommend having the inspection performed by an employee of SCHWING, if no qualified personnel is available.

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**
Keeping to the inspection schedule is of great importance!	

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

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!

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, thus we strongly recommend assigning SCHWING 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.

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 jeopardise the life and health of users and any person staying in the danger zone and also cause damage to private property and economic goods.

S1 parts are for example:

- Placing boom arms
- Levers and bolts on the placing boom
- Hydraulic cylinders on the boom and outrigger
- Supports (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 are for example:

- Hydraulic pumps
- Drives
- Gears
- Chutes
- Concrete filling hoppers

In practice, the significance of individual components as regards technical safety will often be overlapping, often making it difficult to clearly assess their individual relevance to technical safety.

It also always depends on the specific situation. Rupturing concrete pumping lines or hydraulic hoses, for example, lead to machine failure, but can also endanger the lives and health of nearby persons!

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!

NOTIFICATION OF DAMAGE FOR SAFETY COMPONENTS

Please complete the copy of this questionnaire and send the completed copy to

SCHWING GmbH
Service
Postfach 20 03 62

D-44647 Herne

Of course you can also fax us this page or reply by email:

Fax: +49 (0)2325 74674 E-Mail: service@schwing.de

Customer no.:.....	Tel.:.....
Address:.....	Fax:.....
.....	Email:.....
.....	Machine type:.....
.....	Machine no.:.....
.....	Operating hours:.....
Contact person:	Concrete delivery volume in m³:.....

Short description of the damage:

Following parts were replaced (article number, if known):

Was welded? □ yes □ no

If so, where?

Were mechanical procedures carried out?

□ drilling □ sanding □ other

If so, where?

Was the work documented by photos or drawings?

□ yes □ no

If so, is this document attached to this message?

□ yes □ no

4.70 Welding repairs

OBSERVE SAFETY MANUAL!

On the placing boom, on the support 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.: 1)

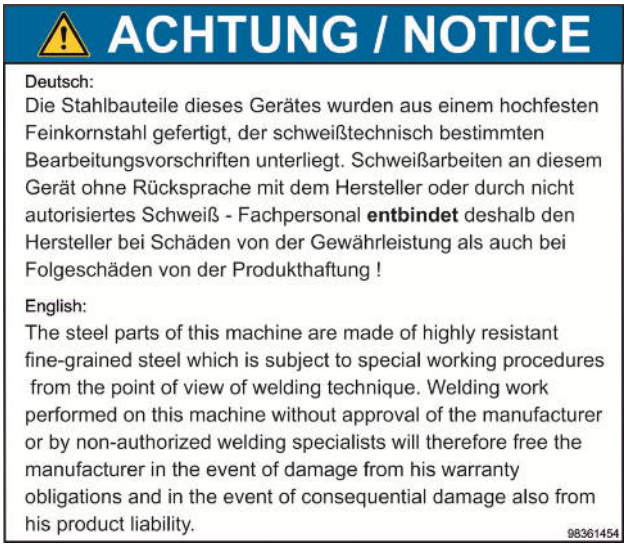

Fig.: 1

- Before carrying out electric welding, disconnect all batteries (see chap. 4.60) and, where appropriate, take measures to protect vehicle or 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.

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SCHWING

Presentation 1

Safety 2

Operation 3

Maintenance 4

Radio remote control 5

Special equipment 6

Appendix 7

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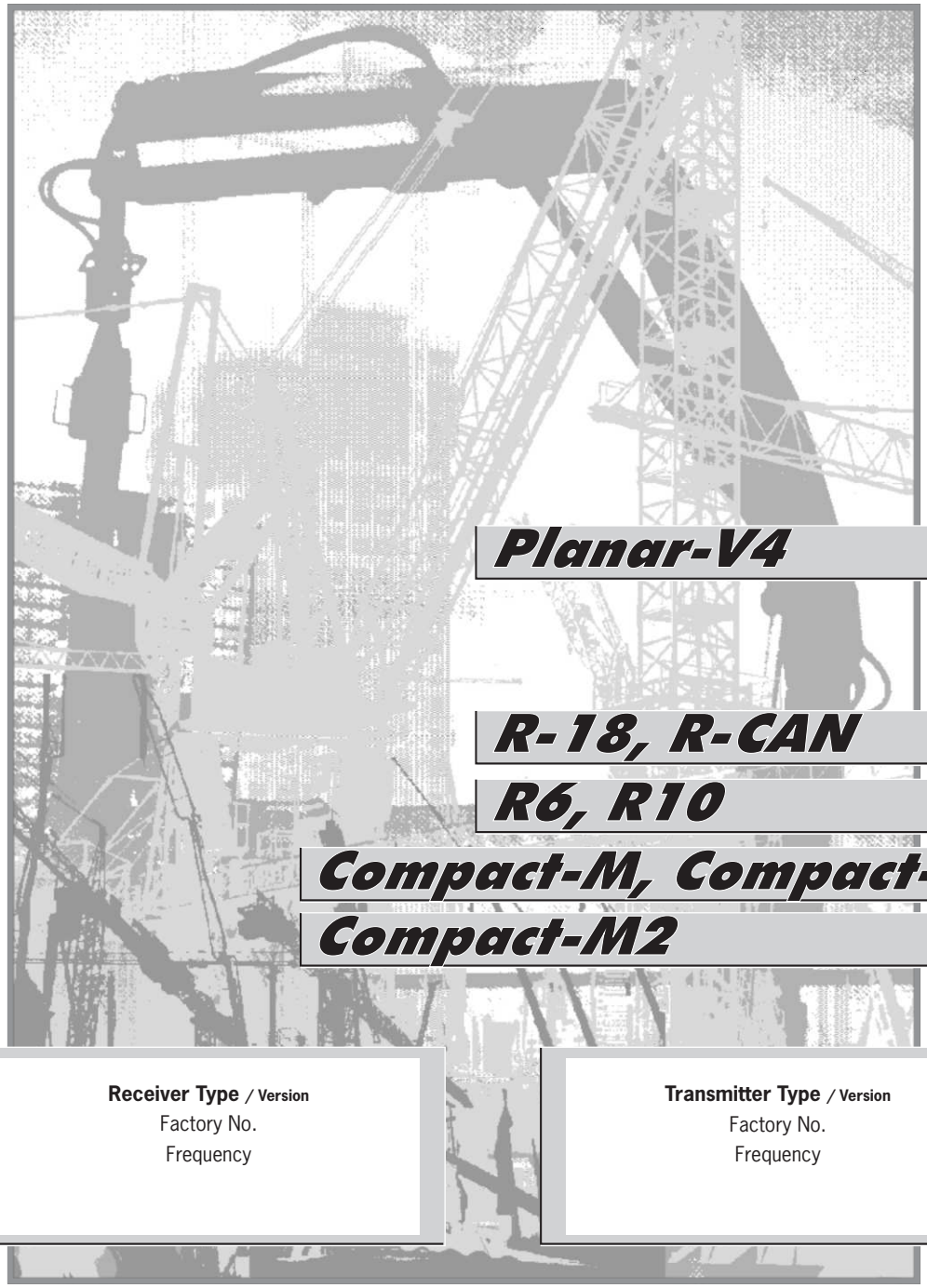
OPERATING INSTRUCTIONS



Planar-V4

R-18, R-CAN

R6, R10

Compact-M, Compact-V

Compact-M2

Receiver Type / **Version**
Factory No.
Frequency

Transmitter Type / **Version**
Factory No.
Frequency

1. STANDARD SPECIFICATION

- Portable transmitter.
- Receiver with integrated mounting holes.
- Multi-pin connecting cable for the receiver according to your specifications.

The actual delivery specification is as detailed on the confirmation of order or the delivery note accompanying the goods!

2. SAFETY PRECAUTIONS

Even if you are accustomed to working with radio control systems, read these operating instructions carefully before using this equipment. Only this document contains the latest information relating to your NBB radio control system.

For explanatory notes on obtaining an operating permit please refer to registration documents enclosed in the appendix of this operating instruction. Observe all applicable work-safety and accident prevention regulations carefully. Only fully trained, authorized personnel may use the NBB radio control equipment. Components, etc. built into the NBB equipment for safety purposes must be regularly inspected.

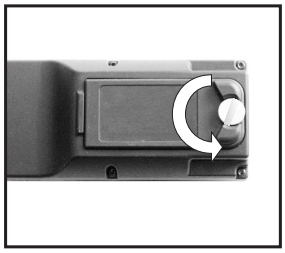
If the NBB radio control unit develops a fault, it must be shut down immediately. The transmitter should be switched off with the STOP key. The connecting cable must be disconnected at the receiver from the connecting socket (terminal) of the unit to be controlled . The repair of the equipment must not be carried out other than by NBB or an NBB authorized technician.

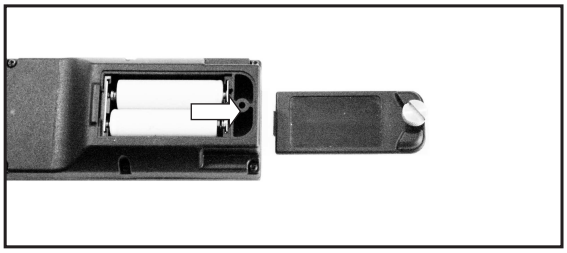
Failure to observe these recommendations will put both you yourself and others at risk. Under these circumstances, NBB rescinds the guarantee and any other form of liability. This radio control unit is designed exclusively for the control of construction machines and industrial plants. Only under these conditions are the safety systems (STOP and zero setting) fully effective. No other form of use is permitted. Any non-observance of this condition will relieve NBB of all liability.

3. TRANSMITTER

Switching on: To make the unit ready for use, unscrew the screw plug of the battery compartment on the back of the transmitter and remove the cover. Insert 2 charged AA Mignon batteries 1,2V NiMH (or batteries 1,5V - not rechargeable) into the battery compartment, close the cover and tighten the screw plug again.

Rechargeable batteries (NiMH or NiCd) must be fully charged before first use!
Never attempt to charge standard non rechargeable 1,5V AA batteries!





The functions of the receiver are released with the “ON/HORN” key.
The receiver has to be switched off with the "STOP" key when work is finished.
A red dot flashes on the Planar display during operation.

Energy saving function: The transmitter switches off automatically, if the keys are not pressed within a specified time. The red dot goes out.
Optional: Transmitter for continuous operation possible.
**The duration of this stand-by can be specified when ordering.*

Operation:
The red dot flashes.

Slowly flashing:
Batteries are to low, to operate the transmitter.

Quickly flashing:
Batteries are nearly empty. Transmitter can be operated for appr. 30 minutes more.

Base Unit

When a transmitter is operated with AA Mignon 1,2 V NiMH rechargeable batteries, these batteries automatically charge inside the transmitter in the optional base unit. To start the charging process simply slide the transmitter into base unit (see image 1). An automatically controlled charging process keeps batteries from over-charging. Base unit has to be connected to a power supply (optional also with dc-charger) – (see image 2).

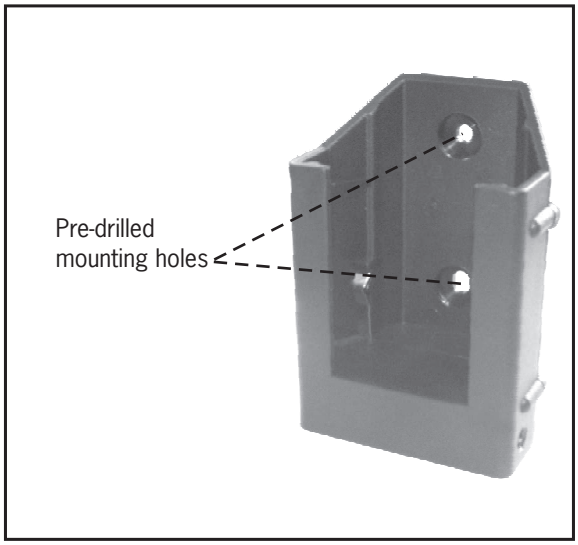
WARNING: Never try to charge regular AA batteries (non-rechargeable batteries) – danger of explosion!

WARNING: Charge 8 hours (2000 mA/h) after total discharge of batteries or before first use.

Image 1

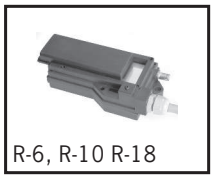
Image 2

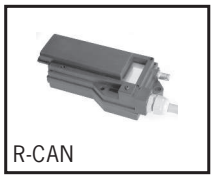
Connection power plug/
car power plug



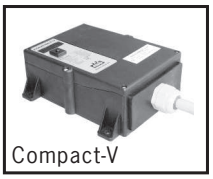
5. RECEIVER

R-6, R-10, R-18, R-CAN,
Compact-M,
Compact-V

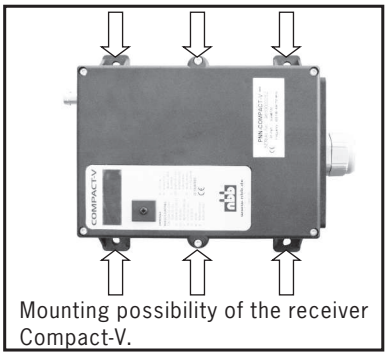

R-6, R-10 R-18

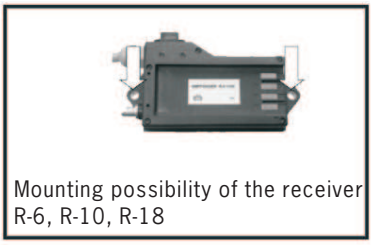

R-CAN


Compact-M


Compact-V


Mounting possibility of the receiver R-18, R-CAN,Compact-M.

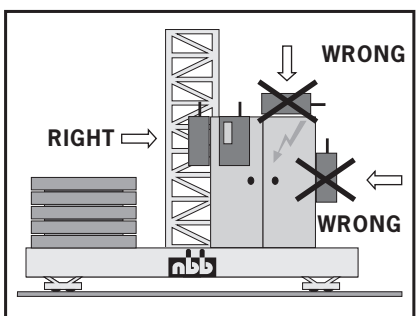

Mounting possibility of the receiver Compact-V.


Mounting possibility of the receiver R-6, R-10, R-18

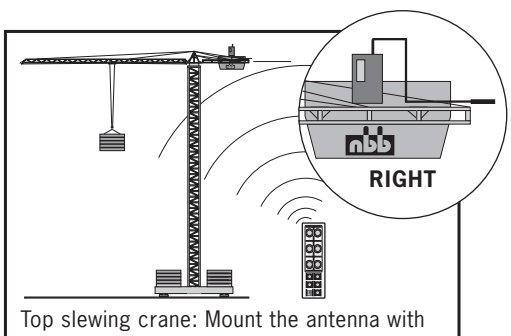
The receiver is connected to the unit to be controlled with the multi-pin connecting cable supplied. Please observe the instructions issued by the manufacturer of the unit to be controlled! **We recommend urgently to realize this connection via a central, well accessible, multi-pin plug connector (for example HTS-plug connector series HE/HB/HN/HA or comparable ones of other manufacturers) to make possible a quick and clear fault diagnosis in the service case and to take off the receiver without an expenditure of assembly.**

The power supply of the receiver is generally effected by the connecting cable.

- **In general, an earth lead is required in case the units to be controlled have not previously been operated by radio control. Failing this, the receiver electronic circuit will not receive any power supply. Ensure that the operating voltage of the receiver complies with the electrical specifications of the unit to be controlled. The applicable operating voltage is specified in the supplement.**
- **Never expose the receiver to a high pressure cleaning jet. This applies to the transmitter also.**
- **The receiver should always be fixed vertically at the outside panel of the switching cabinet. (The antenna should always reach over the top of the panel.)**
- **You have to make sure that the antenna is not shielded by metal parts totally or partly.**
- **Mounting the receiver in a cabine or in a switching cabinet the antenna should be layed with an extension cable to the outside and be attached with the fastening strapping as horizontally as possible with distance to the shielding metal parts.**
- **In general the antenna should always be mounted in such a way so that the antenna is still visible with each change of position of the transmitter.**



Mounting on a tower slewing crane.



Top slewing crane: Mount the antenna with extension cable horizontally.

4. OPERATING THE UNIT

Safety equipment in the NBB-radio remote control:

In the transmitter, this comprises mainly:

- STOP (transmitter ON/OFF) with automatic disconnection of the power supply.
- Automatic zero positioning.

In the receiver:

- Automatic zero setting when switching back on after radio interruption.
- Locking of the radio commands at relay level in the event of a defective STOP circuit.

To ensure fault-free operation, please follow precisely the following rules for operation: The unit to be controlled can only be switched on - it is assumed that the transmitter is ready to operate - when no command unit is actuated. The command necessary to do so is triggered by the key "ON/HORN". This triggers a horn signal in the unit to be controlled. After switch-on of the facility to be controlled, this key is used for repeated emission of the horn signal in accordance with working regulations.

If the NBB radio remote control is not used for a long period, it is urgently recommended - if you use rechargeable batteries - that they should be charged now and again (about every 4 weeks). This prevents deep discharges of the batteries and prolongs their useful life. If you shut down the NBB radio remote control for a long period, we recommend you take the batteries out of the transmitter.

Frequency change Planar-V4:

A manual frequency change isn't necessary. By turning on the receiver locks into the new frequency, which will be shown shortly in the 7- secment functional display. If it's necessary to change the channel, the transmitter has to be turned off and on again.

The selection of the channel happens automatically.

Display of the channel: e.g. channel 53

53 Channel, which has been chosen automatically.

<u>Turn on / Turn off</u>

Turn on: The toggle switch ON/OFF turn to ON, until the red dot flashes.

Turn off: The toggle switch ON/OFF turn shortly to OFF until the red dot dosn't flashes anymore.

6. FUNCTION CHECK

To maintain operational safety, a regular function check of the NBB radio remote control is necessary. In single-shift day-to-day operation, we recommend performing this check at least once a week. Checking is possible using the display lights provided on the receiver. To do so, the transmitter must be set to the ready-to-operate state.

First connect just the receiver - the transmitter remains switched off.

- Activate the transmitter by pressing the "STOP" key, resp. the key "START/ ON/ HORN".
- Now check the commands (always start with the lowest stage) and check for correct function of the unit to be controlled.
- Ensure in particular that there is nobody in the danger area. **ACCIDENT RISK!**
- **STOP**, **check**. Press the STOP key at the transmitter until the switch engages. Then observe if the unit to be controlled is switched off (time to switch off according to the application).

7. RATING PLATES

The rating plates state the type of transmitter or receiver, the factory number, the frequency range and the approval number for non EU countries.

Always state the factory number in all your queries.

Example:

Transmitter Type / Version:	**Planar-B**
Factory No.:	999 899 4990
Frequency:	402 -470 Mhz

Receiver Type / Version:	**Compact-V**
Factory No.:	999 899 4990
Frequency:	402 -470 Mhz

8. MAINTENANCE

Your NBB radio remote control is largely maintenance-free. Nevertheless, please bear in mind the following points:

- The STOP key must be easy to move.
- Remove any leftover building materials!
- During electro-welding work on the unit to be controlled, disconnect the receiver from the current supply! Otherwise there is a risk of damage to the receiver's electronic system!
- Check wear and tear parts like dust shield tops regular!

9. WARRANTY

We grant a function warranty for 12 months after the sale date for all NBB radio remote controls (transmitter, receiver, charger). The warranty covers working time and material used. Shipping costs shall be charged to the customer. The warranty shall not cover: wear and tear parts, relays and batteries. The function warranty shall be invalidated in the case of damage, accident damage, negligence, incorrect use, non-compliance with operating conditions, non-compliance with operating, testing and maintenance instructions, and repairs or unit modifications not authorised by NBB. NBB shall not be liable for indirect damage and reserves the right to decide on repair or replacement.

10. IN CASE OF DEFECTS

Do not attempt to continue working with a defective NBB radio remote control. Even initially minor defects might be the start of a more extensive defect.

Do not try to repair the NBB radio remote control yourself. If there is any fault please contact your dealer or our company.

TECHNICAL DATA

Operating ambient temperature	-20 to +70 °C
Insulation class - Protection	IP 65

TRANSMITTER Planar-V4

Transmission frequency range	see rating plate

The use of synthesizer technology permits frequencies to be selected in accordance with the appropriate waveband for the country of use.

Low frequency modulation	GFSK
Data repetition rate	about 15 ms / 60 ms
Baud rate	1200 - 9600 Baud (Bit / sec.)
Range	about 100 m
Power input	about 60 mA
RF ouput	< 10 mW
Weight (without battery)	about 420g
Size (L x W x H)	12,2 x 15,6 x 8,1 cm
Power supply	2 x rechargeable batteries 1,2V AA NiMH (or 2 x batteries 1,5V - not rechargeable)
Operating duration	>30h (2000mA/h NiMH batteries)

RECEIVER R-6, -10, -18, -CAN, Compact-M, Compact-V

Reception frequency range	see rating plate

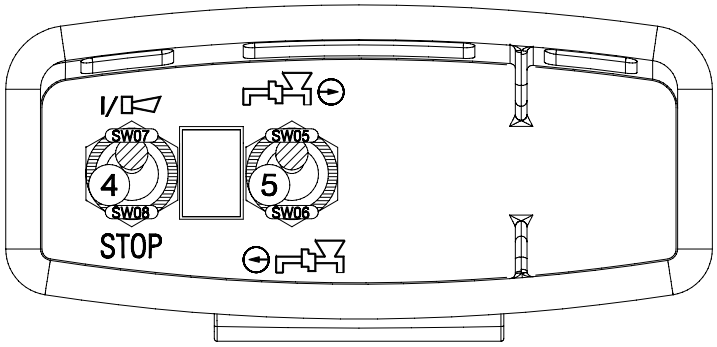
Data security:
Generates a CRC code with a Hamming distance = 4. Generates a neutral position.
Addressing of each transmitter with its own, unique combination (max. 2^{16} possible combinations).

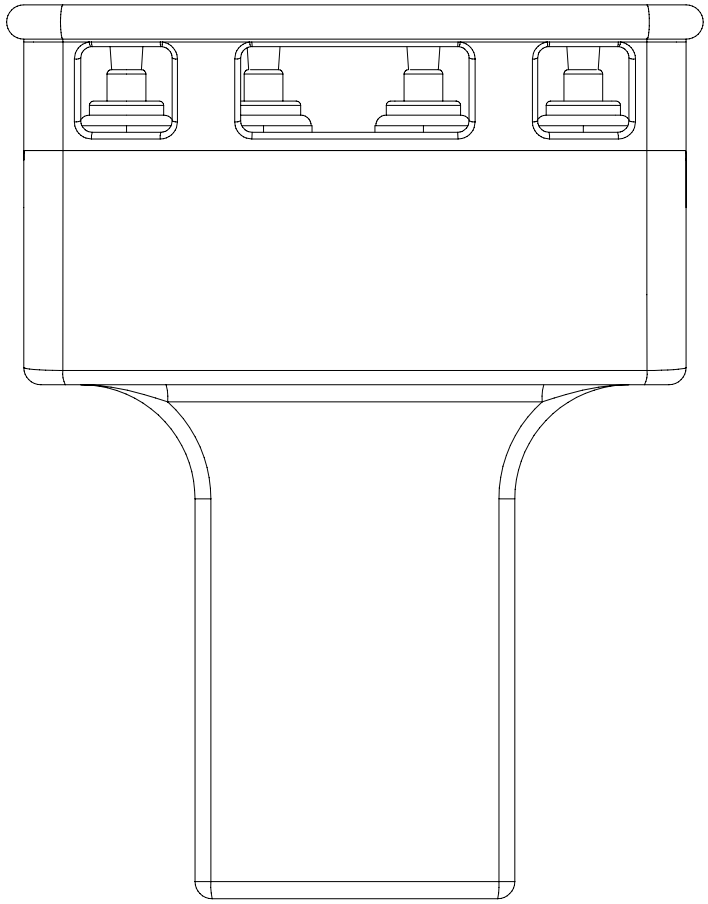
Security	EMERGENCY STOP with self test.
max. switching voltage	250V AC (12V / 24V DC - R-18, R-CAN, Compact-M, Compact-V)
max. switching current	4A AC (3A DC at 12V / 24V - R-18, R-CAN, Compact-M, Compact-V)
max. switching power	1000 VA

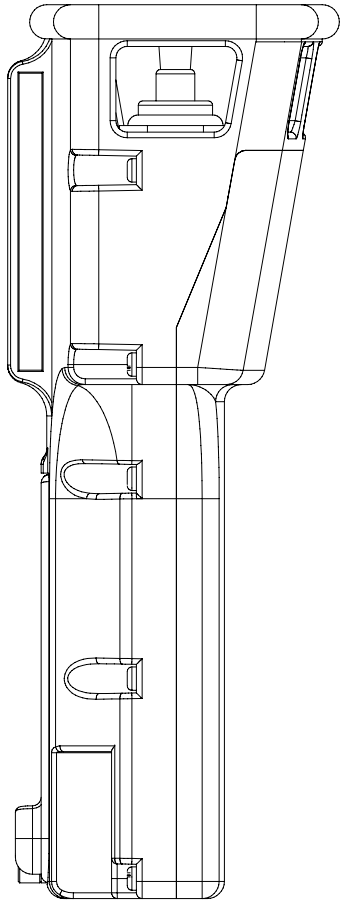
	Weight	Size (L x W x H)
R-6 (with cable)	640 g	13,5 x 8,6 x 5,7 cm
R-10 (with cable)	740 g	13,5 x 8,6 x 7,3 cm
R-18, R-CAN	640 g	18 x 9,7 x 4,4 cm
(potted)	800 g	
Compact-M	640 g	18 x 9 x 7 cm
(potted)	800 g	
Compact-V (potted)	1,5 kg	21,5 x 16 x 6,5 cm

CHARGING UNIT

Input	12V/24 V/DC,P=2W
Output	5 V DC ⎓ 320 mA
Weight	about 90g
Size (L x W x H)	4,9 x 7,0 x 9,8 cm







No.:	Description:	Order-No.:	No.:	Description:	Order-No.:	No.:	Description:	Order-No.:
1	Key switch 0-ON	3.740.1001	13	Rotary switch Gray-Code 12 steps	3.740.1029	25	Toggle switch (Otto) lever lock. MOM-0-ON	3.740.1081
2	Key switch 0-MOM	3.740.1011	14	Rotary switch BCD-Code 16 steps	3.740.1025	26	Piezo Emergency Stop Switch	3.740.5006
3	Toggle switch 0-ON	3.740.1016	15	Potentiometer 5k + Contr.knob Φ16	3.980.1156	27	Toggle OTTO switch lever lock. ON-0	3.740.1082
4	Toggle switch MOM-0-MOM	3.740.1017	16	Control knob Φ17mm	3.930.1002	28	Potentiometer 4,7k	3.980.1518
5	Toggle switch ON-0-ON	3.740.1018	17	Control knob Φ20mm	3.930.1003	29		
6	Toggle switch ON-0-MOM	3.740.1019	18	Control knob Φ24mm	3.930.1004	30		
7	Toggle switch lever lock. ON-0-ON	3.740.1028	19	Emergency Stop Switch with key 0-On red	3.740.1000	31		
8	Pushbutton switch APR 0-MOM	3.740.1020	20	Emergency Stop Switch 0-On red	3.740.1014	32		
9	Rotary switch ON-0-ON	3.740.1022	21	Rotary switch Gray-Code 3 steps	3.740.1076	33		
10	Rotary switch Gray-Code 3 steps	3.740.1041	22	Toggle switch 0-MOM	3.740.1043	34		
11	Rotary switch BCD-Code 10 steps	3.740.1026	23	Miniature pushbutton switch 0-MOM	3.740.1030	35		
12	Rotary switch BCD-Code 12 steps	3.740.1027	24	Toggle switch APR lever lock. ON-0	3.740.1045	36		

nbb

ON 1 2 3 4 5 6 7 8
TRANSMITTER-CODE

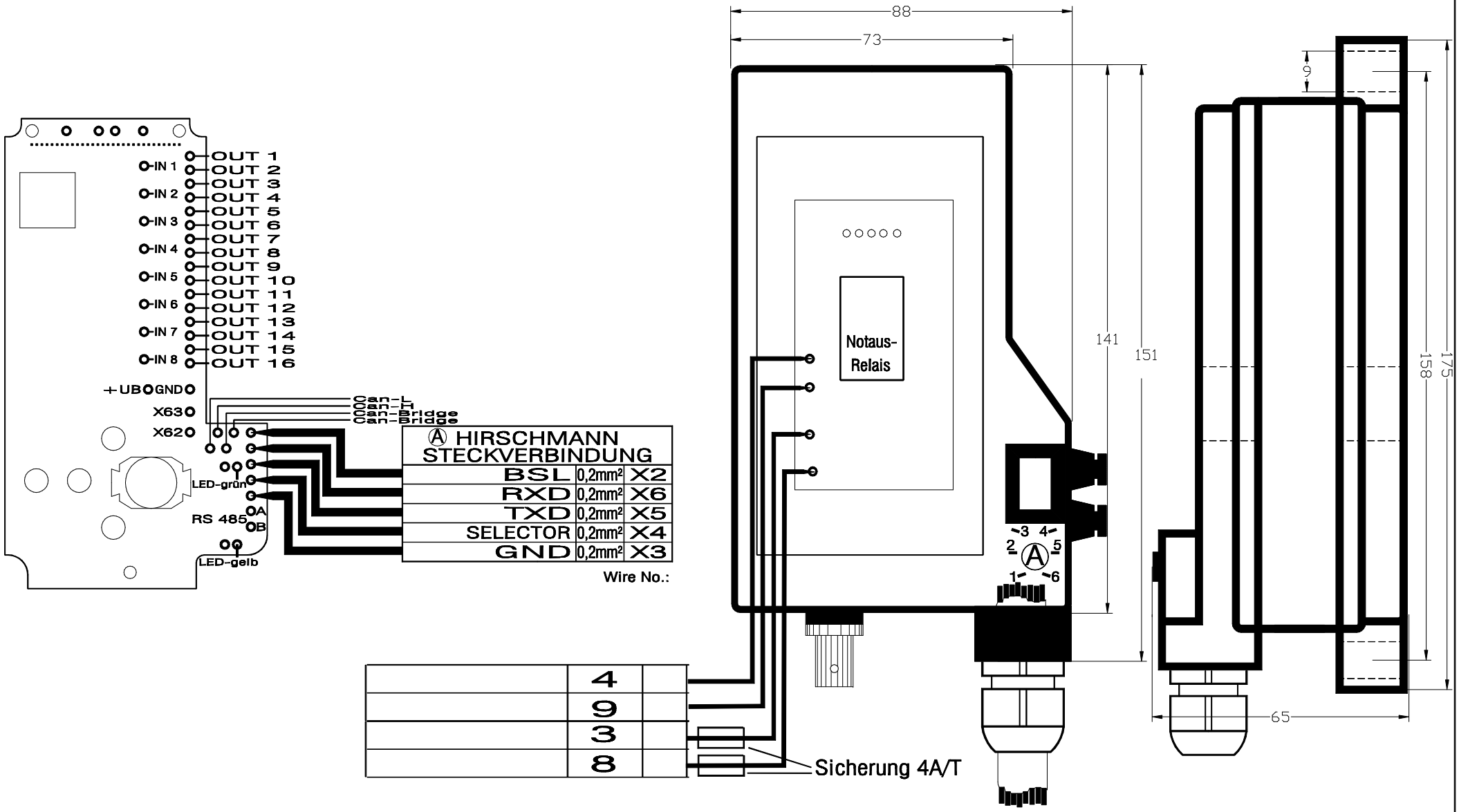
Serial no.:	Ref.: 9999904790
Model:	Line- Pumps
Customer:	Schwing Hydraulik
Date:	04.02.2011
Name:	P. Heit
Änderung:	M. Tscholak

TRANSMITTER
Planar V4

Date:

Signature stamp:

Approbation:



NOTE		Serial no.:	Ref.: 9999904790
RECEIVER POTTED		Model:	Line- Pumps
YES	NO	Customer:	Schwing Hydraulik
X		Date:	04.02.2011
		Name:	P. Heit
		Modification:	M. Tscholak

RECEIVER
Compact M- B

R-18 CONNECTING PLAN

Serial no.:	**Ref. : 9999904790**	Cable length:	**~2.5 m**
Model:	**Line-Pumps**	Cable loop-no.:	**3.400.7011** (*15 x 0,75mm²*)
Wiring diagram no.:	**---**	System-plug-no.:	**Harting Han 10A (19200101540)***
Producer:	**Schwing Hydraulik**	Indert-no.:	**Harting Han D 15pol. (09210153001)***
Date:	**2011-03-16**		***Connecter installed by costumer.**
Name:	**M. Tscholak**		
Modification:			

RECEIVER	CONTROL CABLE			SYSTEM
Terminal strip no.:	Function:		Wire-No.:/Pin-No.:	Terminal strip: / or plug socket:
5/40VDC / 9VDC	1	**Power supply 24V DC**	**1 / B1**	
	2	**Power supply 0V DC**	**2 / C5**	
IN 1	14	**Common**	**14 / B3**	
OUT 1/ *SW07*	13	**ON/ HORN** (momentary) **	**13 / B4**	
OUT 2/		**** To activate the receiver OUT3 + OUT4 must be off.**	/	
IN 2	6	**Common**	**6 / C1**	
OUT 3/ *SW05*	5	**pumping/ Forward** (maintained)	**5 / C3**	
OUT 4/ *SW06*	7	**suction/ Reverse** (maintained)	**7 / C4**	
IN 3			/	
OUT 5/			/	
OUT 6/			/	
IN 4			/	
OUT 7/			/	
OUT 8/			/	
IN 5			/	
OUT 9/			/	
OUT 10/			/	
IN 6			/	
OUT 11/			/	
OUT 12/			/	
IN 7			/	
OUT 13/			/	
OUT 14			/	
IN 8			/	
OUT 15/			/	
OUT 16/			/	
IN 9			/	
OUT 17/			/	
IN 10			/	
OUT 18/			/	
		Common 1	**3 / B1**	
4A/T		**Emergency- stop 1** (Floating contact)	**4 / B2**	
		Common 2	**8 / A1**	
4A/T		**Emergency- stop 2** (Floating contact)	**9 / A2**	

DATASHEET TRANSMITTER

SERIAL No.: ***9999904790***

Formular-Nr.: 154_engl

Stand: 01-10/10

NAME:	*M. Tscholak*	DATE:	***16.03.2011***

Transmitter *Planar V4*

	QUANTITY	PART No.:	BOARD TITLE:	NOTE:
FREQUENCY BAND			***F- Band***	
FM	**yes**			
Active / Passive	**2s**			
LBT-Mode	**1**			
Auto Off	**no**			
Charger	**no**			
PROGRAM 1	***1*** ***1*** ***1***		**Firmware** **Config** **Interpreter**	***Forst_V1_1_V_2_4.txt*** ***PLV4_4139.scd*** ***PLV4_4139.il2***
PROGRAM 2			**Firmware** **Config** **Interpreter**	
UPPER PART	**1**	**3.300.1620**		**black**
LOWER PART	**1**	**2.250.1670**		**black, AA**
PART	**1**	**3.300.1110**		**black**
FACE PLATE 1	**1**			**silver, lasered**
FACE PLATE 2				
FACE PLATE 3				
BOARD 1	**1**	**2.100.1331**	**S-SW18A1 V1/1**	**mainboard**
BOARD 2	**1**	**2.100.1330**	**S-SW08A2 V1/1**	**adaptor board**
BOARD 3	**1**	**2.100.1329**	**S-AD04A4 V1/1**	**display board 7-Segment Forst**
BOARD 4				
SPECIAL 1				
SPECIAL 2				
SPECIAL 3				
SPECIAL 4				

	DATASHEET RECEIVER	Formular-Nr.: 154_engl
	SERIAL No.: *9999904790*	Stand: 01-10/10

NAME:	***M. Tscholak***	DATE:	***16.03.2011***

RECEIVER *Compact M- B*				
	QUANTITY	**PART No.:**	**BOARD TITLE:**	**NOTE:**
FREQUENCY BAND			***F- Band***	
FM	**yes**			
Active / Passive	**2s**			
RECEIVER POTTED	**yes**			
PROGRAM 1	***1***		**H86**	***E_5029.H86***
PROGRAM 2			**Firmware Config Interpreter**	
UPPER PART	**1**	**3.300.1410**		**black**
LOWER PART	**1**	**2.250.1601**		**black**
PART	**1**	**3.300.2621**		**black**
FACE PLATE	**1**	**3.820.1215**		**silver**
HOUSING				
INSERT				
BOARD 1	**1**	**2.100.1198**	**E-DC02A7 V1/5**	**mainboard**
BOARD 2	**1**	**2.100.1310**	**A-AD07A1 V1/5**	**emergency board**
BOARD 3	**1**	**2.102.1171**	**S-EM01A0 V2/4**	**HF- part: Prog:s_em01a0_rw_v11.afm**
BOARD 4				
SPECIAL 1				
SPECIAL 2				
SPECIAL 3	**1**	**3.680.1019**		**emergency- stop relay with 2 contacts**
CABLE	**1**	**3.400.7011**		**15 x 0,75mm²**
CABLE LENGTH	**~2,5m**			
SYSTEM PLUG				
INSERT				

APPROVALS AND CERTIFICATES

Approvals EU countries:

Enclosure:

EC Declaration of Conformity

Obtainable at demand:

M-Zert mbH
Certificate DIN EN ISO 9001:2008 No. 03022

Otto-Hahn-Straße 3-5
DE-75248 Ölbronn-Dürrn
Tel.: 0 72 37 / 9 99 - 0
Fax: 0 72 37 / 9 99 - 1 99
eMail: sales@nbb.de
http://www.nbb.de

Bedienungsanleitung Planar-V4, R-18, R-CAN, Compact-M, Compact-V
englisch, Teile-Nr. 3.150.1340, Stand 07.11

SCHWING

Presentation 1

Safety 2

Operation 3

Maintenance 4

Radio remote control 5

Special equipment 6

Appendix 7

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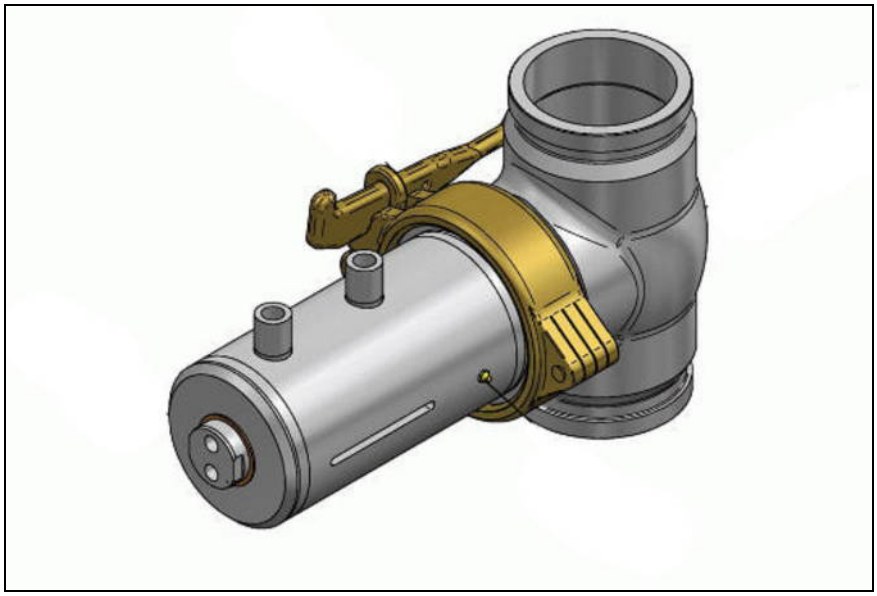
Hydraulic shut-off assembly



Editor: SCHWING GmbH
Dep.: **TDS 1**
PO box : 20 03 62
D - 44647 Herne

20/08/2017 19:19:00

TABLE OF CONTENTS

1. PREFACE

The SCHWING hydraulic shut-off assemblies (Fig. 1) are designed for installation in SCHWING concrete pumping lines.

The shut-off assemblies can be supplied for various

- Pumping line diameters,

- Concrete pressures,

- Flanges.

Should you have any queries or issues, please contact our Customer Services or your SCHWING representative.

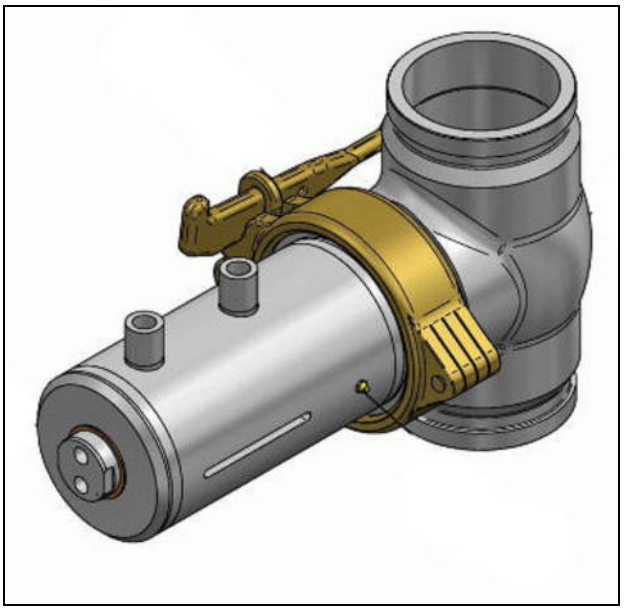


Fig. 1

2. AREA OF APPLICATION

Hydraulic shut-off assemblies are required for high-rise or downwards conveying as of approx. 30 m high (deep).

During interruptions of the pump, the closed shut-off assembly prevents, for e.g.:

- In high-rise conveying (install to the rear of the concrete pump), a backflow of the concrete column to the concrete pump.

- For downwards conveying (install to the rear of the line), the concrete column from breaking off.

3. SAFETY

Work carefully through these operating instructions before initial commissioning. Only begin with the work when you have understood everything.

Should you have any doubts or queries, never begin to work!

In case of danger, actuate an EMERGENCY OFF button on the machine.

⚠ WARNING

Faults during the pressure cleaning of pumping lines are dangerous:

- Only authorised persons (experts) may operate the shut-off assembly.
- The pumping line must only be opened when pressure-free.
- The machine operator is responsible for ensuring that no unauthorised persons reach the proximity of the shut-off assembly or associated control elements.
- Persons not involved must leave the danger area of the shut-off assembly.
- During the cleaning process, no-one must remain at the end of the line in the area of the concrete output.
- Observe without fail chapter 3.40 of the concrete pump operating instructions.
- Do not use the shut-off assembly under any circumstances in order to prevent clogging!

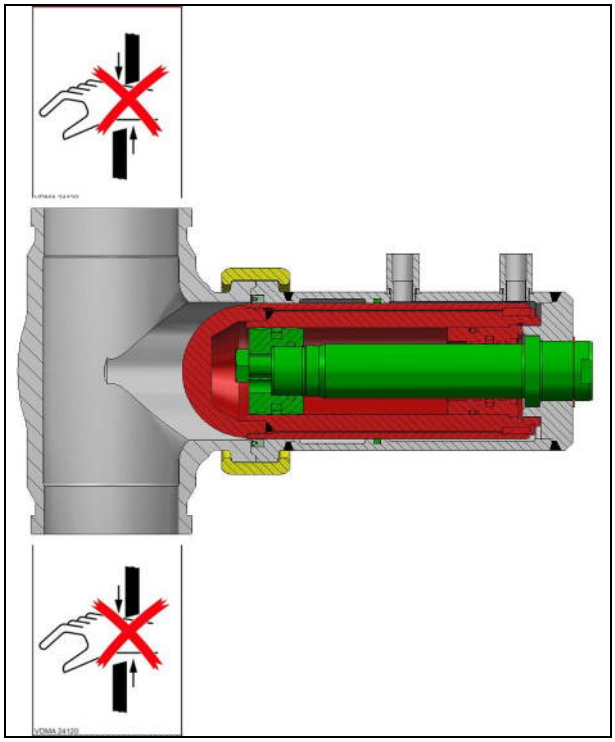
⚠ WARNING

Danger of crushing and injury!

Do NOT reach into the openings of the shut-off assembly and the pumping line and do not put any objects in there.

Switch off the drive motor of the machine prior to opening the shut-off assembly and secure the machine from unintentional switching on.

During the spraying process with the water hose, only direct the water spray into the openings, do not put the hose nozzle in.



Schematic drawing of the shut-off assembly, Fig. 1

4. SETTING UP OF THE SYSTEM

1 Junction tube

2 Housing

3 "Retract" junction = gate valve "open"

4 "Extend" junction = gate valve "closed"

5 Visual display of the switch position

6 Cone-type lubricating nipple

7 * optional proximity switch

* = required for operation from a control station

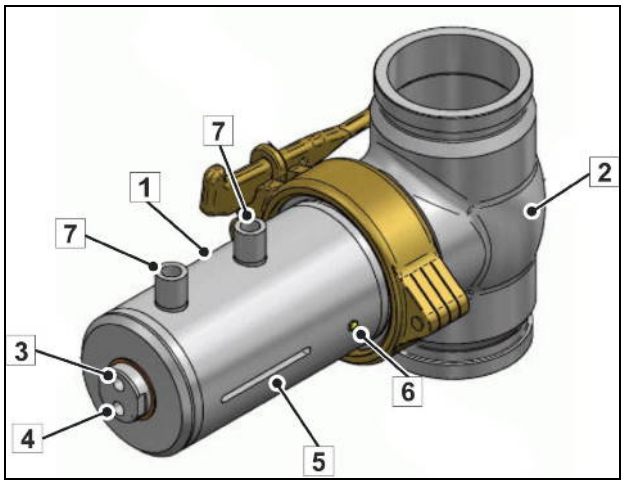


Fig. 1

5. INSTALLATION

The shut-off assembly is installed in the pumping line with two couplings.

WARNING

The use and insertion of other materials as those supplied from Schwing lead firstly to a loss of operational safety and thus automatically to the loss of operational approval.

Only use original SCHWING couplings and spare parts.

6. DRIVE

Hydraulic shut-off assemblies can be connected to the hydraulic system of the concrete pump and actuated via a separate aggregate or a hand pump.

WARNING

Do NOT operate the shut-off assembly when it is not visible.

If required, a second person should be present.

7. MAINTENANCE

Depending on the operating conditions, the shut-off assembly must be lubricated at least once a week with grease (grease nipple). As the lubrication requirement increases with progressive wear, the lubricating intervals must be shortened accordingly.

See the operating instructions of the SCHWING concrete pump:
GREASE AND HYDRAULIC OIL RECOMMENDATIONS

8. TECHNICAL DATA

Closing volume	: 0.63 l
Opening volume	: 0.38 l
Stroke	: 125 mm
Piston diameter	: 80 mm
Piston rod diameter	: 50 mm
P max. hydraulic	: 200 bar

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Presentation 1

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Operation 3

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Radio remote control 5

Special equipment 6

Appendix 7

Blank page!

Do you already use our information service? - 5 minutes that pay off!

Dear Customer,

With the purchase of your SCHWING machine, you have acquired a high quality product.

Of course, we are constantly working on the improvement of 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 to having obtained the SCHWING machine second-hand!

In order to send you our information, we need your address.

Please complete the questionnaire on the back and send it to

SCHWING GmbH
Service
Postfach 20 03 62

D-44647 Herne

Of course you can also fax us this page or reply by email:

Fax: +49 (0)2325 74674 **E-Mail: service@schwing.de**

We look forward to your response!

Please complete in block letters:

Customer no.:		*Contact person: .....*
Address:		*.....*
.....		*Tel.: .....*
.....		*Fax: .....*
.....		*Email: .....*
.....		*Machine type: .....*
Country:		*Machine no.: .....*

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Customer no.:		*Contact person: .....*
Address:		*.....*
.....		*Tel.: .....*
.....		*Fax: .....*
.....		*Email: .....*
.....		*Machine type: .....*
Country:		*Machine no.: .....*

IMMER IN IHRER NÄHE.

HERNE

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Service-Center
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ET-Verkauf: 02325/987-641/352
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Kontakt: Frau M. Vollmer
Herr Beiersdorf

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Telefax: 04106/71810
E-Mail: Hamburg@schwing.de
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Telefax: 0561/582963
E-Mail: Kassel@schwing.de
Kontakt: Herr Döring

GOTHA

Eberhard Becker & Partner GmbH
Dr. Troch Straße 15
D-99867 Gotha

Telefon: 03621/404444
03621/404445
Telefax: 03621/404446
E-Mail: Gotha@schwing.de
Kontakt: Herr Becker

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Eberhard Becker & Partner GmbH
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D-01665 Klipphausen

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E-Mail: Dresden@schwing.de
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 Suomen tasavalta	**Tamflow OY** Kalevanpuistotie 7 33500 Tampere Finnland	00358 - 3 - 31 38 44 00 00358 - 3 - 31 38 44 44	tamflow@yritys.tpo.fi

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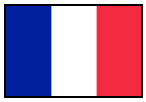
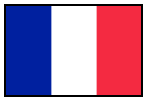
 République française	**Schwing / Stetter S.A.** 12, Rue des Tuileries B.P.44 67460 Souffelweyersheim	0033 - 3 - 8881 5151 0033 - 3 - 8833 9955	DI@schwing-stetter.fr
 République française	**Impasse du Vexin** 78250 Hardricourt Frankreich	0033-1 - 3492 9505 0033-1 - 3474 7260	
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 Saudi Arabia	**Bakheet Co. for Machinery** P.O. Box 6101 Madina Road, Kilo 9 Jeddah 21442	00966 - (0) 2 691 0550	inquirejd@bakheet.com.sa www.bakheet.com.sa
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 Ukrajina	**Construction Machinery Ltd.** 54 a, Petropavlovskaya Str. 04086 Kiev	00380 - 44 - 467 2601 o. 467 2602 00380 - 44 - 467 2607	kiev@construction.com.ua
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