

Original operating instructions

TOX®-Powerpackage
Type RZS, RZK, RZKW

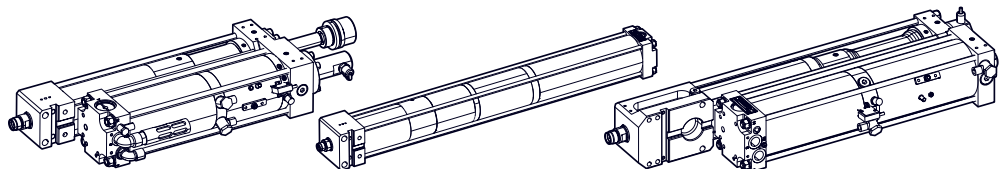


Table of contents

1	Important information	
1.1	Legal note	7
1.2	Exclusion of liability	7
1.3	Conformity	7
1.4	Validity of the document	8
1.4.1	Content and target group	8
1.4.2	Other applicable documents	8
1.5	Gender note	8
1.6	Displays in the document	9
1.6.1	Display of warnings	9
1.6.2	Display of general notes	10
1.6.3	Highlighting of texts and images	10
2	Safety	
2.1	Basic safety requirements	11
2.2	Organizational measures	11
2.2.1	Safety requirements for the operating company	11
2.2.2	Selection and qualifications of personnel	12
2.3	Fundamental hazard potential	13
2.3.1	Electrical hazards	13
2.3.2	Thermal hazards	13
2.3.3	Pneumatic hazards	13
2.3.4	Contusions	14
2.3.5	Hydraulic hazards	14
2.3.6	Electromagnetic hazards	14
2.3.7	Laser	15
2.3.8	Hazardous substances	15
2.4	Safety device on the product	15
2.4.1	Safety device of system	15
3	About this product	
3.1	Intended use	17

3.1.1	Safe and correct operation	17
3.1.2	Foreseeable misuse	18
3.2	Product Identification	18
3.2.1	Position and content of the type plate	18
3.3	Function description of Powerpackage	18
3.4	Product overview of Powerpackage Type RZS, RZK, RZKW	19
3.4.1	Product attributes of Powerpackage Type RZS, RZK, RZKW	20
3.5	Optional equipment	21
3.5.1	Additional optional equipment	21
4	Technical data	
4.1	Type sheet and data sheet	23
4.2	Compressed air quality and pneumatic connection	23
4.3	Tightening torques	23
4.3.1	Tightening torques for flange mounting the drive	23
4.3.2	Tightening torques on the piston rod	24
4.4	Press force table	24
4.5	Specification for hydraulic oil	25
5	Transport and storage	
5.1	Safety during transport	27
5.2	Lifting device	28
5.3	Temporary storages	28
5.4	Dispatch for repair	28
6	Installation	
6.1	Safety during installation	29
6.2	Installing drive	30
6.3	Installing accessories	31
6.3.1	Installing electronic pressure switch (ZDO)	31
6.3.2	Installing position sensors of stroke monitoring for forward and return stroke (ZHU)	33
6.3.3	Installing pressure control in the power stroke line (ZDK)	35
6.3.4	Installing proportional pressure control valve in the power stroke line	37

- 6.3.5 Installing external power stroke connection (ZKHZ) 38
- 6.3.6 Installing external power stroke release (ZKHF) and power stroke deactivation (ZKHD) 39
- 6.3.7 Preparing external power stroke supply 40
- 6.3.8 Installing the stroke frequency optimization (ZHO) 41
- 6.3.9 Installing the speed reduction for power stroke venting 43
- 6.3.10 Installing tool coupling (ZWK) 44

7 Commissioning

- 7.1 Safety during the commissioning 45
- 7.2 Requirements for the commissioning 46
 - 7.2.1 Measuring connection and control connection 46
- 7.3 Avoidance of dynamic oil leakage 47
 - 7.3.1 Setting speed ratio of return stroke to fast approach stroke 48
 - 7.3.2 Set the speed ratio between power stroke and power stroke venting (optional) 48
- 7.4 Setting control throttle 'X' 49
- 7.5 Setting total length of stroke (optional)..... 50

8 Operation

- 8.1 Safety in operation 51
- 8.2 Requirements for operation..... 52
- 8.3 Operating drive..... 52

9 Troubleshooting

- 9.1 Safety during troubleshooting 53
- 9.2 Searching for causes of fault..... 54

Maintenance table of Powerpackage

10 Maintenance

- 10.1 Safety during maintenance 59
- 10.2 Requirements for maintenance 61

10.2.1	Set system to maintenance position	61
10.3	Checking oil level	62
10.4	Refilling oil and venting drive	63
10.5	Lowering of oil level.....	66
10.6	Checking hydraulic hoses	67

11 Repairs

11.1	Safety during repairs	69
11.2	Changing seals	69

12 Disassembly and Disposal

12.1	Safety during disassembly and disposal	71
12.2	Decommissioning	72
12.3	Shutdown	72
12.4	Disassembling	73
12.5	Disposal	73

13 Appendices

13.1	DECLARATION OF INCORPORATION	75
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Index

1 Important information

1.1 Legal note

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Operating instructions, manuals, technical descriptions and software are originally compiled in German.

1.2 Exclusion of liability

TOX® PRESSOTECHNIK has checked the contents of this publication to ensure that it conforms to the technical properties and specifications of the products or plant and the description of the software. However, discrepancies may still be present, so we cannot guarantee complete accuracy. The supplier documentation included with the system documentation is an exception.

However, the information in this publication is checked regularly and any required corrections are included in subsequent editions. We are grateful for any corrections and suggestions for improvement. TOX® PRESSOTECHNIK reserves the right to revise the technical specifications of the products or plant and/or the software or documentation without prior notice.

1.3 Conformity

The product is compliant with EU guidelines.

See separate EU-declaration of conformity or installation declaration.

1.4 Validity of the document

1.4.1 Content and target group

This manual contains information and instructions for the safe operation and safe maintenance or servicing of the product.

- All information in this manual is up to date at the time of print. TOX® PRESSOTECHNIK reserves the right to make technical changes that improve the system or increase the standard of safety.
- The information is intended for the operating company as well as operating and service personnel.

1.4.2 Other applicable documents

In addition to the available manual, further documents can be supplied. These documents must also be complied with. Other applicable documents can be, for example:

- additional operating manuals (e.g. of components or of a whole system)
- Supplier documentation
- Instructions, such as software manual, etc.
- Technical data sheet
- Safety data sheets
- Data sheets

1.5 Gender note

In order to enhance readability, references to persons that also relate to all sexes are normally only stated in the usual form in German or in the corresponding translated language in this manual, thus e.g. "operator" (singular) for male or female, or "operators" (plural) for male or female". This should in no way convey any gender discrimination or any violation of the principle of equality, however.

1.6 Displays in the document

1.6.1 Display of warnings

Warning signs indicate potential dangers and describe protective measures. Warning signs precede the instructions for which they are applicable.

Warning signs concerning personal injuries

DANGER

Identifies an immediate danger!

Death or severe injuries will occur if appropriate safety measures are not taken.

→ Measures for remedial action and protection.

WARNING

Identifies a potentially dangerous situation!

Death or serious injury may occur if appropriate safety measures are not taken.

→ Measures for remedial action and protection.

CAUTION

Identifies a potentially dangerous situation!

Injury may occur if appropriate safety measures are not taken.

→ Measures for remedial action and protection.

Warning signs indicating potential damage

NOTE

Identifies a potentially dangerous situation!

Property damage may occur if appropriate safety measures are not taken.

→ Measures for remedial action and protection.

1.6.2 Display of general notes

General notes show information on the product or the described action steps.



Identifies important information and tips for users.

1.6.3 Highlighting of texts and images

The highlighting of texts facilitates orientation in the document.

✓ Identifies prerequisites that must be followed.

1. Action step 1

2. Action step 2: identifies an action step in an operating sequence that must be followed to ensure trouble-free operation.

▷ Identifies the result of an action.

▶ Identifies the result of a complete action.

➔ Identifies a single action step or several action steps that are not in an operating sequence.

The highlighting of operating elements and software objects in texts facilitates distinction and orientation.

- <In square brackets> identifies operating elements, such as buttons, levers and (valves) stopcocks.
- "with quotation marks" identifies software display panels, such as windows, messages, display panels and values.
- **In bold** identifies software buttons, such as buttons, sliders, check-boxes and menus.
- **In bold** identifies input fields for entering text and/or numerical values.

2 Safety

2.1 Basic safety requirements

The product is state of the art. However, operation of the product may involve danger to life and limb for the user or third parties or damage to the plant and other property.

For this reason the following basic safety requirements will apply:

- Read the operating manual and observe all safety requirements and warnings.
- Operate the product only as specified and only if it is in perfect technical condition.
- Remedy any faults in the product or the plant immediately.

2.2 Organizational measures

2.2.1 Safety requirements for the operating company

The operating company is responsible for compliance with the following safety requirements:

- The operating manual must always be kept available at the operation site of the product. Ensure that the information is always complete and in legible form.
- In addition to the operating manual, the generally valid legal and other binding rules and regulations must be provided for the following content and all personnel must be trained accordingly:
 - Work safety
 - Accident prevention
 - Working with hazardous substances
 - First aid
 - Environmental protection
 - Traffic safety
 - Hygiene
- The requirements and contents of the operating manual must be supplemented by existing national regulations (e.g. for prevention of accidents and for environmental protection).
- Instructions for special operating features (e.g. work organization, work processes, appointed personnel) and supervisory and reporting obligations must be added to the operating manual.

- Take action to ensure safe operation and make sure that the product is maintained in a functional condition.
- Only allow authorized persons access to the product.
- Ensure that all personnel work with awareness of safety and potential dangers with reference to the information in the operating manual.
- Provide personal protective equipment.
- Maintain all safety and information on dangers regarding the product complete and in legible condition and replace as required.
- Do not make any changes, carry out attachments or conversions to the product without the written approval of TOX® PRESSOTECHNIK. Action contrary to the above will not be covered by the warranty or the operating approval.
- Make sure that the annual safety inspections are carried out and documented by an expert.

2.2.2 Selection and qualifications of personnel

The following safety requirements are applicable for the selection and qualifications of personnel:

- Only appoint persons to work on the plant who have read and understood the operating manual, and in particular, the safety instructions before starting work. This is particularly important for persons who only work on the plant occasionally, e.g. for maintenance work.
- Only allow persons appointed and authorized for this work access to the plant.
- Only appoint reliable and trained or instructed personnel.
- Only appoint persons to work in the danger zone of the plant who can perceive and understand visual and acoustic indications of danger (e.g. visual and acoustic signals).
- Ensure that assembly and installation work and the initial commissioning are performed exclusively by qualified personnel who have been trained and authorized by TOX® PRESSOTECHNIK.
- Maintenance and repairs must be performed by qualified and trained personnel only.
- Ensure that personnel who are being trained, instructed or are in an apprenticeship can only work on the plant under the supervision of an experienced person.
- Have work on electrical equipment performed only by electricians or trained persons under the direction and supervision of an electrician in accordance with the electrotechnical regulations.

2.3 Fundamental hazard potential

Fundamental hazard potentials exist. The specified examples draw attention to known hazardous situations, but are not complete and do not in any way provide safety and risk awareness action in all situations.

2.3.1 Electrical hazards

Attention should be paid to electrical hazards particularly inside the components in the area of all assemblies of the control system and motors of the installation.

The following basically applies:

- Have work on electrical equipment performed only by electricians or trained persons under the direction and supervision of an electrician in accordance with the electrotechnical regulations.
- Always keep the control box and/or terminal box closed.
- Before commencing work on electrical equipment, switch off the main switch of the system and secure it against being switched back on inadvertently.
- Pay attention to the dissipation of residual energy from the control system of the servomotors.
- Make sure that the components are disconnected from the power supply when carrying out the work.

2.3.2 Thermal hazards

The drive works in continuous operation and can become hot and cause burns when touched.

- Wear individual protective equipment.
- Before starting work, make sure that surfaces have cooled down sufficiently.

2.3.3 Pneumatic hazards

Attention must be paid to pneumatic hazards particularly on the pneumatic supply lines and connection points.

The following basically applies:

- Allow work to be carried out on pneumatic equipment by authorized service personnel only.
- Wear individual protective equipment.

- Do not exceed the permissible pressure.
- First switch on compressed air when all hose connections have been established and secured.
- Do not uncouple any hoses under pressure.
- If hoses slip off, switch off the compressed air supply immediately.

2.3.4 Contusions

Contusions and hand injuries can occur in the radius of action of the product.

The following applies generally:

- Make sure that that no persons are located in the danger area during operation.
- During necessary work in the danger area (e.g. maintenance, cleaning), secure the system against unexpected, accidental and unauthorized activation.
- Make sure that parts or tools cannot fall down or descend as a result of stored energy. Use appropriate fuses.

2.3.5 Hydraulic hazards

Attention must be paid to hydraulic hazards particularly on the supply lines, connection points and vent points.

The following applies generally:

- Allow work to be carried out on hydraulic equipment by authorized service personnel only.
- Wear individual protective equipment.
- Do not exceed the permissible pressure.
- Do not remove any hoses under pressure.
- Never vent hydraulic components under pressure.

2.3.6 Electromagnetic hazards

Electromagnetic hazards must be observed in the area of electromagnetically vibrating or oscillating components.

Regular work on and with electromagnetically vibrating or oscillating components can lead to disturbances in the blood circulation of the fingers as well as neurological and motoric dysfunctions.

Basically applies:

- Use antivibration gloves according to EN ISO 10819:1997 for necessary work!
- Electromagnetic fields can influence pacemakers (PM) and other implants through indirect effects. Avoid possible malfunctions.

2.3.7 Laser

Depending on the model and features, lasers can be installed for the purpose of recognition. There is a danger of looking into the laser in some situations. If this is not avoided, eye injuries may result.

2.3.8 Hazardous substances

The following safety requirements apply when handling chemical substances:

- Observe the applicable safety regulations on handling chemical substances and the information on the manufacturer's safety data sheets of hazardous substances.
- Wear individual protective equipment.
- In the event of eye or skin contact, rinse the affected area, change contaminated clothing and visit a doctor if necessary. Provide appropriate equipment (eye wash bottle, washbasin) near the workplace.
- Groundwater hazardous substances must not get into the ground or sewage system. Collect groundwater hazardous substances and dispose of them properly.

2.4 Safety device on the product

Safety devices are important components of the safety concept and help to prevent accidents.

2.4.1 Safety device of system

A superordinate safety concept must be developed.

3 About this product

3.1 Intended use

The hydropneumatic drive performs the strokes that are generally defined as fast approach stroke, power stroke and return stroke. The drive is intended for installation in machines or robot tongs with the following technical applications:

- Installing, pressing
- Punching, pressing (of function elements)
- Riveting, crimping, flaring
- Punching, piercing
- Embossing, marking
- Tensioning, clamping, crimping
- Pressing, compressing
- Clinching, joining

This incomplete machine may not be commissioned until it has been ascertained that the incomplete machine in which the component is to be installed complies with the requirements of the Machinery Directive (2006/42/EC).

3.1.1 Safe and correct operation

Intended use includes the following conduct:

- Only operate with the components for which it is specified.
- Follow all instructions in this operating manual.
- Comply with the specified maintenance intervals and perform maintenance work correctly.
- Operate in compliance with the conditions of the technical data.
- Operation with fully assembled and functional safety devices.
- Activities may only be carried out by persons who are qualified or authorized for this purpose.

Any other use or application beyond this does not come under the scope of intended use.

3.1.2 Foreseeable misuse

Use contrary to intended use includes the following foreseeable misuse:

- Operation under conditions that deviate from the technical data.
- Operation without fully assembled and functional connections.
- Operation without fully assembled and functional safety devices.
- Modifications to the product without prior approval by the TOX® PRESSOTECHNIK and the approving authority.
- Incorrect parameterization.
- Execution of activities by persons who are not qualified or authorized to do so.

The operating company is exclusively responsible for all personal injury and property damage resulting from non-intended use. Non-intended use will not be covered by the warranty or the operating approval of the complete plant.

3.2 Product Identification

3.2.1 Position and content of the type plate

Designation on the type plate	Meaning
Type	Product designation
No.	Serial number
ΔV [ml]	Lowering volume Indicates the amount of oil that must be discharged again after completely filling.
P_{max}	Maximum pressure

Type code structure

Type key	Description
X-S 008. 3030. 100. 12	
X-S 008. 3030. 100. 12	Identifies the series type such as X-S, S, K, etc.
X-S 008 . 3030. 100. 12	Indicates the press force in [tons].
X-S 008. 3030 . 100. 12	Indicates the version.
X-S 008. 3030. 100 . 12	Indicates the length of the total stroke.
X-S 008. 3030. 100. 12	Indicates the length of the power stroke.

3.3 Function description of Powerpackage

See Design and installation guideline.

3.4 Product overview of Powerpackage Type RZS, RZK, RZKW

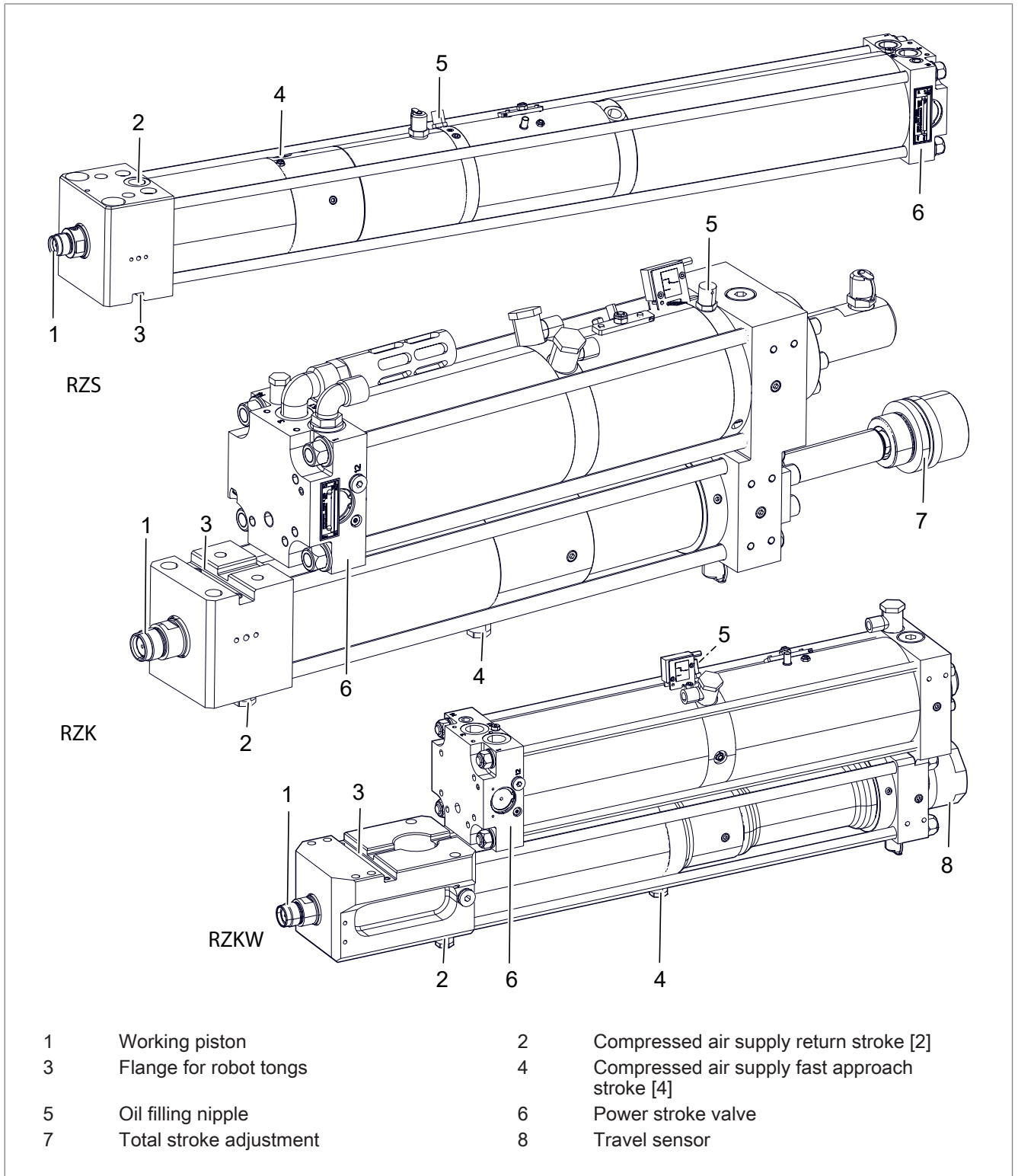


Fig. 1 Product of Type RZS, RZK, RZKW

3.4.1 Product attributes of Powerpackage Type RZS, RZK, RZKW

Type RZS	Area of use Type RZK	RZKW
<ul style="list-style-type: none"> For use in robot tongs and machine tongs. 		
<ul style="list-style-type: none"> Intensifier and working part are interconnected with a tension rod in a sandwich construction. 	<ul style="list-style-type: none"> Intensifier and working part are connected with an intermediate flange (compact construction). 	
<ul style="list-style-type: none"> Including power bypass ZLB with hydraulic end position cushioning ZHD in the upper final position. 		
<ul style="list-style-type: none"> Prepared for pressure valve (pneumatic spring). 		
<ul style="list-style-type: none"> Including fixed stop with elastomer cushioning in the lower final position. 		
	<ul style="list-style-type: none"> Equipped with total stroke adjustment. The length of the total stroke distance can be adjusted independently of the length of the power stroke. 	
		<ul style="list-style-type: none"> Equipped with integrated linear position sensor.

3.5 Optional equipment

3.5.1 Additional optional equipment

Type	Product attributes
ZKW	Linear position sensor <ul style="list-style-type: none"> The travel sensor indicates the absolute actual position of the piston. For internal installation (for series K and EK).
ZHW	Linear position sensor <ul style="list-style-type: none"> The travel sensor indicates the absolute actual position of the piston. For external installation (for series line-Q and line-X to Q-S/Q-K 30, X-SX-K 30).
ZHU	Stroke monitoring <ul style="list-style-type: none"> Determines the position of the working piston during forward stroke and return stroke via the external sensor.
ZDK	Pressure regulation in power stroke line <ul style="list-style-type: none"> Make possible the individual adjustment of the press force with a manual pressure valve or electrical proportional valve.
ZKHZ	External power stroke connection <ul style="list-style-type: none"> Enables the connection of the power stroke valve with an electrically actuated 3/2-way valve.
ZWK	Tool coupling <ul style="list-style-type: none"> Connects the drive and tool flexibly to prevent transverse forces from affecting the drive.
ZDO	Electronic pressure switch <ul style="list-style-type: none"> Records the oil pressure in the high-pressure part as system pressure and visualizes it via a four-digit LED display. The set switching function allows 2 output signals to be created.
ZHO	Stroke frequency optimization <ul style="list-style-type: none"> Reduces the cycle time. Replaces the existing power stroke valve with one of the next size.
ZPS	Pressing force sensor <ul style="list-style-type: none"> Measures the press forces in the direction of the pressure.

Tab. 1 Optional equipment

For optional equipment, see data sheet and brochure TOX®-Powerpackage.

<http://tox-pressotechnik.com/>

4 Technical data

4.1 Type sheet and data sheet

For technical data and installation dimensions see type sheet and data.
(<https://www.tox-pressotechnik.com>)

4.2 Compressed air quality and pneumatic connection

The following is required:

- Filtered and dried compressed air

Lightly oiled compressed air is permitted.

Compressed air quality (according to DIN ISO 8573-1):

Solids		Water dew point		Maximum Oil content	
Class	[μm]	Class	[°C]	Class	[mg/m ³]
5	40	4	3	3	1

4.3 Tightening torques

4.3.1 Tightening torques for flange mounting the drive

Thread size	Torque
M 6	17 Nm
M 8	40 Nm
M 10	80 Nm
M 16	340 Nm
M 20	660 Nm
M 24	1,130 Nm

4.3.2 Tightening torques on the piston rod

Tool coupling ZWK	Tightening torque
ZWK 001	10 Nm
ZWK 002	15 Nm
ZWK 004	40 Nm
ZWK 008	180 Nm
ZWK 015	210 Nm
ZWK 030	230 Nm
ZWK 050	290 Nm
ZWK 075	500 Nm
ZWK 200	500 Nm

4.4 Press force table

The effective press force is the ratio of the available press force at the specified air pressure to the press force required for the pressing process.
Press force table see separate document.

4.5 Specification for hydraulic oil

The following oils are approved for standard application:

- Hydraulic oil HLP32 (according to DIN 51524-2), filtered < 5µm, load rating > 30 N/mm²
- Food grade oil Klüber Summit HySyn FG 32

The following hydraulic oils are approved with limitations for standard application:

- Hydraulic oil UCON™ LB-165
- Synthetic oil ISOTEX 46
- Synthetic oil Envolubric PC 46 NWL
- The use of hydraulic oils that have not been approved as standard can lead to an increase of maintenance intervals due to an increased intake of air.
- The use of hydraulic oils that have not been approved as standard can reduce the lubrication capacity lower than for HLP32 hydraulic oils. This can lead to a shorter lifetime of seals.
- Some sealing materials in case of hydraulic oils not approved as standard tend towards increased swelling and therefore to a reduced lifetime of the seals.

NOTE

Loss of warranty in case of the use of non-approved hydraulic oils!

Due to the negative effects on maintenance intervals, swelling behavior and lifetime of the seals in case of the use of hydraulic oils that have not been approved as standard, the granted warranty becomes extinct.

- Use hydraulic oils that have been approved by TOX® PRESSOTECHNIK as standard.
- Use other hydraulic oils only after the express approval of TOX® PRESSOTECHNIK.
- Do not mix different hydraulic oils. Negative effects such as flocculation cannot be excluded.

5 Transport and storage

5.1 Safety during transport

WARNING

Hazard from suspended loads!

Severe crushing, impacts and serious accidents as a result of improper transportation and falling load!

- Only use lifting gear that is appropriate and in perfect technical condition, as well as load attachment devices with an adequate safe working load.
- Never stand or work under suspended loads.
- Make sure that that no person is in the danger area.
- When transporting and setting down, make sure that no parts of the body become jammed.
- Wear suitable personal protective equipment (e.g. safety boots).

CAUTION

Injury from toppling and falling products!

- Secure product from toppling, falling, accidentally moving.
- Store product horizontally or secure with dowels.

- The transportation may only be carried out by authorized personnel.
- The product may only be transported with the transport pallet or transport device provided.
- The product may only be lifted with suitable lifting devices at suitable lifting points.
See Safety symbols.
- Note the weight of the product.
See technical data sheet.
- Note the center of gravity of the product.
See general arrangement drawing.

5.2 Lifting device

Depending on the size of the drive, the flange cover at the rear is provided with threaded bore holes for ring bolts for hoisting.

WARNING

Risk of impact and crushing due to products swivelling out!

Severe impacts, crushing, and serious accidents as a result of the product rotating and swiveling out.

- Pay attention to the center of gravity and pivot point.
- Establish a V-shaped suspension connection in the center of gravity between the ring bolts.
- If there are no threaded holes, suspend the ring bolt between the working part and intensifier.
- Lift up the product carefully.

5.3 Temporary storages

- Use original packaging.
- Make sure that all connections and threads are covered to prevent dust ingress and shocks.
- Store the product only in closed, dry, dust-free and dirt-free rooms at room temperature.

5.4 Dispatch for repair

If the device is sent to TOX® PRESSOTECHNIK for repair, the following information is required:

- Detailed description of the fault
- Operating conditions and installations e.g. upstream devices, etc.
- Contact person at TOX® PRESSOTECHNIK
- Contact person at your company in case of questions

For additional information and forms see

<http://www.tox-pressotechnik.com/>.

6 Installation

6.1 Safety during installation

The installation may only be carried out by trained and authorized personnel.

DANGER

Electrical hazards in case of contact with live parts!

Electric shock, burns or death in case of contact with live parts!

- Have all work on the electrical equipment performed by an electrician.
- Disconnect power supply.
- Wait for residual energy to dissipate safely (at least 3 minutes).

WARNING

Ejecting parts and compressed air from compressed air conducting lines!

Serious injuries to eyes and body cavities!

- Always connect and disconnect lines without pressure.
- Pay attention to maximum permitted pressures.
- Wear individual protective equipment.

CAUTION

Tripping points from laid supply lines!

Injuries from tripping and falling!

- Avoid tripping points when setting up.
- Mark unavoidable tripping points with warning sign.

6.2 Installing drive

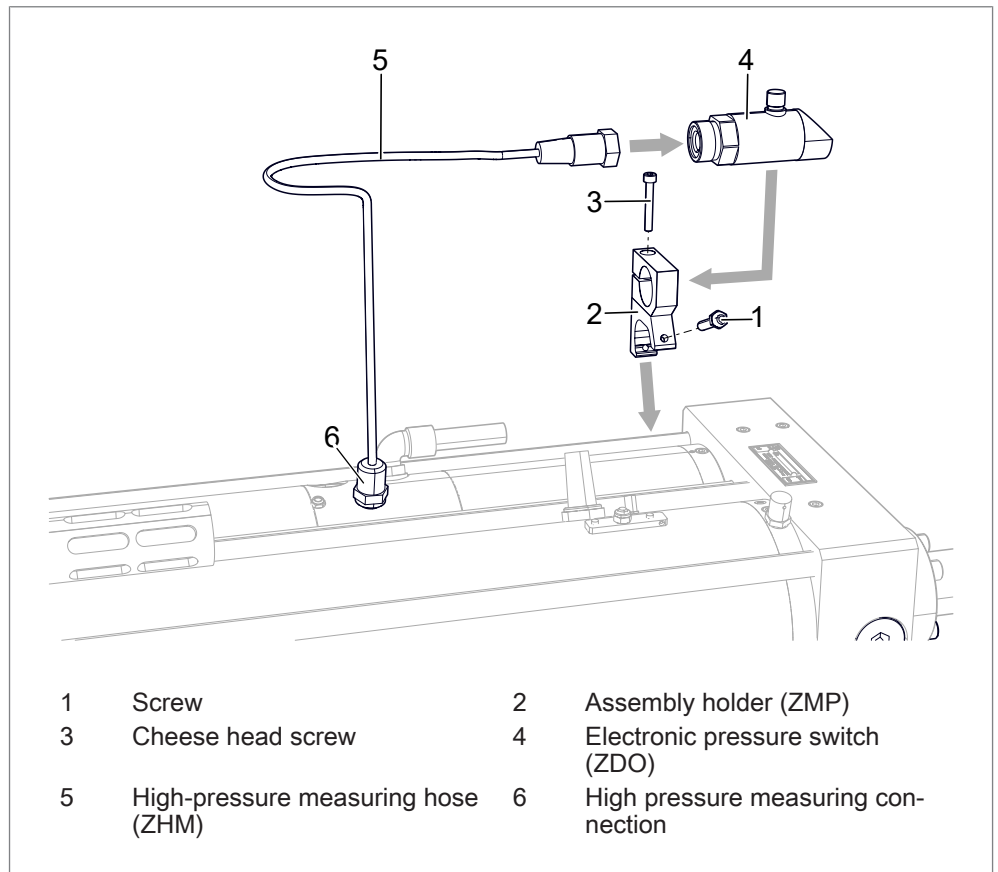
Material required:

- Screws of the strength class : 12.9 (in accordance with ISO 4762)
- Torque wrench

1. **WARNING!** Risk of crushing! Attach lifting device (ring bolts) and use appropriate lifting gear.
Place and align drive on the fastening element provided.
2. Tighten screws, observe torques while doing so.
See [Chap. 4.3 Tightening torques, Page 23](#).

6.3 Installing accessories

6.3.1 Installing electronic pressure switch (ZDO)



Material required:

- Electronic pressure switch (ZDO)
- Assembly holder (ZMP)
- High-pressure measuring hose (ZHM)

NOTE

Air trapped in the connecting line!

Air could get into the high pressure chamber, impair the working process and distort the measuring result.

➔ Fill connecting line with oil and vent.

- ✓ Make sure that the system is depressurized and disconnected from the power supply.
 - ✓ Observe the tightening torques.
See [Chap. 4.3 Tightening torques, Page 23](#).
1. Install assembly holder of pressure switch on the drive. Make sure that display and operating elements are easily accessible.
 2. Fasten the pressure switch in the assembly holder.
 3. Install high pressure hose on the pressure switch and on the high pressure measuring connection.
 4. Connect cable of the pressure switch on the control system according to circuit diagram.
See pressure switch ZDO operating manual.

6.3.2 Installing position sensors of stroke monitoring for forward and return stroke (ZHU)

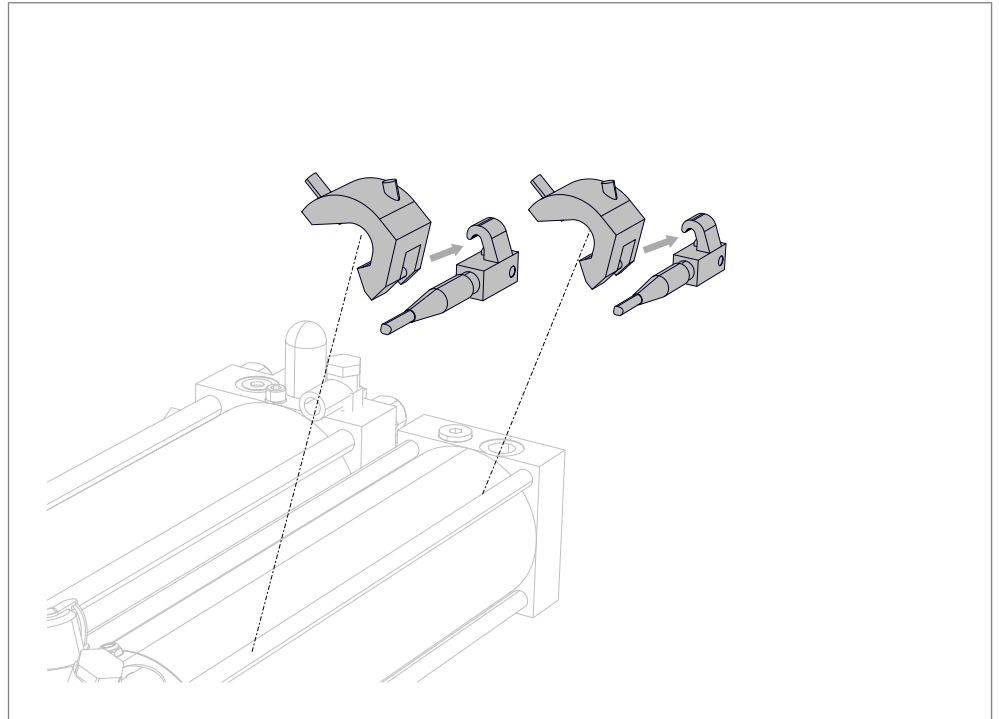


Fig. 2 Installing position sensors for stroke monitoring for forward and return stroke

Material required:

- Magnet-sensitive proximity switch with LED (ZHS 001.001)
- Holding angle for proximity switch
- Cable box

1. Installing holding angle.
2. Installing proximity switch.
3. Connect the proximity switch to the control.
See circuit diagram.

Setting the position sensors

- ✓ Proximity switches are connected.
 - ✓ Working piston in home position.
1. Push the proximity switch from the edge of the cylinder to the first switch-on point.
 - ▷ The LED lights up.
 2. Mark the edge of the proximity switch on the cylinder.
 3. Push the proximity switch further to the switch-off point.
 - ▷ The LED switches off.
 4. Push the proximity switch back to the 2nd switch-on point.
 - ▷ The LED lights up.
 5. Mark the edge of the proximity switch on the cylinder.
 6. Position and fix the proximity switch between the two markings.

6.3.3 Installing pressure control in the power stroke line (ZDK)

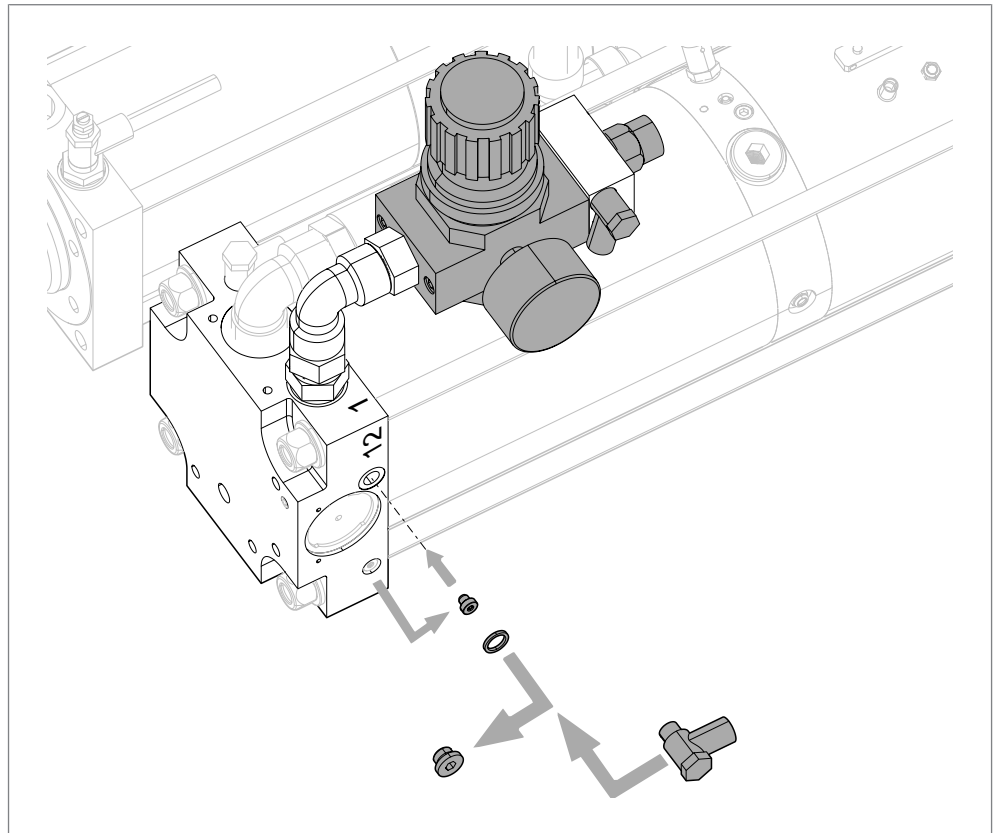


Fig. 3 Installing pressure control in the power stroke line (assembly ZDK)

Material required:

- Manual pressure regulator (ZDK)
- Screw plug with collar, size M 5 (laterally on power stroke valve next to connection [12])

- ✓ For connections see Pressure control in the power stroke line (assembly ZDK) (optional).
- 1. Remove the screw plug on the control connection [12].
 - ▷ The lower positioned M 5 threaded hole is set free.
- 2. Remove the M5 screw plug from the par position.
- 3. Screw the M 5 screw plug fully into the lower positioned M 5 threaded hole of the control connection [12].
 - ▷ The M 5 threaded hole in power stroke valve is closed.
- 4. Connect control connection [12] on the power stroke valve to output of fast approach stroke [4.1] or connection [4.4] on the pressure regulator. In addition, install hose line and seal.
- 5. Install pressure regulator on power stroke input [1].
- 6. When installing a proportional pressure regulator, connect it to the control.
See data sheet, or circuit diagram.

6.3.4 Installing proportional pressure control valve in the power stroke line

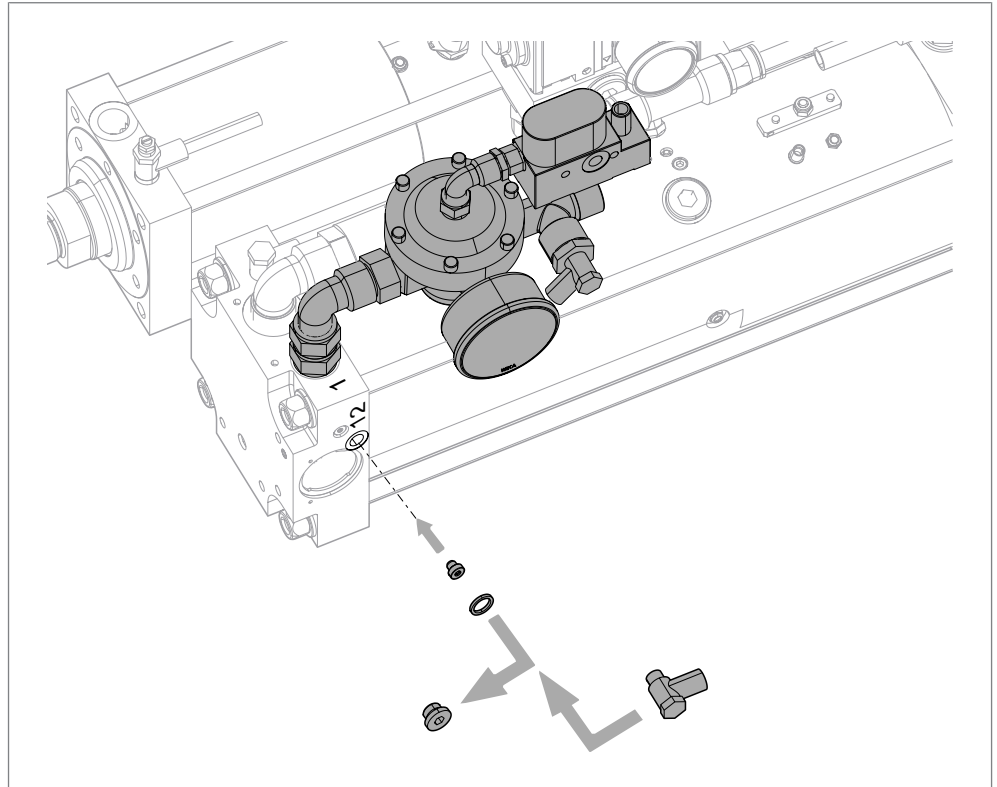


Fig. 4 Installing proportional pressure control valve in the power stroke line

Material required:

- Proportional pressure control valve
 - Screw plug with collar, size M 5 (laterally on power stroke valve next to connection [12])
- ✓ For connections see Pressure control in the power stroke line (assembly ZDK) (optional).
1. Remove the screw plug from the control connection [12] and screw the M 5 screw plug with collar fully in.
 - ▷ Bore hole in power stroke valve is closed.
 2. Connect the control connection [12] on the power stroke valve with output of fast approach stroke [4.1] or connection [4.4] on the proportional pressure control valve. In addition, install hose line and seal.
 3. Install pressure regulator on power stroke input [1].
 4. When installing a proportional pressure control valve, connect it to the control.
See data sheet, or circuit diagram.

6.3.5 Installing external power stroke connection (ZKHZ)

Material required:

- Electrical switching valve power stroke switch (ZKHZ)
 - Screw plug
- ✓ For connections see External power stroke switch (assembly ZKHZ) (optional).

1. Disassemble control throttle 'X'.
2. Connect the control throttle 'X' connection to screw plug.
3. Install power stroke switch to connection of the power stroke valve [14].
4. Connect the power stroke switch to permanent compressed air supply.
5. Connect the power stroke connection to the control.
See circuit diagram.

6.3.6 Installing external power stroke release (ZKHF) and power stroke deactivation (ZKHD)

Material required:

- Electrical switching valve power stroke release (ZKHF) and power stroke deactivation (ZKHD) with pneumatic OR valve

Installing the external power stroke release (ZKHF)

- ✓ For connections see External power stroke deactivation (assembly ZKHD) (optional).
1. Install switching valve power stroke release and power stroke deactivation with OR valve on control connection [14].
 2. Connect line of the control throttle 'X' to the OR valve.
 3. Connect pneumatic input [3] of the switching valve to compressed air supply.

Installing the external power stroke deactivation (ZKHD)

- ✓ For connections see External power stroke deactivation (assembly ZKHD) (optional).
1. Install switching valve power stroke release and power stroke deactivation with OR valve on control connection [14].
 2. Connect line of the control throttle 'X' to the OR valve.
 3. Connect pneumatic input [1] of the switching valve to compressed air supply.

6.3.7 Preparing external power stroke supply

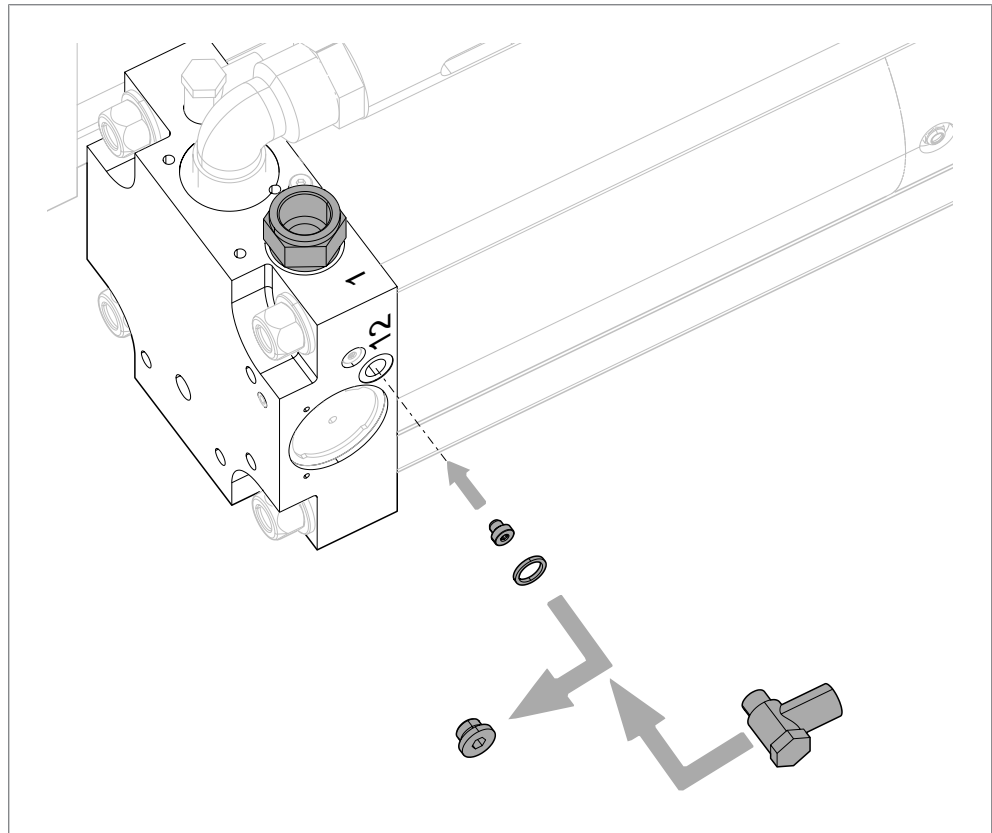


Fig. 5 Preparing external power stroke supply

Material required:

- Screw plug M 5 with collar (laterally on power stroke valve next to connection [12])

✓ For connections see External power stroke supply (optional).

1. Remove the screw plug from the control connection [12] and screw the M 5 screw plug with collar fully in.
 - ▷ Bore hole in power stroke valve is closed.
2. Connect control connection [12] on the power stroke valve to output of fast approach stroke [4.1]. In addition, install hose line and seal.
3. Install external power stroke supply on power stroke input [1].

6.3.8 Installing the stroke frequency optimization (ZHO)

Installing the stroke frequency optimization (ZHO) for drive with integrated power stroke valve

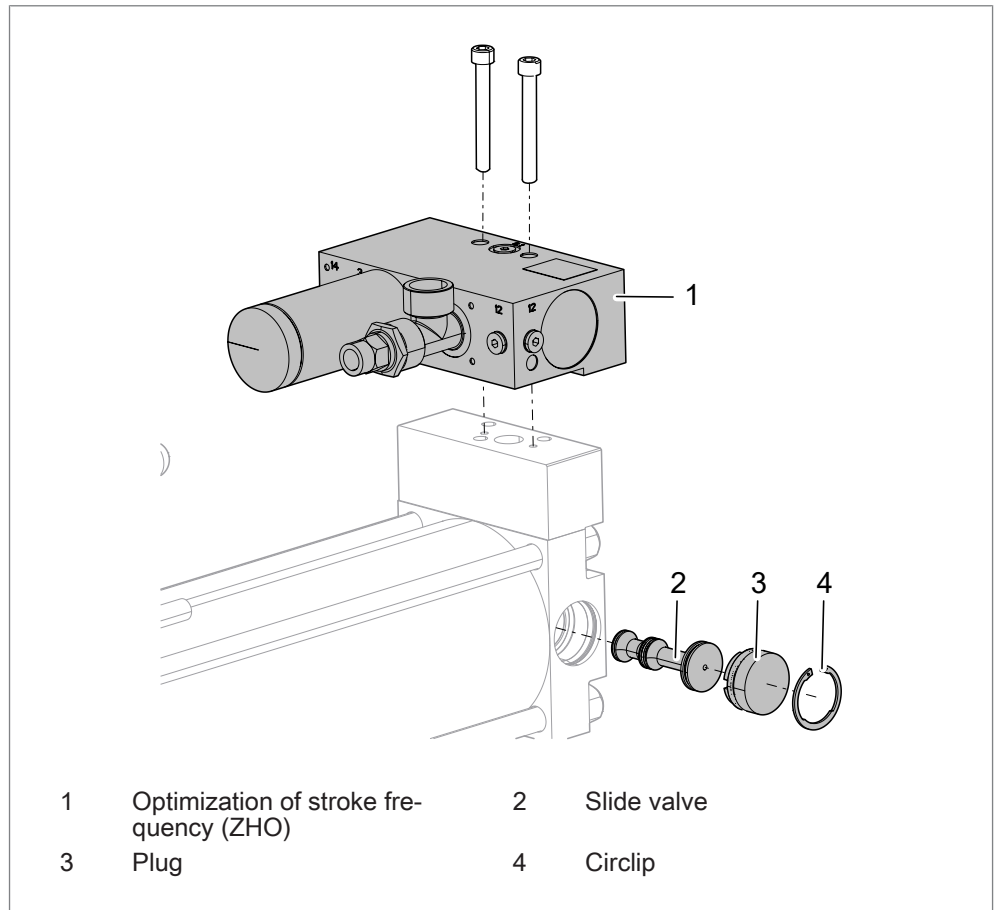


Fig. 6 Installing the stroke frequency optimization ZHO

Material required:

- Stroke frequency optimization (ZHO) for drive with integrated power stroke valve
- Pneumatic supply line including all series-connected valves in the size fitting to the connections.

1. Remove circlip and plug.
2. Remove the valve slide.
3. Install the plug and circlip.
4. Installing the stroke frequency optimization (ZHO).

Installing the stroke frequency optimization (ZHO) for drive with external power stroke valve

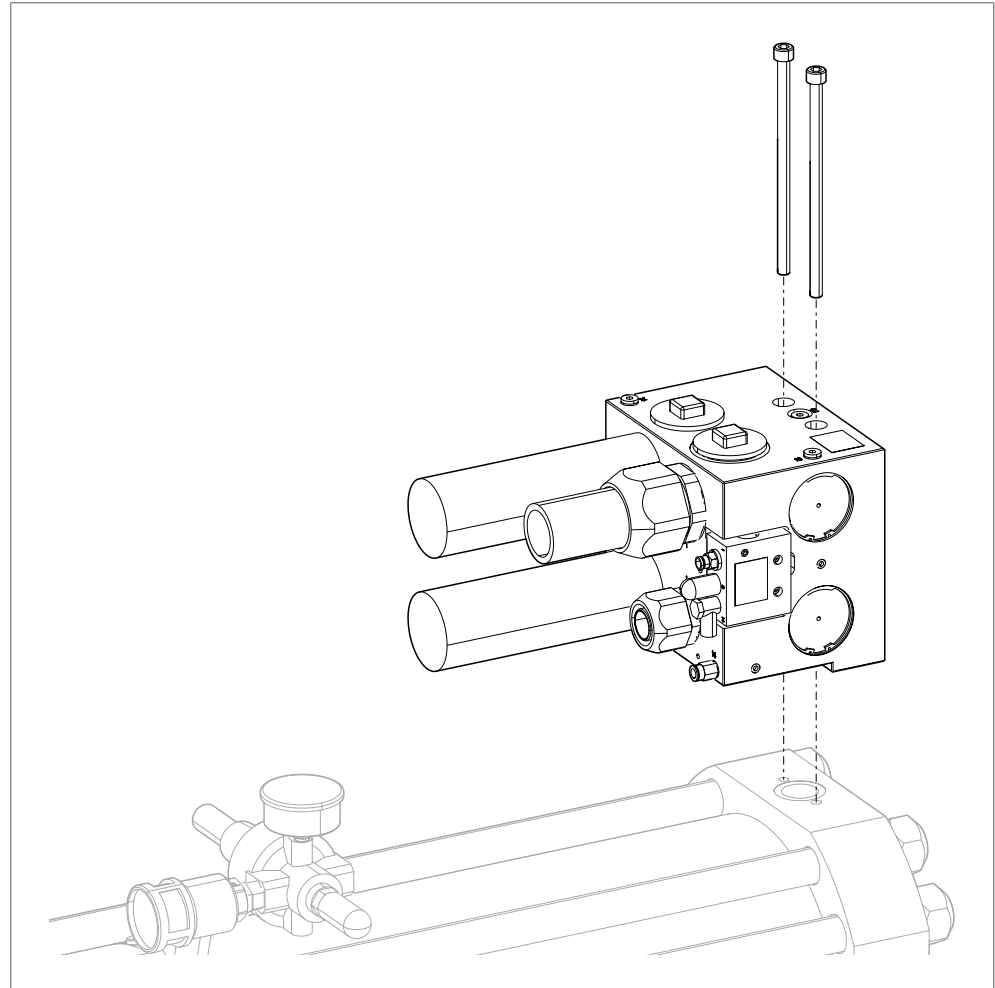


Fig. 7 Installing the stroke frequency optimization ZHO

Material required:

- Installing the stroke frequency optimization (ZHO) for drive with external power stroke valve
- Pneumatic supply line including all series-connected valves in the size fitting to the connections.

1. Dismantle the existing external power stroke valve.
2. Install the stroke frequency optimization (ZHO).

6.3.9 Installing the speed reduction for power stroke venting

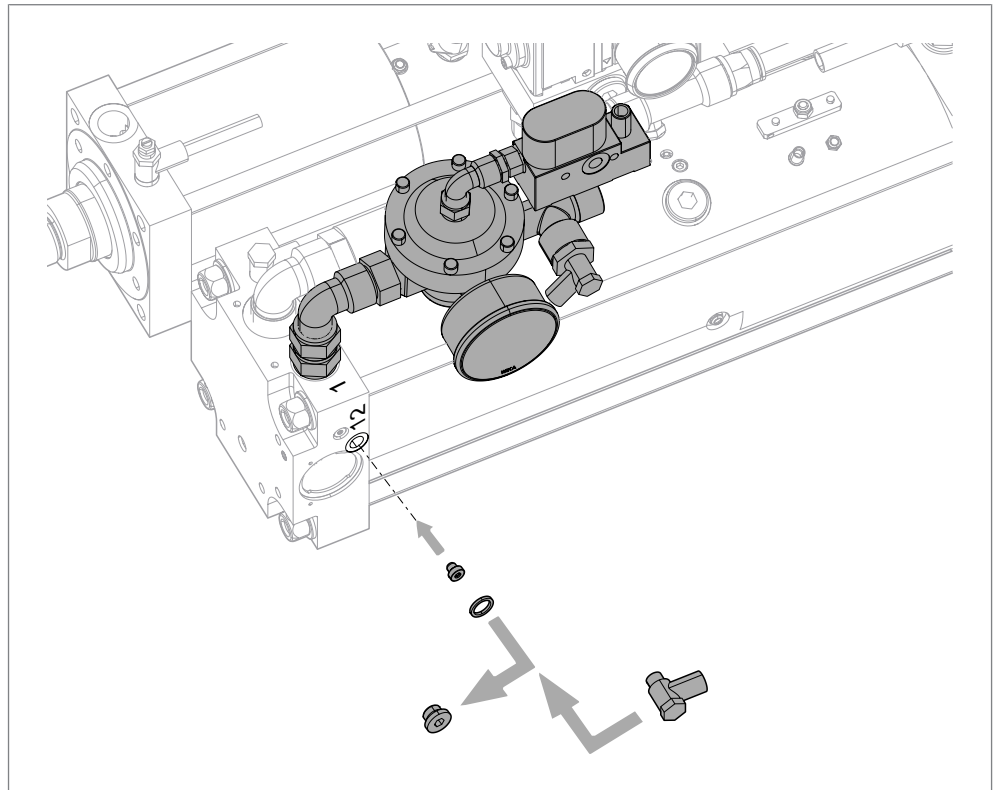


Fig. 8 Installing the speed reduction for power stroke venting

Material required:

- Adjustable exhaust air damper (ZD)

1. Install the exhaust throttle between the power stroke valve output [3] and the muffler.
2. Connect the compressed air supply connections.
3. Set the exhaust air damper.
See [Chap. 7.3.2 Set the speed ratio between power stroke and power stroke venting \(optional\), Page 48.](#)

6.3.10 Installing tool coupling (ZWK)

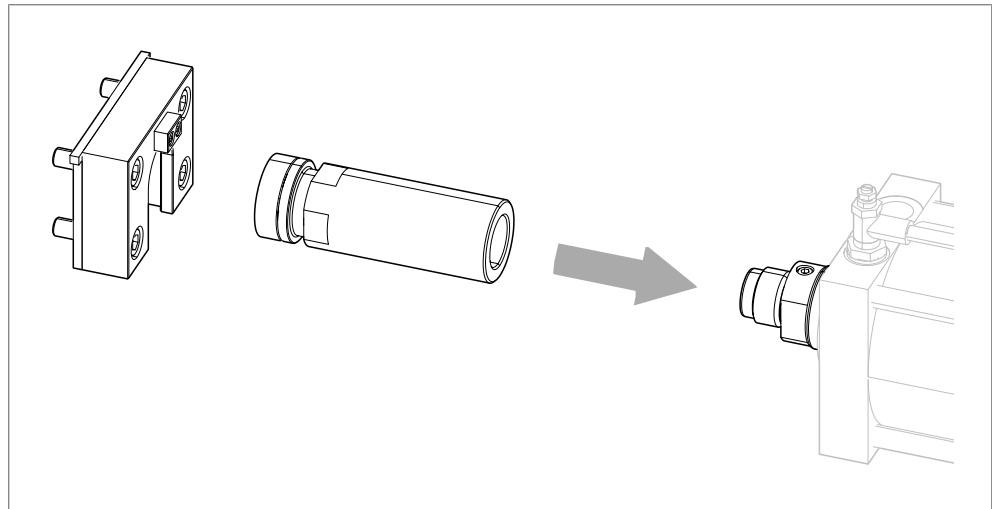


Fig. 9 Installing tool coupling (ZWK)

Material required:

- Tool coupling (ZWK)
- Screw locking compound - low-strength (e.g. Loctite 222)
- Food grade grease (e.g. UH1 14-151)

✓ Technical data, dimensions are observed.

See data sheet, or type sheet at <https://www.tox-pressotechnik.com>.

1. Install the tool holding fixture on the thread of the working piston. Observe tightening torques.
See [Chap. 4.3 Tightening torques, Page 23](#).
2. Secure the tool holding fixture screw locking compound.
3. Wet the contact surface between the holding tray and tool holding fixture with food grade grease.
4. Install the holding tray on the ram or on the tool plate.

7 Commissioning

7.1 Safety during the commissioning

1. The commissioning may only be carried out by trained and authorized personnel.
2. Make sure that that no persons are located within the danger area of the machine.
3. Observe technical data and limit values.
See Technical data.

7.2 Requirements for the commissioning

This incomplete machine may not be commissioned until it has been ascertained that the incomplete machine in which the component is to be installed complies with the requirements of the Machinery Directive (2006/42/EC).

The requirements are:

- Safety devices of the machine are fully assembled and functional.
- The drive is fully assembled.
- All supply lines are connected.
- The required compressed air qualities and connection values are present.
- Sufficient pieceparts and material are available.

7.2.1 Measuring connection and control connection

The oil pressure proportional to the press force is present on the measuring connection and control connection.

This can be displayed, for example, by connecting a pressure gauge or used via transmission to a pressure switch for generating a switching pulse. The following applies for the activation of the compressed air supply during venting:

- During venting, the return stroke and pressure valve (pneumatic spring) must be impinged with compressed air.
- It must not be possible to activate the fast approach stroke and the power stroke when doing so.
- Attach drop protection if necessary.

When depressurizing a pressure valve (pneumatic spring), the following applies:

- When the forward stroke connection and back stroke connection are switched, the compressed air supply of the pneumatic spring must also be turned off.

7.3 Avoidance of dynamic oil leakage

The dynamic oil leakage is based on the physical effect of drag flow: the higher the speed, the thicker the oil film dragged along. In the case of an unfavorable speed ratio between the fast approach stroke and return stroke, an oil film could get into the pneumatic chambers of the Powerpackage.

The following applies:

- The ratio of the speed between the return stroke and the fast approach stroke must be set.
 - For setting the speed ratios, also the exhaust air dampers must be installed on the fast approach stroke connections and the return stroke connections.
- A balanced power stroke speed.
 - For the attuned power stroke speed an exhaust air damper must also be installed in the power stroke venting.
- For the throttled power stroke speed, the speed ratios between power stroke speed and venting of the power stroke must be set.
See [Chap. 6.3.9 Installing the speed reduction for power stroke venting, Page 43](#).
- The power cross sections to the Powerpackage (hose cross sections, switching valves, maintenance unit) must at least meet the specifications in the type sheet.

For technical data and installation dimensions see the type sheet.

(<https://tox-pressotechnik.com/>)

7.3.1 Setting speed ratio of return stroke to fast approach stroke

The speed of the working piston in the fast approach stroke and return stroke can be set with external exhaust air dampers on the forward stroke and return stroke. The exhaust air dampers may have to be retrofitted.

Type	Type
RZK	RZH
<ul style="list-style-type: none"> Return stroke equally fast as fast approach stroke or Return stroke max. 20% faster than the fast approach stroke 	<ul style="list-style-type: none"> Fast approach stroke equally fast as return stroke or Fast approach stroke max. 20% faster than the return stroke

Tab. 2 Necessary speed ratio



A visual check of the speeds is generally sufficient.

1. Set speed ratio according to the specifications.
2. Perform test and check the speed visually.

7.3.2 Set the speed ratio between power stroke and power stroke venting (optional)

At throttled power stroke speed
Necessary speed ratio between power stroke and power stroke venting
<ul style="list-style-type: none"> Power stroke speed equal to the return stroke speed of the intensifier piston or Power stroke speed faster than the return stroke speed of the intensifier piston

Tab. 3 Necessary speed ratio



A visual check of the speeds is generally sufficient.

1. Set speed ratio according to the specifications.
2. Perform test and check the speed visually.

7.4 Setting control throttle 'X'

The control throttle 'X' is used to set the timing of the switchover from fast approach stroke to power stroke, and must be readjusted for each application (e.g. tool weight drawing/pressing). The effect of the control throttle 'X' is influenced by the system pressure and by setting an optional fast approach stroke throttle.

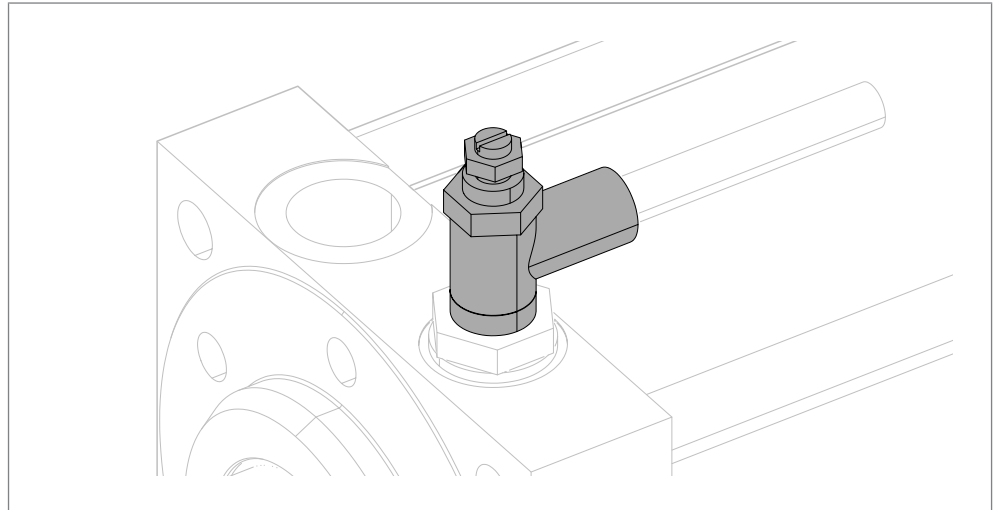


Fig. 10 Setting control throttle 'X'

- ✓ Working piston is retracted.
 - ✓ Compressed air supply is switched on.
1. Close control throttle 'X' when piston is retracted and impinged by turning clockwise.
 2. Extend working piston rod.
 3. Open control throttle 'X' slowly by turning counterclockwise until the power stroke is noticeably activated on meeting a counterforce. Opening the control throttle 'X' further causes the power stroke to be activated earlier.

7.5 Setting total length of stroke (optional)

In the series with total stroke adjustment, the length of the total stroke can be adjusted independently of the length of the power stroke and the length of the cylinder.

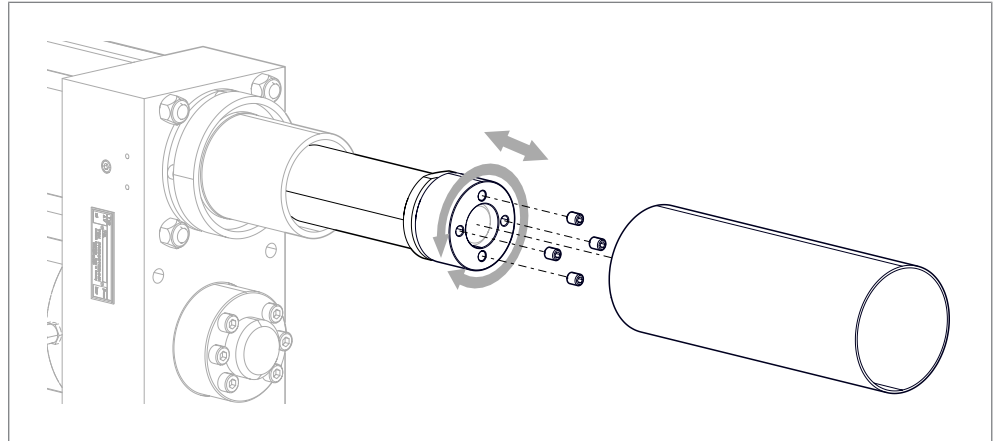


Fig. 11 Setting total length of stroke

1. Dismantle the protective covering on the working piston.
2. Loosen clamping screws.
3. Screw in or unscrew the adjustment sleeve until the desired total stroke length is adjusted. The adjustment path can be read on a scale on the adjustment sleeve.
 - ▷ Unscrew adjustment sleeve: The total stroke length is extended.
 - ▷ Screw in adjustment sleeve: The total stroke length is shortened.
4. Tighten clamping screws.
See [Chap. 4.3 Tightening torques, Page 23](#).
5. Install the protective covering.

8 Operation

8.1 Safety in operation

⚠ WARNING**Dangerous machine movements!**

Serious contusions and injuries!

- Make sure that that no persons are located in the danger area during operation.
-

⚠ CAUTION**Noise during operation!**

Hearing impairment!

- Wear individual protective equipment.
-

⚠ CAUTION**Hazard from flying parts!**

Injuries to eyes and body cavities!

- Wear individual protective equipment.
-

8.2 Requirements for operation

- The safety devices of the entire machine are properly assembled and functional.
- All components are properly maintained, clean and without damage.
- Supply connections, communication and control connections, material or media hoses are installed properly. The permissible values are complied with.
- The main switch of the machine is switched on.
- Compressed air supply is open.
- The fault message on the machine are acknowledged.
- There are no persons are located in the danger area.
- A visual inspection is carried out, especially:
 - Position of the oil level indicator when the working piston is retracted (oil level indicator flush with the surface of the cylinder).
 - No objects in the working area.

8.3 Operating drive

The operation depends on:

- Intended purpose
- Control system
- Operating elements
- Safety equipment
- Tooling and accessories

9 Troubleshooting

9.1 Safety during troubleshooting

- Troubleshooting may only be carried out by trained and authorized personnel.
- Make sure that that no persons are located within the danger area of the machine.

9.2 Searching for causes of fault

Fault	Possible cause	Measure
Piston rod does not extend.	Tool jams. Guiding columns are jammed.	Mechanically decouple the Powerpackage and check ease of movement by extending and retracting.
	Air pressure too low (only for assembly direction from the bottom to the top).	Check air pressure and increase if necessary.
	Main control valve does not switch.	Check main control valve. Contact authorized service personnel.
	Unlockable check valves (optional equipment) do not open.	Check non-return valves. Contact authorized service personnel.
	Faulty pneumatic hose.	Check the compressed air supply. Contact authorized service personnel.
No execution of power stroke. Press force not reached.	Insufficient air pressure.	Increase air pressure.
	Compressed air setting on pressure regulator in the power stroke line (optional) is too low.	Increase air pressure in power stroke line.
	Pneumatic spring pressure setting is too high or the pneumatic spring is faulty.	Check compressed air supply of the pneumatic spring. Contact authorized service personnel.
	Oil level is too low.	Checking oil level, Page 62.
	Air is trapped in the hydraulic oil system.	Refilling oil and venting drive, Page 63.
	Power stroke valve is faulty.	Contact authorized service personnel.
	Control throttle 'X' incorrectly set, overloaded.	Setting control throttle 'X', Page 49.
Power stroke not triggered with very short fast approach stroke (only for type Q-S, X-S, S, EL with hydraulic end position cushioning ZHD)	No air pressure in home position.	Impinge the return stroke with air pressure before initiating the fast approach stroke.
	The fast approach distance traveled is too short. Required: min. 8 mm.	Set sufficient travel for fast approach stroke before the power stroke is switched on.

Fault	Possible cause	Measure
Piston rod does not retract.	Tool jams. Guiding columns are jammed.	Mechanically decouple the Powerpackage and check ease of movement by extending and retracting.
	Air pressure too low (only for assembly direction from the bottom to the top).	Check air pressure and increase if necessary.
	Main control valve does not switch.	Check main control valve. Contact authorized service personnel.
	Unlockable check valves (optional equipment) do not open.	Check non-return valves. Contact authorized service personnel.
	Pneumatic hose is faulty.	Check the compressed air supply. Contact authorized service personnel.
	Tool is too heavy for return stroke force.	Increase return stroke pressure. Use additional return stroke cylinders.
	Changeover signal for return stroke is not present.	Check electrical switching signal (e.g. for ZHU, ZHW, ZDO). Contact authorized service personnel.
	Power stroke valve is faulty.	Contact authorized service personnel.
	Pneumatic spring pressure regulator or pressure gauge pneumatic spring is faulty.	Check the compressed air pressure on the pressure gauge. Contact authorized service personnel.
Frequent refilling of hydraulic oil is necessary.	Speed ratio of fast approach stroke to return stroke is set incorrectly.	Setting speed ratio of return stroke to fast approach stroke, Page 48. Contact authorized service personnel.
	Speed ratio of power stroke and power stroke venting is set incorrectly.	Set the speed ratio between power stroke and power stroke venting (optional), Page 48. Contact authorized service personnel.
	Pneumatic supply insufficient. Cross-section of hose, size of connectors, switching valves, maintenance unit are too small.	Observe predefined connections sizes and cross-sections. See Datasheet.
	Powerpackage is not fully vented.	Refilling oil and venting drive, Page 63.
	Oil level after oil filling is not lowered.	Lowering of oil level, Page 66.
	The HP measuring connection, vent screw or oil filling nipple is leaky or faulty.	Contact authorized service personnel.
	Seals are damaged.	Contact authorized service personnel.

Maintenance table of Powerpackage

The specified intervals are only approximate values. Depending on the area of application, the actual values may differ from the guide values. The actual intervals can be found in the system control.

Maintenance cycle	Additional information	
according to counter (flexible)	10.3	Checking oil level
	10.4	Refilling oil and venting drive
Yearly	10.6	Checking hydraulic hoses

10 Maintenance

10.1 Safety during maintenance

 DANGER**Electrical hazards in case of contact with live parts!**

Electric shock, burns or death in case of contact with live parts!

- Have all work on the electrical equipment performed by an electrician.
 - Disconnect power supply.
 - Wait for residual energy to dissipate safely (at least 3 minutes).
-

 WARNING**Hot surfaces on the drive and on the control box!**

Injuries from burns!

- Allow hot surfaces and motors to cool down before touching them.
-

 WARNING**Ejecting parts and compressed air from compressed air conducting lines!**

Serious injuries to eyes and body cavities!

- Always connect and disconnect lines without pressure.
 - Pay attention to maximum permitted pressures.
 - Wear individual protective equipment.
-

 WARNING**Dangerous machine movements!**

Serious contusions and injuries!

- Make sure that that no persons are located in the danger area during operation.
-

NOTE**Incorrect cleaning agents or cleaning processes, lack of corrosion protection!**

Damage to machine components!

- Only touch bare areas with gloves.
 - Use cleaning set, such as industrial cleaner (e.g. Loctite 7063, or Würth Montagekraftreiniger 0890 107), vacuum cleaner, dry cloth and brush.
 - Do not clean with compressed air but with suction.
 - After cleaning, protect bare outer surfaces from corrosion. Coat surfaces with a cloth slightly moistened with anticorrosive fluid.
 - Keep inside surfaces, especially element-carrying parts, dry and free of grease.
-

10.2 Requirements for maintenance

10.2.1 Set system to maintenance position

Unless specified otherwise, before all maintenance work:

1. Retract the working piston.
 - ▷ The machine is in initial position (working piston retracted).
2. Install a restraint device if necessary.
3. Make sure that fast approach stroke and power stroke cannot be activated in maintenance position.
4. Make sure that return stroke is impinged with compressed air.
5. Make sure that the pressure valve (pneumatic spring) is impinged.
6. Make sure that unauthorized, accidental or unexpected starting up of the machine and initiation or dangerous movements due to latent energies are prevented.

10.3 Checking oil level

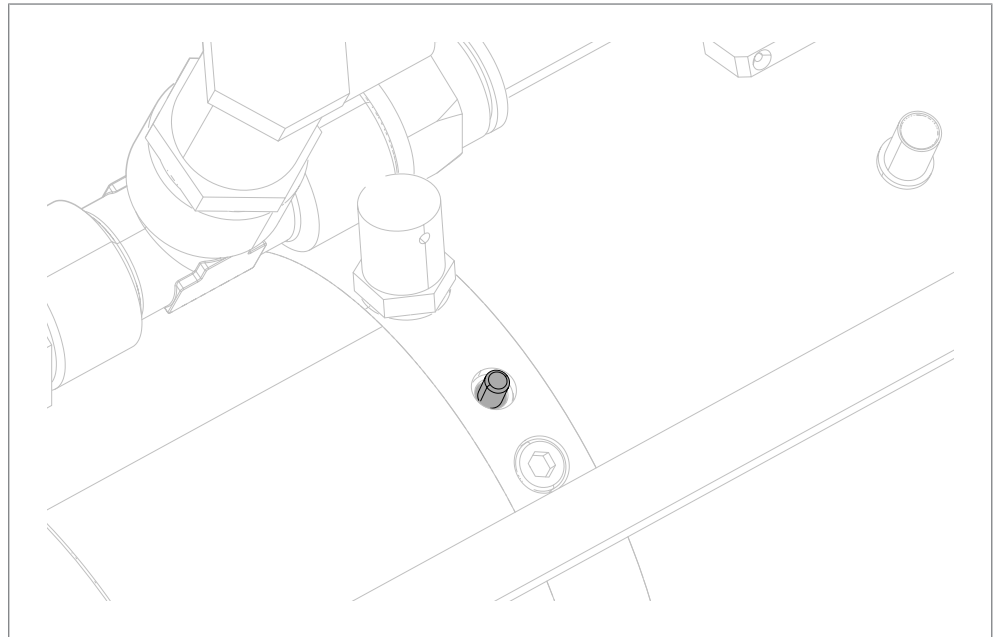


Fig. 12 Checking oil level

- ✓ System is in maintenance position.
See [Set system to maintenance position, Page 61](#).
- ➔ Check needle of the oil level indicator.
- ▶ The needle of the oil level indicator is flush with the surface of the cylinder: Oil level is ok.
- OR -
- ▶ The needle of the oil level indicator comes out: Oil must be refilled.
See .

10.4 Refilling oil and venting drive

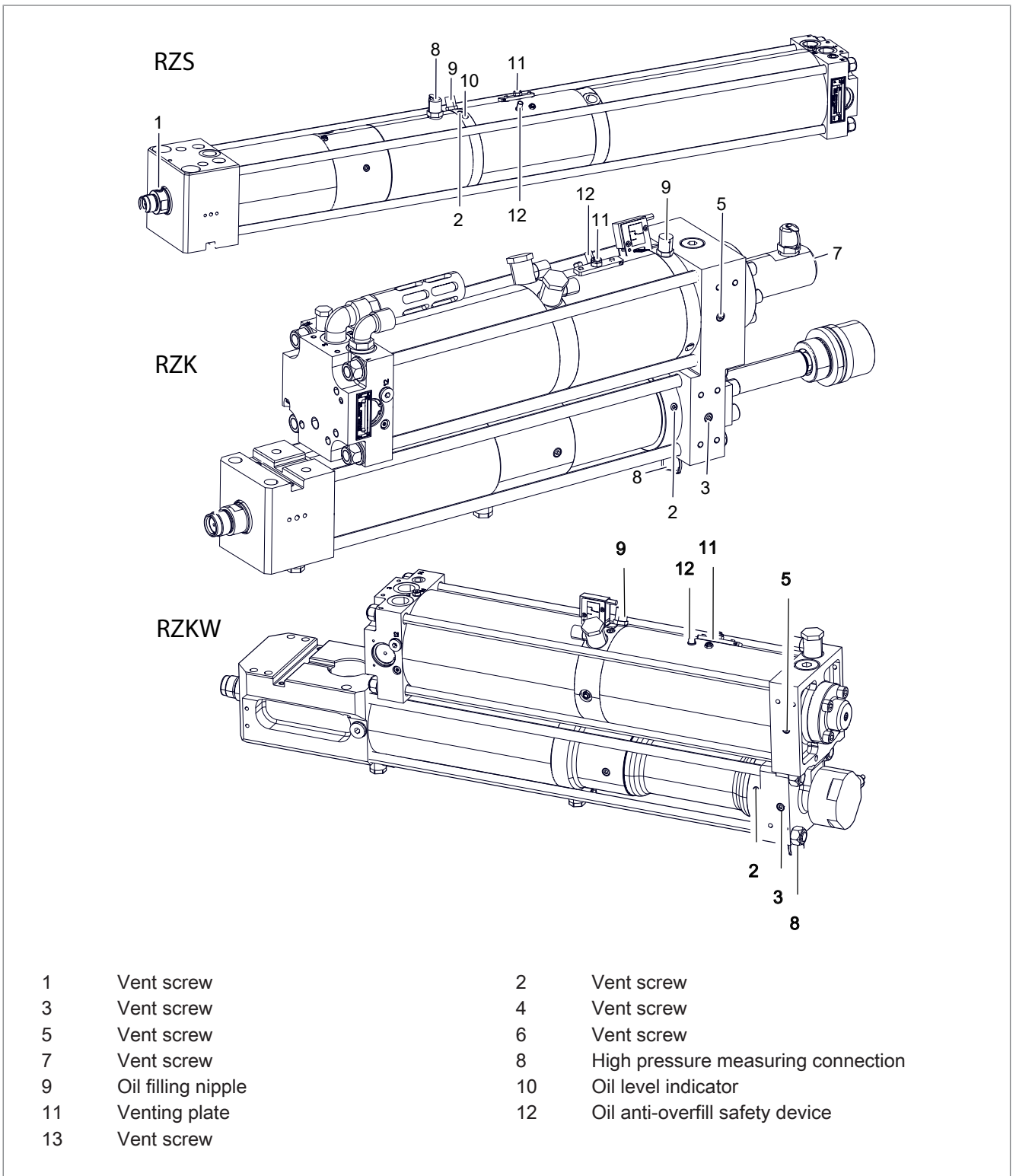


Fig. 13 Refilling oil and venting drive

Material required:

- Oil, filtered < 5 µm, load rating > 30 N/mm² (in accordance with DIN 51524-2 HLP32)
If different special oils are used, see sticker.
- Oil pump ZP 20



The top vent screws or the top HP measuring connection must be selected for the venting.

Venting points according to installation position

Installation position	Type RZS	Type RZK, Type RZKW
Vertical, working piston downward	Vent screw 2	Vent screws 2, 4, 6, 7
Vertical, working piston upward	Vent screw 1 HP measuring connection 8	Vent screws 3, 5 HP measuring connection 8
Horizontal, operating side facing upward	Vent screw 2 HP measuring connection 8	Vent screws 2, 3, 5, 6 HP measuring connection 8

Tab. 4 Venting point according to installation position

⚠ WARNING

Contusions caused by uncontrolled extending working piston!

Serious contusions and injuries on hand and fingers.

- Make sure that the return stroke is impinged with compressed air.
- Make sure that fast approach stroke and power stroke cannot be activated.
- Install a restraint device if necessary.
- If no valve block ZVX is installed, turn off compressed air supply of the pressure valve.

⚠ CAUTION

Environmental pollution caused by environmentally harmful liquids!

- Absorb spilled liquids and remove without residue.
- Dispose of liquid according to the statutory regulations.

NOTE**Damage caused by trapped air!**

- Vent drive after filling with oil.
- Use highest vent screw or high pressure measuring connection for venting.

- ✓ System is in maintenance position.
See [Set system to maintenance position, Page 61](#).
- 1. Remove venting plate with locking wire.
- 2. Unscrew knurled cap of the oil filling nipple.
- 3. Vent filling hose of the oil pump.
- 4. Install filling hose of the oil pump on oil filling nipple.
- 5. **CAUTION!** Splashing oil! Open vent screw slowly!
Unscrew corresponding vent screw (see table "Venting point according to installation position") by 2 turns.
- OR -
Unscrew corresponding high pressure measuring connection cover (see table "Venting point according to installation position:") and push in with a blunt object (e.g. a pin).
- 6. Continue to fill until oil escapes from the open vent hole free of bubbles.
- 7. **CAUTION!** Risk of injury and risk of slipping from leaking oil! Absorb oil immediately and without residue!
- 8. Wait 10 min. Afterwards, repeat filling procedure until oil escapes from the open vent hole free of bubbles.
- 9. Unscrew filling hose of the oil pump.
- 10. Tighten vent screw.
- OR -
Close high pressure measuring connection.
- 11. Screw in knurled cap of the oil filling nipple.
- 12. Install venting plate.
- 13. Fasten locking wire.
- 14. **NOTE!** Device damage due to overfilling!
Lower oil level.
See [Lowering of oil level, Page 66](#).

10.5 Lowering of oil level

CAUTION

Environmental pollution caused by environmentally harmful liquids!

- Absorb spilled liquids and remove without residue.
- Dispose of liquid according to the statutory regulations.

NOTE

Damage to seal due to high oil level!

After refilling and venting, lower the oil level by a defined value (lowering volume " ΔV ").

For lowering volume " ΔV " see type plate.

Material required:

- Oil pump ZP 20
-
- ✓ System is in maintenance position.
See [Set system to maintenance position, Page 61](#).
 - ✓ Drive is filled and vented.
See [Refilling oil and venting drive, Page 63](#).
-
1. Remove venting plate with locking wire.
 2. Unscrew knurled cap of the oil filling nipple.
 3. Screw filling hose of the oil pump onto oil filling nipple.
 4. **CAUTION!** Risk of slipping from leaking oil! Absorb oil immediately and without residue!
Remove oil quantity exactly according to lowering volume " ΔV ".
 5. Unscrew filling hose of the oil pump.
 6. Install venting plate.
 7. Screw on knurled cap of the oil filling nipple.
 8. Fasten locking wire.
 9. Push in oil level indicator needle.

10.6 Checking hydraulic hoses



- Check hydraulic hoses regularly.
- Change hydraulic hoses after 6 years at the latest.
- Observe country-specific guidelines.

11 Repairs

11.1 Safety during repairs

Repair work may only be carried out by trained and authorized service personnel.

For information and contact see Sources and contact to customer service.

11.2 Changing seals

Seals may only be replaced by trained and authorized service personnel.

12 Disassembly and Disposal

12.1 Safety during disassembly and disposal

 DANGER**Electrical hazards in case of contact with live parts!**

Electric shock, burns or death in case of contact with live parts!

- Have all work on the electrical equipment performed by an electrician.
 - Disconnect power supply.
 - Wait for residual energy to dissipate safely (at least 3 minutes).
-

 WARNING**Ejecting parts and compressed air from compressed air conducting lines!**

Serious injuries to eyes and body cavities!

- Always connect and disconnect lines without pressure.
 - Pay attention to maximum permitted pressures.
 - Wear individual protective equipment.
-

 CAUTION**Sharp edges caused by material splintering!**

Injuries from worn parts!

- Wear individual protective equipment.
 - Do not move fingers along the cutting edges.
 - Be particularly careful and attentive.
-

12.2 Decommissioning

Decommissioning means that the plant is not in operation for a longer period of time but remains at the installation site for recommissioning later.

1. Move plant into home position.
2. Install a restraint device if necessary.
3. Switch off plant at the main switch.
4. Clean the system and protect it against corrosion.
5. Protect plant against loss of data and deep discharge.

12.3 Shutdown

Shutdown means that the system is shut down permanently and/or is prepared for removal.

1. Stop system and wait for it to come to a standstill.
2. Remove material if necessary.
3. Switch off the system at the main switch and secure it against being switched on again.
4. First disassemble or dismantle after switching off the power (electricity, pneumatics) and after residual energy has safely dissipated (at least 3 minutes).
5. Remove electrical supply line (first at the terminal, then on the machine).
6. Remove compressed air supply line.
7. Remove network connection.
8. Clean the system and protect it against corrosion.
9. Protect open cable ends against penetration of dirt.
10. Do not remove cable identifications.

12.4 Disassembling

The system consists of recyclable materials.

NOTE

Environmental damage!

Improper recycling endangers the environment!

- Dispose of materials separately and properly.
- Regional disposal regulations must be observed.

1. Strip the system down into its constituent parts.
2. Dispose of greases and oils separately.
3. Sort the constituent parts by material and dispose of according to the local regulations.

12.5 Disposal



When disposing of packaging, consumables and spare parts, including the machine and its accessories, the relevant national environmental protection regulations must be complied with.



13 Appendices

13.1 DECLARATION OF INCORPORATION

DECLARATION OF INCORPORATION

in accordance with the Machinery Directive (2006/42/EC), Annex II 1 B

Original declaration of incorporation

TOX® PRESSOTECHNIK GMBH & CO. KG herewith declares that the concept and design of the incomplete machine specified hereinafter and the execution traded by us

Designation/function	Pneumohydraulic drive
Product name/module	TOX®-Powerpackage
Modell/Typ	S, Q-S, EL, ELD, B-S K, Q-K, EK RZK, RZS, RZH, RZHL, RZHO R, RP, O, T, VH, VHZ KT, ES, HZ, HZL, HZO, AT, PHA KWE, EKWE, ATW, HZW, HZLW, HZOW, RZKW ELD, EKD, EKDW, ATD EKSD, ATSD SSL, KSL, ELSL, EKSL
Serial number	See type plate

complies with the relevant requirements of the Machinery Directive (2006/42/EC).

Insofar as the requirements of Annex 1 apply to the incomplete machine, the relevant health and safety requirements shall be documented in the technical documents according to Annex VII Section B.

Applied harmonized standards:

DIN EN ISO 12100:2011-03	Safety of machinery - General principles for design - Risk assessment and risk minimization
DIN EN ISO 4414:2011-04	Pneumatic fluid power - General rules and safety requirements for systems and their components

This incomplete machine may not be commissioned until it has been ascertained that the incomplete machine in which the component is to be installed complies with the requirements of the Machinery Directive (2006/42/EC).

The technical documents specific to this incomplete machine are available and can be transmitted electronically to national authorities in response to a reasoned request.

The commercial property rights of TOX® PRESSOTECHNIK GMBH & CO. KG shall remain unaffected by this.

The technical documents belonging to the incomplete machine according to Annex VII Part B have been produced.

Documentation officer: Albert Rankel, Riedstraße 4, 88250 Weingarten

Place, date Weingarten, 25.05.2020
Manufacturer TOX® PRESSOTECHNIK GMBH & CO. KG

Signature



Information on the signatory: ppa Stefan Katzenmaier

Index

A		
Avoidance of dynamic oil leakage	47	
B		
Basic safety requirements	11	
C		
Change		
Seal.....	69	
Changing seals.....	69	
Check		
Hydraulic hoses	67	
Oil level	62	
Checking hydraulic hoses	67	
Commissioning	45	
Compressed air quality.....	23	
Conformity	7	
Control connection	46	
Control throttle 'X'		
Setting.....	49	
Contusion	14	
D		
Decommissioning	72	
Disassembly	71, 73	
Safety.....	71	
Dispatch		
Repair	28	
Disposal.....	71, 73	
Safety.....	71	
Document		
additional	8	
Validity	8	
Drive		
Install	30	
Operating	52	
Venting.....	63	
Dynamic oil leakage		
Avoiding	47	
E		
Equipment		
Optional	21	
Exclusion of liability	7	
External power stroke connection (ZKHZ)		
Installing.....	38	
External power stroke release (ZKHF)		
Installing.....	39	
F		
Function description	18	
G		
Gender note	8	
Guidelines	7	
H		
Hazard		
Contusion.....	14	
Electrical	13	
Hazardous substances	15	
hydraulic	14	
Laser	15	
Pneumatic.....	13	
Thermal.....	13	
Hazard potential	13	
Hazardous substances	15	
Hydraulic		
Hazard	14	
Hydraulic oil		
Specification	25	

I		L	
Identification		Laser	
Product	18	Hazard	15
Images		Legal note	7
Highlighting	10	Lifting device	28
Important information	7	Lowering	
information		Oil level	66
Important	7		
Installation	29	M	
Accessories	31	Maintenance	59
Drive	30	Requirement	61
External power stroke switch (ZKHZ)	38	Safety	59
Power stroke deactivation (ZKHD)	39	Maintenance position	61
Power stroke release (ZKHF)	39	Measures	
Pressure control in the power stroke line (ZDK)	35	Organizational	11
Proportional pressure control valve	37	Measuring connection	46
Safety	29	Misuse	18
Speed reduction for power stroke	43		
Stroke frequency optimization (ZHO) for drive with integrated power stroke valve	41	N	
Tightening torques	23	Note	
Tool coupling (ZWK)	44	Gender	8
ZDK	35	General	10
ZHO	41	Legal	7
ZKHD	39	Warning signs	9
ZKHF	39		
ZKHZ	38	O	
ZWK	44	Oil	
Installing		Refilling	63
Position sensors of stroke monitoring for forward and return stroke (ZHU)	33	Oil leakage	
Pressure switch	31	Avoiding	47
Stroke frequency optimization (ZHO)	41	Oil level	
ZDO	31	Checking	62
ZHO	41	Lowering	66
Installing accessories	31	Operation	51
Installing pressure control in the power stroke line (ZDK)	35	Drive	52
Installing tool coupling (ZWK)	44	Requirements	52
Installing ZDK	35	Safe	17
Installing ZWK	44	Safety	51
Intended use	17	Optional	
		Equipment	21
		Organizational measures	11

P

Piston rod	
Tightening torques	24
Pneumatic connection	23
Position sensors of stroke monitoring for forward and return stroke (ZHU)	
Installing.....	33
Power stroke	
Installing speed reduction	43
Power stroke connection (ZKHZ)	
Installing.....	38
Power stroke deactivation (ZKHD)	
Installing.....	39
Power stroke release (ZKHF)	
Installing.....	39
Preparation	
Power stroke supply, external.....	40
Preparing external power stroke supply ...	40
Preparing external power stroke supply	40
Press force table	24
Pressure switch	
Installing.....	31
Product Identification	18
Product overview	19
Proportional pressure control valve	
Installing.....	37

Q

Qualifications	12
----------------------	----

R

Refilling	
Oil	63
Repair	
Dispatch	28
Repairs	69
Safety.....	69
Requirement	
Maintenance	61

S

Safety	11
Disassembly	71
Disposal	71
Installation.....	29
Maintenance	59
Operation	51
Repairs	69
Transport	27
Troubleshooting	53
Safety device	
Product	15
Safety requirements	
Basic	11
Operating company	11
Searching	
Causes of fault.....	54
Searching for causes of fault.....	54
Selection	
Personnel.....	12
Selection of personnel.....	12
Set	
Speed ratio between power stroke and power stroke venting	48
Setting	
Control throttle 'X'	49
Speed ratio between return stroke and fast approach stroke	48
Total length of stroke	50
Shutdown	72
Specification for hydraulic oil.....	25
Speed ratio between power stroke and power stroke venting	
Set	48
Speed ratio between return stroke and fast approach stroke	
Setting.....	48
Speed reduction for power stroke	
Installing.....	43
Storage	27
Temporary storage	28
Stroke frequency optimization (ZHO)	
Installing.....	41
Stroke frequency optimization (ZHO) for drive with integrated power stroke valve	
Installing.....	41

T

Target group	8
Technical data	23
Texts	
Highlighting	10
Tightening torques	
Installation.....	23
Piston rod.....	24
Total length of stroke	
Setting.....	50
Transport	27
Safety.....	27
Troubleshooting.....	53
Safety.....	53
Type plate.....	18

U

Use	
Intended	17

V

Validity	
Document	8
Venting	
Drive	63

W

Warning signs.....	9
--------------------	---

Z

ZDO	
Installing.....	31
ZHO	
Installing.....	41
ZKHD	
Installing.....	39
ZKHF	
Installing.....	39
ZKHZ	
Installing.....	38