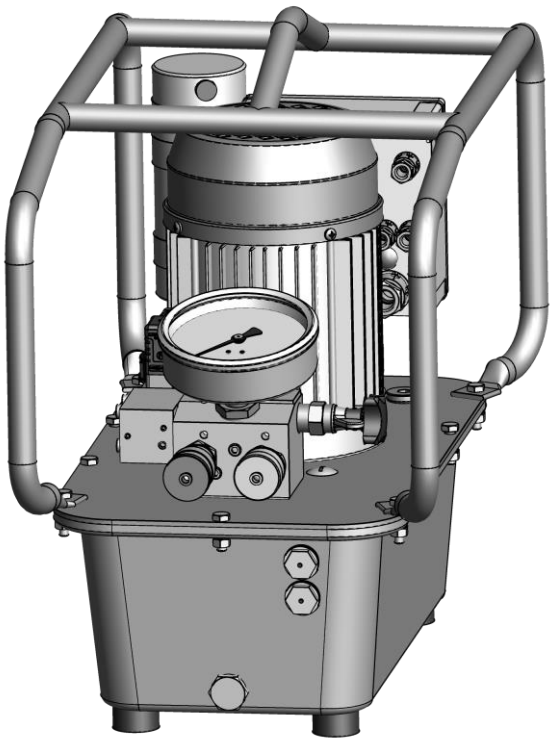
Hydraulic unit

HYFLOW 230-2



English translation of the original german

Maintenance and repair instructions

for qualified and authorized personnel at the TORC LLC branch

Version 7/2015

Always store these maintenance and repair instructions together with the hydraulic unit. Ensure that the maintenance and repair instructions are available to the qualified and authorized personnel at the TORC LLC branch. Read and observe the maintenance and repair instructions.

Failure to comply can result in injuries or even death. The operating instructions contain information for using the unit.

Table of contents

Notes concerning this manual and the manufacturer

The HYFLOW 230-2 hydraulic unit is referred to as the “unit” in the following.

Referenced documents

⚠ WARNING	
	Risk of injury through failure to observe the referenced documents. ▶ Read and observe all referenced documents before carrying out any maintenance or repair work. ▶ These can be found in the documentation folder of the unit.

More information, instructions and details about the unit components can be found in the documentation from the respective manufacturers. These documents are regarded as a part of these instructions. Store these documents together with this manual. Hand over these documents when selling the unit or passing it on in other ways.

Referenced documents are the following document types in particular:

- operating instructions
- assembly instructions
- maintenance or repair instructions
- wiring diagrams
- terminal diagrams
- hydraulic diagrams
- safety data sheets
- drawings

▶ Observe and follow the information from the referenced documents.
These can be found in the documentation folder of the unit.

Design features of this manual

Various elements of these maintenance and repair instructions have fixed design characteristics. These allow you to easily distinguish the following elements:

Normal text

- Lists

▶ Action steps

References to headers are set in quotation marks.

‘Labels’ of switches or other elements are set in inverted commas.

Table titles are set in bold.

ⓘ Tips. Contains additional information.

Manufacturer's address

TORC LLC
218 Island Road
N.J. 07430 Mahwah
USA
Phone: 1 888-444-TORC (8672)
Email: info@torc.com
Web: www.torc.com

Safety

⚠ WARNING	
	Danger to life from disregarding the information in the safety chapter. Disregarding the information in the safety chapter can lead to accidents with serious injuries. ▶ Read and observe all information in the safety chapter before carrying out any maintenance or repair work.

In addition to the information in these maintenance and repair instructions, always observe any statutory and other regulations which apply at the place of installation, e.g.:

- accident prevention regulations
- regulations for safe and professional working
- regulations on explosion protection and fire protection which apply at the place of installation

Responsibilities of the operating company

- The operating company has to ensure that all accident prevention regulations are observed.
- The responsibility lies with the head of the TORC LLC branch.
- The head of the TORC LLC branch has to ensure that the maintenance and repair work is only carried out by qualified and authorized personnel.

Persons at particular risk

The following groups of persons must not be granted access to the unit as they might sustain serious or lethal injuries:

- children
- persons with physical or mental limitations
- persons under the influence of drugs and medication
- persons under the influence of alcohol
- unauthorized persons, e. g. pedestrians

Ambient conditions

Information about ambient conditions and technical data can be found in the operating instructions for the unit.

Qualification of personnel

These maintenance and repair instructions are intended for the qualified and authorized personnel from the TORC LLC branch.

Carrying out electrical work

The following knowledge and experience are required for the qualified personnel:

- trained for the task
- aware that improper maintenance and repairs can cause accidents
- able to assess hazards which may arise from voltage and current
- able to assess hazards which may arise from noise and heat
- able to apply information from wiring and terminal diagrams
- able to install electrical connections
- able to measure voltage, current and resistance
- able to create a measuring path for measuring currents
- able to identify defective electronic components due to visual changes
- able to localize defective electronic components using a multimeter
- able to replace defective electronic components in a professional manner
- knows the recognized safety rules and applies them

Carrying out mechanical and hydraulic tasks

The following knowledge and experience are required for the qualified personnel:

- trained for the task
- aware that improper maintenance and repairs can cause accidents
- knows the recognized safety rules and applies them
- able to release and fasten screw connections with the permitted torque
- able to assess hazards and environmental impact caused by hydraulic oil
- able to assess hazards which arise from noise and heat
- able to identify leaks
- able to carry out work with hot or pressurized media in a professional manner
- able to replace hydraulic components such as hydraulic hoses, seals, valves, etc.

Ban of unauthorized conversions

Unauthorized conversions or changes on the unit may lead to serious or even lethal injuries. This applies in particular to changing and altering safety devices.

▶ Never bypass or shunt any safety devices.

Personal protective equipment

▶ Risk of crushing feet when lifting and carrying the unit! Wear safety shoes with steel toes.

▶ Risk of slipping and therefore bone fractures during hydraulic work! Wear safety shoes with non-slip soles.

▶ Risk of skin irritation from contact with hydraulic oil and hydraulic components! Always wear oil-resistant nitrile gloves.

▶ Risk of burns from contact with hot media and components! Wear protective gloves against thermal hazards.

▶ Risk of skin cuts and grazes on sharp-edged components! Wear protective gloves against mechanical hazards.

▶ Risk of eye injuries when checking for leaks on open oil tanks and when changing the hydraulic oil! Wear chemical-resistant protective goggles.

▶ Risk of ear damage when the unit is running! Wear ear protection while the unit is running.

▶ Risk of poisoning in poorly ventilated rooms! The unit may overheat. This may lead to the formation of oil mist and oil vapor. Wear respiratory protection in this case.

Basic safety information

Preventing serious injury or death

Using untested replacement parts poses a risk of serious or lethal injuries as these parts may fail.

- ▶ Only use the original spare parts specified in the spare parts list which is available as a separate document.

Preventing explosion hazards

Operation, maintenance and repair of the unit in explosive atmospheres may lead to serious injuries or death.

- ▶ Only operate, maintain and repair the unit in areas with no explosive atmosphere (measure safe levels first).

Preventing electric shock

Electric shock can cause serious or even lethal injuries!

- ▶ Check the electric supply cable for damage.
- ▶ Only use the unit if the cable is in perfect condition.
- ▶ Disconnect the mains plug before carrying out electrical work on the unit or before cleaning the unit.
- ▶ Use tools which are insulated up to at least 370 V.
- ▶ If you detect a broken cable with a continuity tester, replace the defective cable.
- ▶ Only clean the unit dry. Do not clean the unit with a high-pressure cleaner, cold cleaners or water.

Preventing burns from fire

Short circuits can cause fires and result in serious burns.

- ▶ Disconnect the mains plug before starting any maintenance and repair work.
- ▶ Remove all highly flammable materials which are not required from your work area.
- ▶ Ensure that a fire extinguisher with powder and foam extinguishing agents is available.

Preventing burns from oil and hot surfaces

Risk of burns from metal surfaces and hydraulic oil if the unit was previously in operation.

- ▶ Wear protective gloves against thermal hazards.

Preventing poisoning

The unit may overheat. This may lead to the formation of oil mist and oil vapor.

- ▶ Ensure sufficient ventilation.
- ▶ Wear respiratory protection in poorly ventilated rooms and if oil mist and oil vapors are present.
- ▶ Switch off of the unit if it overheats.
- ▶ Leave the unit to cool down.
- ▶ Use a contactless infrared thermometer to ensure that the unit has cooled down to 25 °C (77 °F).
- ▶ Check the unit for any damage.
- ▶ If the unit is damaged, repair it before using it again.
- ▶ Soak up any escaped liquid with a cloth immediately.
- ▶ Dispose of the cloth in an environmentally friendly manner.

Preventing bone fractures and crushing

Bone fractures and crushing may occur. The unit can fall if it is set up, lifted or carried in an unsafe manner. Risk of slipping and therefore bone fractures during hydraulic work!

- ▶ Always place the unit on a level, solid and strong surface.
- ▶ Secure the unit and tools against falling.
- ▶ Wear safety shoes with steel toes when lifting and carrying the unit.
- ▶ Wear safety shoes with non-slip soles for hydraulic work.

Preventing eye damage

For pressure levels over 700 bar (10,000 psi) and operation of the unit outside the tool and hose specification, hydraulic hoses may burst, causing hydraulic oil to be ejected. Hydraulic oil may also escape during leak testing while the oil tank is open.

- ▶ Ensure that the permitted pressure levels are not exceeded.
- ▶ Comply with the tool and hose specifications.
- ▶ Consult the operating instructions for the tools and the hose specification.
- ▶ Wear chemical-resistant protective goggles.

Preventing skin irritation

Contact with hydraulic oil during maintenance and repair work on hydraulic components may lead to skin irritation.

- ▶ Always create a permanent, tight connection between the unit and the hydraulic tool.
- ▶ Wear nitrile gloves when carrying out maintenance and repair work on hydraulic components.
- ▶ Ensure that the permitted pressure levels are not exceeded.
- ▶ Comply with the tool and hose specifications.
- ▶ Consult the operating instructions for the hydraulic tool.
- ▶ Request the hose specifications from the manufacturer.

Preventing material damage

- ▶ Avoid soiling the couplings by installing the protective caps and protective plugs when the couplings are not in use.
- ▶ Always set the hydraulic tool down safely.

Intended use

Information about intended use can be found in the operating instructions for the unit.

Design characteristics of warning information

⚠ DANGER	
	Sections with the word DANGER warn of imminent dangerous situations that lead to death or serious injury.

⚠ WARNING	
	Sections with the word WARNING warn of imminent dangerous situations that may lead to death or serious injury.

⚠ CAUTION	
	Sections with the word CAUTION warn of dangerous situations that may lead to minor or moderate injuries.

Explanation of symbols

Hazard from electric shock

Slipping hazard from leaked media

Burning hazard, scalding hazard

Design of information about property damage

ATTENTION!	
	These notes warn of situations that can lead to property damage and limited functionality.

Warning and information signs

- ▶ Ensure that all warning and information signs attached to the unit remain well visible and legible at all times.
- ▶ Replace any damaged or lost warning and information signs immediately.

Information about the warning and information signs attached to the unit can be found in the operating instructions.

Carrying and setting down

- Only carry the unit by its carrying handle.
- Place the unit on a dry, level, solid and strong surface.
- Secure the unit and the associated tools against falling.

Required tools

The following tools and equipment are required for maintenance and repair of the unit:

- one set of box and open-end wrenches
- one set of hexagon socket wrenches
- one set of crosshead screwdrivers
- one set of slotted screwdrivers
- one torque wrench (10–30 N m) with suitable attachments (e. g. open-end keys, ratchet)
- a vise
- an infrared thermometer
- a multimeter
- a current clamp
- a circuit continuity tester
- a wooden wedge

Maintenance schedule

Interval	Component	Action
Before each operation	Pressure gage	▶ Check whether the display of the pressure gage reacts after switching on the unit. ▶ Have the defective pressure gage replaced by qualified personnel, see page 19.
	Hydraulic hoses	▶ Check hydraulic hoses for visible damage, twisting and kinks. ▶ Remove the twists. ▶ Have defective or bent hydraulic hoses replaced by qualified personnel, see page 18.
	Electric supply lines	▶ Check electric supply lines for visible damage, twisting and kinks. ▶ Remove the twists. ▶ Have defective or bent electric supply lines replaced by qualified personnel, see page 29.
Before each coupling	Couplings	▶ Clean the couplings with a dry cloth.
As required	Unit	▶ Clean the unit with a dry cloth.
Every 500 operating hours	Oil tank	▶ Change the hydraulic oil, see page 17.
Every 7 years	Hydraulic hoses	▶ Replace the hydraulic hoses, see page 18.

Carrying out maintenance tasks

Changing the hydraulic oil

⚠ WARNING	
	Slipping hazard from leaked oil. Bruising and bone fractures possible. ▶ Clean up any leaked oil with a cloth or suitable binding agents. ▶ Wear safety shoes with non-slip soles.

⚠ CAUTION	
	Health hazard from contact with hydraulic oil. ▶ Wear nitrile gloves and chemical-resistant protective goggles during work that may include contact with hydraulic oil.

To change the hydraulic oil, proceed as follows:

- ▶ Switch off the unit.
- ▶ Disconnect the mains plug.
- ▶ Leave the hydraulic oil to cool until it is tepid.
- ▶ Place a container under the oil drain plug which can hold the oil volume in the unit, 8 l (2.1 gal).
- ▶ Open the oil drain plug.

The hydraulic oil will flow into the container.

- ▶ Check the seal of the drain plug for damage.
- ▶ Replace the damaged seal if required.
- ▶ After completely draining the hydraulic oil from the oil tank, seal the oil drain opening with the oil drain plug.
- ▶ Tighten the oil drain plug with a torque of 20 N m.
- ▶ Open the filler opening of the unit.
- ▶ Fill in fresh hydraulic oil (manufacturer's recommendation: Castrol Hyspin HVI 32) until the oil level fills half of the upper sight glass.
- ▶ Close the filler opening with the corresponding cap.
- ▶ Dispose of the drained hydraulic oil in line with the environmental regulations at the place of installation.

Replacing hydraulic hoses

⚠ WARNING

Slipping hazard from leaked oil.
Bruising and bone fractures possible.
- ▶ Clean up any leaked oil with a cloth or suitable binding agents.
- ▶ Wear safety shoes with non-slip soles.

⚠ CAUTION

Health hazard from contact with hydraulic oil.
- ▶ Wear nitrile gloves and chemical-resistant protective goggles during work that may include contact with hydraulic oil.

The hydraulic hoses have to be replaced with new hoses of the same type if any visible damage is found, but after seven years at the latest.

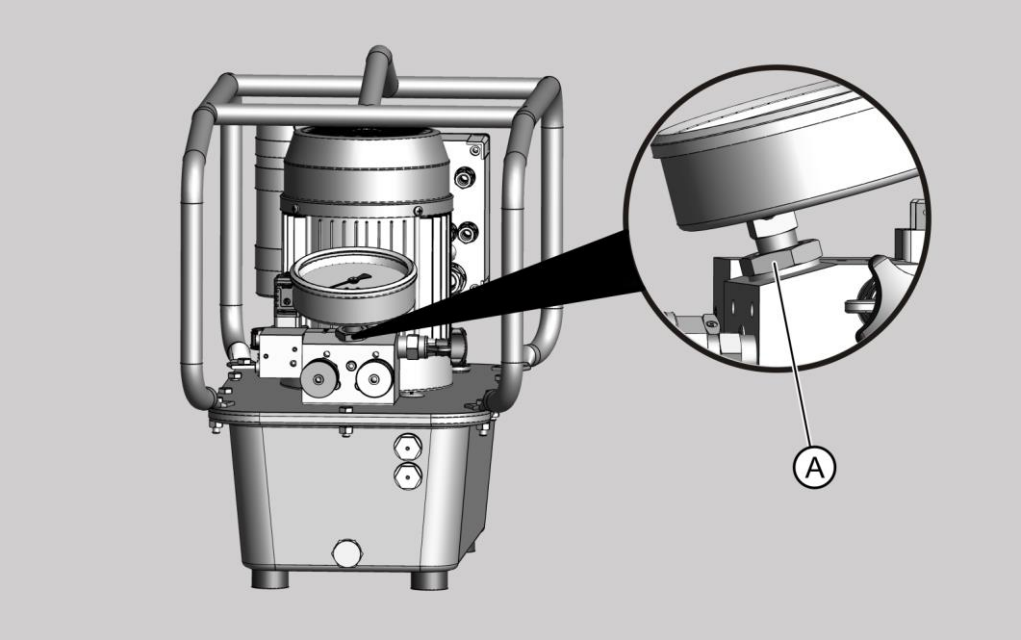
To replace a hydraulic hose, proceed as follows:

- ▶ Switch off the unit.
- ▶ To depressurize the unit, press the Stop button on the remote control several times until the display of the pressure gage shows 0 bar (0 psi).
- ▶ Disconnect the mains plug.
- ▶ Release the screw connection of the couplings.
- ▶ Remove one end of the hydraulic hose from the coupling on the unit.
- ▶ Remove the other end of the hydraulic hose from the coupling on the tool.
- ▶ Place one end of the new hydraulic hose on the coupling of the tool.
- ▶ Place the other end of the new hydraulic hose on the coupling of the unit.
- ▶ Tighten the screw connection of the coupling.

Replacing the pressure gage

To replace the pressure gage, proceed as follows:

- ▶ Switch off the unit.
- ▶ To depressurize the unit, press the stop button on the remote control several times.
- ▶ Disconnect the mains plug.
- ▶ Release the screw connection (A) below the pressure gage.
- ▶ Lift the pressure gage upwards to remove it.
- ▶ Ensure that an intact O-ring is installed on the underside of the part to be screwed in.
- ▶ Place a new pressure gage of the same type on the screw fitting.
- ▶ Fix the pressure gage with the screw fitting.



Malfunctions

Malfunction	Possible cause	Corrective action
The pump is not working.	Electrical components are damaged.	▶ Check the electrical components, see page 25. ▶ Replace damaged electrical components or have these replaced by the manufacturer.
	The power supply is interrupted.	▶ Check the power supply, see page 27.
	The remote control is defective.	▶ Check the remote control, see page 31.
The motor only hums.	The stator is defective.	▶ Check the motor windings, see page 36. ▶ Have the defective motor windings repaired by the manufacturer.
	The capacitor is defective.	▶ Check the current of the capacitor, see from page 36. ▶ Replace a defective capacitor, see page 42.
No pressure or pressure below 70 bar.	The solenoid valve is defective.	▶ Check the solenoid valve electrically, see page 43. ▶ Check the solenoid valve hydraulically, see page 58. ▶ Replace the defective solenoid valve, see page 47.
	The torque valve is defective.	▶ Check the torque valve hydraulically, see page 55 ▶ Replace the defective torque valve, see page 86.
	Leak on the pump flange.	▶ Check the pump flange, see page 61. ▶ Have the defective pump flange repaired by the manufacturer.
	The screen filter is blocked.	▶ Check the screen filter, see page 64. ▶ Clean the blocked screen filter, see page 64.
	The maximum pressure valve is leaking.	▶ Check the maximum pressure valve, see page 65. ▶ Replace the defective maximum pressure valve, see page 67.

Malfunction	Possible cause	Corrective action
	The pipe work is leaking.	▶ Check the pipe work, see page 80. ▶ Replace the leaking pipe work, see page 83
The pressure is only 70 bar.	The low pressure cut off valve is defective.	▶ Check the low pressure cut off valve, see page 72. ▶ Replace the defective low pressure cut off valve, see page 74.
	The pipe work is leaking.	▶ Check the pipe work, see page 80. ▶ Replace the leaking pipe work, see page 83
The pressure is only 70 – 80 bar.	The solenoid valve is defective.	▶ Check the solenoid valve electrically, see page 43. ▶ Check the solenoid valve hydraulically, see page 58. ▶ Replace the defective solenoid valve, see page 47.
	The back pressure valve is leaking.	▶ Check the back pressure valve, see page 76. ▶ Replace the defective back pressure valve, see page 79.
	The pipe work is leaking.	▶ Check the pipe work, see page 80. ▶ Replace the leaking pipe work, see page 83

Malfunction	Possible cause	Corrective action
The max. pressure of 700 bar was not reached even though there are no leaks.	The torque valve is defective.	▶ Check the torque valve mechanically, see page 84. ▶ Replace the defective torque valve, see page 86.
	One or more pump elements are defective.	▶ Check the pump elements, see page 69. ▶ Replace the pump elements, see page 69.
	The pipe work is leaking.	▶ Check the pipe work, see page 80. ▶ Replace the leaking pipe work, see page 83
The motor switches off.	The motor temperature is too high.	▶ Wait about 10 minutes and switch on the unit. ▶ If the motor switches off again, check the motor temperature problem, see page 36.
The display on the pressure gage fluctuates very strongly at 700 bar.	The check valve is defective.	▶ Have the defective check valve replaced by the manufacturer, see manufacturer's address.
Oil mist and oil vapor being emitted.	The unit is overheated.	▶ Wear your chemical-resistant goggles. ▶ Ensure sufficient ventilation for this. ▶ Wear respiratory protection in case of insufficient ventilation. ▶ Proceed as described from page 36.
	The pipe work is leaking.	▶ Check the pipe work, see page 80. ▶ Replace the leaking pipe work, see page 83

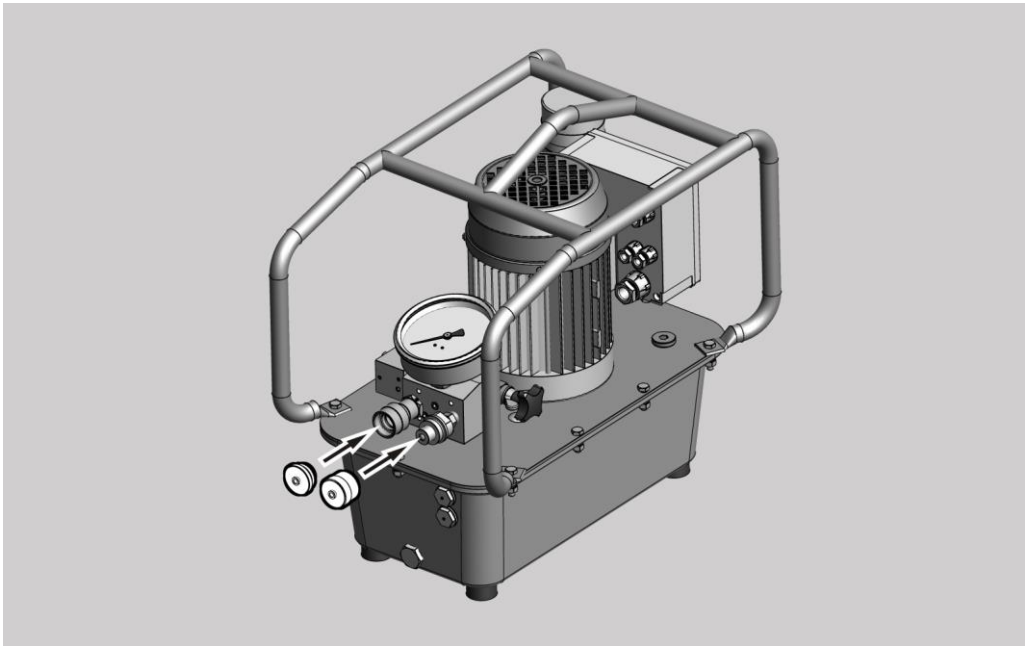
Checks and repairs on electrical components

Preparing checks and repairs on electrical components

⚠ WARNING	
	Risk of injury from electric shock caused by inexpert work on the electrical equipment. ▶ Disconnect the mains plug from the socket. ▶ Have work on electrical equipment carried out only by specialist personnel who are qualified for these tasks.

Proceed as follows to prepare checks and repairs on the unit:

▶ Ensure that the couplings on the unit are secured with the protective caps and the protective plugs.



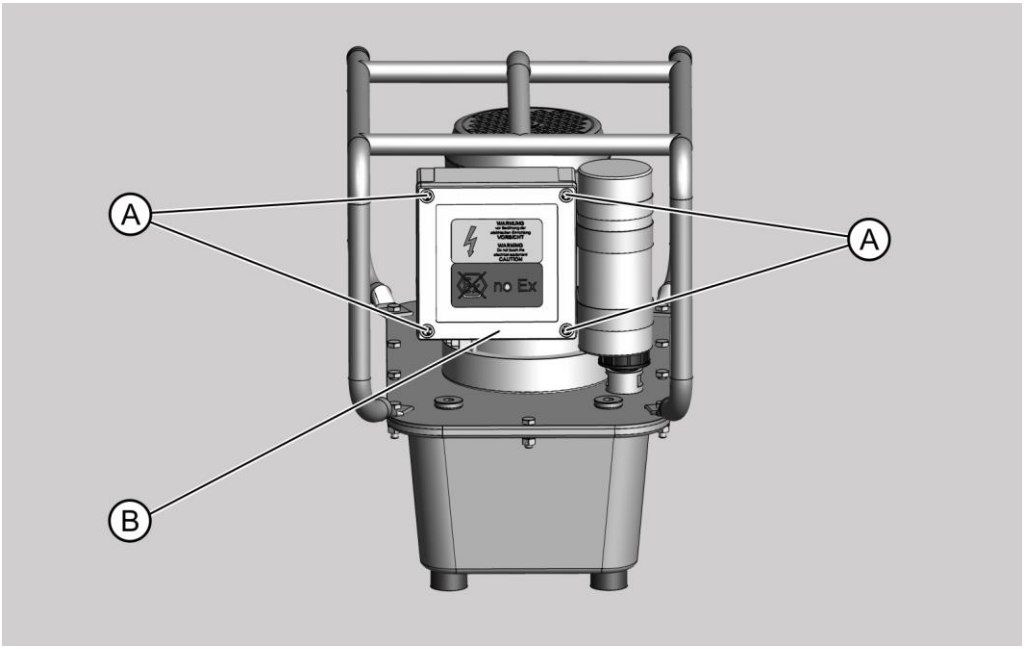
▶ Move the unit into the repair position for the electric control, see from page 24.

Moving the unit into the repair position for the electric control

⚠ WARNING	
	Risk of injury from electric shock caused by inexpert work on the electrical equipment. ▶ Disconnect the mains plug from the socket. ▶ Have work on electrical equipment carried out only by specialist personnel who are qualified for these tasks.

Proceed as follows to bring the unit into the repair position for the electric control:

- ▶ Place the unit on a solid surface.
- ▶ Remove the screws (A) with a crosstip screwdriver size PH3.
- ▶ Remove the cover (B) from the electric control.



Carrying out checks and repairs on electrical components

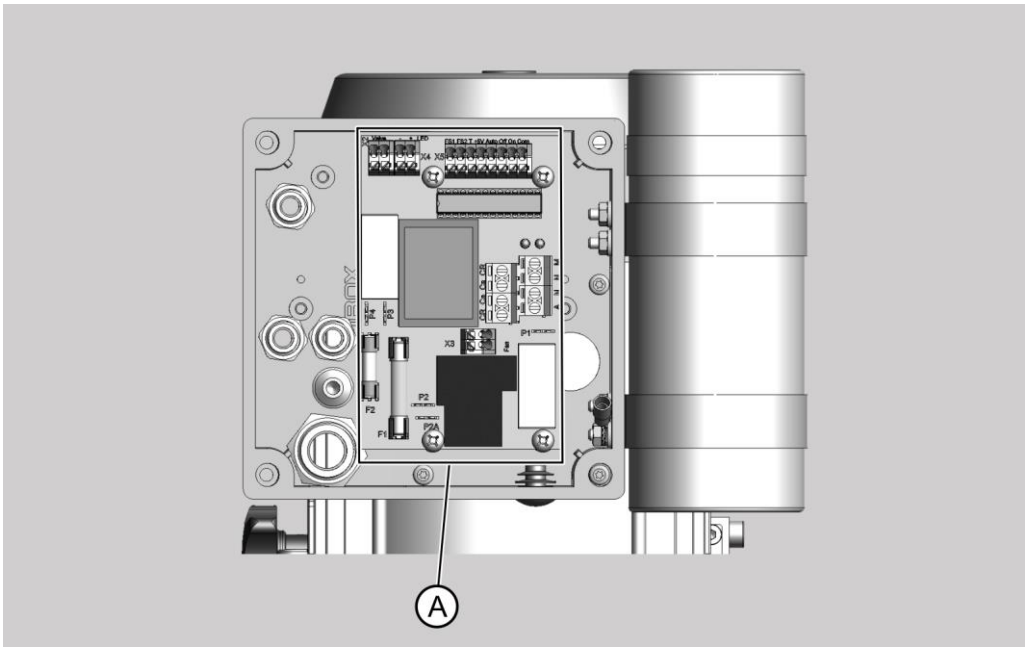
Checking the circuit board

⚠ WARNING	
	Risk of injury from electric shock caused by inexpert work on the electrical equipment. ▶ Disconnect the mains plug from the socket. ▶ Have work on electrical equipment carried out only by specialist personnel who are qualified for these tasks.

To check the circuit board, proceed as follows:

▶ Move the unit into the repair position for the electric control, see from page 24.

▶ Check the entire circuit board (A) for visible burn marks or destruction.



▶ If the circuit board does not show any visible burns or destruction, install the cover of the electric control.

▶ Otherwise replace the circuit board, see page 26.

Replacing the circuit board

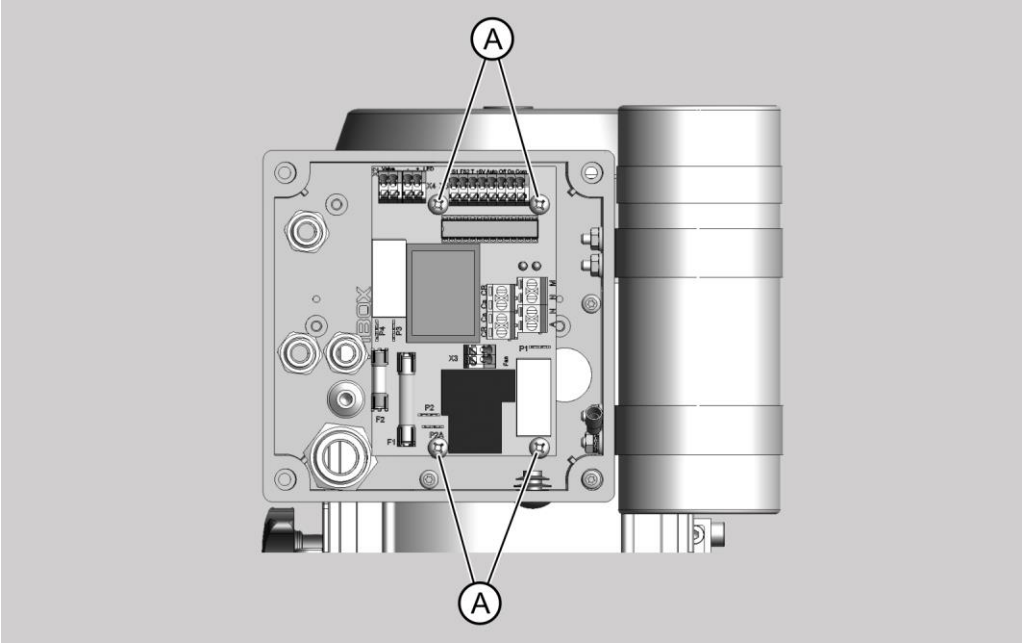
⚠ WARNING

Risk of injury from electric shock caused by inexpert work on the electrical equipment.

- ▶ Disconnect the mains plug from the socket.
- ▶ Have work on electrical equipment carried out only by specialist personnel who are qualified for these tasks.

To replace the circuit board, proceed as follows:

- ▶ Move the unit into the repair position for the electric control, see from page 24.
- ▶ Release all cable connections on the defective circuit board.
- ▶ Release the screwed connection (A) of the defective circuit board with a crosstip screwdriver.



- ▶ Remove the defective circuit board from its housing.
- ▶ Place a functioning circuit board into the housing.
- ▶ Fix the circuit board with a crosstip screwdriver.
- ▶ Reinstall all cable connections on the circuit board according to the applicable wiring diagram, see appropriate spare parts list.
- ▶ Mount the cover of the electric control.

Checking the energy supply

⚠ WARNING

Risk of injury from electric shock caused by inexpert work on the electrical equipment.

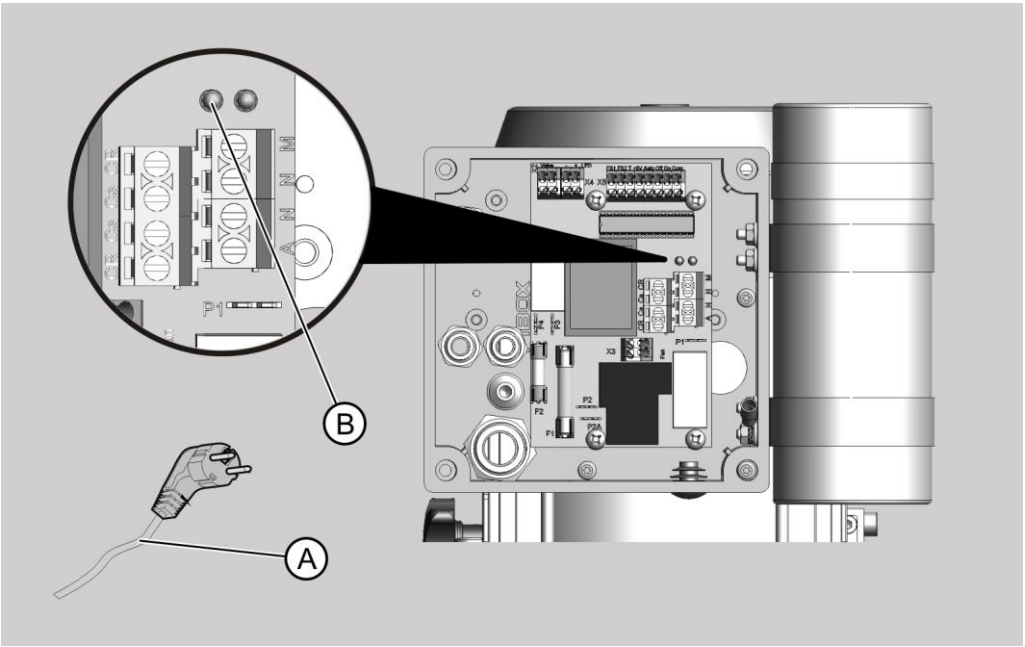
- ▶ Disconnect the mains plug from the socket.
- ▶ Have work on electrical equipment carried out only by specialist personnel who are qualified for these tasks.

To check the energy supply, proceed as follows:

- ▶ Move the unit into the repair position for the electric control, see from page 24.
- ▶ Connect the mains plug to a grounded mains socket with a voltage of 230 V and a frequency of 50/60 Hz.

The LED (B) lights up permanently with correct energy supply.

- ▶ Move the power cord (A) while observing whether the LED goes out occasionally.



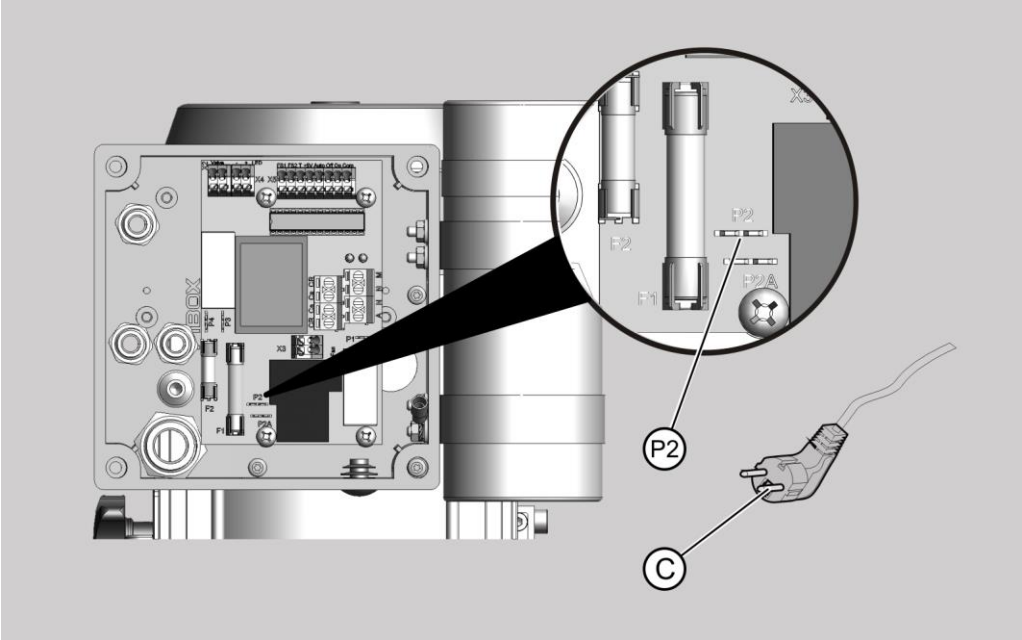
If the LED goes out occasionally, the power cord or its connections are defective.

Alternatively, you can check the power cord of the power supply for broken wires with a continuity tester.

To check the power cord of the power supply with a continuity tester, proceed as follows:

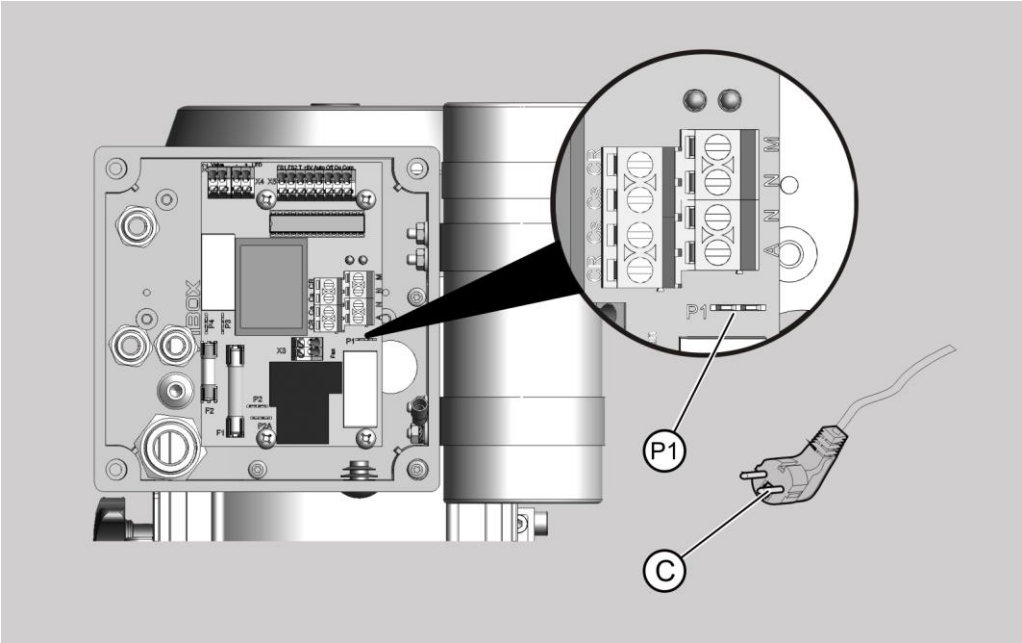
▶ Connect a continuity tester to the brown wire (P2) and the mains plug (C).

▶ Check whether the line is working correctly.



▶ Connect the continuity tester to the blue wire (P1) and the mains plug (C).

▶ Check whether the line is working correctly.



If the result of the continuity test shows a defective line, replace the power cord, see page 29.

▶ Mount the cover of the electric control.

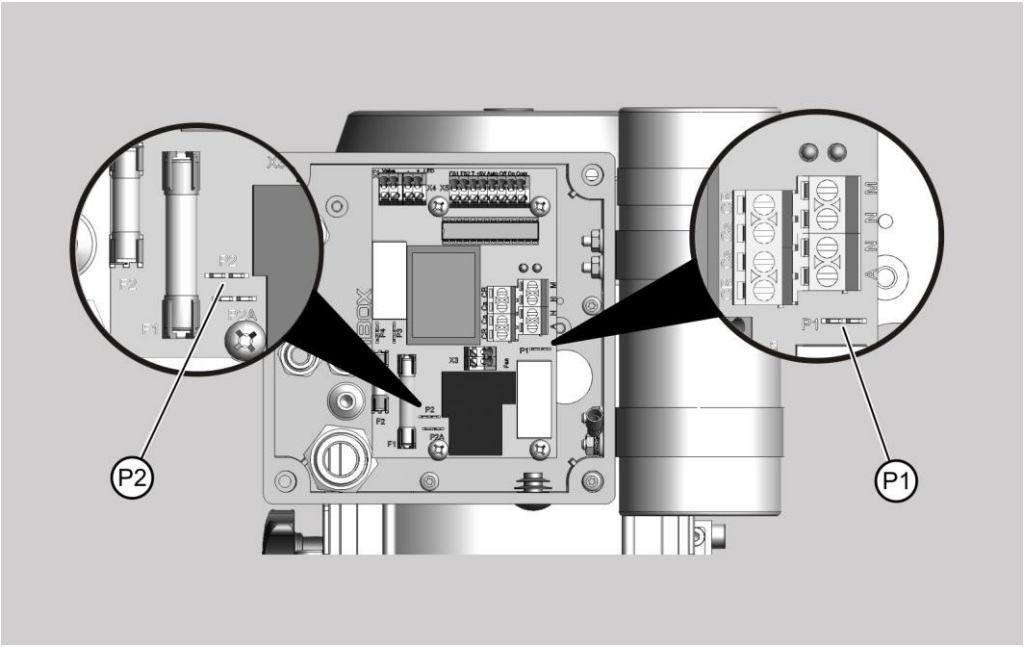
Replacing the power cord

⚠ WARNING	
	Risk of injury from electric shock caused by inexpert work on the electrical equipment. ▶ Disconnect the mains plug from the socket. ▶ Have work on electrical equipment carried out only by specialist personnel who are qualified for these tasks.

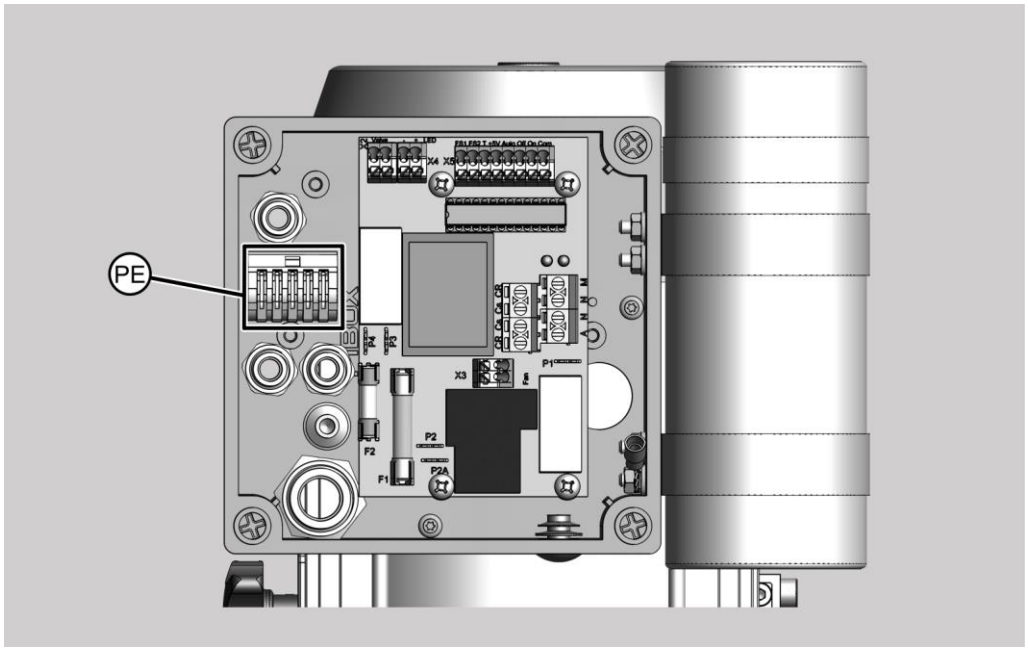
To replace the power cord, proceed as follows:

▶ Move the unit into the repair position for the electric control, see from page 24.

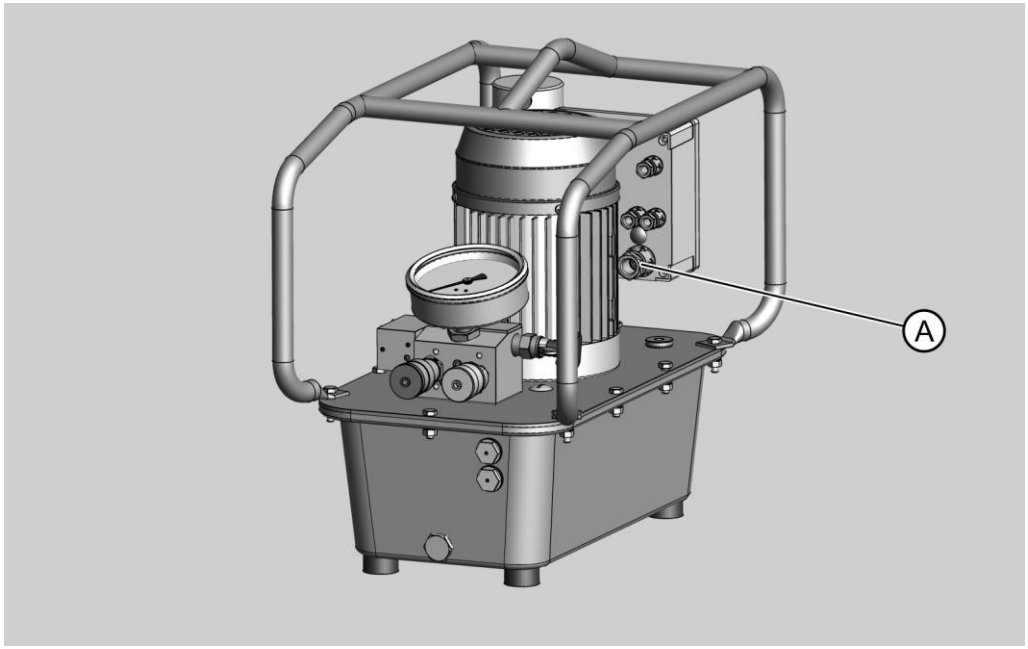
▶ Disconnect the brown cable (P2) and the blue cable (P1) from the circuit board.



- ▶ Flip the orange actuating lever of the power cord on the PE terminal (PE) upwards.
- ▶ Remove the green-yellow wire of the power cord from the PE terminal.



- ▶ Remove the cable feedthrough (A) of the power cord on the housing.



- ▶ Remove the hose clamp of the power cord on the oil tank.
- ▶ Remove the defective power cord.
- ▶ Install a functioning power cord.
- ▶ Secure the power cord to the oil tank with the hose clamp.
- ▶ Fix the power cord to the housing with the screw connection.

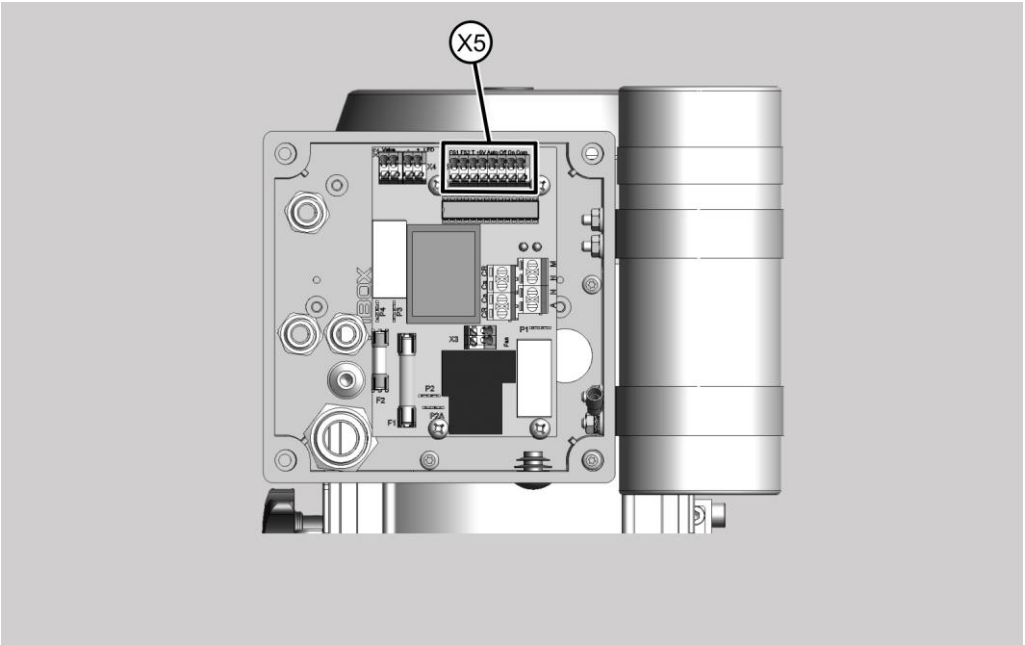
- ▶ Fix the brown cable and the blue cable to the circuit board.
- ▶ Clip the green-yellow wire of the power cord into the PE terminal.
- ▶ Flip the orange actuating lever on the PE terminal downwards.
- ▶ Mount the cover of the electric control.

Checking the remote control

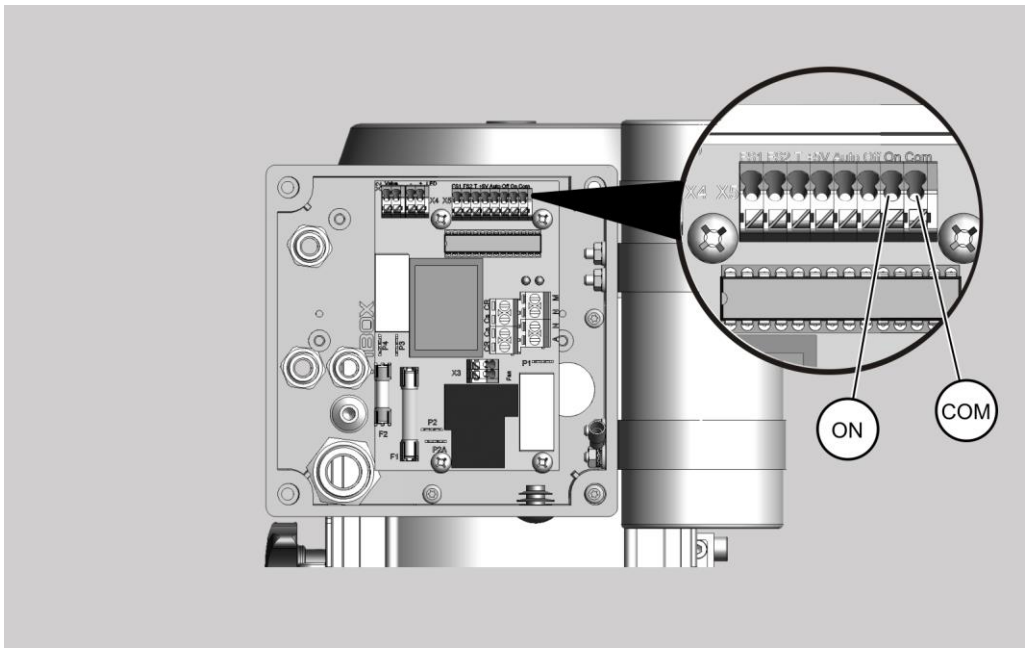
⚠ WARNING	
	Risk of injury from electric shock caused by inexpert work on the electrical equipment. ▶ Disconnect the mains plug from the socket. ▶ Have work on electrical equipment carried out only by specialist personnel who are qualified for these tasks.

To check the remote control, proceed as follows:

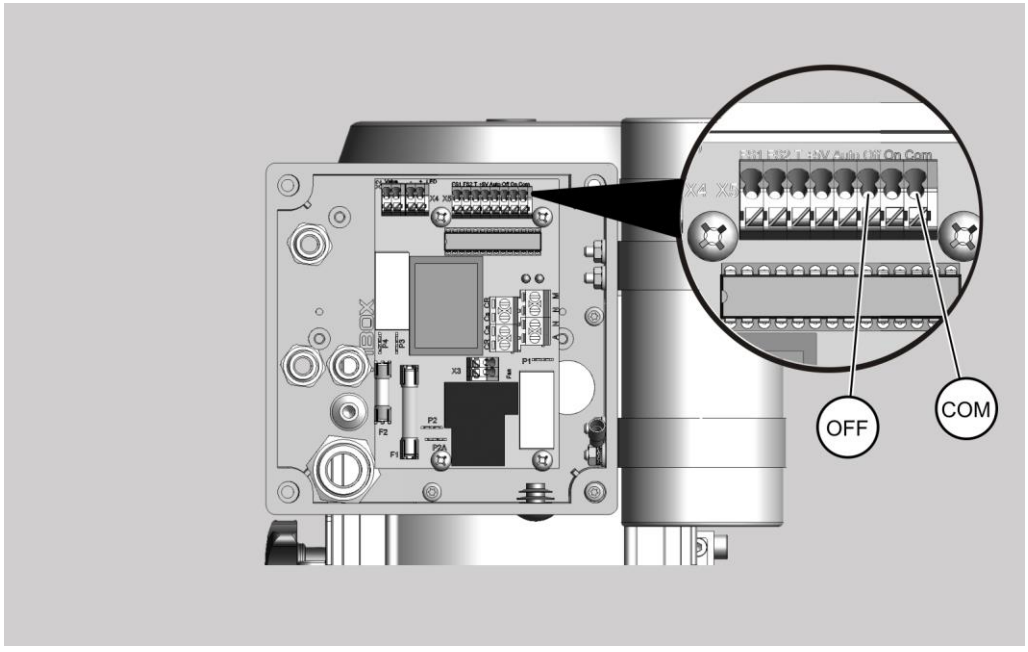
- ▶ Move the unit into the repair position for the electric control, see from page 24.
- ▶ Remove the connections of the remote control (X5).



- ▶ Connect the mains plug to a grounded mains socket with a voltage of 230 V and a frequency of 50/60 Hz.
- ▶ To check the input line, connect a multimeter to the (ON) connection and the (COM) connection.
- ▶ Check whether any voltage is present.



- ▶ Connect the multimeter to the (OFF) connection and the (COM) connection to check the connecting line.
- ▶ Check whether any voltage is present.



If no voltage is present, the circuit board is defective.

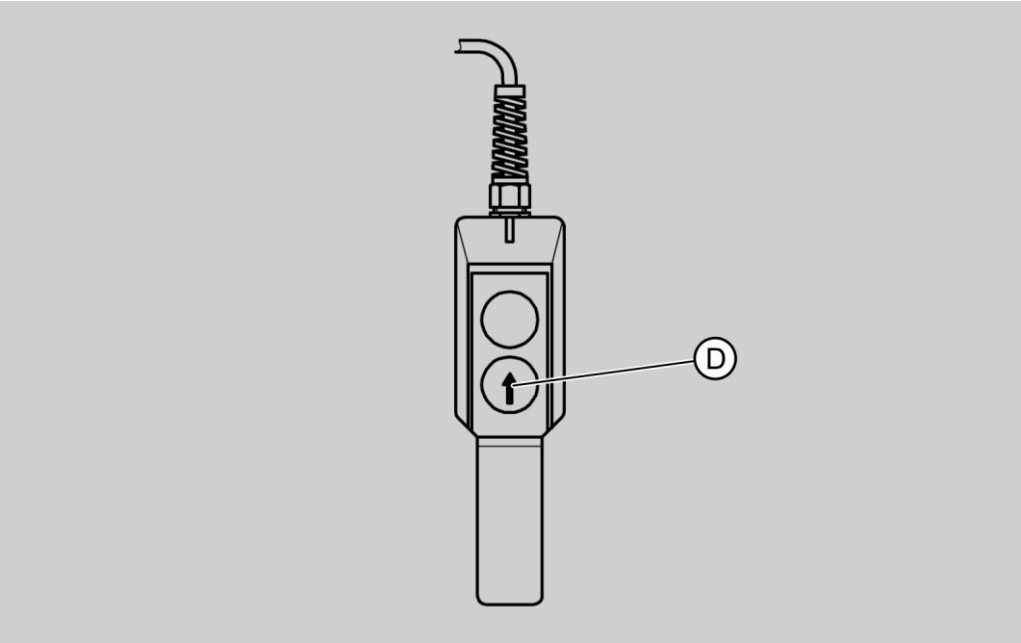
▶ Replace the defective circuit board, see page 26.

If voltage is present, the circuit board is fine.

In this case, check the wiring of the remote control, as follows:

▶ Connect the multimeter with the wire of the (ON) connection and the wire of the (COM) connection.

▶ Press the button (D) on the remote control.



▶ Measure the electrical resistance.

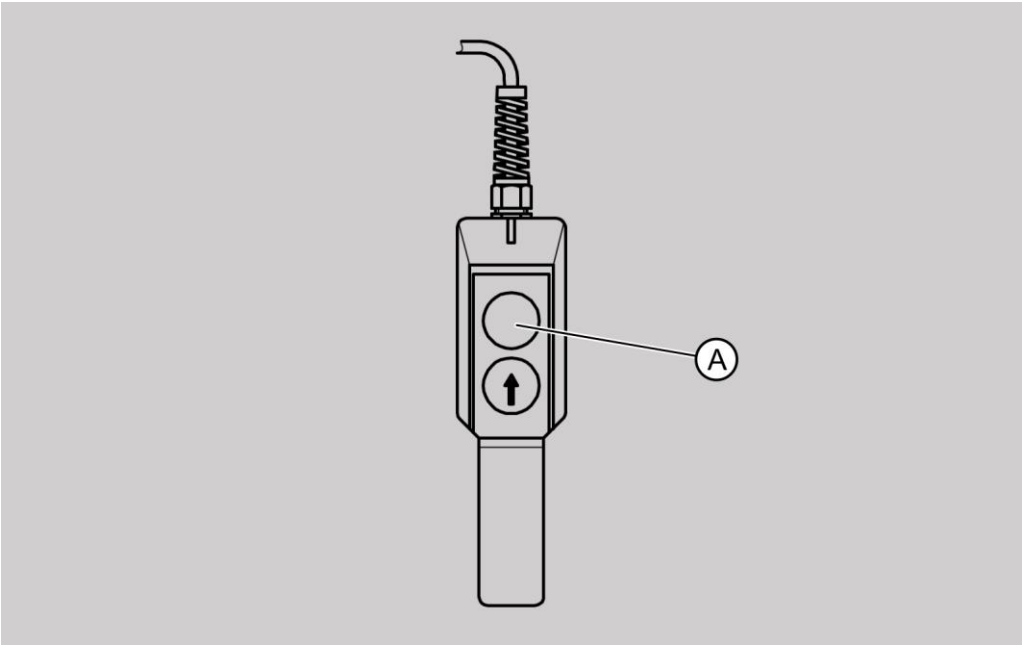
The resistance has to be significantly less than 10 Ω.

If the resistance is higher, the remote control is defective.

▶ Replace the defective remote control, see page 35.

▶ Connect the multimeter to the wire of the (OFF) connection and the wire of the (COM) connection.

▶ Press the OFF button (A) on the remote control.



▶ Measure the electrical resistance.

The resistance has to be significantly less than 10 Ω.

If the resistance is higher, the remote control is defective.

▶ Replace the defective remote control, see page 35.

Replacing the remote control

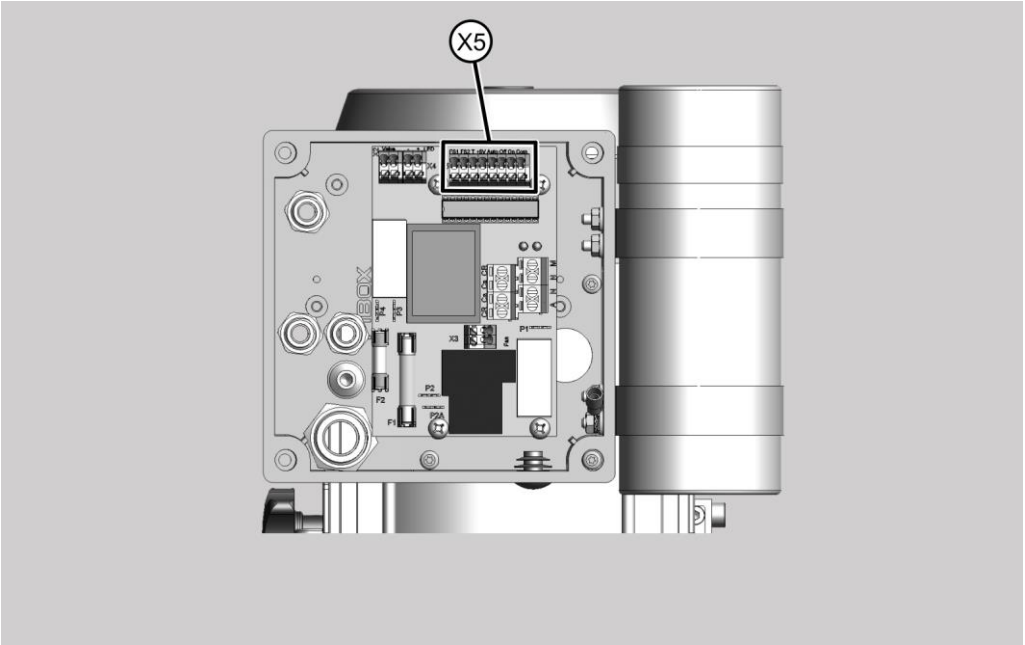
⚠ WARNING

Risk of injury from electric shock caused by inexpert work on the electrical equipment.

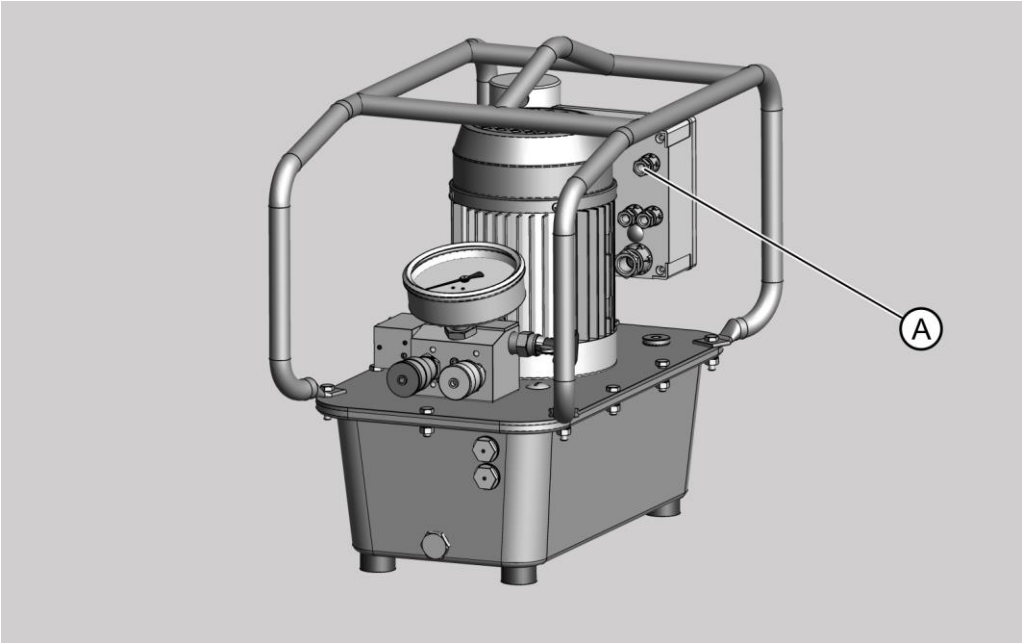
- ▶ Disconnect the mains plug from the socket.
- ▶ Have work on electrical equipment carried out only by specialist personnel who are qualified for these tasks.

To replace the remote control, proceed as follows:

- ▶ Move the unit into the repair position for the electric control, see from page 24.
- ▶ Disconnect the wires (X5) from the circuit board.



▶ Disconnect the cable feedthrough (A) of the remote control cable.



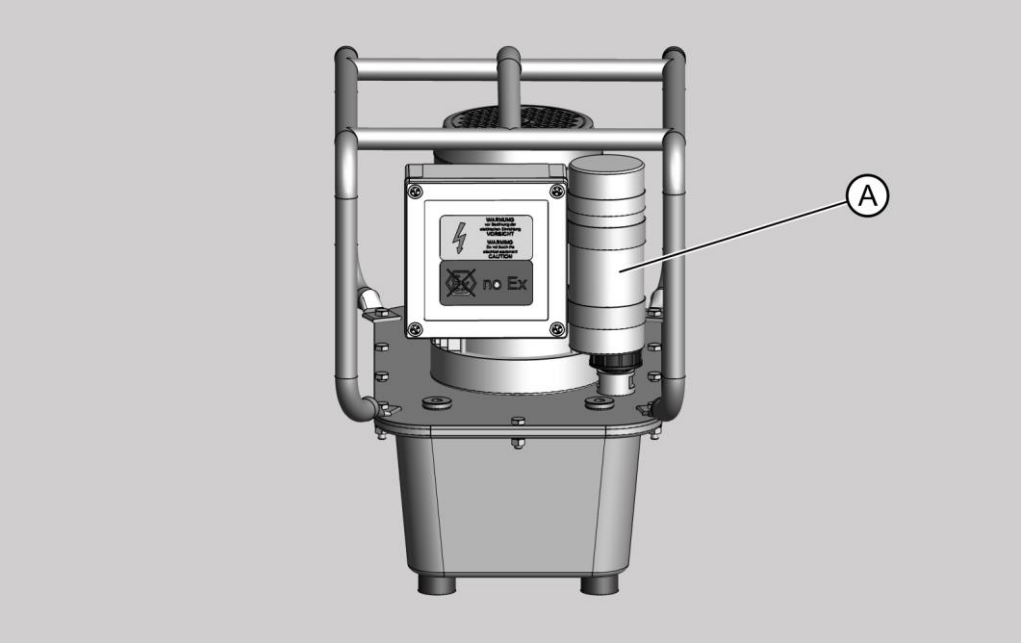
▶ Remove the hose clamp of the remote control cable on the oil tank.
▶ Remove the defective remote control.
▶ Install a functioning remote control.
▶ Secure the remote control cable to the oil tank with the hose clamp.
▶ Fix the remote control cable with the screw connection (A).
▶ Connect the wires (X5) to the circuit board according to the terminal plan.
▶ Mount the cover of the electric control.

Checking a motor temperature problem

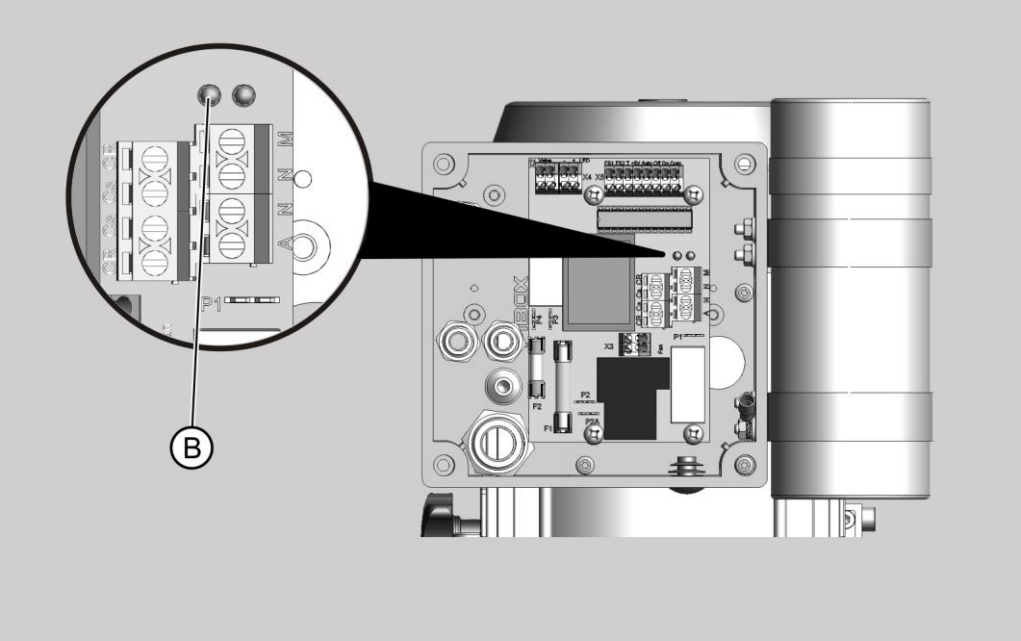
⚠ CAUTION	
	Risk of burning from hot motor. Skin burns may occur from contact with the hot motor. ▶ Let the motor cool down to a temperature of about 25 °C/77 °F.

Excessive motor temperature can be identified by the following signs:

- The motor temperature fuse automatically switches off the motor.
- The capacitor (A) does not switch off.



- The LED (B) on the circuit board goes out.

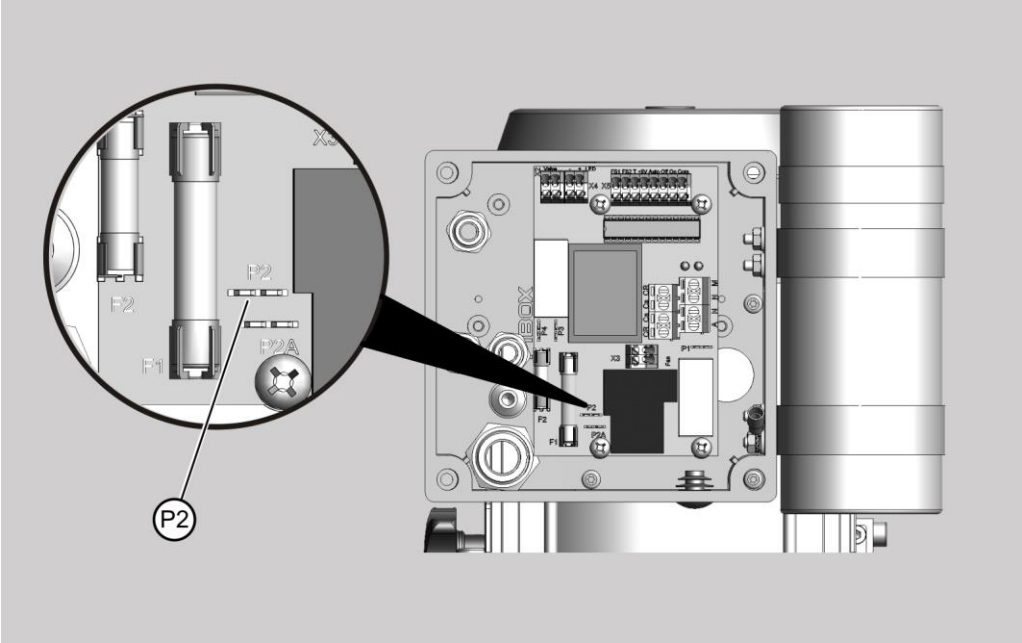


Excessive motor temperature can have the following causes:

- The capacitor is defective.
- The stator is defective.

To check the capacitor, proceed as follows:

- ▶ Let the motor cool down to a temperature of about 25 °C/77 °F.
- ▶ Check the temperature with a contactless thermometer.
- ▶ Move the unit into the repair position for the electric control, see from page 24.
- ▶ Connect the mains plug to a grounded mains socket with a voltage of 230 V and a frequency of 50/60 Hz.
- ▶ Connect a current clamp to the brown cable (P2).

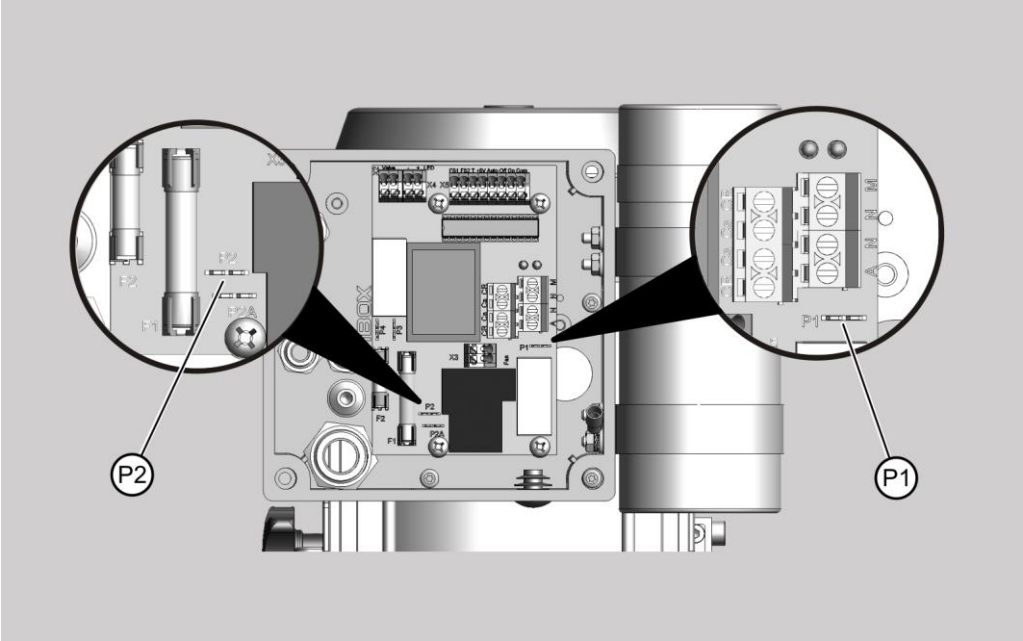


▶ Measure the current at 0 bar.

The regular current is 10.2 A ± 0.5 A at a pressure of 0 bar.

After approx. one second, the current has to decrease by about 2 A.

If the current does not decrease, the capacitor is defective.



If the capacitor is defective, replace it, see page 42.

To check the stator, proceed as follows:

▶ Let the motor cool down to a temperature of about 25 °C/77 °F.

▶ Check the temperature with a contactless thermometer.

▶ Move the unit into the repair position for the electric control, see from page 24.

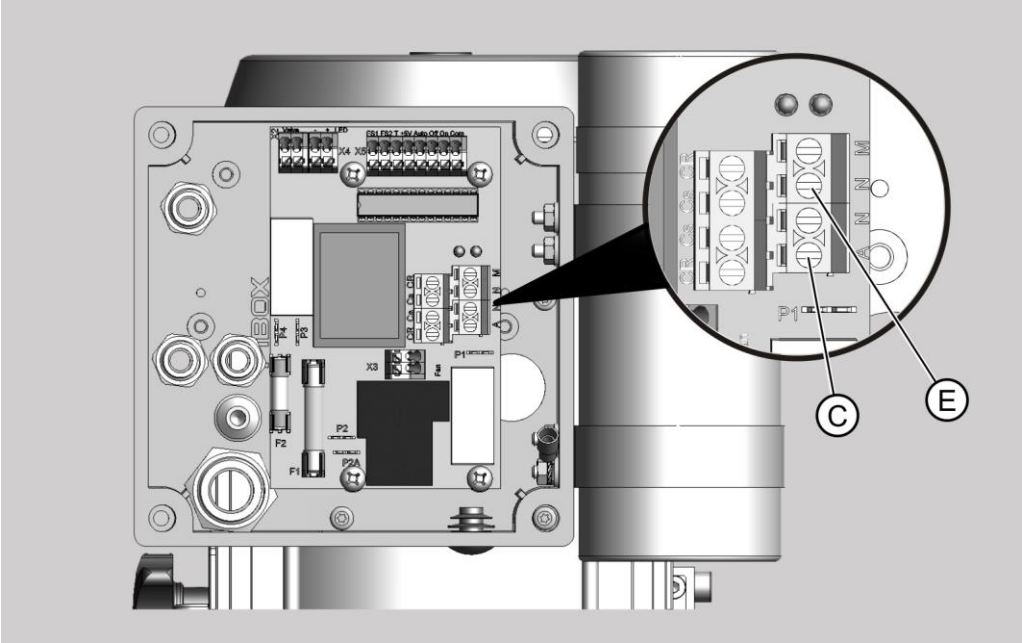
▶ Measure the electrical resistance of the main motor winding.

▶ Measure the electrical resistance of the shunt motor winding.

To check the main motor winding, proceed as follows:

▶ Disconnect the black wire from the connecting terminal (C) and the red wire from the connecting terminal (E).

▶ Connect a multimeter to the black and the red cable.



▶ Measure the electrical resistance.

The nominal resistance is 1.8 Ω.

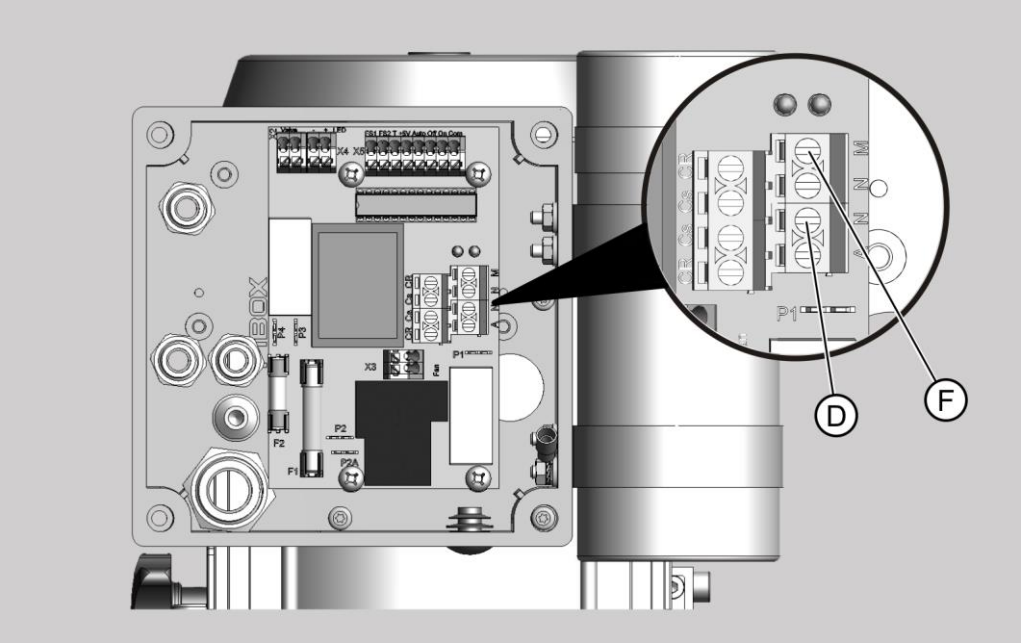
A significantly different resistance indicates a defective stator.

▶ Connect the wire previously removed to the corresponding connecting terminals.

To check the shunt motor winding, proceed as follows:

▶ Disconnect the blue wire from the connecting terminal (D) and the white wire from the connecting terminal (F).

▶ Connect a multimeter to the blue and the white cable.



▶ Measure the electrical resistance.

The nominal resistance is 5.2 Ω.

A significantly different resistance indicates a defective stator.

▶ Connect the wire previously removed to the corresponding connecting terminals.

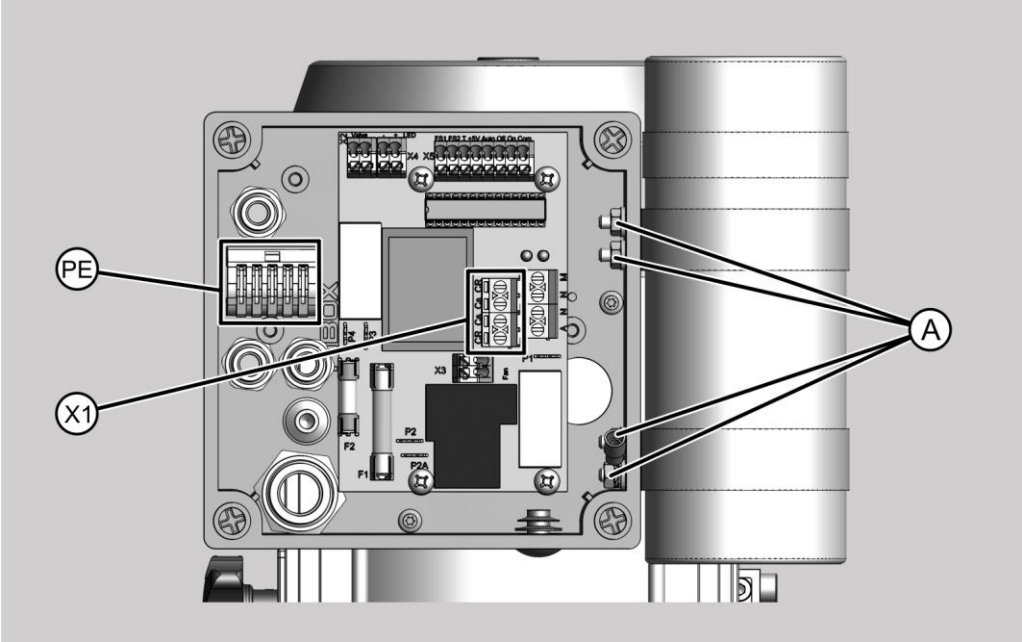
If the stator is defective, send the unit to the manufacturer for repair.

▶ Mount the cover of the electric control.

Replacing the capacitor

To replace the capacitor, proceed as follows:

- ▶ Move the unit into the repair position for the electric control, see from page 24.
- ▶ Disconnect the black cables from the connections (X1).
- ▶ Flip the orange actuating lever of the capacitor on the PE terminal (PE) upwards.
- ▶ Remove the green-yellow wire of the capacitor from the PE terminal.
- ▶ Release the four nuts (A) with an open-end wrench WAF 4.



- ▶ Use the four nuts and an open-end wrench WAF 4 to install a functioning capacitor.
- ▶ Only tighten the nuts by hand, do not overtighten.
- ▶ Connect the black cables to the connections (X1) according to the terminal diagram.
- ▶ Clip the green-yellow wire of the capacitor into the PE terminal.
- ▶ Flip the orange actuating lever on the PE terminal downwards.
- ▶ Mount the cover of the electric control.

Checking the solenoid valve electrically

⚠ WARNING

Risk of injury from electric shock caused by inexpert work on the electrical equipment.

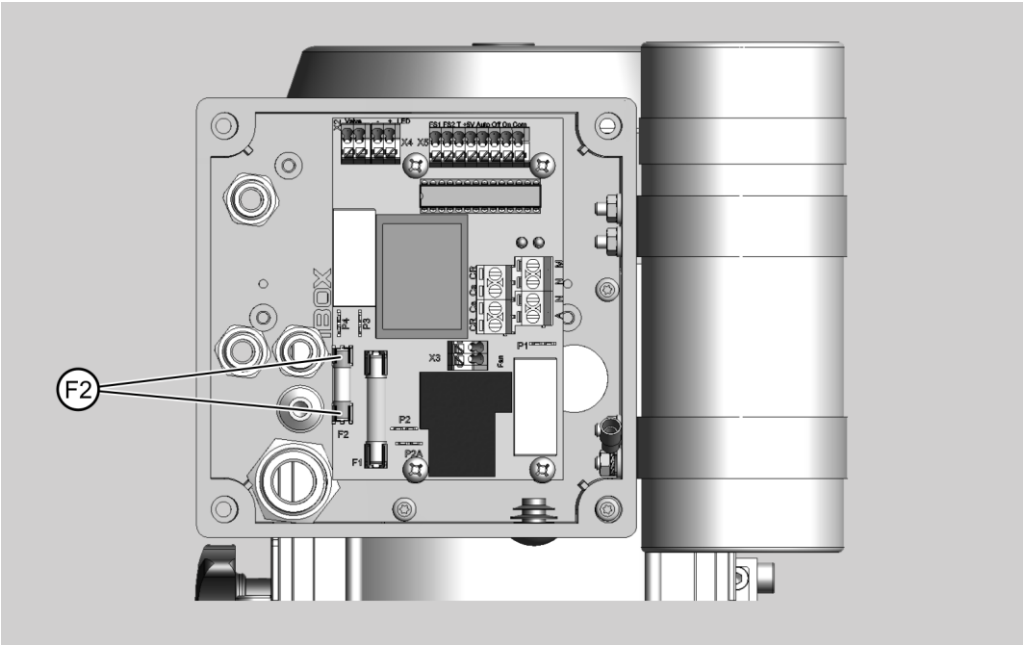
- ▶ Disconnect the mains plug from the socket.
- ▶ Have work on electrical equipment carried out only by specialist personnel who are qualified for these tasks.

To check the solenoid valve electrically, proceed as follows:

- ▶ Move the unit into the repair position for the electric control, see from page 24.
- ▶ Verify that the fuse (S2) is functioning.

If the fuse is discolored or mechanically defective, replace it with a new one.

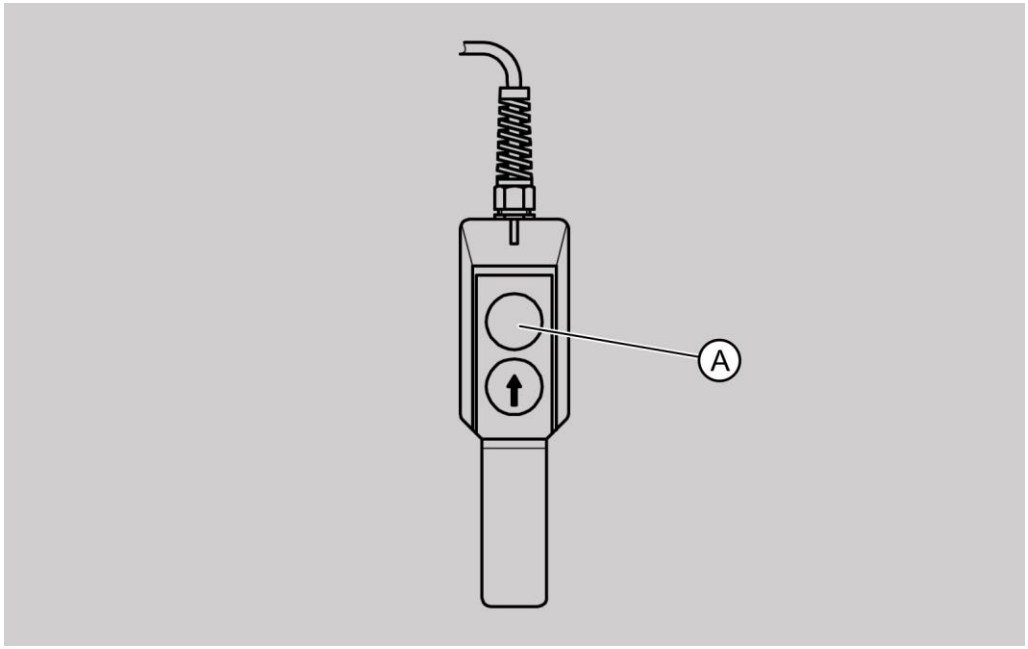
- ▶ If the fuse is visually intact, connect a multimeter to the fuse.
- ▶ Connect the mains plug to a grounded mains socket with a voltage of 230 V and a frequency of 50/60 Hz.



▶ Measure the voltage of the fuse.

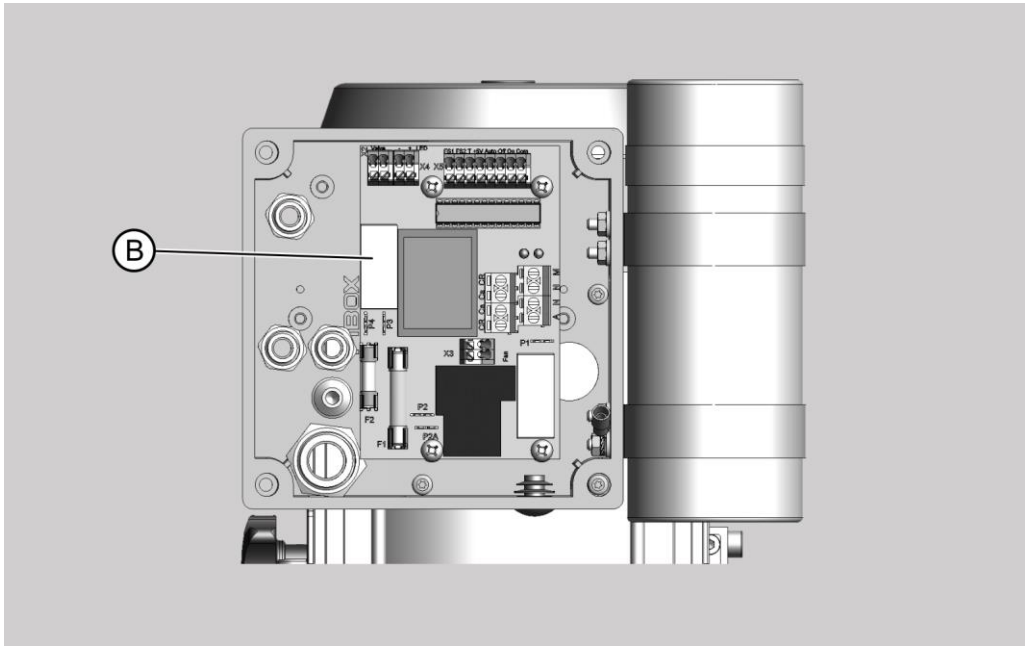
Replace the fuse if it is defective.

▶ Press the Off button (A) on the remote control.



If the relay (B) clicks audibly, the relay is switching.

If the relay (B) does not click audibly, the relay is defective.

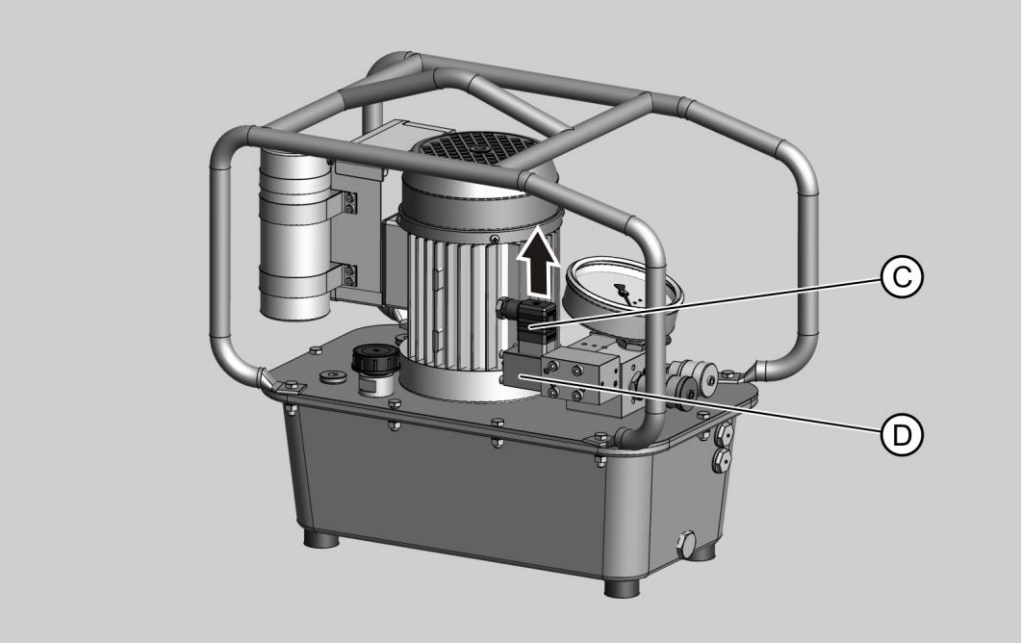


▶ If the control of the solenoid valve is defective, replace the circuit board, see from page 26.

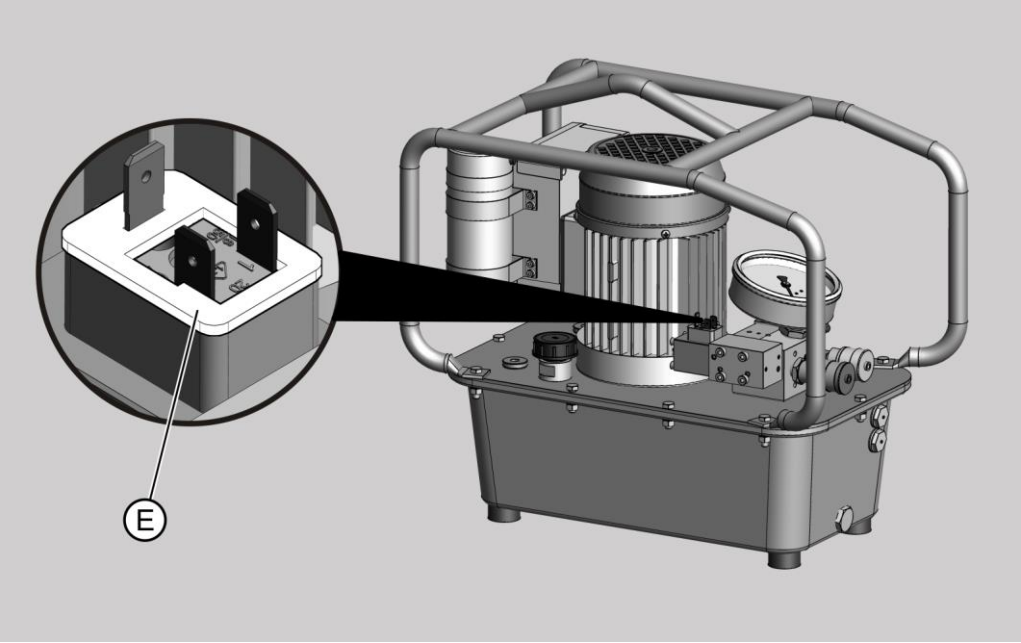
▶ Mount the cover of the electric control.

▶ If the control of the magnetic valve is working, check the electrical resistance of the coil in the solenoid valve.

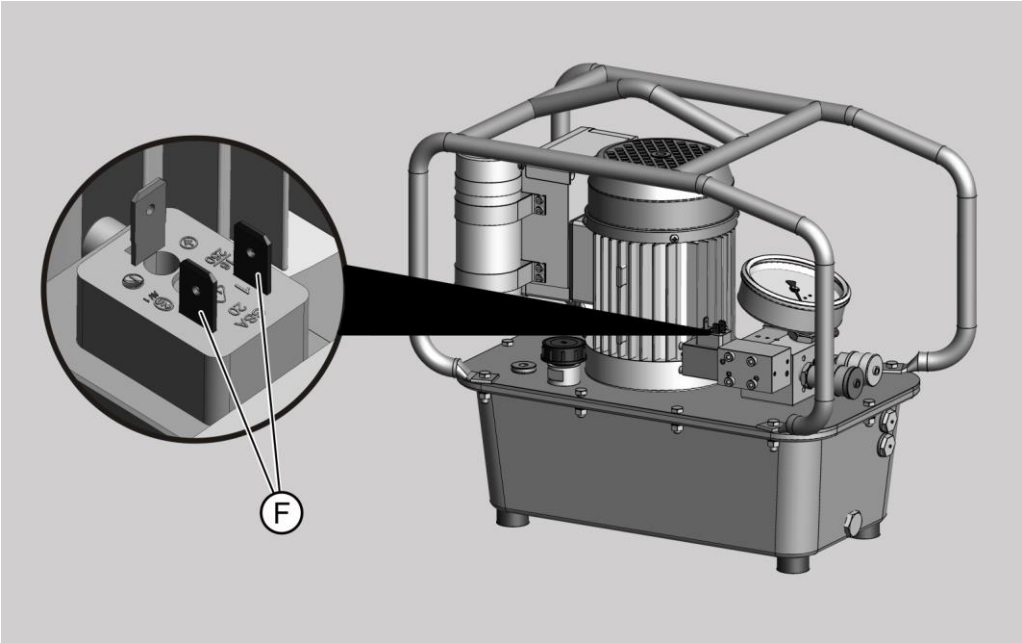
- ▶ Move the unit into the repair position for the upper structures, see from page 51.
- ▶ Release the screw which holds down the solenoid valve connector (C).
- ▶ Remove the solenoid valve connector from the solenoid valve (D).



- ▶ Remove the seal (E) of the solenoid valve.



▶ Connect a multimeter to the two contacts (F) of the solenoid valve.



▶ Measure the electrical resistance of the coil.

The resistance has to be 1100 Ω ± 10 %.

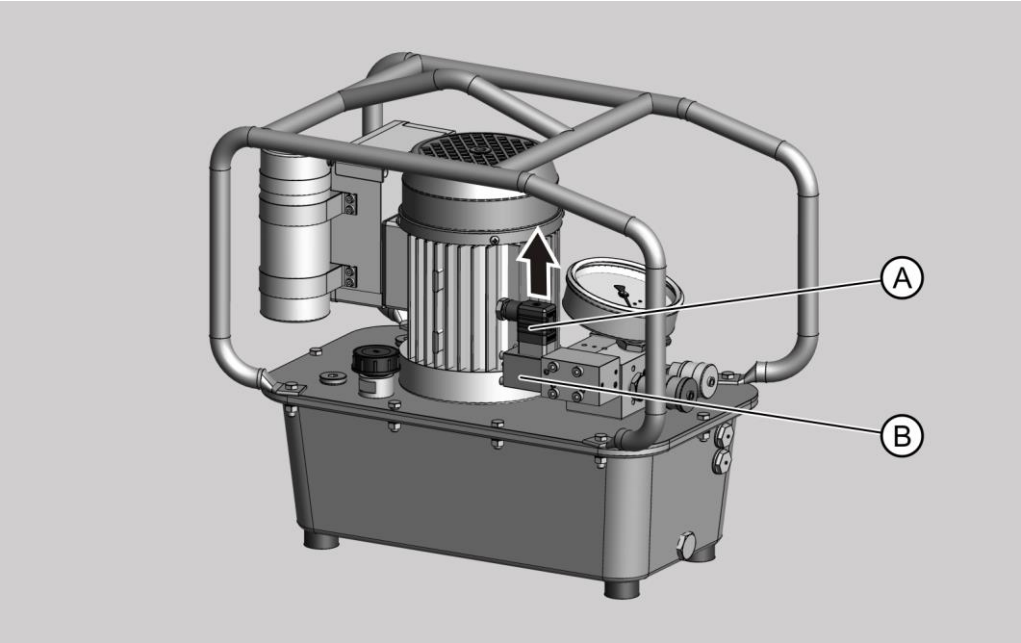
If the resistance is outside this range, the solenoid valve is defective.

▶ Replace the defective solenoid valve, see from page 47.

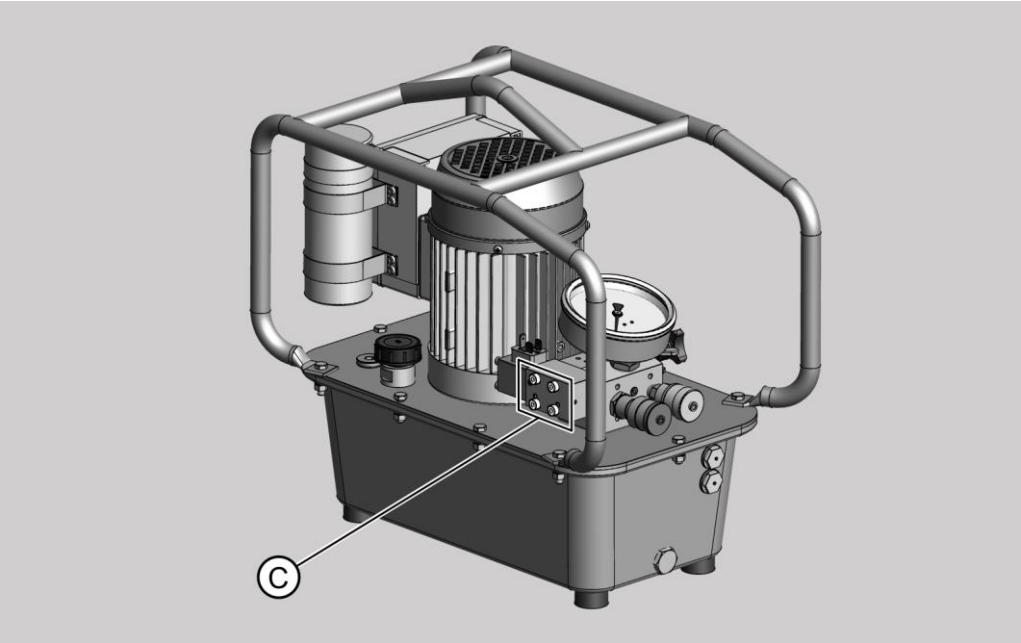
Replacing the solenoid valve

To replace the solenoid valve, proceed as follows:

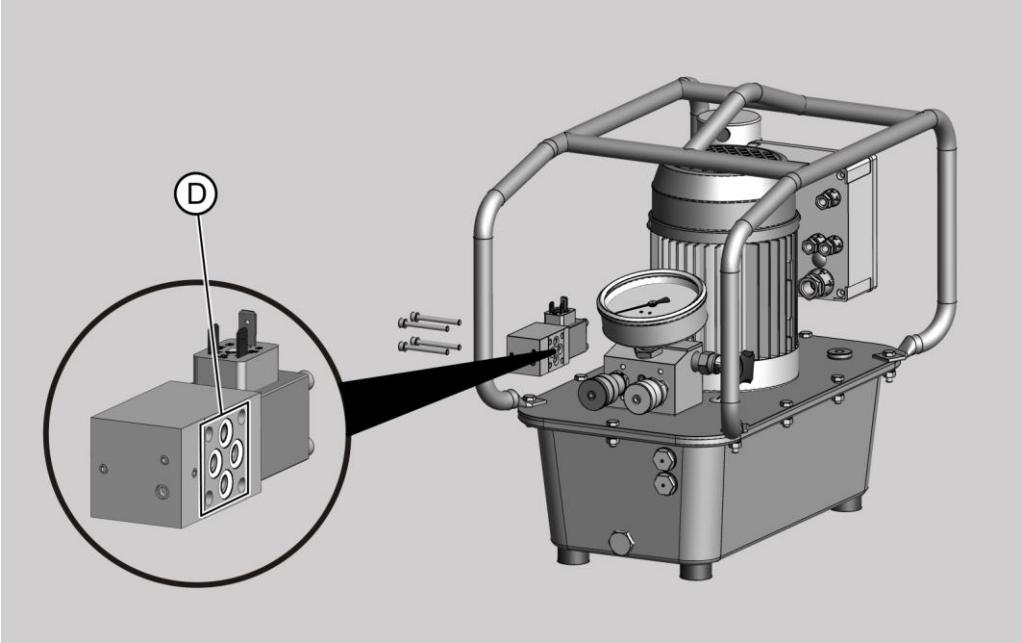
- ▶ Move the unit into the repair position for the upper structures, see from page 51.
- ▶ Release the screw which holds down the solenoid valve connector (A).
- ▶ Remove the solenoid valve connector from the solenoid valve (B).



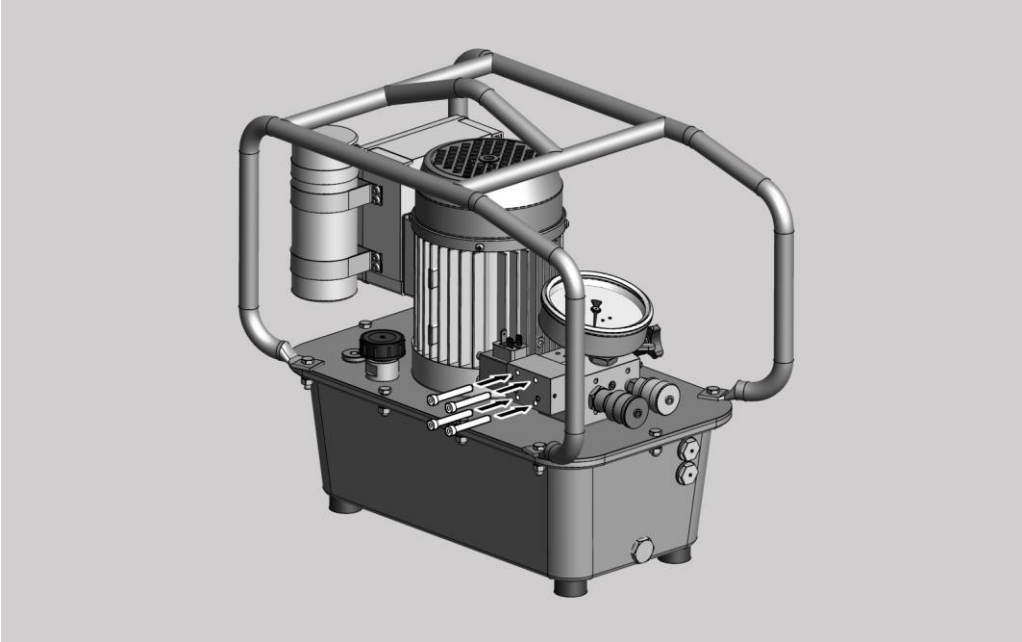
- ▶ Release the screw connections (C) of the solenoid valve with a 4 mm hexagon socket wrench.



- ▶ Remove the solenoid valve from the valve block.
- ▶ For the new solenoid valve, ensure that the 4 O-rings (D) are in the corresponding boreholes and that they are undamaged.



- ▶ Connect the new solenoid valve and the valve block with the M5 hexagon socket screws using a 4 mm hexagon socket wrench.
- ▶ Tighten the hexagon socket screws with a torque of 8 N m.



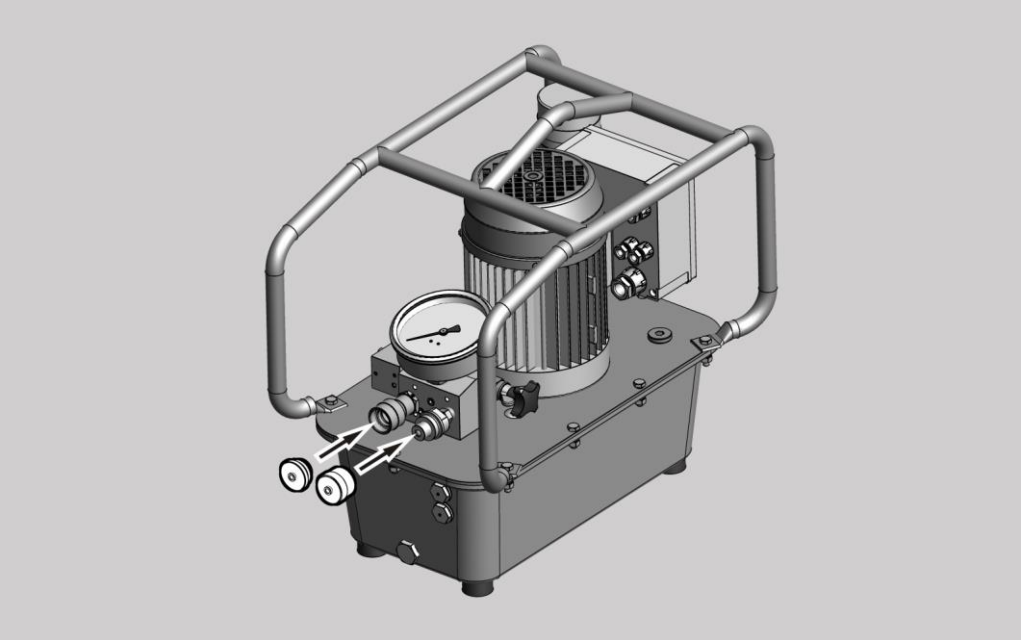
- ▶ Fix the solenoid valve connector to the solenoid valve with the corresponding screw.

Checks and repairs on hydraulic components

Preparing checks and repairs on hydraulic components

Proceed as follows to prepare checks and repairs on the unit:

- ▶ Ensure that the couplings on the unit are secured with the appropriate protective caps and the protective plugs.

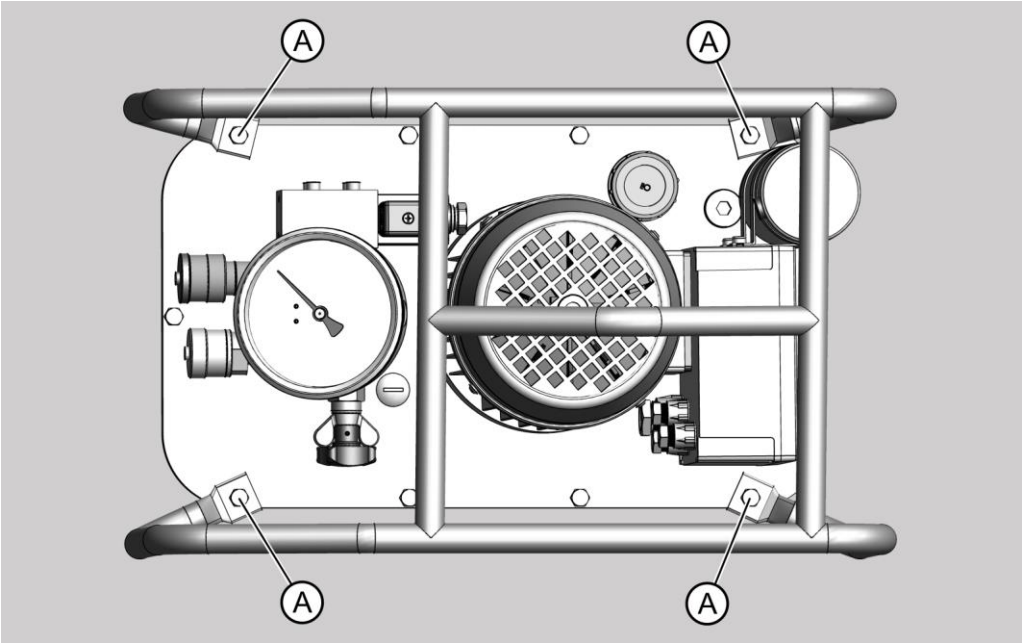


- ▶ Remove the carrying handle, see from page 50.
- ▶ Move the unit into the repair position for the upper structures, see from page 51, or
- ▶ Move the unit into the repair position for the lower structures, see from page 52.

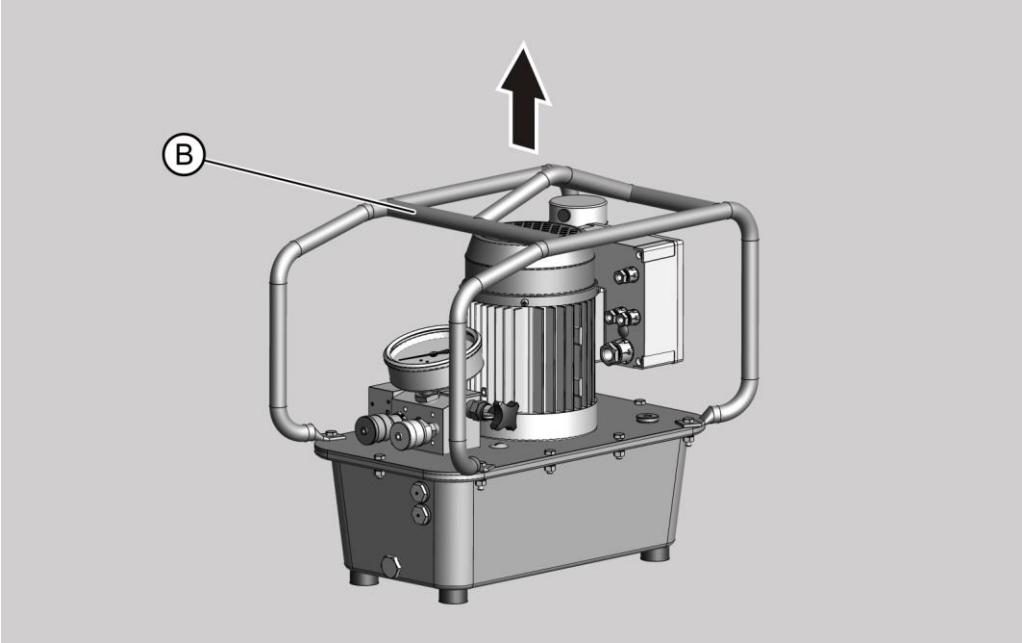
Removing the carrying handle

To remove the carrying handle, proceed as follows:

- ▶ Place the unit on a solid surface.
- ▶ Release the screw connections (A) with two combination wrenches WAF 10.



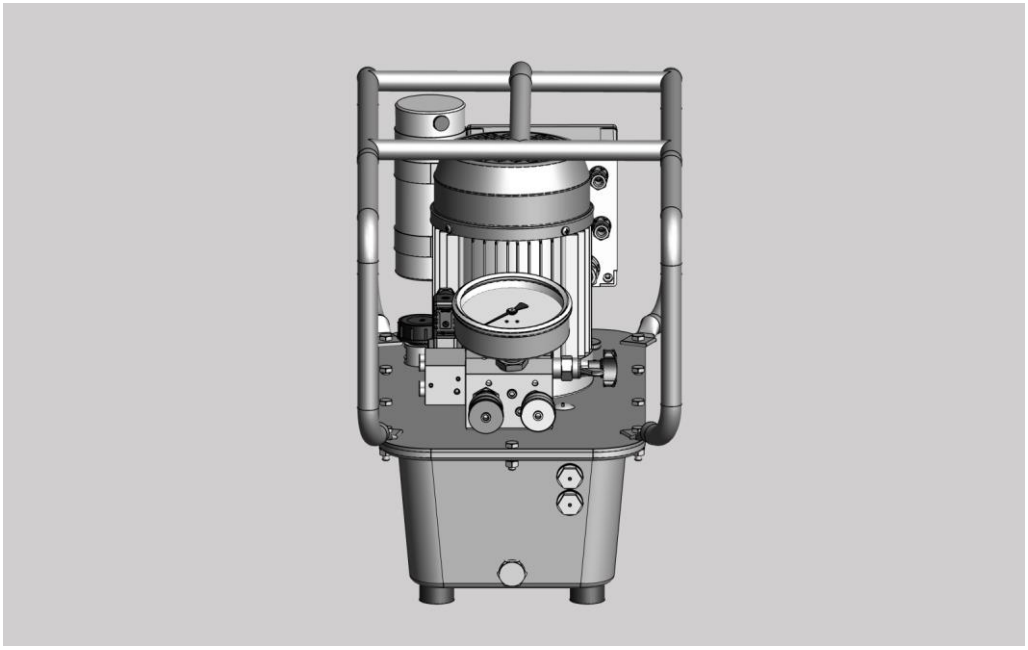
- ▶ Remove the screws, the nuts and the tooth lock washer and keep them in safe place.
- ▶ Remove the carrying handle (B) and set it down safely.



Moving the unit into the repair position for the upper structures

Proceed as follows to bring the unit into the repair position for the upper structures:

- ▶ Place the unit on a solid surface.
- ▶ Position the unit so that the pressure gage is facing you.



Moving the unit into the repair position for the lower structures

⚠ WARNING
 Slipping hazard from leaked oil. Bruising and bone fractures possible. ▶ Clean up any leaked oil with a cloth or suitable binding agents. ▶ Wear safety shoes with non-slip soles.

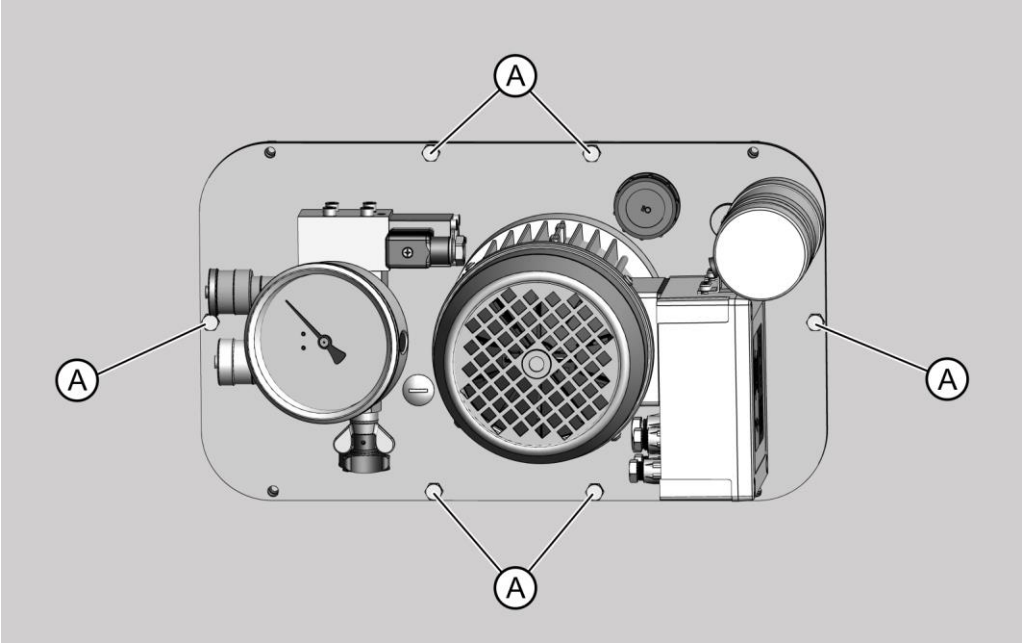
⚠ CAUTION
 Health hazard from contact with hydraulic oil. ▶ Wear nitrile gloves and chemical-resistant protective goggles during work that may include contact with hydraulic oil.

Proceed as follows to bring the unit into the repair position for the lower structures:

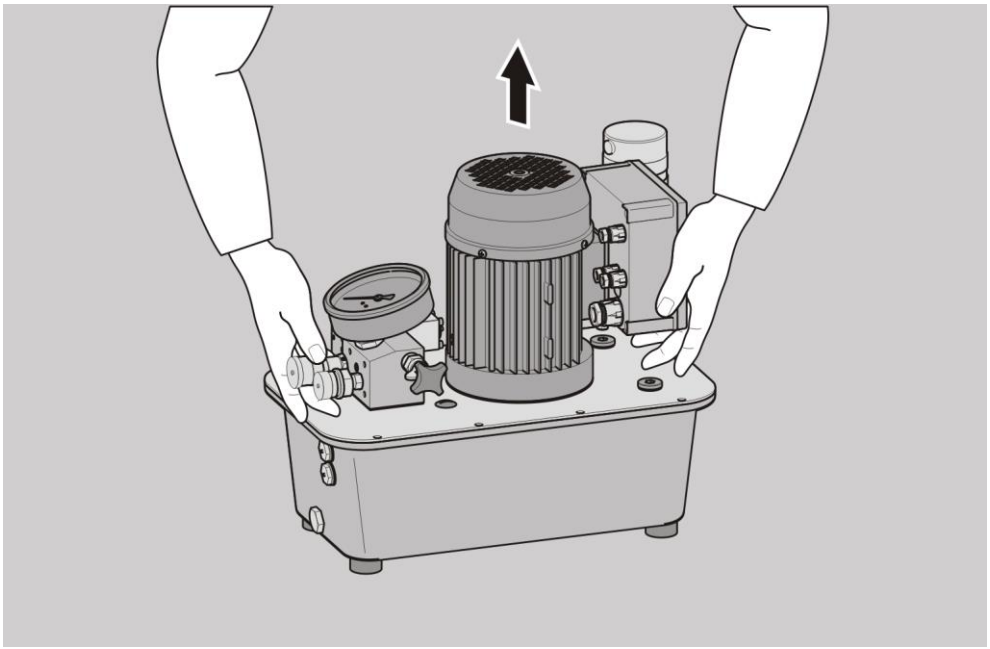
▶ Place the unit on a solid surface.

▶ Remove the carrying handle, see from page 50.

▶ Release the screw connections (A) with two combination wrenches WAF 10.

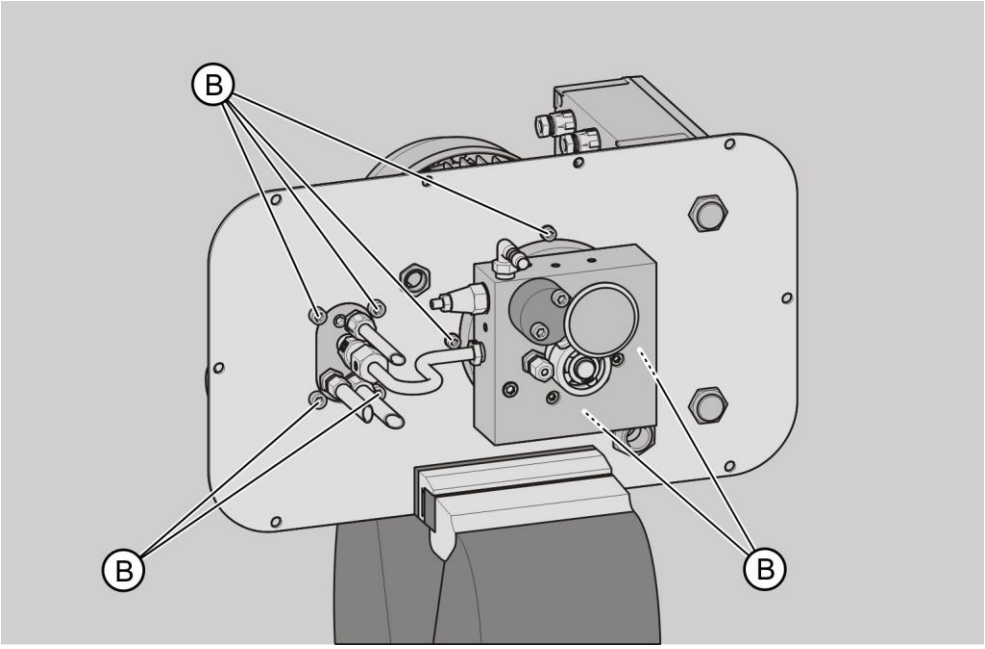


- ▶ Remove the screws, the nuts and the tooth lock washer and keep them in safe place.
- ▶ Hold the unit by the couplings and on the underside of the electric control.



ATTENTION!	
	Risk of damaging the cover with the structures through the jaws of the vise. ▶ Use protective jaws for the vise.

- ▶ Lift the cover with the structures from the oil tank.
- ▶ Chuck the unit in a vise with the help of a second person.
- ▶ Use the edge of the cover as a fixing point.
- ▶ As a precaution, tighten the screws (B) of the valve block and the motor flange.



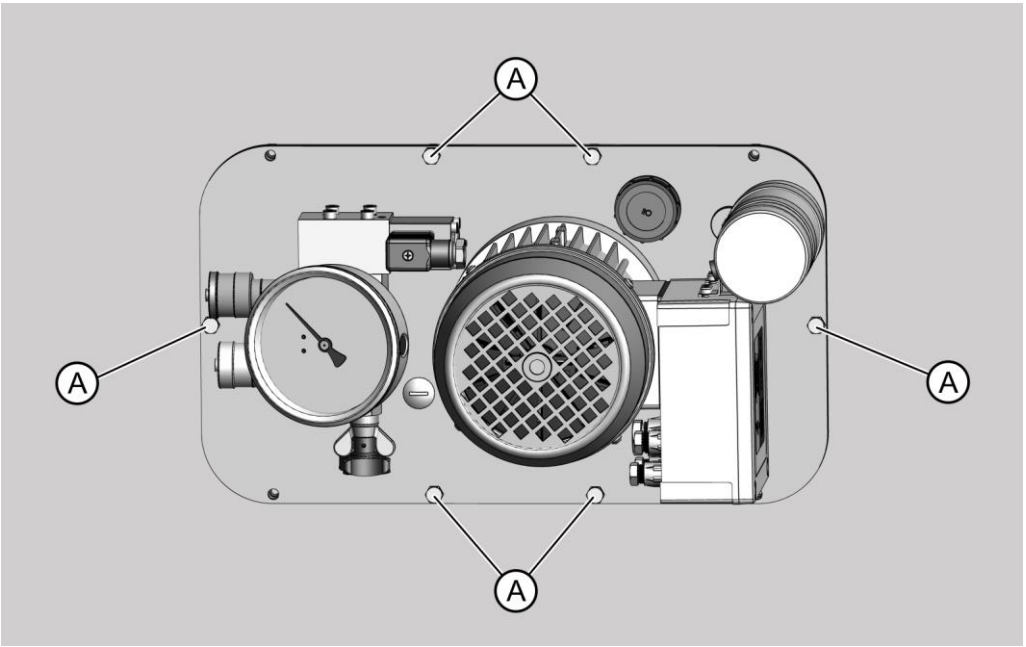
Carrying out checks and repairs on hydraulic components

Checking the torque valve hydraulically

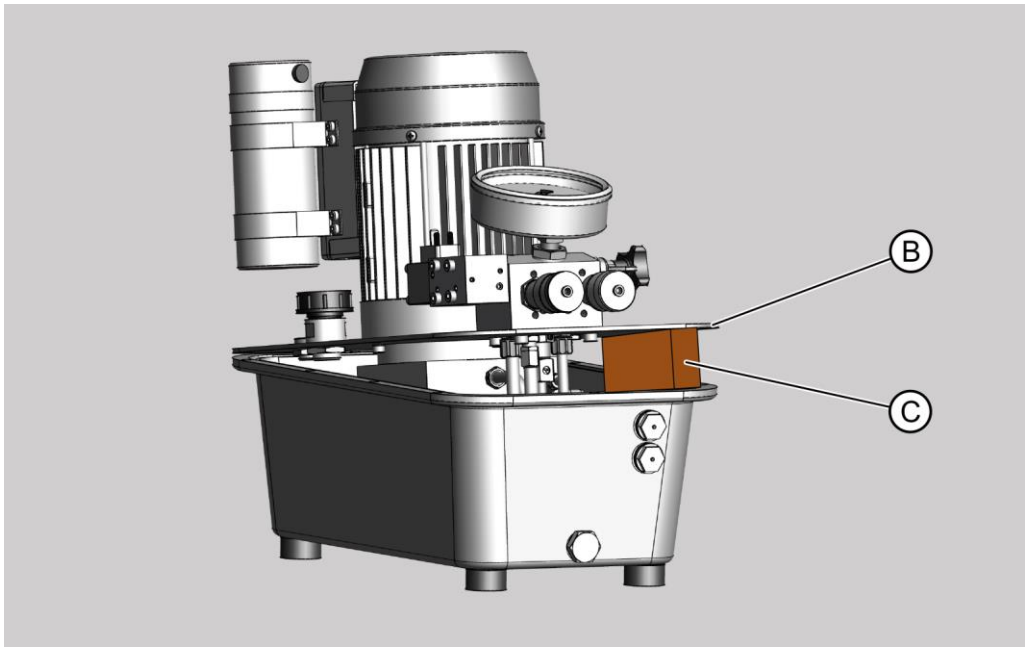
⚠ CAUTION	
	Health hazard from contact with hydraulic oil. ▶ Wear nitrile gloves and chemical-resistant protective goggles during work that may include contact with hydraulic oil.

To check the torque valve electrically, proceed as follows:

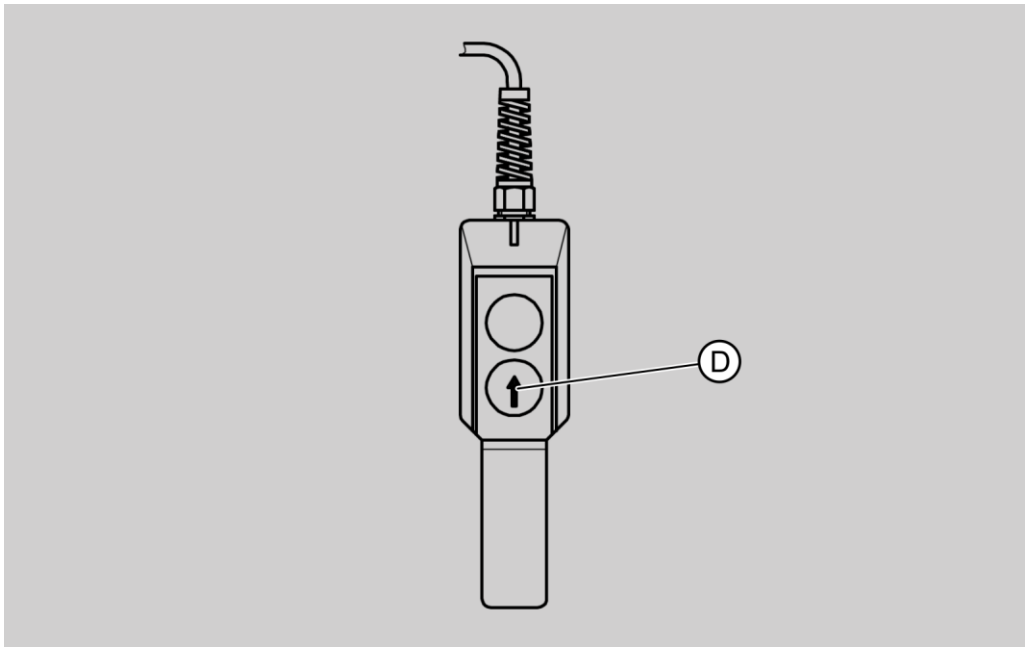
- ▶ Move the unit into the repair position for the upper structures, see from page 51.
- ▶ Remove the carrying handle, see from page 50.
- ▶ Mount the protective caps and protective plugs of the couplings, see from page 49.
- ▶ Release the screw connections (A) of the cover with two combination wrenches WAF 10.



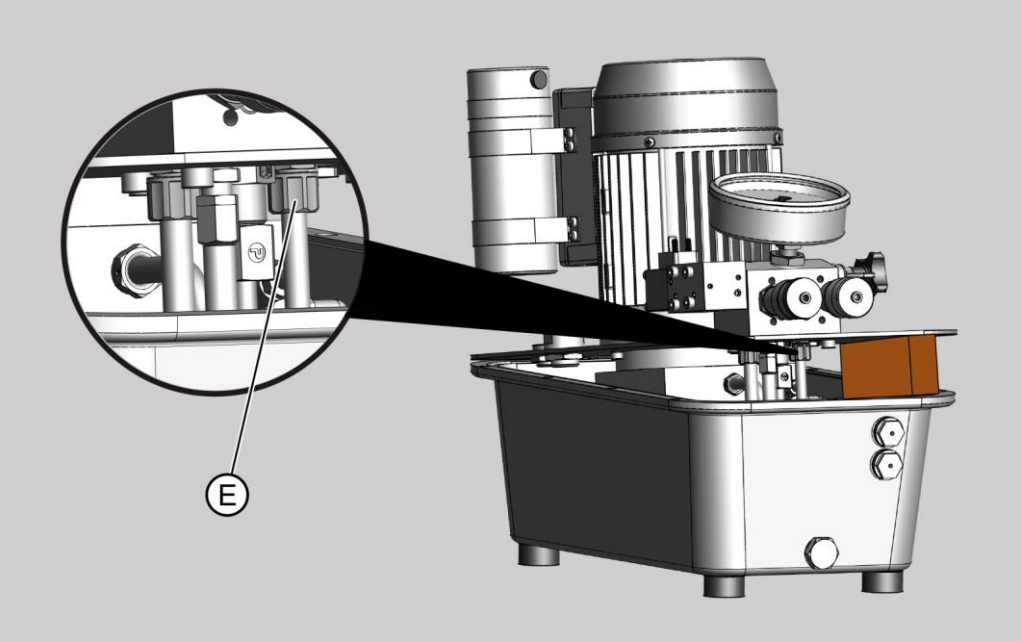
- ▶ Lift the cover (B) at the front by approx. 15 cm (6"), as otherwise oil could be ejected through the ball bearing.
- ▶ Support the cover with a rectangular piece of wood (C).



- ▶ Set the pressure of the unit to 0 bar with the torque valve.
- ▶ Switch on the pump of the unit.
- ▶ Press and hold the button (D) on the remote control and slowly increase the pressure of the unit with the torque valve.



▶ Check whether oil is dripping from the tank pipe/borehole 5 (E).



If oil is dripping from the tank pipe/borehole 5, the torque valve is defective.

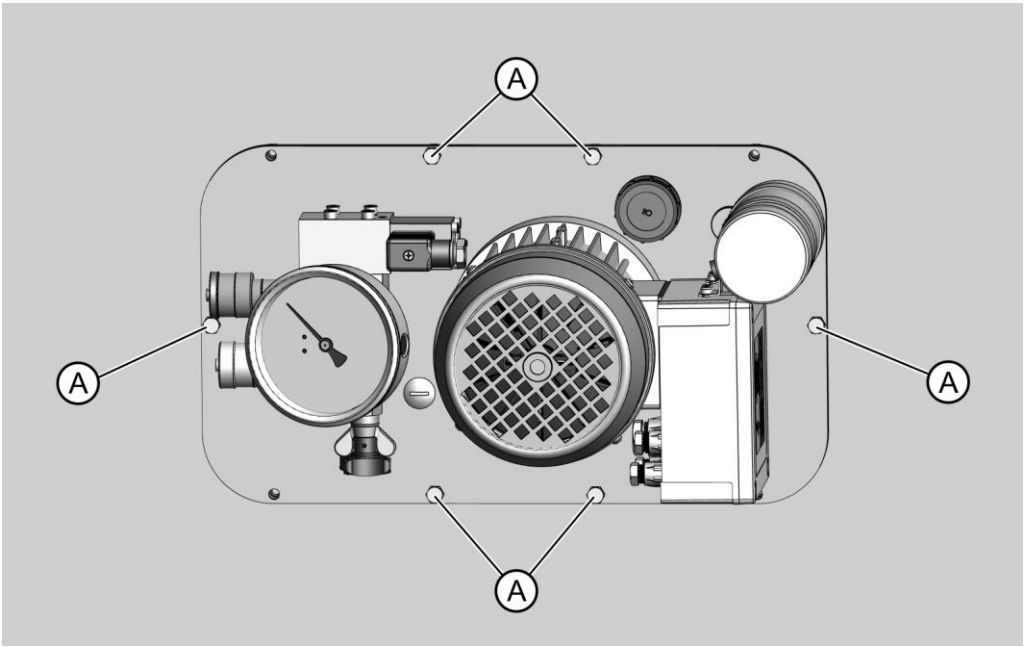
▶ If the torque valve is defective, replace it, see page 86.

Checking the solenoid valve hydraulically

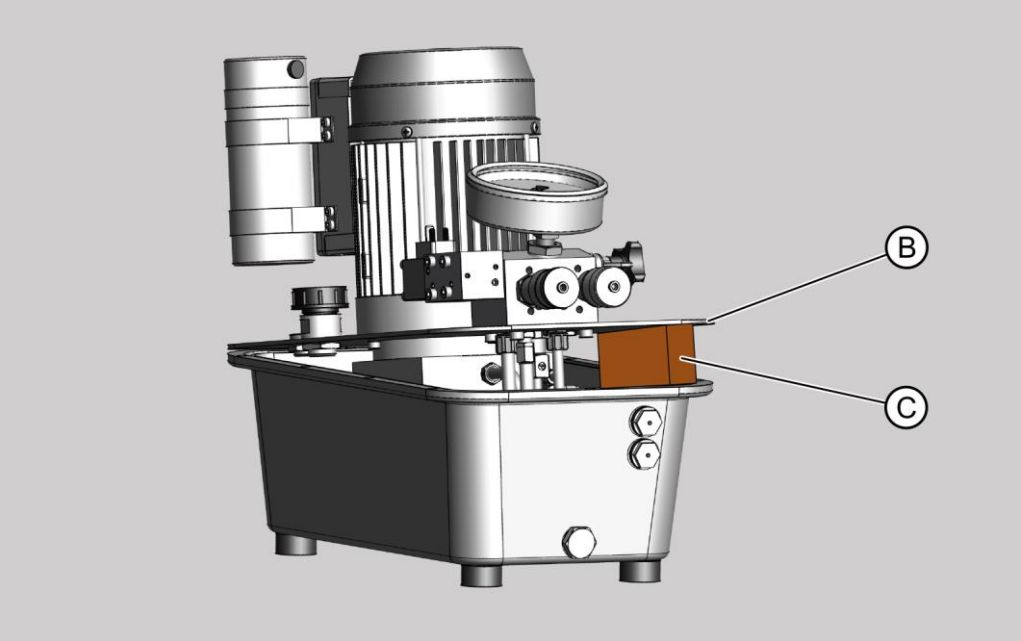
⚠ CAUTION	
	Health hazard from contact with hydraulic oil. ▶ Wear nitrile gloves and chemical-resistant protective goggles during work that may include contact with hydraulic oil.

To check the solenoid valve electrically, proceed as follows:

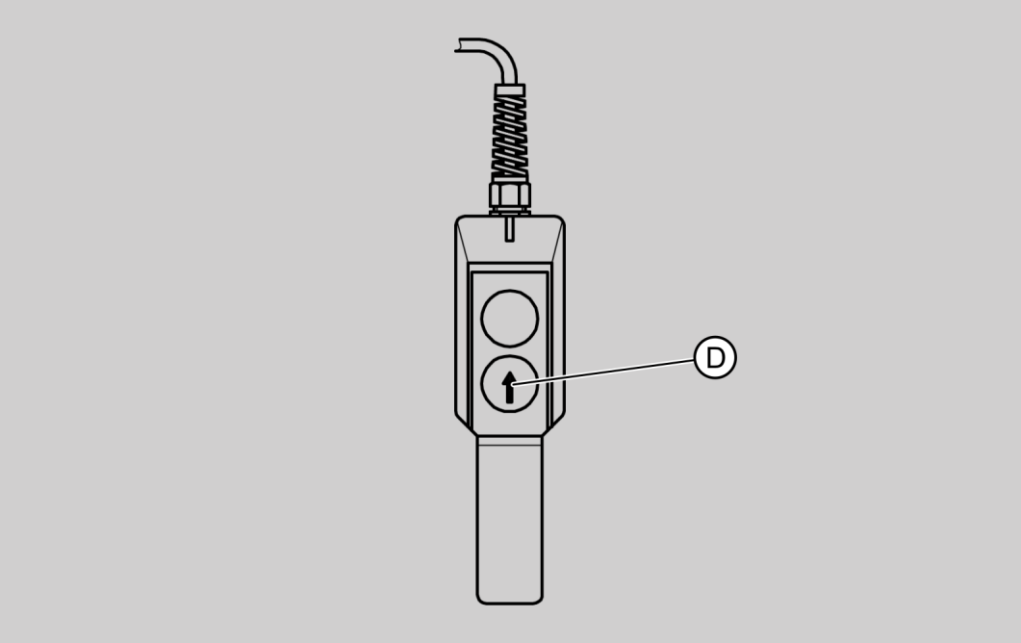
- ▶ Move the unit into the repair position for the upper structures, see from page 51.
- ▶ Remove the carrying handle, see from page 50.
- ▶ Mount the protective caps and protective plugs of the couplings, see from page 49.
- ▶ Release the screw connections (A) on the cover with two combination wrenches WAF 10, as described in the chapter “Moving the unit into the repair position for the lower structures”, see from page 52.



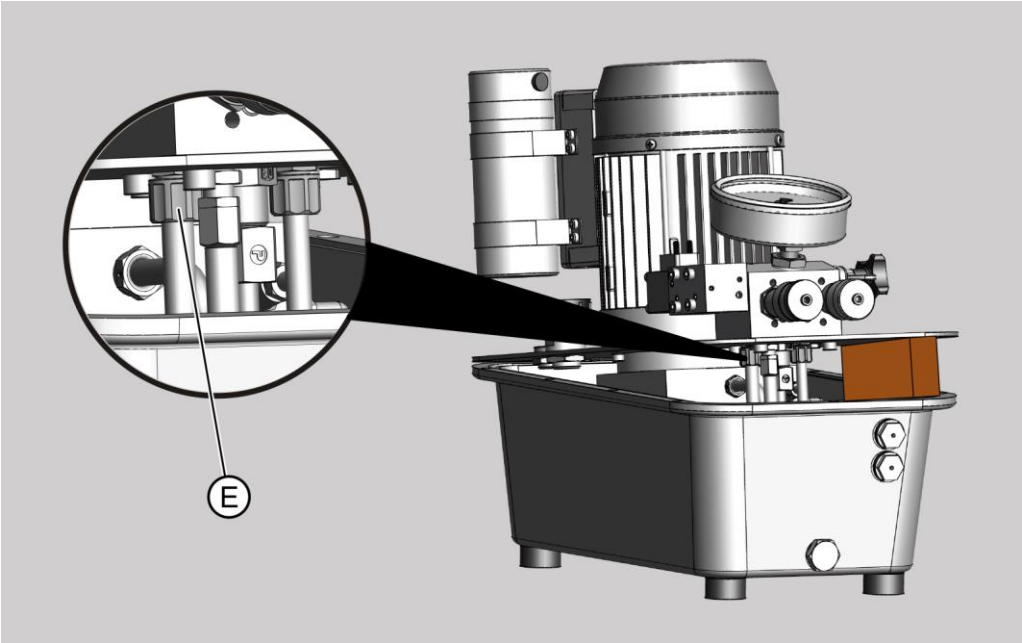
- ▶ Lift the cover (B) at the front by approx. 15 cm (6"), as otherwise oil could be ejected through the ball bearing.
- ▶ Support the cover with a rectangular piece of wood (C).



- ▶ Set the pressure of the unit to 0 bar with the torque valve.
- ▶ Switch on the pump of the unit.
- ▶ Press and hold the button (D) on the remote control and slowly increase the pressure of the unit with the torque valve.



▶ Check whether oil is dripping from the tank pipe/borehole 7 (E).



If oil is dripping from the tank pipe/borehole 7, the solenoid valve is defective.

▶ If the solenoid valve is defective, replace it, see page 47.

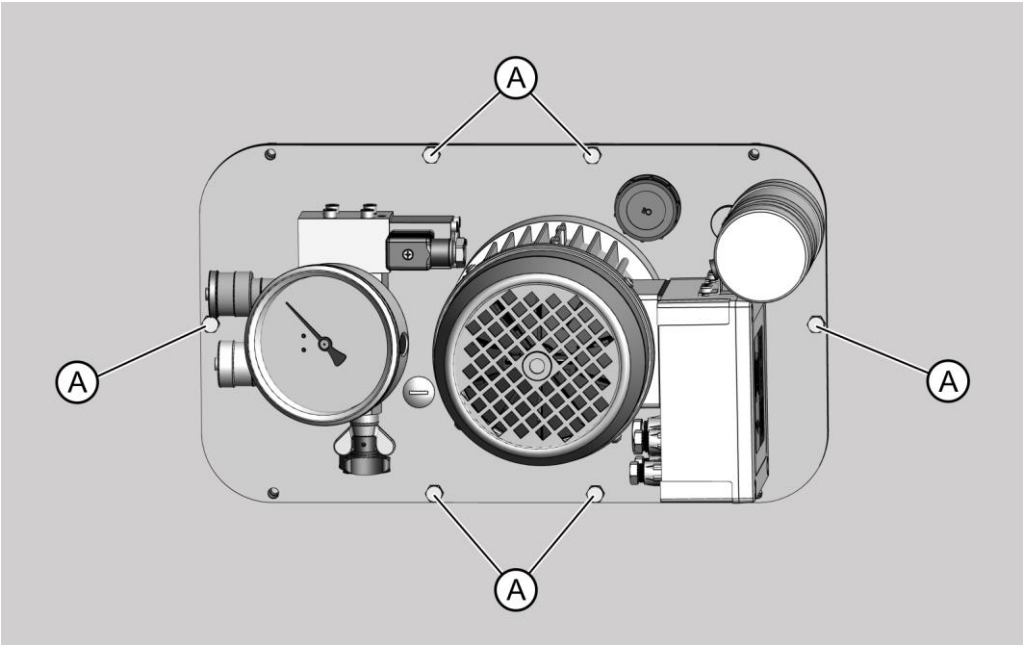
Checking the pump flange

⚠ WARNING	
	Slipping hazard from leaked oil. Bruising and bone fractures possible. ▶ Clean up any leaked oil with a cloth or suitable binding agents. ▶ Wear safety shoes with non-slip soles.

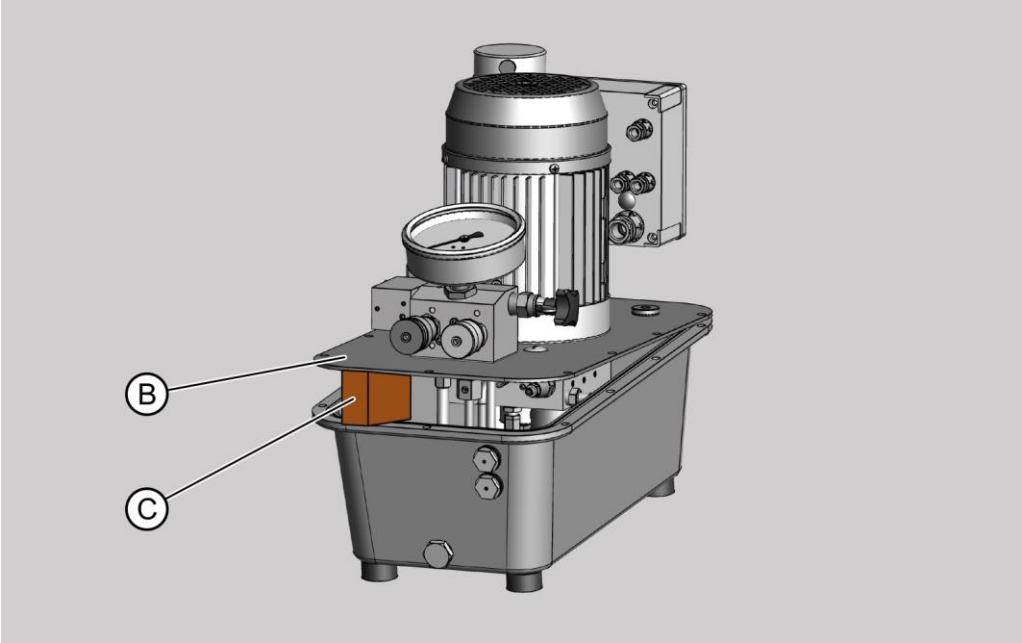
⚠ CAUTION	
	Health hazard from contact with hydraulic oil. ▶ Wear nitrile gloves and chemical-resistant protective goggles during work that may include contact with hydraulic oil.

To check the pump flange, proceed as follows:

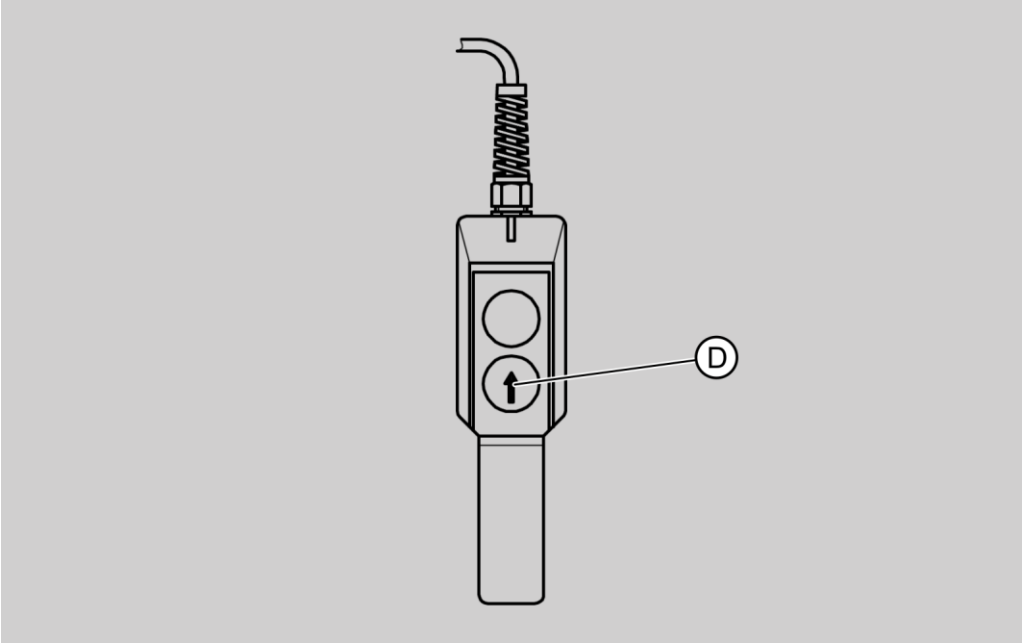
- ▶ Move the unit into the repair position for the upper structures, see from page 51.
- ▶ Remove the carrying handle, see from page 50.
- ▶ Mount the protective caps and protective plugs of the couplings, see from page 49.
- ▶ Release the screw connections (A) on the cover with two combination wrenches WAF 10, as described in the chapter “Moving the unit into the repair position for the lower structures”, see from page 52.



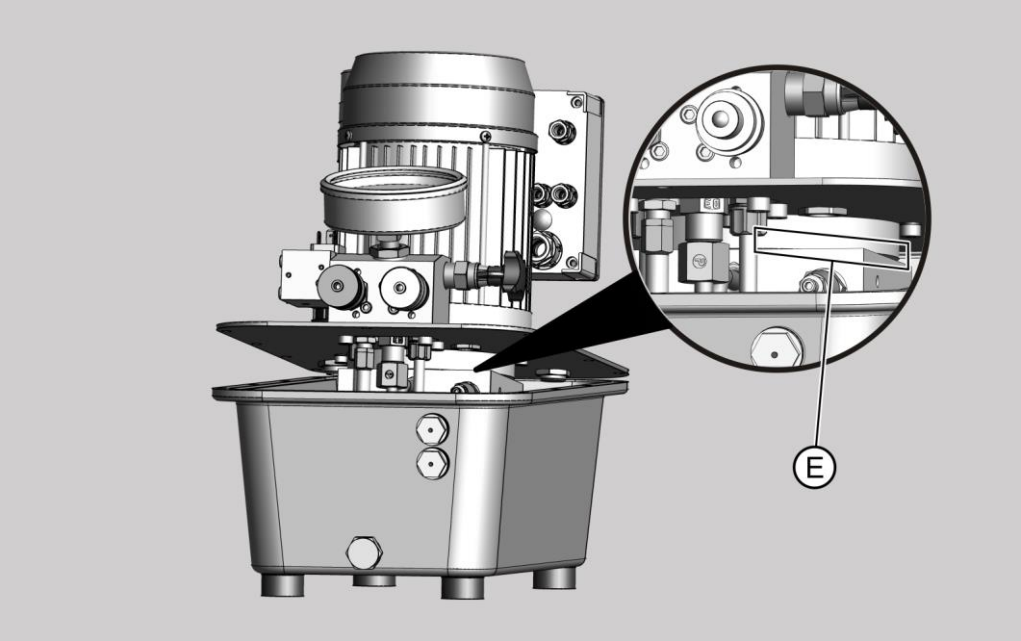
- ▶ Lift the cover (B) at the front by approx. 15 cm (6"), as otherwise oil could be ejected through the ball bearing.
- ▶ Support the cover with a rectangular piece of wood (C).



- ▶ Set the pressure of the unit to 0 bar with the torque valve.
- ▶ Switch on the pump of the unit.
- ▶ Press and hold the button (D) on the remote control and slowly increase the pressure of the unit with the torque valve.



▶ Check whether oil is dripping from the pump flange (E).



If oil is dripping from the pump flange, the O-ring of the pump flange is defective.

▶ If the O-ring of the pump flange is defective, send the unit back to the manufacturer for repair.

Checking and cleaning the screen filter

⚠ WARNING

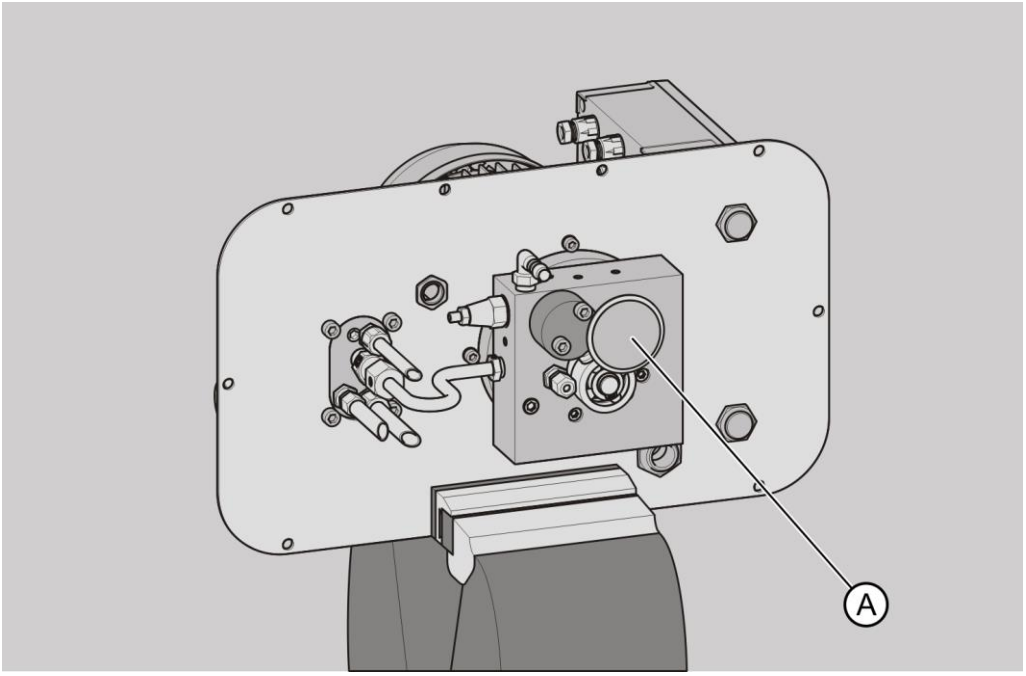
Slipping hazard from leaked oil.
Bruising and bone fractures possible.
- ▶ Clean up any leaked oil with a cloth or suitable binding agents.
- ▶ Wear safety shoes with non-slip soles.

⚠ CAUTION

Health hazard from contact with hydraulic oil.
- ▶ Wear nitrile gloves and chemical-resistant protective goggles during work that may include contact with hydraulic oil.

To check the screen filter, proceed as follows:

- ▶ Move the unit into the repair position for the lower structures, see from page 52.
- ▶ Check the screen filter (A) for visible contamination.



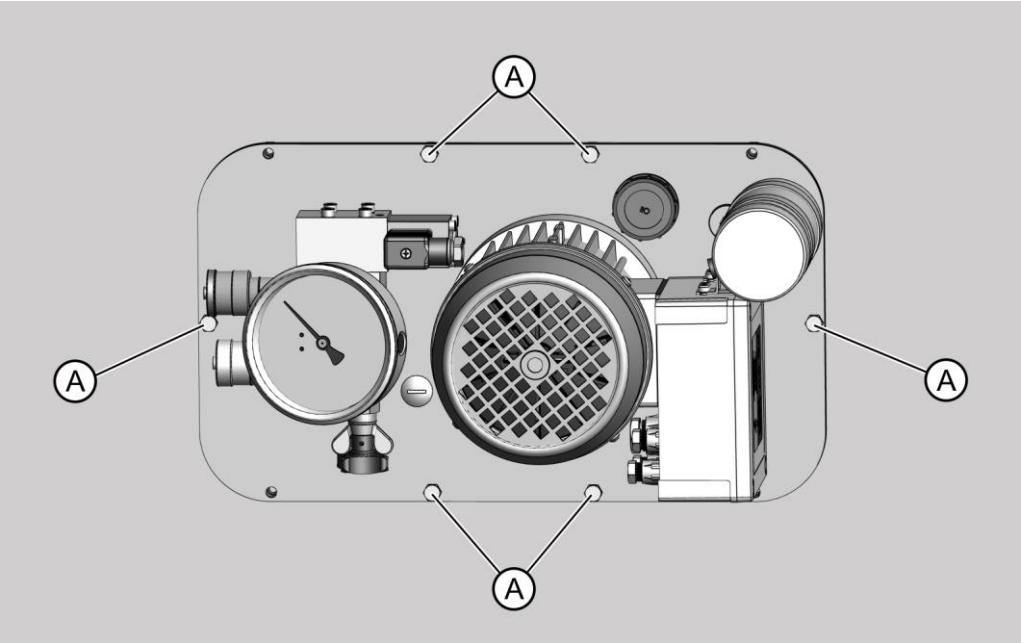
To clean a blocked screen filter, proceed as follows:

- ▶ Remove the contaminations with a soft cloth.
- ▶ During cleaning, exert only light pressure on the screen filter to avoid damaging it.

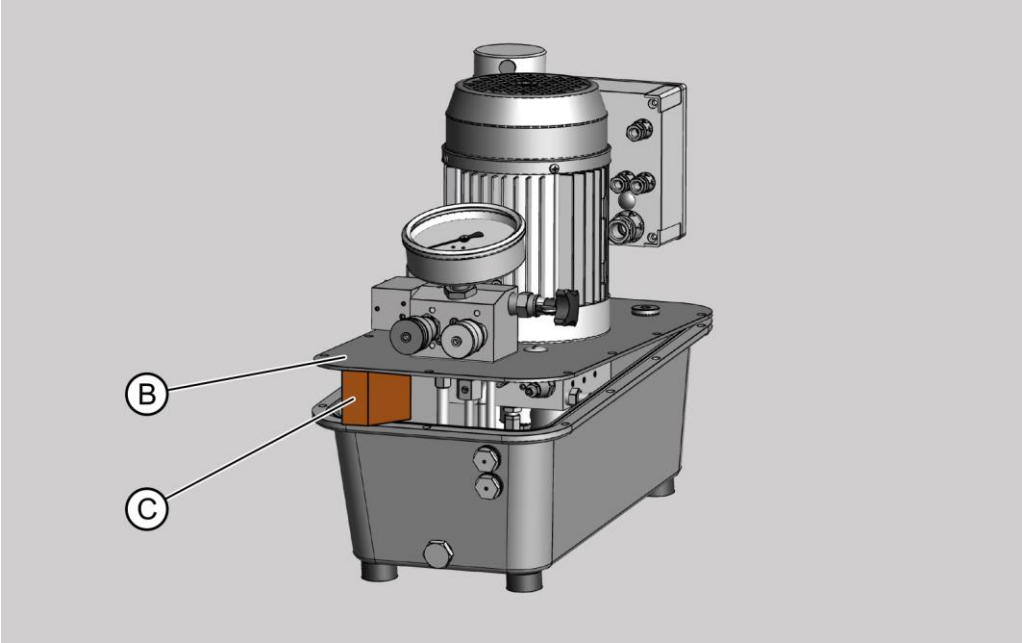
Checking the maximum pressure valve

To check the maximum pressure valve, proceed as follows:

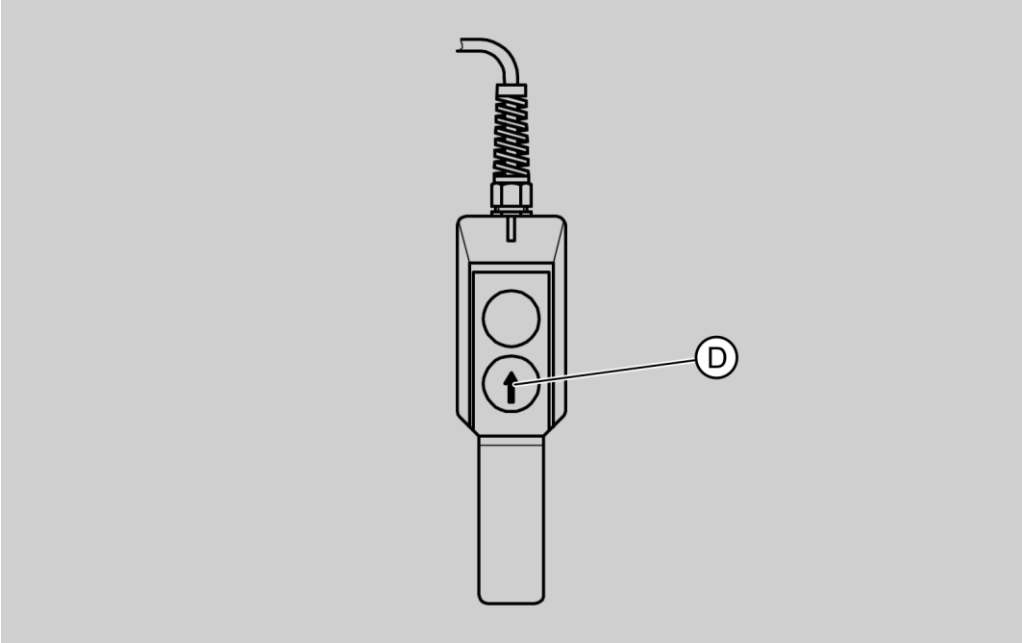
- ▶ Move the unit into the repair position for the upper structures, see from page 51.
- ▶ Remove the carrying handle, see from page 50.
- ▶ Mount the protective caps and protective plugs of the couplings, see from page 49.
- ▶ Release the screw connections (A) on the cover with two combination wrenches WAF 10, see chapter “Moving the unit into the repair position for the lower structures”, see from page 52.



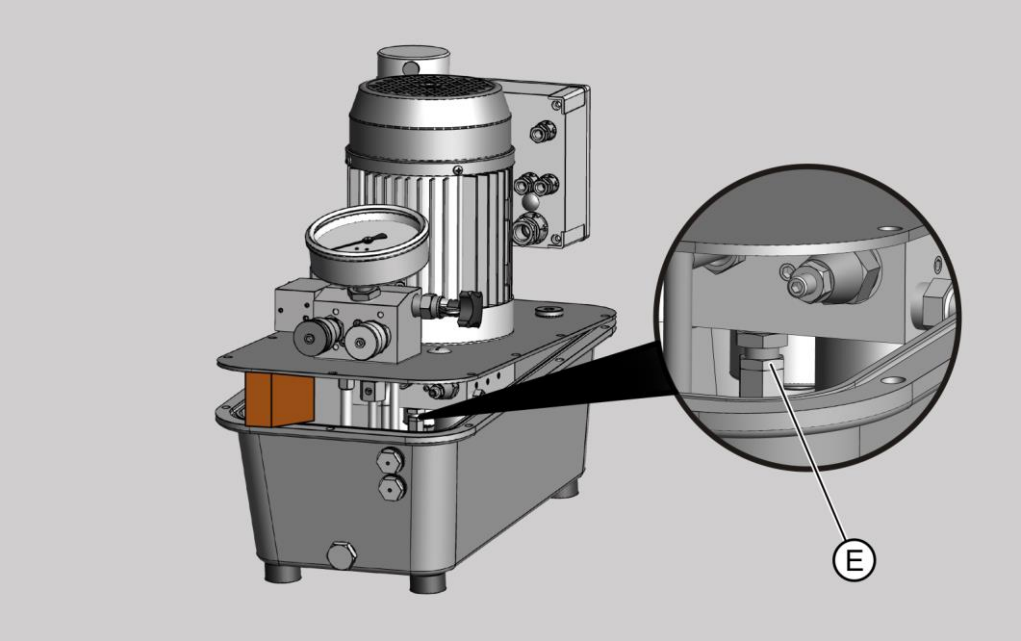
- ▶ Lift the cover (B) at the front by approx. 15 cm (6"), as otherwise oil could be ejected through the ball bearing.
- ▶ Support the cover with a rectangular piece of wood (C).



- ▶ Set the pressure of the unit to 0 bar with the torque valve.
- ▶ Switch on the pump of the unit.
- ▶ Press and hold the button (D) on the remote control and slowly increase the pressure of the unit with the torque valve.



▶ Check whether oil is dripping from the maximum pressure valve (E).



If oil drips from the maximum pressure valve, it is defective.

▶ If the maximum pressure valve is defective, replace it, see page 67.

Replacing the maximum pressure valve

⚠ WARNING

Slipping hazard from leaked oil.

Bruising and bone fractures possible.

▶ Clean up any leaked oil with a cloth or suitable binding agents.

▶ Wear safety shoes with non-slip soles.

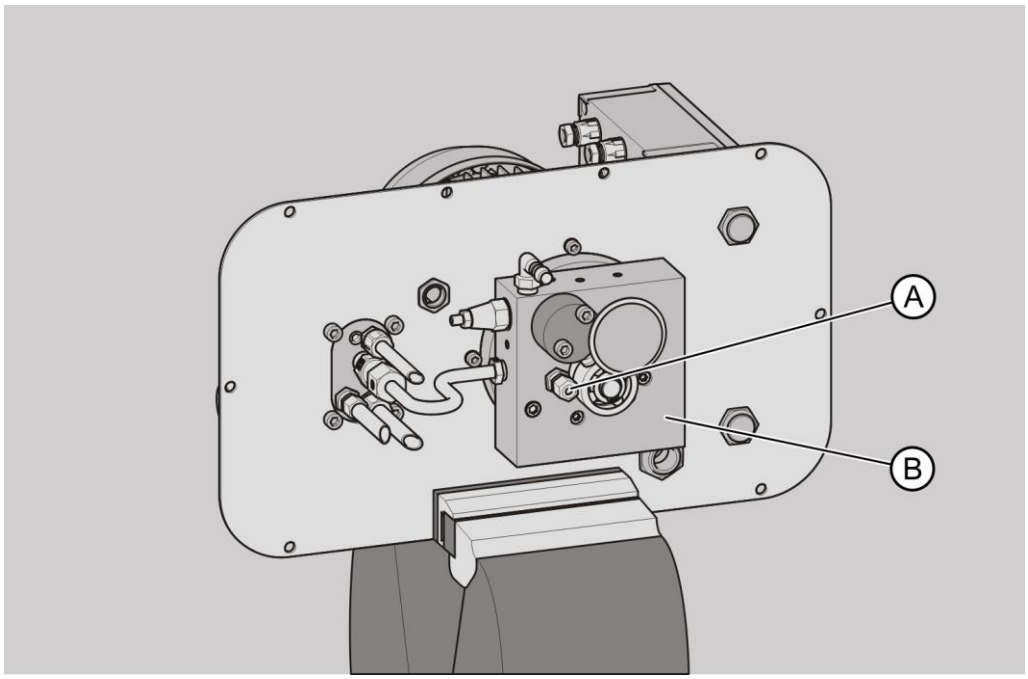
⚠ CAUTION

Health hazard from contact with hydraulic oil.

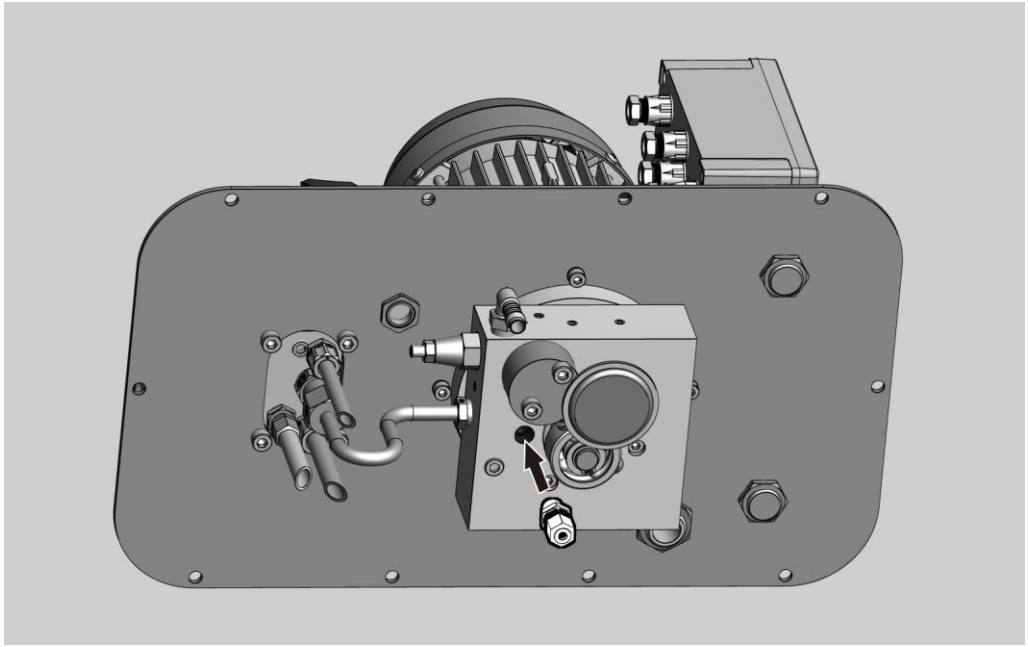
▶ Wear nitrile gloves and chemical-resistant protective goggles during work that may include contact with hydraulic oil.

To replace the maximum pressure valve, proceed as follows:

- ▶ Move the unit into the repair position for the lower structures, see from page 52.
- ▶ Unscrew the maximum pressure valve (A) from the pump flange (B) with a combination wrench WAF 14.



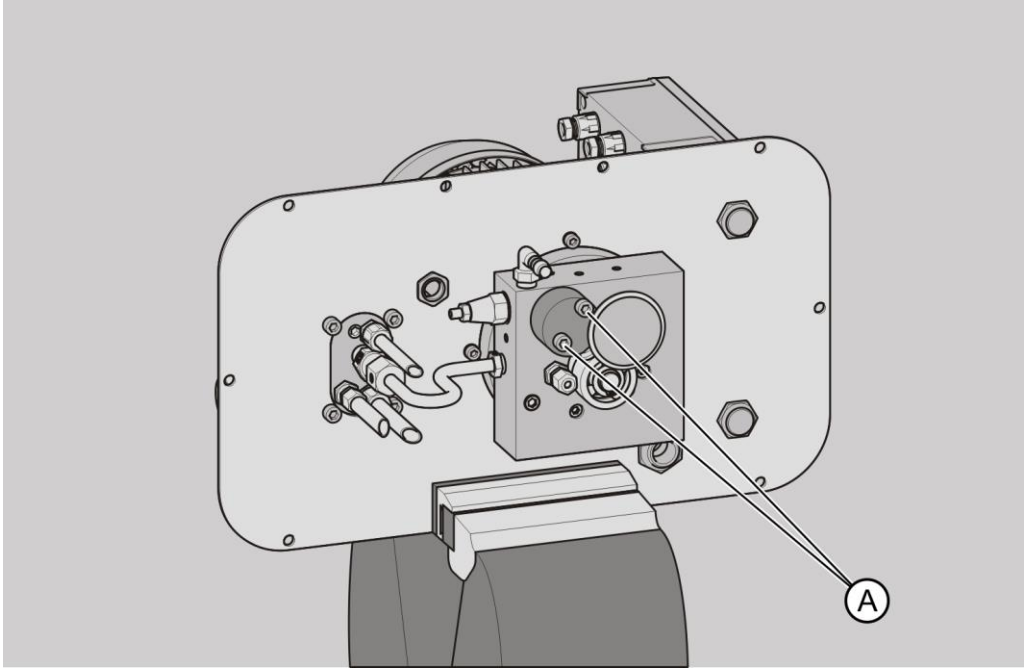
- ▶ Screw a functioning maximum pressure valve into the pump flange with a combination wrench WAF 14.
- ▶ Tighten the valve with a torque of 30 Nm.



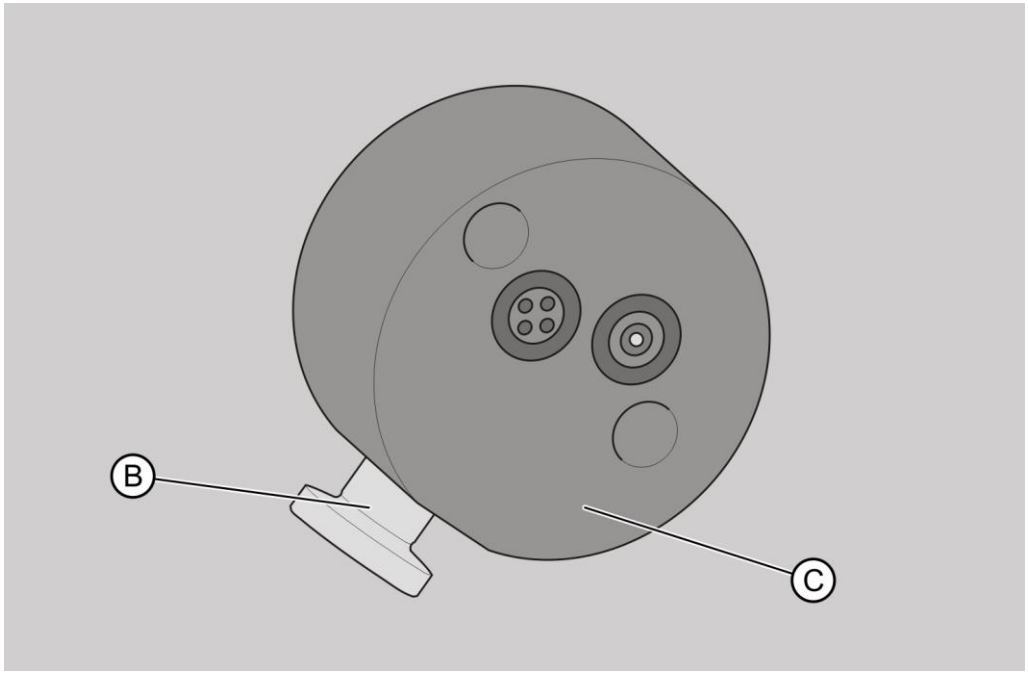
Checking and replacing the pump element

To check the pump element, proceed as follows:

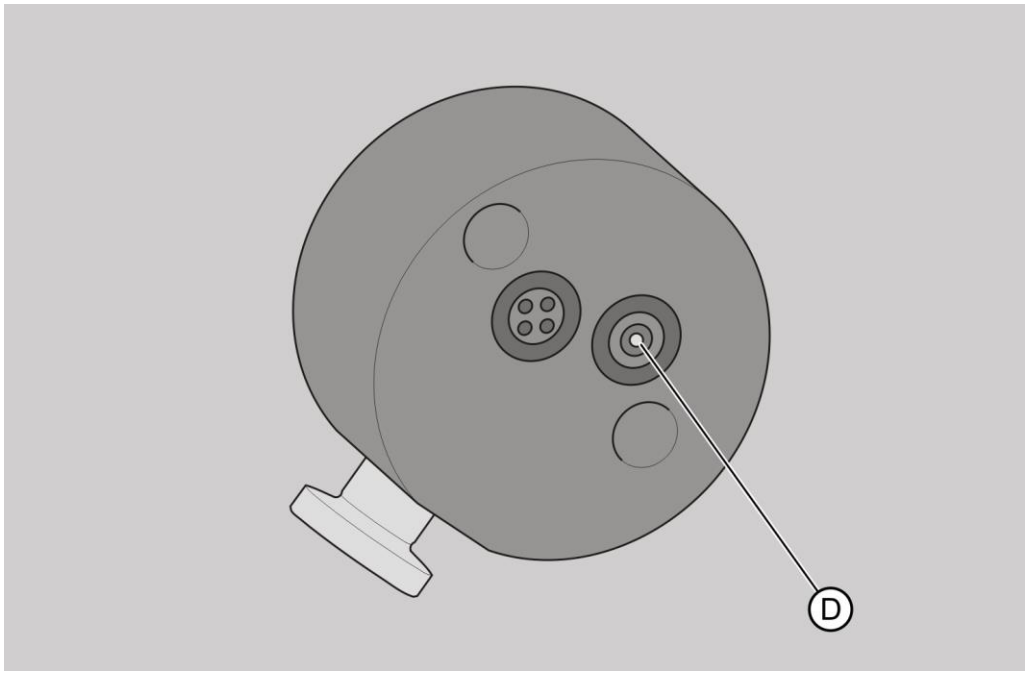
- ▶ Move the unit into the repair position for the lower structures, see from page 52.
- ▶ Release the screw connections (A) of the pump element with a 5 mm hexagon socket wrench.



▶ Place the pump element with the rear side facing upwards on a stable surface, ensuring that the piston (B) does not slide from the housing (C).



▶ Press the ball (D) into the pump element with a sharp tool, e. g. long nose pliers.



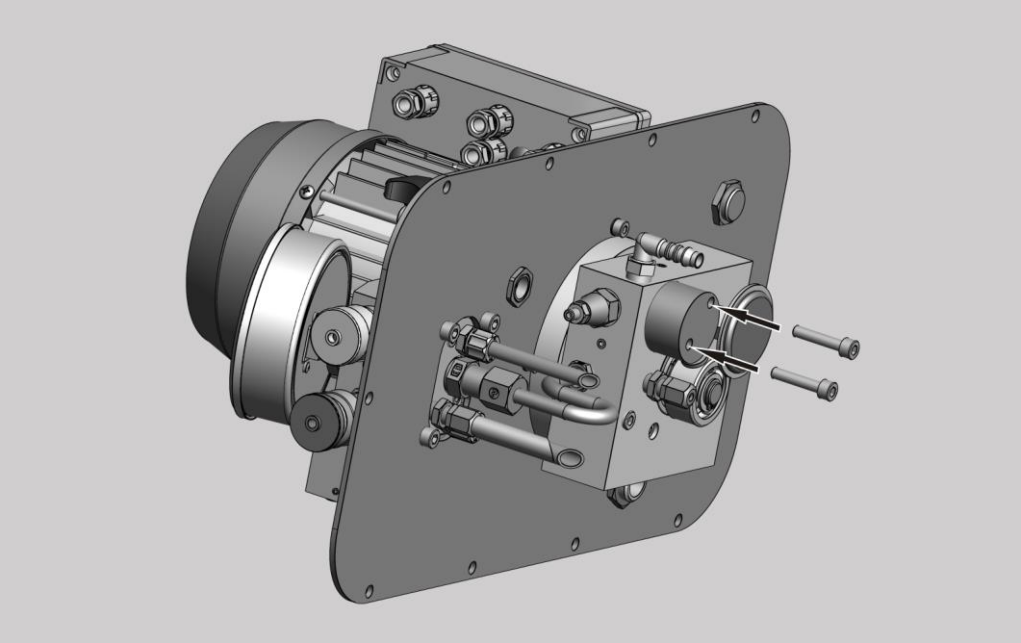
▶ Check whether the ball is being pushed out again by the spring behind it.

If the ball is not being pushed out again, the spring is defective.

▶ If the spring is defective, replace the pump element.

▶ Fix the checked or replaced pump element with the 5 mm hexagon socket screws and a 5 mm hexagon socket wrench.

▶ Tighten the hexagon socket screws with a torque of 12 N m.



Checking the low-pressure cut off valve

⚠ WARNING

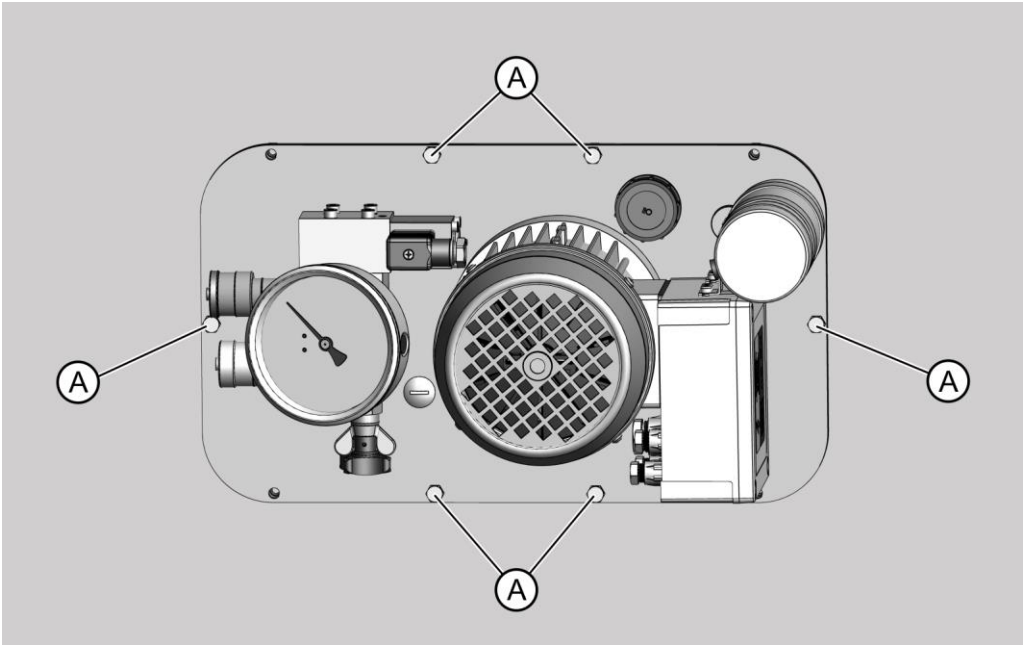
Slipping hazard from leaked oil.
Bruising and bone fractures possible.
- ▶ Clean up any leaked oil with a cloth or suitable binding agents.
- ▶ Wear safety shoes with non-slip soles.

⚠ CAUTION

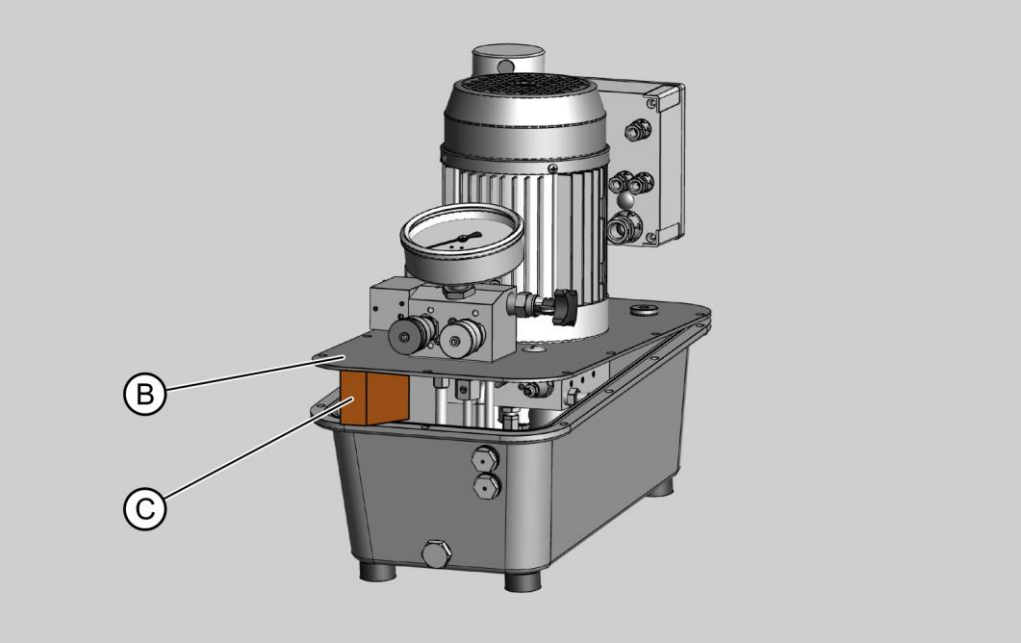
Health hazard from contact with hydraulic oil.
- ▶ Wear nitrile gloves and chemical-resistant protective goggles during work that may include contact with hydraulic oil.

To check the low-pressure cut off valve, proceed as follows:

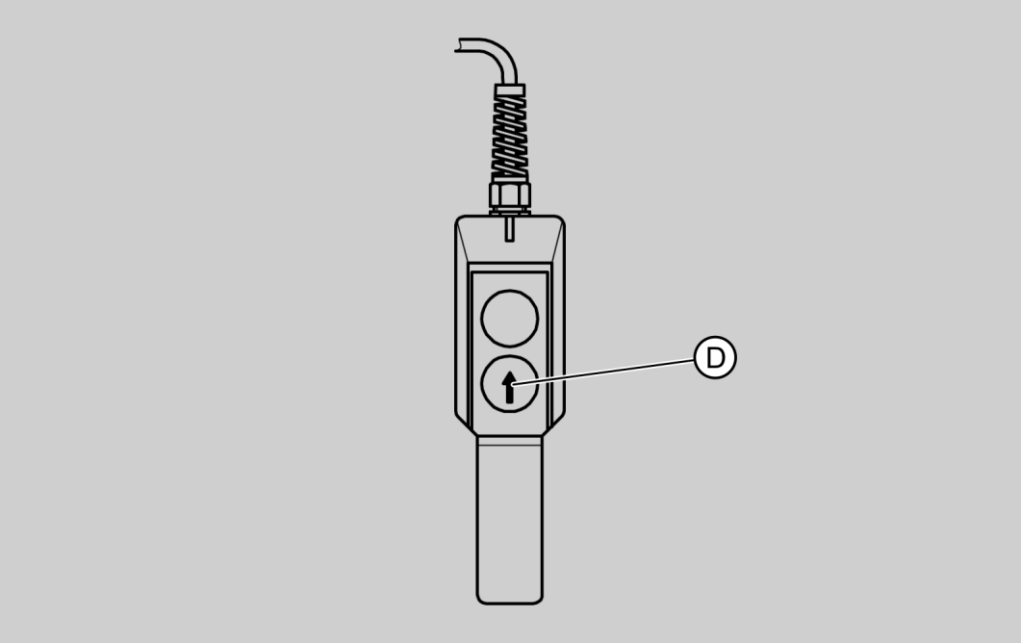
- ▶ Move the unit into the repair position for the upper structures, see from page 51.
- ▶ Remove the carrying handle, see from page 50.
- ▶ Mount the protective caps and protective plugs of the couplings, see from page 49.
- ▶ Release the screw connections (A) on the cover with two combination wrenches WAF 10, as described in the chapter “Moving the unit into the repair position for the lower structures”, see from page 52.



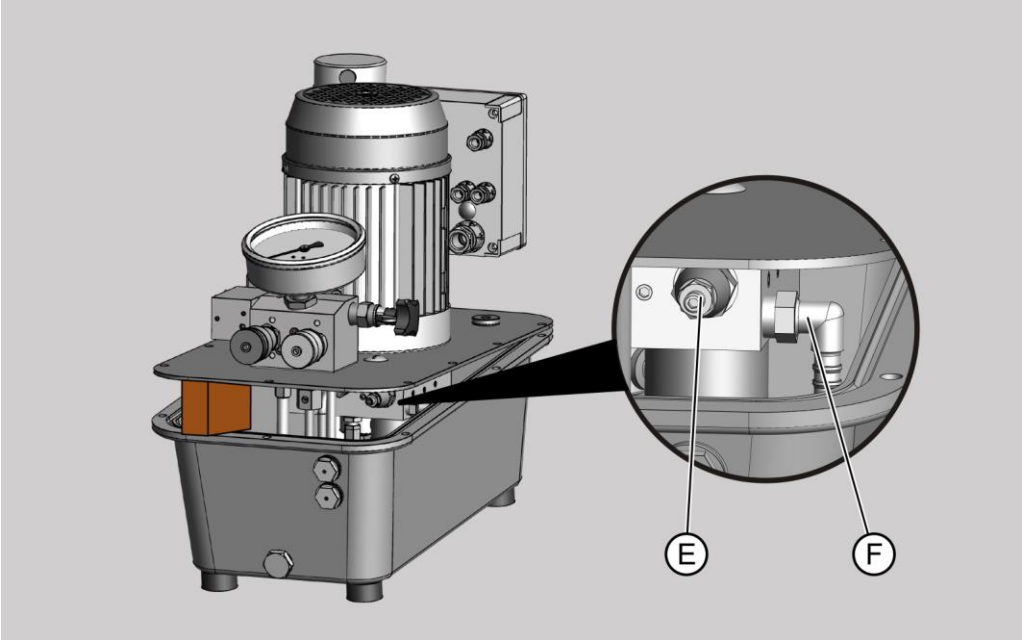
- ▶ Lift the cover (B) at the front by approx. 15 cm (6"), as otherwise oil could be ejected through the ball bearing.
- ▶ Support the cover with a rectangular piece of wood (C).



- ▶ Set the pressure of the unit to 0 bar with the torque valve.
- ▶ Switch on the pump of the unit.
- ▶ Press and hold the button (D) on the remote control and slowly increase the pressure of the unit with the torque valve.



▶ Check whether any oil is emitted from the tank pipe (F) at a pressure of less than 50 bar.



If oil is emitted from the tank pipe, the low-pressure cut off valve is defective.

▶ If the low-pressure cut off valve is defective, replace it, see from page 74.

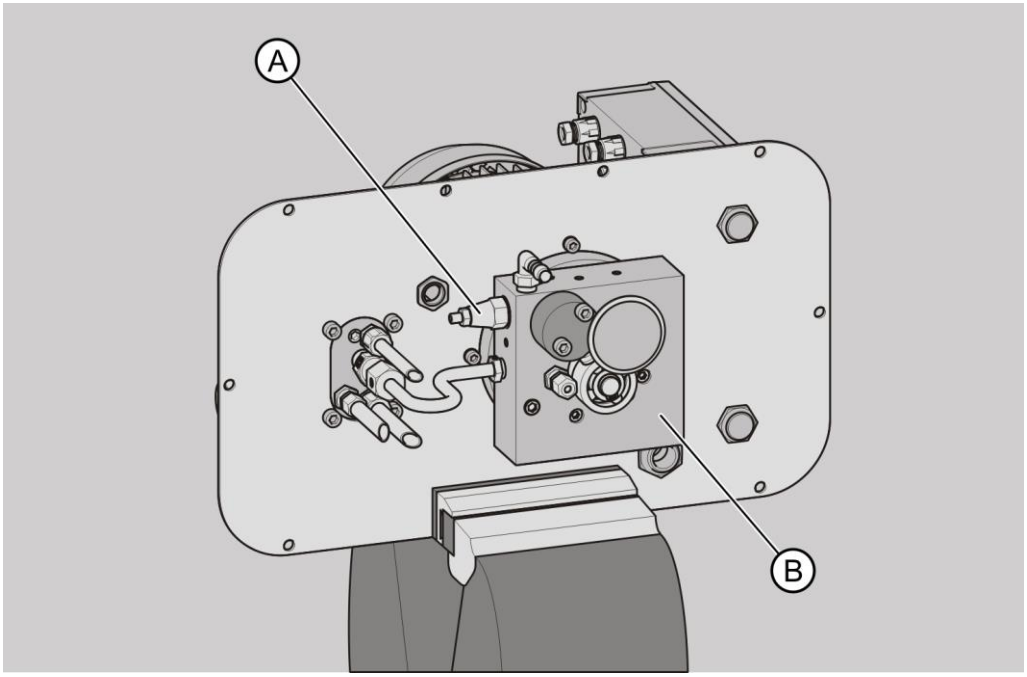
Replacing the low-pressure cut off valve

⚠ WARNING	
	Slipping hazard from leaked oil. Bruising and bone fractures possible. ▶ Clean up any leaked oil with a cloth or suitable binding agents. ▶ Wear safety shoes with non-slip soles.

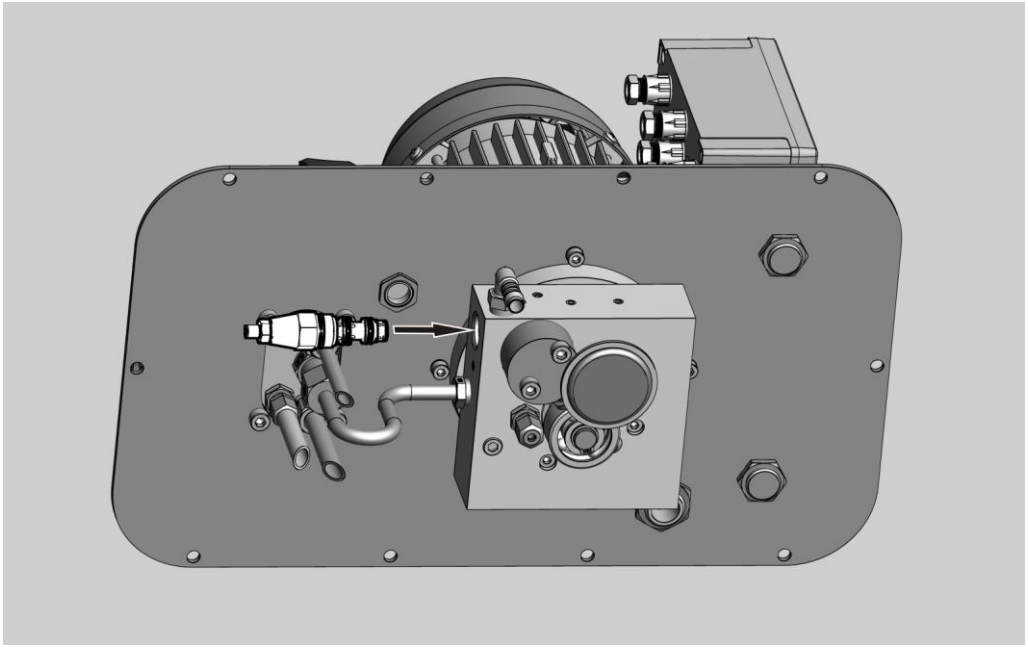
⚠ CAUTION	
	Health hazard from contact with hydraulic oil. ▶ Wear nitrile gloves and chemical-resistant protective goggles during work that may include contact with hydraulic oil.

To replace the low-pressure cut off valve, proceed as follows:

- ▶ Move the unit into the repair position for the lower structures, see from page 52.
- ▶ Unscrew the low-pressure cut off valve (A) from the pump flange (B) with a combination wrench WAF 17.



- ▶ Screw a functioning low-pressure cut off valve into the pump flange with a combination wrench WAF 17.
- ▶ Tighten the valve with a torque of 25 N m.



Checking the back pressure valve

⚠ WARNING

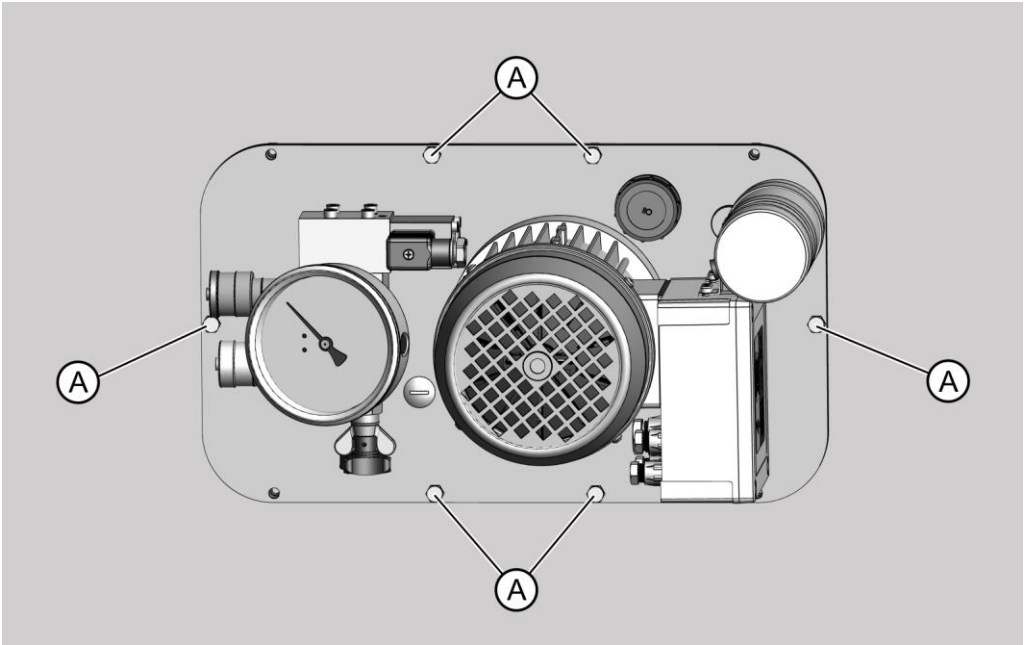
Slipping hazard from leaked oil.
Bruising and bone fractures possible.
- ▶ Clean up any leaked oil with a cloth or suitable binding agents.
- ▶ Wear safety shoes with non-slip soles.

⚠ CAUTION

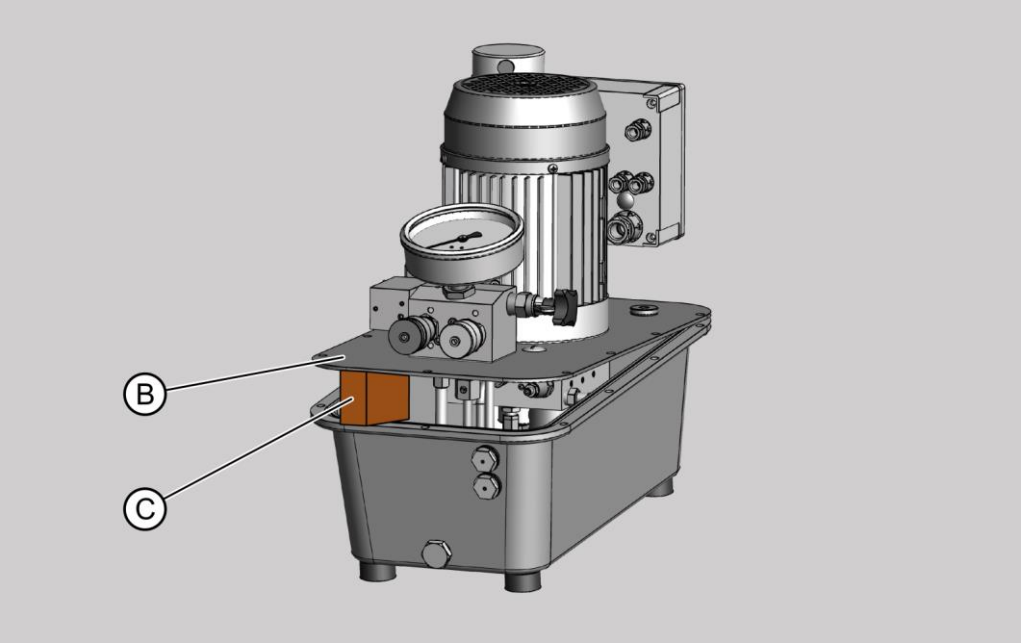
Health hazard from contact with hydraulic oil.
- ▶ Wear nitrile gloves and chemical-resistant protective goggles during work that may include contact with hydraulic oil.

To check the back pressure valve, proceed as follows:

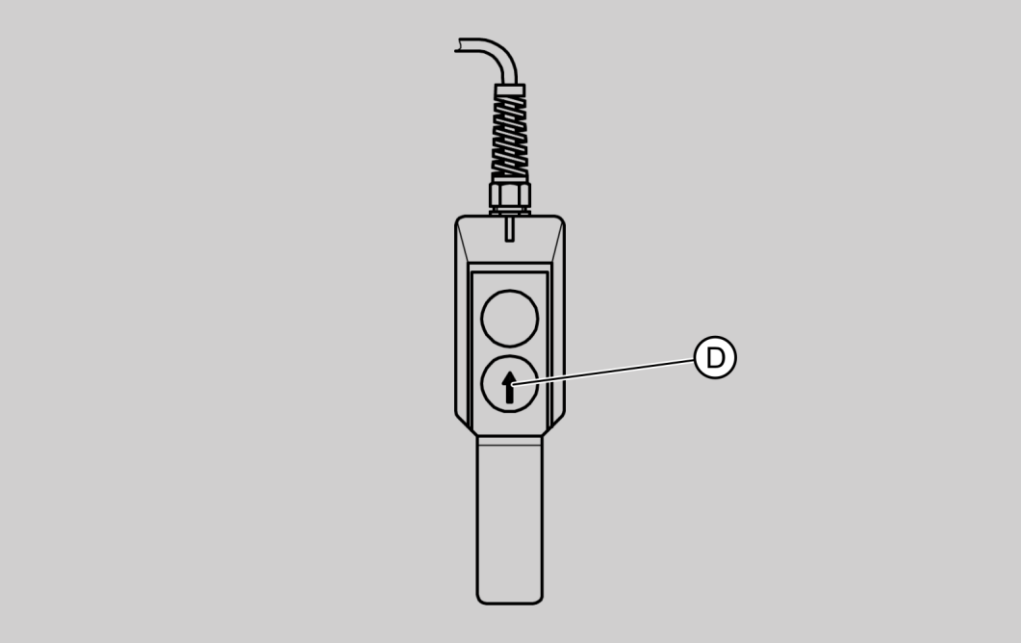
- ▶ Move the unit into the repair position for the upper structures, see from page 51.
- ▶ Remove the carrying handle, see from page 50.
- ▶ Mount the protective caps and protective plugs of the couplings, see from page 49.
- ▶ Release the screw connections (A) on the cover with two combination wrenches WAF 10, as described in the chapter “Moving the unit into the repair position for the lower structures”, see from page 52.



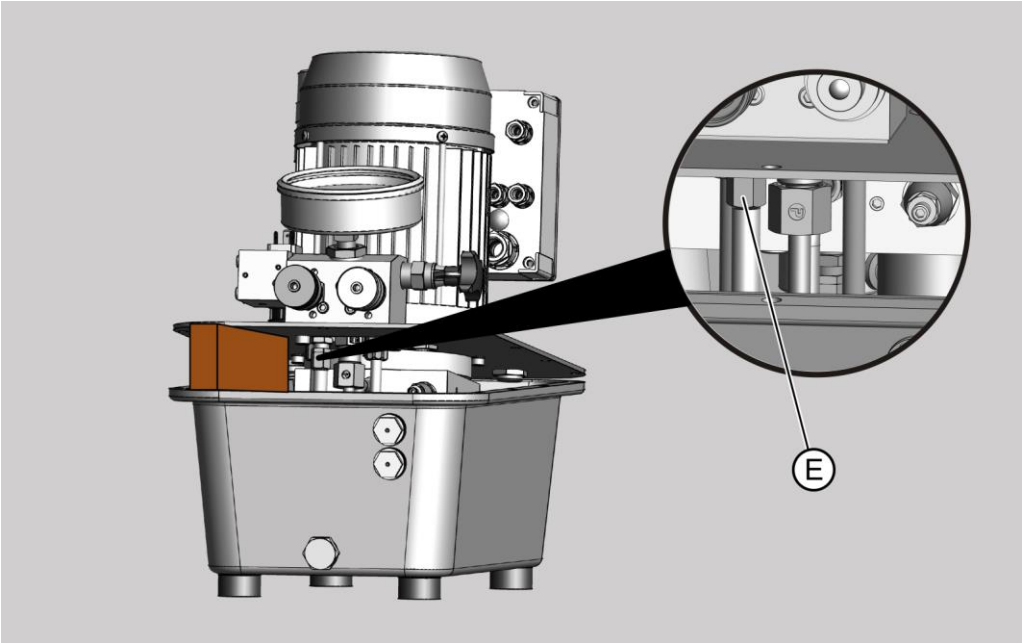
- ▶ Lift the cover (B) at the front by approx. 15 cm (6"), as otherwise oil could be ejected through the ball bearing.
- ▶ Support the cover with a rectangular piece of wood (C).



- ▶ Set the pressure of the unit to 0 bar with the torque valve.
- ▶ Switch on the pump of the unit.
- ▶ Press and hold the button (D) on the remote control and slowly increase the pressure of the unit with the torque valve.



▶ Check whether oil is emitted from the back pressure valve (E).



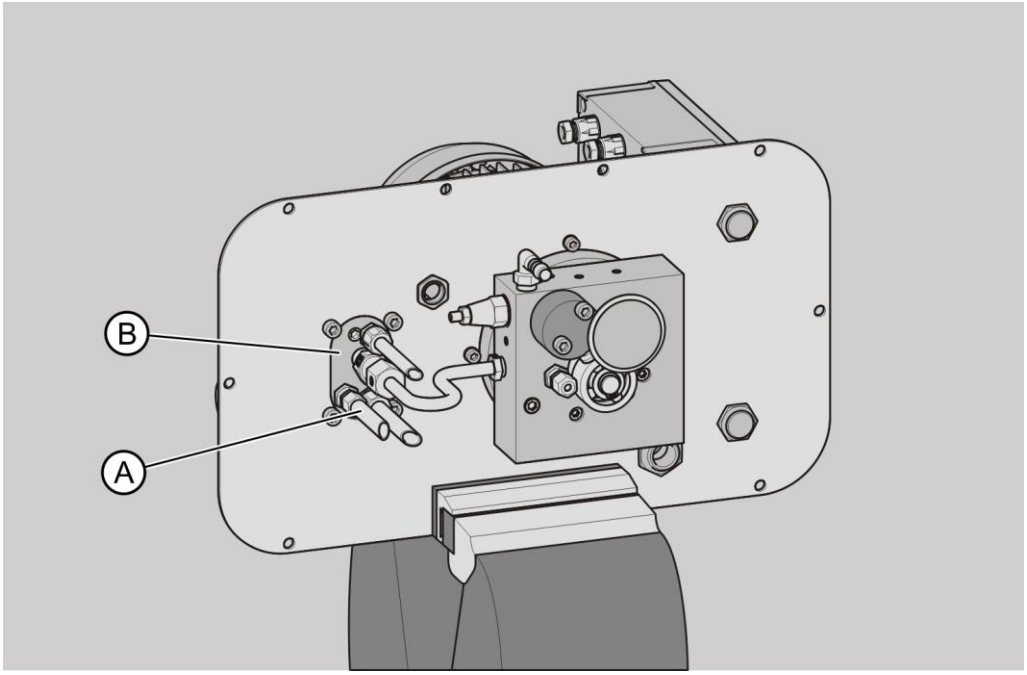
If oil is emitted from the back pressure valve, it is defective.

▶ If the back pressure valve is defective, replace it, see page 79.

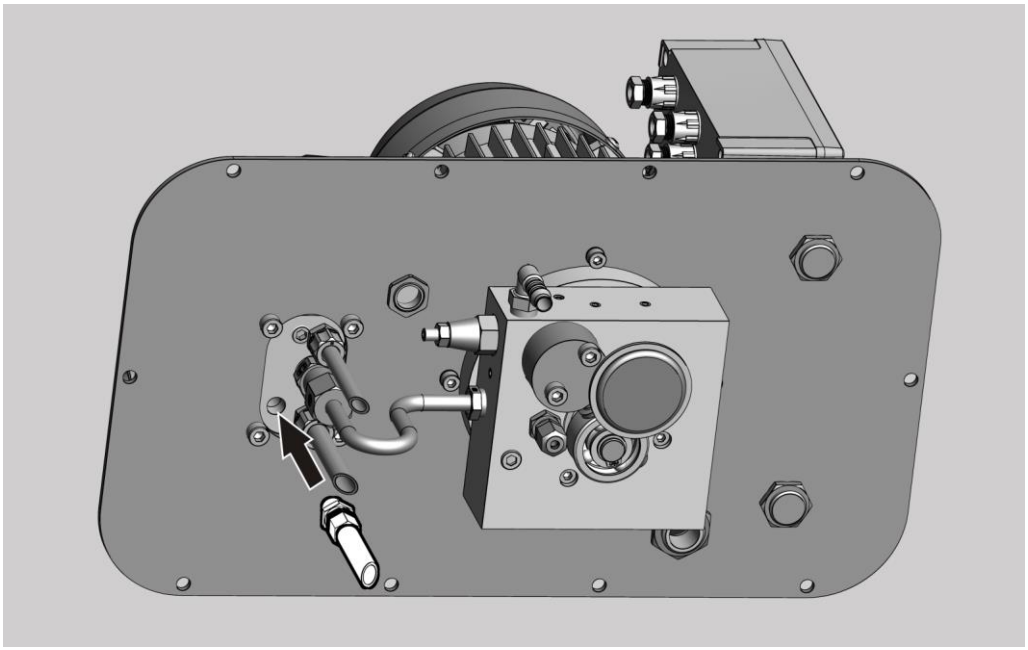
Replacing the back pressure valve

To replace the back pressure valve, proceed as follows:

- ▶ Move the unit into the repair position for the lower structures, see from page 52.
- ▶ Unscrew the back pressure valve (A) from the valve block (B) with a combination wrench WAF 14.



- ▶ Screw a functioning back pressure valve into the valve block with a combination wrench WAF 14.
- ▶ Tighten the valve with a torque of 20 N m.



Checking the pipe work

⚠ WARNING

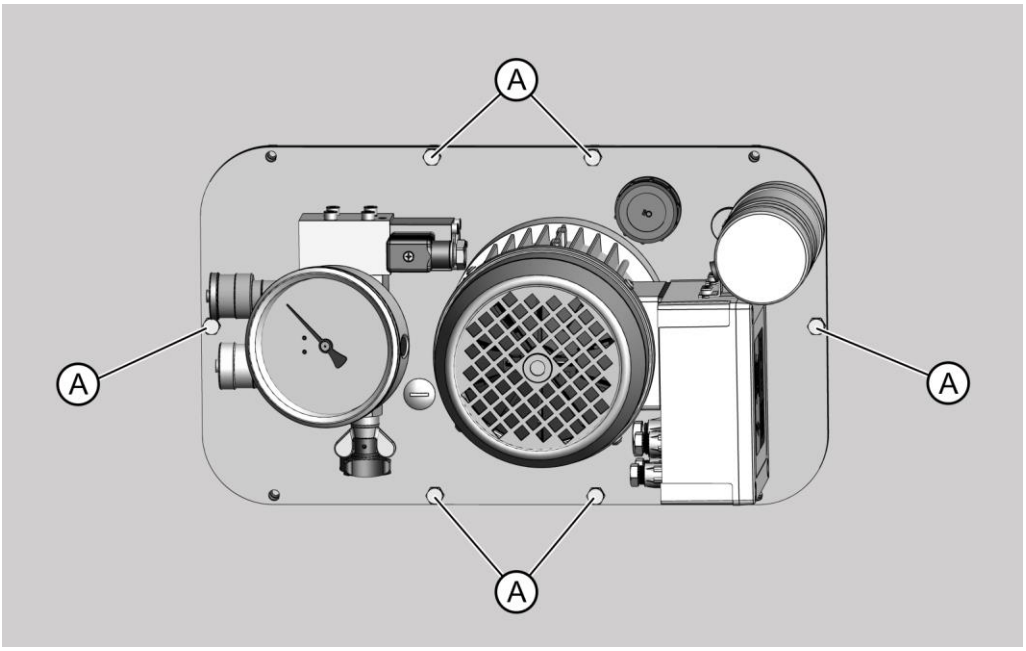
Slipping hazard from leaked oil.
Bruising and bone fractures possible.
- ▶ Clean up any leaked oil with a cloth or suitable binding agents.
- ▶ Wear safety shoes with non-slip soles.

⚠ CAUTION

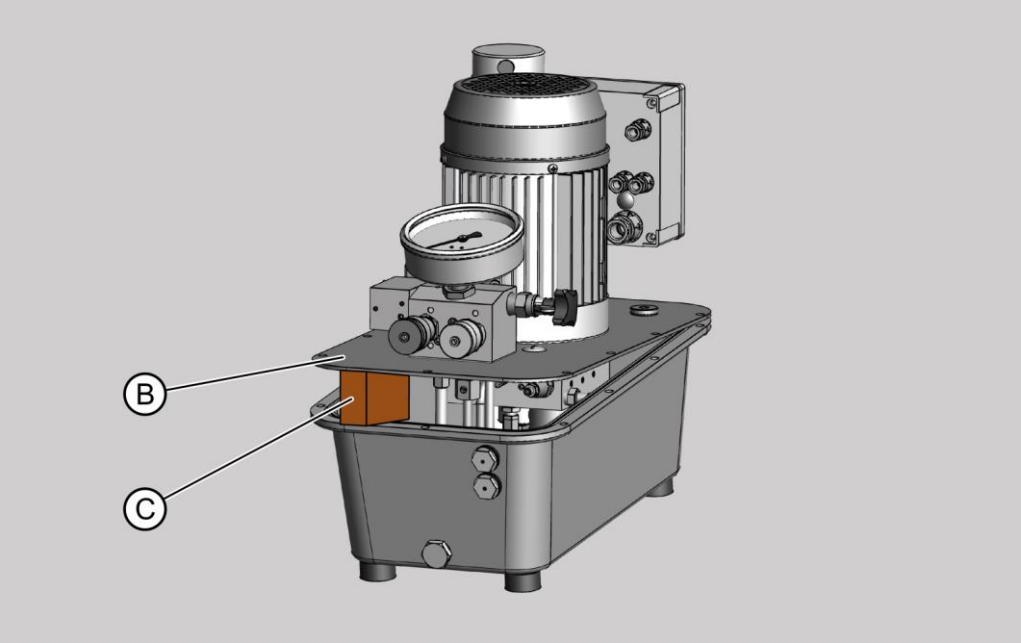
Health hazard from contact with hydraulic oil.
- ▶ Wear nitrile gloves and chemical-resistant protective goggles during work that may include contact with hydraulic oil.

To check the pipe work, proceed as follows:

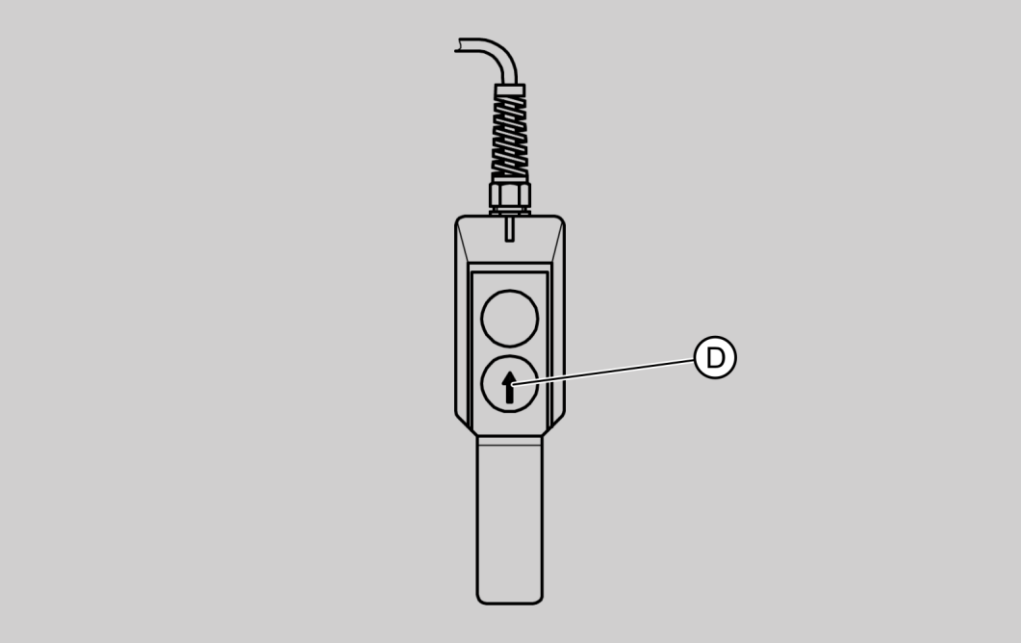
- ▶ Move the unit into the repair position for the upper structures, see from page 51.
- ▶ Remove the carrying handle, see from page 50.
- ▶ Mount the protective caps and protective plugs of the couplings, see from page 49.
- ▶ Release the screw connections (A) of the cover with two combination wrenches WAF 10.



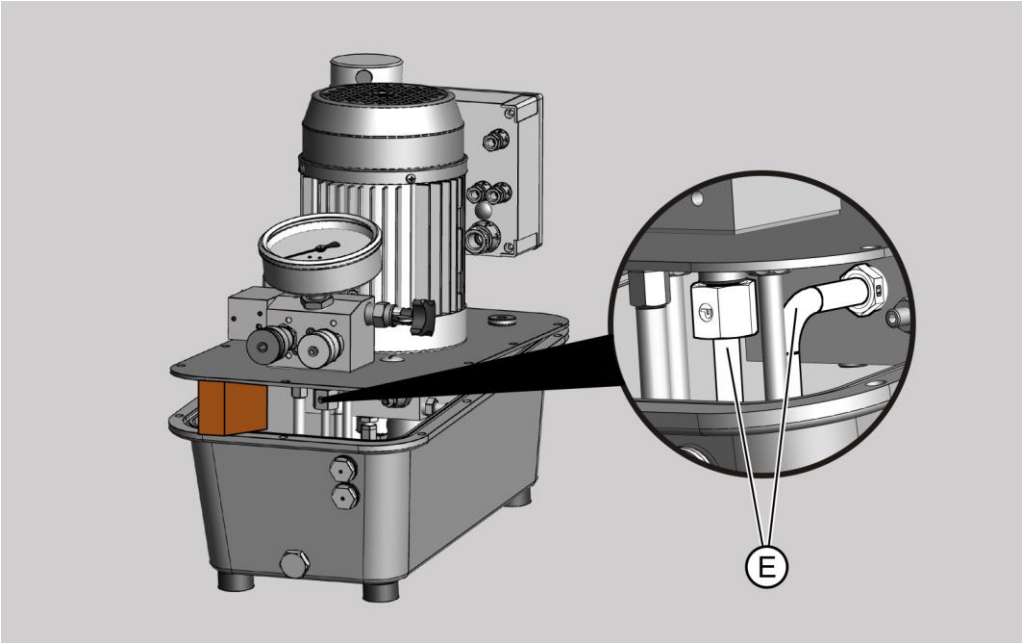
- ▶ Lift the cover (B) at the front by approx. 15 cm (6"), as otherwise oil could be ejected through the ball bearing.
- ▶ Support the cover with a rectangular piece of wood (C).



- ▶ Set the pressure of the unit to 0 bar with the torque valve.
- ▶ Switch on the pump of the unit.
- ▶ Press and hold the button (D) on the remote control and slowly increase the pressure of the unit with the torque valve.



▶ Check whether oil is dripping from the pipe work (E).



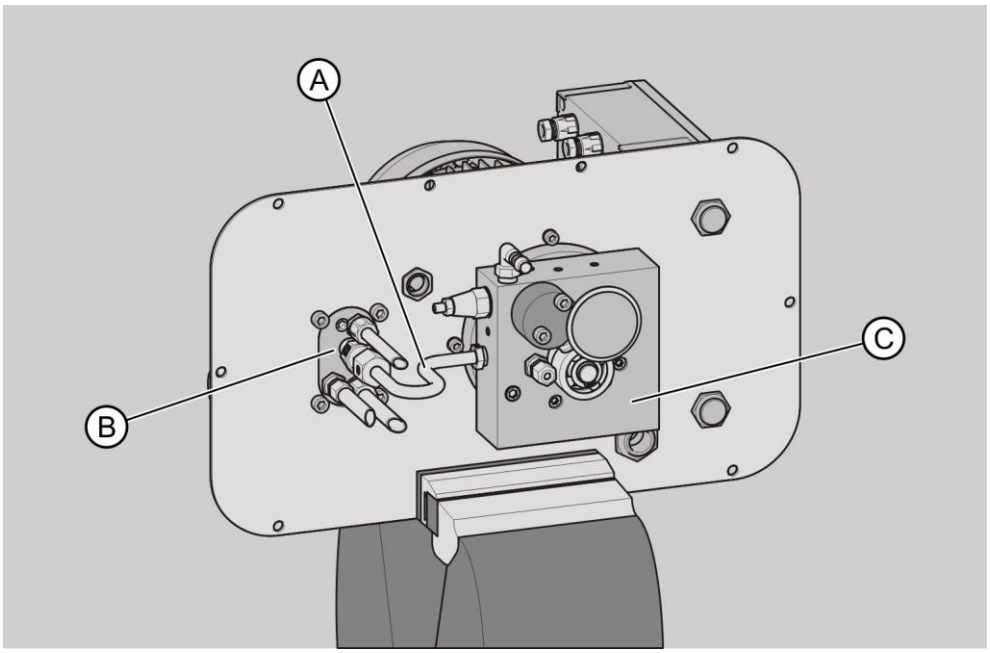
If oil drips from the pipe work, it is defective.

▶ If the pipe work is defective, replace it, see from page 83.

Replacing the pipe work

To replace the pipe work, proceed as follows:

- ▶ Move the unit into the repair position for the lower structures, see from page 52.
- ▶ Unscrew the pipe work (A) from the valve block (B) with an open-end wrench WAF 19.
- ▶ Unscrew the pipe work (A) from the pump flange (B) with a combination wrench WAF 14.



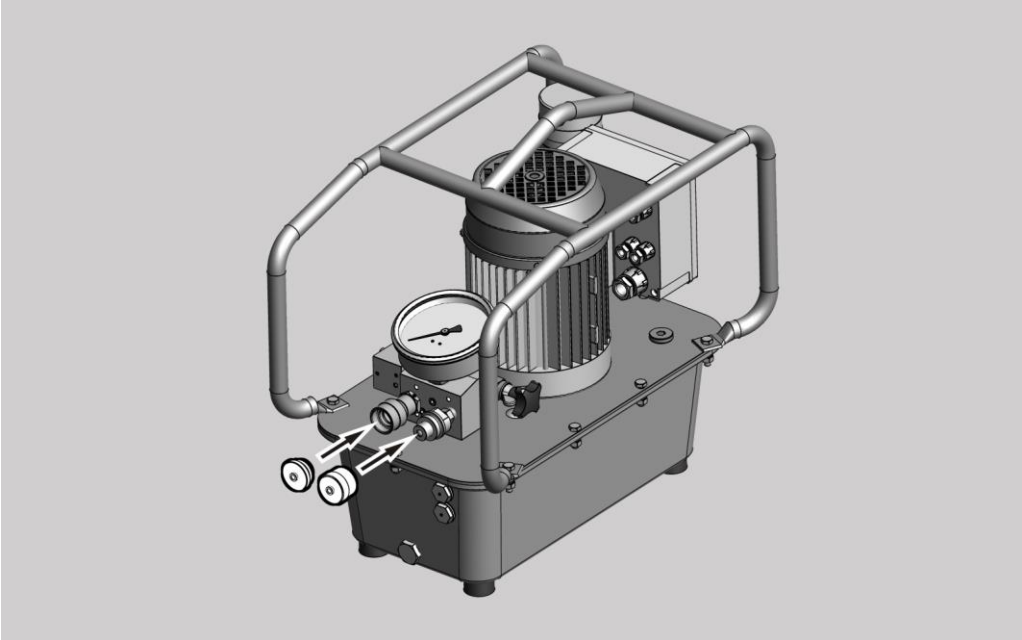
- ▶ Press the functioning pipe work into the screw collar of the valve block.
- ▶ Hold the screw collar with an open-end wrench WAF 19 and tighten the sleeve nut as tightly as possible with an open-end wrench WAF 19.
- ▶ Press the pipe work into the pump flange.
- ▶ Screw in the pipe work with a torque wrench WAF 14 and a torque of 25 N m.
- ▶ Check the pipe work, see page 80

Checks and repairs on mechanical components

Preparing checks and repairs on mechanical components

Proceed as follows to prepare mechanical checks and repairs on the unit:

▶ Ensure that the couplings on the unit are secured with the appropriate protective caps and the protective plugs.



▶ Move the unit into the repair position for the upper structures, see from page 51.

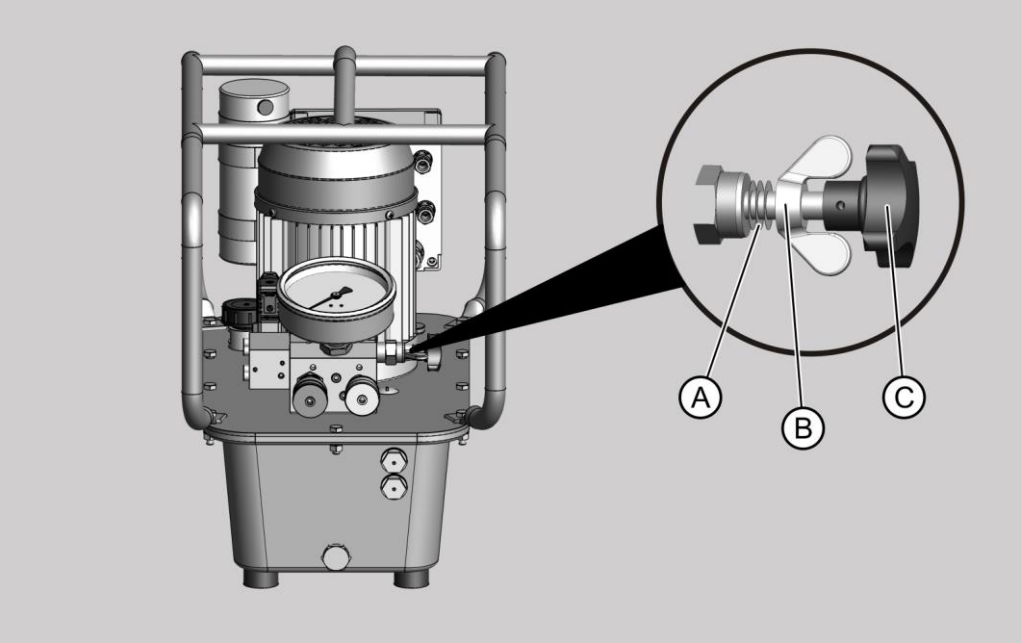
Carrying out checks and repairs on mechanical components

Checking the torque valve mechanically

⚠ CAUTION	
	Risk of burns from hot components. The wing nut can reach a temperature of about 60 °C during operation. ▶ Wear protective gloves to prevent burns when releasing the wing nut.

To check the torque valve mechanically, proceed as follows:

- ▶ Move the unit into the repair position for the upper structures, see from page 51.
- ▶ Turn the cross-shaped knob (C) counter-clockwise to gain access to the wing nut (B).
- ▶ Turn the wing nut counter-clockwise to gain access to the shims (A).
- ▶ Destroy one shim.
- ▶ Remove the destroyed shim.
- ▶ Turn the wing nut clockwise to the stop.
- ▶ Turn the cross-shaped knob clockwise until it rests against the wing nut.



Removing the shim allows the torque valve to be screwed in further which raises the pressure.

- ▶ Use the star-shaped knob to turn the torque valve in to the maximum.
- ▶ Check on the pressure gage whether the maximum pressure of 700 bar (10,000 psi) is reached.

If the maximum pressure is reached, the torque valve functions properly.

If the maximum pressure is not reached, repeat the process with the second and possibly with the third shim.

If you have removed all shims and maximum pressure is still not achieved, the torque valve is defective.

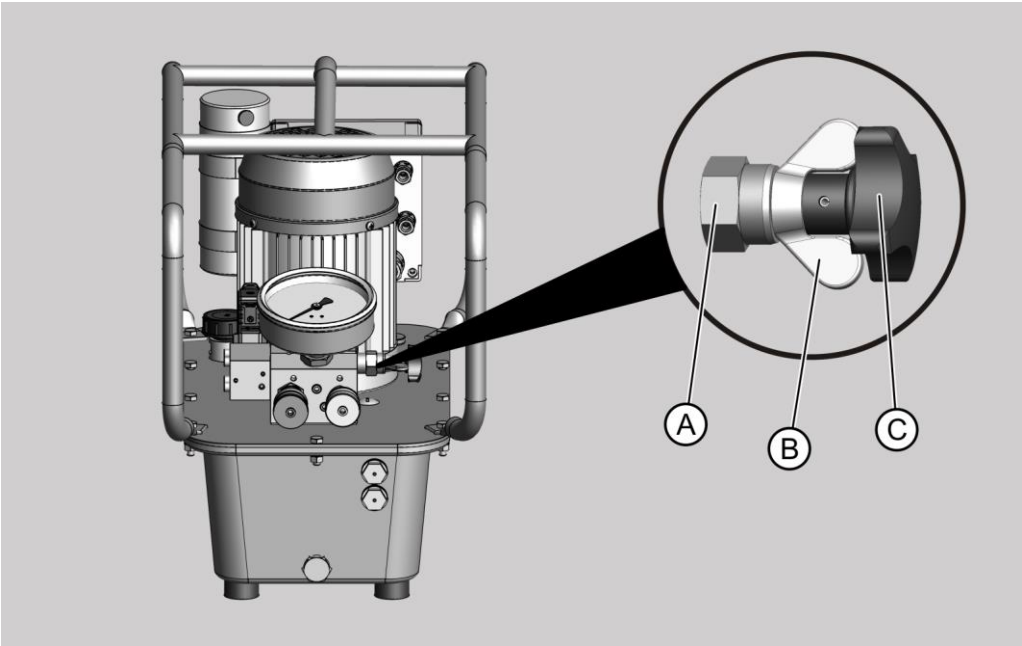
- ▶ Replace the torque valve, see from page 86.

Replacing the torque valve

⚠ CAUTION	
	Risk of burns from hot components. The wing nut can reach a temperature of about 60 °C during operation. ▶ Wear protective gloves to prevent burns when releasing the wing nut.

To replace the torque valve, proceed as follows:

- ▶ Move the unit into the repair position for the upper structures, see from page 51.
- ▶ Release the wing nut (B).
- ▶ Turn the star-shaped knob (C) counter-clockwise to the stop.
- ▶ Release the torque valve at the screw connection (A) with a 19 mm open-end wrench.



- ▶ Remove the defective torque valve.
- ▶ Install a functioning torque valve.
- ▶ Install a torque valve with a 19 mm open-end wrench.

Completing repair work

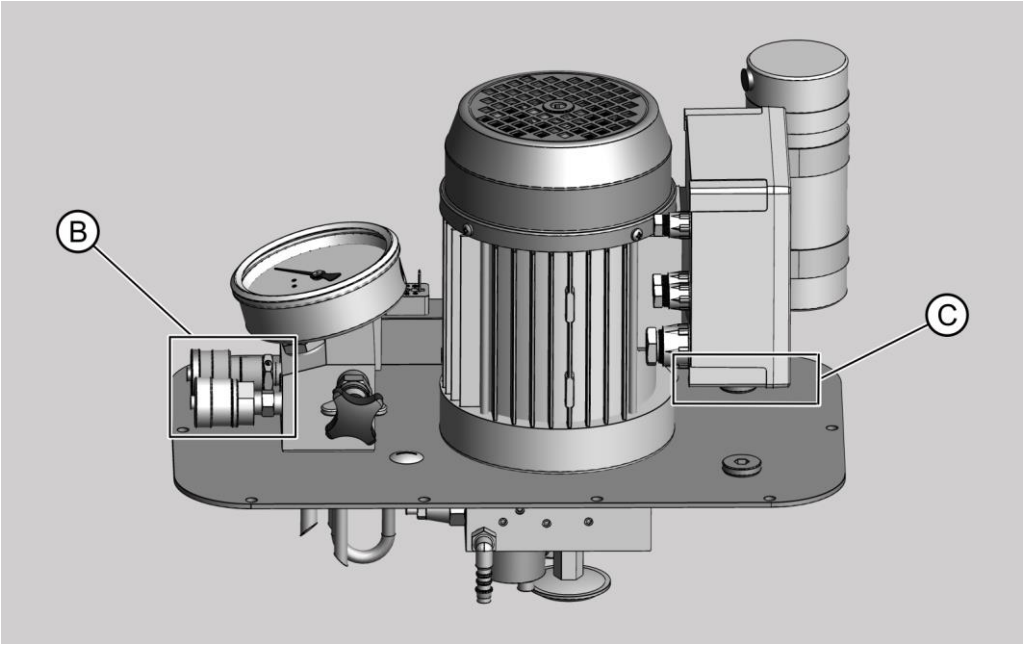
Mounting the unit on the oil tank

⚠ WARNING	
	Slipping hazard from leaked oil. Bruising and bone fractures possible. ▶ Clean up any leaked oil with a cloth or suitable binding agents. ▶ Wear safety shoes with non-slip soles.

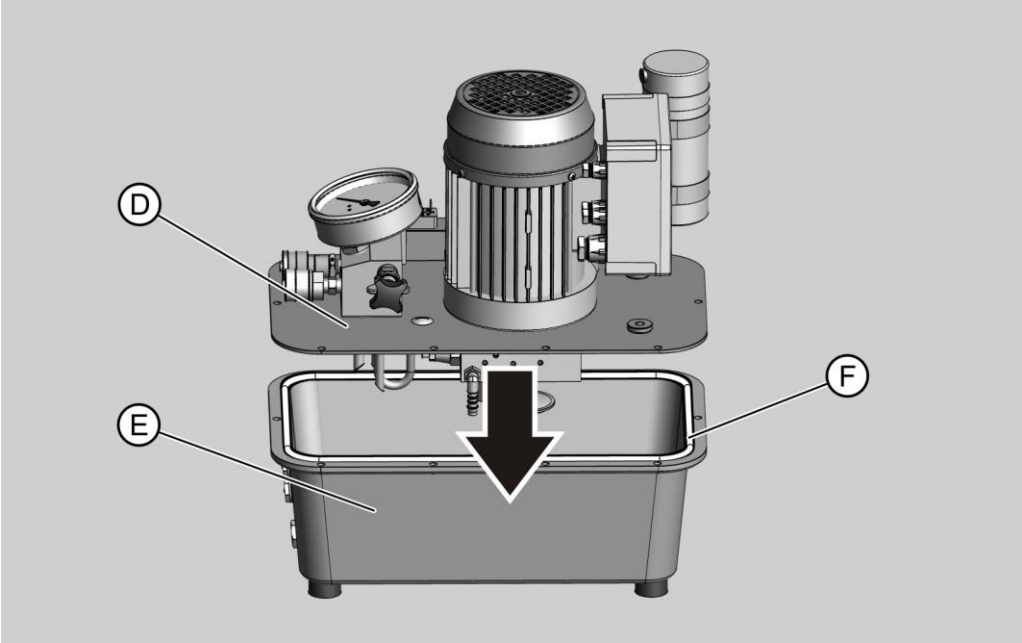
⚠ CAUTION	
	Health hazard from contact with hydraulic oil. ▶ Wear nitrile gloves and chemical-resistant protective goggles during work that may include contact with hydraulic oil.

Proceed as follows to mount the unit back onto the oil tank:

- ▶ Ensure that the oil tank rests on a stable surface.
- ▶ Hold the unit by the couplings (B) and on the underside of the electric control (C).

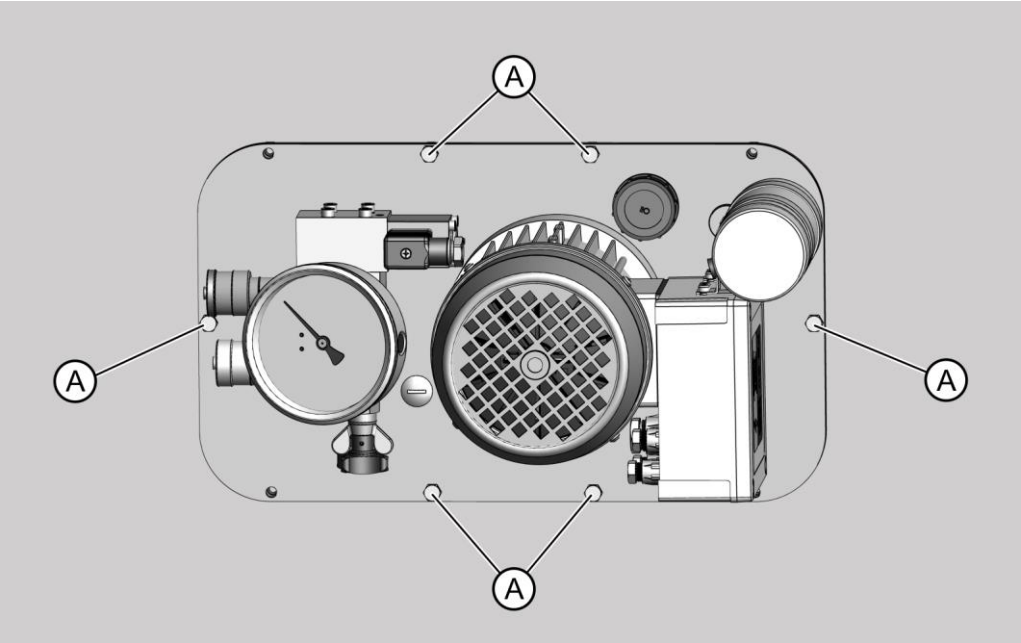


- ▶ Ensure that the seal (F) at the top of the oil tank is installed and undamaged.
- ▶ Place the unit (D) onto the oil tank (E).



Use the screws M6 × 20 for fixing the unit to the oil tank.

- ▶ Place the screws (A) into the boreholes from the top.
- ▶ Secure the power cord to the oil tank with a hose clamp.
- ▶ Secure the remote control cable to the oil tank with a hose clamp.
- ▶ Slide one tooth lock washer over each thread from underneath.
- ▶ Screw the nuts onto the screws.
- ▶ Tighten the screws and nuts with a torque of 12 N m.



Cleaning unit

⚠ WARNING
 Slipping hazard from leaked oil. Bruising and bone fractures possible. ▶ Clean up any leaked oil with a cloth or suitable binding agents. ▶ Wear safety shoes with non-slip soles.

⚠ CAUTION
 Health hazard from contact with hydraulic oil. ▶ Wear nitrile gloves and chemical-resistant protective goggles during work that may include contact with hydraulic oil.

ATTENTION!
Water or steam may enter into the unit. There is a risk of damage to the unit and limited functionality. ▶ Never clean the unit with a steam jet cleaner, cold cleaner or water.

▶ Clean the unit with a clean and absorbent cloth.

▶ Dispose of the cloth in an environmentally friendly manner.

Carry out a test run

- After each maintenance or repair measure, carry out a test run according to the operating instructions for the unit.

Disposal

In Europe

Observe and follow the regulations for disposal. If in doubt, please consult your municipal or local authority.

⚠ WARNING	
	Risk of poisoning from hydraulic oil Hydraulic oil can contaminate ground water and soil. ▶ Always dispose of hydraulic oil in an environmentally friendly manner using a specialist firm.

⚠ CAUTION	
	Health hazard from contact with hydraulic oil. ▶ Wear nitrile gloves and chemical-resistant protective goggles during work that may include contact with hydraulic oil.

▶ Dispose of hydraulic oil in an environmentally friendly manner using a specialist firm.

Replaced wear parts and defective components consist of e. g. the following materials:

- steel
- rubber
- plastic
- copper

⚠ WARNING	
	Risk of poisoning from hydraulic oil Hydraulic oil can contaminate ground water and soil. ▶ Use a cloth to remove hydraulic oil from parts to be disposed of. ▶ Dispose of the cloth in an environmentally friendly manner after use.

▶ Remove any residue of hydraulic oil from the replaced wear parts or defective components with a cloth.

▶ Dispose of the replaced wear parts or defective components in an environmentally friendly manner.

▶ Dispose of the cloth in an environmentally friendly manner.

In the USA

Observe and follow the regulations for disposal. If in doubt, please consult your municipal or local authority.

⚠ WARNING	
	Risk of poisoning from hydraulic oil Hydraulic oil can contaminate ground water and soil. ▶ Always dispose of hydraulic oil in an environmentally friendly manner using a specialist firm.

⚠ CAUTION	
	Health hazard from contact with hydraulic oil. ▶ Wear nitrile gloves and chemical-resistant protective goggles during work that may include contact with hydraulic oil.

▶ Dispose of hydraulic oil in an environmentally friendly manner using a specialist firm.

Replaced wear parts and defective components consist of e. g. the following materials:

- steel
- rubber
- plastic
- copper

⚠ WARNING	
	Risk of poisoning from hydraulic oil Hydraulic oil can contaminate ground water and soil. ▶ Use a cloth to remove hydraulic oil from parts to be disposed of. ▶ Dispose of the cloth in an environmentally friendly manner after use.

▶ Remove any residue of hydraulic oil from the replaced wear parts or defective components with a cloth.

▶ Dispose of the cloth in an environmentally friendly manner.

▶ Dispose of the unit in an environmentally friendly manner through the manufacturer.