rexroth
A Bosch Company

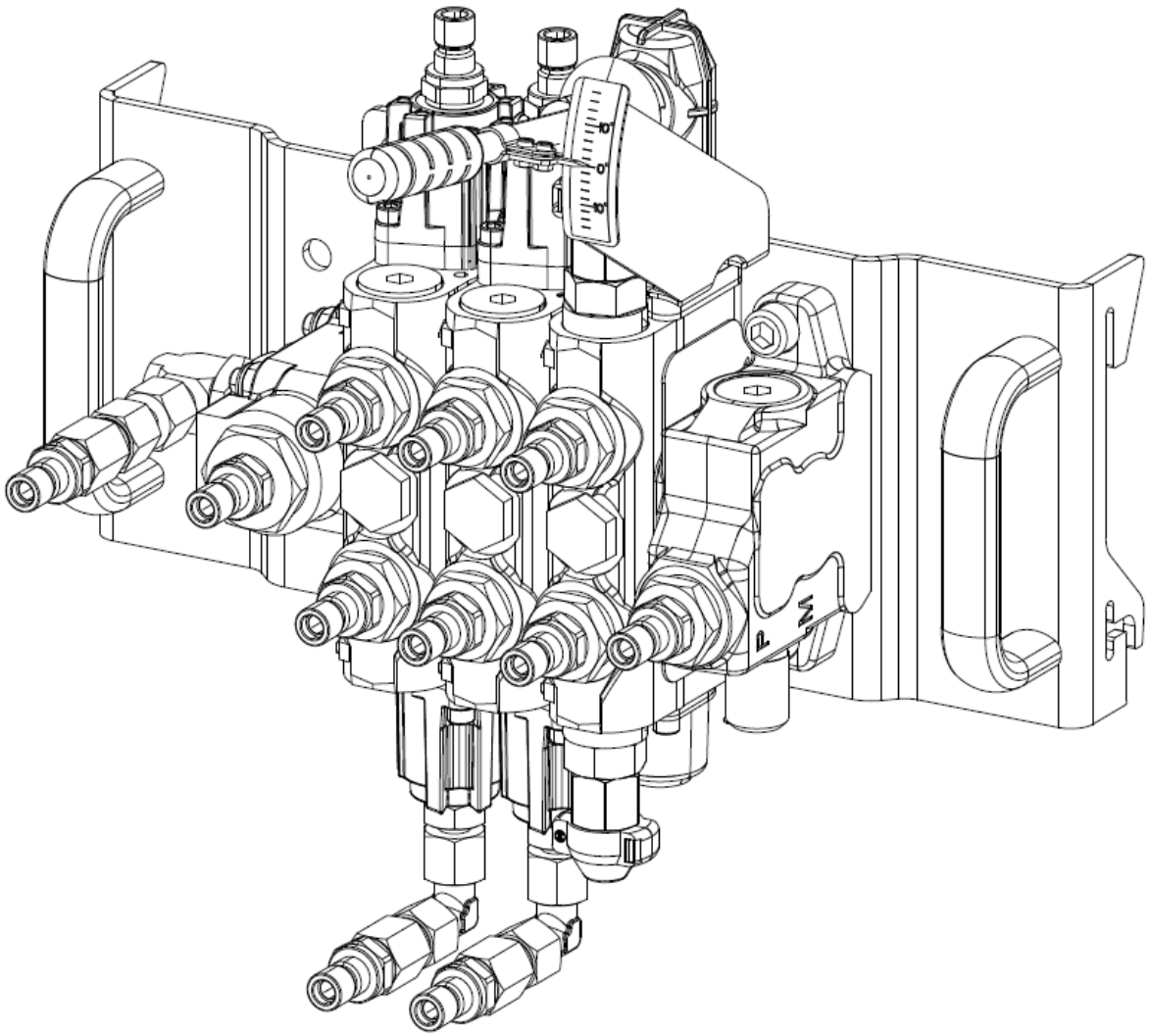
Training components for the DS4 training system - Mobile hydraulics

TS-DS-MH2X/3SM-12-R908403821

RE 09985-MON/09.2023

Replaces: RE 09985-/12.11
English

Assembly instructions



The data specified above serve to describe the product. If there is also information on the use, it is only to be regarded as application examples and proposals. Catalog information does not constitute warranted properties. The information given does not release the user from the obligation of own judgment and verification. Our products are subject to a natural process of wear and aging.

The cover page shows an example configuration. The product supplied may therefore differ from the photo shown.

The original assembly instructions were prepared in German.

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1 About these assembly instructions

This document describes the TS-MH2X/3SM-12 training component on the basis of the industrial serial product 3SM-12 mobile control block.
Further down in the description, the term "Control block TS-…/3SM-12" will be used for the training component.

These assembly instructions contain important information on the safe and appropriate transport, assembly, maintenance, disassembly and simple troubleshooting of the control block TS-…/3SM-12.

The original assembly instructions were prepared in German.

Please note that the operating instructions for the DS4 hydraulic training system are an indispensable part for compliance with occupational health and safety regulations for the entire handling of the DS4 hydraulic training system.

1.1 Related documents

Please also observe the following documents:

- Data sheet RE 64122 "Mobile control block, 6-way version, in sandwich plate design"
- Operating instructions RE 00225-B "DS4 hydraulic training system"
- Data sheet RE 64020 "Hydraulic valves for mobile applications"

Please also observe the generally applicable, legal or otherwise binding regulations of the European or national legislation and the regulations on accident prevention and environmental protection applicable in your country.

If you need more help, please contact your local foreign subsidiary which you can find at:
www.boschrexroth.com

1.2 Abbreviations used

Abbreviations used

Abbreviation	Meaning
RE	Rexroth document number
MON	Assembly instructions
DCA	Drive & Control Academy
MNR	Material number
TS	Training system
DS4	Didactics system 4 (hydraulic training system)
T	Tank port
P	Pump port
M	Minimess connection

2 General safety instructions

The TS-.../3SM-12 control block has been manufactured according to the generally accepted state-of-the-art. There is, however, still a risk of personal injury and damage to property if the general safety instructions and warnings contained in these assembly instructions are not observed.

Please observe the following information:

- Read these assembly instructions completely and thoroughly before working with the control block.
- Read the operating instructions for the DS4 hydraulic training system before working with the DS4 training system and the TS-…/3SM-12 control block. Please observe particularly chapter 2 "Safety instructions".
- Keep the assembly instructions in a location where they are accessible to all users at all times.
- Always include the assembly instructions when you pass the TS-…/3SM-12 control block on to third parties.

2.1 Intended use

The TS-.../3SM-12 control block may generally only be used as component for setting up hydraulic exercises at the DS4 training system.

It is technical equipment for hydraulic experts or for persons under the supervision of such qualified persons.

The control block is intended for the set-up of exercises and simulations according to the Bosch Rexroth project manuals available for that purpose or comparable exercise arrangements in order to impart knowledge and skills in the area of hydraulics in the industrial and technical training and further development.

The TS-.../3SM-12 control block is not intended for private use.

The intended use also includes that you have completely read and understood this information and direction for use, in particular chapter "2 General safety instructions".

Deviating from the general rule, use as component for setting up exercises at other training systems is possible provided that:

- There are the same brackets for the mechanical system,
- Identical quick release couplings are used,
- The identical performance limits as specified in the technical data are complied with,
- Equal superior safety equipment is available and effective.

2.2 Improper use

Any use of the TS-.../3SM-12 control block other than described in chapter “Intended use” is considered as improper.

The operation of hydraulic hoses outside their life cycle is prohibited.

Any non-professional use of the product is prohibited during the practical exercises and outside the training sessions.

2.3 Safety instructions in these assembly instructions

In these assembly instructions, there are safety instructions before the steps whenever there is a risk of personal injury or damage to the equipment. The measures described for the prevention of dangers must be observed.

Meaning of signal words

Signal word	Application
WARNING! 	Indicates a potentially hazardous situation, which, if not avoided, could result in serious injury or even death.

2.4 Adhere to the following instructions

For safety in general

- Observe the regulations on accident prevention and environmental protection for the country where the product is used and at the workplace.
- Check the product for visible defects, for example cracks in the housing or missing lead seals, screws, covers or seals.
- Exclusively use Rexroth products in technically perfect condition.
- Exchange defective quick release couplings immediately.
- Make sure that all hydraulic connections are either used or covered. Commission the product only if it is installed completely.
- Never assemble and disassemble components under pressure! There is a risk of injury from components flying around (missiles) or from leaking oil (oil jet).
- Please observe the information on the pressure relief in the project manual.

For your personal safety

- Persons who assemble, operate, disassemble or maintain Rexroth products must not consume any alcohol, drugs or pharmaceuticals that may affect their ability to react.
- Working shoes and safety goggles must be worn as personal protective equipment during transport, assembly and disassembly.

To maintain the functionality

- Never relieve the pressure by opening the hydraulic system (fittings).
- When assembling, provide for absolute cleanness in order to prevent contamination from getting into the hydraulic piping and causing product wear or malfunctions.
- Let the product acclimate itself for several hours before commissioning, as otherwise water may condense in the housing.
- Before commissioning, make sure that all the seals and caps of the quick release couplings are installed correctly and undamaged to ensure that fluids and contamination parts are prevented from penetrating the product.
- Close unused Minimess connections using protective caps. Contamination will lead to leakage in the Minimess connection.
- Never try to connect the quick release couplings using force. Set the lever of the control block into neutral position and ensure pressure relief according to the exercise set-up.

Warranty

- The warranty expires if the product is incorrectly assembled, not used as intended and/or handled improperly.
- Do not change or modify the TS-.../3SM-12 control block.
- Only use the product within the performance limits specified in the technical data.

3 Scope of delivery

Scope of delivery

Quantity	Designation	Mat. no.
1	Training component for the mobile hydraulics, TS-MH2X/3SM-12 control block	R961005970
1	Assembly instructions RE 09985-MON in English	R961005953

4 Product description

4.1 Performance description

The control block allows for the proportional-hydraulic control of directional valves. It shows the following features:

- Sensitive actuation
- Precise control free of play
- Low actuating force at the control lever

Suitability for teaching and learning contents

Within the scope of industrial training and further development, the TS-.../3SM-12 control block can be used to impart the following contents:

- The mode of operation when controlling mobile hydraulic control blocks, depending on the equipment.
- The influence of the control curves (characteristic curves) of pilot control units on the control behavior.
- The influence of loads; the different load types.
- The system comparison in parallel operation (2 axes), the degree of mutual influencing of the axes in the control system.

Use in exercise manuals

The TS-.../3SM-12 control block can be used to set up exercises at the "DS4" hydraulic training stand, which - at the time of printing - are described in the following project manuals:

- "Mobile hydraulics throttle control" project manual:
  Trainer manual RE 00886; trainee manual RE 00887.

4.2 Unit description

The TS-.../3SM-12 control block consists of:

- 1 input element with P port and Minimess connection,
- 1 end element with T port and P3 pressure forwarding,
- 1 directional valve element with manual control via 1 control lever with two secondary pressure relief valves,
- 2 directional valve elements with hydraulic control without secondary pressure relief valves
- Retaining sheet.

Inlet pressure

The inlet pressure is supplied via port "P".

Secondary pressure relief valve

An the first directional valve disc, there are two secondary pressure relief valves. They are used to reduce the working pressure.

Control lever

The control lever is used to activate and/or deactivate the 1st directional valve element.

Pilot ports

The hydraulic control pressure is used to control the hydraulic fluid flow through the directional valve elements 2 and 3.

Measuring port

The measuring port has a protective cap and a check valve which is opened upon connection of the measuring line. When it is screwed off, the check valve automatically closes the test point.

Quick release couplings

Every quick release coupling contains a check valve which opens upon insertion of the counterpart and automatically closes upon its removal.

Functional principle in detail

The hydraulic control pressure or the manual lever movement is used to operate the directional valve spools. The actuator is moved depending on the load pressure. The pressure differential is load pressure-independent and not compensated.

For a more detailed description of the hydraulic functional principle please refer to the data sheet: Data sheet RE 64122 "Mobile control block, 6-way version, in sandwich plate design".

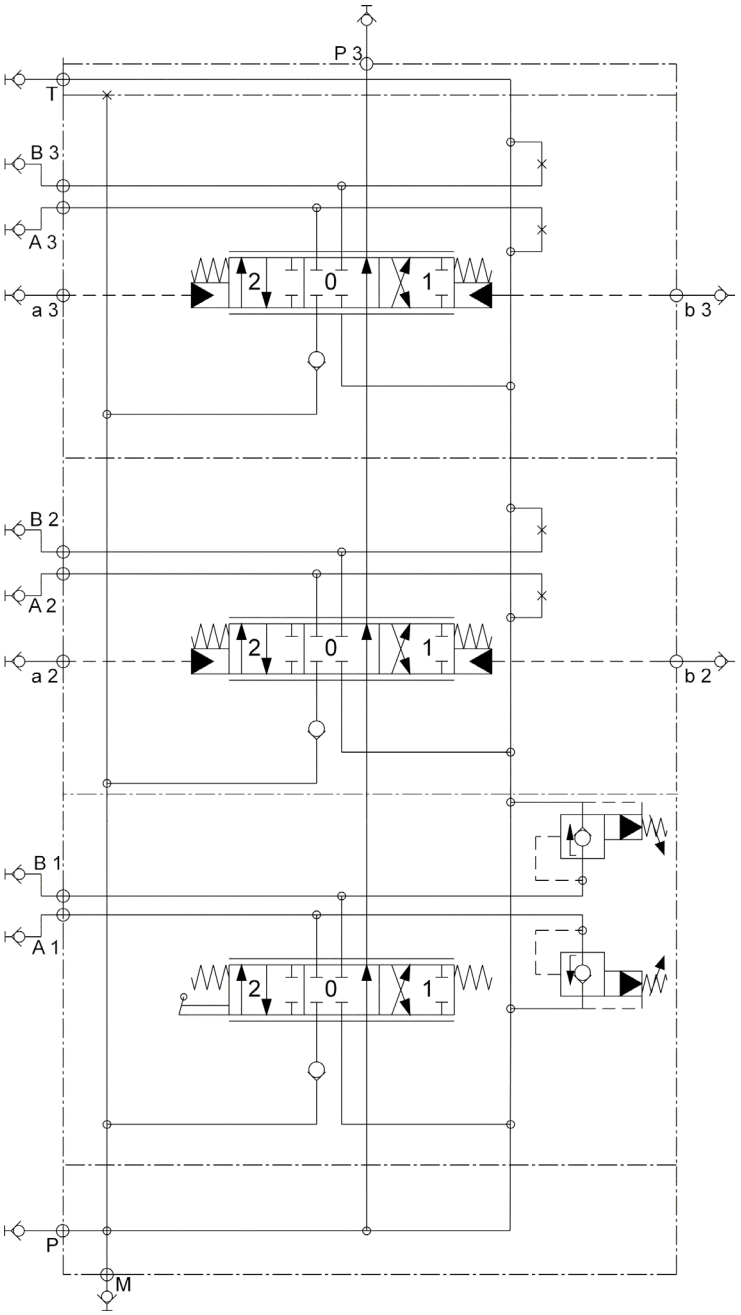

Fig. 1: Hydraulic control block scheme

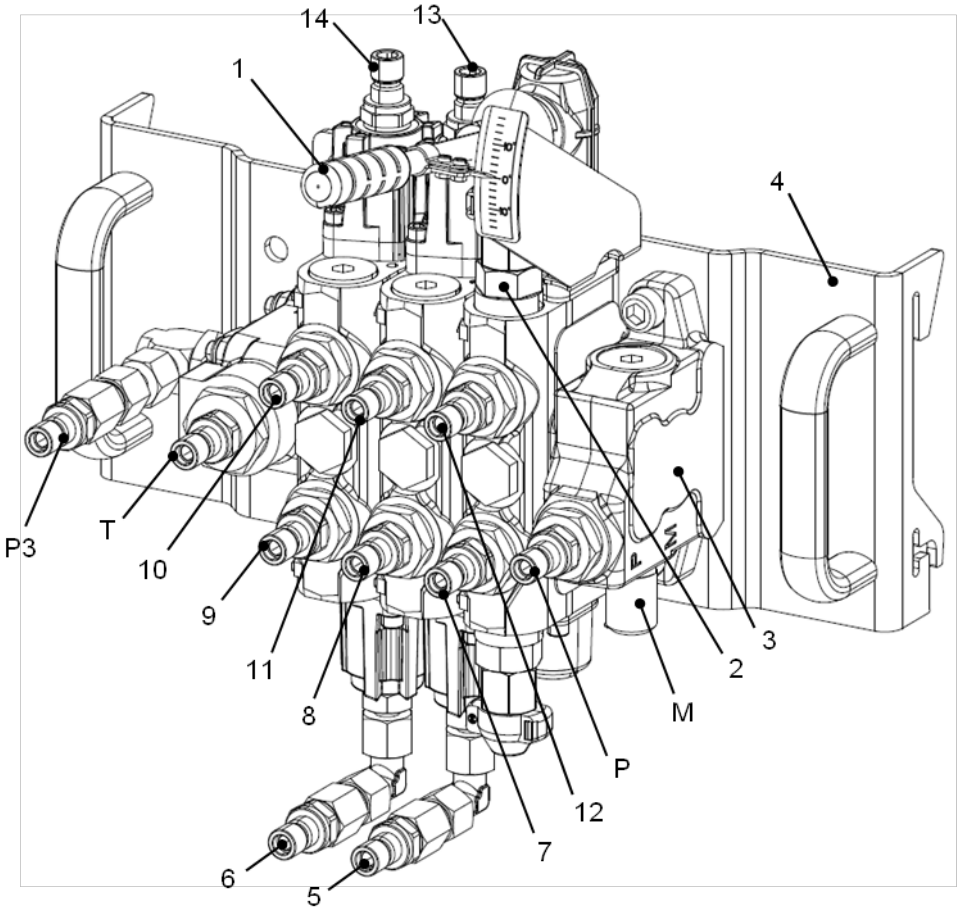

Fig. 2: Control block overview

1 Control lever with display
2 Sealed secondary pressure relief valve
3 Input element
4 Retaining sheet
5 Pilot oil port "b" directional valve disc 2
6 Pilot oil port "b" directional valve disc 3
7 Working port "B" directional valve disc 1
8 Working port "B" directional valve disc 2
9 Working port "B" directional valve disc 3
10 Working port "A" directional valve disc 3
11 Working port "A" directional valve disc 2
12 Working port "A" directional valve disc 1
13 Pilot oil port "a" directional valve disc 2
14 Pilot oil port "a" directional valve disc 3
M Minimess connection
P Port for pressure line
T Port for relief line
P3 Pressure port

4.3 Product identification

The training component is identified by means of the attached name plate.

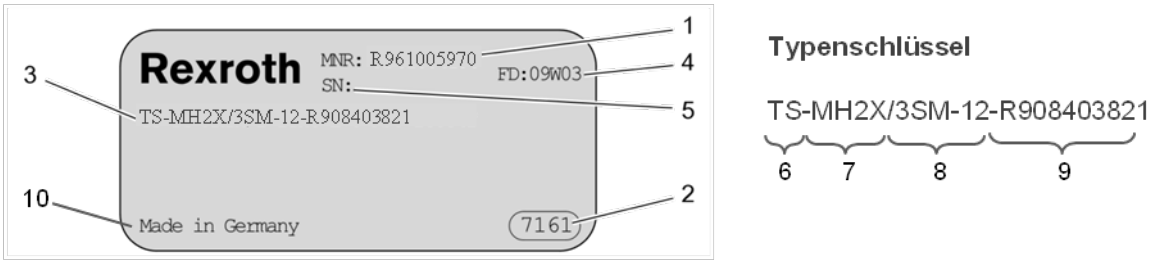

Fig. 3: Name plate and type key

1 Material number of the training component
2 Internal code for area / works number
3 Type designation of the training component
4 Date of manufacture
5 Serial number (placeholder)
6 TS training system assignment
7 MH - mobile hydraulics, 2X - assignment
8 3SM-12- Functional code, industrial serial product
9 R908403821 – Material number, industrial serial product
10 Designation of origin

5 Transport and storage

- When storing and transporting the product, always observe the ambient conditions specified in Chapter 10 "Technical data".

Storage

For safekeeping between exercises, the control block should be fastened at the component rack.

- Fasten the control block at the component rack as described in chapter 6.1.
- Make sure that all hydraulic connections are covered.
- Make sure that there is an oil tray under the control block for collecting the leaking residual oil.

6 Assembly

6.1 Assembling the training component

Preparation for assembly

- Remove the training component from its packaging.
- Dispose of the packaging in accordance with the national regulations.
- Carry out a visual inspection of the training component.

Fastening the control block

The bracket at the training component is prepared for a 50 x 50 mm grid as it is available at the DS4 graining system and the component rack.

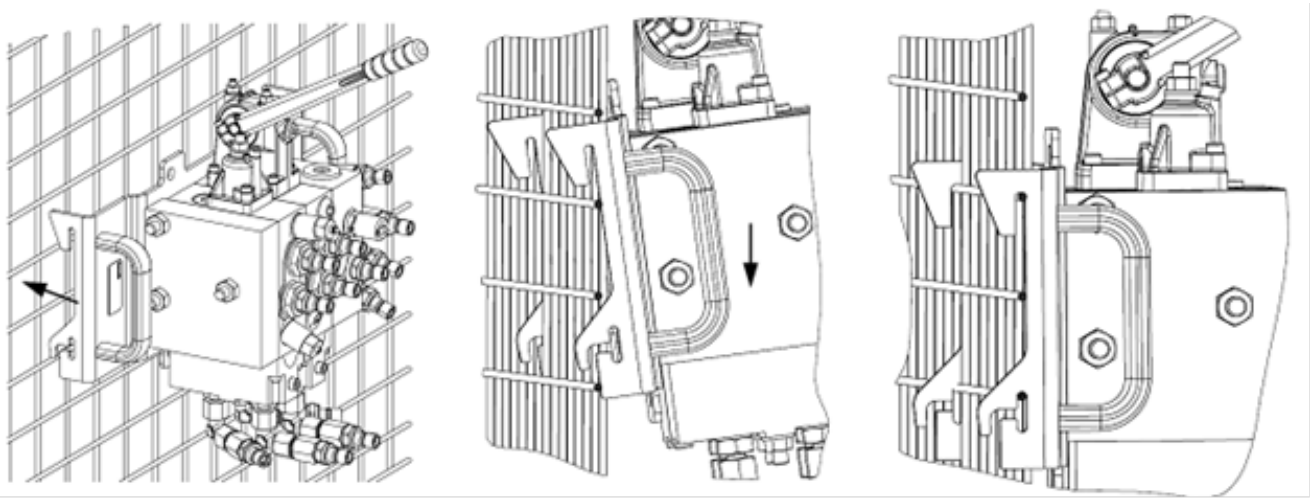

Fig. 4: Hooking the training component in

- Grab the control block safely with both hands.
- Attach the mobile valve block to the grid at an angle, until the retaining sheet rests against the cross wire of the DS4 mounting grid
- Lower the mobile valve block (the lower mounting is aligned automatically).
- Check the safe support of the training component

The training component is now safely attached to the DS4 mounting grid.

6.2 Hydraulically connecting the control block

The hydraulic connection is established according to the specifications on the exercise set-up regarding the quick release couplings at the training component.

7 Disassembly and exchange

Considering the exercise set-up before the disassembly, the TS-.../3SM-12 control block is to be brought into a hydraulically depressurized condition.

Disassembly

- Cause a depressurized condition according to the exercise set-up.

WARNING!

Risk of intoxication and injury!

Hydraulic oil spurting out under high pressure may cause most severe injuries!

- Never disassemble the pressure lines using force.
- Before opening, depressurize the system.
- Be very careful when opening the system despite completed pressure relief.
- Works at the hydraulic system may only be performed by a hydraulic expert.

- Interrupt the connection to other components by loosening the quick release couplings.

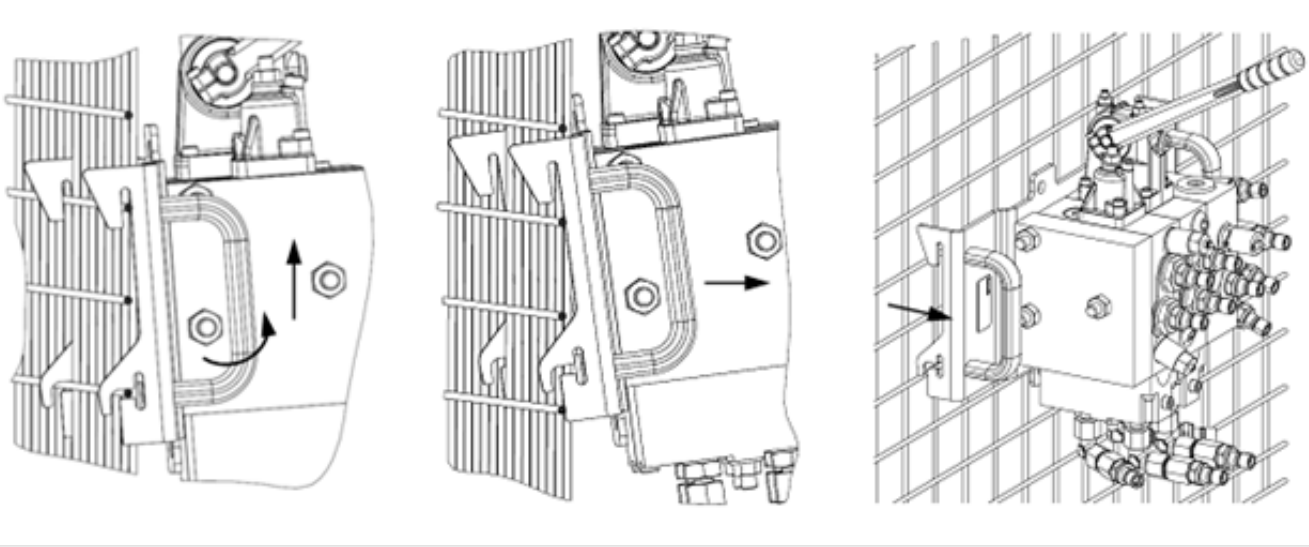

Fig. 5: Hooking the training component out

- Grab the control block safely with both hands.
- Turn the control block away from the grid while lifting it at the same time.
- Release the control block from the grid at an angle.
  The training component is disassembled.

8 Disposal

Careless disposal of the control block and the hydraulic fluid could lead to pollution of the environment.

Please observe the following:

- Thus, dispose of the TS-.../3SM-12 control block and the hydraulic fluid in accordance with the currently applicable national regulations in your country.
- Dispose of hydraulic fluid residues according to the safety data sheet for this hydraulic fluid.

The control block consists of the following materials:

- Cast iron
- Rubber
- Steel
- Oil residues
- Plastic

9 Troubleshooting

In case of malfunctions, re-check the exercise set-up first. Failures are almost always attributable to non-compliance with the specifications in the exercises.

Malfunction list control block

Fault	Cause	Remedy
Couplings cannot be inserted or only with difficulties	Pressure was not discharged	Depressurize the system - Observe the exercise set-up
The hand lever at the control block is stiff	The relief line at "T" is not connected	Connect the relief line at "T"
Leakage at the quick release couplings	Mechanical damage at the quick release couplings	Exchange of the quick release coupling

10 Technical data

General data

General data control block

Denomination	Unit	Value
Dimensions (length x width x depth)	mm	366 x 344 x 275
Weight	kg	14
Type of mounting	Can be hooked into grid 50 x 50 mm	

Hydraulic data

Hydraulic data control block

Denomination	Unit	Value
Max. pressure	bar	120
Max. control pressure	bar	30
Input element[1)]		
LS pressure limitation	bar	100
1st directional valve[1)]		
Secondary pressure limitation	bar	50
Max. flow from P-A; from P-B reduction via stroke limitation	l/min	70 Maximum value upon delivery
Type of actuation	manual	
2nd directional valve[1)] / 3rd directional valve[1)]		
Secondary pressure limitation	bar	without
Max. flow from P-A; from P-B reduction via stroke limitation	l/min	70 Maximum value upon delivery
Type of actuation	Hydraulic	
Operating temperature	°C	20 - 60
Hydraulic fluid	See operating instructions of the DS4 training system	
Hydraulic fluid temperature	See operating instructions of the DS4 training system	
Hydraulic connections	Quick release coupling with connector, type W	
Minimess connection	Threaded coupling AB20-11/K1 G 1/4	

1) Specified by the design of the industrial type; see following reference

Storage and application conditions

Storage and application conditions control block

Denomination	Unit	Value
Ambient temperature	°C	15 – 30
Maximum humidity	%	90 (at 20 °C)
Maximum altitude of the location	m	1000 above sea level

Reference industrial type

Reference industrial type control block

Denomination	Type
Control block	3 SM12L1X/
Input element	A 000
1st directional valve	P001 A2R5A H050 H050
2nd directional valve	P001 H200 Q Q
3rd directional valve	P001 H200 Q Q
End element	K M01
Data sheet (English)	RE 64122

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