

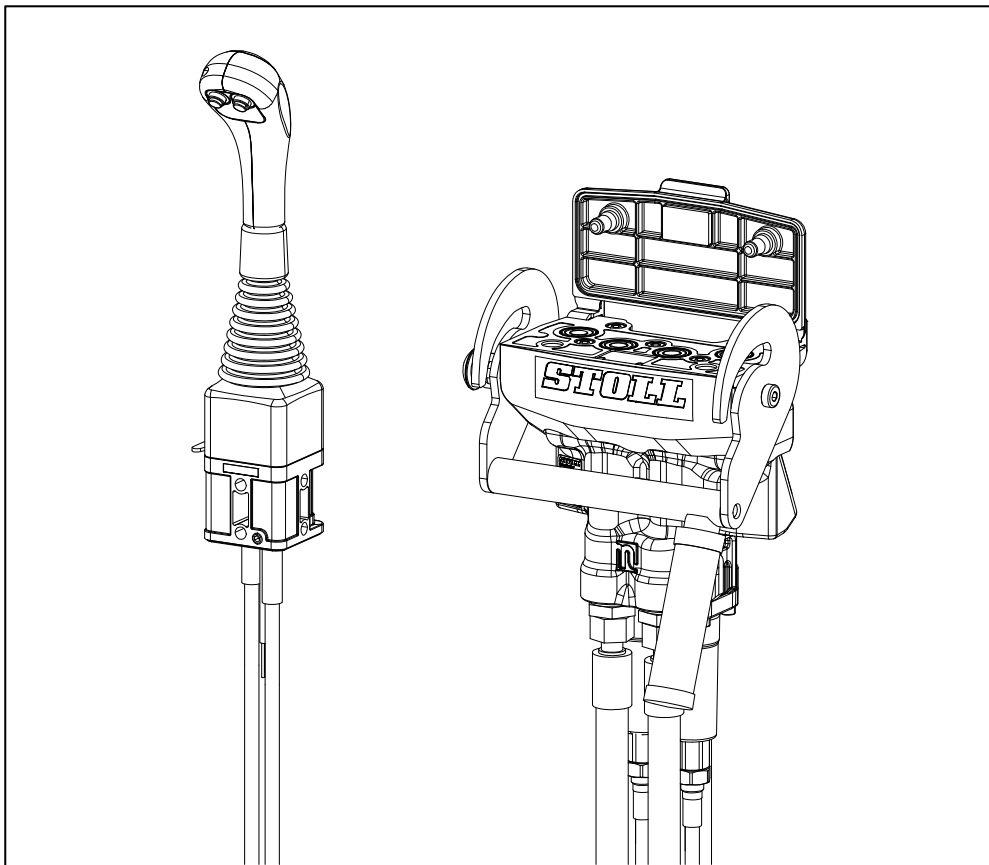


STOLL

Installation instructions

Single-lever control unit

Base Control



Status: 10/2019

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The original instructions were written in the German language.

Instructions in other languages were translated from German.

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1 About these installation instructions

1.1 Use and purpose of the installation instructions

These installation instructions are aimed at specialist workshops. Experience in installing hydraulic components and basic knowledge of vehicle electrical systems are required in particular.

More detailed information can be found in the operating instructions of the front loader.

Directions refer to the forward direction of travel, unless otherwise specified.

For better readability, Wilhelm STOLL Maschinenfabrik GmbH will hereinafter be called "STOLL".

1.2 Validity of the installation instructions

The installation instructions are valid for the different versions of the Base Control single-lever control unit.

Please also note the installation instructions supplied for the hydraulic equipment or front loader mounting kits, which take into account individual connection points and mounting brackets for the respective tractor.

1.3 Storage of the documents

The installation instructions are part of the machine. They have to be stored safely in a dry place. When lending or selling the front loader, the installation instructions must also be handed over.

1.4 Other applicable documents

In conjunction with these installation instructions, the following additional documents also apply:

- Installation instructions for the front loader mounting kit,
- Installation instructions for hydraulic equipment,
- Operating instructions of the tractor,
- Operating instructions for the front loader.

For all types of work, please also observe:

- The recognised technical regulations for safe and professional work,
- The legal regulations for accident prevention,
- The legal regulations for health and environmental protection,
- The national regulations that apply in the country of the operator / user of the front loader,
- The specifications that are relevant for the status of the technology.

1.5 Design tools

The installation instructions contain the following different symbols and markings in the text:



Warning symbol that is used for warning notices and is graduated based on the danger (see 2 Safety)



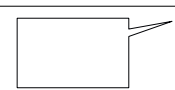



Additional information and tips

- List points
- ➔ Requirement for a sequence of actions
- ✂ Required tools
- (1) Numbered action step
- ✓ Result of an action or sequence of actions
- Unnumbered action step

Moreover, photographs and stylised line drawings are used. For better understanding, some of the figures are exemplary, simplified or with dismantled parts for better representation and explanation.

- Please observe the following:
 - Dismounting is not always absolutely required for the respective description.
 - No different equipment variations are shown in the figures, unless otherwise specified.
 - The associated descriptive text always applies to the figures.
 - The following representation rules and elements apply:

Representation	Meaning
	Elements represented in yellow highlight the components for the respective operating situation.
	Item numbers designate assemblies or components. In each figure, there is always an explanatory legend for the item numbers.
	Magnifying glasses serve to focus on individual parts and details.
	Arrows indicate a direction of movement or action to be performed.

1.6 Nomenclature of the footer

The footer consists of the following parameters:

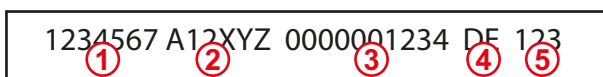


Fig. 1 Nomenclature of the footer

Legend

- 1 Document number (order number)
- 2 Type of instructions
- 3 Internal system number
- 4 Language identifier
- 5 Version

2 Safety

2.1 Explanation of safety and warning notices

The basic safety information comprises instructions that always apply for safe assembly and installation of the front loader.

The action-related warning notices warn against residual dangers and are placed in front of dangerous action sequences.

2.2 Representation and layout of warning notices

Warning notices are action-related and are designed according to the following principle:

DANGER

Type and source of danger!

Explanation of the type and source of danger.

- ▶ Measures to prevent the danger.

2.3 Danger grading of warning notices

Warning notices are graded according to their level of danger and are represented as follows with the corresponding signal words and warning symbols:

DANGER

Immediate lethal danger or serious injuries.

WARNING

Possible lethal danger or serious injuries.

CAUTION

Possible slight injuries.

NOTICE

Damage to the implement or the surroundings.

2.4 Proper use

The versions of the Base Control single-lever control unit described in these installation instructions are supplied to be mounted solely on agricultural and forestry tractors for operating STOLL front loaders.

The maximum permissible pressure in the hydraulic system is 205 bar.

The information for its correct use and technical data in the operating instructions of the front loader apply in all other respects.

2.5 Basic safety information

2.5.1 Instructions to avoid hazards during the assembly and installation

- Secure the tractor against accidental start-up and rolling away!

Danger when working on the hydraulic system!

- Hydraulic oil can escape under high pressure/at high-speed and people in the immediate vicinity can be seriously injured!
- Hydraulic equipment can move unexpectedly when the pressure drops (e.g. disconnecting a line)!
- Before starting work on the hydraulic system, depressurize the system and secure it against restarting. Please refer to the operating instructions of the tractor.
- For work that must be performed on a pressurised hydraulic system (e.g. bleeding):
Protect yourself from escaping oil!
Make sure that no other people are at risk!
- For work on the chassis hydraulics (e.g. detaching and turning the lines of the steering hydraulics):
Support the axles of the tractor to prevent sagging while working.

2.5.2 Instructions to prevent hazards caused by a defective installation

If the hydraulic lines are routed incorrectly, this may endanger the operator and other people!

- Route the hydraulic lines correctly! Follow the instructions for installing the hydraulic lines (see 6 *Connecting the hydraulic lines*)!
- Follow the occupational health and safety regulations and technical regulations for hydraulic lines that are applicable for the place of assembly and use.

If the screws are tightened with the incorrect torque or screws are inserted with dirt, they may loosen and cause an accident!

- Make sure that the threads are clean. If necessary, clean them!
- Screws and threads must be free from grease!
- Observe the correct tightening torques for the screws (see 7 *Tightening torques for screws*)!

2.6 Personnel requirements

The installation instructions are aimed at specialised mechanics. Experience in installing hydraulic components and basic knowledge of vehicle electrical systems are required in particular.

A specialised mechanic has a recognised training certificate or specialised knowledge that is required to observe existing specifications, regulations, and directives.



Work on electrical components of the machine may only be performed by an electrician according to the electro-technical regulations.

Welding work may only be performed in an authorised workshop.

3 Overview

The Base Control single-lever control unit consists of the operating lever, a proportional valve and the Bowden cables.

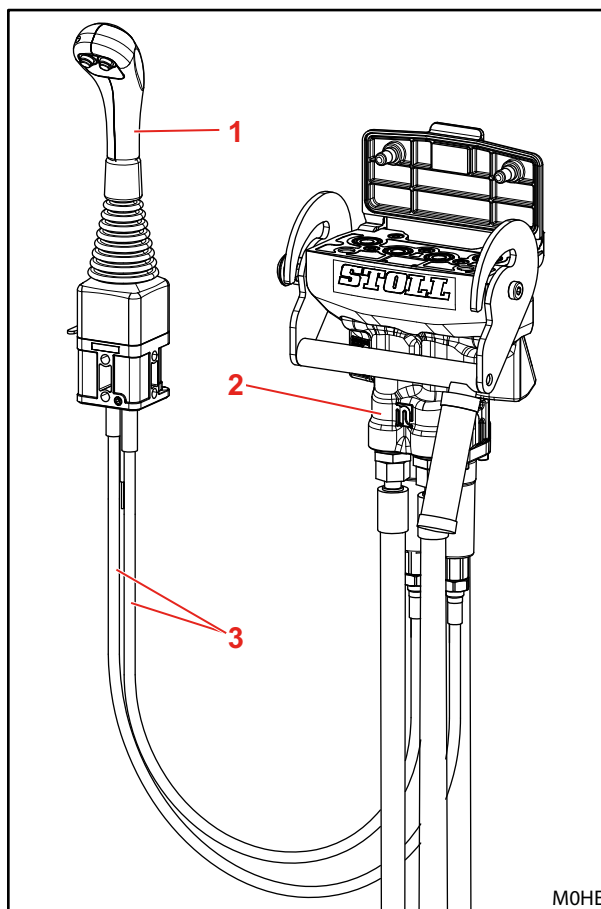


Fig. 2 Base Control overview

Equipment

Pos.	Id. no.	Qty.	Name	Notes
1	3489150		Operating lever equipment complete 56.00-88, consisting of:	
1.1	3479750	1	Operating lever complete 56.00-83	Operating lever CU300 with 0 buttons
1.2	2368170	1	Operating lever complete 56.00-23	Operating lever CU300 with 2 buttons
1.3	3516380	1	Operating lever complete 56.00-145	Operating lever CU300 with 3 buttons
1.4	3601130	1	Operating lever complete 56.00-180	Pre-fabricated operating lever with 2 buttons
1.5	0295380	2	Hexagonal screw M8x90 8.8	
1.6	0011630	2	Hexagonal nut M8	
1.7	0407070	1	Washer 9	
1.8	0452140	2	Detent edged ring VSK 8	
1.9	1422810	2	Protective cap SW 13	
2		1	Proportional valve	
3		2	Bowden cable	

STOLL recommends the following procedure for the mounting and installation work:

- (1) Install the operating lever bracket (see installation instructions for the front loader mounting kit).
- (2) Install the Bowden cables on the operating lever (see *4.1 Installing the Bowden cables on the operating lever*).
- (3) Route the Bowden cables to the installation site of the proportional valve (see *4.1 Installing the Bowden cables on the operating lever*).
- (4) Fasten the operating lever on the intended bracket (see *4.2 Installing the operating lever*).
- (5) Fasten the proportional valve on the intended bracket (see *5.1 Mounting the proportional valve on the tractor*).
- (6) Install the Bowden cables on the proportional valve (see *5.2 Installing the Bowden cables on the proportional valve*).
- (7) Option: Install the Hydro-Fix (see *5.3 Installing the Hydro-Fix (optional)*).
- (8) Connect the hydraulic lines (see *6 Connecting the hydraulic lines*).
- (9) Option: Connect the buttons on the operating lever (see *4.3 Connecting the button on the operating lever*).

4 Installing the operating lever

4.1 Installing the Bowden cables on the operating lever

Bowden cable A is for lifting and lowering the front loader. Bowden cable B is for dumping and scooping with the implement.

- (1) Push the bellows onto the hand lever, so that the mounting piece is free.
- (2) Loosen the fixing screw of the bearing pin.
- (3) Route Bowden cables A, B through the housing.
- (4) If necessary, grease the bearing positions and ball heads.
- (5) Attach the ball joints of the Bowden cables at the bearing positions on the mount.
- (6) Reassemble the fixing screw with the bearing pin.
- (7) Fasten the Bowden cables in the housing with socket head screws in the groove.
- (8) Put the bellows back on.

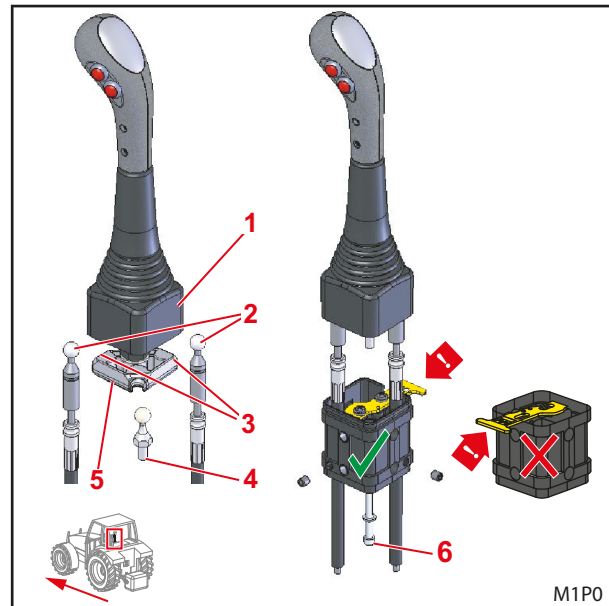


Fig. 3 Installing the Bowden cables – Step 1

Legend

- 1 Bellows
- 2 Ball heads
- 3 Bearing position
- 4 Bearing pins
- 5 Mount
- 6 Fixing screw

- (9) For operating levers with a plastic housing: Insert the sleeves in the base body of the operating lever.
- (10) Route Bowden cables A, B through a suitable grommet from the operating lever bracket to the proportional valve.



Do not bend the Bowden cables. The smallest bending radius of the Bowden cables must be at least 200 mm.

- (11) If necessary, route the electric cable of the operating lever so that it remains accessible for the electrical installation.
- ✓ The Bowden cables are installed on the operating lever.

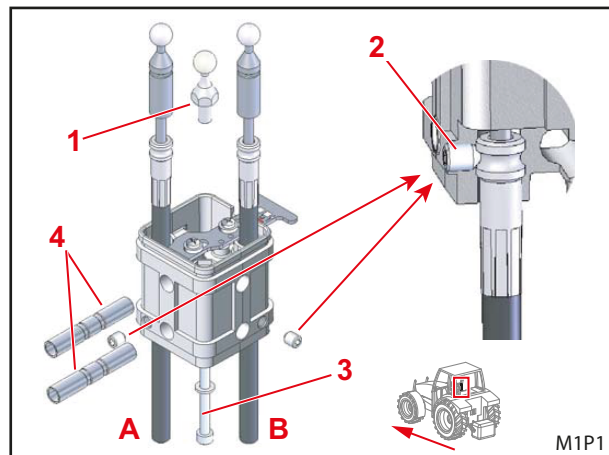


Fig. 4 Installing the Bowden cables – Step 2

Legend

- 1 Bearing pins
- 2 Socket head screw
- 3 Fixing screw
- 4 Sleeves
- A Bowden cable
- B Bowden cable

4.2 Installing the operating lever

i Use sleeves for operating levers with plastic housing (see 4.1 *Installing the Bowden cables on the operating lever*).

Install the operating lever:

- (1) Fasten the operating lever with 2 hexagonal screws M8x90 with washer, detent edged rings, hexagonal nuts and protective caps on the operating lever bracket.

✓ The operating lever is installed.

i The operating lever brackets vary depending on the tractor. Always insert the washer at the slotted hole.

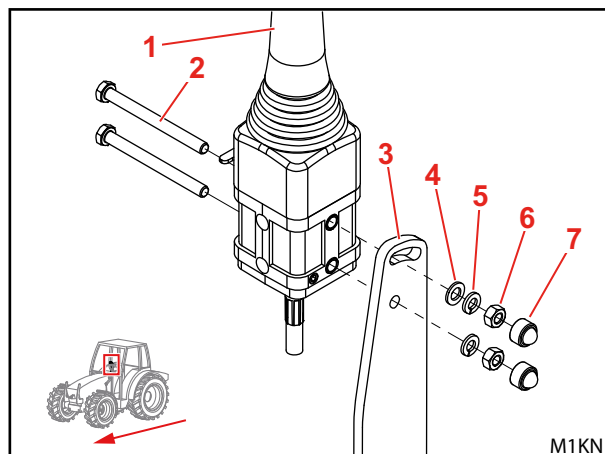


Fig. 5 Installing the operating lever

Legend

- 1 Bellows
- 2 Hexagonal screws M8x90
- 3 Operating lever bracket
- 4 Washer 9
- 5 Detent edged rings VSK 8
- 6 Hexagonal nuts M8
- 7 Protective caps

4.3 Connecting the button on the operating lever

i Disconnect the battery before performing any work on the electrical system. The battery may only be reconnected after completing the electrical installation.

The operating lever can be equipped with 1, 2 or 3 buttons.

Cable assignment 1-button operating lever:

Button A – white cable (wh, 2)

Supply 12 V Plus (switched via the ignition) – black cable (bk, 1)

Cable assignment 2-button operating lever:

Button A – white cable (wh, 2)

Button B – red cable (rd, 3)

Supply 12 V Plus (switched via the ignition) – black cable (bk, 1)

Recommended configuration:

A 3rd control circuit, rapid emptying/quick emptying

B Return to level or 4th control circuit

Cable assignment 3-button operating lever:

Button A – white cable (wh, 2)

Button B – green cable (gn, 4)

Button C – red cable (rd, 3)

Supply 12 V Plus (switched via the ignition) – black cable (bk, 1)

Recommended configuration:

A 3rd control circuit, rapid emptying / quick emptying

B Return to level

C 4th control circuit

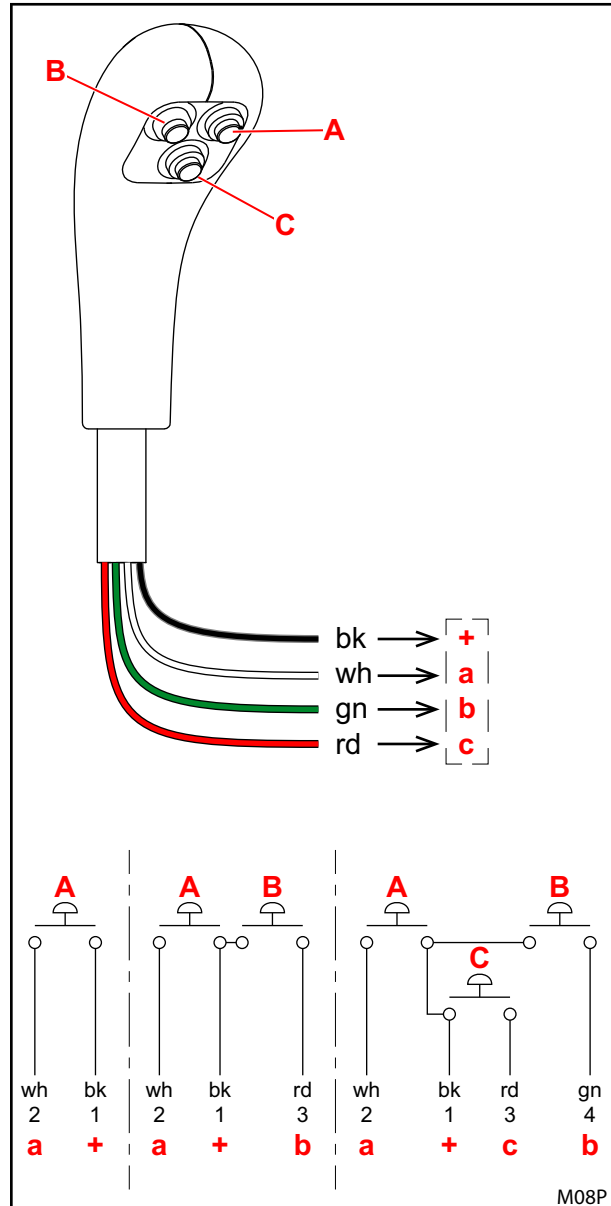


Fig. 6 Cable assignment

i If necessary, two more push buttons (STOLL ID no. 3478660), such as for power shifting, may be incorporated in the operating lever.

i Do not route the cable too tightly at the control lever so that it does not get damaged when the operating lever is moved.

Additional wiring diagrams depend on the electrical equipment that is already equipped on the front loader.

Instructions for the electrical connection of the front loader are enclosed with the electrical equipment or are included in the installation instructions of the front loader mounting kit.

5 Installing the proportional valve

5.1 Mounting the proportional valve on the tractor



The standard bracket on the right mounting part is shown in the installation drawing. Depending on the tractor, special brackets may be required (see installation instructions for the front loader mounting kit).

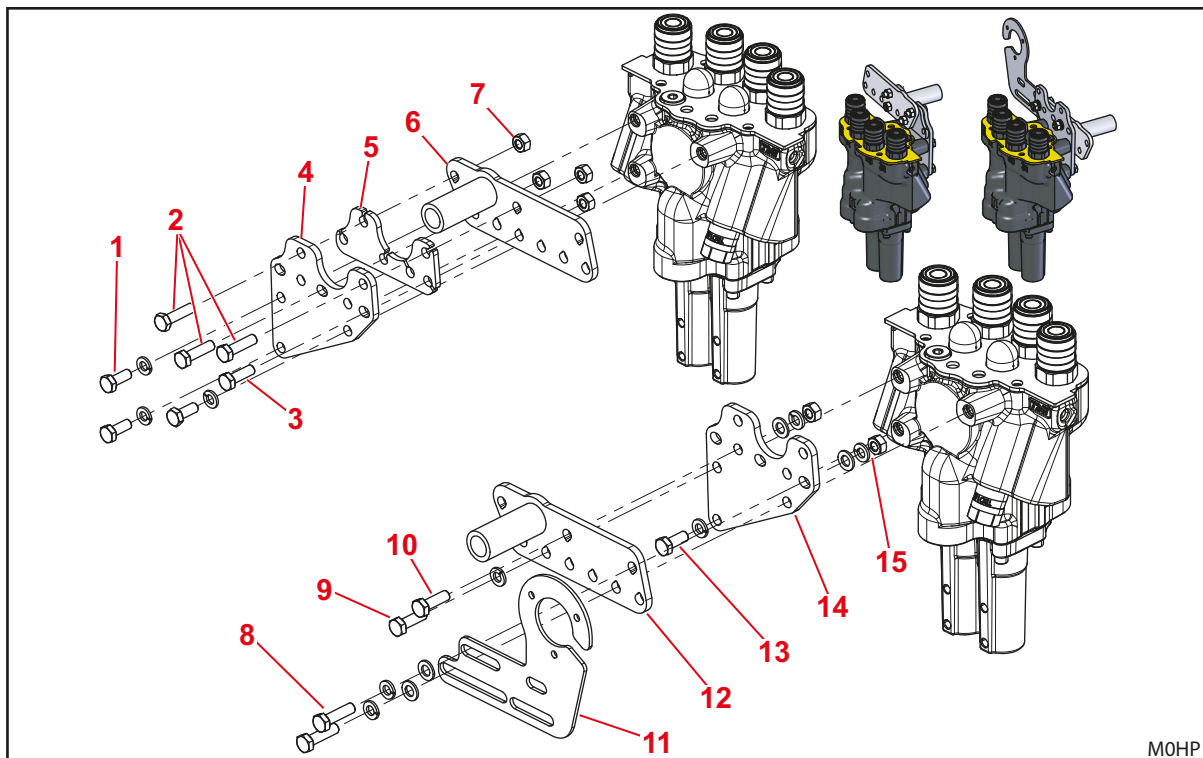


Fig. 7 Base Control – Installing the proportional valve

Legend

- 1 3 hexagonal screws M8x20 with circlips
- 2 3 hexagonal screws M8x30
- 3 Hexagonal screw M8x25
- 4 Valve mount
- 5 Intermediate plate
- 6 Bracket on the right mounting part
- 7 4 hexagonal nuts M8
- 8 2 hexagonal screws M8x30 with circlips and washers
- 9 Hexagonal screw M 8x25 with circlip
- 10 Hexagonal screw M8x25
- 11 Socket bracket
- 12 Bracket on the right mounting part
- 13 Hexagonal screw M 8x20 with circlip
- 14 Valve mount
- 15 3 hexagonal nuts with circlips and washers

The proportional valve is attached to the right mounting part. Different mounting positions are possible with the supplied material. Fig. 7 shows two examples.



Pay attention to the length of the screws! The fixing holes on the valves are only 12 mm deep! Use washers and circlips if the screws are too long!

For front loaders models that have a 7-pin plug/7-pin socket: Secure the socket bracket together with the valve.

5.2 Installing the Bowden cables on the proportional valve

i Do not remove the housing on the proportional valve for the Bowden cables.

- (1) Lock the operating lever in the central position.

Each Bowden cable A, B:

- (2) Unscrew the grub screws a little.
- (3) Screw the adapter on the Bowden cable and secure with the locknut.
- (4) Screw on the adapter sleeve.
- (5) Slide the Bowden cable onto the proportional valve and secure with a long grub screw (tightening torque: max. 3 Nm).
- (6) Screw the adapter sleeve against the housing and secure with a short grub screw.
- (7) Secure the Bowden cable with a locknut. In doing so, hold the Bowden cable sleeve so that it does not twist.
- (8) Press the plugs down.

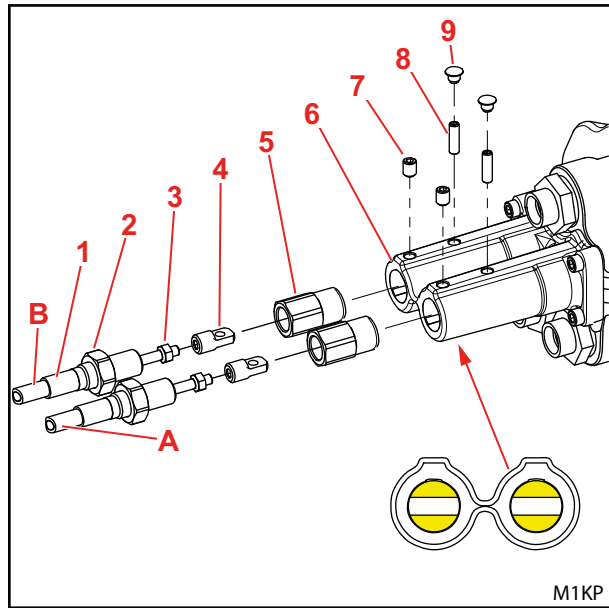


Fig. 8 Installing the Bowden cables on the proportional valve

Legend

- 1 Bowden cable
- 2 Locknut
- 3 Locknut
- 4 Adapter
- 5 Adapter sleeve
- 6 Housing on the proportional valve
- 7 Short grub screw
- 8 Long grub screw
- 9 Plug
- A Bowden cable
- B Bowden cable

After having installed both Bowden cables and mounted the proportional valve on the bracket:

- (9) Check if the Bowden cable control works correctly and if the control unit regulates completely when both valve pistons are actuated simultaneously.
- (10) Readjust the Bowden cables if necessary.
 - ✓ The Bowden cables are installed on the proportional valve.

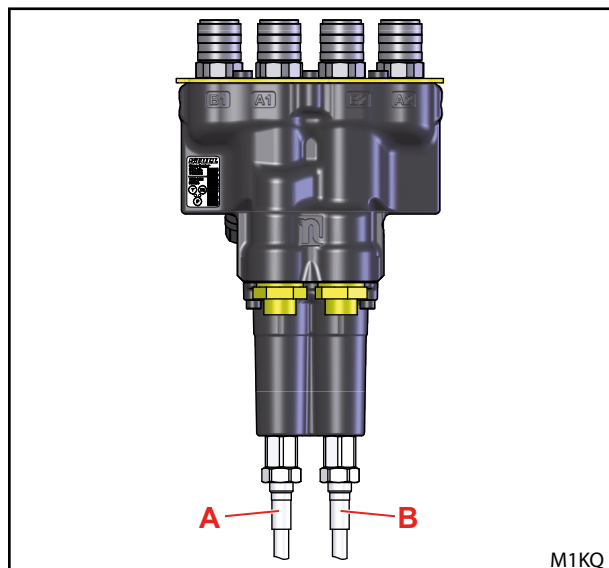


Fig. 9 Bowden cables installed on the proportional valve

Legend

- A Bowden cable
- B Bowden cable

5.3 Installing the Hydro-Fix (optional)

Required tools:

- ✖ Allen key WAF 6
- ✖ Screwdriver

5.3.1 Mounting without electrics

- (1) Unscrew the 5 screws on the valve.
- (2) Remove the lug on the cover.
- (3) Slide the cover on the valve until it is about 5 mm from the edge of the sheet.
- (4) Slide the Hydro-Fix lower part on the valve (not all the way down).

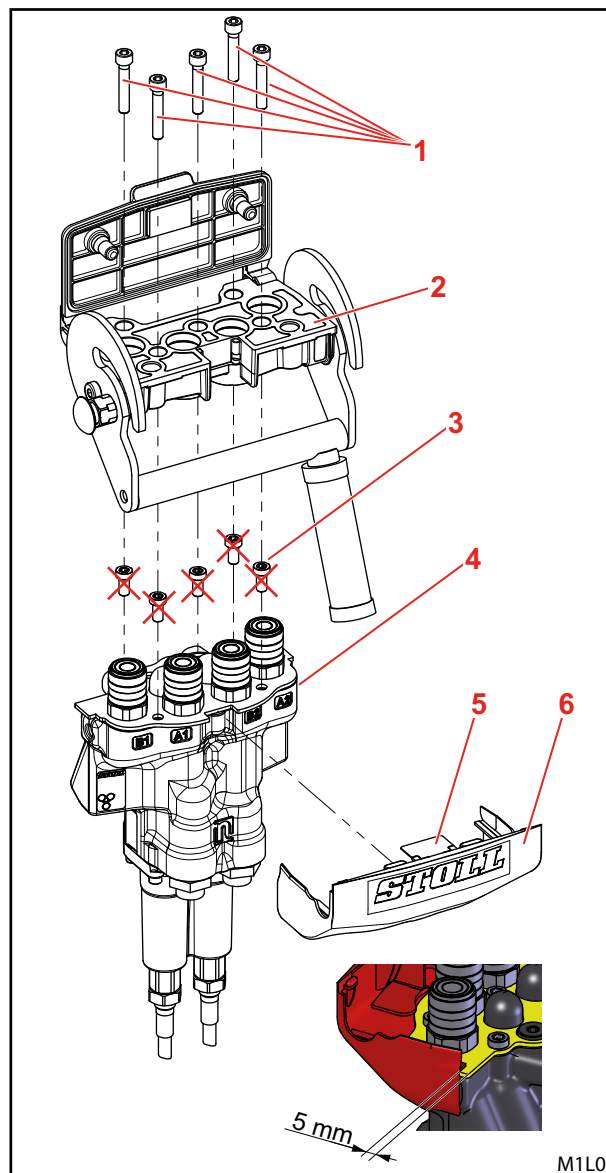


Fig. 10 Installing the Hydro-Fix lower part on Hydac valves (without electrical system)

Legend

- 1 Screws M8x45
- 2 Hydro-Fix lower part
- 3 Screws
- 4 Valve
- 5 Lug
- 6 Cover

- (5) Carefully lift the lug with a screwdriver and slide the cover in all the way so that the lug rests on both supports.
- (6) Slide the Hydro-Fix lower part all the way on.
- (7) Secure the Hydro-Fix lower part with the 5 screws M8x45.

i Observe the tightening torque: 27 Nm.
Tighten the middle screw first. Tighten the screws evenly.

✓ The Hydro-Fix lower part is installed.

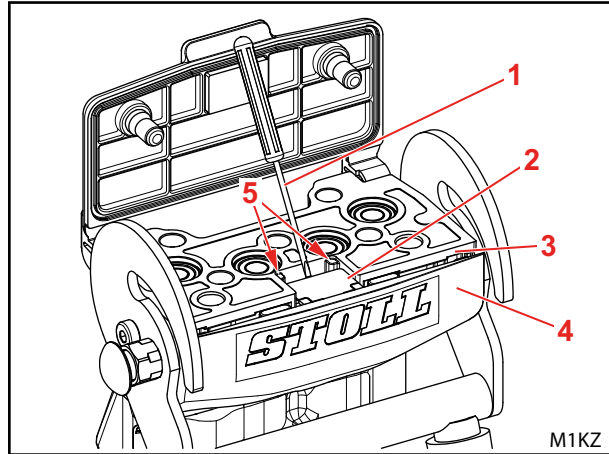


Fig. 11 Installed Hydro-Fix lower part (without electrical system)

Legend

- 1 Screwdriver
- 2 Lug
- 3 Hydro-Fix lower part
- 4 Cover
- 5 Supports

5.3.2 Mounting with integrated electrical interface

- (1) Unscrew the 5 screws on the valve.
- (2) Remove the lug on the cover.
- (3) Slide the cover on the valve until it is about 5 mm from the edge of the sheet.
- (4) Insert electrical plug connectors on the cover.

i The groove of the electric plug connector points to the Hydro-Fix lower part, and the spring to the cover.

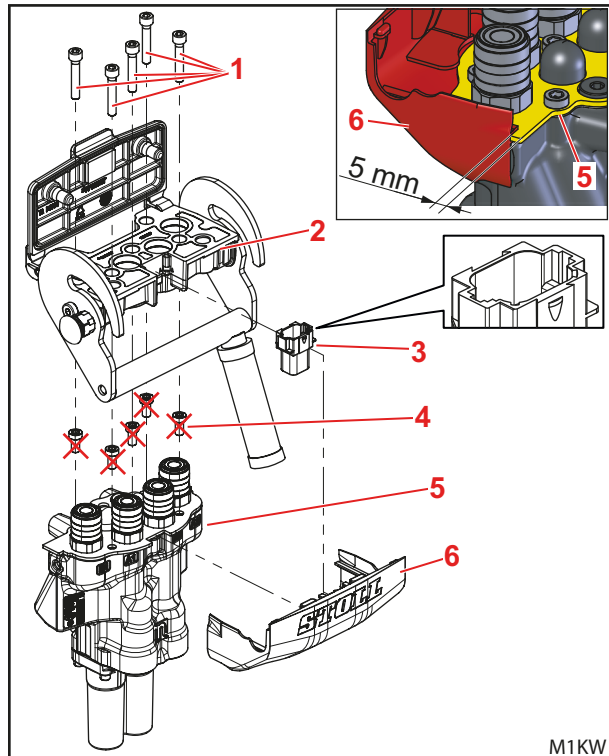


Fig. 12 Installing the Hydro-Fix lower part on Hydac valves (with integrated electrical interface)

Legend

- 1 Screws M8x45
- 2 Hydro-Fix lower part
- 3 Electrical plug connector
- 4 Screws
- 5 Valve
- 6 Cover

- (5) Route the cable to the side.



Make sure that the cable is not crushed.

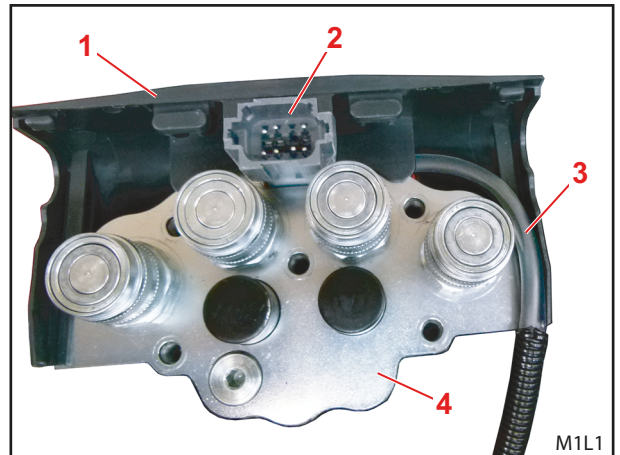


Fig. 13 Inserted electrical plug connector

Legend

- 1 Cover
- 2 Electrical plug connector
- 3 Cable
- 4 Valve

- (6) Slide the Hydro-Fix lower part on the valve (not all the way down).
- (7) Set the electric plug connector at a slight angle so that it slides into the guides and support plates (see arrows in Fig. 14) when you put the cover and the Hydro-Fix upper part together.
- (8) Slide the cover on completely, and at the same time, gently press down on the Hydro-Fix lower part.
- (9) Secure the Hydro-Fix lower part with the 5 screws M8x45.



Observe the tightening torque: 27 Nm.

Tighten the middle screw first. Tighten the screws evenly.

- ✓ The Hydro-Fix lower part is installed.

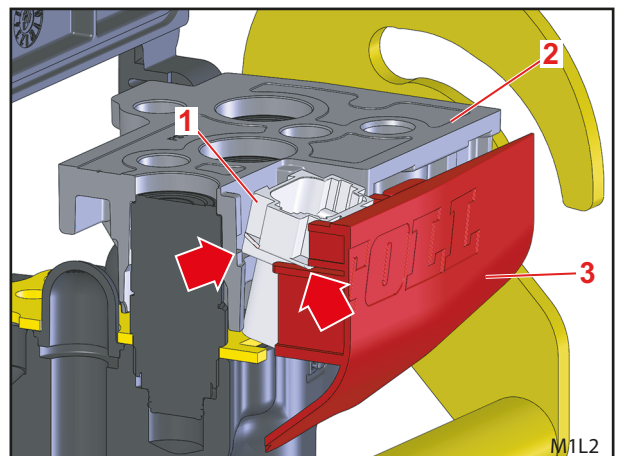


Fig. 14 Installing the Hydro-Fix lower part – Electric plug connector and cover

Legend

- 1 Electrical plug connector
- 2 Hydro-Fix lower part
- 3 Cover

6 Connecting the hydraulic lines



For the hydraulic installation, the following instructions must be observed

- Before starting work on the hydraulic system, depressurize the system and secure it against restarting. To do so, refer to the operating instructions of the tractor.
- Set up the drip trays ready to catch any residual oil that leaks.
- Only use the supplied hose lines and fittings. These are designed to bear the load.
- Avoid torsion. Hydraulic hoses must not be twisted in their routing.
- First connect hydraulic lines "N RKA90" or "A RKN90" with the 90° end, then remove all possible torsion (twisting) of the hose lines. You can only connect the straight end after you have done this.
- Avoid tensile and compressive loads on the hoses.
- Route the hoses in such a way that there are no points where they bend or rub. Be especially mindful that the hoses are routed straight from the connecting points. A bend in the hose right by the connecting point may tear the hose.
- Hydraulic hoses must be routed in such a manner that if a line breaks, nobody is endangered by the spraying hydraulic fluid. As such, do not route the hydraulic hoses through the driver's cab.
- If the driver is not protected by the cab or other components, a minimum distance of one metre must be kept between the driver's body and the hydraulic lines. Install splash guard hoses if this distance cannot be provided. Also make sure it is still possible to open the front or rear windows! The safety of the driver must be guaranteed even if the pane is open!
- Hydraulic hoses can be easily laid under the cab usually after removing the right-side rear wheel. Take account of the travel of the cab's suspension. Be especially careful that the hydraulic lines do not rub on the electrical lines that move through the cab's suspension!
- The hydraulic lines are partially pre-assembled. The fittings are not tightened to avoid any unnecessary torsions as they are being installed. After routing the lines, retighten all of the screws!

6.1 Assignment of the lines of the front loader to the connection points

The hose lines on the front loader are A1, B1, A2 and B2 (see Fig. 15). The designations A1, B1, A2, B2 can also be found on the proportional valves (see Fig. 16).

Functions and identification colours:

- A1 Lifting, yellow
- B1 Lowering, green or black
- A2 Scooping, blue
- B2 Dumping, red

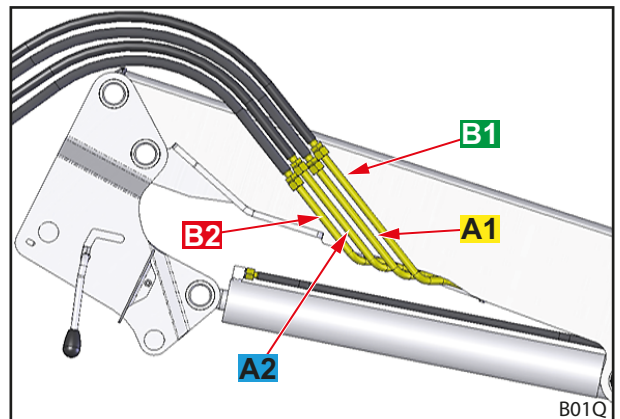


Fig. 15 Hose lines on the front loader



The embossed lettering on the cast bodies of the proportional valves can vary. The connection sequence from left to right is always B1-A1-A2-B2.

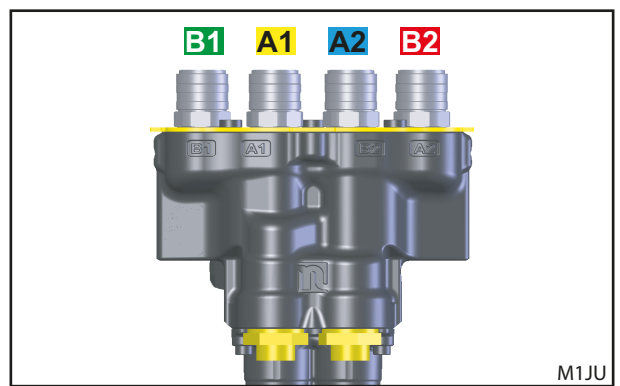


Fig. 16 Proportional valve

6.2 Base Control ST for tractors with open-centre hydraulic system (OC) or closed-centre hydraulic system (CC)

6.2.1 Operating principle

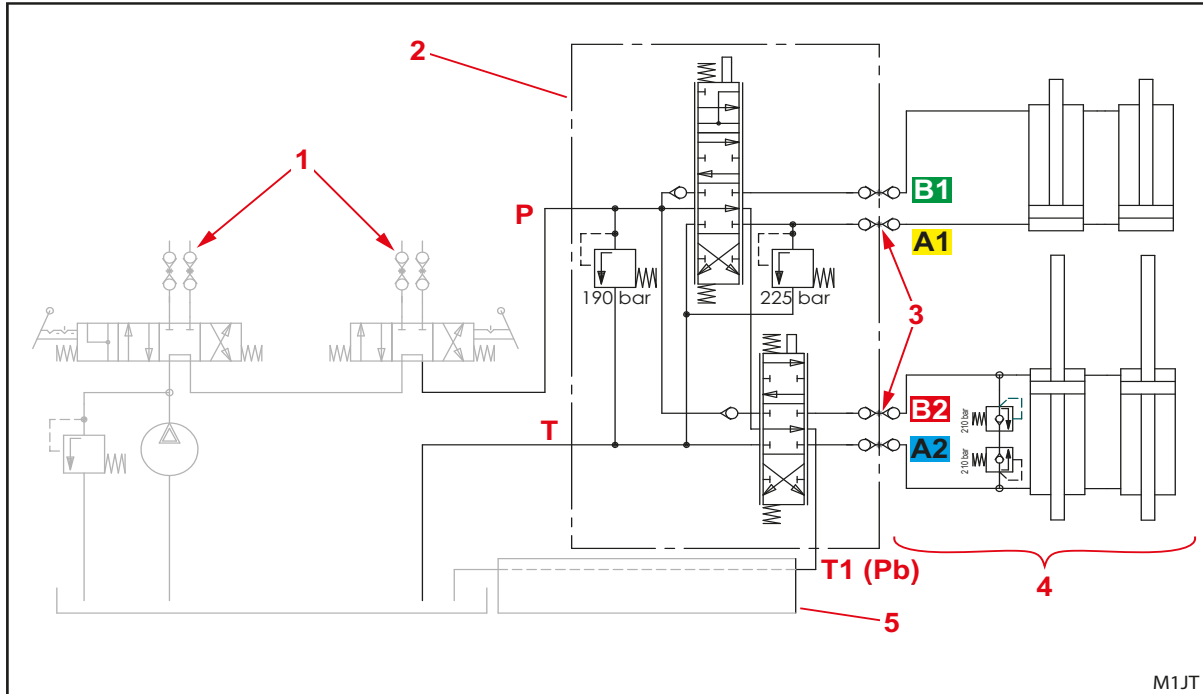


Fig. 17 Working principle of the open-centre hydraulic system (OC)

Legend

- 1 Existing valves on the tractor (e.g. for coupling points at the rear) can be used for other devices
- 2 Proportional valve on the right mounting part
- 3 Interface to the front loader (see 5.1 Mounting the proportional valve on the tractor)
- 4 Front loader
- 5 Unload pressure point to lower priority users
- P Pressure line
- T1 Unload pressure point (Pb)
- T Return line (tank connection line)

The three hydraulic lines P, T1, and T connect the OC proportional valve to the tractor's hydraulic system.

Open Centre, last consumer (OC-LU)

If the proportional valve is the last consumer in the chain (open-centre load user, OC-LU), the connections T and T1 are connected to the valve. Only lines P and T are then connected.

Closed-centre (CC)

In closed-centre hydraulic systems, all the consumers are connected in parallel with the lines P and T. Connection T1 (Pb) is closed on the valve. The "190 bar" pressure relief valve is closed.

6.2.2 Connecting the hydraulic lines to the tractor

With open-centre hydraulic systems (OC), all the hydraulic consumers of the tractor are connected in series between the pump and tank, so that when a valve is closed, the hydraulic pressure is passed from one consumer to the next.

The proportional valve of the front loader is integrated in this hydraulic circuit: A hydraulic line of the tractor is interrupted and the proportional valve is interposed with its connections P and T1.

The proportional valve should be placed downstream of the pressure relief valve of the tractor, so that the pump cannot be overloaded by the front loader. Since this pressure relief valve is often integrated into the valve assembly of the first consumer of the tractor, the proportional valve should not be connected upstream of the first consumer of the tractor.

Furthermore, the proportional valve requires a tank connection T.

Basic procedure for open-centre hydraulic systems (OC):

- (1) Look for a pressure line of the tractor that can be interrupted.
 - (2) Interrupt this pressure line, usually by removing a tubular piece, a hose or a screw connection.
 - (3) Connect line P to the supply side (from the direction of the pump).
 - (4) Connect line T1 to the unload pressure side (in the direction of the tank).
 - (5) Connect line T to a free tank connection or to a T-piece on a tank line.
- ✓ The hydraulic lines are connected to the tractor.

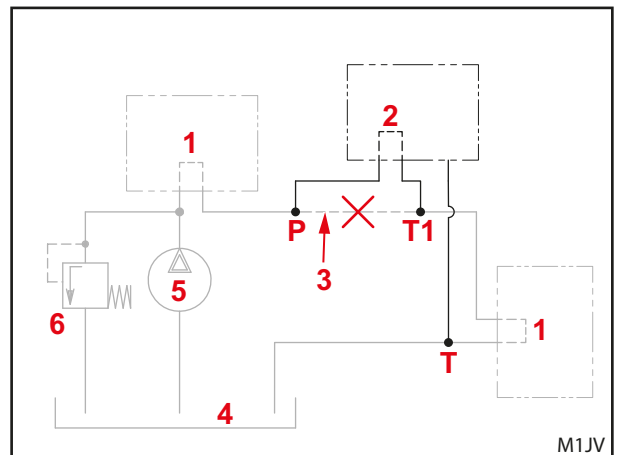


Fig. 18 Connection of the hydraulic lines to tractors with open-centre hydraulic system (OC)

Legend

- 1 Hydraulic consumer
- 2 Proportional valve
- 3 Hydraulic line
- 4 Tank
- 5 Pump
- 6 Pressure relief valve
- P Pressure line
- T1 Unload pressure point
- T Return line (tank connection line)

6.2.3 Connection points on the proportional valve

Hydac proportional valve – Base Control, OC configuration

Connect the hydraulic lines to the proportional valve:

- (1) Screw the three $\frac{3}{4}$ " screw-in connectors into the proportional valve.
 - (2) Connect lines P, T1 and T on the screw-in connectors.
- ✓ The hydraulic lines are connected to the proportional valve.

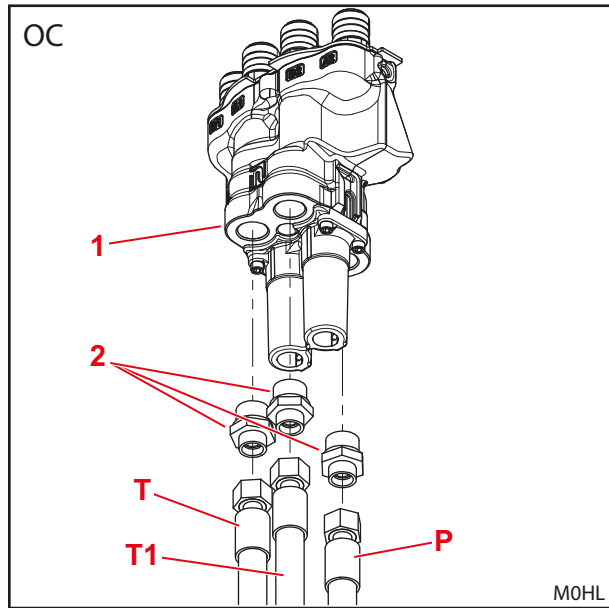


Fig. 19 Hydac proportional valve (OC)

Legend

- 1 Proportional valve
- 2 Screw-in connector $\frac{3}{4}$ "
- P Pressure line
- T1 Unload pressure point
- T Return line (tank connection line)

Hydac proportional valve – Base Control, OC-LU configuration

Connect the hydraulic lines to the proportional valve:

- (1) Screw the three $\frac{3}{4}$ " screw-in connectors into the proportional valve.
 - (2) Screw in the plug on the connecting piece.
 - (3) Screw 2 screw-in connectors into the connecting piece.
 - (4) Install the connecting piece with screw-in connector on the proportional valve.
 - (5) Connect line T with the screw-in connector to the connecting piece.
 - (6) Connect line P to the $\frac{3}{4}$ " screw-in connector in the proportional valve.
- ✓ The hydraulic lines are connected to the proportional valve.

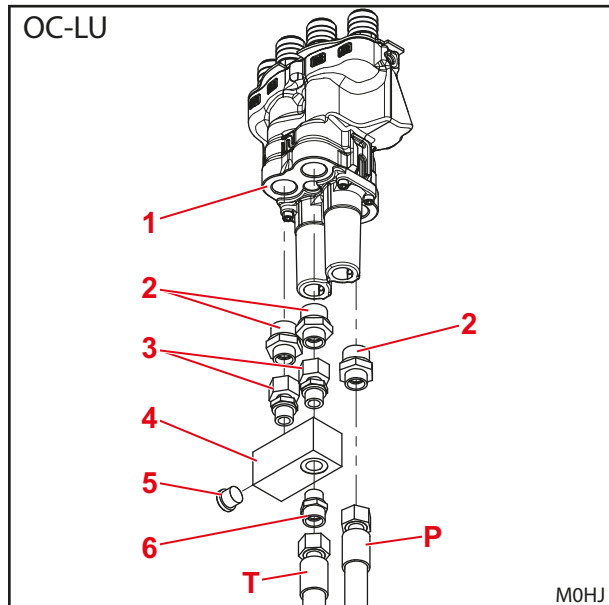


Fig. 20 Hydac proportional valve (OC-LU)

Legend

- 1 Proportional valve
- 2 Screw-in connector $\frac{3}{4}$ "
- 3 Screw-in connector
- 4 Connecting piece
- 5 Seal plug
- 6 Screw-in connector
- P Pressure line
- T Return line (tank connection line)

Hydac proportional valve – Base Control, CC configuration



In closed-centre hydraulic systems, the "190 bar" pressure relief valve must be closed.

Connect the hydraulic lines to the proportional valve:

- (1) Pierce the plastic plugs labelled "190" in the hole below on the proportional valve with a small screwdriver and remove them.
 - (2) With an Allen key (6 mm), turn the screw of the pressure relief valve to the right in the hole up to the stop.
 - (3) Screw in the plug on the proportional valve in connection Pb.
 - (4) Screw the two $\frac{3}{4}$ " screw-in connectors into the proportional valve.
 - (5) Connect lines P and T with the screw-in connectors.
- ✓ The hydraulic lines are connected to the valve.

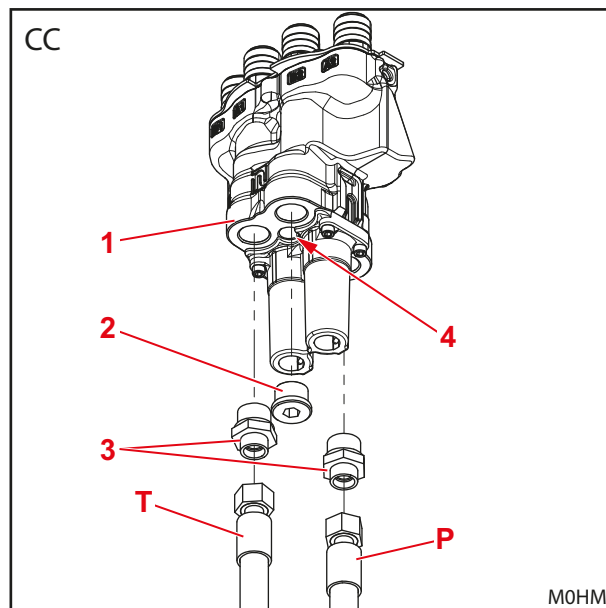


Fig. 21 Hydac proportional valve (CC)

Legend

- 1 Proportional valve
- 2 Seal plug
- 3 Screw-in connector $\frac{3}{4}$ "
- 4 Hole
- P Pressure line
- T Return line (tank connection line)

6.3 Base Control OCLS for tractors with open-centre hydraulic system with load sensing (OCLS)

6.3.1 Operating principle

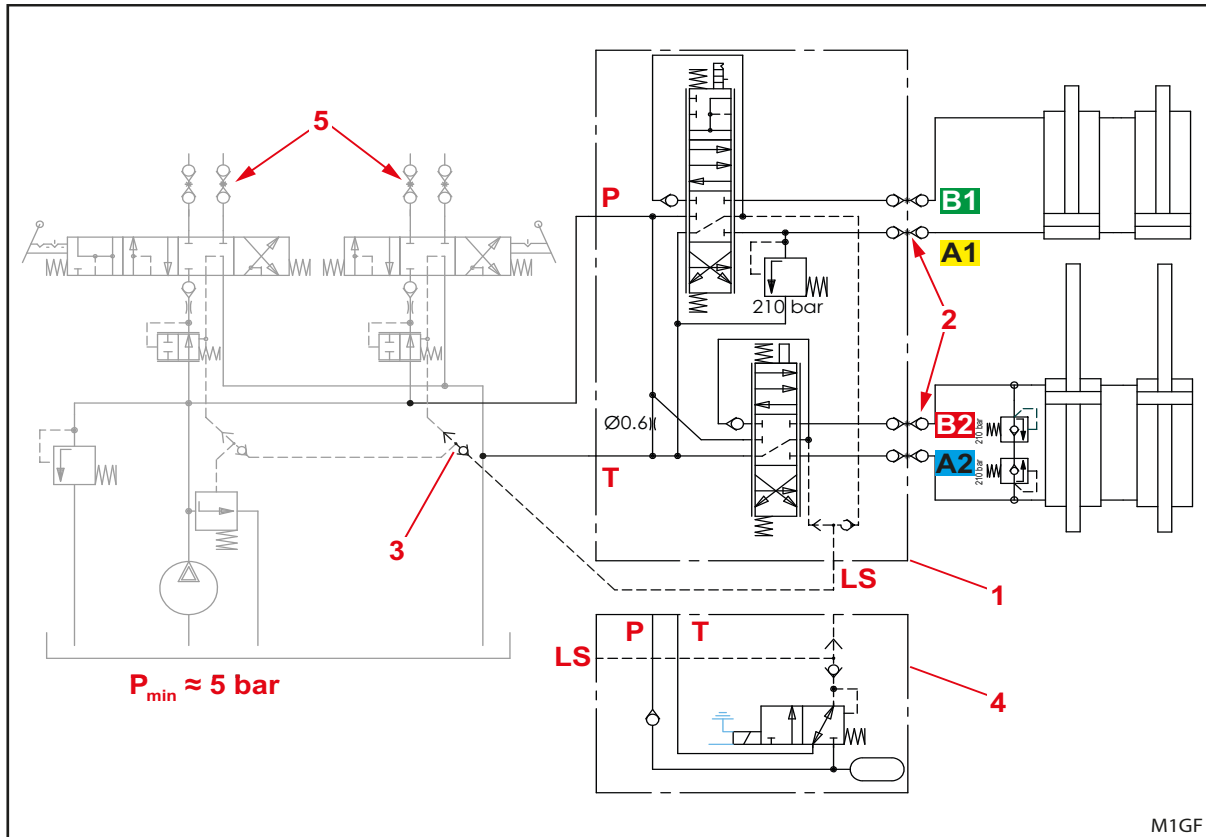


Fig. 22 Working principle of the open-centre hydraulic system and load sensing (OCLS)

Legend

- 1 Control unit on the right mounting part (pilot-operated electric proportional valves)
 - 2 Interface to the front loader (see 5.1 Mounting the proportional valve on the tractor)
 - 3 Additional shuttle valve for load sensing
 - 4 Additional module "start function": When the standby pressure is too low, the system pressure is raised by a pressure pulse from the reservoir when it is deflected out of the neutral position.
 - 5 Existing valves on the tractor (e.g. for coupling points at the rear) can be used for other devices.
- LS Load sensing (line P1)
P Pressure line
 P_{min} Standby pressure of the system
T Return line (tank)

6.3.2 Connecting the hydraulic lines to the tractor

For open-centre hydraulic systems with load sensing (OCLS), all the hydraulic consumers of the tractor are connected in parallel to the pump with a pressure line and to the hydraulic tank with a tank line. In addition, all the consumers are connected to the pressure compensator of the tractor control units via a load-sensing line. The individual load-sensing lines are connected to shuttle valves, so that consumers with the highest load always determine the pressure on the LS line and therefore the pump capacity.

The proportional valve of the front loader is connected as follows:

- (1) Insert an additional shuttle valve on an LS line of the tractor.
- (2) Connect line P1 to the shuttle valve.
- (3) Connect lines P and T to the existing pressure and tank lines.



The pressure line of the proportional valve should be positioned after the pressure relief valve of the tractor so that the pump cannot be overloaded by the front loader.

- ✓ The proportional valve is connected.

Basic procedure:

- (1) Connect the line P to a free pressure connection or with a T-piece to a pressure line.
- (2) Connect line T to a free tank connection or to a T-piece on a tank line.

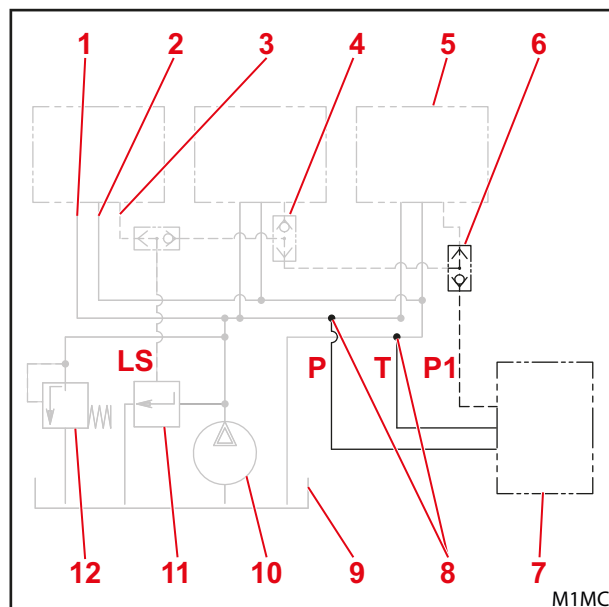


Fig. 23 Connecting the hydraulic lines to tractors with OCLS

Legend

- 1 Pressure line
- 2 Tank line
- 3 Load sensing line
- 4 Shuttle valve
- 5 Hydraulic consumer
- 6 Additional shuttle valve
- 7 Proportional valve
- 8 T-pieces
- 9 Hydraulic tank
- 10 Pump
- 11 Pressure compensator of the tractor control units
- 12 Pressure relief valve
- LS Load sensing
- P Pressure line
- P1 Pressure line (load sensing)
- T Return line (tank connection line)

- (3) Interrupt an LS line of the tractor, usually at a connection point.
- (4) Install the shuttle valve.



The T-shaped shuttle valve must be inserted in the correct installation direction: The ends of the "crossbar" of the T pointing towards the hydraulic consumers. The "foot" of the T points towards the pressure compensator of the tractor control units.

- (5) Connect line P1 to the shuttle valve.
- ✓ The hydraulic lines are connected to the tractor.

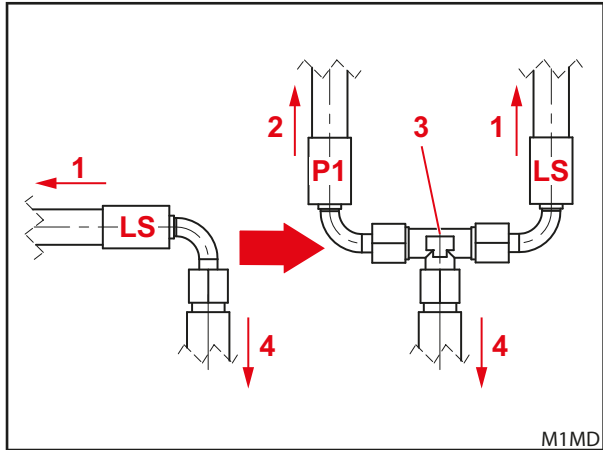


Fig. 24 Installing the shuttle valve

Legend

- 1 Hydraulic consumer
- 2 Hydraulic consumer
- 3 Shuttle valve
- 4 Pressure compensator of the tractor control units
- LS Load sensing
- P1 Pressure line (load sensing)

6.3.3 Connection points on the proportional valve

Hydac proportional valve – Base Control, LS configuration

Connect the hydraulic lines to the proportional valve:

- (1) Screw the two $\frac{3}{4}$ " screw-in connectors into the proportional valve.
- (2) Screw one $\frac{1}{4}$ " screw-in connector into the shuttle valve.
- (3) Connect lines P, P1 and T to the screw-in connectors.
- ✓ The hydraulic lines are connected to the proportional valve.

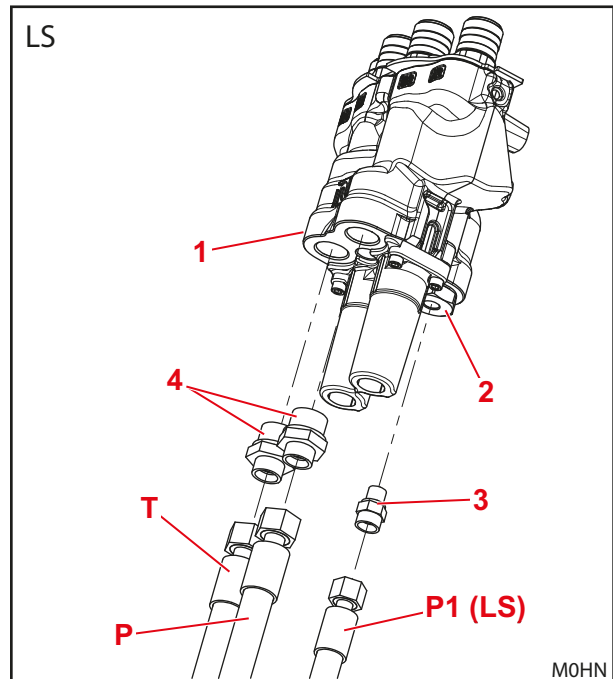


Fig. 25 Hydac proportional valve (LS)

Legend

- 1 Proportional valve
- 2 Shuttle valve
- 3 Screw-in connector $\frac{1}{4}$ "
- 4 Screw-in connector $\frac{3}{4}$ "
- P Pressure line
- P1 Load sensing line
- T Return line (tank connection line)

6.4 Base Control CCLS for tractors with closed-centre hydraulic system with load sensing (CCLS)

6.4.1 Operating principle

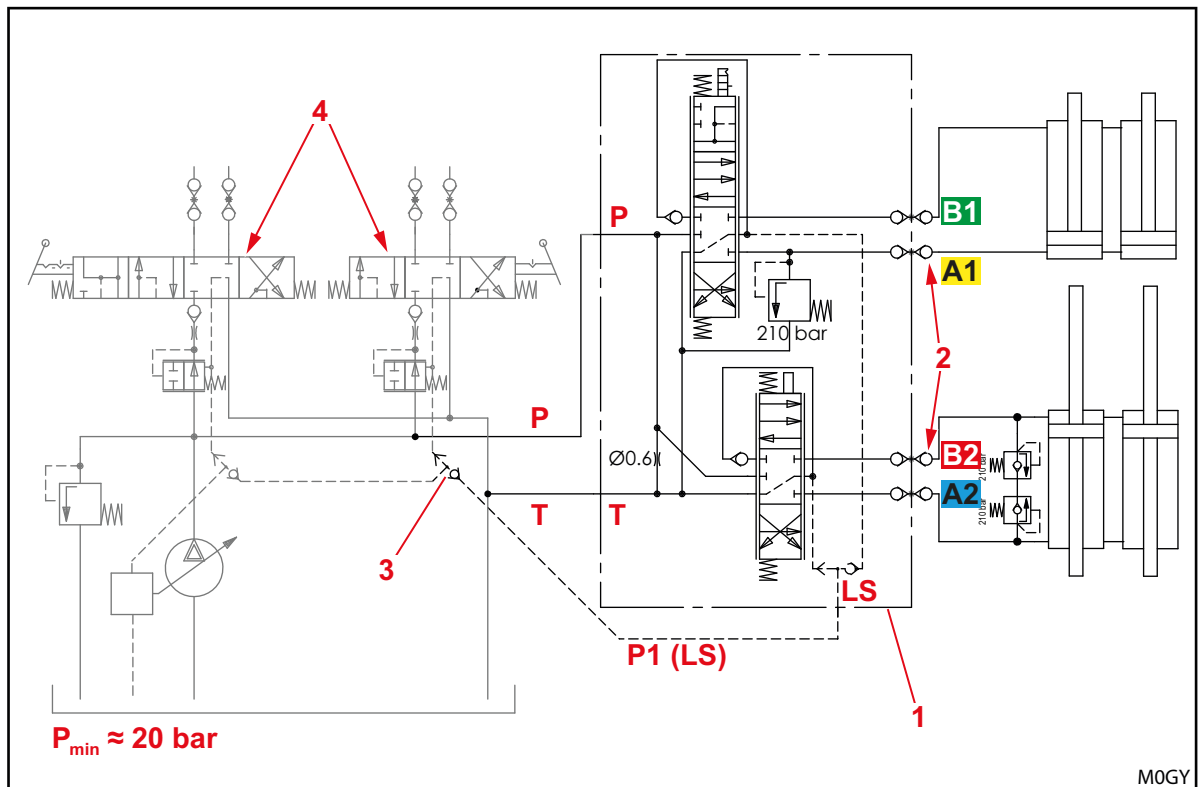


Fig. 26 Working principle of the closed-centre hydraulic system with load sensing (CCLS)

Legend

- 1 Control unit on the right mounting part (pilot-operated electric proportional valves)
- 2 Interface to the front loader (see 5.1 Mounting the proportional valve on the tractor)
- 3 Additional shuttle valve for load sensing
- 4 Existing valves on the tractor (e.g. for coupling points at the rear) can be used for other devices.
- LS Load sensing (line P1)
- P Pressure line
- P_{\min} Standby pressure of the system
- T Return line (tank)

6.4.2 Connecting the hydraulic lines to the tractor

For closed-centre hydraulic systems with load sensing (CCLS), all the hydraulic consumers of the tractor are connected in parallel with a pressure line to the pump and a tank line to the hydraulic tank. In addition, all the consumers are connected with a load-sensing line to the pump controller. The individual load-sensing lines are connected to shuttle valves, so that consumers with the highest load always determine the pressure on the LS line and therefore the pump capacity.

The proportional valve of the front loader is connected as follows:

- (1) Insert an additional shuttle valve on an LS line of the tractor.
- (2) Connect line P1 to the shuttle valve.
- (3) Connect lines P and T to the existing pressure and tank lines.

i The pressure line of the proportional valve should be positioned after the pressure relief valve of the tractor so that the pump cannot be overloaded by the front loader.

✓ The proportional valve is connected.

Basic procedure:

- (1) Connect the line P to a free pressure connection or with a T-piece to a pressure line.
- (2) Connect line T to a free tank connection or to a T-piece on a tank line.

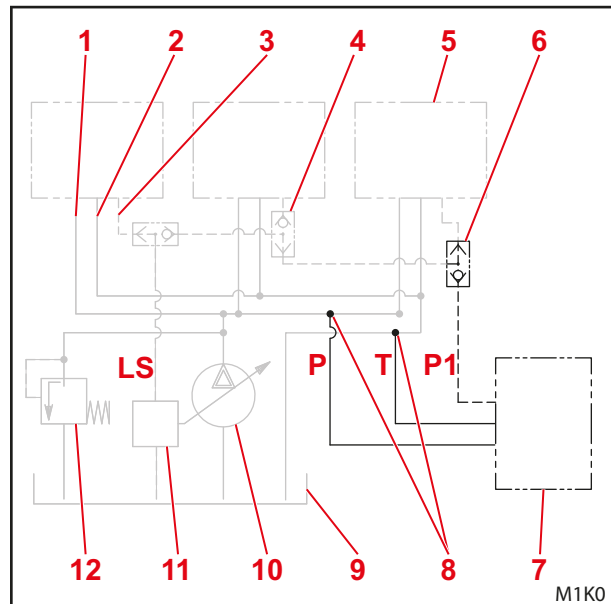


Fig. 27 Connecting the hydraulic lines to tractors with CCLS

Legend

- 1 Pressure line
- 2 Tank line
- 3 Load sensing line
- 4 Shuttle valve
- 5 Hydraulic consumer
- 6 Additional shuttle valve
- 7 Proportional valve
- 8 T-pieces
- 9 Hydraulic tank
- 10 Pump
- 11 Pump control
- 12 Pressure relief valve
- LS Load sensing
- P Pressure line
- P1 Pressure line (load sensing)
- T Return line (tank connection line)

- (3) Interrupt an LS line of the tractor, usually at a connection point.
- (4) Install the shuttle valve.



The T-shaped shuttle valve must be inserted in the correct installation direction: The ends of the "crossbar" of the T pointing towards the hydraulic consumers. The "foot" of the T pointing towards the pump control.

- (5) Connect line P1 to the shuttle valve.
- ✓ The hydraulic lines are connected to the tractor.

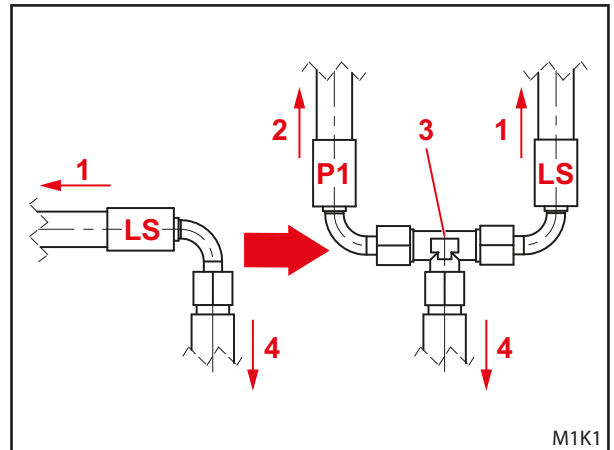


Fig. 28 Installing the shuttle valve

Legend

- 1 Hydraulic consumer
- 2 Hydraulic consumer
- 3 Shuttle valve
- 4 Pump control
- LS Load sensing
- P1 Pressure line (load sensing)

6.4.3 Connection points on the proportional valve

Hydac proportional valve – Base Control, LS configuration

Connect the hydraulic lines to the proportional valve:

- (1) Screw the two $\frac{3}{4}$ " screw-in connectors into the proportional valve.
- (2) Screw one $\frac{1}{4}$ " screw-in connector into the shuttle valve.
- (3) Connect lines P, P1 and T to the screw-in connectors.
- ✓ The hydraulic lines are connected to the proportional valve.

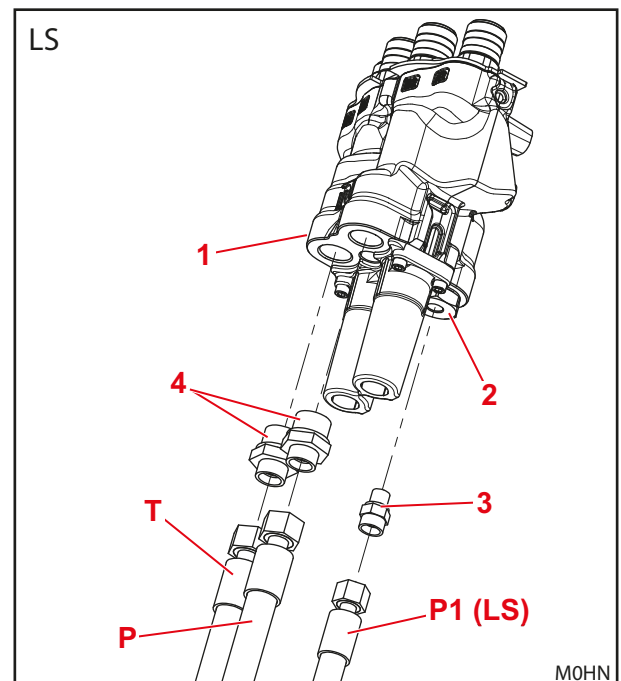


Fig. 29 Hydac proportional valve (LS)

Legend

- 1 Proportional valve
- 2 Shuttle valve
- 3 Screw-in connector $\frac{1}{4}$ "
- 4 Screw-in connector $\frac{3}{4}$ "
- P Pressure line
- P1 Load sensing line
- T Return line (tank connection line)

7 Tightening torques for screws

Tightening torque for screws						
Thread	Strength category					
	8.8		10.9		12.9	
	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft
M4	3	2	4.5	3	5	4
M6	11	8	15	11	17	13
M8	27	20	36	27	42	31
M8x1	29	21	38	28	45	33
M10	54	40	71	52	83	61
M10x1.25	57	42	75	55	87	64
M12	93	69	123	91	144	106
M12x1.5	97	72	128	94	150	111
M12x1.25	101	74	133	98	155	114
M14	148	109	195	144	229	169
M14x1.5	159	117	209	154	244	180
M16	230	170	302	223	354	261
M16x1.5	244	180	320	236	374	276
M18	329	243	421	311	492	363
M18x2	348	257	443	327	519	383
M18x1.5	368	271	465	343	544	401
M20	464	342	592	437	692	510
M20x2	488	360	619	457	724	534
M20x1.5	511	377	646	476	756	558
M22	634	468	807	595	945	697
M22x2	663	489	840	620	984	726
M22x1.5	692	510	873	644	1022	754
M24	798	589	1017	750	1190	878
M24x2	865	638	1095	808	1282	946
M27	1176	867	1496	1103	1750	1291
M27x2	1262	931	1594	1176	1866	1376
M30	1597	1178	2033	1499	2380	1755
M30x2	1756	1295	2216	1634	2594	1913
5/8" UNC (normal)	230	170	302	223		
5/8" UNF (fine)	244	180	320	236		
3/4" UNC (normal)	464	342	592	437		
3/4" UNF (fine)	511	377	646	476		



Make sure that the threads are clean! The specified tightening torques are valid for screws and threads that are clean, dry and free of grease.

Address of the dealer



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