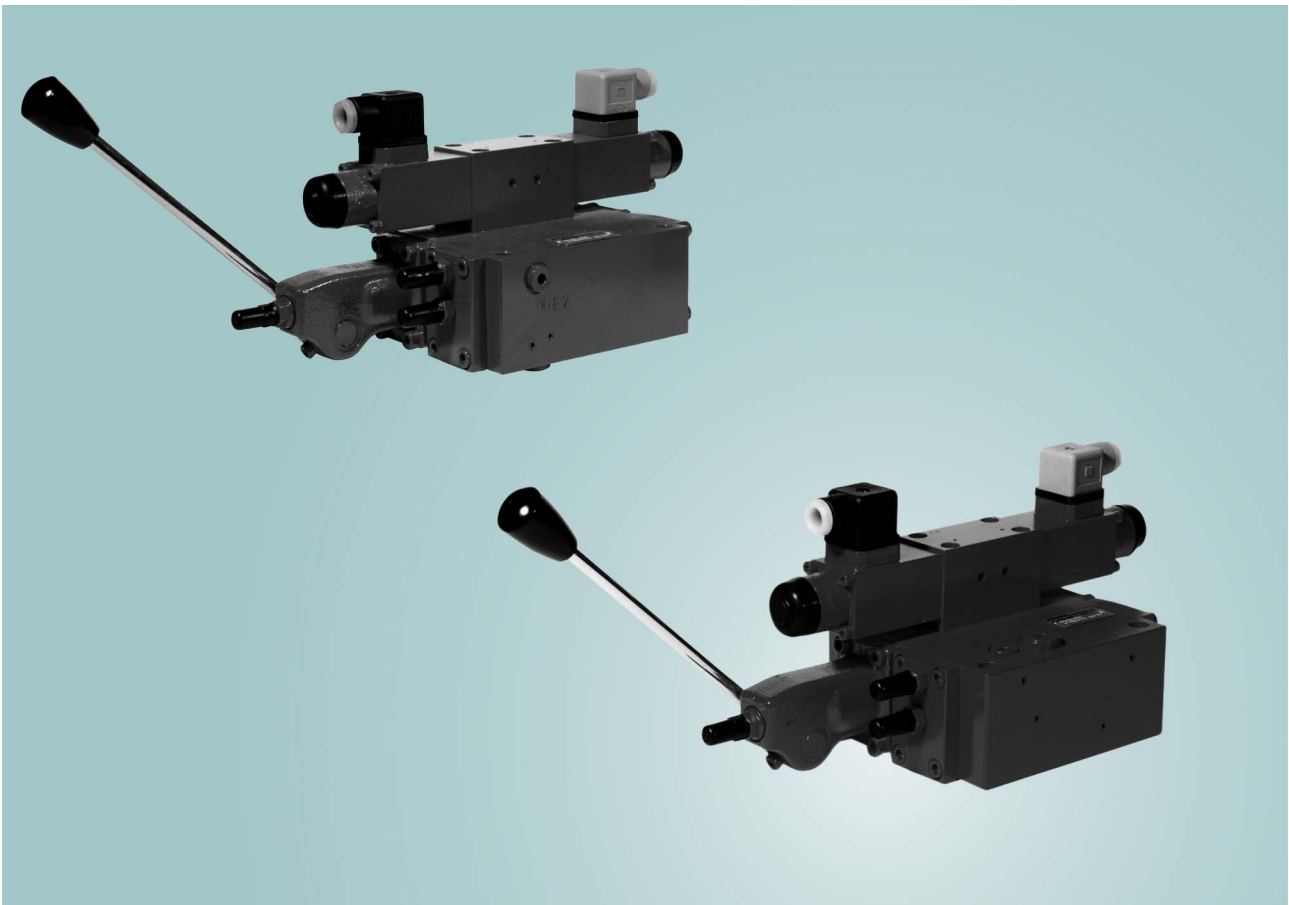


## Safety for Hydraulics

User's information about proportional valves in monoblock and compac design



**motion and progress**

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## 1. Functional description

Bucher proportional valves in monobloc and compac design control the flow load-independently to the actuator. The mono/compac block design means: all valve functions are integrated in a single compac block. These units consist of a pump connection section and up to four proportional directional control valve ports. (Compac blocks generally have only one proportional directional control valve section. The directional control valve regulates

the flow load-independently to ports A and B in proportion to the control signal on the basis of internal load feedback to the pressure compensator.

All directional valves may be operated simultaneously. However, only the flow of the actuator with the highest pressure may be controlled load-independently.

A wide variety of valve types permits optimal adaptation to specific applica-

tions. A broad range of applications is covered by the available actuation types - manual, hydraulic, electrical, or any combination thereof, and versions with a variety of pump connection sections - with 2- or 3-way function pressure compensators, or pressure-relief valves.

For the hydraulic and electrical control there are available remote control units as well as amplifier cards which are optimally suited to the proportional valves.

## 2. Safety instructions

- Use the valves only for their intended purpose.
- The valves may only be adjusted by specialized personnel.
- The hydraulic system must be depressurized before work can be performed on the system.
- The unit may only be opened with the manufacturer's authorization.
- Ensure that the pump provides an adequate flow for the supply of all actuators during parallel operation of multiple actuators. If this is not observed, the motion of the actuator with the highest load pressure may inadvertently change its direction.
- In general there is a risk of sticking spool often caused by contamination of the pressure fluid. A risk assessment with regard to the safety of the machine/system must be performed during the design of the hydraulic control system and suitable safety measures must be implemented, which may be defined in categories as per EN 954.

## 3. Installation instructions

- Never lift the valve by the solenoids, displacement transducers or similar sensitive components.
- Do not exceed the tightening torque of threaded connections; see table 3.1
- Install the valve using the "B" mounting holes only (see table 3.1/3.2 and fig. 3.3)
- Monobloc: Attach the valve only at three points (three-point contact surface) to prevent deformations of the housing. Ensure that the mounting surface is clean. The mounting surface must be level within 0.01 mm per 100 mm (in accordance with DIN ISO 1101).
- Compac: Attach the valve at four points. Ensure that the mounting surface is clean. The mounting surface must be level within 0.01 mm per 100 mm (in accordance with DIN ISO 1101).
- Pipeline systems must not be subjected to stress during installations.

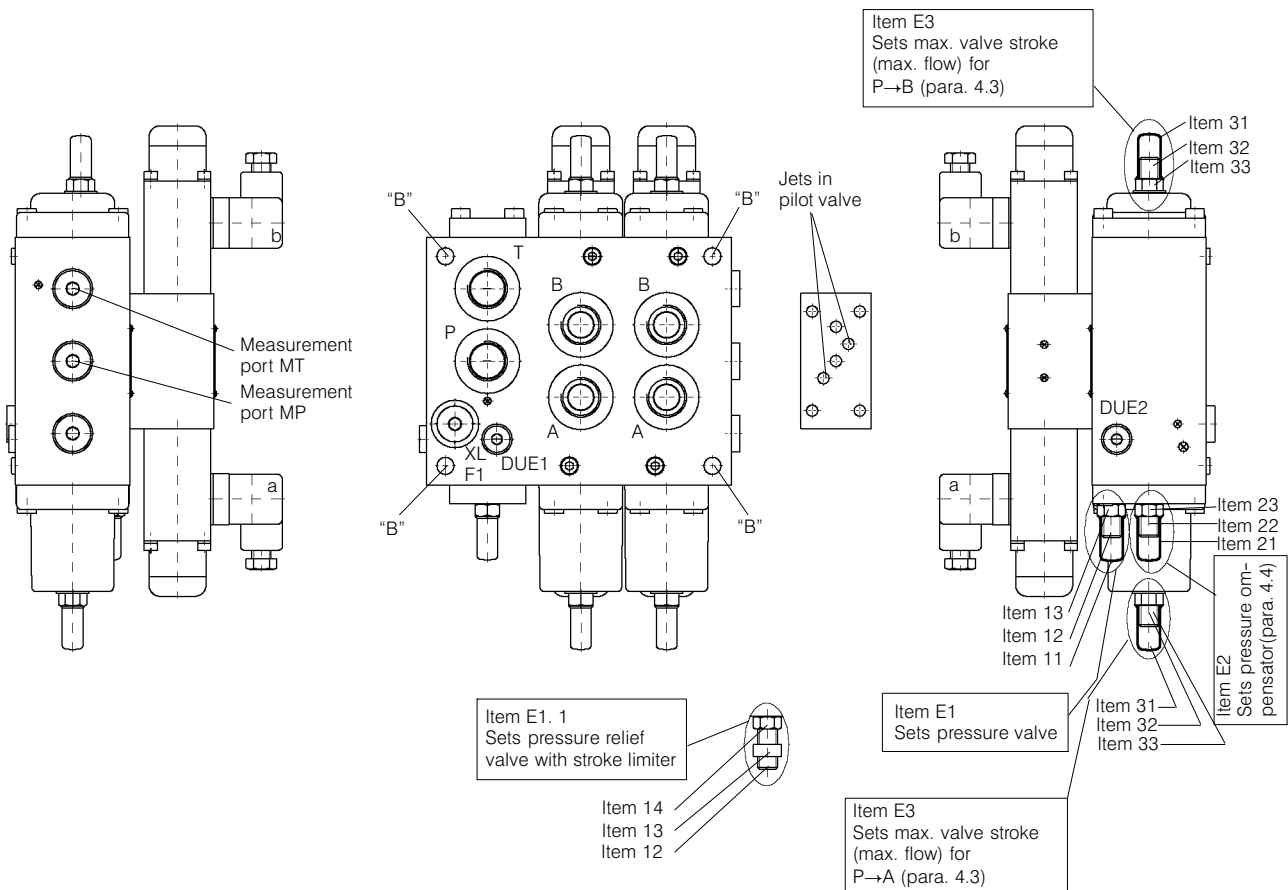
### 3.1 Table: tightening torques für threaded connections, S series - B type

Threads	Tightening torque[Nm]
G1/4"	55
G3/8"	80
G1/2"	115
G1"	310
G1 1/2"	540

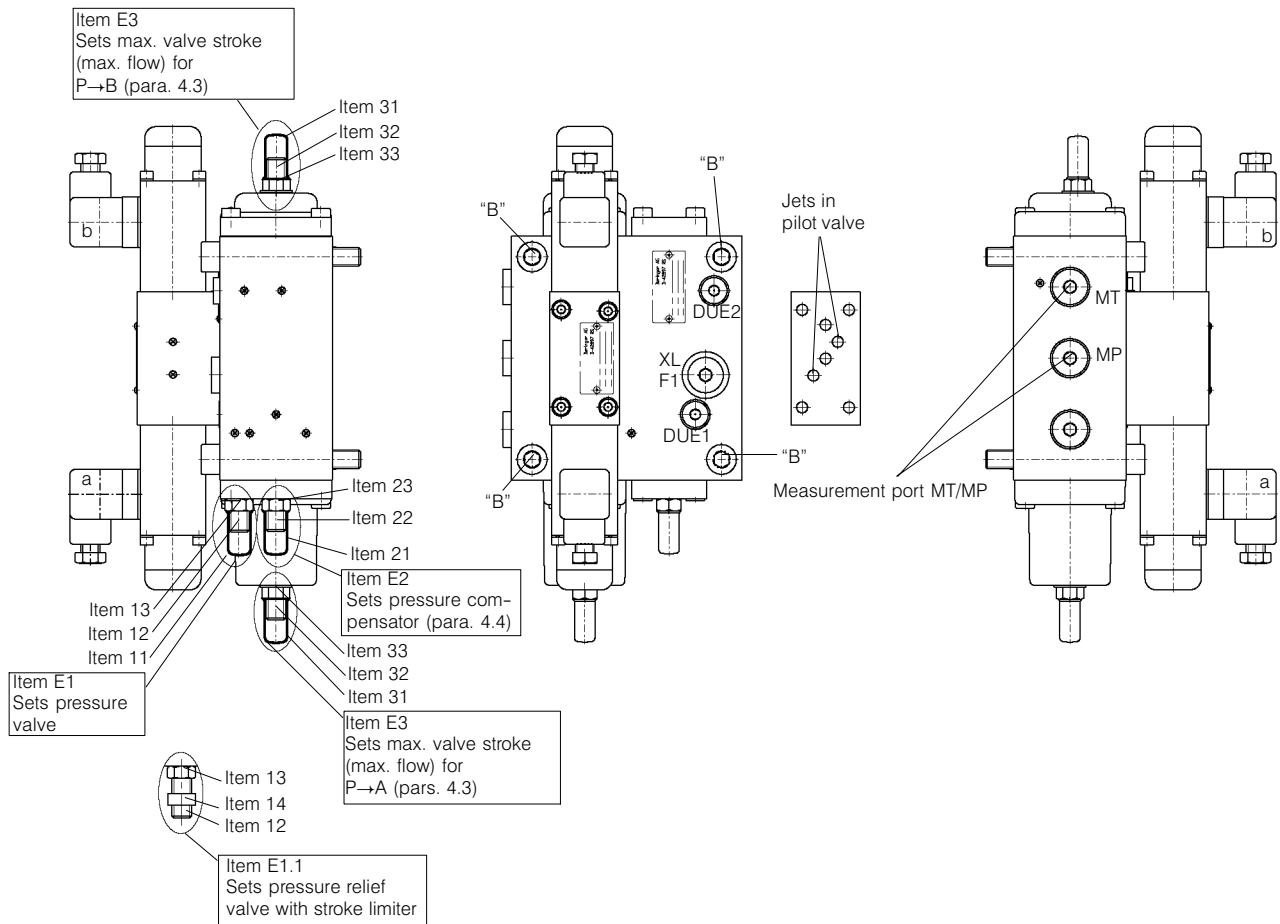
### 3.2 Table: tightening torques $M_A$ ( $\mu_{ges} = 0.125$ ) or the fastening bolts, ISO 4762 (DIN 912) - 12.9

Size	Thread		Wrench size	MA [Nm]
	Monobloc	Compac		
8	M6	-	5	11.4
8	-	M8	6	28
12	M8	-	6	28
12	-	M10	8	55
18	M10	-	8	55
18	-	M12	10	94
25	M12	-	10	94
25	-	M16	14	232

### 3.3 Figure: View of a proportional valve (here for example: monobloc size 12 with 2 actuator modules, pump connection module MU, electro-hydr. actuation)




**3.4 Figure: View of a proportional valve (here for example: compac block size 12, pump connection module CU, electro-hydr. actuation)**



**4. Adjustment instructions**


**4.1 General safety instructions**

The valves are adjusted according to the order datas of the customer. Adjustment should be made only in exception and by specialized personnel!

 **Caution:** The setting range of the adjustment units is not limited mechanically! Changes to the pressure or flow must be made with extreme care, in small steps and in accordance with the adjustment instructions (Para. 4.2 and 4.3)! Uncontrolled adjustments and non-observance of the adjustment instructions can lead to a failure of the maximum pressure-relief device!

**4.2 Adjusting the maximum pressure-relief device**

Changes of the maximum pressure-relief device may only be made with a pressure gauge connected to the measurement points MP or XL (measurement point XL = load, measurement point MP = pump pressure; please refer to fig. 3.3/3.4 for the locations of the measuring points). Maximum-pressure measurements may only be performed with an actuated directional control valve and blocked actuator.

 **Caution:** Do not mistake maximum pressure-relief device with setting of the pressure compensator spring (item E2)!

#### 4.2.1 Procedure:

- Remove the protective cap (item 11).
- Stick the hexagon socket screwdriver (according to DIN 911) into the set screw (item 12)
- When loosen the lock nut (item 13), hold set screw at its home position.
- During turning the set screw read the pressure gauge:
- Maximum pressure reduction: turn adjustment screw counterclockwise
- Maximum pressure increase: turn adjustment screw clockwise
- Standard value: 1/4 turn ~ 40 bar pressure change
- For standard valves the maximum permissible set value is 350 bar.
- For special designed valves with permissible set value under 350 bar the set screw must be fitted with a mechanical stop (item 14) (see item E1.1 figure 3.3/3.4).



**Caution:** This special set screw may never be changed!

- After adjustment is finished hold set screw (item 12) with the hexagon socket screwdriver and tighten lock nut (item 13) (tightening torque: 20Nm)
- Put on the protective cap (item 11)

### 4.3 Adjusting the maximum flow via the main spool stroke



**Note:** Uncontrolled movement of the adjustment screw by several clockwise turns can lead to the failure of the fail-safe position; i.e. the spool of the directional control valve may not be able to return to its neutral position!

Adjustment is effected with the adjustment screw in the main spool cover; see item E3, fig. 3.3/3.4.

#### 4.3.1 Procedure:

- Check that the pump flow is adequate.
- Ensure that the directional control valve has reached its maximum stroke:
- manual lever adjustment: ~ 20° adjustment angle
- hydraulic adjustment: control pressure difference > 18 bar
- electrical adjustment: control current (24V) > 700 mA  
control current (12V) > 1400 mA  
control current (EEx ia I) > 270 mA
- Do not actuate valve
- Remove the protective cap (item 31) from the side to be adjusted (actuator A/B)
- Loosen the lock nut (item 33) (wrench size see table 4.3.2).
- Turn the adjustment screw (item 32):
  - clockwise to reduce the flow
  - counterclockwise to increase the flow
- turn adjustment screw by ~1/2 -turn.
- Tighten lock nut (item 33) with the correct tightening torque; see table 4.3.2.
- Actuate valve, check the change in actuator speed.
- If actuator speed is o.k. - put on the protective cap (item 31).



**Note:** If a change will not be achieved, the adjustment of the pressure compensator can be changed.

#### 4.3.2 Table: tightening torques and wrench sizes for the stroke adjustment of the directional control valve spool and of the pressure compensator (para. 4.4)

Size	Thread	Allen key / Spanner size					Torque
		Compensator adjuster			Spool-stroke limiter		
		Setscrew (old) ISO4026 (DIN913)	Capscrew (new) ISO4762 (DIN912)	Hexagonal nut DINEN24032 (DIN934)	Setscrew ISO4026 (DIN913)	Sealing nut 'Seal-Lock'	Hexagonal nut and sealing nut
		Item 22 [mm]	Item 22 [mm]	Item 23 [mm]	Item 32 [mm]	Item 33 [mm]	Item 22/32 [Nm]
8	M6	3	5	10	3	10	8.5
12	M8	4	6	13	4	13	20
18	M10	5	8	16 (17)	5	17	40
25	M12	6	10	18 (19)	6	19	65

#### 4.4 Adjusting the maximum flow via pressure compensator adjustment (item E2 in fig. 3.3/3.4)

This proceeding can only be performed on MU/CU, MD/CD and MR versions.



**Caution:** Do not mistake the set screw of pressure compensator spring with maximum pressure-relief device (item E1, fig. 3.3/3.4)!

##### 4.4.1 Procedure:

- **Depressurize the system!** (stop pump).
  - Remove the protective cap (item 21, fig. 3.3/3.4).
  - Stick the hexagon socket screwdriver (according to DIN 911) into the set screw (item 22).
  - Turn the adjustment screw (item 22) clockwise until a hard stop is felt.
  - Set the adjustment screw counterclockwise by the number of turn mentioned in table 4.4.2 (with this adjustment the maximum possible speed will be reached).
  - To check the speed, start pump and control actuator.
  - If speed is too high, set the adjustment screw (item 22) counterclockwise (reduction of the spring force) until the correct speed (flow rate) for the actuator is reached.
- Caution:** Never overturn the maximum set of the pressure compensator spring, otherwise the pressure compensator is unable to close and there will be no flow control- and pressure relief function anymore!
- Tighten lock nut (item 23) with the correct tightening torque; see table 4.3.2.
  - Put on the protective cap (item 21).



**Note:** If a change will not be achieved please contact the valve manufacturer.

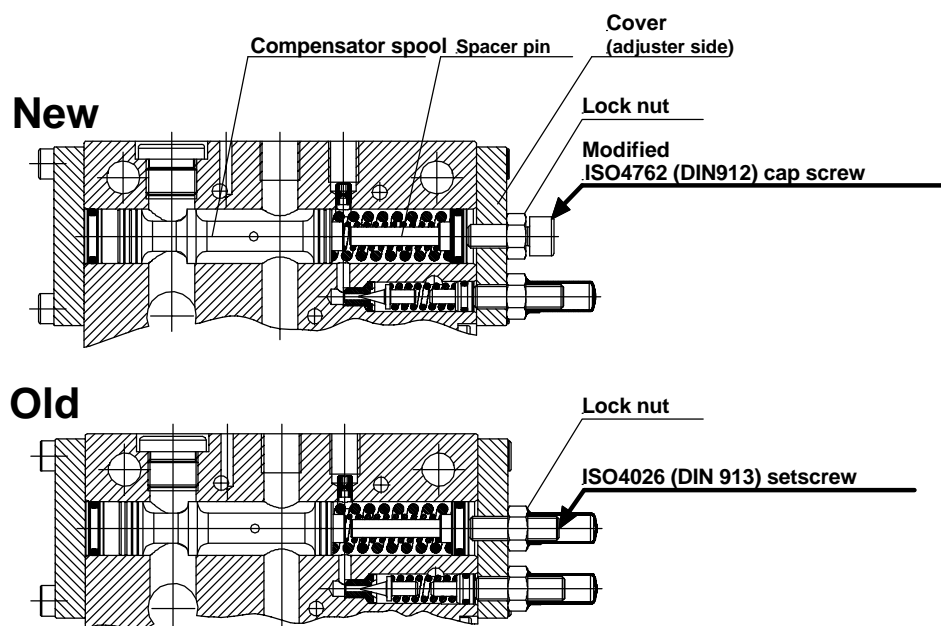
##### 4.4.2 Table: pressure compensator adjustment (minimum number of turns back from the stop = maximum spring force)

Size	Pressure compensator *1 MU/CU	Pressure compensator *1 MD/CD
	Number of turns	Number of turns
8	3	3.5
12	3.5	4
18	4	4.5
25	5	4

\*1 look at 4.4.3

#### 4.4.3 New adjuster on the 2-way compensator (hydrostat)

The previous ISO4026 (DIN 913) setscrew adjuster for the 2-way compensator has been superseded by a modified ISO4762 (DIN912) cap screw adjuster. This change is an improved engineering solution.



This change does not alter in any way the effect produced by the adjuster.

The change merely simplifies the procedure for setting the maximum compensator spring force.

To set the maximum compensator spring force with the previous adjuster, it was necessary to first screw the setscrew in to its end stop and then to unscrew it by the number of turns specified in the User information leaflet.

To set the maximum compensator spring force with the new adjuster, it is only necessary to screw the cap screw complete with lock nut into the cover as far as it will go.

The maximum compensator spring force is identical in both cases. The spring force can be subsequently reduced by unscrewing the adjuster in the same way as before.

Advantages of the new adjuster:

- the maximum compensator spring force can be set reliably
- the spring force can be changed easily

For technical reasons, it is unfortunately not possible to retrofit any valve systems already supplied.



**Warning:** Replacing the modified cap screw by any other screw is not permitted and can result in failure of the pressure relief function.

## 5. Storage notes

The maximum permissible storage period in closed, dry rooms is six months. Longer storage periods (up to 3 years) may be achieved by using suitable packaging materials and preservation.

### BUCHER HYDRAULICS

#### Germany

Phone +49 7742 85 20  
Fax +49 7742 71 16  
info.de@bucherhydraulics.com

#### France

Phone +33 389 64 22 44  
Fax +33 389 65 28 78  
info.fr@bucherhydraulics.com

#### Netherlands

Phone +31 79 34 26 24 4  
Fax +31 79 34 26 28 8  
info.nl@bucherhydraulics.com

#### UK

Phone +44 24 76 35 35 61  
Fax +44 24 76 35 35 72  
info.uk@bucherhydraulics.com

#### USA

Phone +1 262 605 82 80  
Fax +1 262 605 82 78  
info.wi@bucherhydraulics.com

#### Switzerland

Phone +41 33 67 26 11 1  
Fax +41 33 67 26 10 3  
info.ch@bucherhydraulics.com

#### Italy

Phone +39 0522 92 84 11  
Fax +39 0522 51 32 11  
info.it@bucherhydraulics.com

#### Austria

Phone +43 6216 44 97  
Fax +43 6216 44 97 4  
info.at@bucherhydraulics.com

#### China

Phone +86 10 64 44 32 38  
Fax +86 10 64 44 32 35  
info.bj@bucherhydraulics.com

#### Product Center (Elevator)

Phone +41 41 757 03 33  
Fax +41 41 757 16 49  
info.nh@bucherhydraulics.com

[www.bucherhydraulics.com](http://www.bucherhydraulics.com)

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