

## Instruction manual C4WERE 6

**4/3 proportional spool valve  
Control valve with on-board electronics and  
positional transducer  
solenoid-operated, direct-acting****DESCRIPTION**

HYDAC 4/3 control valves from the series C4WERE 6 are direct acting, electrically operated spool valves.

The valve operates by an oil-immersed control solenoid.

During this process, the solenoid quickly and precisely pushes the valve's control spool into the respective position to obtain the desired flow path.

The piston position is proportional to the input signal and is controlled by integrated electronics and direction control (LVDT).

**FEATURES**

- Application for position, pressure and speed control
- Resistant to contamination thanks to powerful solenoids
- Easy to use thanks to plug-and-play design
- Highly dynamic and very good response
- Interface according to ISO 4401-03; DIN 24340 Form A6



Nominal size 6  
up to 100 l/min  
up to 350 bar

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# INHALTSVERZEICHNIS

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# 1 INTRODUCTION

## 1.1 QUALIFICATIONS FOR INITIAL START-UP OF THE VALVE

The valve must only be put into operation by trained specialist personnel with knowledge of hydraulics and electrical systems, or under the supervision of such qualified personnel.

Specialist personnel refers to any person who has acquired knowledge through their specialist training regarding the provisions for carrying out the initial start-up work. They must be able to recognise potential dangers during the work and to take appropriate protective measures to prevent accidents.

## 1.2 SAFETY INFORMATION

Warning sign and signal word	Description
 <b>NOTICE</b>	Refers to the possibility of damage occurring to the product or its environment.
 <b>WARNING</b>	Warns of hazardous situations that could lead to severe physical injury or even death.


## 1.3 INTENDED USE

The valve is a hydraulic component and must be used as intended, as follows:

- As a direct-acting, solenoid-operated 4/3 proportional spool valve with on-board electronics and positional transducer, it is used to control the speed and pressure of consumers in hydraulic circuits.

Part of intended use is that you must have read the enclosed documentation in full and understood it. The valve must only be installed and operated in perfect technical condition. For the installation/initial start-up, operation and dismantling, the conditions and specifications set down in this instruction manual apply.

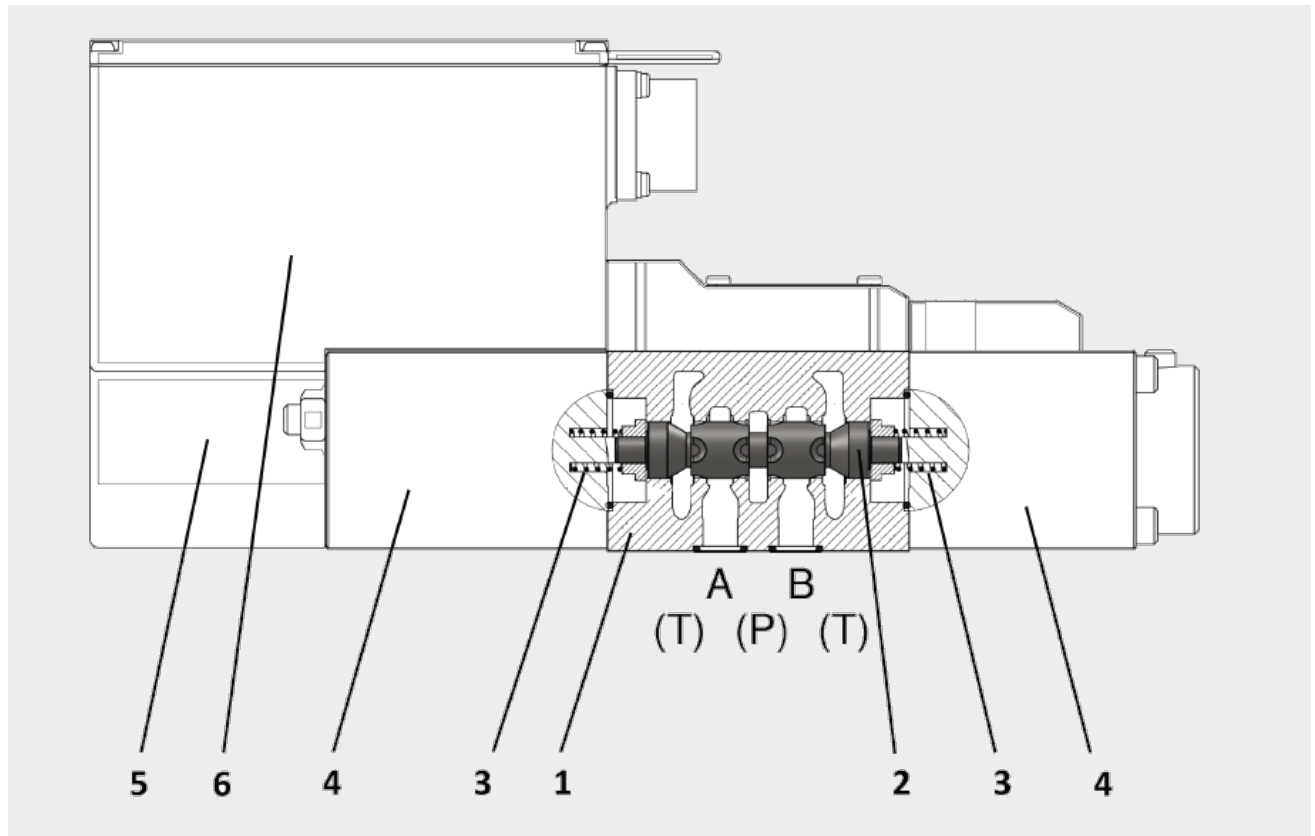
## 1.4 IMPROPER USE

 Improper use or use deviating from intended use can result in property damage and/or personal injury.

Any use deviating from the use described in section 1.3, "Intended use", is improper use and is therefore not permitted.

HYDAC Fluidtechnik GmbH accepts no liability for loss or damage arising from improper use of the valve or use deviating from intended use.

## 1.5 DESCRIPTION OF FUNCTION



The solenoid-operated proportional directional spool valves of type C4WERE 6 are used to control a flow precisely and dynamically.

The valve comprises a valve housing (1) with corresponding valve piston (2). It has two return springs (3) and is fitted with two powerful regulating solenoids (4), a positional transducer (5) and on-board electronics (6).

The on-board electronics convert an analogue nominal value signal into a proportional piston displacement in relation to the return spring. This causes the nominal flow directions between the respective connections to be released or closed. The force needed to perform the displacement is generated by the solenoid. The positional transducer constantly records the current position and the on-board electronics compare the actual position with the target position and set the pilot flow to the level required to correct any difference. This makes it possible to have a steadily increasing flow even if the pressure difference across the valve is increasing.

If the valve is de-energised, the return springs return the valve piston to a safe position (fail-safe function as an option).

## 1.6 FIELDS OF APPLICATION

The valve is used in the following applications, for example:

- Injection moulding machines
- Grinding machines
- Blow moulding technology
- Honing machines
- Steelworks
- Wood processing
- Machine tools

If you plan on using the valve for other fields of application, please consult with our technical department before initial start-up.

## 1.7 SCOPE OF DELIVERY

The parts included in the scope of delivery are listed in the following table.

Parts	Quantity	Part no.
Fastening screws (M5x45)	4	615548
O-rings at each of ports P, A, B, T (9.25x 1.78-FKM -80Sh)	4	3120269

### 1.7.1 CHECKLIST FOR VISUAL INSPECTION OF THE VALVE

Check the following aspects of the valve after delivery:

- Have you received the correct valve?
- Have you received the correct model? To verify this, check the model code (the model code is explained in section 2.1) and the specified part number.
- Is the valve damaged? If so, document the damage and inform us without delay.
- Have all individual parts and accessory parts been included in the delivery? Compare your order with the delivery you have received.

Accessory parts (not included in the scope of delivery)	Quantity	Part no.
Connection plug for on-board electronics	1	6080324

If you have received the wrong valve or if your order has not been delivered in full, please contact the relevant HYDAC technical department.

## 2 PRODUCT DESCRIPTION

### 2.1 MODEL CODE

**C4WERE 6 Z – FA 35 K01 / E0B / V**

#### Type

Solenoid-operated control valve with integrated electronics and displacement transducer, direct-acting

#### Nominal size

6

#### Piston symbol

See section 2.2

#### Fail-safe function

No details = no fail-safe function (standard)

FA = ports P and B to ports A and T

FB = ports P and A to ports B And T

#### Flow rate (at 10 bar $\Delta p$ from port P to T)

10 = 10 l/min

20 = 20 l/min

35 = 35 l/min

#### Design

K01 = standard

#### Input signal

E0B = voltage  $\pm 10$  V

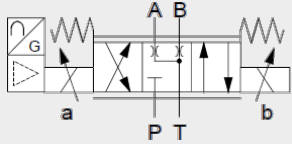
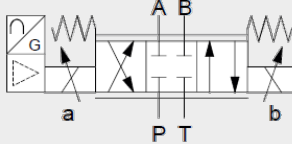
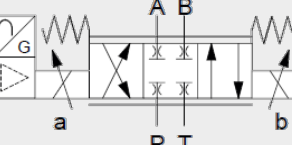
E1B = current 4–20 mA

#### Sealing material

N = NBR

V = FKM (standard)

### 2.2 PISTON TYPES / SYMBOLS

Type	Symbol	Description
Q		
E		10% overlap with total stroke*
Z		2% overlap with total stroke*

\*Full piston stroke = 2.5 mm

## 2.3 TECHNICAL DATA

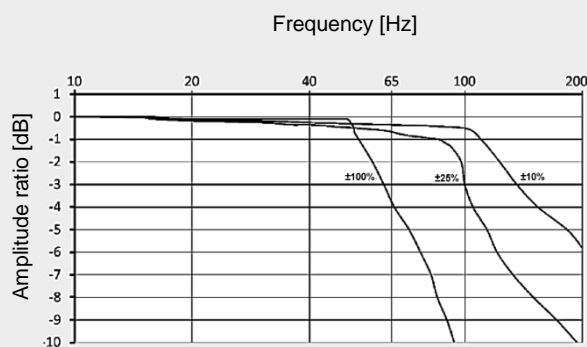
General specifications		
Ambient temperature:	[°C]	0 to 50
Mounting position:		Horizontal ± 15°
Weight:	[kg]	3.3
Material:	Valve housing:	cast iron
	Electronics housing:	metal die-cast
	Coil housing:	steel
	Name plate:	aluminium
Surface coating:	Valve housing:	phosphate-plated
Hydraulic specifications		
Operating pressure:	[bar]	350
Tank pressure:	[bar]	210
Flow rate: (at 10 bar $\Delta p$ P → T)	[l/min]	10
		20
		35
Operating fluid:		Hydraulic oil to DIN 51524 Part 1, 2 and 3
Temperature range of operating fluid:	[°C]	-15 to +60
Viscosity range:	[mm <sup>2</sup> /s]	15 to 400
Permitted contamination level of operating fluid:		Class 18/16/13 according to ISO 4406
Sealing material:		FKM (standard), NBR
Electrical specifications		
Hysteresis:	[%]	0.1
Repeatability:	[%]	0.1
Protection class according to DIN EN 60529:		IP 65

For more information on the technical data, see “Operating conditions and instructions for valves” in brochure 53.000.

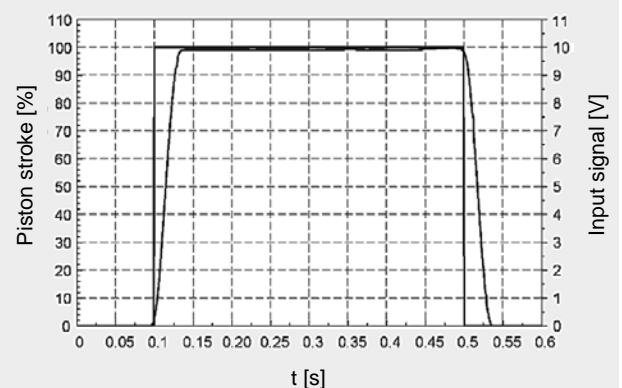
## 2.4 PERFORMANCE CURVES

Z piston used as an example

Frequency range



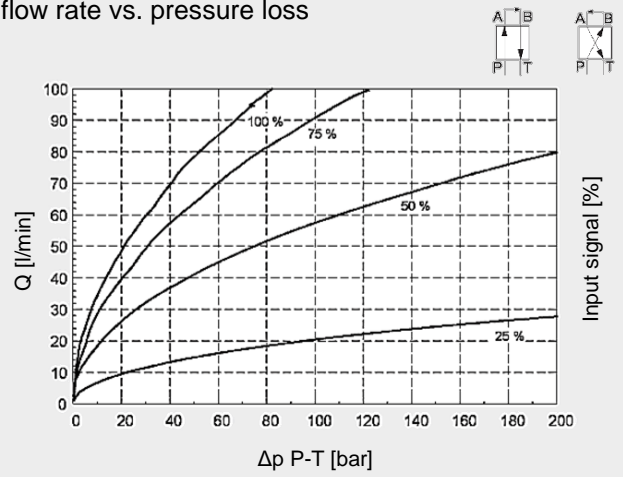
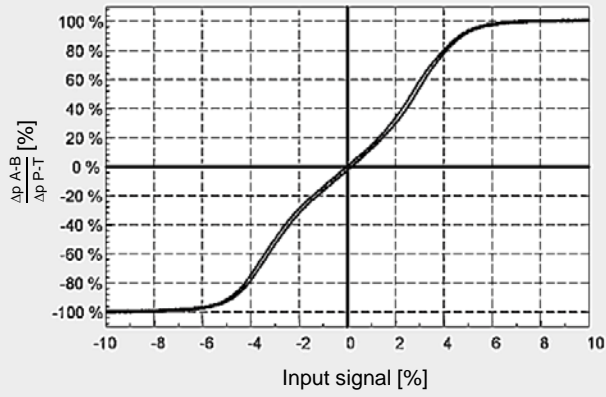
Switching times



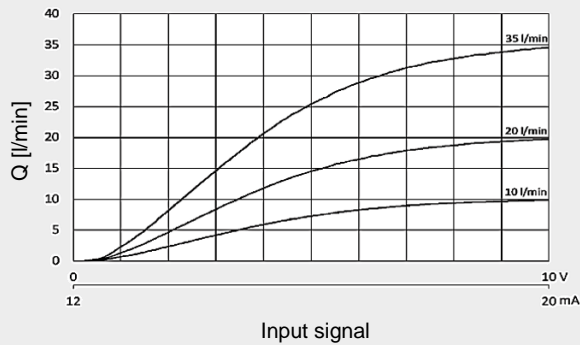


Pressure increase

flow rate vs. pressure loss



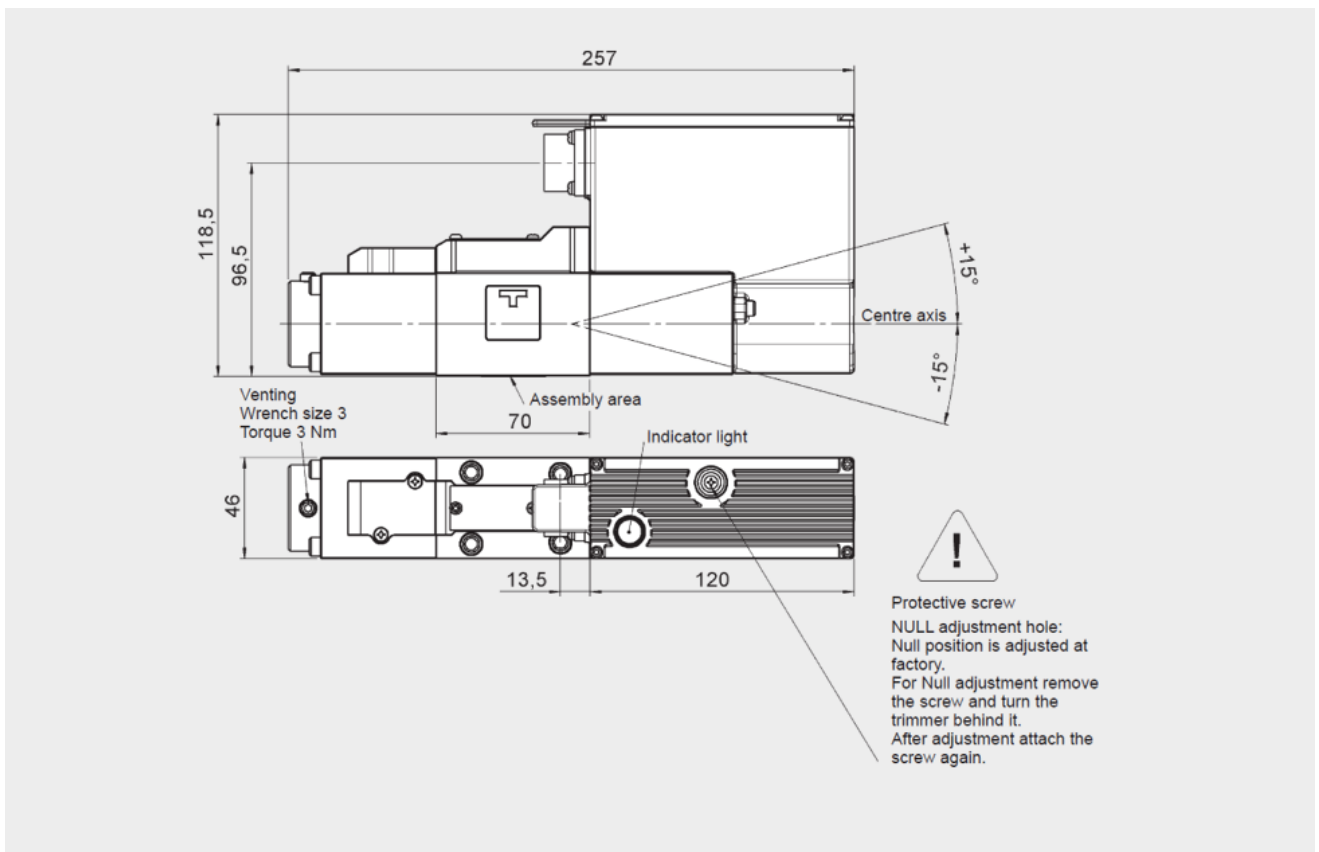
Flow increase ( $\Delta p P \rightarrow T$ : 100 bar)



Calculation of the flow rate:  
(at pressure difference > 10 bar)

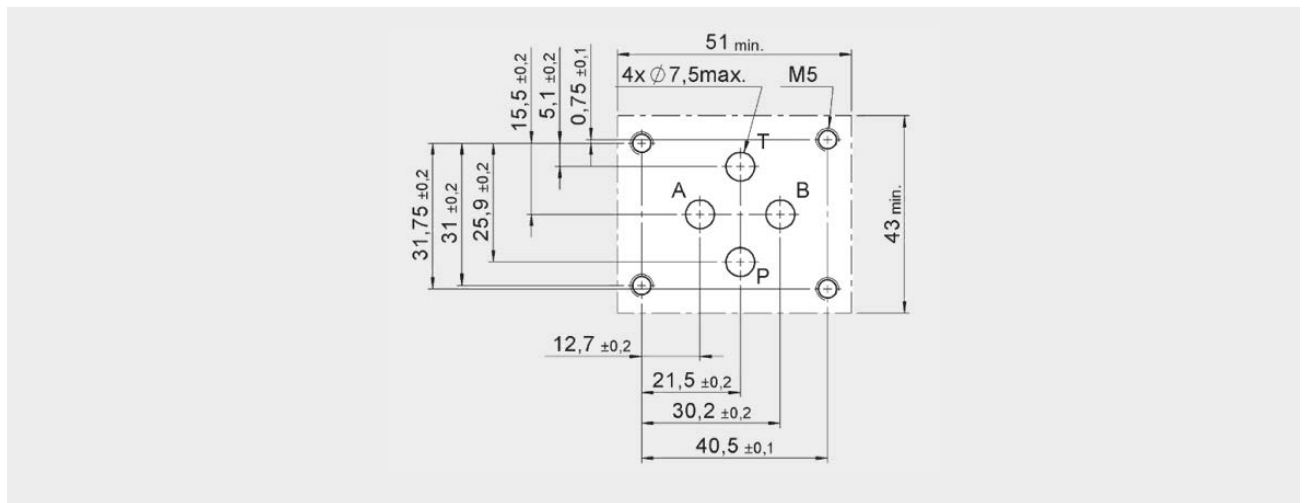
$$Q_x = Q_{NOM} \times \sqrt{\frac{\Delta p_x}{10}}$$

## 2.5 DIMENSIONAL DRAWING AND INTERFACE



Note that the valve can only be fitted to a mounting surface in accordance with ISO 4401-03-02-0-05 (CETOP 4.2-4-03-350) and with the following fastening screws:

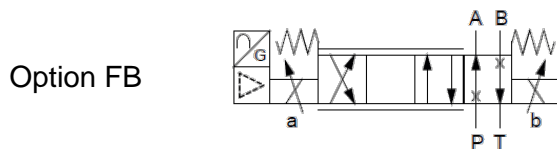
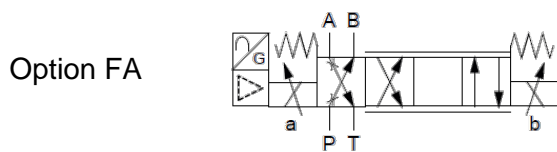
Fastening screws	Tightening torque	Clamping length	Quantity	Part no.
Screws acc. to ISO 4762, M5x45	7 Nm (screws A10.9)	38 mm	4	615548



## 2.6 FAIL-SAFE FUNCTION

Choose an option for the fail-safe function if you need this for your application.

A fail-safe function is recommended if the piston needs to be held in a secure position that is safe for your system in the event of power supply failure.



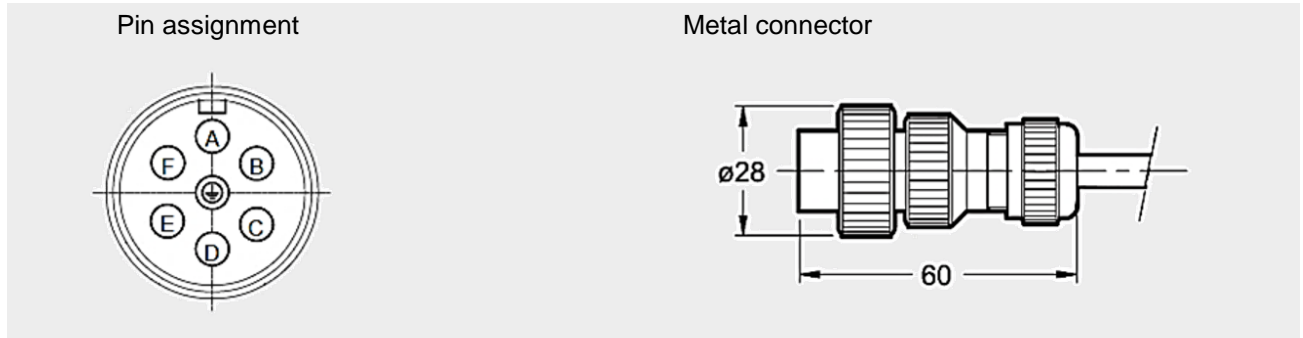
Designation	Piston position	Symbol
C4WERE 6 E ... K01/.../.	Centre position: All ports blocked	Piston E
C4WERE 6 Q ... K01/.../.	Centre position: From ports A and B little leakage to T	Piston Q
C4WERE 6 .-FA .. K01/.../.	20% of total stroke Equivalent to roughly 20% of $Q_{NOM}$	Pistons E, Z and Q
C4WERE 6 .-FB .. K01/.../.	20% of total stroke Equivalent to roughly 20% of $Q_{NOM}$	Pistons E, Z and Q

## 2.7 CONNECTOR

To connect the electronics, an EN175201 part 804 connector (available as an option, part no. 6080324) is recommended and a shielded cable with at least seven leads is required.

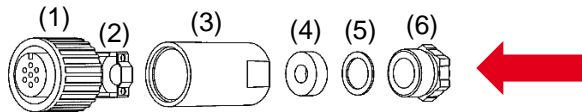
Note when using the recommended standard connector:

- The external diameter of the cable sheath must be at least 8 mm and no more than 10 mm.
- The cross section of the single leads of the cable must not exceed 1.0 mm<sup>2</sup>.
- The cable length is dependent on the size of your system. Bear in mind the loss of voltage over the cable length, however.



### 2.7.1 TERMINATING THE CONNECTOR

**!** Do not wire the connector while the system is switched on.




Before initial start-up, prepare the cable ends for the connector as follows:



1. Strip the length of the cable sheath and the ends of the leads as shown above.
2. Guide the cable through (6), (5), (4), (3) and (2), in this specific order, in the direction shown by the arrow in the above figure.
3. Solder the leads to the pins in the connector socket (1). Then tighten the screws of the cable clamp (2) to anchor the cable.
4. Screw the connector housing (3) into the connector socket (1).
5. Insert the seal (4) and the washer (5) into the connector housing (3).
6. Then tighten the cable bushing (6). The tightening torque is determined by the cable diameter. There must be no gap between cable and seal.

## 2.7.2 TABLE – PIN ASSIGNMENT OF THE ELECTRONIC CONTROLS


Pin	Code	C4WERE.../E1B	C4WERE.../E0B
PIN A	Power Supply	24 V DC (21,6 - 26,4 V DC) * <sup>3</sup>	
PIN B		0 V	
PIN C	Signal Common	COM (0 V)	
PIN D	Input (+) (Differential) * <sup>1</sup>	4-20 mA Ri = 200 Ω	± 10 V Ri ≥ 50 kΩ
PIN E	Input (-) (Differential) * <sup>1</sup>		
PIN F	Spool Travel Monitoring	4-20 mA Ri = 100 - 500 Ω* <sup>2</sup>	± 10 V Ri ≥ 10 kΩ
PIN 	Protective Earth	-	


<sup>1</sup> The different input signal is only used for the type C4WERE.../E0.

<sup>2</sup> Recommended ballast resistor Ri = 200 Ω

<sup>3</sup> Power consumption max. 75 VA and without nominal value setting min. 16 VA

## 3 INSTALLATION

 All work on the hydraulic circuit must only be performed in a depressurised state. Otherwise there is a risk of injury arising from parts becoming detached / operating fluid.

-  - If dirt and foreign bodies enter the inside of the valve, this may result in increased wear and malfunctions. During installation, it must therefore be ensured that the installation environment is clean.
- Parts that are damaged or installed incorrectly may cause external leakage at the valve.

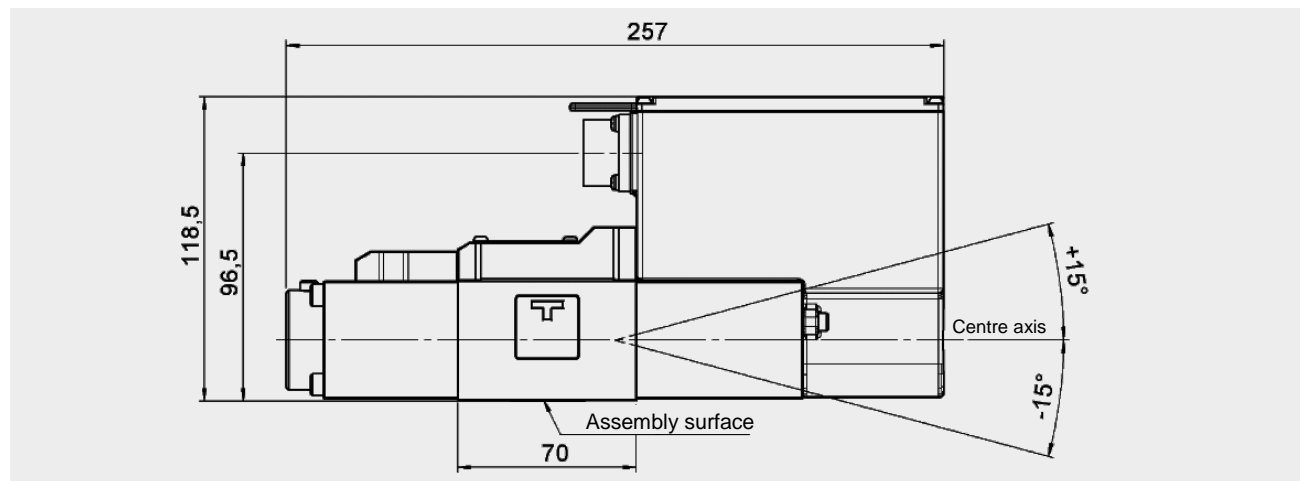
### 3.1 PREPARATION OF REQUIRED PARTS AND NOTICES

Observe the following steps during installation and ensure that all the required parts are on hand:

- Only install the product on the mounting surface specified in section 2.5.
- Check the product again for damage and scratches. Do not put a damaged valve into operation, even if you believe it to be harmless.
- Check that the seal rings are correctly mounted at ports P, A, B and T.
- Ensure before installation that the surface is free from dirt and does not exceed a roughness of 0.8.
- Ensure that the four fastening screws from section 2.5 that are included in the scope of delivery are close at hand.

### 3.2 MOUNTING POSITION

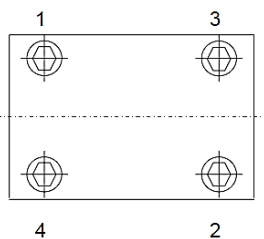
Mount the valve in a horizontal position. A deviation of max. ± 15°, starting from the centre axis, must not be exceeded.



### 3.3 VALVE ASSEMBLY

To ensure that the product functions correctly, observe the following steps during initial start-up:

1. Remove the protective cap from the interface.
2. Ensure that the O-rings are present, free from damage and correctly mounted on all four ports before continuing with the installation.
3. Check both contact surfaces for damage and clean away any dirt. Rectify any damage before continuing with the installation.
4. Orientate the valve in accordance with the valve mounting cavities in the block/subplate (see section 2.5).
5. Mount the four supplied fastening screws at the correct points.
  - ❗ If the fastening screws are difficult to mount, check the orientation of the valve again before continuing with the installation.
6. Tighten the screws in the order shown in the figure below with a torque of 7 Nm.
  - ❗ Exceeding the specified tightening torque may cause permanent damage to the screws and threads. If a tightening torque lower than the specified torque is applied, the screw connection will not be sufficiently pretensioned.



Sequence: 1 – 2 – 3 – 4 – 1  
Tightening torque: 7 Nm



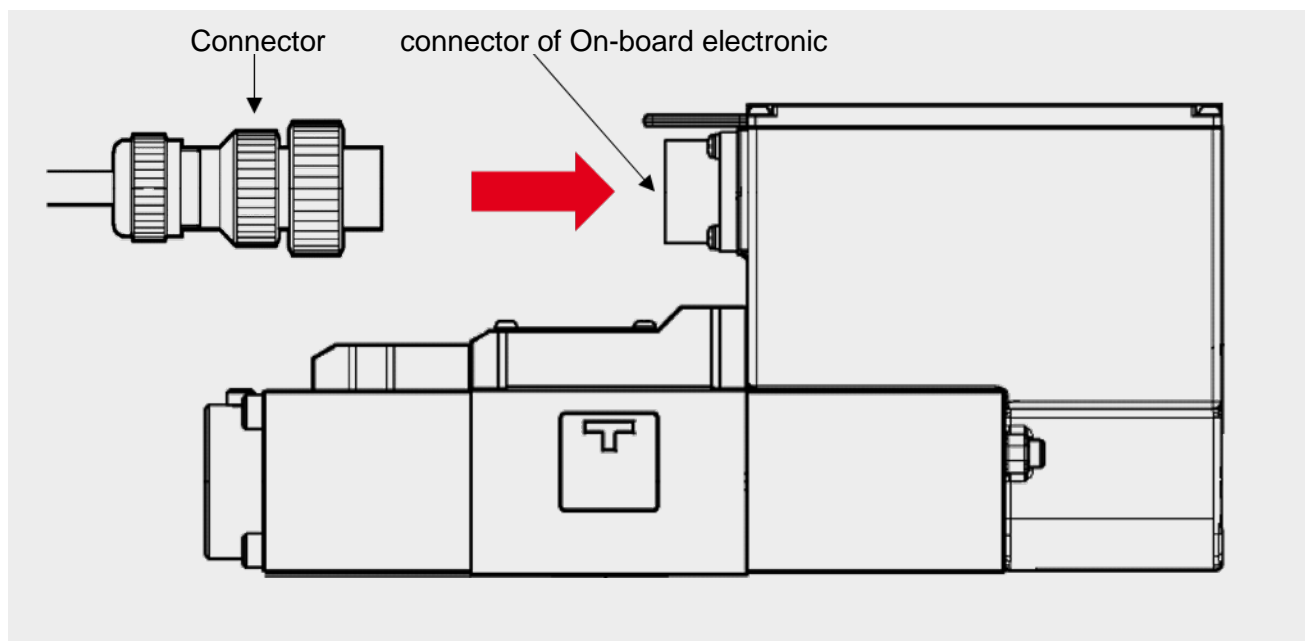
Failing to observe the installation instructions described above or mounting third-party fastening parts not included in delivery may cause external leakage to occur and impair the valve function and/or put people in danger.

## 4 CONNECTING THE ON-BOARD ELECTRONIC




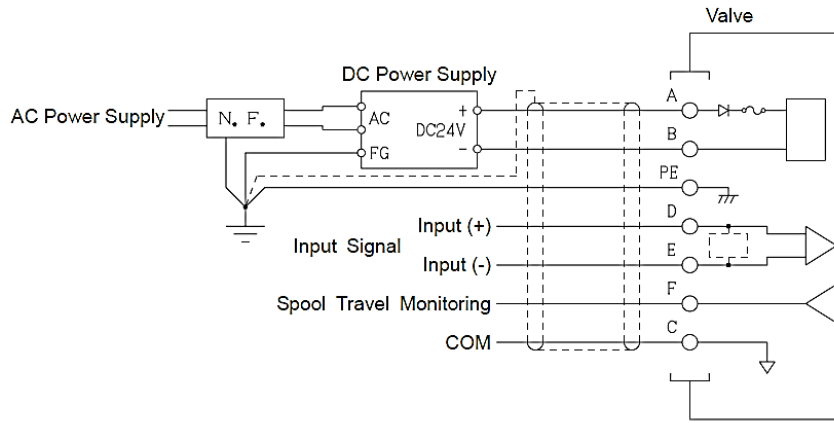
No voltage may be present at the connector during the installation, as this could cause uncontrolled movement of the drive.

During initial start-up, insert the connector from section 2.7 into the corresponding connector of the on-board electronic as shown in the figure. Tighten the coupling nut of the connector.

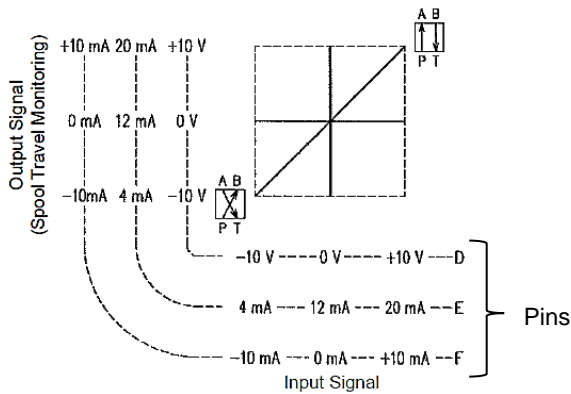


For correct voltage and signal supply for the valve, observe the following:

- To supply the valve with power, use a suitable power supply unit with an output voltage of 24 V DC and a power output of at least 75 VA.
- A supply voltage of 24 V DC must only fluctuate within the range of  $\pm 10\%$  (permitted voltage range 21.6–26.4 including residual ripple). If this range is exceeded, amplifier malfunction may occur.
- Route the PE connection (protective earth) of the supply cable separately to the earth rail.
-  Never bridge the PE with the neutral conductor of the power supply unit (pin B of the connector).
- Connect the shielding of the supply cable to the earth rail.



- Ensure that the output signal of your machine control correlates to the input signal of the on-board electronics (current or voltage input).

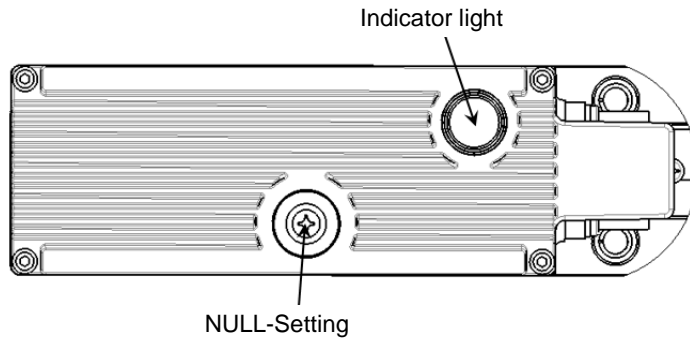


## 5 ON-BOARD AMPLIFIER

### 5.1 INDICATOR LIGHT AND NULL SETTING



Familiarise yourself with the function of the on-board electronics before initial start-up.

- ! Never open the housing of the on-board electronics, as this could cause malfunction or failure. Furthermore, this would void the warranty of the valve.



#### 5.1.1 INDICATOR LIGHT

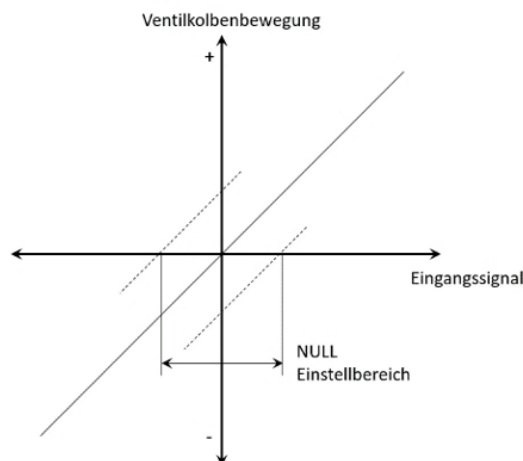
Observe the status of the indicator light shown in the figure above. The light can be one of two colours:

Colour of the indicator light	Meaning
 Gree	The valve is switched on.
 Red	There is a malfunction – for details see section 5.4.

#### 5.1.2 NULL-SETTING

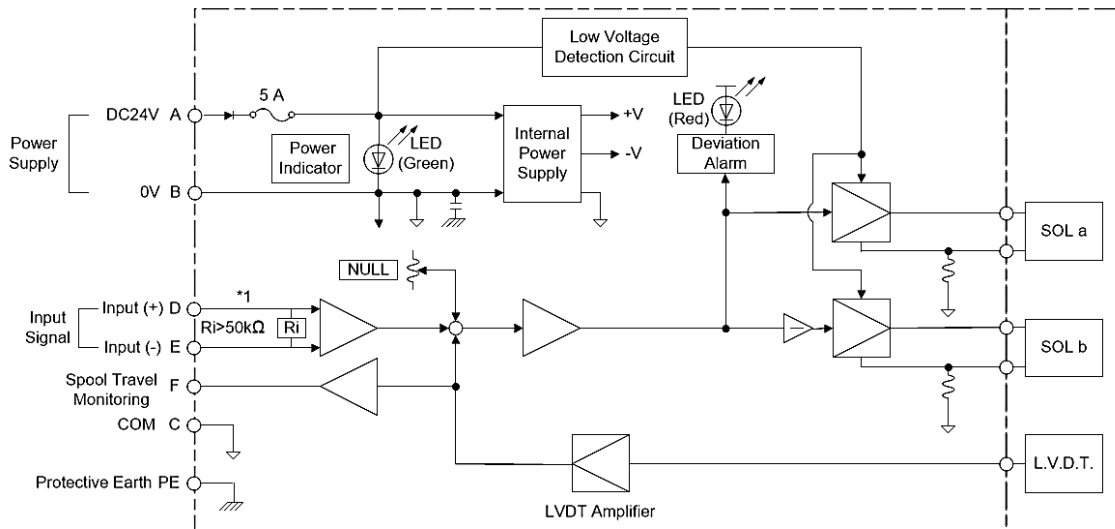
The trimmer potentiometer is used to set the neutral position of the valve spool and is preset before delivery. If the neutral position needs to be readjusted, the protective screw (M5) must be removed to make it possible to turn the trimmer. The setting range is roughly  $\pm 15\%$  of the piston stroke (full piston stroke = 2.5 mm).

- ! If the trimmer signal is changed, the displacement signal must be recalibrated.

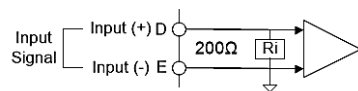


## 5.2 BLOCK DIAGRAM

The following circuit diagram illustrates the design and functionality of the on-board amplifier.



\*1. Die Eingangsstufe für Eingangssignal 4-20mA sieht wie folgt aus :



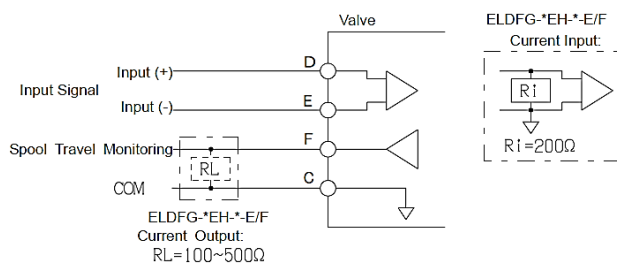
## 5.3 MONITOR SIGNAL

There is a direct correlation between the monitor signal and the type of input signal:

Designation	Input signal	Spool travel monitoring
C4WERE...E0B...	$\pm 10 \text{ V}$	$\pm 10 \text{ V}$
C4WERE...E1B...	4-20 mA*	4-20 mA

\*If the input signal  $\leq 1.5 \text{ mA}$  an open circuit is detected and the valve moves to the neutral position (12 mA)

Resistance adjustment of monitor output with current signal:





## 5.4 POTENTIAL MALFUNCTIONS OF THE VALVE

If the valve malfunctions, check the following points:

LED indicator light red  = deviation alarm


Possible malfunction	Cause	Possible corrective action
Piston stroke deviates from the output signal by >3% or does not follow the input signal within one second	Stiff movement or jamming of the valve piston caused by contamination of the operating fluid	<ul style="list-style-type: none"><li>- Clean valve</li><li>- Check filtration in the oil circuit</li><li>- Replace operating fluid</li></ul>
Contact problem of the connection plug or the cabling for the signal line	Faulty assignment or damage to the connector or cable break	<ul style="list-style-type: none"><li>- Check contact points and wiring</li><li>- Replace cable or connector</li></ul>
Under-voltage at the valve	Power supply unit failing to provide sufficient supply voltage	<ul style="list-style-type: none"><li>- Check configuration of the power supply unit in terms of connected load</li><li>- Check cabling to the power supply unit and cable length</li></ul>
Faulty input signal	The control's nominal value signal type does not correspond to the valve's expected current/voltage input	<ul style="list-style-type: none"><li>- Adjust the control's nominal value signal to suit the valve</li><li>- Select a valve that matches the control's nominal value signal</li></ul>

## 6 INITIAL START-UP OF THE VALVE



### 6.1 NOTICES REGARDING INITIAL START-UP OF THE VALVE



- Use the valve exclusively to control the speed and pressure of consumers in hydraulic circuits.
- There is some risk of leakage in the valve, which may cause movement at the drive.
- The valve may heat up intensely during operation. Do not touch the valve during operation, particularly the coils, as this may cause burns.
- Actuating the pin on the front of the solenoid will cause uncontrolled movement of the drive.

Instructions to follow	Precautions/ assistance	Possible consequences if instructions not followed
Use exclusively the specified operating fluids in pure form.	Ensure that the valve is operated in accordance with the cleanliness class 18/16/13 ISO4406 or cleaner (equivalent to NAS 1638 class 10).	Impaired function or malfunction
Vent your hydraulic system before initial start-up. After that, we recommend venting the valve separately during initial start-up.	 Only perform the venting procedure at the valve if there is no pressure at ports A or B. To perform venting, loosen the vent screw (max. three thread turns), but do not removed it completely. Apply pressure to the valve at port P. When oil exits without any bubbles, tighten the vent screw.	Impaired valve function and unstable function of the hydraulic drive are possible
Take suitable measures to prevent interference in the voltage or signal supply.	Use shielded connection cables and connect the cable shielding to the earth rail.	Function impaired by interfering signals in the voltage and signal supply
Bear in mind the loss of voltage over the cable length.	To comply with the specified supply voltage range, choose a large cable cross section or adjust the cable length. If the voltage drop in the signal line is excessively high, change to a valve with current input.	Function impaired by drop in voltage in the voltage and signal supply
Perform a safety review of the system.	Add an extra hydraulic safety circuit for the valve for secure pausing and stopping of the drive during operation and initial start-up.	Uncontrolled movement of the consumer.
Pretension the tank connection.	We recommend integrating a non-return valve with 0.5 bar into the tank line.	Impaired function and instability of the valve
Prevent tank back pressure from affecting the valve.	Connect the tank lines to the tank container as directly as possible to avoid higher back pressures of <5 bar.	Malfunction or failure of the valve
Ensure that the valve is only operated with the described environmental conditions regarding the protection type and vibration load.	Observe the technical data specified in section 2.3.	Malfunction or impaired function of the valve
Ensure that the defined viscosity and temperature ranges are complied with.	Observe the technical data specified in section 2.3.	Malfunction or impaired function of the valve

## 6.2 PERFORMING INITIAL START-UP

1. Familiarise yourself with the notices regarding initial start-up in section 6.1.
2. Ensure that the drive does not perform any uncontrolled movement when the hydraulic circuit is opened and when voltage is applied. Lock the drive mechanically as required.
3. Install the valve as described in section 3.3.
4. Connect the pre-terminated connector, contacted on the control side, from section 2.7.1 to the on-board electronics.
5. Fasten the valve on the control side and supply it with voltage.
6. Continue with item 7. if the LED display lights up green.  
If the display lights up red, check the valve for the conditions described in section 5.4, "Potential malfunctions of the valve". Only continue with the following steps once the errors have been corrected and the LED display lights up green.
7.  Ensure that no persons are located in the hazard zone of the drive.  
Observe alternatively the notices of the system manufacturer/owner.  
Unlock the drive as applicable and ensure that the drive can move freely.
8. Supply the valve with pressure.
9. Vent the valve.
10. Check the plausibility of the control-side nominal value assignment for the drive movement on the basis of small nominal value changes.  
 Observe alternatively the notices of the system manufacturer regarding initial start-up.
11. Increase the nominal value in steps until reaching the planned  $Q_{\max}$  /  $v_{\max}$  or  $p_{\max}$  /  $F_{\max}$ . that is permitted on the drive side.

## 7 OPERATING THE VALVE

No intervention is required during normal operation.

After a power failure during operation, the valve can be switched back on without taking any further action and it will be ready for operation immediately.

## 8 MAINTENANCE AND REPAIR


Bear in mind that the components and the performance of the valve worsen with increasing operation or in accordance with the operating conditions and/or the contamination level of the operating fluid. We recommend checking the valve performance regularly at an interval of at least every two to three years to retain the valve's functionality and to prevent unexpected failure. If performance is excessively impaired, contact HYDAC Systems & Services GmbH or replace the valve.



Remove dust and dirt deposits from the valve periodically. Excessive dust and dirt deposits may otherwise cause the valve to overheat.



- Performing maintenance work on the system while it is switched on may cause severe personal injury. Unless explicitly stated otherwise, all work must be performed with the system switched off, and locked as required.
- When work is performed on the hydraulic circuit, operating fluid may be released in an uncontrolled way, which may result in severe personal injury. Before work on the hydraulic circuit is commenced, check that the system is depressurised.

	Service	Repair work
O-rings	We recommend keeping a stock of seal kits for the valve to enable faster replacement when natural wear occurs in the O-ring material.	 Do not clean the valve with aggressive cleaning agents or solvents. This can cause damage to the valve surface and the seals. If visible leakage occurs at the mounting surface, replace the O-rings immediately and clean the contact surfaces between valve and mounting surface.
Operating fluid	To enable the valve to function perfectly, regularly check the cleanliness level and the water content of the operating fluid.	Highly contaminated oil must be cleaned or replaced.
Venting	After work has been performed on the hydraulic circuit, the valve must be vented again. Depending on the valve's position in the system, we recommend periodic venting.	
Connectors	Check at least once a year that the connector is fastened securely.	Connectors and cables with visible external defects must be replaced immediately.

## 9 DISMANTLING

1. Ensure that the drive does not perform any uncontrolled movement when the hydraulic circuit is opened and when voltage is applied. Lock the drive mechanically as required.
2. Depressurise the valve.
3. Vent the valve.
4. Disconnect the valve from the supply voltage.
5. Loosen the fastening screws at the valve.
6. Remove the valve from the mounting surface and remove the O-rings from the ports.
7. Collect any escaping oil and dispose of it in accordance with the safety data sheet.
8. Mount a new valve immediately or close up the mounting surface with a cover plate to protect it. When exchanging the valve, follow the additional steps in accordance with the installation instructions in section 3.

## 10 STORAGE

Store the valves in their original packaging in a dry place protected from weather exposure to prevent rust and corrosion. Keep the valve protected from chemicals, for example organic solutions, acids and alkalis and aggressive gases.

The maximum storage time corresponds to the warranty period. If this storage period is exceeded, check the valve for corrosion and exchange the O-rings.

Keep the storage temperature between 0°C and 40°C with consistent humidity, not exceeding 60%.

Moisture exposure resulting from condensation must also be avoided.

### Storage after dismantling:

If a removed valve is to be stored, the following points must be observed:

- Drain the operating fluid out of the valve.
- The ports must be protected from the entry of dirt.
- The valve must be packaged in a way that protects it from corrosion.



Failing to observe the storage conditions may cause damage to the valve and impair the valve's functionality.

## 11 DISPOSAL

Before disposing of the product, fully drain the operating fluid.  
The valve does not contain any hazardous substances. Oil residue may adhere to the packaging.  
The valve and packaging must be disposed of and recycled in accordance with national regulations.

## 12 CUSTOMER SERVICE

If you have any problems or questions, please contact our technical department "Technical Sales Support at HYDAC Fluidtechnik GmbH" or the following address:

### **HYDAC Fluidtechnik GmbH**

Justus-von-Liebig-Str.  
Phone: +49 (0)6897 - 509-01  
Fax: +49 (0)6897 - 509-598  
E-mail: valves@hydac.com

If you need help with maintenance and repair, please contact our Service department at the following address:

### **HYDAC Systems & Services GmbH**

Geschäftsbereich Service  
Friedrichsthaler Str. 15  
D-66540 Neunkirchen  
Phone: +49 (0)6897 - 509-01  
Fax: +49 (0)6897 - 509-324

## 13 INTENDED USE / FORESEEABLE MISUSE

Claims for defects or liability, regardless of the legal foundation, do not apply with incorrect or improper installation, commissioning, usage, handling, storage, maintenance, repair, use of unsuitable components or other circumstances, which the manufacturer is not responsible for.

The manufacturer of the cartridge valve assumes no responsibility for determining the interfaces for installation in a system or the installation, use or functionality of the product in this system.

## 14 EXCLUSION OF LIABILITY FOR MANUAL

These operation and maintenance instructions were made to the best of our knowledge. Nevertheless and despite the greatest care, it is possible that it may contain errors. Therefore please understand that in the absence of any provisions to the contrary hereinafter our warranty and liability – for any legal reasons whatsoever – are excluded in respect of the information in these operation and maintenance instructions. In particular, we shall not be liable for lost profit or other financial loss.

This exclusion of liability does not apply in cases of intent or gross negligence. Moreover, it does not apply to defects which have been deceitfully concealed or whose absence has been guaranteed, nor in cases of culpable harm to life, physical injury and damage to health. If we negligently breach any material contractual obligation, our liability shall be limited to foreseeable damage. Claims due to the product liability shall remain unaffected.

Insofar as this manual has been compiled in more than one language, the version in the national language of the owner is authoritative.