



Directional control valves ND 4

manually operated, max. operating pressure 500 bar



1 Description of the product

Directional control valves are used for leakage-free control of cylinders (e.g. clamping cylinders).

The switching function of the valve can be recognized by the put up switching symbol.

Function

The directional control valves are designed as spring-loaded ball-type poppet valves. The closed directions of flow are hermetically tight.

The types marked with "R" are equipped with a check valve. This valve can be retrofitted in the remaining types.

2 Validity of the documentation

Directional control valve ND 4 of data sheet C 2.320. The following types or part numbers are concerned:

Directional control valve ND 4

- 2321 302
- 2321 201
- 2321 300

3 Target group of this document

- Specialists, fitters and set-up men of machines and installations with hydraulic expert knowledge.

Qualification of the personnel

Expert knowledge means that the personnel must

- be in the position to read and completely understand technical specifications such as circuit diagrams and product-specific drawing documents,
- have expert knowledge (electric, hydraulic, pneumatic knowledge, etc.) of function and design of the corresponding components.

3

An **expert** is somebody who has due to its professional education and experiences sufficient knowledge and is familiar with the relevant regulations so that he

- can judge the entrusted works,
- can recognize the possible dangers,
- can take the required measures to eliminate dangers,
- knows the acknowledged standards, rules and guidelines of the technology.
- has the required knowledge for repair and mounting.

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4 Symbols and signal words

WARNING

Person damage

Stands for a possibly dangerous situation.

If it is not avoided, death or very severe injuries will result.

CAUTION

Easy injuries / property damage

Stands for a possibly dangerous situation.

If it is not avoided, minor injuries or material damages will result.

Hazardous to the environment

 The symbol stands for important information for the proper handling with materials that are hazardous to the environment.

Ignoring these notes can lead to heavy damages to the environment.

Note

This symbol stands for tips for users or especially useful information. This is no signal word for a dangerous or harmful situation.

5 For your safety

5.1 Basic information

The operating instructions serve for information and avoidance of dangers when installing the products into the machine as well as information and references for transport, storage and maintenance.

Only in strict compliance with these operating instructions, accidents and property damages can be avoided as well as trouble-free operation of the products can be guaranteed.

Furthermore, the consideration of the operating instructions will:

- avoid injuries
- reduce down times and repair costs,
- increase the service life of the products.

5.2 Safety instructions

WARNING

Poisoning due to contact with hydraulic oil!

Wear, damage of the seals, ageing and incorrect mounting of the seal kit by the operator can lead to escapes of oil.

Incorrect connection can lead to escapes of oil at the ports.

- For handling with hydraulic oil consider the material safety data sheet.
- Wear protection equipment.

Injury by high-pressure injection (squirting out of hydraulic oil under high pressure)!

- Improper connection can lead to escapes of oil under high pressure at the connections.
- Mounting or dismantling of the element must only be made in depressurised mode of the hydraulic system.
- Connection of the hydraulic line as per DIN 3852/ISO 1179.
- Unused connections have to be locked professionally.
- Use all mounting holes.

WARNING

Injury by high-pressure injection (squirting out of hydraulic oil under high pressure)!

Wear, damage of the seals, ageing and incorrect mounting of the seal kit by the operator can lead to escapes of oil under high pressure.

- Before using them make a visual control.

CAUTION

Operating pressure of 500 bar does not exceed

The maximum operating pressure of 500 bar must not be exceeded.

NOTE

Qualification of personnel

All works may only be effected by qualified personnel familiar with the handling of hydraulic components.

6 Application

6.1 Intended use

Directional control valves are used for control of cylinders (e.g. clamping cylinders).

The switching function of the valve can be recognized by the put up switching symbol.

Furthermore, the following are intended uses:

- Use within the capacity indicated in the technical characteristics (see data sheet).
- Use as per operating instructions.
- Qualified and trained personnel for the corresponding activities.
- Mounting of spare parts only with the same specifications as the original part.

6.2 Misapplication

WARNING

Injuries, material damages or malfunctions!

- Do not modify the product!

The use of these products is not admitted:

- For domestic use.
- On pallets or machine tool tables in primary shaping and metal forming machine tools.
- If due to physical / chemical effects (vibrations, welding currents or others) damages of the products or seals can be caused.
- In machines, on pallets or machine tool tables that are used to change the characteristics of the material (magnetise, radiation, photochemical procedures, etc.).
- In areas for which special guidelines apply, especially installations and machines:
 - For the use on fun fairs and in leisure parks.
 - In food processing or in areas with special hygiene regulations.
 - For military purposes.
 - In mines.
 - In explosive and aggressive environments (e.g. ATEX).
 - In medical engineering.
 - In the aerospace industry.
 - For passenger transport.
- For other operating and environmental conditions e.g.:

- Higher operating pressures than indicated on the data sheet or installation drawing.
- With hydraulic fluids that do not correspond to the specifications.
- Higher flow rates than indicated on the data sheet or installation drawing.
- For use as safety component with safety function.

Special solutions are available on request!

7 Assembly

⚠️ WARNING

Injury by high-pressure injection (squirting out of hydraulic oil under high pressure)!

- Improper connection can lead to escapes of oil under high pressure at the connections.
- Mounting or dismantling of the element must only be made in depressurised mode of the hydraulic system.
- Connection of the hydraulic line as per DIN 3852/ISO 1179.
- Unused connections have to be locked professionally.
- Use all mounting holes.

Injury by high-pressure injection (squirting out of hydraulic oil under high pressure)!

Wear, damage of the seals, ageing and incorrect mounting of the seal kit by the operator can lead to escapes of oil under high pressure.

- Before using them make a visual control.

Injury by falling parts!

- Keep hands and other parts of the body out of the working area.
- Wear personal protection equipment!

Poisoning due to contact with hydraulic oil!

Wear, damage of the seals, ageing and incorrect mounting of the seal kit by the operator can lead to escapes of oil.

Incorrect connection can lead to escapes of oil at the ports.

- For handling with hydraulic oil consider the material safety data sheet.
- Wear protection equipment.

7.1 Design

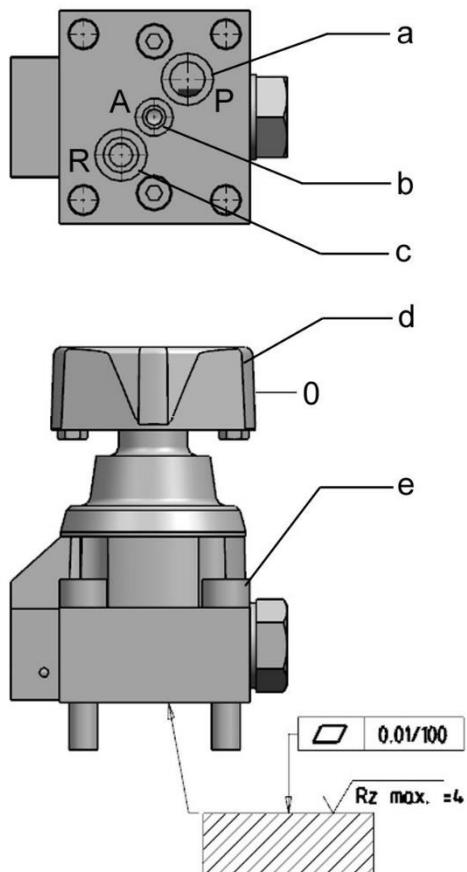


Figure 1: Design

a Pump (P)	d Knob (in switching position 0)
b Port A (consumer)	e Fixing screws (4xM6, tightening torque 9,5 Nm)
c Return line (R)	

💡 NOTE

O-ring

O-rings NBR 90Sh P+R 8 x 1.5, A5 x 1.5

7.2 Installation

Any mounting position is possible.

- Drill holes for hydraulic oil supply and return in the fixture.
- Grind flange surface.
- Clean the support surfaces.
- Fix the valve with inserted sealing rings on the fixture with screws (4 screws see data sheet)

7.2.1 Connection of the hydraulic equipment

1. Connect hydraulic lines to qualifying standards and pay attention to scrupulous cleanliness!

NOTE

More details

- See ROEMHELD data sheets A 0.100, F 9.300, F 9.310 and F 9.360.

Screwed Plug

- Use only fittings "screwed plug B and E" as per DIN 3852 (ISO 1179).

hydraulic connection

- Do not use sealing tape, copper rings or coned fittings.

Hydraulic fluids

- Use hydraulic oil as per ROEMHELD data sheet C2.320.

Hydraulic oil

The hydraulic oil must be perfectly filtered with particles not larger than nominally 10 µm. This is the reason why we offer a filter unit (part-no. 3887-060), which can be directly integrated in the tubing of the low-pressure side (see page 2).

Completely bled

After completion of all assembly and installation works, the hydraulic system must be completely bled.

- Swarf or contamination in the hydraulic oil lead to increased wear or damage at the guides, running surfaces and seals. The maximum operating pressure and the admissible flow rate of the valve must not be exceeded.
- Use only hydraulic oil HLP32 as per DIN51524.

NOTE

The return flow from A to P is only possible if the inlet pressure P drops below the set outlet pressure A.

7.2.2 2/2 and 3/2 directional control valve

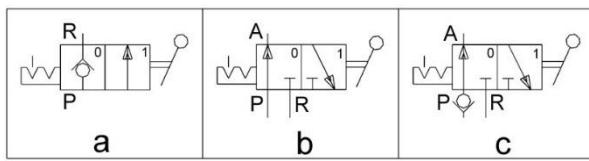


Figure 2: Presentation in the hydraulic circuit diagram

a 2/2 directional control valve without check valve	c 3/2 directional control valve with built-in check valve
b 2/2 directional control valve without check valve	

8 Start up

WARNING

Injuries due to misuse, incorrect operation or abuse!

Injuries can occur if the product is not used within the intended use and the technical performance data.

- Before start up, read the operating instructions!

Troubles of functioning

Protect the valve against penetration of swarf, otherwise the clamping force of a connected clamping cylinder is possibly no longer guaranteed.

Swarf in the hydraulic oil

Swarf in the hydraulic oil can damage the valve seat so that an immediate pressure drop can occur in the clamping system.

CAUTION

Operating pressure should not exceed

The max. operating pressure must not be exceeded (see technical characteristics).

9 Operation

Manual operation

- By turning the knob by 90° the valve will be moved from zero position to switching position. By further clockwise or counterclockwise turning of the knob, the zero position will be obtained.

NOTE

Check perfect functioning by repeated operation.

10 Maintenance

WARNING

Burning due to hot surface!

- In operating conditions, surface temperatures of more than 70 °C can appear at the product.
- All maintenance and repair works must only be effected in cooled mode or with safety gloves.

10.1 Cleaning

The product must be cleaned from dirt, swarf and liquids at regular intervals.

10.2 Regular checks

WARNING

Injury by high-pressure injection (squirting out of hydraulic oil under high pressure)!

Defect or leaking fittings and connecting parts have to be exchanged.

General information

Check if the hydraulic ports are tight (visual control). The valves themselves are maintenance free.

11 Trouble shooting

Fault	Cause / Remedy	
Switching function is not correctly effected	Manual operation is not correctly adjusted	Control the position of the knob
	Valve defect	Exchange
Pressure at outlet port is not maintained	Check valve contaminated or leaky	Dismount valve of mounting plate and check, clean or exchange check valve
	Internal poppet valve leaky	Exchange valve

12 Accessory

NOTE

Accessories

- See data sheet.

13 Technical characteristics

Characteristics

Part no.	2321 XXX
Max. operating pressure, ports A, P, R	500 bar
Max. flow rate	8 l/min
Hydraulic oil	HLP 22
Ambient temperature	-30...+50 °C
Weight	0.4 kg

NOTE

Further information

- For further technical data see ROEMHELD data sheet.

14 Storage

CAUTION

Storage of components!

- The product may not be exposed to direct solar radiation, because the UV light can destroy the seals.
- A storage differing from the storage conditions is inadmissible.
- In case of improper storage, the seals can embrittle and resinification of the anti-corrosive oil or corrosion at the element can occur.

The elements are tested by default with mineral oil. The exterior of the elements is treated with a corrosion inhibitor.

The oil film remaining after the test provides for a six-month interior corrosion protection, if stored in dry and uniformly tempered rooms.

For longer storage times, the element has to be filled with a non-resinifying corrosion inhibitor and the outside surfaces must be treated.

15 Disposal

Hazardous to the environment

Due to possible environmental pollution, the individual components must be disposed only by an authorised expert company.

The individual materials have to be disposed as per the existing regulations and directives as well as the environmental conditions.

Special attention has to be drawn to the disposal of components with residual portions of hydraulic fluids. The instructions for the disposal at the material safety data sheet have to be considered.

For the disposal of electrical and electronic components (e.g. stroke measuring systems, proximity switches, etc.) country-specific legal regulations and specifications have to be kept.

16 Declaration of manufacture

Manufacturer

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Declaration of manufacture of the products

They are designed and manufactured in line with the relevant versions of the directives 2006/42/EC (EC MSRL) and in compliance with the valid technical rules and standards.

In accordance with EC-MSRL and EN 982, these products are components that are not yet ready for use and are exclusively designed for the installation in a machine, a fixture or a plant.

According to the pressure equipment directives the products are not to be classified as pressure reservoirs but as hydraulic placing devices, since pressure is not the essential factor for the design, but the strength, the inherent stability and solidity with regard to static or dynamic operating stress.

The products may only be put into operation after it was assessed that the incomplete machine/machine, in which the product shall be installed, corresponds to the machinery directives (2006/42/EC).

The manufacturer commits to transmit the special documents of the products to state authorities on request.

The technical documentation as per appendix VII part B was prepared for the products.

Responsible person for the documentation:
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Römhled GmbH
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Laubach, 03.12.2018