Block Cylinder with Guide Housing

Max. operating pressure: extending 500 bar steel block cylinders – 350 bar aluminium block cylinders / retracting 350 bar all versions

Table of contents

1 Description of the product

The hardened clamping bolt is located in a guide housing, and is connected to the flange-mounted block-cylinder by means of a coupling.

The following variants are available

1. Block cylinder as per data sheet B 1.5094 without position monitoring.
2. Block cylinder as per data sheet B 1.552 with extended piston rod for position monitoring with inductive proximity switches.
3. Block cylinder as per data sheet B 1.554 with magnetic piston and aluminium housing for position monitoring with magnetic sensors.

2 Validity of the documentation

This document applies to the following products:

Block cylinders with guide housing of data sheet B1.738.
The following types or part numbers are concerned:

- Block cylinder with extended piston rod and guide housing
  1738 330, 336, 350, 356, 360, 366, 370
- Block cylinder with guide housing
  1738 030, 036, 050, 056, 060, 066, 070, 076
- Aluminium block cylinder with guide housing
  1738 130, 136, 150, 156, 160, 166, 170, 176

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.

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.

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

The product was manufactured in accordance with the generally accepted rules of the technology.
Observe the safety instructions and the operating instructions given in this manual, in order to avoid personal damage or material damage.

- Read these operating instructions thoroughly and completely, before you work with the product.
- Keep these operating instructions so that they are accessible to all users at any time.
- Pay attention to the current safety regulations, regulations for accident prevention and environmental protection of the country in which the product will be used.
- Use the ROEMHELD product only in perfect technical condition.
- Observe all notes on the product.
- Use only accessories and spare parts approved by the manufacturer in order to exclude danger to persons because of not suited spare parts.
- Respect the intended use.
- You only may start up the product, when it has been found that the incomplete machine or machine, in which the product shall be mounted, corresponds to the country-specific provisions, safety regulations and standards.
- Perform a risk analysis for the incomplete machine, or the machine.
  Due to the interactions between the product and the machine/fixture or the environment, risks may arise that only can be determined and minimized by the user, e.g. :
  - generated forces,
  - generated movements,
  - Influence of hydraulic and electrical control,
  - etc.

6 Application

6.1 Intended use

⚠ CAUTION

Provide operating pressure> 160 bar support

For operating pressures exceeding 160 bar, block cylinders must be supported against the effective direction to compensate the occurring forces.
Screws for fixing can be damaged.

The products are used in industrial applications to transform hydraulic pressure to a linear movement and /or force. They must only be operated with hydraulic oil.
Furthermore the following belongs to possible uses:

- Use within the capacity indicated in the technical characteristics.
- Use as per operating instructions.
- Compliance with service intervals.
- 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.

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 dismounting 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.

⚠ CAUTION

Great weight may fall

Some product types have a considerable weight. These have to be secured against working free during transport.
Weight specifications see chapter "Technical characteristics".

Side loads and forced conditions acting on the piston lead to increased wear

- Provide external guides.
- Avoid forced conditions (overdetermination) of the piston.

7.1 Design

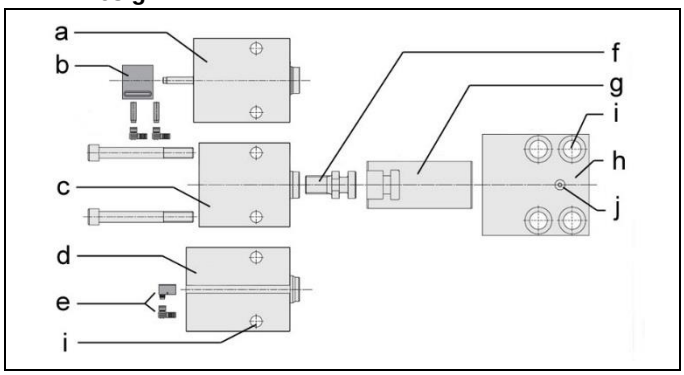

Figure 1: Variants

a	Block cylinder B1.552	e	Magnetic sensors
b	Position monitoring with inductive proximity switches	f	Contact bolt
		g	Clamping bolt
		h	Guide housing
c	Block cylinder B1.5094	i	Fixing possibility
d	Block cylinder B1.554	j	Lubricating nipple

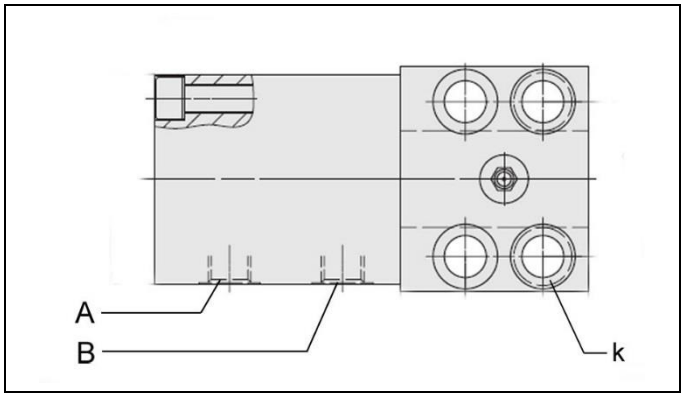

Figure 2: Port A and B

A	Extending	k	2 counterbores for drill bushes DIN 179
B	Retracting		

7.1.1 Fixation of guide housing

4 fixing screws DIN 912 - 8.8 are included in our delivery. Tightening torque see "Technical data".

⚠ CAUTION

Do not use fixing screws 10.9 and 12.9 to avoid deformation of the guide housing.

For precise fixation of the guide housing, there are 2 counterbores for drill bushes DIN 179 at the bottom side (see data sheet B1.738 "Accessories").

7.2 Admissible oil flow rate

⚠ WARNING

Injury due to overload of the element

High-pressure injection (squirting out of hydraulic oil under high pressure) or flying components!

- Due to throttling or closing of ports a pressure intensification can occur.
- Connect the ports professionally!

⚠ CAUTION

Maximum flow rates do not exceed

The maximum flow rate must not be exceeded.

7.2.1 Calculation of the admissible flow rate

Admissible oil flow rate

The admissible flow rate or the admissible stroke speed is valid for vertical mounting positions in combination with standard add-on parts as clamping arms or contact bolts, etc.
In case of other mounting positions and/or add-on parts the flow rate has to be reduced.
If the pump flow rate divided by the number of elements is larger than the admissible flow rate of one element, the flow rate has to be throttled.
This prevents an overload and therewith an early failure.
The flow rate can be checked as follows:

$$Q_P \leq 0{,}06 \cdot \dot{V}_Z \cdot n \text{ and/or } Q_P \leq 6 \cdot v_Z \cdot A_K \cdot n$$

for clamping elements and work supports (indicated on the data sheets)

Maximum piston speed

At specified pump flow rate **Q_P** and with the effective piston area **A_K** the piston speed can be calculated as follows:

$$v_m < \frac{Q_P}{6 \cdot A_K \cdot n}$$

Legend

$\dot{V}_Z$ = Admissible flow rate of the element in [cm³/s]

Q_P = Flow rate of the pump in [l/min]

A_K = Piston area in [cm²]

n = Number of elements, same dimensions

$v_Z = v_m$ = Admissible/maximum stroke speed in [m/s]

NOTE

Oil volume

- The maximum oil volume and/or the maximum stroke speed depend on the corresponding product.
  - For clamping cylinders see data sheet A 0.100.
  - or clamping elements, work supports, hydraulic valves, power units and other hydraulic elements indicated on the corresponding data sheets.

Further " things worth knowing about hydraulic cylinders, basics, detailed knowledge and calculations on hydraulic cylinders" see in the Technical library on the internet!

or download

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7.2.2 Throttling of the flow rate

The throttling always has to be effected in the supply line to the element. Only thus pressure intensification and thereby pressures exceeding the operating pressure are avoided. The hydraulic circuit diagram shows flow control valves which allow oil return from the element without any impediments.

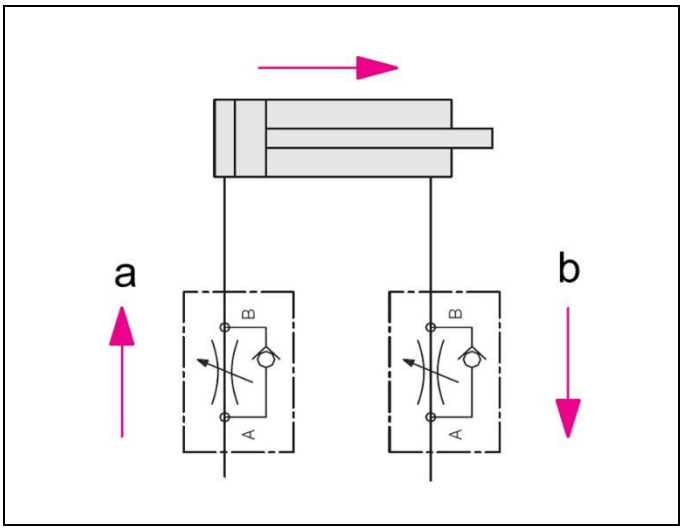

Figure 3: Hydraulic circuit diagram without flow control valves

a Throttling direction	b Free flow

If a return-flow throttling is required due to a negative load, it must be guaranteed that the max. operating pressure (see technical characteristics) will not be exceeded.

7.3 Connection of the hydraulic equipment

1. Connect hydraulic lines to qualifying standards and pay attention to scrupulous cleanness (A = Extend, B = Retract)!

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.

Pressure fluids

- Use hydraulic oil as per ROEMHELD data sheet A 0.100.

8 Start up

⚠ 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.

⚠ CAUTION

Operating pressure of 500 bar does not exceed

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

Operating pressure when retracting

The maximum operating pressure of 350 bar must not be exceeded during retraction

Do not exceed the operating pressure of 350 bar

The maximum operating pressure of 350 bar must not be exceeded when using **aluminium block cylinders**.

- Check tight seating (check tightening torque of the fixing screws, see chapter "Technical characteristics").
- Check tight seating of hydraulic connections (check tightening torque of the hydraulic connections, see chapter "Technical characteristics").
- Bleed the hydraulic system.

NOTE

Clamping time

- Without bleeding the clamping time will be considerably prolonged and function problems may occur.

8.1 Bleeding of pipe-mounted types

1. Loosen carefully at low pressure union nut of the pipe at the hydraulic ports.
2. Pump until bubble free oil comes out.
3. Fasten union nuts of the pipe.
4. Check tightness.

8.2 Position monitoring

- Start up of position monitoring.

Note

See operating instructions of the position monitoring.

9 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.

9.1 Cleaning

⚠ CAUTION

Avoid damages of the moved components

Avoid damages of the moved components (rods, plungers, bolts, etc.) as well as of wiper and seal.

Aggressive cleaning agents

The product must not be cleaned with:

- Corrosive or corroding components or
- Organic solvents as halogen or aromatic hydrocarbons and ketones (cellulose thinner, acetone, etc.),

because this can destroy the seals.

The product must be cleaned at regular intervals, especially the area of the piston or the plunger housing has to be cleaned from swarf and other liquids.

In the case of heavy contamination, the cleaning has to be made in shorter intervals.

9.2 Regular checks

1. Check tightness of hydraulic connections (visual control).
2. Check running surfaces (of the piston rod or bolt) if there are marks and scratches. Traces of marks can be an indication for a contaminated hydraulic system or an inadmissible side load of the block cylinder.
3. Leakage check at the housing - piston rod, bolt or flange.
4. Clamping force control by pressure control.
5. Check if the maintenance intervals are kept.

9.3 Lubrication

NOTE

The guide housing is equipped with a lubricating nipple, so that the clamping bolts can be lubricated with high-temperature grease according to the operating hours. Lubrication intervals must be adapted to existing operating conditions.

⚠ CAUTION

The clamping bolt must be retracted in off-position.

9.4 Exchange seal kit

The exchange of the seal kit is made in case of external leakages. For high availability, the seals have to be changed at the latest after 500,000 cycles or 2 years.

The seal kit is available as spare part. An instruction for the exchange of the seal kit is available on request.

NOTE

Seal Kits

- Do not install seal kits which were exposed to light for a longer time.
- Pay attention to the storage conditions (see chapter "Technical characteristics").
- Only use original seals.

9.5 Trouble shooting

Trouble	Cause	Remedy
Piston does not extend:	hydraulic oil supply or return is impeded	check and blow through tubes or channels
Piston extends jerkily:	air in the hydraulic system	hydraulic bleeding
System pressure reduces:	hydraulic port leaky	seal
	wear of seals	replace seals

10 Accessory

NOTE

Accessories

- See data sheet.

11 Technical characteristics

11.1 General characteristics

Block cylinder with extended piston rod and guide housing

Type	Maximum operating pressure [bar]	Maximum clamping force [kN]
1738-33X	500	**20.6**
1738-35X	500	**58.9**
1738-36X	500	**94.2**
1738-37X	500	**152**

Block cylinders with guide housing

Type	Maximum operating pressure [bar]	Maximum clamping force [kN]
1738-03X	500	**24.5**
1738-05X	500	**62.8**
1738-06X	500	**98.5**
1738-07X	500	**156**

Aluminium block cylinders with guide housing

Type	Maximum operating pressure [bar]	Maximum clamping force [kN]
1738-13X	350	**17.1**
1738-15X	350	**44.0**
1738-16X	350	**68.7**
1738-17X	350	**109.2**

11.2 Weights

Block cylinder with extended piston rod and guide housing

Types	Stroke [mm]	Weight [kg]
1738-330	20	**2.5**
1738-336	50	**3.9**
1738-350	25	**5.7**
1738-356	50	**7.7**
1738-360	25	**7.6**
1738-366	50	**10.5**
1738-370	30	**14.8**

Block cylinders with guide housing

Types	Stroke [mm]	Weight [kg]
1738-030	20	**2.4**
1738-036	50	**3.8**
1738-050	25	**5.6**
1738-056	50	**7.6**
1738-060	25	**7.5**
1738-066	50	**10.4**
1738-070	30	**14.7**
1738-076	63	**20.8**

Aluminium block cylinders with guide housing

Types	Stroke [mm]	Weight [kg]
1738-130	20	**2.14**
1738-136	50	**2.36**
1738-150	25	**4.40**
1738-156	50	**5.90**
1738-160	25	**5.74**
1738-166	50	**8.05**
1738-170	30	**12.00**
1738-176	63	**16.10**

Proposal, tightening torques for screws of tensile strength 8.8

NOTE

- The indicated values are approximate values and have to be interpreted according to the user's application!
  See note!

Thread	Tightening torque (MA) [Nm]
	8.8
M6	10
M8	25
M10	49
M12	85
M14	135
M16	210
M20	425
M24	730
M30	1,450

Note: Valid for workpieces and set screws made of steel with metric thread and connecting surface dimensions as per DIN 912, 931, 933, 934 / ISO 4762, 4014, 4017, 4032
In the table values for tightening torques (MA) the following is considered:
Design steel/steel, friction value µges = 0.14 - not oiled, utilisation of the minimum yield point = 90%.

NOTE

Further information

- For further technical data see ROEMHELD data sheet.

12 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.

13 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.

14 Declaration of manufacture

Manufacturer

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Tel.: +49 (0) 64 05 / 89-0
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www.roemheld.com

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:
Dipl.-Ing. (FH) Jürgen Niesner, Tel.: +49(0)6405 89-0.

Römheld GmbH
Friedrichshütte

Laubach, 15.10.2018