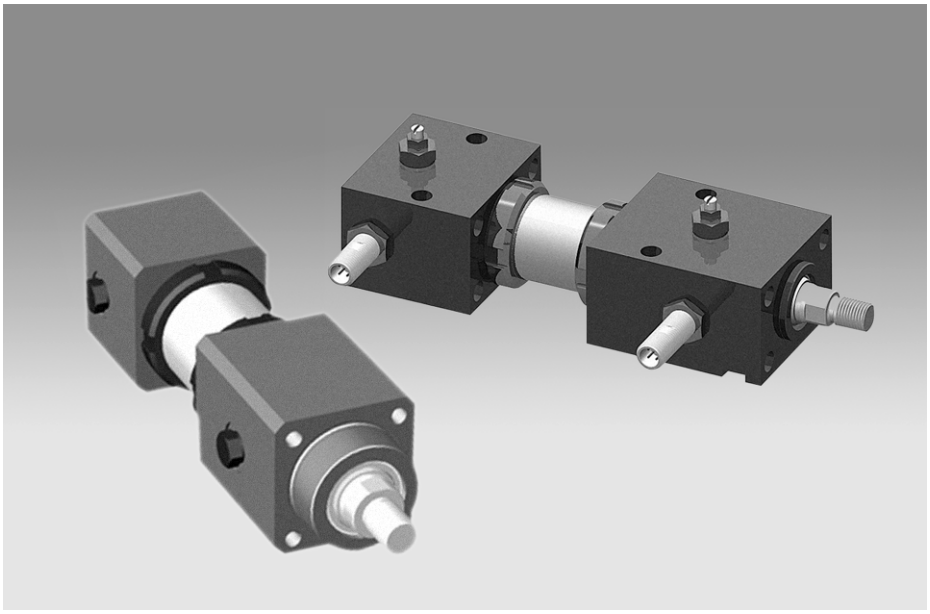
Operating Instructions

Hydraulic Cylinders / Hydraulic Block Cylinders



Hydraulic Cylinders / Hydraulic Block Cylinders

- **double acting**
- **with hydraulic port and tubes or with hydraulic manifold mounting port**
- **partially with stroke end cushioning**
- **partially with position monitoring**
- **partially with spherical bearing joint**

These operating instructions are available for hydraulic cylinders of the following types:

128x-0x3 **129x-0x0**
129x-1x-xxxx

and hydraulic block cylinders of the types:

159x-xx-xxxx

Target group of this document

Fitters and setters of machine tools. They have to be familiar with the handling of hydraulic components.

Provided use

These cylinders are used to transform hydraulic pressure to a linear movement. Use only hydraulic oil.
Avoid side loads acting on the piston, see lateral force diagram on the data sheet.

Safety

⚠ ***Danger of crushing***
Keep hands and other parts of the body out of the working area!

⚠ ***Material damage***
With hydraulic pressure very high forces are generated. The fixture or machine must be in the position to compensate these forces.

Instructions for safe operation

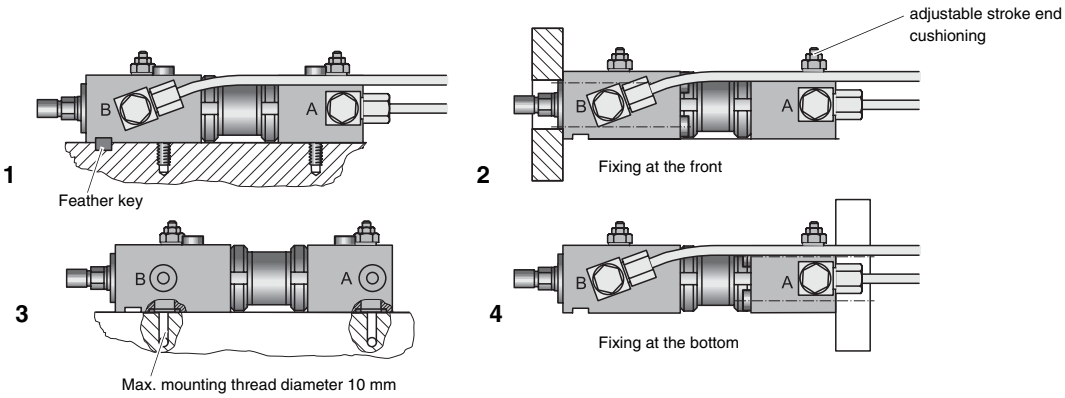
- Swarf or contamination in the hydraulic oil lead to increased wear or damage at the guides, running surfaces and seals.
- Clamping and support points at the workpiece must be free of swarf to guarantee an exact and safe force application.
- In case of bucking load reduced limit values of stroke and operating pressure have to be observed. Limit values see diagramm on the data sheet.
- Use hydraulic oil as per Römheld data sheet A 0.100.

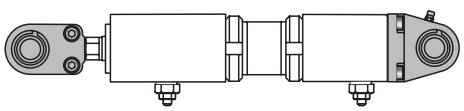
Function

The cylinders are designed as differential cylinders, therefore the force to push is approx. 1.6 x the force to pull. The cylinders are double acting.
The opitonal hydraulic stroke end cushioning avoids a crash stop of the piston in its end positions at high speeds or with large loads.
For hydraulic vloxk cylinders with position monitoring pressure-proof proximity switches are used. These deliver a signal, when the piston achieves the stroke end position.

Characteristics in comparison:

Hydro-Cylinder 128x/129x	**Hydraulic block cylinder 159x**
max. 200 bar	max. 250 bar
Block shape square with fixing thread	Block shape rectangular, fixing by longitudinal mounting holes and cross holes
no standard position monitoring	Position monitoring of the end position possible by pressure-resistant sensors
Stroke end cushioning available (129x)	Stroke end cushioning available
Oil supply by tubes	Oil supply by tubes or drilled channels
Only piston with exterior thread	Piston with interior or exterior thread
Spherical bearing joint at front and at rear available	Spherical bearing joint at front possible
Circular flange available	Standard tenon slot for additional support against the effective direction





All figures are schematic figures.

Install cylinder

Material damage
*For operating pressure exceeding 100 or 200 bar in the case of fixation with 4 screws) the hydraulic block cylinders 159x have to be supported in the slot (**1**), to protect the fixing screws against side loads. Use tenon blocks as per DIN.*

Hydraulic port and tubes
- Clean the support surfaces.
- Fasten hydraulic cylinder (**1**, **2** and **4**).

Hydraulic connection without tubes
- Drill holes for hydraulic oil supply and return in the fixture (**3**).
- Grind the surface of the fixture (R_a = 0.8).
- Insert O-rings in the ports.
- Clean the support surfaces.
- Fasten hydraulic on the fixture.

Mount the spherical bearing joint

For versions with spherical bearing joint (**5**) clevis pin fit has to be m6.
For mounting of the spherical bearing joint proceed as follows:
- Screw the spherical bearing joint firmly against the piston rod shoulder.
- Tighten clamping screws so that the ball-and-socket joint can be returned on the piston rod thread.
- Clamp spherical bearing joint carefully in a vice and tighten piston rod firmly with fork spanner against the spherical bearing joint.
- Tighten clamping screws.

By this procedure the thread receives a certain initial tension which prevents loosening with alternating loads.

Operating pressure for versions with spherical bearing joint
During cylinder movements the maximum operating pressure is 160 bar, and in the end position 200 bar.

Hydraulic connection

- Connect hydraulic lines to qualifiying standards, pay attention to scrupulous cleanness! See also Römheld data sheets A 0.100, F 9.300, F 9.310 and F 9.360.
- Use only fittings "screwed plug B" as per DIN 3852 (ISO 1179).
- Do not use sealing tape, copper rings or coned fittings.
- Check sealing of the hydraulic connections!

Port	Function
A	Extend
B	Retract

Material damage
*When connecting the version with spherical bearing joint (**5**), pay attention that the hydraulic tubes will not get twisted in any stroke position.*

Hydraulic bleeding

Bleed the hydraulic lines during start-up of the system, otherwise clamping times can be considerably prolonged and function problems can be caused.

Hydraulic port and tubes
- Loosen carefully at low pressure union nut of the tube at the hydraulic ports.
- Pump until bubble free oil comes out.
- Fasten union nuts of the tube.

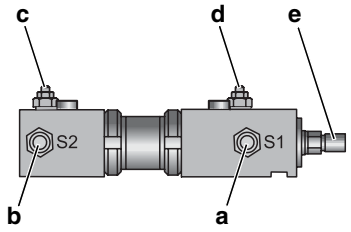
Hydraulic connection without tubes (O-ring sealing)
- Loosen carefully the plugs at the cylinder heads.
- Pump until bubble free oil comes out.
- Fasten the plugs.

General characteristics

Part-no.		12x3	12x4	12x5	12x6	12x7	12x8	1593	1594	1595	1596	1597	1598
Operating pressure, max.	bar	200	200	200	200	200	200	250	250	250	250	250	250
Force to push in case of maximum operating pressure	kN	9.8	16	25	39.2	62.3	100.5	12.3	20.1	31.4	49.1	77.9	125.7
Force to pull in case of maximum operating pressure	kN	5.7	9.8	15.3	23.1	37.2	61.2	7.25	12.3	19.1	29	46.5	76.6

Further data see Römheld data sheet.

Start up of position monitoring



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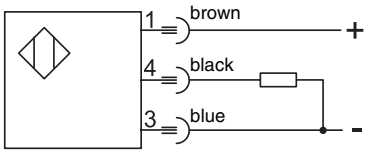
- ***a*** *Proximity switch S1 (extended)*
- ***b*** *Proximity switch S2 (retracted)*
- ***c*** *Throttle pin of the stroke end cushioning (retracted)*
- ***d*** *Throttle pin of the stroke end cushioning (extended)*
- ***e*** *Piston rod*



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Circuit diagram for pnp(+) proximity switches

Condition for start up is that the proximity switches S1 (**1a**) and S2 (**1b**) are electrically wired as per circuit diagram and a correct supply voltage is available.

- Extend piston rod (**1e**) completely.
- Screw in carefully proximity switch S1 up to the stop.
- Turn back S1 by 1/2 rotation so that there will be a switching distance of approx. 0.5 .
- Lock S1 in this position by means of a nut
- Retract completely the piston rod.
- Proceed correspondingly with proximity switch S2.

Technical characteristics of the positon monitoring

Voltage	10 ... 30 V DC
Code class	IP 67
Operating temperature	–25 °C up to 90 °C
LED operating voltage	green
LED Function display	yellow

Adjust stroke end cushioning

Adjustment of the cushioning depends on the viscosity and temperature of the hydraulic oil. Adjust in succesion the cushioning for the extended and retracted piston rod.

⚠ ***Danger of spill***
Do not completely turn out the throttle pin, otherwise hydraulic oil will spill.

- Unscrew lock nut.
- Screw in throttle pin (**1c** or **d**) to increase the cushioning or screw out to reduce the cushioning.
- Tighten lock nut.

Maintenance

Check if the hydraulic ports are tight (visual control). The hydraulic cylinder itself is maintenance free.

Maintenance of the lubricating nipple at the spherical bearing joint

- Use standard anticorrosive and pressure-resistant grease on lithium base with EP and solid lubricant additions.
- Lubricate periodically the bearing. Too frequent relubrication can reduce the life of the bearing - in the case of spherical bearing joints friction is always increased for a short time after relubrication.

Data sheets

Types	Corresponding data sheets
128x-0x3	B 1.281
129x-0x0	B 1.281
129x-1x-xxxx	B 1.282
159x-xx-xxxx	B 1.590

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
Hydraulic pressure reduces due to cylinder	Wear at the seals - Exchange seals
Stroke end will not be obtained	Cushioning needs adjusting - Screw out throttle pin
Proximity switch does not switch	Proximity switch wrongly wired or adjusted - Check cabling - Check switching distance and adjuste to 0.5 mm

Subject to changes without notice.