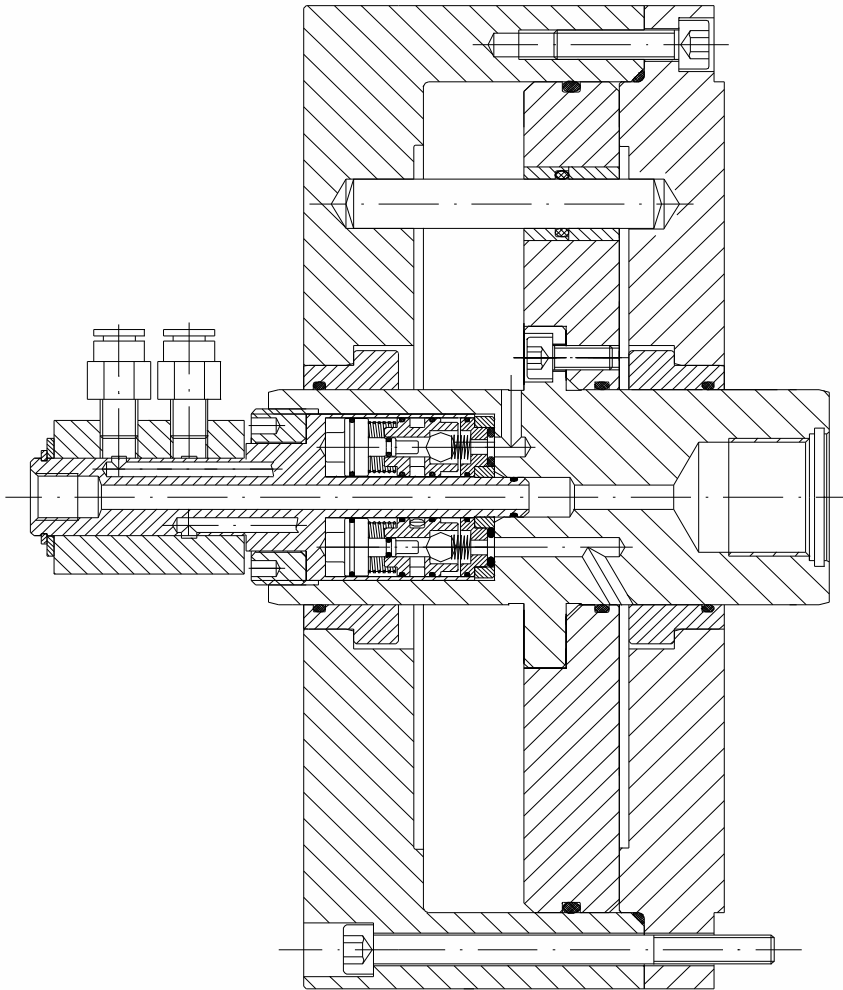


Air cylinder

Operating manual



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1. Introduction

Thank you very much for the purchase of an MicroCentric air cylinder. We wish you a good success on your work with it. Please read the operation manual carefully before you start the work with this product. The consideration of this manual will help you to avoid accidents, breakdowns and damages.

Clamping systems are the most important components of tool machines, when you have to produce high precision parts with high accuracy and concentricity. Our products have several advantages and are in usage for different applications, e.g. turning, grinding and milling.

Please call our sales- and service engineers if you would like to get additional information.

2. General

2.1 Features of air cylinders

MicroCentric air cylinders are designed according to the actual stand of technique and correspond to the requirements of modern clamping systems:

- Pneumatic operation in both axial directions
- Short length
- Steplessly adjustable clamping force between 170 daN to 1700 daN (dependent from the size)
- Stepless adjustable air pressure from 1,5 bar to 8 bar
- 20 mm axial stroke
- Maintenance and lubrication free
- Long lifetime
- Cylinders have a through bore as standard to bring coolant through the spindle directly to the workpiece or to bring air through it for an air sensing or a pneumatic part ejector.
- Stroke control possible by an actuate ring
- Built in security equipment which provides, that the cylinder will keep the clamping force, if a sudden air pressure lost is happened.
- The cylinder could be actuated while rotation.

2.2 Security notices

Please read and pay attention to the following security notices very carefully. If you will get faults or damages through the non-observance of this manual, MicroCentric can not take over the liability.

1. All applications of the air cylinders must be according to this operation manual.
2. Do not touch the cylinder while it is rotating.
3. The spindle adapter must be manufactured in the right way and may not have a lateral runout greater than 0,05 mm.
4. The radial runout of the cylinder may not exceed 0,10 mm. During mounting the cylinder onto the machine, spindle, adapter plate and the cylinder must be clean. Further all mounting bolts have to tighten strong enough.
5. Periodically you should verify, that all mounting bolts on the cylinder resp. the adapter plate are still fixed and if the air supply hoses are fixed without an air pressure lost.
6. The supplied air must be without humidity or pollution. Please never exceed the maximum air pressure of 8 bar.
7. For a proper function of the cylinder, please us as minimum air pressure 1,5 bar.
8. The rotary air journal must be protected against distortion unconstrainedly.
9. Please let us know first and immediately in every cases, when the cylinder works abnormally or it has no function. Our well educated service engineers will support you well and solve your problems soon.
10. On the usage of our clamping systems the valid instructions and laws to avoid accidents must be observed.

3. System description

3.1 Assembly

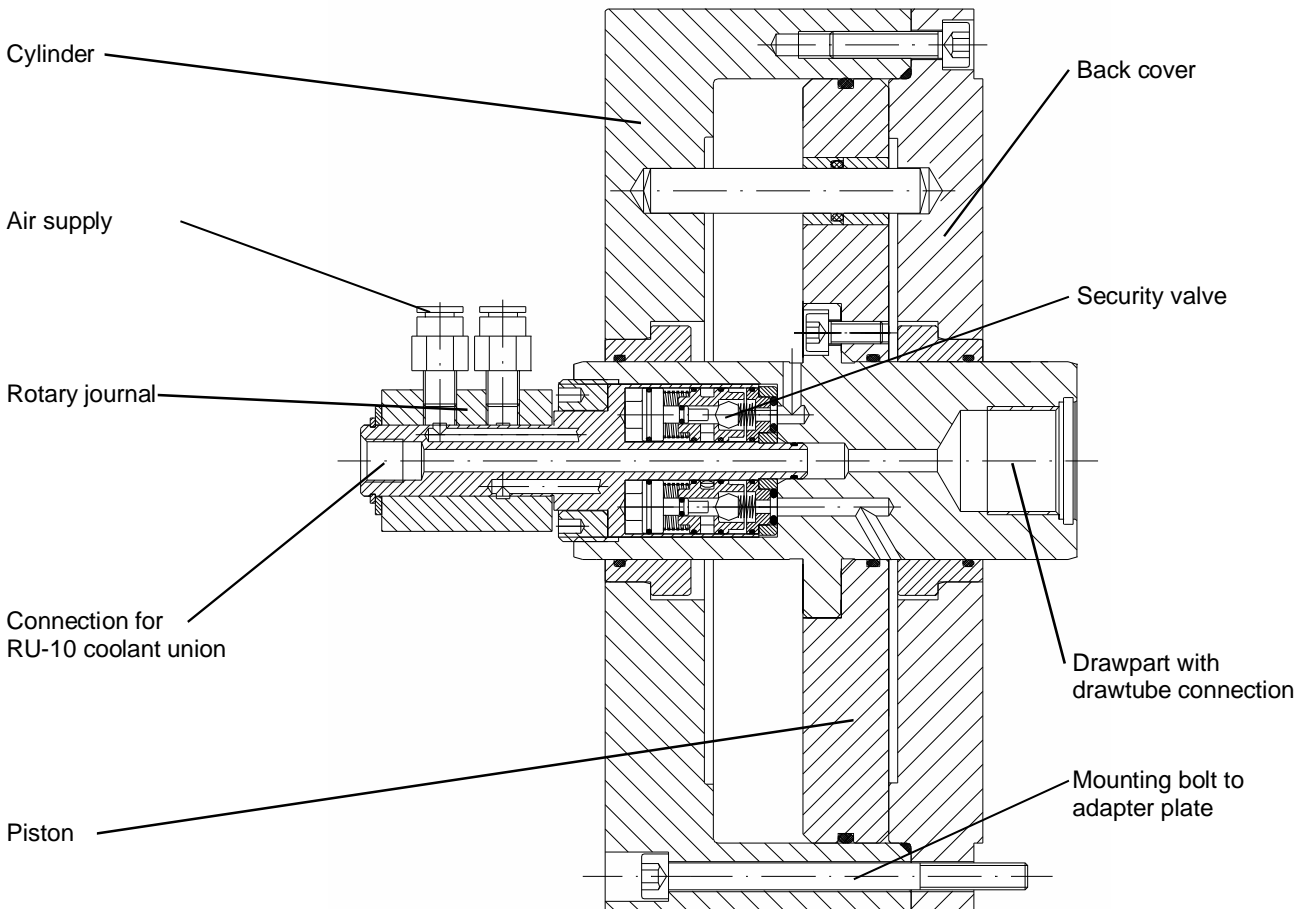


Fig. 1

3.2 Function principle

Through introduction of air pressure over the rotary journal into the rear Piston chamber a movement of the piston will be done frontwards. With the piston the drawpart moves frontwards and also the drawtube to the chuck. In the most applications the clamping system opens (outside clamping). Simultaneously closes the security valve and so the cylinder remain in the front position, when the air supply interrupt suddenly.

For the rear movement air pressure must flow in the front piston chamber and simultaneously the security valve must be opened. The piston moves with the drawpart and the drawtube to the back side of the cylinder. In the most cases the clamping system closes (outside clamping). Even this position is protected by a security valve against unintentional movement.

The clamping force can be adjusted over the air pressure very fine and flexible.

3.3 System construction

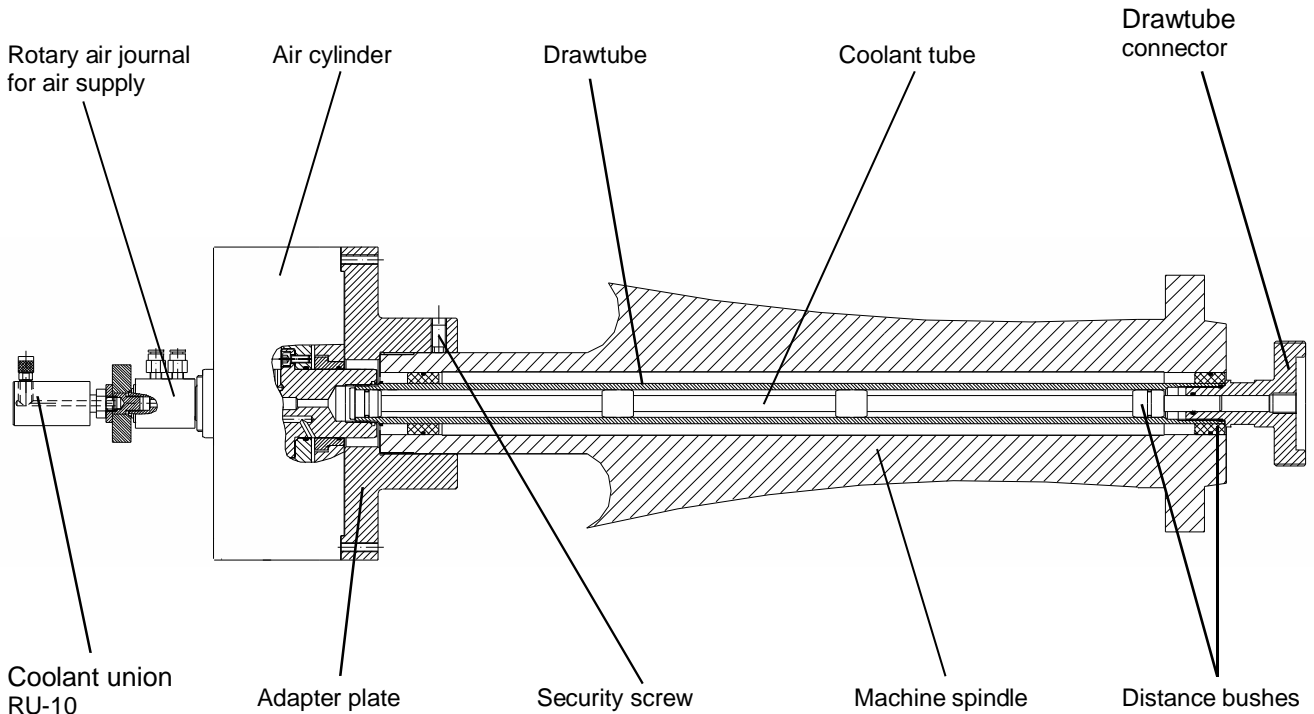


Fig. 2

3.4 Mounting of Cylinders

Attention:

All bolts must be fixed with the in appendix A listed torque.

1. For the installation of MicroCentric cylinders a suitable adapter plate is required. When you manufacture the adapter plate by yourself, please take the necessary dimensions out of the DIN-ISO-norms resp. our data sheets. The adapter plate should get a suitable recess with enough clearance to the pilot diameter of the cylinder. The lateral runout may not exceed 0,05 mm. Through the clearance between the recess and the pilot diameter it is possible to adjust a radial runout. The adapter plate must have a through bore for the drawtube and if required cross holes for security screws. Please bring in 6 holes and taps into the adapter plate for mounting the cylinder onto the plate.
2. Make sure that mounting surfaces of cylinder, adapter plate and spindle are free from nicks or pollution. Please tighten all mounting bolts alternately and equally. It is recommended to use bolts with solidity class 12.9.
3. At first fix the adapter plate onto the machine spindle with handforce. Adjust the adapter plate by taking out a lateral runout. (should not exceed 0,05 mm) Tighten the mounting screws equally and if it is required fix the adapter plate with the security screws in the cross holes against unintentional separation.
4. Mount the drawtube to the air cylinder.
5. Push air cylinder with drawtube into the machine spindle and mount it onto the adapter plate. Then adjust the cylinder radial (runout should not exceed 0,10 mm) and tighten all mounting bolts alternately and equally.

6. Connect control valve, air tube hoses and the air filter-regulator-lubrication unit carefully. The Usage of an air filter-regulator-lubrication unit is necessary. Otherwise the cylinder can be destroyed. For the actuating of the cylinder each control valve can be used, which fulfil the valid instructions and laws to avoid accidents. MicroCentric offers corresponding hand valves, foot valves and pneumatic control units.
7. The rotary air journal must be protected against distortion unconstrainedly. Please pay attention, that the rotary air journal makes the full stroke of the air cylinder in axial direction. Here you need enough space between the air cylinder and machine components.
8. Connect the drawtube connector with the drawtube.
9. Mount the clamping system with the drawtube connector.

4. Additional functions

4.1 Coolant through bore

Our air cylinder have central passage to bring coolant through the machine spindle directly to the workpiece. To use this passage a coolant union RU-10 is mounted on the rear of the cylinder. Through it the coolant flows into the air cylinder. By an additional tube in the machine spindle the coolant gets to the clamping system. Alternate this passage can be used for the actuate of part ejectors or for air sensing control units in the chuck system.

4.2 Cylinder with adjustable axial stroke

In our program is also an air cylinder available with adjustable axial stroke, when you have to restrict the stroke on a special reason (e.g. cause the clamping system need that).

For the adjustment of the axial stroke (e.g. rear position) the air cylinder has to move to the opposite direction (front side) until the end position. Then the set screws for the rear position can be turned in clockwise for less stroke and turned out counter-clockwise for more stroke. For each stroke direction there are 2 set screws built in, which should be screwed in or out approximately similar.

With these set screws 3 bolts (per stroke direction) can be adjusted, which determine the maximum stroke of the air cylinder.

For the determination of the other stroke direction (e.g. front position) you should move the cylinder into the other end position (rear side) and then please do the adjustment analogously.

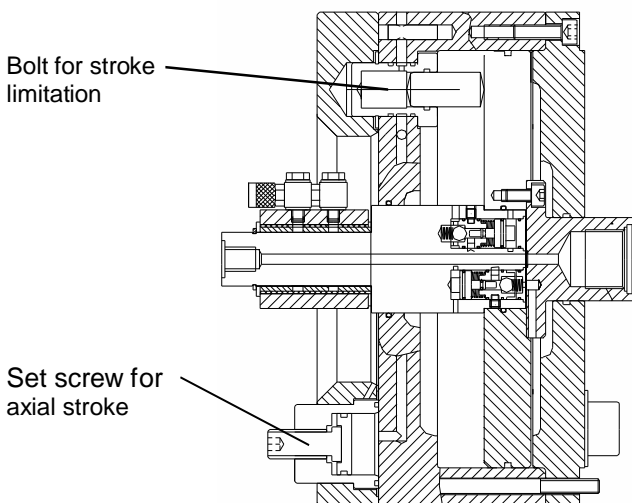


Fig. 3

5. Care and maintenance

The lifetime of your MicroCentric cylinder can be increased significantly through careful and periodical care. The following notices should help you certainly:

1. You do not have to lubricate the cylinder periodically.
2. Do never exceed the maximum air pressure. The cylinder could be damaged.
3. Protect the cylinder when the system is not on your machine. Please clean it and protect the cylinder against dust and humidity (corrosion).
4. When your machine is working with coolant emulsion or dry, please protect the cylinder against corrosion while the cylinder stands still for a couple of days (e.g. during holidays).
5. The cylinder may not be dismantled from uneducated employments. When the cylinder is dismantled without our agreement, we can not guarantee further for the function and the security of the chuck system.
6. Please call us in all cases, where the cylinder is working abnormally or it has no function. Our service engineers will support you to remove faults from your clamping system.

6. Trouble shooting guide

Problems	Possible causes
1. Not enough draw force	A,B,C,D
2. The piston move too slowly	A,B,C,D
3. Excessive vibration	E
4. Excessive radial runout of cylinder	F
5. Too less piston stroke	C,D,F,G,I
6. Air leaks from cylinder or through operating valves	H

Possible causes and solutions:

- A. Air pressure is too low. Check setting air on the air regulator.
- B. Restricted air flow. First check the air tube hoses if they are sealed. Further verify the right mounting and adjustment of the air filter-regulator-lubrication unit and the air regulator. All air tube hoses could have a restricted air flow.
- C. Improper assembly of cylinder. If the air cylinder has been dismantled recently, make sure that all parts of the axial chuck have been cleaned carefully and installed correctly.
- D. Damage of cylinder. Please check all moveable components if they are crashed, molten or damaged. When you can not find out the problem, you should contact us for a rework of the air cylinder.
- E. Unequal weight distribution. Counterbalance as required.
- F. Improper system mounting. Please check the adapter plate and the spindle nose for damages and pollution. Verify if the mounting bolts are not too long. Tighten the mounting bolts equally and alternately.
- G. The drawtube is too short or too long. Please search possible cause on the connection draw tube to drawtube connection resp. chuck.
- H. Verify the O-Rings. If necessary renew the seals.
- I. The drawtube connector is manufactured with faults. Please call us for the required dimensions and if necessary use a new connector.

Appendix A: Torque for mounting bolts

Bolt size	Torque at bolts 8.8	Torque at bolts 12.9
M 5	6,0 Nm	10,4 Nm
M 6	10,4 Nm	17,9 Nm
M 8	25,3 Nm	43,6 Nm
M 10	51,0 Nm	88,0 Nm
M 12	87,0 Nm	150,0 Nm
M 14	139,0 Nm	239,0 Nm

Appendix B: Drawtube force in relation to the air pressure

Cylinder	Air pressure minimum [bar]	Air pressure maximum [bar]	Draw force minimum [daN]	Draw force maximal [daN]	R.p.m. max.
PVZ-150	1,5	6,0	150	590	6.000
PVZ-200	1,5	6,0	315	1270	5.000
PVZ-250	1,5	6,0	600	2150	4.500
LDZ-160	1,0	6,9	100	740	6.000
LDZ-200	1,0	6,9	160	1110	5.000
LDZ-250	1,0	6,9	275	1980	4.000
LDZ-160-SZ	1,0	6,9	100	740	6.000

Notices