

Hydraulic cylinder maintenance and repair manual.



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1 Basics

1.1 Take of the pressure / safety

Before you start to disconnect the cylinder, make sure that you always turn off the pump and secure the power-switch.

Always wear safety glasses while detaching the oil-connections to prevent damage to the eyes.

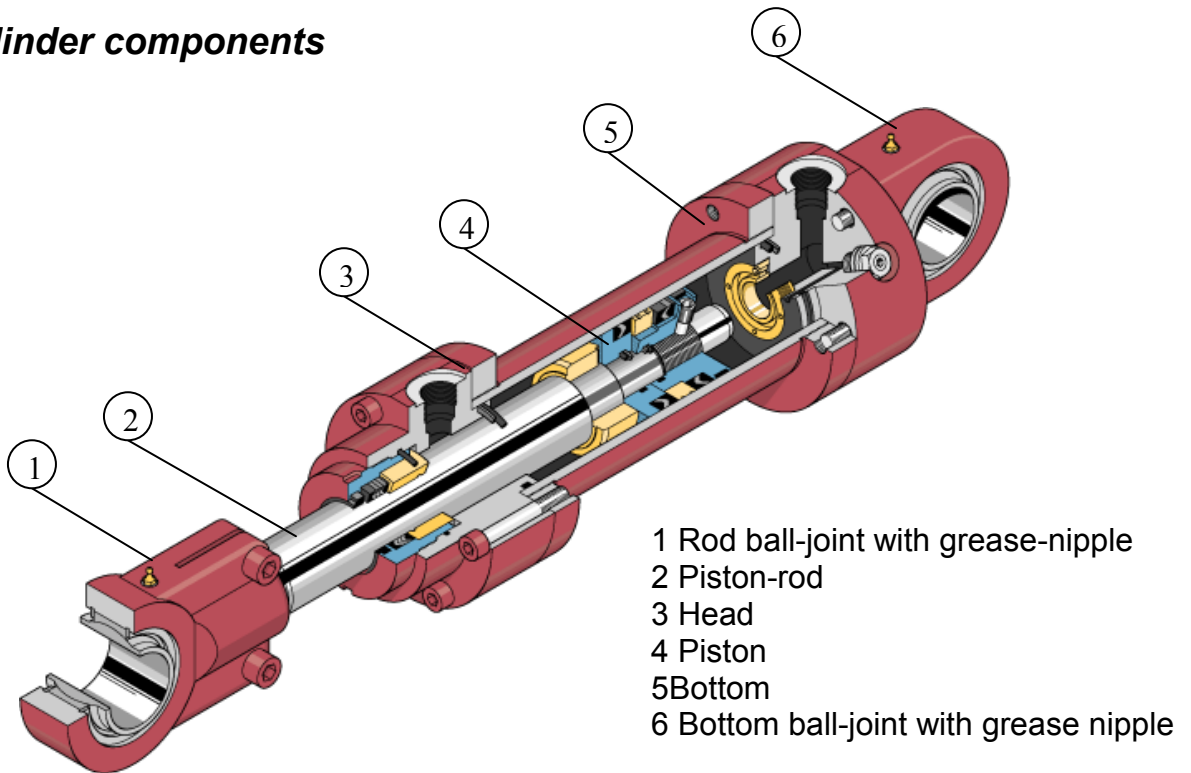
1.2 Replacing seals / scraper and guiding-rings

When a cylinder has been taken apart after usage, all the o-rings, seals, guide-rings and scraper have to be replaced.

1.3 Check if everything is sealed / locked

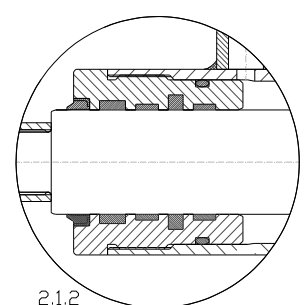
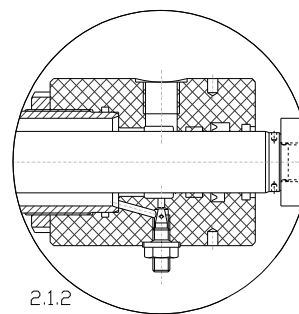
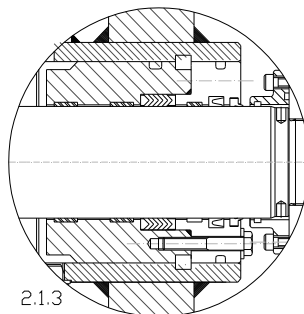
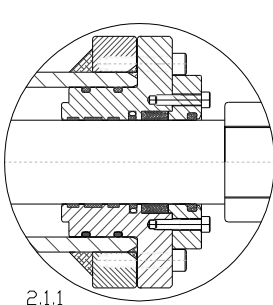
Make sure all seals, o-rings guide rings are in place. Make sure all air-bleed holes are closed. Check if all bolts are tight in place.

2 Cylinder components

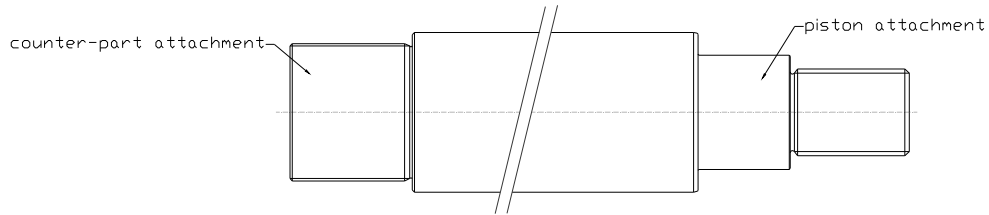


2.1 Head

- 2.1.1 Bolted head
- 2.1.2 Screwed head
- 2.1.3 internal secured head

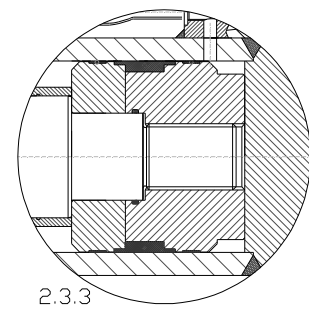
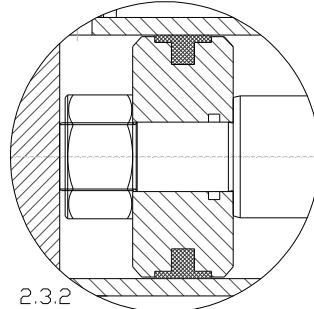
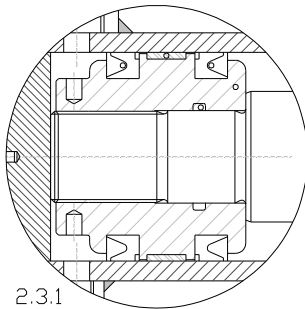


2.2 piston-rod



2.3 Piston

- 2.3.1 screwable piston
- 2.3.2 secured piston with nut
- 2.3.3 separated piston

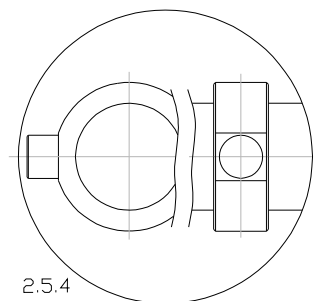
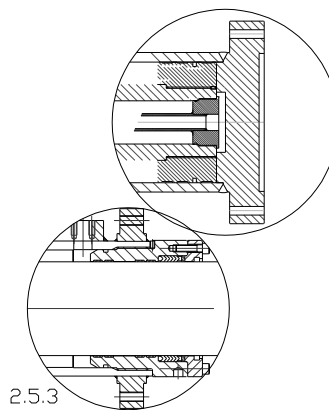
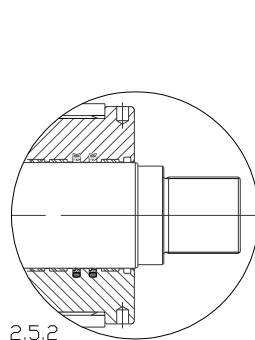
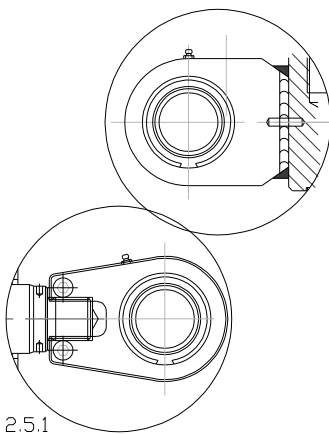


2.4 Bottom

- 2.4.1 welded
- 2.4.2 bolted
- 2.4.3 screwed

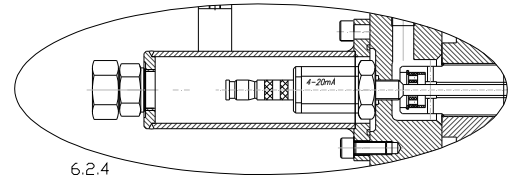
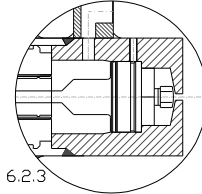
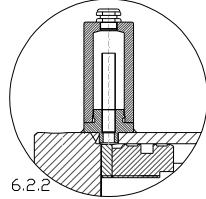
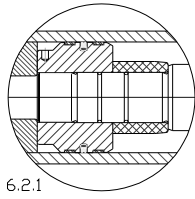
2.5 mounting attachments

- 2.5.1 ball-joint with(out) grease nipple
- 2.5.2 screwing wire with(out) counter-nut
- 2.5.3 head / bottom flange
- 2.5.4 yoke



2.6 Additions

- 2.6.1 damping
- 2.6.2 in / out sensor
- 2.6.3 internal micropulse measurement
- 2.6.4 external micropulse measurement



3 Putting the cylinder into place

3.1 assessing the situation

Look if there's room enough. Decide a working order. Make sure the needed tools are available. Look for lifting points if the cylinder is heavy.

3.2 mounting points

If there is a thread on the rod for a counter-part, use the flat surfaces on the rod to screw it on the counter-part (if the counter-part doesn't rotate)

3.3 oil connections

Connect the oil connections. Use the appropriate seals to seal the oil connection.

3.4 pressurising oil and air-bleeding

While pumping oil into the cylinder use (if necessary) a spherical crane attached to the air-bleeding connection with a hose and a buffer to catch any oil that might be spilled. (decide size of buffer by the size of the cylinder)

4 Disconnecting the cylinder

4.1 assessing the situation

Look if there's room enough. Decide a working order. Make sure the needed tools are available. Look for lifting points if the cylinder is heavy.

4.2 Pressure

Take of the pressure. Secure the pump so no one can turn it on while working on the cylinder.

4.3 detaching oil-connections

Unscrew the oil-connections. Close the connections with plugs to prevent oil spilling while transporting the cylinder.

4.4 detaching mounting points

If necessary support cylinder. Disconnect the cylinder depending on the way the cylinder is connected.

5 Dismantle the cylinder

5.1 basic cylinder dismantling

5.1.1 step 1: Bleed oil

After the disconnecting you have to keep the oil-connections upwards. Put the cylinder in a clamp. Take out the plugs. Turn the oil-connections towards the floor and make sure you collect the oil in a big enough bucket. (always keep oil-connections open while working on cylinder)

5.1.2 step 2: detach head

5.1.2.1 screwed head.

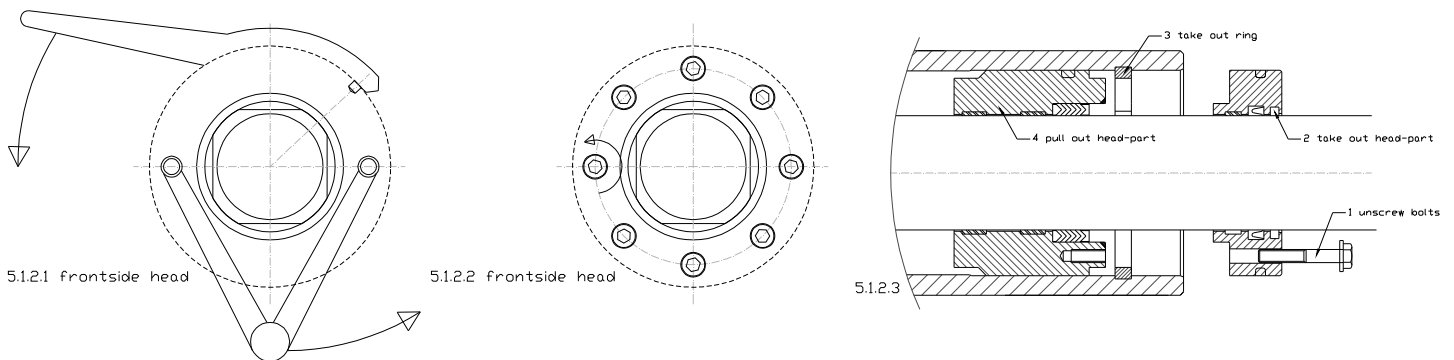
Use an appropriate tool to unscrew the head (there are blind holes in the head)

5.1.2.2 bolted head.

Unscrew the bolts that attach the head to the tube.

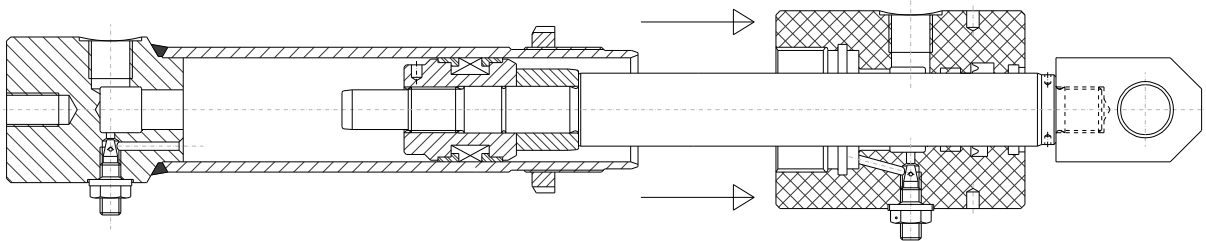
5.1.2.3 internal secured head.

Unscrew the bolts. Pull back the first part of the head. Push back the second part of the head into the tube. Take out the parted ring.



5.1.3 step 3: removing piston-rod and head

Pull out the piston-rod including head and piston



5.1.4 step 4: detaching piston

Put the piston-rod including head and piston in a clamp. Clamp the piston rod in such a way that it doesn't damage!

5.1.4.1 detaching screwed piston

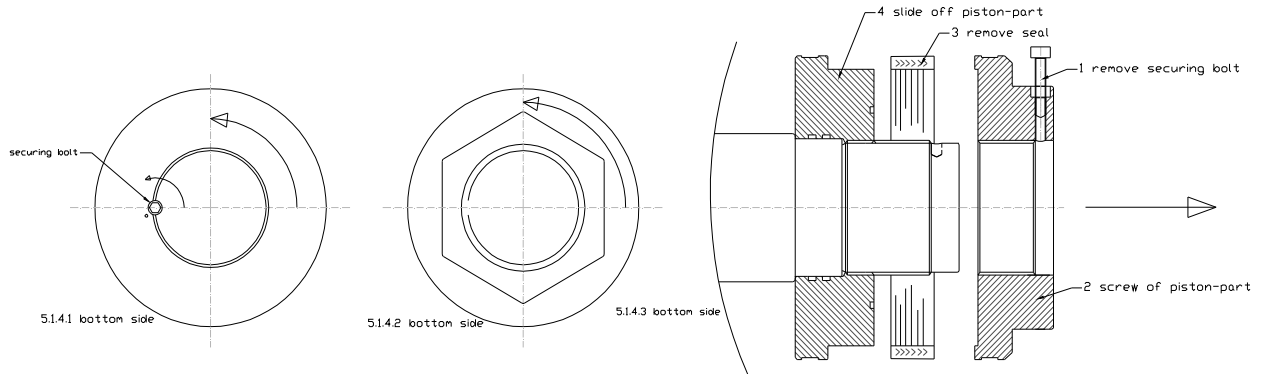
Remove the securing bolt and unscrew the piston

5.1.4.2 detaching secured piston with nut

Unscrew the nut and pull the piston off.

5.1.4.3 detaching separated piston

Unscrew the screwed on part of the piston(or nut) And pull off the piston parts that slide off

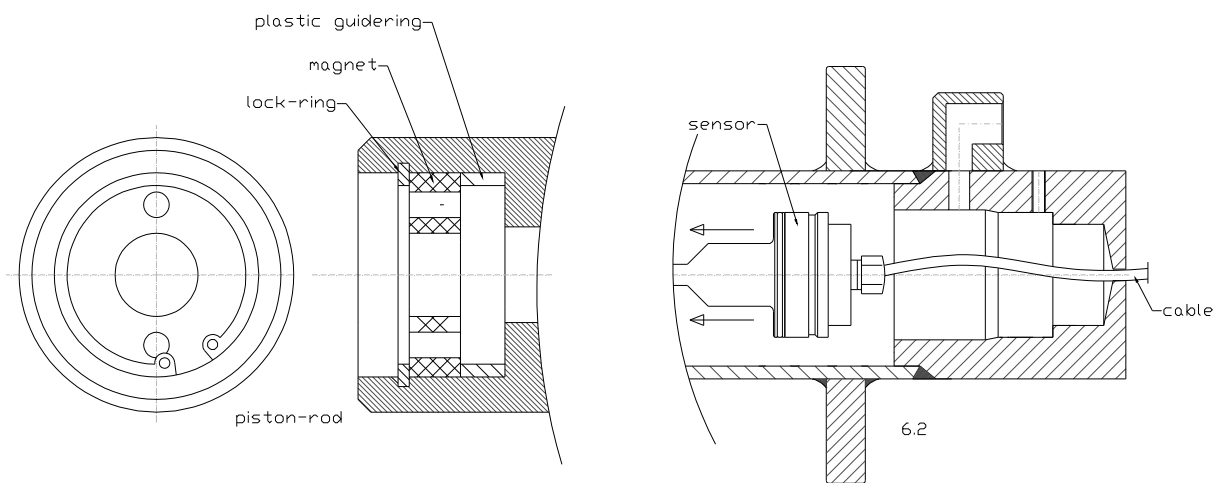


5.1.5 step 5:removing seals / scraper and guide-rings

Take a small pointy tool and take out all the seals / guide rings and scraper. Try to avoid damage to the internal surfaces of the head(external parts of the piston)

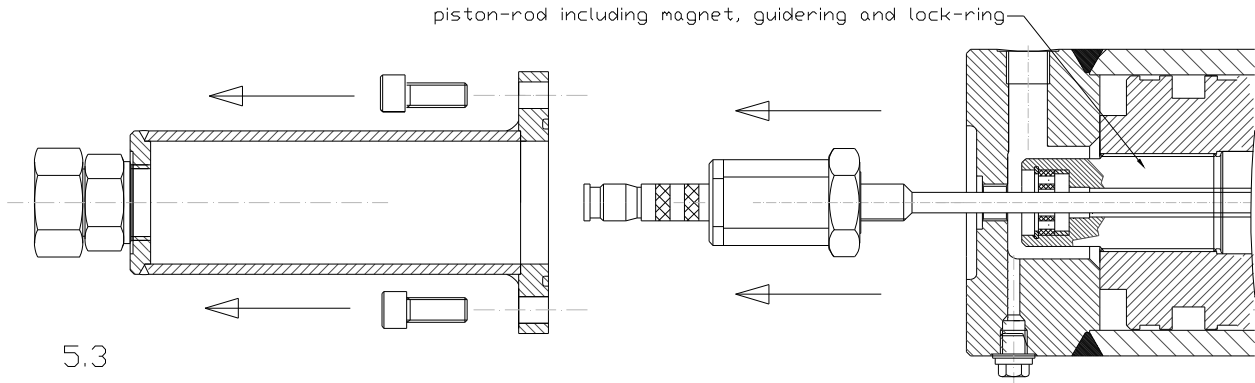
5.2 cylinder with internal micropulse sensor

After the tige, head and piston have been removed The sensor can be taken out. Make sure the electricity cable doesn't have any plugs attached.(just cable) Untighten the securing nuts. Pull the sensor out the tube.



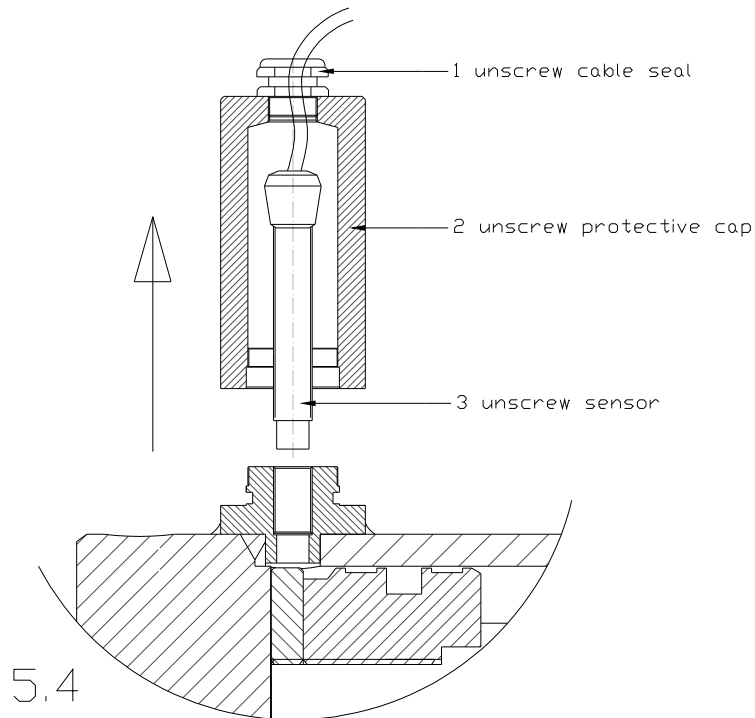
5.3 cylinder with external micropulse sensor

The sensor can be removed at any point in the dismantling process. Unbolt the protect-tube and unscrew the sensor. Pull out the sensor.



5.4 cylinder with in / out sensor

The sensors can be removed at any point in the dismantling process. Unscrew cable seal.(If there, remove protect caps). Unscrew the sensor-cable. Unscrew the sensor from the tube.



6 Assemble the cylinder

6.1 basic cylinder assembling

6.1.1 step 1:cleaning parts

Clean all parts before assembling (degrease)

6.1.2 step 2:placing seals / scraper and guide-rings

Put the seals, guide rings, o-rings and scraper into the head.

6.1.3 step 3: sliding head onto piston-rod

Place the piston-rod into a clamp and support the rod. Grease up the rod. Grease up the inside of the head. Slide the head onto the rod (scraper first from the piston side of the rod).

6.1.4 step 4: attaching piston onto piston-rod

6.1.4.1 mounting screwed piston

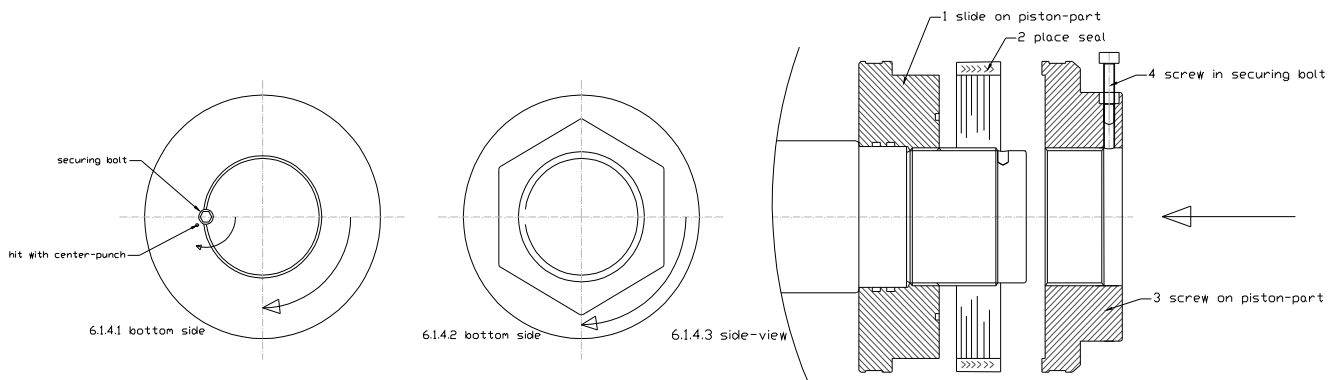
Spray copper spray on to the rod. Screw on the piston until the hole of the securing bolt is in place. Screw securing bolt firmly. Use center punch to secure the securing bolt. (hit approximately 3mm besides the edge of the securing-bolt. Put the seal and guide rings into place.

6.1.4.2 mounting secured piston with nut

Slide the piston on to the piston side of the rod. Put loctite on the thread. Screw on the self-securing nut. If the nut is not self securing, use the securing steps as described at 6.1.4.1.

6.1.4.3 mounting separated piston

Put the seal on one part of the piston. Inclose the seal with the second part of the piston. Spray copper spray on the thread. Take the piston and screw it on to the rod. Secure the piston, depending on the securing method, by using the description at points 6.1.4.1 or 6.1.4.2



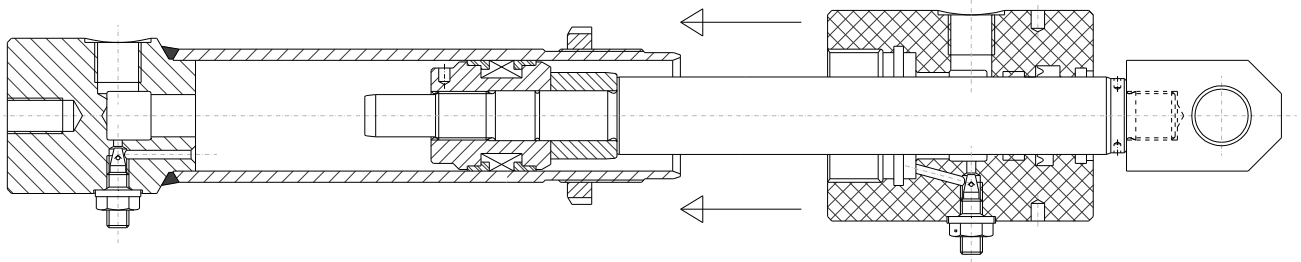
If you have a cylinder with micropulse sensor, first read: 6.2 & 6.3

6.1.5 step 5: slide head, piston and tige into tube

Before sliding the head, rod and piston into the tube, make sure that:

- Tube and piston are greased up
- There are no small particles of steel on any of the parts
- The tube is clamped and supported.
- (The micropulse sensor goes into the hole in the rod)

Make sure the rod and the tube are in line of each other. Push the piston, by pushing the rod, carefully but firmly in to the tube. Use small circular movement while pushing. Make sure the seal and guide rings don't damage. Push the rod so far into the tube untill the head is partially into the tube.



6.1.6 step 6: mounting the head

6.1.6.1 screwed head

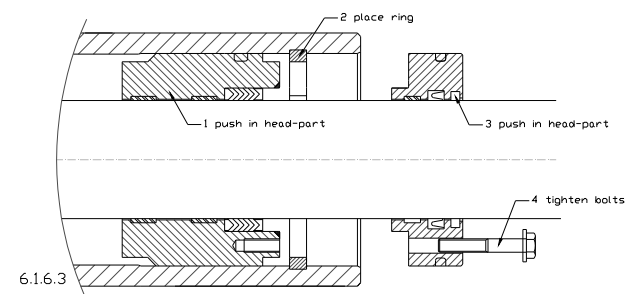
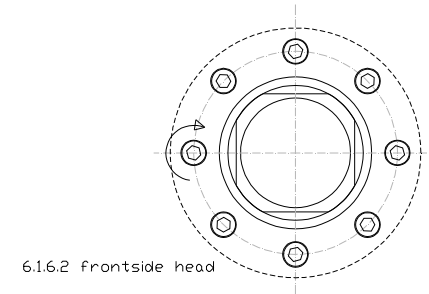
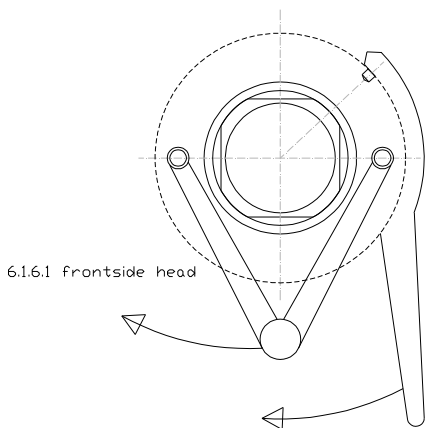
Spray copper spray on the thread of the head. Screw the head on(in) to the tube by pushing and turning at the same time.(try to support the weight of the head as well) Tighten the head proper by hitting the tightening tool with a hammer.

6.1.6.2 bolted head

Grease up the part of the head that goes in to the tube. Get the mounting holes in line with those in the tube. Push firmly(or use hammer) until the head doesn't go in further. If necessary line up the holes again by turning the head. Bolt the head very tight to the tube. (it available use tork-wrench)

6.1.6.3 Internal secured head

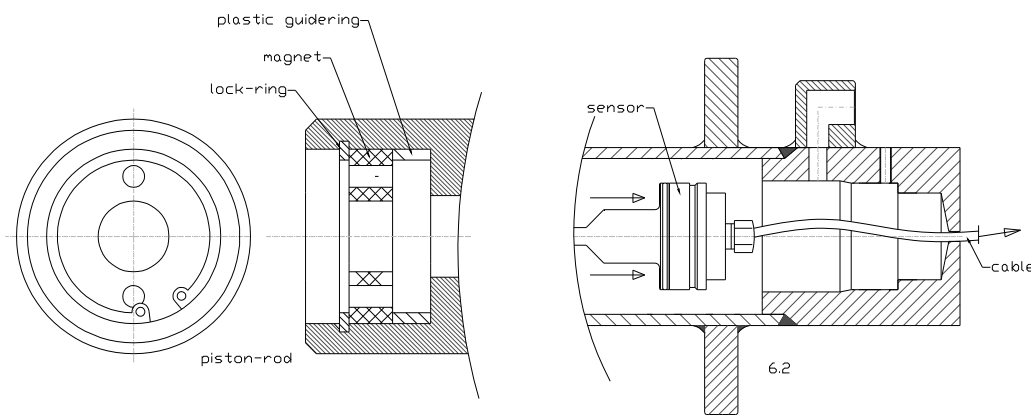
Grease up the head. Push(hammer) the head part closest to the tube past the notch (+/- 3mm) Make sure the head goes in equally. Grease up the securing ring and place it in the notch. Push the other part of the head against the tube. Line up the mounting holes of the head. Use some long screws to get the head parts closer together. If close enough use the prescribed bolts to tighten the head parts together.



6.2 cylinder with internal micropulse sensor

Rod: Place the plastic ring in the rod. Place the magnet in the rod. Secure the magnet and ring with a lockring.

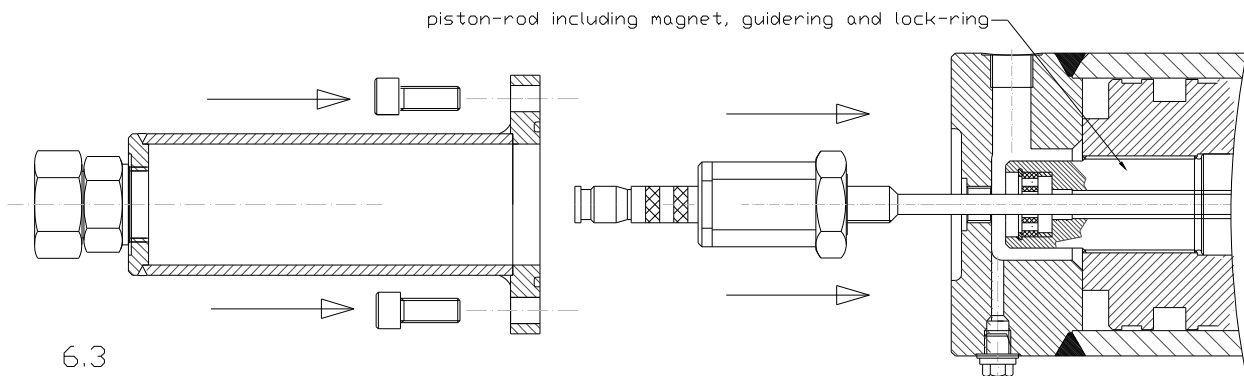
Tube: push a stiff plastic wire down the exit point of the electricity cable until it exits the head side of the tube. Connect the electricity cable to the plastic wire (use tape). Pull back the plastic wire and guide the sensor into the tube. Keep a light tension on the electricity cable and push the sensor in the bottom hole until it doesn't go any further. Screw in the securing bolts from the outside (use loctite to secure the bolts).



6.3 cylinder with external micropulse sensor

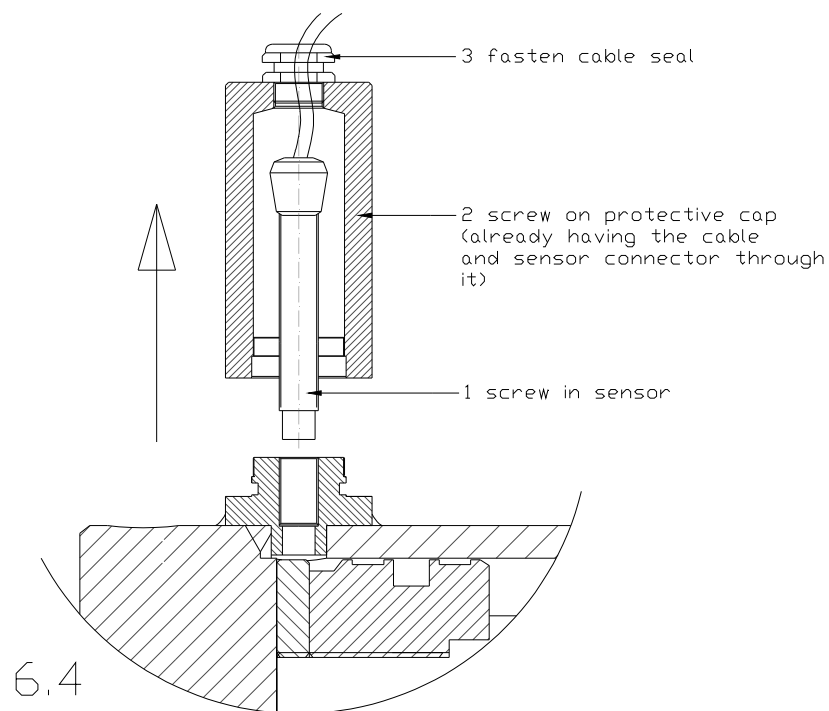
Rod: Place the plastic ring in the rod. Place the magnet in the rod. Secure the magnet and ring with a lock ring. Go to 6.1.5 & 6.1.6 and continue here.

Tube: Stick the sensor from the bottom side into the cylinder. Screw it tight against the bottom (don't forget the o-ring) Take the electricity cable through the protective-tube and mount the protective-tube against the bottom. Secure the cable by sliding on the screw cable seal.



6.4 cylinder with in / out sensor

Push the rod so the piston will hit the bottom. Screw the sensor in the bottom socket until it won't go further (don't twist too hard, or else it'll damage the sensor) Now twist back the sensor half a turn and secure it with the securing nut. Pull the rod so the piston will hit the head and repeat the same process with the head-side socket.



6.5 Final steps

Push piston against bottom
Screw plugs into oil connections to prevent the cylinder from getting unwanted debris inside the cylinder.