

MECHANICAL CYLINDERS

Operating Instructions

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1. Health and Safety

These operating instructions contain the information necessary for the daily work of the operator responsible for the handling and usage of the equipment.

The operating instructions must be available to the persons involved in the operation of the equipment.

It is important that:

- The operating instructions and other applicable documents are retained throughout the lifetime of the equipment.
- The operating instructions and other applicable document are included as part of the equipment.
- The operating instructions are passed on to all other users of the equipment.
- The operating instructions are updated following any additions or changes to the equipment.
- The operating instructions describe the methods required in the use of the equipment.

1.1 Notice about safety

Before you start to use the equipment, or to perform maintenance or servicing of the equipment, please read the relevant parts of these instructions.

Pay attention to all the Danger, Prohibition, Edict, and Note textboxes mentioned in this manual.

Serious damage to persons and machinery can occur if this information is not observed.

The machinery is intended for use by an authorised operator.

Consider all electrical equipment to be live.

Consider all the hoses and pipes to be pressurised.

During servicing and maintenance of the equipment / machine, ensure that the source of power to the electricity, pneumatics (air) and hydraulic is broken before any maintenance is performed. The machine must be vented and the safety switch should be locked.

Servicing and maintenance should only be performed by qualified service personnel.

Follow the instructions in terms of the maximum loads, and see the decal on the equipment for the technical data.

1.2 Warning devices

Annual checks of warning devices and protective devices must be implemented to maintain control of their function and status.

1.3 Warnings and cautions

The Danger, Prohibition, Edict and Note textboxes contain information that is of importance in this manual:

(see the pictures below).

	DANGER! Ignoring this information will result in immediate danger to life!!
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	PROHIBITION! Prohibited act associated with death or serious injury!
---	--

	EDICT! Correct use of personal protective equipment or other aids.
---	--

	NOTE! Information that requires extra attention!
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2. Safety of the Machinery

The machine is labelled with a CE mark, see 2.4, which means that it has been designed, constructed and described in accordance with the EU Machinery Directive 2006/42/EC.

2.1 When rebuilding the machine

If the machine is rebuilt or supplemented with other parts that are not approved by the manufacturer, the CE mark does not apply for the parts that have changed the machine's functions. Warning labels and the CE mark must be clearly visible on the machine. If the warning label for a machinery part is replaced, then the new warning label should be installed in the same place as before.

Damaged decals and CE marks must be replaced immediately.

If the machine is rebuilt or parts are added, it is very important that these instructions are immediately completed / adjusted with the necessary illustrations, photographs and texts.

2.2 Personnel requirements

To avoid damage or injuries, the operator and operating personnel must be specifically instructed or trained according to the manufacturer's instructions. Operators and operating staff may only handle those parts that they have been instructed or trained to use.

All controls and keys shall be operated by hand and should never be activated by means of another kind, unless it is otherwise provided.

2.3 Manufacturer

This machine is manufactured by:
Swedrive AB
341 51 Lagan
SWEDEN

2.4 Mark

This machine is supplied with the following mark:



Type of mark

The serial number is given in the "No." field.
This matches the Swedrive order number and
must always be given in matters relating to the mechanical cylinder.

3. Noise

This machine features a continuous A-weighted sound pressure level that is below 70 dB (A).

4. Safety Instructions

- The machine may only be used by trained personnel and when the user has read and understood the contents of the current operating instructions.
- The machine may only be used for its predetermined purposes and only with the installed protection devices. All applicable safety regulations must be observed.
- Daily maintenance work must be performed by trained personnel.
- Electrical work must only be performed by trained personnel.
- Work on live electrical parts is not permitted.
- Rebuilds, repairs and modifications to the machine may only be performed under the applicable safety regulations.
- When repairs are performed, it is only permitted to use the original spare parts.

5. Mechanical Cylinder Description and Maintenance Instructions

5.1 Product description

The mechanical cylinder consists of gearbox (worm gear) that transfers the rotational motion to an axial motion. A spindle is fixed into the worm wheel. By rotating the worm wheel / spindle and by fixing the trapezoid nut into the piston rod in combination with the rotational locking of the end eye of the mechanical cylinder, the end eye will move axially.

5.2 Usage

The mechanical cylinder is designed to move loads horizontally (pull / push) or vertically (raise / lower). Only the axial forces should affect the mechanical cylinder. Therefore, the load must be steered so that no radial forces will affect the mechanical cylinder (see Section 2 of the Installation Instructions).

If there is a risk of personal injury or if unwanted damage to the machinery could occur, the mechanical cylinder should be supplemented with another safety system. Other uses of the mechanical cylinder than those described above may only be done with the permission of the manufacturer.

Warning! If the mechanical cylinder is assembled in such a way that people are at risk of injury from contact with the piston rod when it is in motion, the builder of the machine is responsible for ensuring that the piston rod is protected against any such contact.

Use a mechanical cylinder of the right size – if in doubt, check the specifications in our mechanical cylinder catalogue or contact Swedrive.



WARNING:

The mechanical cylinder alone is not a safety device. In cases where there is a risk of personal injury, the mechanical cylinder should be supplemented with an alternative safety system.

5.3 Handling

When unpacking and installing the mechanical cylinder, the weight of the mechanical cylinder and the motor must be taken into consideration. See the mechanical cylinder catalogue for information about the weights.

5.4 Storage

The mechanical cylinder must be stored in a way that will prevent exposure to rain, high temperatures, ozone or solar radiation which can cause premature aging of the rubber components. The relative humidity should be kept below 50% to minimise condensation on the mechanical cylinder. If a prolonged storage time or storage in difficult conditions is necessary, please contact Swedrive for further information.

5.5 Installation instructions

1. Make sure that the end eyes are clean and filled with grease. If maintenance-free end eyes are used, do not add lubrication.
2. If possible, mount the mechanical cylinder in a retracted position to protect the piston rod.
3. The mechanical cylinder must be free from any side forces. Side loads must be controlled with a guidance system, or similar, so that only the pull or push loads will affect the mechanical cylinder.



4. Make sure that no stresses are built into the mechanical cylinder during the assembly.
5. When combining multiple mechanical cylinders with a drive motor, gearboxes and intermediate axles, these must be carefully aligned.
6. If the mechanical cylinder (or mechanical cylinders) is correctly mounted, you will be able to rotate the incoming shaft by hand when the mechanical cylinder is unloaded.
7. Be sure to protect the rotating parts from accidental access.



8. If a sensor is used, think about the consequences of a malfunction / voltage loss!

5.6 Commissioning

1. Do not operate the mechanical cylinder unless all limit sensors or possibly safety devices are installed and working properly.



2. If an electric motor is used, it should be installed and commissioned according to its operating instructions.
Check that the actual voltage matches the specified voltage.
The staff member who connects the electricity should have the necessary skills and qualifications.



WARNING!

The staff member who connects the electricity should have the necessary skills and qualifications.

3. Prior to start up, check that there is sufficient lubricant in the gear case of the mechanical cylinder. For the type and amount of lubricant, see Section 5.8 Lubricant.
4. If permitted, it is advantageous to charge the mechanical cylinder with only half the load from the start. After a number of runs, you can increase this to the full load. If abnormally high temperatures occur, investigate the cause and be aware of the risk of fire!
5. Make sure that the mechanical cylinder never runs into the external mechanical stop.



NOTE!

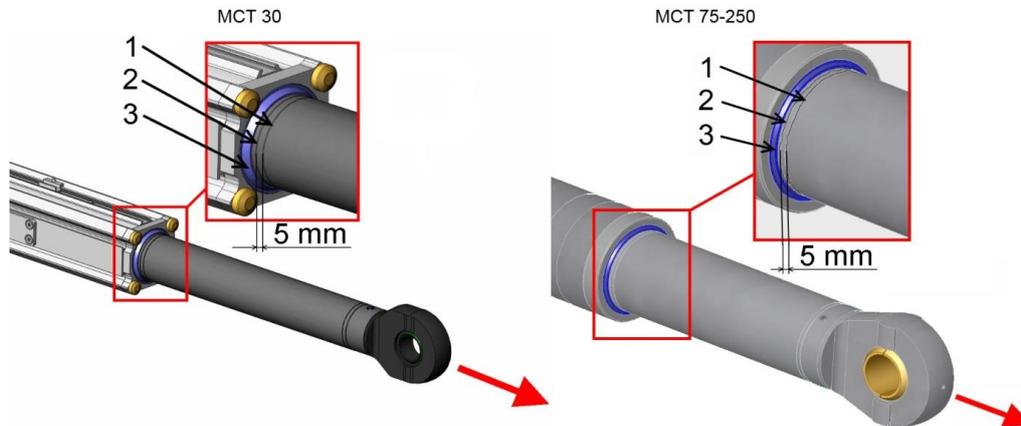
Never run the mechanical cylinder into the external or internal mechanical stops. This could serious damage the mechanical cylinder.

6. Make sure that the mechanical cylinder never runs into the internal mechanical stop. The mechanical cylinder has warning zones (see the pictures below) to allow the operator to visualise the danger and to avoid the internal mechanical stops, in order not to damage the mechanical cylinder. Therefore, during its operation, the operating distance must be adjusted so that the mechanical cylinder never runs into the warning zones. See the additional instructions below.



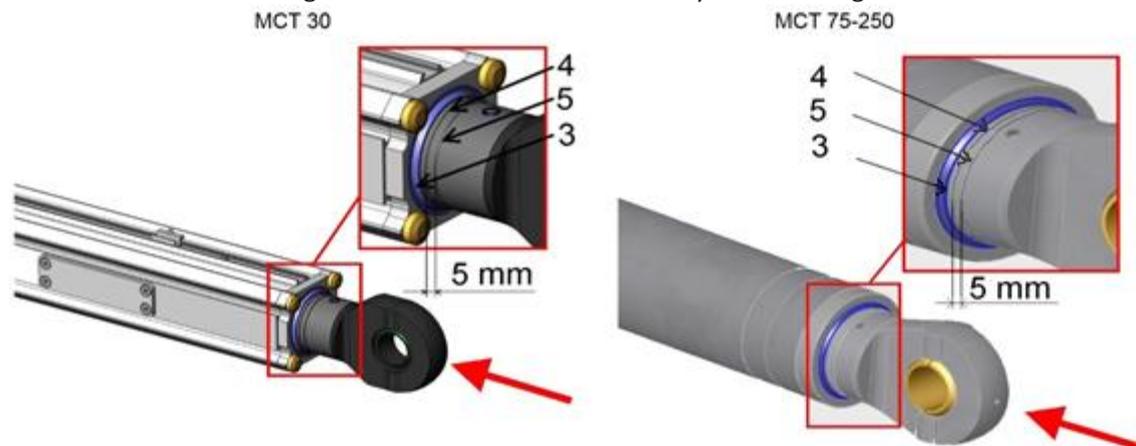
Adjusting the end position sensor when driving the mechanical cylinder outwards.

When Line 1 is visible outside the edge of Wiper 3, the mechanical cylinder has reached the outer warning zone and the mechanical cylinder must be stopped within 5 mm, before reaching Line 2. Driving outwards after reaching Line 2 will lead to mechanical cylinder damage.



Adjusting the end position sensor when driving the mechanical cylinder inwards.

When Line 4 reaches the edge of Wiper 3, the mechanical cylinder has reached the inner warning zone and the mechanical cylinder must be stopped within 5 mm, before reaching Line 5. Driving inwards after reaching Line 5 will lead to mechanical cylinder damage.



5.7 Maintenance

Regularly check that the mechanical cylinder always stops before the actuator warning zones (see the instructions in Section 5.6 Commissioning).

Regularly check that the mechanical cylinder always stops before the external mechanical stops have been reached.

The trapezoid spindle of the mechanical cylinder should be lubricated at least once every 24 months, or sooner if the number of cycles indicated below has been reached (see the table).

Strokes (mm)	Cycles (lubrication interval)
0-300	5000
301-600	2000
601-	1000

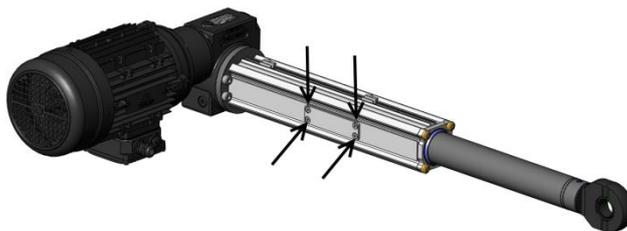


WARNING!

During all maintenance work on the mechanical cylinder, the power source must be disconnected

Lubrication MCT 30:

1. Run the mechanical cylinder to the outer position.



2. Loosen the M5 screws.
3. Remove the inspection hatch.



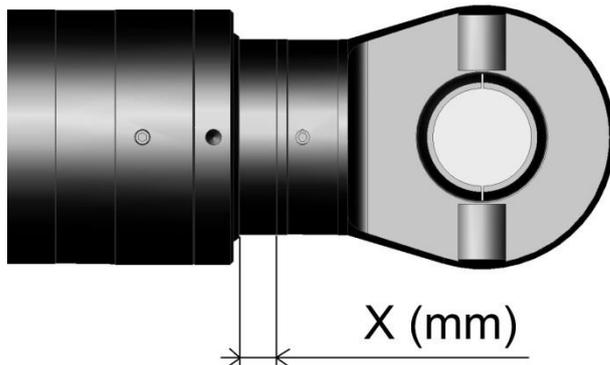
4. Lubricate the trapezoid spindle and the inside of the square tube through the opening with a plentiful amount of grease.
5. The mechanical cylinder gear case is normally lubricated for life. The lubricant level should be at least halfway up the worm wheel or should cover the entire worm screw.



Lubrication MCT 75-250:

1. Run the mechanical cylinder to reach its lubricating position.

Lubricating position (mm from the retracted position)	
MCT 75	X=12 to 28mm
MCT 150	X=12 to 28mm
MCT 250	X=88 to 107mm



2. Lubricate the mechanical cylinder through the nipple, approx. 100g / 1000mm stroke (don't use more grease than is recommended).
3. The mechanical cylinder gear case is normally lubricated for life. The lubricant level should be at least halfway up the worm wheel or should cover the entire worm screw.

5.8 Lubricant

The plates specify the type of lubricant to be used in the mechanical cylinder gear cases. Swedrive's mechanical cylinder gear cases have a one-time lubrication on delivery and the lubricant does not need to be replaced during normal operations.

The trapezoidal spindle is greased with:

Klüber Duotempi PMY45



NOTE!

**Never mix a synthetic lubricant with a mineral oil based lubricant.
Refill only with the type of lubricant specified on the plate!**

Use only the specified grease on the trapezoidal spindle.

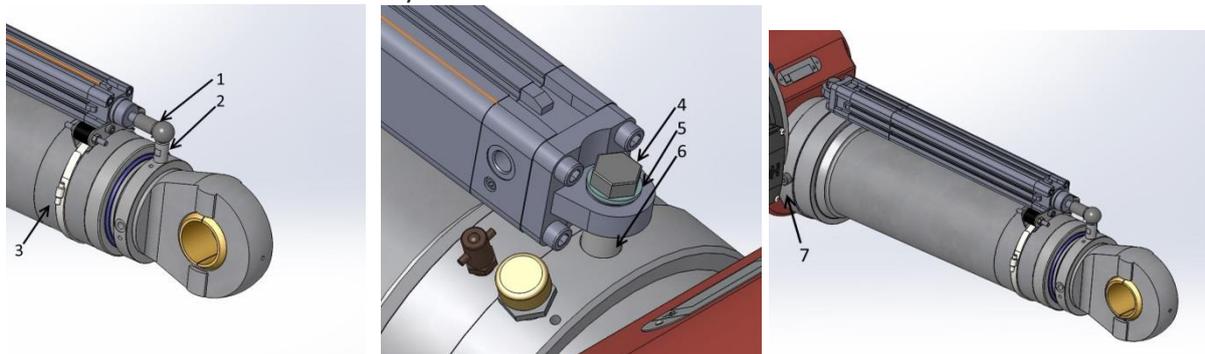
6. Appendix

6.1 Installation of the positions sensors on the MCT75-MCT250

(This only concerns cases where the mechanical cylinder is ordered with sensors.)

At the time of the delivery the sensor assembly is not mounted on the actuator, so that the final position of the sensor assembly can be decided during the installation.

The sensor assembly can be attached in four different equally-spaced positions on the actuator. These are composed of four taped M10 holes at each end of the actuator. On the MCT150, the M10 Allen screw (Pos. 7) in the desired mounting position is removed and is replaced by the rear bracket of the sensor assembly.



Assembly of the sensor unit:

1. Attach the ball (Pos. 2) in the threaded hole corresponding to the desired mounting position, then lock the threads with a Loctite 243 or equivalent.
2. Attach the rear bracket (Pos. 4-6) of the sensor assembly to the corresponding position on the actuator.
3. Remove the clip from the ball link (Pos. 1) and attach it to the ball (Pos. 2), then reinstall the clip.
4. In order to fix the middle bracket of the sensor assembly in place, the actuator is mounted in the brackets and the stroke is placed close to its inner position, then the brackets are aligned and the hose clamp is tightened (Pos. 3).



WARNING!

When working on the mechanical cylinder, the power source must be disconnected.