



**MANUAL
FOR
INSTALLATION
AND
OPERATING**

For gearbox model MO Range



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Introduction

Alfa Gears produces gearboxes of different types and sizes. The model MO is a declutchable override quarter turn gearbox for double acting pneumatic or electric actuators. The MO is intended for manual operation of the valve, in case of failure of the automatic actuator system.

NB. This manual is valid only for the standard MO gearboxes of Alfa Gears B.V.. For special versions, the specifications and model can differ. Alfa Gears B.V. is not responsible for any damage caused by incorrect use of the gearbox.

Handling and safety precautions

Be sure to read and understand this manual before installation and use of our gearboxes. All personnel working with this gearbox must be familiar with the instructions in this manual and observe the instructions given. Safety instructions must be observed to avoid personal injury or property damage.

Qualification of staff

Assembly, commissioning, operation, and maintenance must be carried out exclusively by suitably qualified personnel authorised by the end user or contractor. Prior to working on this product, the staff must have thoroughly read and understood these instructions and, furthermore, know and observe officially recognised rules regarding occupational health and safety. Work performed in explosive atmospheres is subject to special regulations which have to be observed. The end user or contractor is responsible for respecting and to be in control of these regulations, standards, and laws.

Commissioning

Prior to commissioning, it is important to check that all settings are in compliance with the requirements of the application. Incorrect settings might present a danger to the application, e.g. cause damage to the valve or the installation. The manufacturer will not be held liable for any consequential damage. Such risk lies entirely with the user.

Operation

Prerequisites for safe and smooth operation:

- Correct transport, proper storage, mounting and installation, as well as careful commissioning.
- Only operate the gearbox if it is in perfect condition while observing these instructions.
- Immediately notify Alfa Gears B.V. about any faults and damage and allow for corrective measures.
- Observe recognised rules for occupational health and safety. Observe the national regulations.

Protective measures

The end user or the contractor is responsible for implementing the required protective measures on site, such as enclosures, barriers or personal safety equipment for the staff.

Maintenance

To ensure reliable gearbox operation, the maintenance instructions included in this manual must be observed. Any gearbox modification requires the consent of the manufacturer. Alfa Gears B.V. gearbox requires only little maintenance. To ensure that the gearbox is always ready to operate, we recommend for gearboxes the following measures. Three (3) months after commissioning and each year:

- Check the bolts on top of the gearbox;
- Check the bolts on the valve flange;
- Perform a test run every six months;
- Check the gearbox for leakage of grease;
- For gearboxes with permanent vibration and exposure above 60°C, checks should be performed at shorter intervals.

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Storage

The gearboxes that are not yet installed need to be stored inside in a safe way to avoid accidents. Also avoid storage in areas subjected to high temperature extremes and /or areas subjected to large amounts of humidity and dust. Protect against floor dampness by storage on a shelf or on a wooden pallet. Apply suitable corrosion protection agent to bare surfaces.

Long-term storage

If the Gearbox must be stored for a long period (more than 6 months) the following points must be observed.

Prior to storage:

- Protect uncoated surfaces, in particular the output drive parts and mounting surface, with long-term corrosion protection agent.

At an interval of approximately 6 months:

- Check for corrosion. If first signs of corrosion show, apply new corrosion protection.

Packing

Our products are protected and packed by special packaging for the transport from the factory to the customer. The packaging is not suitable for storage outside. If long-term storage outside in the packaging from the factory is required, this should be mentioned during ordering and extra costs could be applicable. The packaging consists of environmentally friendly materials which can easily be separated and recycled. We use the following packaging material: wood, cardboard, paper, and PE foil. For the disposal of the packaging material, we recommend recycling and collection centres.

Handling

Never drop the gearbox or otherwise subject it to strong impact. Lift the gearbox horizontal on the valve. The input shaft or hand wheel cannot be used for lifting the gearbox. Do not lift the gearbox when it is assembled to the valve.

IP rating and environmental conditions

The enclosure protection IP67 only refers to the interior of the gearboxes and not to the stem shaft coupling compartment. (See table. 6 - IP rating) The Alfa Gears MO Range gearboxes can be used at ambient temperatures from –20 to + 120°C. Other temperature ranges are available on request. Suitability for any specific application is not claimed. IP rating is done in accordance to a standard test protocol. It is recommended that users carry out tailor made tests to prove the product is fit for purpose for the specific environmental conditions. For example marine environment, tropical conditions, cold or very hot conditions, chemical sites with acids or salty conditions requires the end user to assess the fit for purpose.

When the product is used in areas with high temperature fluctuations it is recommended to use pressure compensators to prevent pressure differences between the outside environment and the interior of the gearbox.

Stem shafts water ingress

Water can enter into the coupling compartment along the valve shaft, this would lead to corrosion. Therefore a suitable anticorrosive (or sticky grease) must be applied on the inside top bore hole of the gearbox and coupling before mounting. When the manual override is operated in a humid or corrosive environment it is required to apply liquid seal on the bottom flange between the valve and the MO and between the top flange of the MO and the actuator on top. This will prevent corrosion of the coupling.

Paint

Alfa Gears deliver these gearboxes in different RAL colours, our standard average paint thickness is 60 microns, suitable for installation in a clean and dry industrial indoor environment. Our process consists of a phosphating pre-treatment followed by our standard DTM (direct to metal) paint system (Polyaspartic) or primer paint. Other paint systems are on request. For exposure to corrosive outside environment and other non-standard environments, paint system are to be advised by the customer including IP rating. On request we can deliver other paint systems and thicknesses (*see table 5 standard conditions and options*)

Primer

On request we deliver gearboxes in primer. Standard primer is a 1K industry primer which has a maximal lifetime of 1, 5 month and must be stored only in indoor, clean and dry conditions. On request zinc primer can be supplied which has a maximal lifetime of 3 months when free from zinc salts and free from contamination and stored in a clean exterior. In industrial or marine conditions this should be reduced to the practical minimum.

Seals

Alfa Gears B.V. is using a silicone low volatile liquid seal between cover lid and body. Loosening the top bolts of the cover plate from the gearbox can break the seal resulting to leakage. Alfa Gears B.V. will not be held liable when the top bolts are opened without notification. Once opened a new liquid sealing must be applied. Liquid seals kits may be obtained from Alfa Gears B.V.. During the order process it should be mentioned when gearboxes are exposed to high- or low temperatures. Seals made of elastomeric materials are subject to ageing. All NBR seals subject to rotating parts are lubricated with MI-setral 9-M. Gearboxes for low temperatures up to minus 60 degrees Celsius are built with special EPDM O-rings.

Grease

Alfa Gears B.V. is applying grease that is non-self-igniting and do not present an explosion hazard. Dependent on the environmental conditions different greases can be used such as high temperature grease, silicone free grease, foodgrade grease or oxygen free grease. Gearboxes for minus 60 degrees Celsius are built with 75% filling level of grease. Gearboxes are filled for life but on customer request grease nipples are an option to be mentioned during order process.

Correct use

Prior to installation, be sure the gearbox will **NOT** be overloaded during normal use. For this, verify that valve size and required opening torque do not exceed the values given for the gearbox. For the maximum allowable torque on the gearbox, (see table 1). MO gearboxes can only be used for manual operation.

Installation and operating

Not observing the rules as stated in this manual, can lead to damage and/or personal injuries. Qualified personnel must be fully aware of the instructions as described in this manual. Only when the instructions are observed, correct operation of the gearboxes can be guaranteed.

Disposal

Never dispose a gearbox at a general disposal site/depot. The gearbox has to be offered to a disposal depot for recycling. The iron parts can be used for recycling. The seals are of nitrile and can be used for plastic recycling. The grease may not be discharged to sewer- or surface water. It has to be disposed according to local regulations.

Identification

Each gearbox has a nameplate. On this nameplate you find the following standard information:

- Model type - Alfa Gears B.V. Max Torque – Ratio- IP Rate.

N.B. Information on the name plate is important and is required in case of non-conformities or requests. In case of non-conformity, please send a description of the complaint, details from the nameplate with clear photograph(s) to info@alfa-gears.com

Drive options and bottom side PCD options

Figure 1 shows the different drive options. Special drive requirements on request. We deliver MO Range standard off-centre. On request we can deliver on center with reduced tapping depths and dowel pin hole depths (See figure 2)

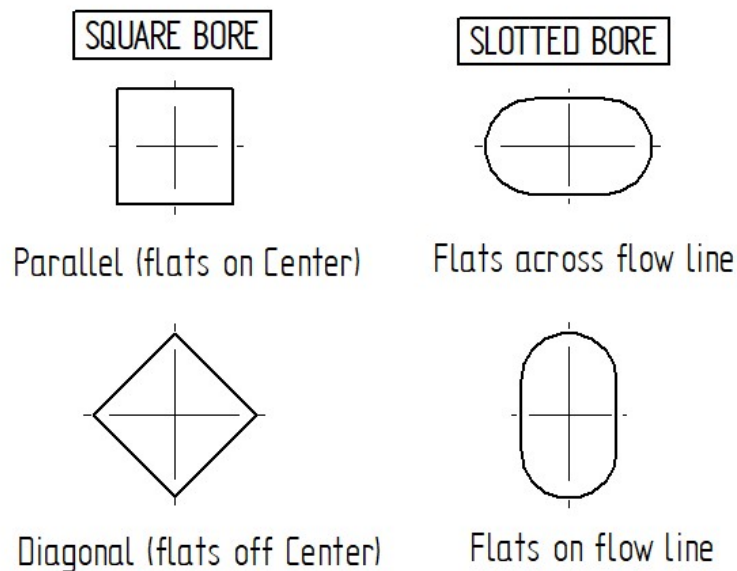


Figure 1. Drive options

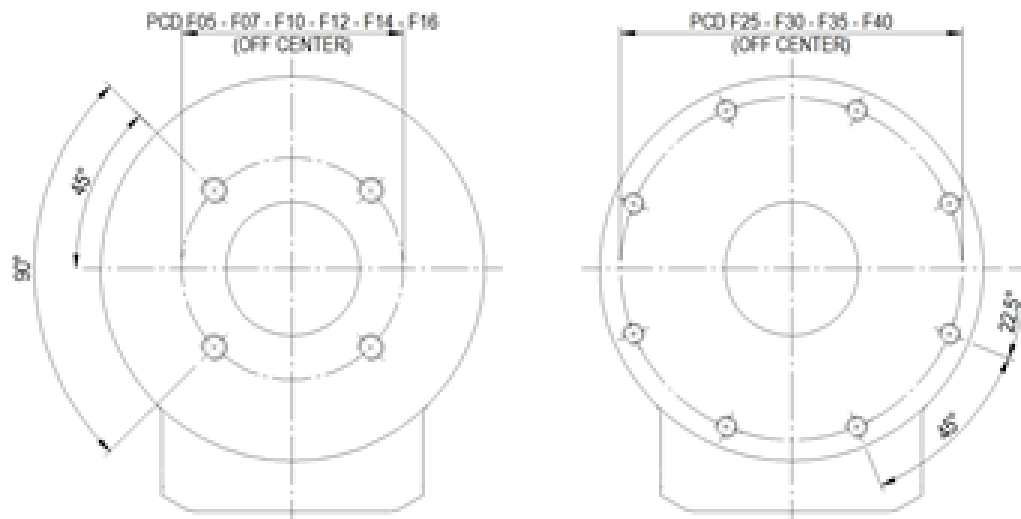


Figure 2: Bottom PCD options

Installation: mounting to the valve.

The MO Range is a manual declutchable override quarter turn gearbox for double acting actuators.

For connection data, maximum allowable input- and output torque refer to table 1. This manual describes the installation of the gearbox and its parts. The intention of the MO Range gearbox is to operate the valve in case of a failing actuator system or emergency situation. Standard we deliver our MO Range gearboxes in Left handed position, the gearbox is observed from above (top view) with set screws pointing downwards. The shaft is then at the top pointing to the left (left handed gearbox).

The gearbox is designed to be mounted on top of the valve as in picture 4. The Gearbox is not constructed for heavy side loads. Apart from side loads in case of horizontal or mounting under an angle, also the selector for manual or auto is not designed for use under an angle in a humid or corrosive environment as under an angle water will deposit on the selector and potentially give corrosion when not operated frequently. This can cause malfunction.

1. The gearbox is standard delivered in the closed position. If the MO needs to be delivered in open position, this needs to be mentioned during in the order.
2. It is recommended to mount a handwheel on the inputshaft, before assembling the gearbox to the valve.

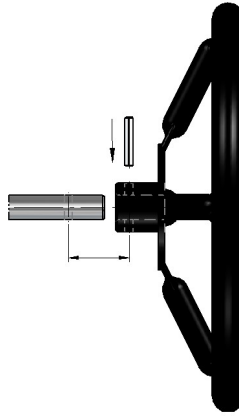


Figure 3: mounting handwheel

3. Check if the bolt circle of the flanges (of gearbox and valve) coincide. Also check if the valve stem and the bore at the bottom of the gearbox match.
4. Make sure the valve is in the closed position. If not, close the valve before continuing.
5. Check if the gearbox is in fully closed position by turning the handwheel clockwise.
6. In case of use of studbolts for fixing the gearbox to the valve, it is recommended to screw them into the bottom flange of the gearbox before mounting the gearbox to the valve.
7. The use of a gasket or liquid seal between the flange of the valve and gearbox is recommended especially in humid or corrosive environment as previously described.
8. The gearbox is mounted perpendicular to the valve (see figure 4).

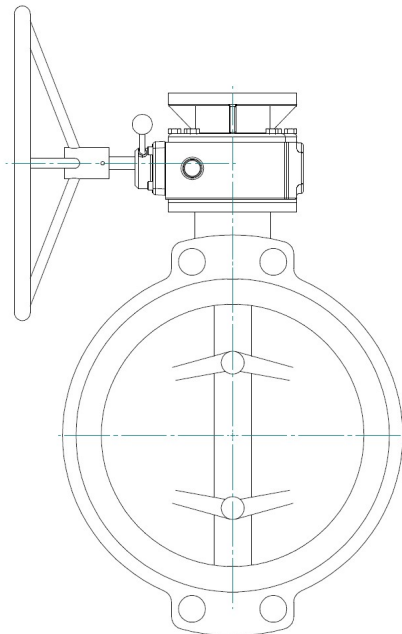


Figure 4: Gearbox perpendicular and on top of the valve

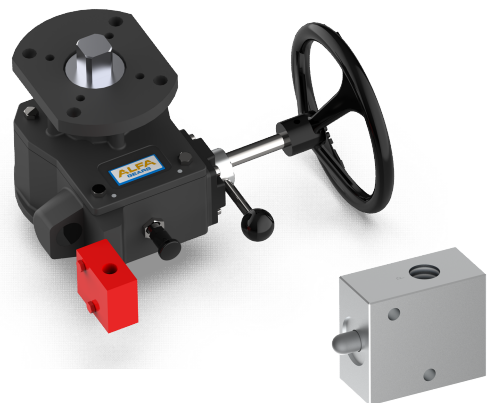


Figure 5.1: 3/2 Vent valve

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9. Fasten the gearbox to the valve with nut and ring. In case of use of bolts, for the maximum tapping depth, see table 3. For tightening, refer to standard VDI 2230.

PCD	F05	F07	F10	F12	F14	F16	F25	F30	F35	F40
max. screw depth	8	11	13	16	18	18	18	18	30	36

Table 3: maximum tapping depth per pitch center diameter

10. The 3/2-valve is optional and meant for gearbox mode detection. The 3/2 vent valve is open (and vents to atmosphere) with the gearbox in manual mode. Figure 6

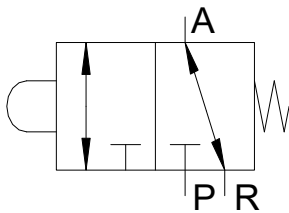


Figure 5.2: port designation

11. The assembly is now ready for adjustment. (See chapter 5).

Adjustment of the stop screws

The gearbox is mounted on top of the valve (see chapter 4).

1. In case of a pneumatic actuator, be sure the actuator depressurised.
2. Put the gearbox in the manual-mode by turning the handle 90 degrees clockwise (see 'operating' and/or figure 6: 1 (pull the nob) → 2 turn the selector → 3 loose the nob and make sure it is released in.
3. Turn the valve into fully closed position by turning the handwheel clockwise.
When the fully closed position can not be achieved, loosen the stopscrew-close (see figure 6) Continue turning the handwheel until the valve is fully closed.
4. Turn the stop screw back into the gearbox until blocked (handtight). Secure the stopscrew–close with the counternut.

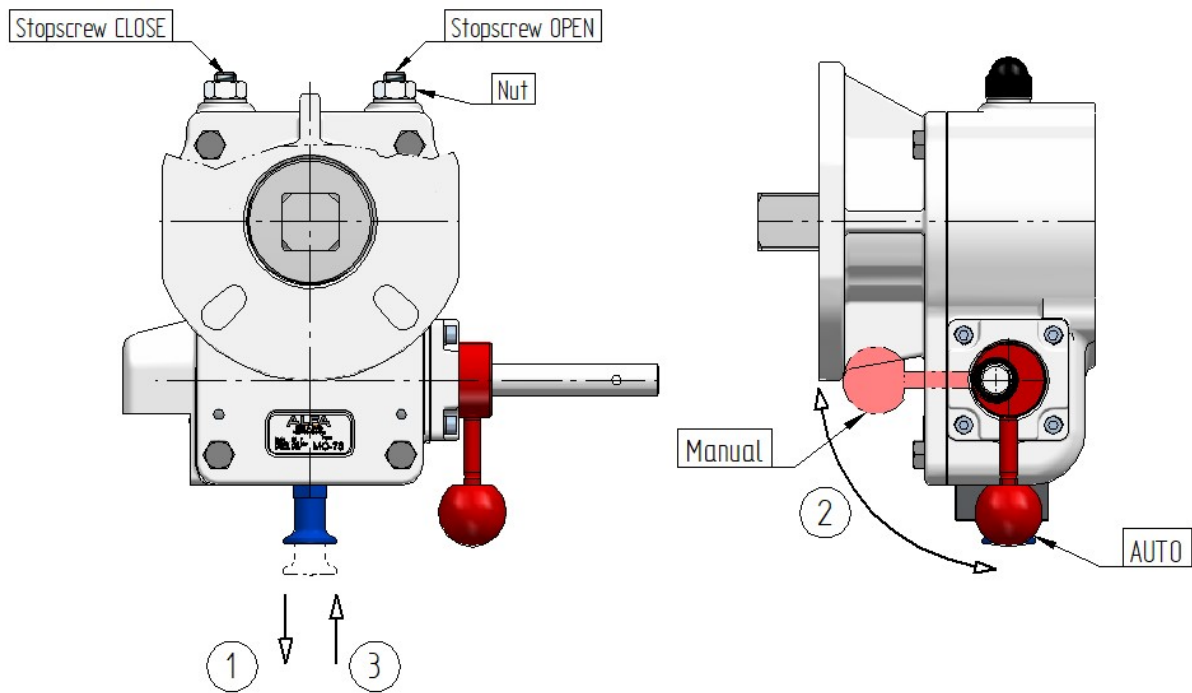


Figure 6: MO SERIES gearbox stop screw adjustment

5. Open the valve by turning the handwheel counter-clockwise. When the fully open position can not be achieved, loosen the stopscrew-open (see figure 6). Continue turning the handwheel until the valve is fully open.
6. Turn the stop-screw back into the gearbox until blocked (handtight). Secure the stopscrew-open with the counternut.
7. Close the valve completely with the handwheel.
8. Pull the knob outwards (3) and turn the handle (counter clockwise) until knob falls back into its locked-position (2).
9. Adjustment completed. The gearbox is now ready for manual or automatic operation.
10. Prior to mounting an actuator,
 - a. Adjust the stopscrews.
 - b. Position the driveshaft (see figure 7) in top of the gearbox.
 - c. Make sure the actuator is in closed position.

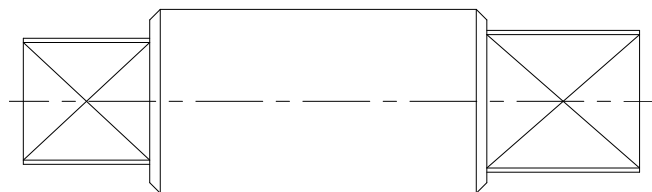


Figure 7: Driveshaft example from an MO SERIES gearbox

For the MO gearboxes, the set screws contain bonded seals. This is to prevent oil leakage from inside the gearbox when the gearboxes are mounted on the valve. When adjusting the set screws more than once it may result in a loss of the bonded seal and it is advised to apply Loctite Threadlock 242. It is also important to lock the screws properly.



Operating

The MO Range is a declutchable manual override quarter turn gearbox for double acting pneumatic or electric actuators. For maximum allowable input- and output torque, refer to table 1.

When switching from auto to manual or during operating the manual gearbox in manual mode, it must be made sure the actuator is not operating or able to operate the gearbox as this may lead to damage.

The gearbox is delivered in automatic mode: valve-operating by actuator.

1. The gearbox is manually operated by handwheel.
 2. Prior to manual operation, the gearbox has to be put into manual mode. To achieve this, refer to figure 8 and follow the next points :
 - i. Pull the knob outwards (3). Secure the knob in this position.
 - ii. Turn the handle clockwise (2) and release the knob. Continue turning the handle until the knob falls back into locking position (1).
- NB When the handle can not be fully turned over $\pm 90^\circ$, turn the handwheel slightly. Continue turning the handle until full engagement is achieved (knob returns to start position).
- iii. The gearbox is ready for manual operation.

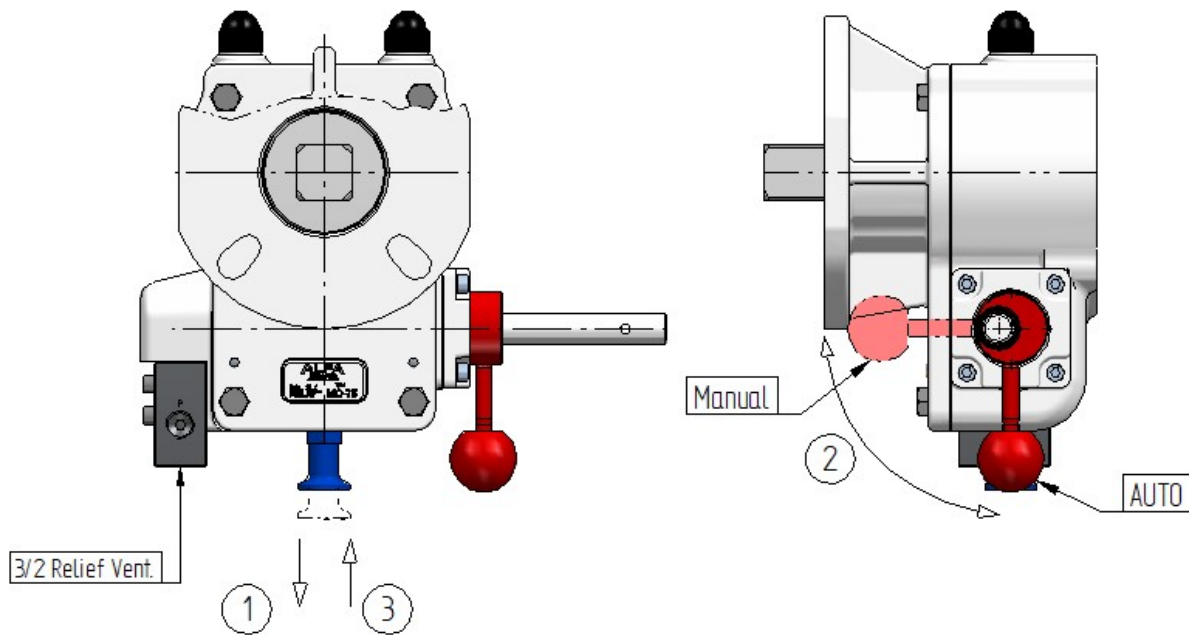


Figure 8: MO Range gearbox

3. To close the valve, turn the handwheel clockwise.
4. Stop turning until the required valve position is achieved.
5. When the valve can not be totally opened (or closed), analyse the cause first to and solve it.
6. In case of malfunction of the gearbox Alfa Gears can be contacted for help. It is important to explain the malfunction, include all details of the nameplate together clear photographs. The report and the pictures can be send to info@alfa-gears.com.
7. Turn the hand wheel the end stops are reached until blocked.
8. Declutch the gearbox:
 - i. Pull de knob outwards (3).
 - ii. Turn the handle counter clockwise (2) and release the knob. Continue turning the handle until the knob falls into its locking position (1).
9. In case of opening the valve, follow procedure described in the previous points, except point 3: to open the valve, turn the handwheel counter clockwise.