

Rotary Displacement Meter DKZ 02



OPERATING INSTRUCTIONS

**Serving the Gas
Industry Worldwide**

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by Honeywell

Note:

Unfortunately, paperwork does not automatically update itself but technical developments are constantly being made. Therefore, we reserve the right to change the descriptions and statements contained in our operating instructions without prior notice. However, you can conveniently download the most recent version of this manual (and those of other devices) from our website www.rmg.com.

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Safety Instructions

The rotary displacement meter has been designed for volumetric gas measurement and is to be used for this purpose only. The device complies with applicable German and international safety regulations. Installation, commissioning, maintenance and repair of this gas meter are to be performed in compliance with these operating and maintenance instructions. If the rotary displacement meter is not properly used or is handled or maintained by people who are not adequately qualified, it can be a hazard under certain circumstances.

Every person entrusted with the installation, commissioning or maintenance of our rotary displacement meters of type DKZ 02 must have read these operating and maintenance instructions before starting work.

- The measuring station has to be designed in such a way that the rotary displacement meter is not subjected to inadmissible pressure shocks or operating conditions in the case of an operating error or a malfunction.
- Parts of the gas pipe and rotary displacement meters must not be removed and shut-off devices must not be opened unless the pressure has been relieved in the appropriate interior spaces.
- Escaping gas is an explosion hazard! It is essential to take all protective measures against explosion when doing installation work.
- The rotary displacement meter must not be improperly modified or repaired. If there are problems, please contact RMG's after-sales service.
- Any modifications or changes are not permitted for safety reasons. For legal reasons, official seals must not be damaged or destroyed.
- The operating staff must not only be qualified for and acquainted with the work to be done; they must also be commissioned to do such work!
- The gas meter can be installed only if it is undamaged and smoothly running. Make sure that its performance limits are observed.
- Fill up or drain lubricating oil only if the gas meter is depressurized and if the rotary pistons are at rest.
- Any used oil resulting from an oil change has to be disposed of in accordance with existing regulations.
- If cleaning agents or sprays are used, you must be aware of the toxic hazard or danger of acid burns.
- Any work which is to be done on electric equipment or current-carrying components must be carried out only by persons who have been commissioned and are qualified for such work. The relevant explosion protection regulations must be observed.
- Do not use any rotary displacement meters with oil or grease lubrication for the volumetric measurement of oxygen. There is a fire hazard!
- Only genuine RMG parts are to be used for repairs.
- The technical rules of DVGW Codes of Practice G 492 I/II are to be observed.

General

The rotary displacement meter of type DKZ 02 is to be used for volumetric gas measurement, primarily in installations according to DVGW G 490 I, G 491, G 492 I/II, G459 II or G 600 in domestic, administrative or industrial buildings.

Its technical data, dimensions and designs are given in publication No. 132.00.

The rotary displacement meter of type RMG DKZ 02 can be used

- for filter-purified gases with a solids grain size of less than 50 µm in compliance with DVGW G 260 and G 280, and for further non-corrosive gases (with the exception of oxygen),
- at operating temperatures from -25°C to +55°C,
- preferably indoors. For outdoor installations, it is necessary to provide at least a weather shield. Furthermore, the ambient temperature must not fall below the water-vapour and hydrocarbon dew points of the gas.

Method of Operation

The rotary displacement meter consists of a measuring element and a totalizer.

In the measuring element, two rotary pistons are caused to rotate by the pressure drop (resulting from the gas flow). The rotary pistons separate always accurate gas quantities and shift them from the inlet to the outlet of the meter.

The rotation of the rotary pistons is controlled by precision gears. Top quality achieved in manufacturing the pistons and the casing ensures a tight but nevertheless non-contact seal between the rotary pistons themselves and between the rotary pistons and the casing.

The rotational movement is transferred through a magnetic coupling to the pressureless compartment of the totalizer where the rotations are added up and then displayed on a digital index as volume (m³). The totalizer is installed rotatably and can be adjusted to the relevant direction of flow of the gas meter.

LF pulsers are fitted into the totalizer. They generate an electric volume pulse which is further processed by appropriate supplementary equipment.

Transport and Storage

In this context, the following is to be observed:

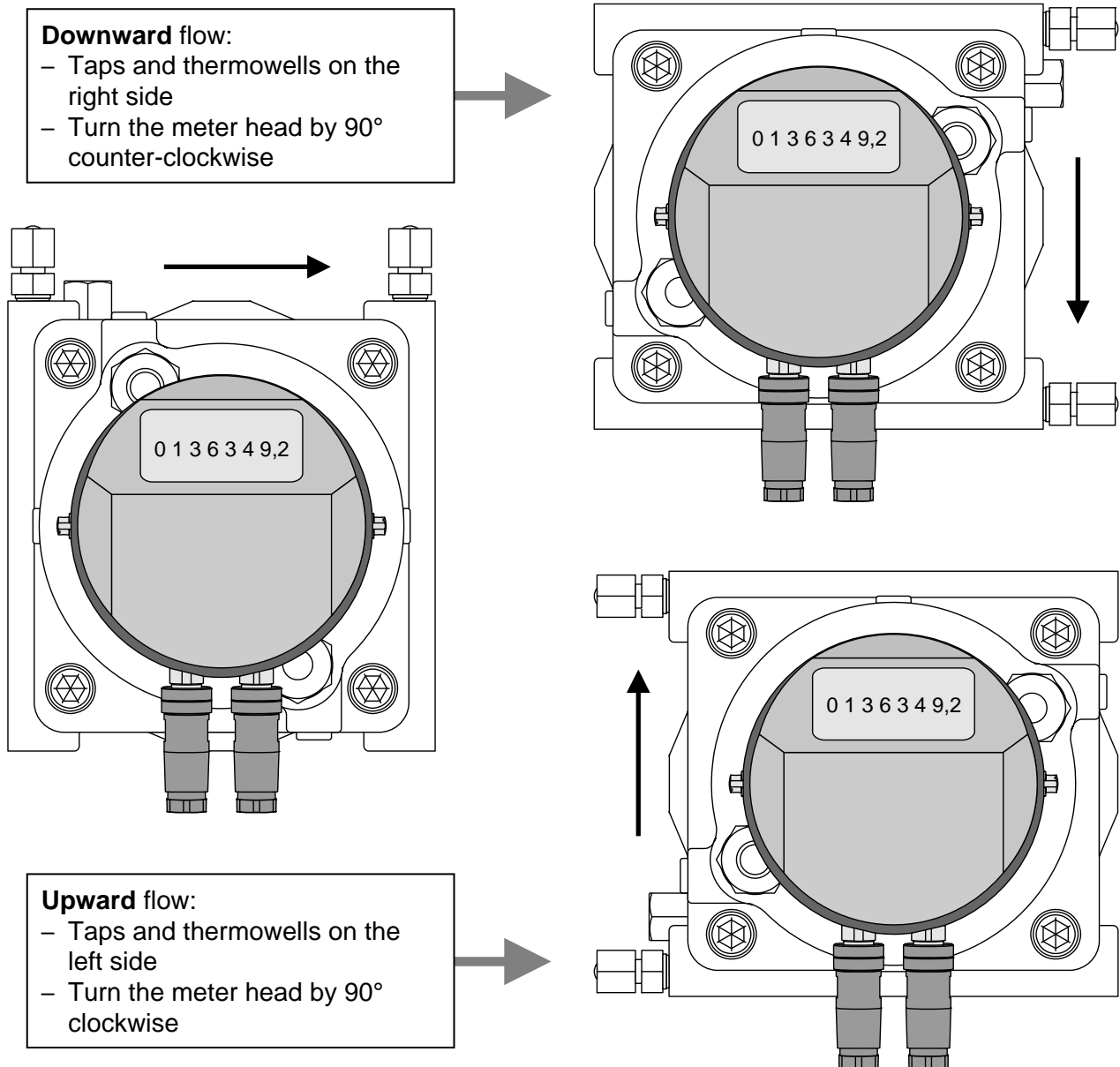
- Input and output flanges are sealed with a flange cover to prevent foreign particles entering and to prevent generally any soiling of the measuring chamber.
- The gas meter is always supplied without any oil.
- Transport is only permitted if there is no oil in the gas meter.
- The rotary displacement meter is a measuring device which is to be protected against shock and vibrations during transport.
- For transport purposes, suitable lifting devices are to be used.
- The gas meter is to be stored in dry and protected areas.

Changing the Installation Position

The flow direction is set in the factory, default is from left to right (view onto top of the meter). The meter inlet is always on the same side as Pr-tap and thermowells. To switch to vertical flow, only the meter head has to be turned so that the digital display is located in a horizontal position.

It is not necessary for a representative of the weights and measures office to be present on this occasion.

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For the change to vertical flow, rotate the meter head as follows (see drawing). For the flow

- from **top to bottom**: turn the meter head by **90° counter-clockwise**,
- from **bottom to top**: turn the meter head by **90° clockwise**.

The rotation can be done without violating a seal. There is no fixing screw to loosen, the head is held in its position because the rotational mechanism is stiff. The rotation therefore requires a slight effort.

The change to horizontal flow from right to left requires more work:

1. Unscrew the thermowells out of the case.
2. Unscrew the pressure taps out of the case.
3. Unscrew the locking screws on the bottom of the case and screw them in the holes where thermowells or pressure taps have been removed.
4. Screw thermowellss and pressure taps in the vacant threaded holes.
It should be noted:
 - **Thermowells and Pr-tap must be on the (new) inlet side of the meter!**
 - **Use new gaskets for the thermowells (see section “Spare Parts, Accessories”)**!
5. Turn the meter head by 180°.
6. Check the tightness at all points where parts were screwed under 3. and 4. immediately after the meter has been set under pressure.

Installation

In this context, the following is to be observed:

- Remove the sealing caps from the flanged ends of the gas meter.
- Clean the sealing faces with an appropriate solvent (e.g. kerosine) to remove the anti-corrosive agent.
- Carefully clean the pipe to be connected from dust, welding residues, condensate, etc.
- Install a protective screen or a filter (e.g. type RMG 906a) in the gas supply pipe at the inlet side of the gas meter to avoid damage due to soiling, in particular while the gas metering station is started up.
- Make sure that the specified direction of flow is observed (note the arrows on the meter case indicating the direction of flow).

INSTALLATION

- Install the gas meter with minimum stress into the pipework.
 - It is imperative that the gas meter is aligned horizontally using a spirit level.
 - The connecting flanges of the pipe must be coaxial and parallel to the flanges of the gas meter.
 - The thickness of the sealings is to be taken into account when the flange clearance for the gas meter is determined.
 - Tighten the fastening screws towards the pipe evenly.
- Make sure that the flange seals are properly dimensioned and located (they should not project into the inside flange diameter).
- Recommended screws for installing gas meters
 - with metric flanges according to DIN 2501-1,
 - with flanges measured in inches according to ASME B 16.5:

Size	DN	Overall length mm	Screws	
			PN 16	ANSI 150
G 16, G 25, G 40, G 65	50	171	4 x M 16 x 50	4 x 5/8" - UNC x 2"
G 100	80	171	8 x M 16 x 45	4 x 5/8" - UNC x 2 1/4"
G 160	80	241	8 x M 16 x 55	4 x 5/8" - UNC x 2 1/2"
G 160, G 250	100	241	8 x M 16 x 55	8 x 5/8" - UNC x 2 1/2"

NOTES:

- Screws without colour coding according to DIN 931 or DIN 933.
- Strength class 5.6 independent of the colour coding.
- Sealing thickness: 2 mm,
material: graphite with metal insert,
dimensions according to DIN-EN1514-1 or DIN 2690
- Screw tightening torque: 80 Nm
- During installation, check whether the rotary pistons are running smoothly. If they are stiff, this indicates either a distortion or soiling of the measuring chamber.

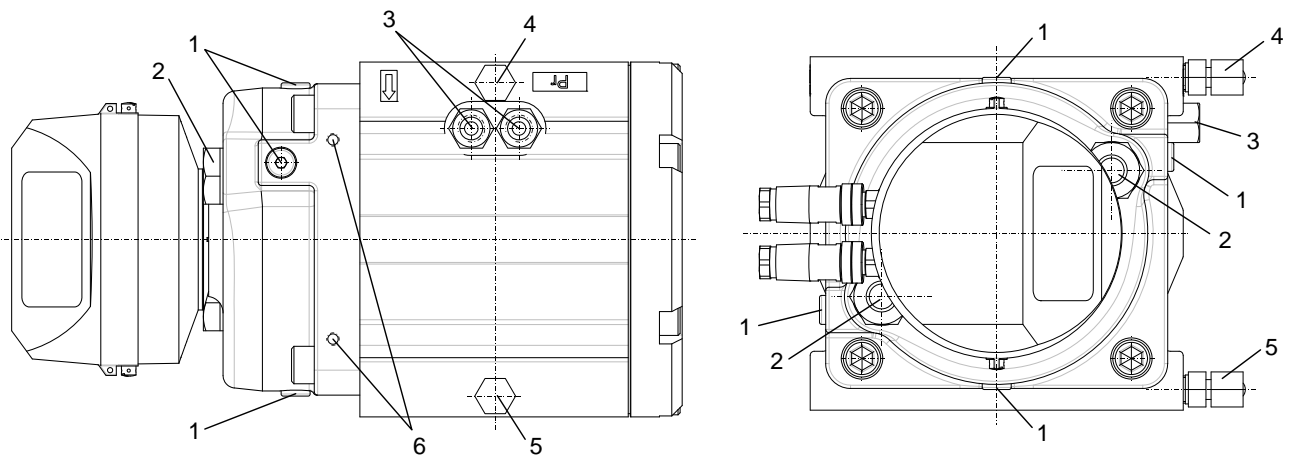
Commissioning

The following should be observed:

- Fill the cover compartments of the unpressurized gas meter with oil until the middle of the sight-glass mark is reached.
 - Open oil filling opening on the top (pos. 1, drawing next page).
 - When you fill the gas meter with oil, proceed gradually in order to avoid filling beyond the sight glass area.
- Use non-resinous and acid-free oil. We would recommend using the oil types Shell Tellus oil 10 or BP Energol HLP 10 or a comparable oil with a kinematic viscosity of 10 mm²/s at 40°C.
- Average oil quantities

Size	Total oil quantity dm ³	
	horizontal	Vertical
G 16, G 25, G 40, G 65, G 100	0.015	0.10
G 160, G 250	0.065	0.28

COMMISSIONING



Explanations:

- 1: Oil filling/drain opening
- 2: Oil sight glass
- 3: Thermowells for temperature transmitters
- 4: Tap for pressure transmitter (P_r)
- 5: Tap for measurement of reference pressure
- 6: Threaded hole for attachment of the mounting bracket for installation of the volume corrector EC 900

Starting-up the gas meter

- The shut-off valves upstream and downstream of the gas meter are closed when supplied.
- Slightly open the shut-off valve upstream of the meter inlet. When you do this, the gas meter must be vented via the oil filling openings in the front cover.
- After venting, screw the oil filling plugs so that they are pressure-tight.
- Completely open the shut-off valve upstream of the gas meter.
- Perform a leak test in accordance with applicable national regulations such as DVGW Codes of Practice G 469, G 492 and G 496 in Germany and in compliance with the relevant regulations abroad under the supervision of an expert.
- Carefully and slowly open the shut-off valve downstream of the gas meter. While you are doing so, the flow rate must not rise abruptly but steadily and must not exceed Q_{\max} .
- If appropriate, measure the pressure loss via p_r and p in order to be able to draw conclusions about the smooth running of the gas meter when repetition measurements are to be taken for maintenance purposes.
- After the work stated above has been done, the gas meter is ready for operation.

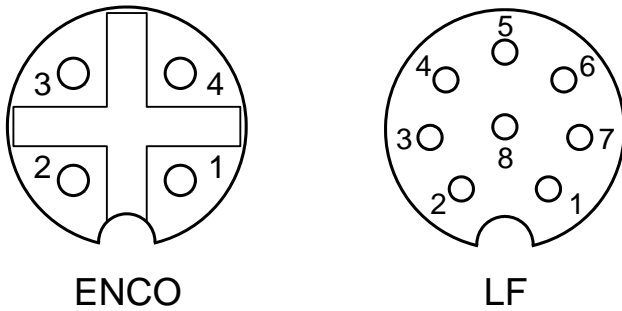
Pulsers

- It is not possible to fit pulsers subsequently.
- Connection is made via a 8-pin Binder plug (series 7 13), degree of protection IP 67 when plugged in.
- Pulsers (standard)
 - LF 2 reed switches, polarity-independent
 - + 1 tamper switch, polarity-independent
 - operating voltage $U = 3-16 \text{ V DC}$
 - switching current, max. $I = 40 \text{ mA}$

PULSERS

- Outputs – Connector pin assignments

On the rear side of the meter head there are two sockets for Binder plugs of series 713. The left one (optional) is used for the connection of an encoder, the right one for the LF pulses. The figure shows the view onto the plugging side of the sockets.



Contact	ENCO
1	Vo +
2	
3	Vo -
4	PE

Contacts	LF
1 - 4	LF 1
2 - 5	LF 2
3 - 6	Tamper contact

Cable diameter for ENCO: 6-8 mm.

- Variants
 - 2x LF, 1 tamper contact (standard)
 - Additionally with encoder type ENCO 08
 - Additionally with mechanical drive shaft according to EN 12261
- Overview of pulse values

Size	LF pulser
	Pulse value Pulses/m ³
G 16, G 25	10
G 40, G 65	
G 100	1
G 160, G 250	

* See the pulser plate for the precise pulse value.

Accessories – Volume Corrector

It is possible to connect an electronic volume corrector to the rotary displacement meter of type DKZ 02. For this purpose, the gas meter is provided with two pressure taps and four temperature taps.

- Pressure taps
 - Pipe couplings for pipes with a diameter of 6 mm
 - Internal thread 1/4" NPT
- Temperature taps
 - Sealed with screw plugs (G 1/4) as standard.
 - For temperature measurement, the screw plugs are to be replaced by RMG thermowells.
 - The thermowells with an G 1/4 internal thread are suitable for temperature sensors with a maximum diameter of 6 mm and a G 1/4 connecting thread.
- The totalizer's pulses for cubic metres at measurement conditions are used in accordance with section "Pulsers" as input pulses for the volume corrector.
- The pressure transducer is to be connected via a three-way check valve to the pressure tap p_r at the meter inlet.
- The resistance thermometer is to be installed in the thermowell at the meter inlet. The second thermowell at the same measuring point or at the meter outlet is used for measuring the reference temperature.
- The volume corrector can be attached to the top of the front cover using the two threaded holes 2x M 6x11. Then the gas meter and the volume corrector can be used as a complete measuring unit. The mounting bracket for installation of a volume corrector of type EC 900 is available as an accessory.

It is possible and officially permitted to subsequently connect a volume corrector including thermowells to the rotary displacement meter.

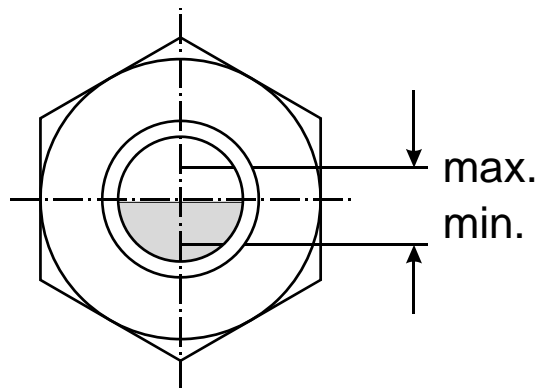
Maintenance

Maintenance intervals essentially depend on the operating conditions and the gas quality. Therefore, no fixed maintenance intervals are specified.

We recommend that the oil level be checked approximately once a year and other maintenance work be performed at intervals in accordance with the specifications of DVGW Code of Practice G 495.

- Maintenance work

Maintenance work	Scope of work
Checking the oil level	<ul style="list-style-type: none"> • Stop the rotary displacement meter and check the oil level after approx. 10 minutes. If you check the oil level while the rotary displacement meter is running, some oil will be in circulation. (The oil level will be below the middle of the sight glass.) <p>The oil level should be in the middle of the sight glass, it must be visible in any case and must not be higher than $\frac{3}{4}$ of the total height of the sight glass (see drawing).</p>
Topping up oil	<ul style="list-style-type: none"> • Stop and depressurize the gas meter and proceed as described in section "Commissioning".
Changing oil	<ul style="list-style-type: none"> • Stop and depressurize the gas meter. Drain all the oil from the gas meter via the oil drain opening (pos. 1) of the front cover. Fill the gas meter with new oil as described in section "Commissioning".
Checking smooth running	<ul style="list-style-type: none"> • Measure the differential pressure of the gas meter via p_r and p.



- We recommend that you change the oil at an interval of approx. 6 years.
- The statutory deadline for subsequent gas meter proving is 16 years in accordance with German regulations. Such gas meter proving can be performed at our state-recognized testing laboratory for gas measuring devices.
- Before you remove the gas meter from the pipeline, you must do the following:
 - Relieve the gas pressure.
 - Carefully drain the oil from the gas meter through the oil drain opening (pos. 1) of the front cover and dispose of it properly.
- Close the oil drain opening (pos. 1) again.
- Check the pistons for smooth running by measuring the differential pressure via p_r and p .
 - Compare the differential pressure value with the value measured when commissioning the gas meter or with that from previous measurements.
 - A considerable increase in differential pressure indicates that the gas meter is soiled. This soiling can be removed by cleaning the measuring chamber (e.g. rinsing it with kerosine).
- If there are other malfunctions or if smooth running cannot be achieved again by cleaning the measuring chamber, you should contact either RMG's after-sales service or your authorized workshop.
- Under metrology legislation, customers are not permitted to do repairs on their own.
- Any damage to the seals makes it necessary to have the gas meter proved once again or have it inspected by a representative of the local weights and measures office.
- Spare parts which affect the measuring properties of the gas meter are only available to the manufacturer or authorized workshop.

Spare Parts, Accessories

The parts listed below are available through RMG's after-sales service. Please indicate the relevant item number.

We expressly point out that we do not assume any liability for any parts obtained from other sources.

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Function, location	Part	Item No.
Lubrication	- Screw plug	60.96.431.00
	- Sealing ring	81.54.430.00
	- Lubricating oil Shell Tellus S2 MA 10 (1 l can)	82.11.148.00
Pressure tap	- Standard olive joint	67.03.215.00
	- Sealing ball	65.53.354.00
Temperature tap	- Without thermowells	
	• Screw plug	60.97.083.00
	• Sealing ring	81.54.614.00
	- With thermowells	
	• Thermowell G16 to G100	00.63.161.14
	• Thermowell G160 / G250	00.61.509.14
• Screw plug	60.96.471.00	
• Sealing ring	81.54.614.00	
Mounting bracket	- For installation of EC 900	00.60.374.00