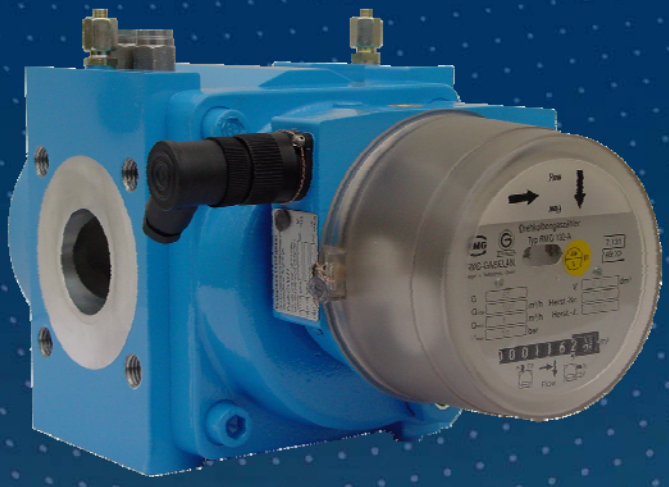
Rotary Displacement Meter RMG 132-A



OPERATING INSTRUCTIONS

Serving the Gas Industry Worldwide

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RMG
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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CONTENTS

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 RMG 132-A 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 RMG 132-A 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 132-A 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 -40°C to +60°C – casing material: Al or
  -20°C to +60°C – casing material: spheroidal cast iron (GGG),
- 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 (m^3, ft^3). The totalizer is installed rotatably and can be adjusted to the relevant direction of flow of the gas meter.

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

Transport and storage

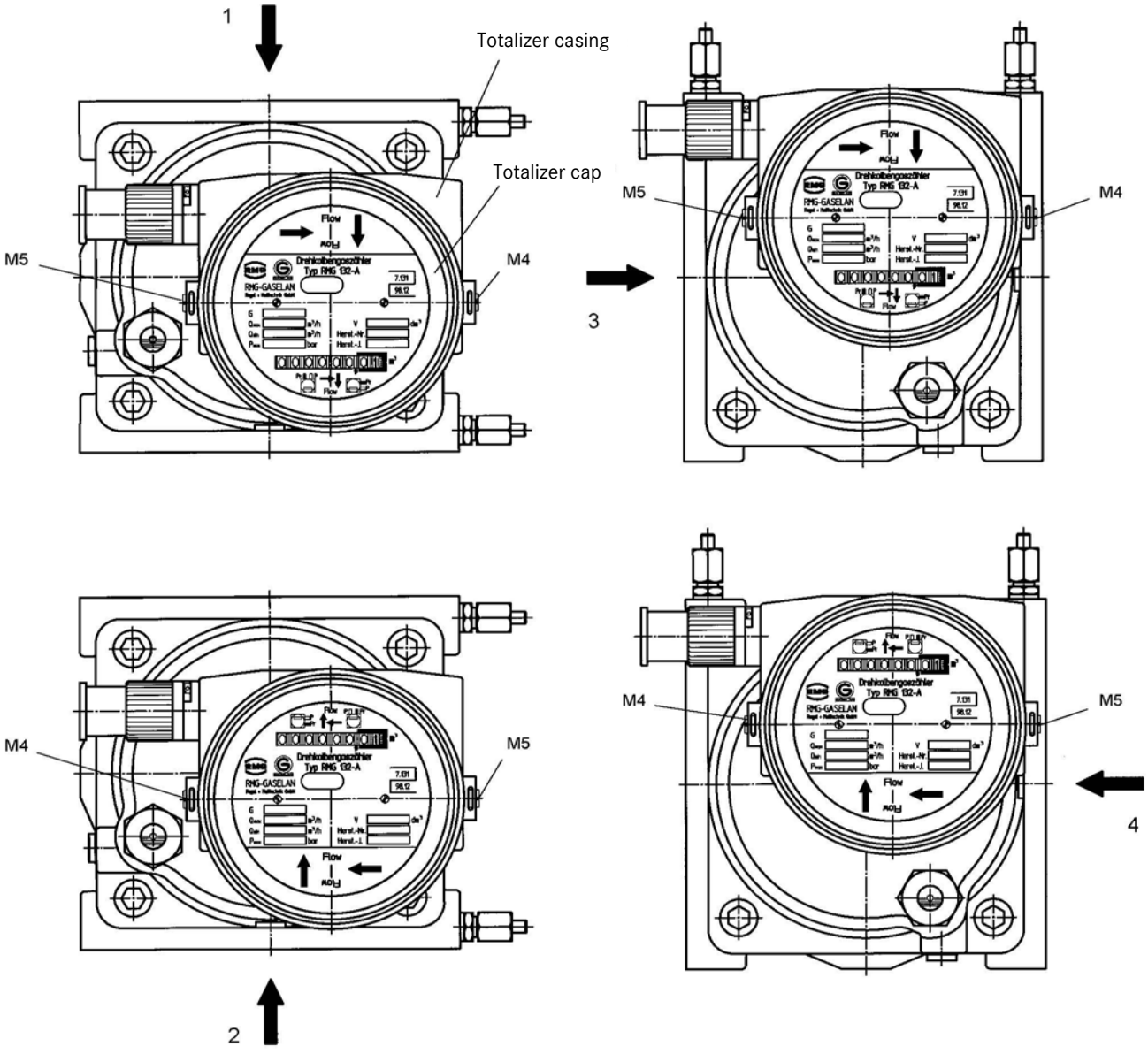
In this context, the following is to be observed:

- 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.
- If gas meters with a casing made of spheroidal cast iron (GGG) are stored for a prolonged period, they are to be relubricated with a corrosion-protective oil (e.g. Shell Ensis oil N) in the measuring chamber and on the sealing surfaces of the flanges.

Changing the installation position and the direction of flow

The necessary work can be done either prior to installing of the gas meter in the pipeline or afterwards. It is limited to turning the totalizer casing and/or the totalizer cap. The digit display should be in horizontal position.

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



- M4 - Screw for official seal
- M5 - Screw for user seal

Changing the direction of flow	Necessary work to be done
1 to 2	- Destroy user seal (RG 3) on screw M5. - Turn back screw by approx. 3 turns until you can turn totalizer cap. - Turn totalizer cap through 180°. - Screw in screw M5 again until it stops. - Apply new user seal to screw M5.
1 to 3	- Loosen 2 studs M6 on the totalizer casing. - Turn totalizer casing through 90° to the right. - Tighten 2 studs M6.
3 to 4	- As described for 1 to 2.
4 to 2	- As described for 1 to 3, but turn totalizer casing to the left.

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 and the measuring chamber of a gas meter made of spheroidal cast iron (GGG) with an appropriate solvent (e.g. kerosine) to remove the anti-corrosive agent.
  Caution! The measuring chamber should only be rinsed, otherwise you may hurt yourself if you come in contact with rotating pistons!
- 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 indicating the direction of flow on the totalizer cap).
- 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:

Size	PN		DN	Overall length mm		Screws		
						Number	Dimensions	
	Al	GGG		Al	GGG		Al	GGG
G 40, G 65	16	16, 25	50	171		8	M 16x45	M 16x40
					171			M 16x50
G100			80	171	171	16	M 16x45	M 16x40
				241	241		M 16x75	M 16x85
G160				241	241	16	M 16x45	M 16x40
		16	100	300	300		M 16x75	M 16x80
	-	25	100	-	241		-	M 20x50
					300			M 20x85

NOTES:

- without colour coding according to DIN 931 or DIN 933.
- Screws with colour coding according to DIN 938. These screws are automatically included in the delivery when the gas meter is ordered.
- Strength class 5.6 independent of the colour coding.
- Sealing thickness: 2 mm
- Screw tightening torque: - M16 – 80 Nm
  - M 20 – 150 Nm

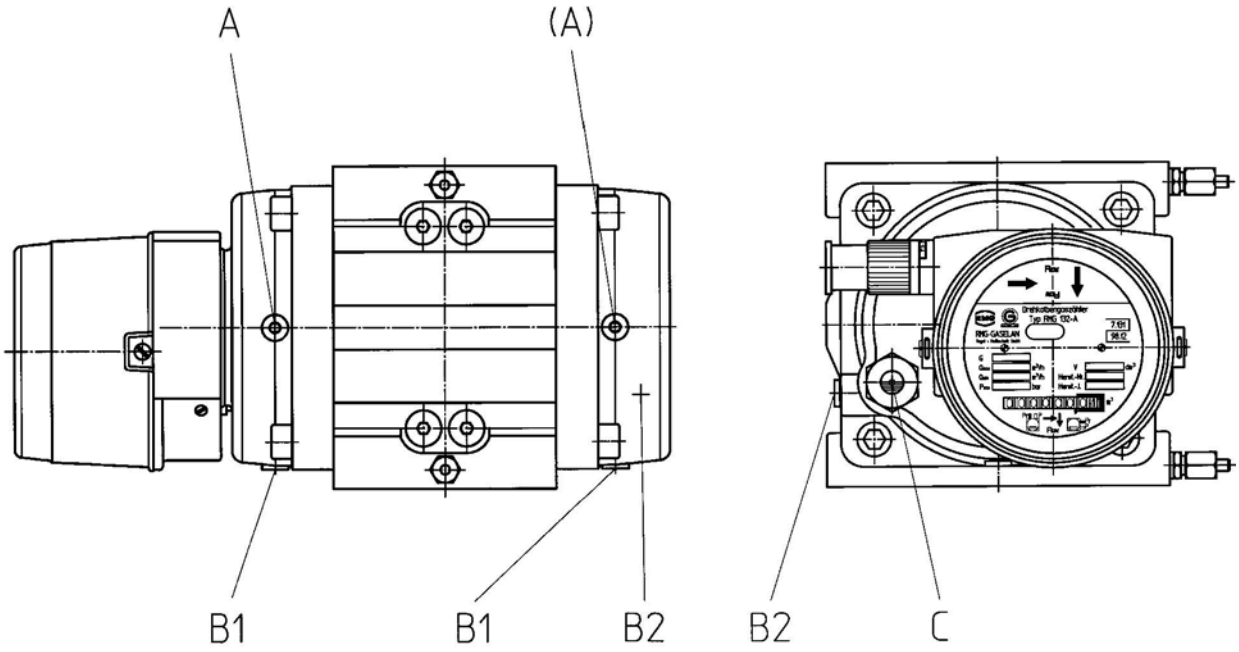
- During installation, check whether the rotary pistons are running smoothly. If they are stiff, this indicates either a distortion or soiling of the measuring chamber.

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 (dia. 3) is reached.
  - In the case of a gas meter with one oil sight glass (front – standard), open oil filling opening "A" at the front.
  - In the case of a gas meter with two oil sight glasses (front and rear), open oil filling openings "A" at the front and at the rear.
  - When you fill the gas meter with oil, proceed gradually in order to avoid filling beyond the sight glass area.
  - Filling takes approx. 4.5 minutes for the gas meter with one oil sight glass.
- 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 mm^2/s at 40°C.
- In the case of a rotary displacement meter designed to resist high temperatures (only made of spheroidal cast iron - GGG), remove the screw plug at the oil sight glass "C" without loosening the oil sight glass. To ensure resistance to high temperatures, reinstall the screw plug together with the seal after you have filled up oil.
- Average oil quantities

Size	Total oil quantity dm^3	
	horizontal	vertical
G 40, G 65	0.04	0.17
G 100		
G 160		



Explanations:

- Vertical position for installation
  - A –oil filling opening
  - B1 –oil drain opening
- Horizontal position for installation
  - A –oil filling opening
  - B2 –oil drain opening
  - C –oil sight glass

( ) Value also applies in the case of a gas meter with a second oil sight glass in the rear cover. In order to ensure that the oil level can be read properly from the rear cover, there should be a clearance of more than 100 mm to adjacent components.

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 and rear covers.
- After venting, seal the oil filling plugs with sealing rings 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

- If requested by the customer, the totalizer can be fitted with one or more pulsers.
- It is not possible to fit pulsers subsequently.
- Connection is made via a 7-pin Binder plug, degree of protection IP 67 when plugged in.
- Types

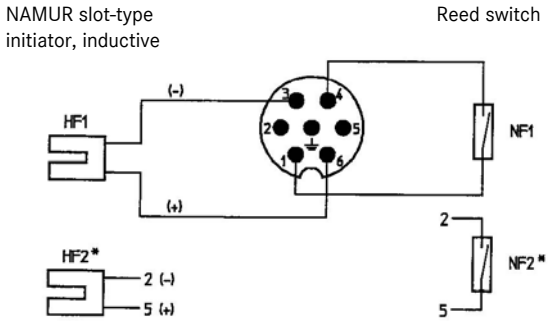
  LF - reed switch, polarity-independent
  - operating voltage U = 3.0 – 24.0 V DC
  - switching current, max. I = 40 mA

  HF - NAMUR slot-type initiator, polarity to be observed
  - operating voltage U = 8 V DC
  - current input

    active area, free ≥ 3 mA

    active area, covered ≤ 1mA

- Outputs – Connector pin assignments



* optionally LF2, HF2
The individual assignments can also be seen on the pulser plate of the totalizer.

- Variants
  - without pulser
  - 1x LF (standard)
  - 1x LF, 1x HF
  - 1x LF, 2x HF
  - 2x LF
  - 2x LF, 1x HF

- Overview of pulse values

Size	Pulse	
	LF	HF
	Pulse value	
	Pulses/m³	approx.* pulses/m³
G 40	10	6000
G 65		
G 100	1	3750
G 160		2400

* 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 RMG 132-A. 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 M 10x1
- Temperature taps
  - Sealed with screw plugs (M 14x1.5) as standard.
  - For temperature measurement, the screw plugs are to be replaced by RMG thermowells.
  - The thermowells with an M 14x1.5 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 working cubic metres are used in accordance with section 7 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 totalizer casing using the two threaded holes M 6x12 with a spacing of 38 mm. Then the gas meter and the volume corrector can be used as a complete measuring unit.

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

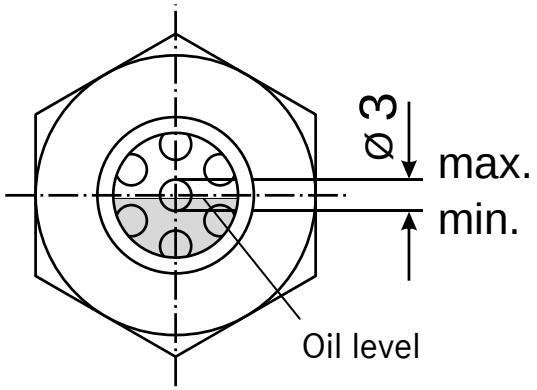
Maintenance

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	• 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 mark.) • In the case of a gas meter designed to resist high temperatures (made of spheroidal cast iron - GGG), remove the screw plug of the oil sight glass C without loosening the sight glass.
Topping up oil	• Stop and depressurize the gas meter and proceed as described in section 6.
Changing oil	• Stop and depressurize the gas meter. Drain all the oil from the gas meter via the oil drain openings B1/B2 of the front and rear covers. Fill the gas meter with new oil as described in section 6.
Checking smooth running	• 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 openings B1/B2 of the front and rear covers and dispose of it properly.
- Close the oil drain openings B1/B2 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, with the exception of the totalizer's user seal, 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.

Function, location	Part	Item No.	
		AL	GGG
Lubrication	- Screw plug	60.96.431.00	60.96.431.00
	- Sealing ring	81.54.430.00	00018586
	- Oil bottle, 0.25 dm^3	96.24.012.00	96.24.012.00
Pressure tap	- Standard olive joint	67.97.246.99	67.97.246.99
	- Sealing ball	65.53.354.00	65.53.354.00
	- Sealing ring	81.54.614.00	00018586
Temperature tap	- Without thermowells		
	• Screw plug	60.96.433.00	60.96.433.00
	• Sealing ring	81.54.614.00	00018802
	- With thermowells		
	• Thermowell G40 to G160	-	00.59.665.14
	• Thermowell G40 to G100	00.59.545.14	-
	• Thermowell G160	00.59.665.14	-
	• Screw plug	60.96.471.00	60.96.471.00
	• Sealing ring	81.54.614.00	00018802