

Instructions for installation and operation

Residential diaphragm gas meters UG & UGT (G1.6, G2.5, G4), 2UG G6



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1. Application

The residential gas meters UG (standard version) and UG T (with mechanical temperature compensation) are designed acc. to the European Standard EN1359 to measure the consumption of gas in households and at other consumers, where the maximum consumption of all gas appliances does not exceed 2.5 m³/h in case of gas meter UG G1.6, 4 m³/h in case of gas meter UG G2.5, 6 m³/h in case of gas meter UG G4 and 10 m³/h in case of gas meter 2UG G6 of the air (density 1,2 kg/m³). They are suitable to measure the consumption of natural gas, synthetic gases and their mixtures. They can optionally be equipped with low frequency pulse transmitter type NI-3 manufactured by APATOR METRIX.

2. Technical data

	UG / UGT G1,6	UG / UGT G2,5	UG / UGT G4	UG G4	UGT G4	2UG G6
Cycle volume	1,2 dm ³	1,2 dm ³	1,2 dm ³	2,2 dm ³	2,0 dm ³	2,2 dm ³
Nominal flowrate Q _n	1,6 m ³ /h	2,5 m ³ /h	4 m ³ /h	4 m ³ /h	4 m ³ /h	6 m ³ /h
Minimal flowrate Q _{min} *)	0,016 m ³ /h	0,016 m ³ /h lub 0,025 m ³ /h	0,016 m ³ /h lub 0,025 m ³ /h lub 0,04 m ³ /h	0,04 m ³ /h	0,04 m ³ /h	0,06 m ³ /h
Maximum flowrate Q _{max}	2,5 m ³ /h	4 m ³ /h	6 m ³ /h	6 m ³ /h	6 m ³ /h	10 m ³ /h
Transitional flowrate Q _t	0,25 m ³ /h	0,4 m ³ /h	0,6 m ³ /h	0,6 m ³ /h	0,6 m ³ /h	1 m ³ /h
Overload flowrate Q _r	3 m ³ /h	4,8 m ³ /h	7,2 m ³ /h	7,2 m ³ /h	7,2 m ³ /h	12 m ³ /h

Cyclic volume – V (measured at 20°C)

UG 1,2 dm³; 2,2 dm³
 UG T 1,2 dm³, 2,0 dm³
 2UG 2,2 dm³

Allowable indication errors limits during initial verification:

- Q_{min} to 0,1Q_{max} – E
- 0,1Q_{max} to Q_{max} – E

UG / UG T
 ±3%
 ±1,5%

Ambient temperature range - t_m

-25÷55°C

Gas temperature range - t_g

-25÷55°C

UG T - TC correction range

Maximum working pressure P_{max}

50 kPa (0,5 bar)

Max. pressure drop Δp at Q_{max}

≤200 Pa (2 mbar)

Index measuring range

99999,999 m³

Pulse value (pulse is optional):

0,01m³

Distance between connection bosses:

0 mm; 100 mm; 110 mm; 130 mm;
6" (152,4 mm); 160 mm; 220 mm;
250 mm

Weight

~1,9 kg to 3,2 kg

Family of gases

Gaseous fuels: family 1,2 & 3 acc. to
EN 437 for all gas meters and
100% hydrogen (H₂) for UG G4

Electromagnetic are classified into classes

E1

Mechanical are classified into classes

M1

Class of gas meter

1,5

Explosive group

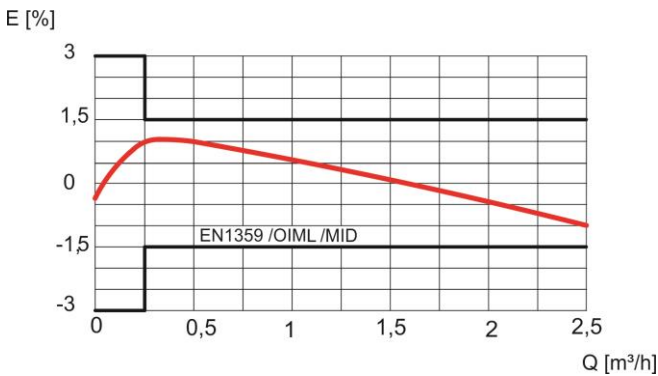
IIB

Possible connection standards:

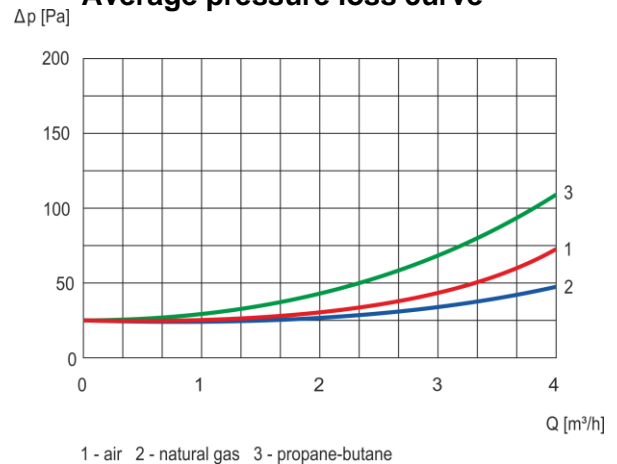
ISO, British Standard, NPT, NPR
and others.

UG G1,6

Average error curve for air

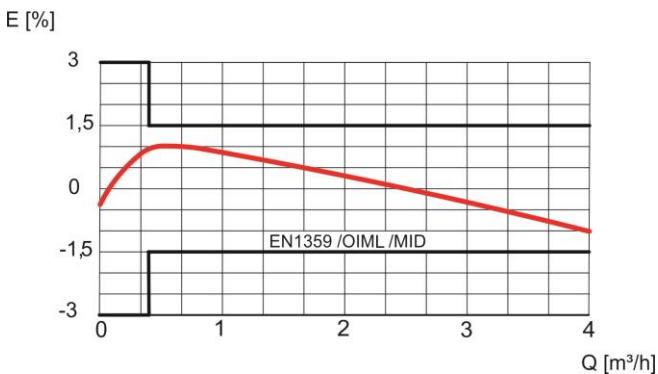


Average pressure loss curve

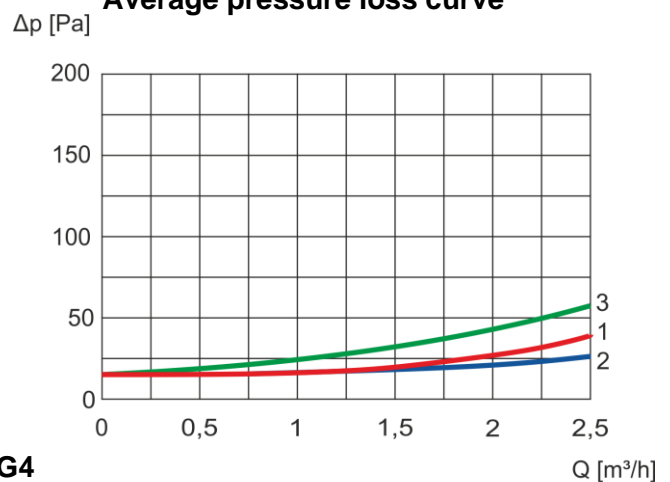


UG G2,5

Average error curve for air



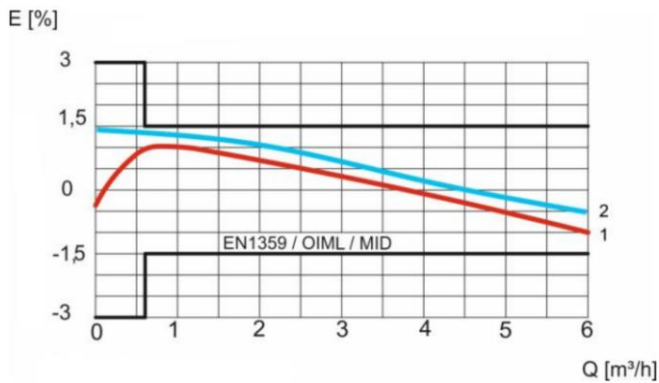
Average pressure loss curve



UG G4

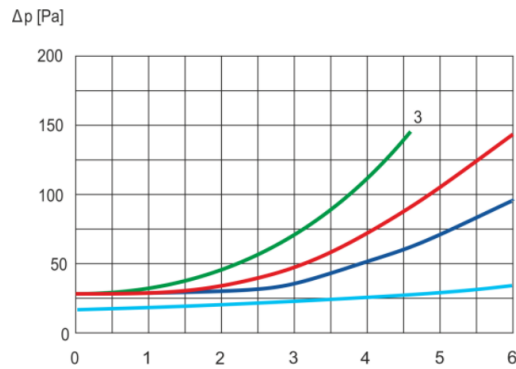
1 - air 2 - natural gas 3 - propane-butane

Average error curve for air



1 – air 2 – hydrogen

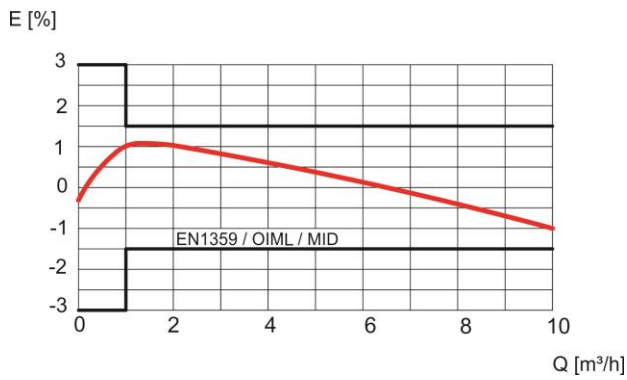
Average pressure loss curve



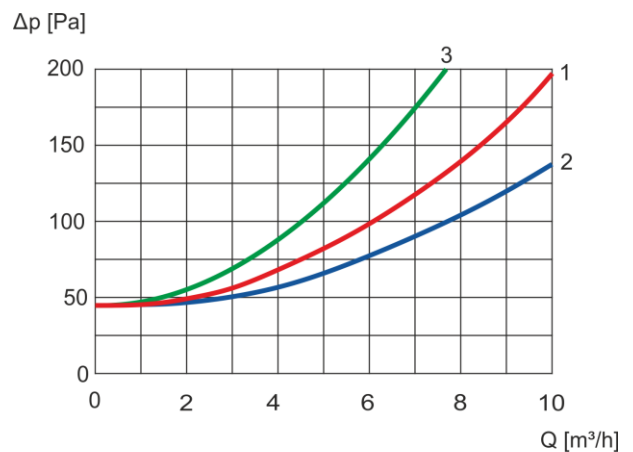
1 – air 2 – natural gas 3 – propane-butane 4 - hydrogen

2UG G6

Average error curve for air

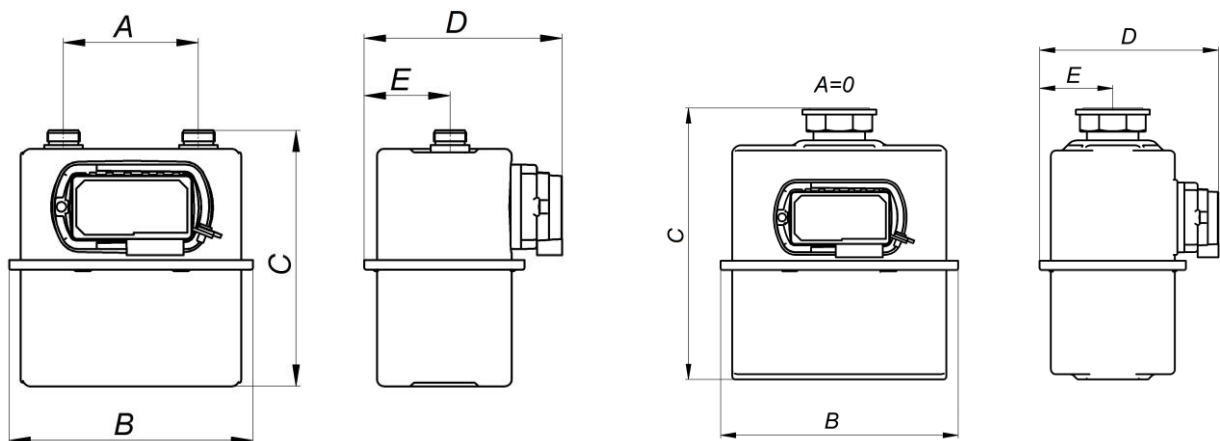


Average pressure loss curve



1 - air 2 - natural gas 3 - propane-butane

3. Dimensions



UG / UGT V=1,2dm³

A [mm]	B [mm]		C [mm]		D [mm]		E [mm]		Weight [kg]
	Steel casing	Alu casing*	Steel casing	Alu casing*	Steel casing	Alu casing*	Steel casing	Alu casing*	
000	199	-	227	-	163	-	66	-	~2,0
100	199	210	212	210	163	175	66	74	~1,9
110	199	210	212	210	163	175	66	74	~1,9
130	199	-	212	-	163	-	66	-	~1,9
152,4	235	-	263	-	177	-	73	-	~2,8
160	235	-	241	-	177	-	77	-	~2,8
220	283	-	222	-	177	-	73	-	~2,6
250	328	-	222	-	177	-	73	-	~3,2

*) Aluminium casing

UG V=2,2dm³, UG T V=2,0dm³ and 2UG G6 V=2,2dm³

A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	Weight [kg]
	Steel casing	Steel casing	Steel casing	Steel casing	
000	235	254	178	72	~2,8
130	235	241	178	72	~2,6
152,4	235	262	178	72	~2,9
160	235	241	178	77	~3,0
220	327	235	178	72	~3,0
250	327	224	178	72	~3,0

4. Construction of the gas meter

The gas meter consists of three basic units:

- measuring unit
- gas meter casing
- index

4.1 Measuring unit

It contains two measuring chambers including diaphragm, distributing duct and control mechanism including valves and sliders, rocking levers, connecting rods, crank and crankshaft. The measuring unit is equipped with a device to prevent the registration of reverse flow acc. to the norm EN1359.

4.2 Gas meter casing

It consists two subassemblies, i.e. top casing and bottom casing. These units are joint hermetically by means of a casing hoop (band). The following parts belong to the top casing: magnetic drive with internal and external magnet subassembly and a driving pinion.

4.3 Index

It is connected to the top casing with screws and is protected from outside by the index housing, which can be locked by a lead seal or the index blockade. The index design allows connecting a Pulse Transmitter NI-3 or Telemetry Module Unismart at any time of the gas meter operation without damaging the seal.

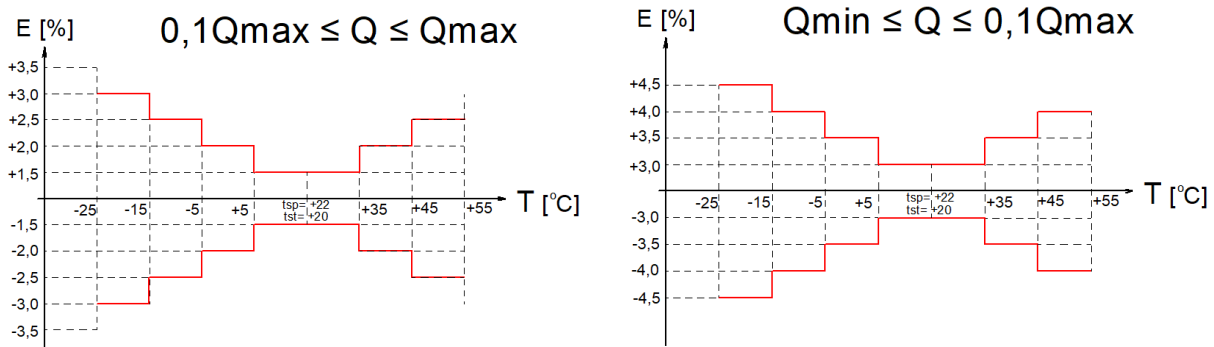
5. Operating principals

The highly precise instrument – gas meter – measures the volume of gas that moves through it. Gas entering the meter flows through the holes of the distribution duct and causes a diaphragm to move, allowing gas into a chamber. The movement of the diaphragms causes a rotary reversible movements of the connected shafts. The rocking levers are fastened on the shafts. The rocking levers are connected throughout the connecting rods to the crank shaft. The rotary movement of the crank shaft is transferred to the slider and through the transmission and magnetic drive to the index driving pinion.

As the cycle continues, the gas is moved from the chamber into the gas line that feeds home's gas appliances. The meter records the number of times the chamber is filled and emptied.

6. Mechanical temperature compensation

Gas meters UG G1.6 up to UG G4 can be equipped with mechanical temperature compensation (bimetal).



Gas is a substance subject to thermal expansion, which means that depending on temperature, it increases or decreases its volume. Consequently, what changes is the measuring accuracy of a gas meter with relation to its energy content. In other words when gas with some energy content, volume and temperature is already in pipes and is heated, then the index unit is to show a bigger consumption after flow, whereas when gas is cooled, the gas meter will indicate a lower consumption. It is a very important issue as a temperature change of 3°C corresponds to a volume change of approximately 1%. Such considerable temperature changes are likely to occur especially to meters placed on the outside of a building. Consequently the meter works at various temperatures depending on the season.

A gas meter with temperature compensation provides a solution to this problem as it uses and undergoes thermal expansion as well. A temperature compensation mechanism installed in the measuring unit is adjusted in such a way so that it changes the cyclic volume of the measuring unit exactly like gas undergoing expansion due to temperature changes. Elements responsible for compensation installed in the meter allow a radial shift of the diaphragm, which results in moving the curve of typical error up or down in relation to the zero line.

Thus the gas meter converts the measured value of gas volume into its value at fiducial temperature – irrespective of measuring temperature.


7. Initial verification (sealing)

The gas meters under obligation are subject of initial verification. The sealing is carried out by authorized staff. The proof of initial verification is the stamp in the right-down corner of the index window or on a traditional seal. Sealing is invalid in case of gas meter damage or if the indication error exceeds the permissible error settled by appropriate regulations.

8. Conformity assessment

Gas meters are required to comply with the 2014/32 / EU (MID) conformity assessment. Proof of conformity assessment is stamped by the manufacturer. The deadline for reporting to the next metrological control is the separate national regulations. The conformity assessment will be invalidated if the meter is faulty.

8.1 Declaration of conformity

	CE - DECLARATION OF CONFIRMITY
<ul style="list-style-type: none">• PN-EN 1359:2017 (UG / UGT G1,6; UG / UGT G2,5; UG / UGT G4 V=1,2dm³, UGT G4 V=2,0dm³, UG G4 V=2,2dm³; 2UG G6 V=2,2dm³)• PN-EN:2004 [EN1359:1998] (2UG G6 V=2,2dm³)• PN-EN ISO 80079-36:2016-7 (ISO/IEC 80079)• OIMIL R 137 1&2:2012 (Only applies to UG G1,6; UGG2,5; UG G4 V=1, 2dm³ gas-meters in version UG-FP &UG FL outside the scope of OIMIL)• Directive MID (2014/32/EC)	

9. Storage and transportation

9.1 Storage

The gas meters should be stored in a dry room, free from dust and highly corrosive chemical vapors. During storage, the gas meter connectors should be protected with plugs. Security measures should not be removed from the moment of verification until the gas meter is connected to the gas installation. Gas meters stored in unit packaging can be placed on top of each other in accordance with handling signs, provided that they are protected against tipping over and falling. The room temperature should be between -25°C and +60°C, and the relative humidity should not exceed 75%. The storage period should not be longer than 12 months from the date of delivery or 6 months for gas meters with mechanical thermocorrection. This is due to the resistance of certain materials (such as gaskets or membranes), which can degrade in contact with air.

9.2 Conditions for the receipt of gas meters

1. Receipt of gas meters at the customer's premises should be performed in accordance with DVGW Gas Information Nr. 14 in accordance with point 3.3 (within 14 days from the receipt of the goods by the customer). The reception representations will follow this period - error messages "in operation" from EN1359 table 2.
2. The stabilization before the temperature measurement was to be checked at the same time and in the same quality, ie 20°C +/- 1°C for the period of every 4 hours.
3. Temperature during thickness measurement 20°C +/- 1°C. Change during the measurement to 1°C
4. Measurement doses (minimum) (according to the PTB Testing Manual, Volume 29, p. 6.3.2.1, Table 8)
5. When making a gas meter, in order to obtain a measurement of the measurement point, you are limited to the control for which, for this measurement, you can use the other side, as well, (Three measurements required for the confidence level for the measurement at 95%). Successor to the gas meter readings.

9.3 Transportation

The gas meters should be transported in unit packages placed on covered means of transport in accordance with the handling signs on the packaging. During transport, the gas meters should be secured against overturning and shifting. Transport of individual gas meters to the place of installation should be carried out together with unit packages or in a way that prevents damage.

10. Installation of gas meter

The gas meter can be installed in the installation or externally in the air in the gas box combined with the current supplement in your country.

The gas installation should be made in such a way that it is possible to connect the gas meter without stresses. There should be a marker on the pipe supplying gas to the gas meter that enables the gas to be shut off. The gas flow direction is indicated by an arrow on the top of the gas meter. The gas meter should be connected to the installation with the use of nuts (nuts in the case of a single-king gas meter), first tightening them by hand and then with a torque wrench to connect to the installation of the connection to obtain a stub pipe.

Torque values are shown in Table 1.

Nominalna średnica króćca przyłączeniowego		Wartość momentu skręcającego - max
Nominal connection diameter		Torque value - max
cale / inch	DN	[Nm]
½	15	50
¾	20	80
1	25	110
1 ¼	32	110
1 ½	40	140
2	50	170
2 ½	65	170
3	80	170
4	100	170
5	125	170

Table 1. Torque values

After installation, the top surface of the gas meter should be in a horizontal position. The gas meter should be started up with a slow increase in gas pressure, not exceeding its permissible Pmax value. Otherwise the gas meter may be damaged. If the gas meter has an integrated valve, this valve must be opened during the leak test.

It is recommended to use the gaskets recommended by the manufacturer. In the case of gas meters with a declaration of heat resistance, gaskets tested for resistance to high temperature must be used. Seals may only be used once.

11. Using gas meters

The gas meters do not require any maintenance. The gas meter should be protected against mechanical and chemical damage. All activities performed on the gas meter or in its vicinity should be performed with the use of chemical agents that do not cause corrosion of the gas meter components.

Periodic checking of the gas installation with the gas meter is carried out in accordance with the requirements of the law. The manufacturer recommends carrying out technical inspections by trained personnel at least once a year - during the inspection, pay attention to signs of corrosion, attempts to break into the counter, tightness, disturbing noises, etc. If there are any signs of red corrosion, the gas meter should be removed from the mains.

Due to the possibility of unintentional electrification of the gas meter housing covered with epoxy-polyester powder paint, for periodic cleaning of the external surfaces of the gas meter, e.g. to remove a layer of dust, use a damp cloth or fabric made of antistatic material.

The gas meter should be used in accordance with the parameters presented on the rating plate and the guidelines for validation and warranty validity, and in accordance with the internal legal regulations in force in a given country.

When removing the gas meter for secondary verification or disposal, the gas meter should be flushed with an inert gas (e.g. nitrogen) before transport, and then the connectors should be protected against external contamination.

12. Reparation

In the event of damage to the gas meter, it must be repaired at the manufacturer's or in a plant having an appropriate permit to repair gas meters. The manufacturer provides training in the field of gas meter repairs. After the repair, the index plate should be permanently marked with a marking consisting of: the index specifying the plant performing the repair and the year of repair. The repaired gas meter is subject to error checking and re-verification. The errors in gas meters readings and the validity of the verification are specified in the relevant regulations.

Service address:
APATOR METRIX S.A.
ul. Grunwaldzka 14
83-110 Tczew

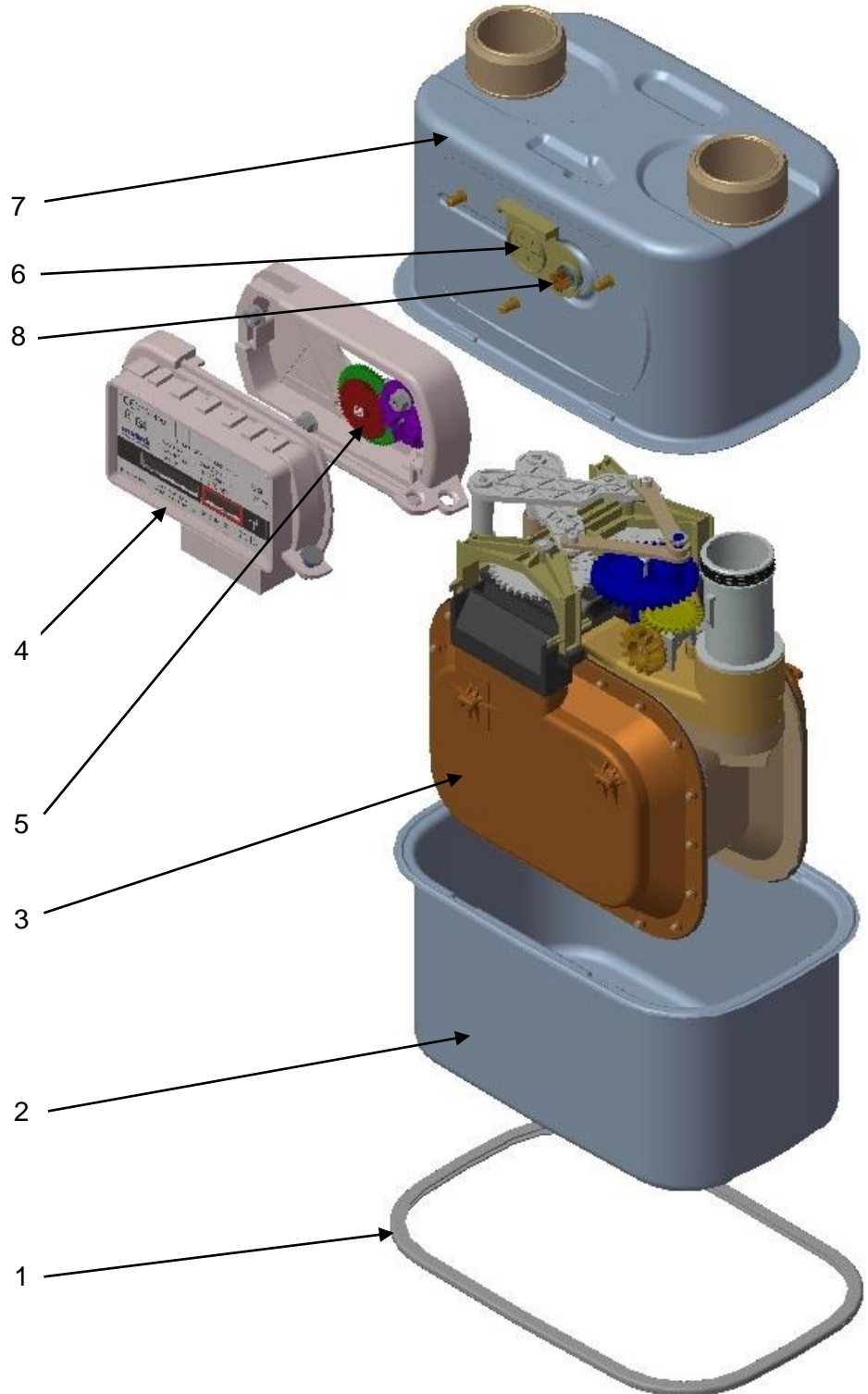
13. Handling with worn-out gas meters

Dispose of the used gas meter in accordance with the applicable local environmental protection regulations. A used meter should be handed over to a licensed recipient of waste. After disassembly, most of the materials from which the product is made can be recycled. Detailed information on the recycling of individual materials from which the gas meter is made can be obtained from the manufacturer.

Dispose of used packaging in accordance with the applicable local environmental protection regulations. The packaging is made of corrugated cardboard and plastic components that can be recycled

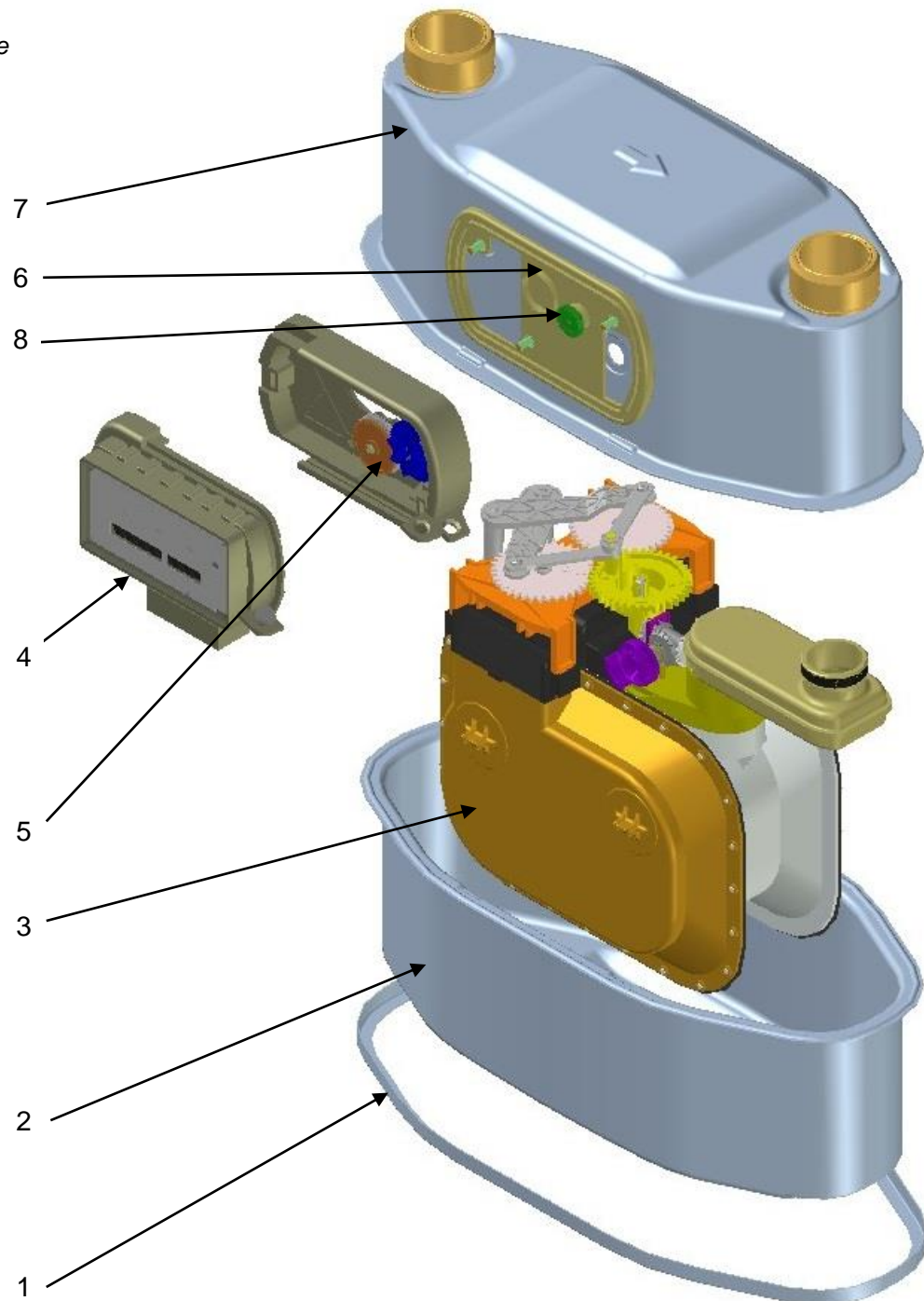
14. Parts of the UG gas meter

- 1) Band
- 2) Bottom casing
- 3) Measuring unit
- 4) Index
- 5) Gears
- 6) Sealing insert
- 7) Top casing
- 8) Wheel drive



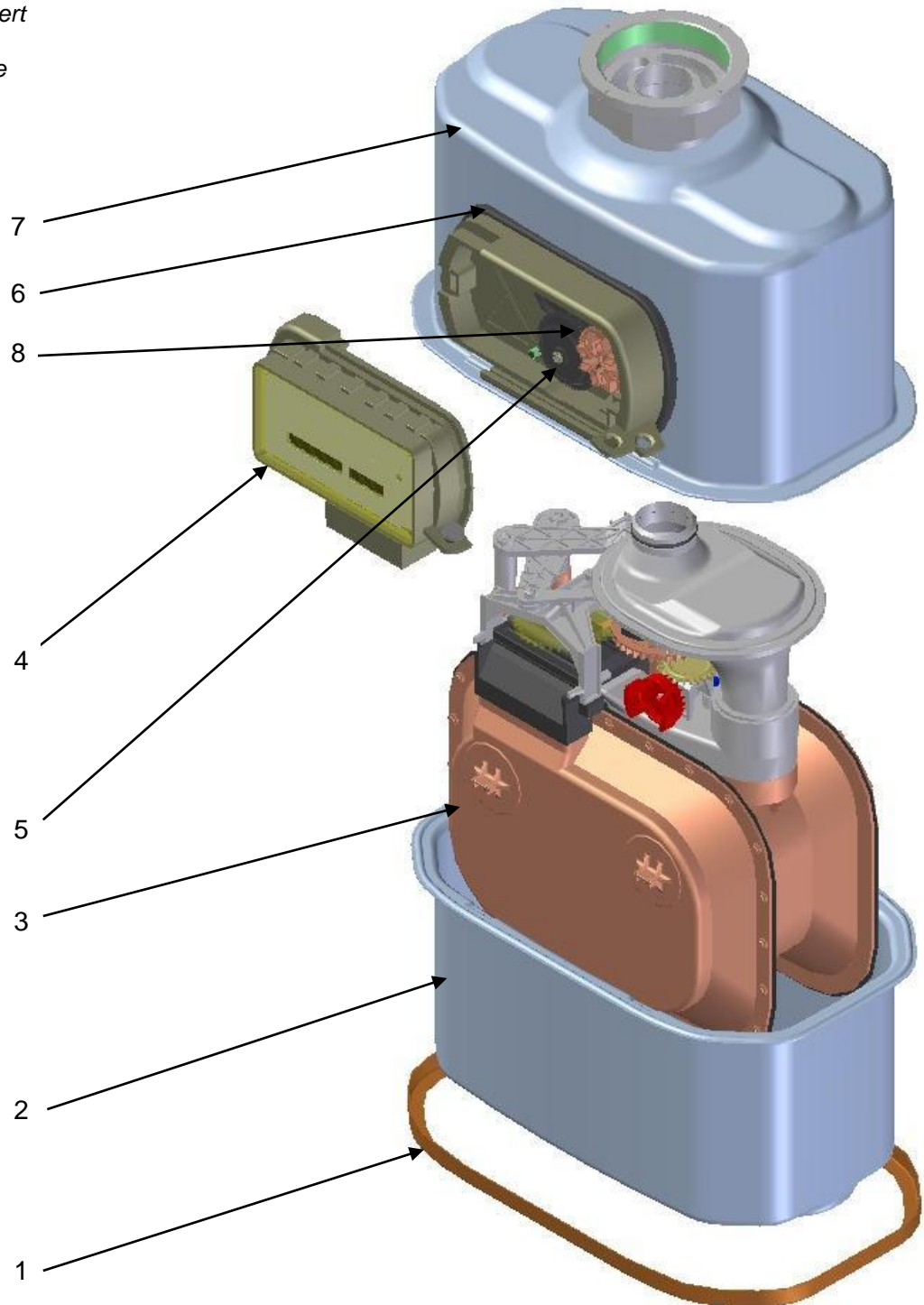
15. Parts of the 2UG gas meter

- 1) *Band*
- 2) *Bottom casing*
- 3) *Measuring unit*
- 4) *Index*
- 5) *Gears*
- 6) *Sealing insert*
- 7) *Top casing*
- 8) *Wheel drive*



16. Parts of the UGT gas meter (bimetal)

- 1) *Band*
- 2) *Bottom casing*
- 3) *Measuring unit*
- 4) *Index*
- 5) *Gears*
- 6) *Sealing insert*
- 7) *Top casing*
- 8) *Wheel drive*





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