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requirements of Directive 2014/32/EU, to:

Manufacturer

Metreg Technologies GmbH
Neckaraue 9
71686 Remseck
Germany

Measuring instrument

A Turbine Gas Meter
Type : MTM
Manufacturer's mark or name : Metreg
Destined for the measurement of : Gas volume
Accuracy class : Class 1,0
Environment classes : M1 / E1
Gas temperature range : -10 °C / +55 °C
Ambient temperature range : -10 °C / +55 °C

Further properties are described in the annexes:

- Description T10660 revision 2;
- Documentation folder T10660-2.

Valid until

1 October 2024

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1 October 2014

Remark

This revision replaces the earlier versions, including its documentation folder.

Issuing Authority

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Certification Board

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1 General information about the gas meter

All properties of the gas meter, whether mentioned or not, shall not be in conflict with the legislation.

1.1 Essential parts

1.1.1 Measuring part

The measuring part consists of a cartridge including all metrological essential parts such as turbine wheel, bearings, shafts, primary gears and inlet flow straighteners. The dimensions of the turbine wheel are presented in the table below. See documentation number 10660/0-07 for the measurements of the inlet flow straightener and nose cone. The number, the appertaining angle of the blades and other essential dimensions of the turbine wheel are given below.

Diameter [mm]	G-value	Impeller diameter [mm]	Blade height [mm]	Vane thickness [mm]	Blade angle [degrees]	Number of blades
50	65	51	5	15,5	45	12
80	100 160 250	83	12	22	45	14
100	160 250 400	103	15	28	45	14
150	400 650 1000	154	22	27	45	16
200	650 1000 1600	198	40	27	45	18
250	1000 1600 2500	246	32	30	45	20
300	1600 2500 4000	296	35,5	30	45	22

1.1.2 Bearings

The characteristics of the deep groove ball bearings, including their lubrication method in the applicable operating pressure range, are given in the table below. The accompanying drawing is given in documentation number 10660/0-06.

Diameter [mm]	Bearing characteristics							
	Main shaft [mm]		Dynamic load rating C _r [N]		Static load rating C _{0r} [N]		Maximum operating pressure	
	inlet	outlet	inlet	outlet	inlet	outlet	16 bar(g)	100 bar(g)
50	2	2	286	286	90	90	permanently lubricated bearings, double shielded	external oil pump lubricated bearings, single or double shielded
80	3	3	644	644	215	215		
100	4	4	1339	644	488	215		
150	5	5	1646	1339	663	488		
200	6	6	2522	2522	1057	1057	-	
250	8	8	3369	3369	1363	1363		
300	10	10	6100	6100	2600	2600		

1.1.3 Internal cartridge

An exploded view of the internal cartridge is given in documentation number 10660/0-05. The metrological characteristics are defined by each individual cartridge. If cartridges are exchanged between meter housings, the metrological characteristics of a certain cartridge are maintained.

1.1.4 Nose cone and inlet flow straighteners

The inlet of the internal cartridge contains a nose cone and flow straightener. Documentation number 10660/0-07 gives a detailed drawing including the dimensions.

1.1.5 Straight inlet tubing

The meter housing should always be equipped with a 2 x DN straight inlet piece in case of severe flow disturbances (see also the main nameplate in documentation numbers 10660/0-02 and 10660/1-01).

For mild flow disturbances, there is no straight inlet piece necessary. See also the prescribed installation conditions in chapter 3.

1.2 Essential characteristics

1.2.1 The table below gives the essential characteristics regarding flow rate and pressure range. Further essential characteristics are described in the evaluation certificate involved.

Diameter [mm]	G-value	Maximum Q_{max} [m ³ /h]	Maximum Q_t [m ³ /h]	Minimum Q_{min} [m ³ /h] for the specified pressure range			
				MR 1:20		MR 1:30	
				0 ... 100 bar(g)	8 ... 100 bar(g)	8 ... 100 bar(g)	16 ... 100 bar(g)
50	65	100	20	5	-	3,3	-
	100	160	32	-	8	-	5,3
80	160	250	50	12,5	-	8,3	-
	250	400	80	20	-	13,3	-
100	160	250	50	-	12,5	-	8,3
	250	400	80	20	-	13,3	-
150	400	650	130	32,5	-	21,7	-
	650	1000	200	50	-	33,3	-
200	1000	1600	320	80	-	53,3	-
	1600	2500	500	125	-	83,3	-
250	1000	1600	320	-	80	-	53,3
	1600	2500	500	125	-	83,3	-
300	2500	4000	800	200	-	133,3	-
	4000	6500	1300	325	-	216,7	-

Remarks regarding the table above:

- The application of permanently lubricated bearings limits the maximum operating pressure to 16 bar(g). See also the table in section 1.1.2.
- MR = measuring range ($Q_{max}/Q_{min} = 1:20$ or $1:30$).

1.2.2 Flow rate range

The flow rate range shall fulfill the following conditions:

Class	Q_{max} / Q_{min}	Q_{max} / Q_t
1,0	≥ 20	≥ 5

1.3 Essential shapes

- 1.3.1 The nameplate is bearing at least, good legible, the information as stated below:
- The CE marking including the supplementary metrological marking (M + last 2 digits of the year in which the instrument has been put into use);
 - Notified Body identification number, following the supplementary metrological marking;
 - EU-type examination certificate number: T10660;
 - manufacturer's name, registered trade name or registered trade mark;
 - manufacturer's postal address;
 - Type designation: MTM
 - serial number of the meter and its year of manufacture;
 - mechanical environment class (may also be stated in the manual);
 - electromagnetic environment class (may also be stated in the manual);
 - accuracy class;
 - Q_{max} , Q_t and Q_{min} ;
 - The gas temperature range and pressure range:
 - $t_{min} - t_{max} = \dots - \dots \text{ }^\circ\text{C}$;
 - $p_{min} - p_{max} = \dots - \dots \text{ bar(g)}$;
 - pulse value of LF and HF frequency outputs (if applicable);
 - indication of the flow direction, e.g. an arrow (may also be indicated directly on the meter body);
 - the necessary straight pipe length in front of the meter (in this case 2xDN for severe flow disturbances).

An example of the markings is shown in documentation number 10660/0-02 and 10660/2-01.

Turbine meters with a manufacturing date 2020 and earlier have a gas temperature and ambient temperature range of +5 °C / +55 °C. Turbine meters with a manufacturing date of 2021 or higher have a gas temperature and ambient temperature range as given on the front page of this certificate.

- 1.3.2 Sealing: see chapter 2.

1.4 Conditional parts

1.4.1 Construction

In addition to the essential parts as mentioned at 1.1, the meter contains at least the following conditional parts:

- housing;
- gear transmission including the adjustment gears;
- pressure measuring point;
- register;
- low frequency impulse output (optional);
- high frequency impulse output (optional).

1.4.2 Housing

The gas meter has an aluminium or a cast steel housing, which has sufficient tensile strength. An example is shown in documentation numbers 10660/0-01 and 10660/0-03 and including 10660/0-04.

1.4.3 Gear transmission

The transmission between the measuring part and the register is executed by means of a magnet coupling. The register is adjustable via adjustment wheels. A table of possible adjustment wheels is given in documentation number 10660/0-08.

1.4.4 Pressure measuring point

The housing contains one or two pressure tapplings to determine the reference pressure at the inlet of the meter. In case the meter contains two pressure tapplings both are internally connected to the same measuring point inside the housing. The pressure tapplings are provided with the indication "pm" or "Pr".

1.4.5 Register

The measured volume is presented by means of a conventional mechanical register. Examples of the register are stated in documentation numbers 10660/0-01 and 10660/0-04.

The register is built up as follows:

size	number of drums		control-element [m ³]
	before the comma	behind the comma	
G65	6	2	0,002
G100 ... G1600	7	1	0,02
G2000 – G4000	8	0	0,2

1.4.6 Low frequency impulse output (optional)

The register can optionally be equipped with an encoder output (low frequency impulse output). The appertaining impulse value is stated on the meter.

1.4.7 High frequency impulse output (optional)

The register can optionally be equipped with a high frequency impulse output, at which the appertaining impulse value is stated on the meter.

1.5 Non-essential parts

The meter has the following non-essential parts:

- Temperature measuring point / thermowell, which is indicated with "T_m";
- Lubrication system;
- Hand lever pump to operate the lubrication system.

The meter is not equipped with the lubrication system and hand lever pump if permanently lubricated bearings are used, see section 1.1.2.

2 Seals

The following items of the meter are sealed:

- the nameplate(s) of the meter;
- the entrance to the measuring part is sealed with one or more seals;
- the entrance to the register is sealed with one or more seals;

See the drawing in documentation number 10660/0-04 for an example of the sealing.



Description

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3 Installation conditions

The meter can operate in the following positions: horizontal flow, vertical flow up and vertical flow down.

Any components, which cause severe flow disturbances and could affect the gas flow, must be avoided within the prescribed inlet pipe length, which is $2xDN$. The inlet pipe must be designed as a straight pipe section of the same nominal diameter as the gas meter. For mild flow disturbances, there is no prescribed inlet pipe length.