

Issued by	NMI Certin B.V., designated and notified by the Netherlands to perform tasks with respect to conformity modules mentioned in article 17 of Directive 2014/32/EU, after having established that the Measuring instrument meets the applicable requirements of Directive 2014/32/EU, to:	
Manufacturer	KROHNE Altometer Kerkeplaat 12 3313 LC Dordrecht The Netherlands	
Measuring instrument	An Ultrasonic Gas Meter	
	Type	: ALTOSONIC V12 ALTOSONIC V12D ALTOSONIC V12 Check ALTOSONIC V12D Check
	Manufacturer's mark or name	: KROHNE
	Destined for the measurement of	: Gas volume
	Accuracy class	: Class 1,0
	Environment classes	: M2 / E2
	Ambient temperature range	: -40 °C / +55 °C
	Gas temperature range	: -20 °C / +100 °C
	Designed for	: Condensing humidity
	Intended location	: Open
	Further properties are described in the annexes: – Description T10170 revision 14; – Documentation folder T10170-8.	
Valid until	29 January 2019	
Remarks	This revision replaces the previous versions, including its documentation folder.	

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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.

The measuring part of the ultrasonic gas meter consists of a meter body in which several measuring paths are incorporated. Each measuring path consists of two transducers which are connected to the Signal Processing Unit (SPU).

Between two transducers acoustic pulses are sent and received. The travel time of the pulses between a pair of transducer is measured and has a correlation with the gas flow through the meter. The measured volume is presented on an electronic display.

1.1 Essential parts

Description	Document	Remarks
Spoolpiece	10170/6-03 10170/1-01	The spoolpiece consists of: - the cylindrical spoolpiece, with 12 distinct chord locations for the ALTOSONIC V12 or 6 distinct chord locations for the ALTOSONIC V12D The meter can be executed as a single version meter or as a dual configuration in which case two separate meters are built in one meterbody.
"Long neck" meter version	10170/12-01	
Transducers	10170/0-01; 10170/6-01	
Sensor driver board	10170/0-04; 10170/8-01;	
CPU board		
Power supply / RS485 board		
Display module		
Diagnostic board / Power supply	10170/6-02	

1.2 Essential characteristics

1.2.1 Flow characteristics

The meter has the following flow characteristics:

Diameter ¹⁾ Nominal	Minimum Q_{min} $T_{gas} \leq 50 \text{ }^\circ\text{C}$ [m ³ /h]	Minimum Q_{min} $T_{gas} \leq 100 \text{ }^\circ\text{C}$ [m ³ /h]	Maximum Q_{max} [m ³ /h]	Minimum Q_t [m ³ /h]	P_{min} [barg]	P_{max} [barg]
3" (80 mm)	8	12	800	0,2 Maximum Q_{max}	1,0 ^{2), 3)}	450
4" (100 mm)	10	12	1000		1,0 ^{2), 3)}	
6" (150 mm)	16	30	2500		1,5 ^{2), 3)}	
8" (200 mm)	20	45	4000		2,0 ²⁾	
10" (250 mm)	25	80	5500		2,5 ²⁾	
12" (300 mm)	35	120	8000		3,0 ²⁾	
14" (350 mm)	45	150	10500		3,5 ²⁾	
16" (400 mm)	60	195	13000		4,0	
18" (450 mm)	100	240	16000		4,5	
20" (500 mm)	150	285	19000		5,0	
24" (600 mm)	180	375	25000		6,0	
26" (650 mm)	250	500	28000		7,0	
28" (700 mm)	300	600	32000		7,0	
30" (750 mm)	400	800	35000		7,0	

Note:

If higher values are chosen for Q_{min} and/or lower values for Q_{max} , it has to be taken into account that $Q_{min} \leq 0,05 Q_{max}$ and $Q_t \leq 0,2 Q_{max}$.

¹⁾ For the exact meter dimensions and path angles see table of document no. 10170/11-01.

²⁾ For a direct path meter of this size an alternative P_{min} of 0 bar g can be used. When using a P_{min} of 0 bar g the minimum Q_{min} of the meter is 0,02 times the maximum Q_{max} .

³⁾ For a reflecting path meter of this size an alternative P_{min} of 0 bar g can be used. When using a P_{min} of 0 bar g the minimum Q_{min} of the meter is 0,02 times the maximum Q_{max} .

1.2.2 Measuring principle

In documentation 10170/0-01, paragraph 2.1, the measuring principle is described.

1.2.3 Bi-directional flow

All sensors can be used to measure flow in forward and reverse directions. See also the conditions as stated in chapter 3.

1.2.4 Software specification (refer to WELMEC 7.2):

- Software type P;
- Risk Class C;
- Extension L while extensions T, S and D are not applicable.

Software version	Checksum	Remarks
KAFKA 1.1.0.4	8019-55AA9659-FF6D1F62	According to the quality system of the manufacturer all changes to the software will lead to an increment of the version number.
KAFKA 1.1.1.0	E88E-4441EBB0-FF6846F4	
KAFKA 1.1.1.1	A3E4-9FDE4FDE-FF689B79	
KAFKA 1.1.2.0	CDAA-571AE41C-FF6A4D9E	
KAFKA 1.2.0.0	A235-1EFCC943-FF834681	
KAFKA 1.3.0.0	CFD3-B8ED01C4-FF81D750	
KAFKA 1.4.0.0	B267-0FFC41B8-FF8751F4	
KAFKA 1.4.0.1	1C2A-B060D436-FF80CDE3	
KAFKA 1.5.0.0	617D-58E5AE12-FF829F80	
KAFKA 1.6.0.0	2BFF-88286A25-FF80DE7B	

The software versions can be read out via the display using the up or down key to scroll to the software version menu. Starting from software version KAFKA 1.3.0.0 also the checksum can be read out via the display.

1.2.5 Measuring paths

Each meter is equipped with 6 measuring paths. For the ALTOSONIC V12 and the ALTOSONIC V12D (5 path) the five horizontal paths are used for determining the flow rate while the vertical path is used for diagnostic purposes. The ALTOSONIC V12 uses reflecting paths and the ALTOSONIC V12D uses direct paths.

For the ALTOSONIC V12D all 6 measuring paths can also be positioned horizontally and used for determining the flow rate.

See paragraph 2.2 of the document number 10170/0-01 and document 10170/8-02 for a general description.

For custody transfer 1 or 2 path(s) of the horizontal measuring paths may fail.

The ALTOSONIC V12 Check has same horizontal path configuration as type V12 or V12D Check as V12D. The vertical path is separated from the custody transfer signal processing unit of type V12 or V12D and has its own label which shall bear the information „not for custody transfer measurement“ (see document 10170/14-01).

1.2.6 Operation and presentation of legal data

The meter is standard equipped with an electronic display and can be operated using the light sensitive keys on the display module or by using a PC with KROHNE Monitoring, Configuration and Service tool software (also see paragraph 1.5.1 of this description).

The operation of the display is further described in chapter 6.2 of documentation 10170/0-01.

- 1.2.7 Totalizers and bi-directional flow measurement
The meter is equipped with totalizers which indicate the flow in forward and reverse direction. On the nameplate of the meter an arrow, accompanied by a plus and minus sign, indicates the positive and negative direction of the flow.
- 1.2.8 Accountable alarms
If malfunctions are detected a visible alarm will be performed which remains present until the alarm is acknowledged. However, it is not possible to clear an alarm as long as the cause of the alarm is still present.
During the accountable alarms the registration of the volume in the main totalizers is stopped, while the registration is continued in the (forward or reverse) alarm totalizer.

1.3 Essential shapes

- 1.3.1 The nameplate is bearing at least, good legible, the information as stated below:
- CE marking according to MID article 17;
 - The EU-type examination certificate number: **T10170**;
 - manufacturer's name, registered trade name or registered trade mark;
 - manufacturer's postal address;
 - The serial number of the meter and its year of manufacture;
 - Accuracy class;
 - Q_{max} , Q_{min} , and Q_t in m^3/h ;
 - $p_{max} = \dots$ MPa (or kPa, or Pa, bar);
 - The ambient temperature range;
 - The gas temperature range;
 - The pulse factor (volume per pulse or pulses per volume);
 - Minimum straight upstream and downstream pipe line length (see §3.1);
 - Nominal supply voltage.

An example of the markings is shown in drawing no. 10170/0-03.

- 1.3.2 Sealing: see chapter 2.

1.4 Conditional parts

- 1.4.1 Pressure measuring point
The housing contains a pressure tapping to determine the reference pressure in the gas meter. This pressure tapping is provided with the indication "p_m" or "p_r". Multiple pressure tappings, marked with the indication "p" can be provided optionally.
- 1.4.2 Power supply
The gas meter needs an external 24 V DC power supply.
During a power failure the registration of the volume will stop.
- 1.4.3 RS485 communication port
The gas meter is equipped with a RS485 communication port. Via this port metrological data can be read from the gas meter via the MODBUS protocol. Data acquired via this port can be used for custody transfer applications. In case of a dispute the totalizers of the gas meter are always decisive.
- 1.4.4 Alarm or pulse outputs
Output impulses can be used for custody transfer.

1.5 Conditional characteristics

1.5.1 Programming

Essential parameters (see documentation no. 10170/0-05) can be changed after the protective dipswitch number 4 is in the "on" position and after entering the correct password. In the normal situation the programming switch always has to be set in the "off" position (see documentation no. 10170/0-01 paragraph 10).

1.5.2 Low flow cut off

The low flow cut off is a programmable minimum flow. If the flow measured by the meter is below the programmed low flow cut off, the flow will be considered zero, so the meter reading will no longer change. The programmed value shall not exceed 20% of Q_{min} .

1.5.3 Velocity of sound and the gas velocity range

These application-specific parameters have to be set for a correct functioning of the meter (see further documentation 10170/0-01).

1.5.4 Linearization (optional)

A linearization is possible via the software by means of a multipoint correction with a maximum of 10 points, where a linear interpolation is applied between the individual points.

1.5.5 Reynolds correction factor

Applies a correction based on the application specific density and viscosity. This correction factor uses fixed values or external inputs.

2 Seals

The following items of the meter are sealed:

- the nameplate with the housing; *)
- the electronics including the protective switch;

See the drawings no. 10170/0-01 paragraph 10 for an example of the sealing.

*) Removal without destroying the nameplate shall not be possible; otherwise the nameplate shall be sealed to the housing.

3 Conditions for conformity assessment

3.1 Installation of the gas meter

The ALTOSONIC V12 is installed either with an upstream pipe of the same nominal diameter as the meter with a minimum length of 5D or at least 3 diameters downstream of a conditioning element type KROHNE "Flowcon 3D" with a minimal thickness of 0,12D, see document no. 10170/0-06.

The ALTOSONIC V12D "5 path" and "6 path" are installed at least 3 diameters downstream of a conditioning element type KROHNE "Flowcon 3D" with a minimal thickness of respectively 0,25D and 0,12D, see document no. 10170/0-06.

A temperature sensor has to be installed at least 2D downstream of the meter.

3.2 Bi-directional flow measurement

During conformity assessment it is sufficient to verify a bi-directional meter only in one direction.

The installation of a temperature sensor is at least 2D downstream of the meter. For bi-directional applications the temperature sensor can be installed at least 4D upstream of the meter.

3.3 Flange to flange installation

It is allowed to install the ALTOSONIC V12 or V12D meters in series with another ultrasonic meter by directly connecting the outlet of the first meter to the inlet of the second meter, while applying the following conditions:

- Both meters are calibrated at the same time, being mounted together;
- The installation conditions of both meter types are fulfilled.

In case the ALTOSONIC V12 or V12D is applied in series with a reduced bore meter the following condition is also applicable:

- If the ALTOSONIC V12 or V12D is mounted on the second position in case of uni-directional flow or if the total installation is used for bi-directional flow, then the angle of inclination of the reduced bore shall be less than 7°.