

OIML Member State
The Netherlands

Number R137/2012-A-NL1-21.05
Project number 2518128
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Identification of the certified type An **ultrasonic gas meter**
Type: FLOWSIC600-XT

Characteristics See page 2 and further

This OIML Certificate is issued under scheme A

This Certificate attests the conformity of the above identified type (represented by the sample(s) identified in the OIML Type Evaluation Report) with the requirements of the following Recommendation of the International Organization of Legal Metrology (OIML):

R 137-1 (2012) "Gas meters"

Accuracy class 0,5

This Certificate relates only to the metrological and technical characteristics of the type of measuring instrument covered by the relevant OIML International Recommendation identified above. This Certificate does not bestow any form of legal international approval.

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Issuing Authority **NMI Certin B.V., OIML Issuing Authority NL1**
4 August 2021

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The conformity was established by the results of tests and examinations provided in the associated report:

- No. NMI-2518128-01 dated 4 August 2021 that includes 64 pages.

Characteristics of the measuring instrument

In Table 1 the general characteristics of the measuring instrument are presented.
Table 2 gives an overview of the general characteristics of the family of instruments.

Table 1 General characteristics

Destined for the measurement of	Gas volume			
Environmental classes	M2 / E2			
Accuracy class	0,5			
Minimum operating pressure	atmospheric			
Maximum operating pressure	depending on transducer type, see below			
Ambient temperature range	-40 ... +70 °C			
Process gas temperature range	-46 ... +110 °C			
Designed for	Non-condensing humidity & condensing humidity			
Orientation	Horizontal, vertical up and vertical down (all orientations)			
Power supply voltage	6 – 24 V DC			
Software identification	Version number: 1.05.00 Checksum: 0x78E1			
Transducers	Type	Frequency [kHz]	p_{max} [bar]	Beam angle [°]
	46	205	180	15,9
	22	205	180	12,2
	S6	205	103	11,9
	26	205	180	11,7
	S5	350	105	9,5
	T210	205	105	13,7
	T220	205	180	12,2
	H210	205	105	6,8
	T218	205	105	13,7
	H218	205	105	6,8
	T228	205	180	12,2

Table 2 Meter types, path configuration & installation conditions

The meter consists of a cylindrical spool piece with 4 or 8 horizontal direct paths. Multiple configurations can be combined in a single housing according to the table below.

When the meter is equipped with a double meter configuration, the pay and check meter shall have a different indicator. A clear distinction between pay and check indicator shall be present, both meters must have their own nameplate with unique serial number.

FLAWSIC 600-XT ...	Metrological relevant transducer paths	Check paths (non-metrological relevant)	Flow disturbance	Minimum installation conditions up- and downstream ^[1]
Standard	4	-	Mild	2D – FC – 8D – USM – 3D
2plex	4	1	Mild	2D – FC – 8D – USM – 3D
Quatro	4	4	Mild	2D – FC – 8D – USM – 3D
Forte	8	-	Mild & Severe	5D – USM – 3D

- [1] xD = Minimum straight inlet piping length
 FC = Flow conditioner: PTB design, FL600, drawing no. 9211779, d.d. 2014-05-19
 USM = Ultrasonic gas meter

Table 3 General characteristics of the family of instruments

<i>Standard (4 Path), 2plex (4 Path), Quatro (4 Path) and Forte (8 Path)</i>					
Diameter Nominal	Internal bore		Maximum V_{max} [m/s]	Minimum	
	minimum [mm]	maximum [mm]		V_t [m/s]	V_{min} [m/s]
4" (100 mm)	94,96	110	39,22	2,54	0,31
6" (150 mm)	142	160	39,22	1,75	
8" (200 mm)	190	210	39,22	1,57	
10" (250 mm)	235	270	39,22	1,54	
12" (300 mm)	270	315	37,84	1,5	
14" (350 mm)	315	340	35,64		
16" (400 mm)	360	400	35,48		
18" (450 mm)	405	450	34,64		
20" (500 mm)	450	500	34,64		
24" (600 mm)	495	550	34,64		
26" (650 mm)	540	600	33,96		
28" (700 mm)	585	650	33,07		
30" (750 mm)	630	700	32,08		
32" (800 mm)	675	750	31,05		
34" (850 mm)	720	800	29,34		
36" (900 mm)	765	850	28,40		
38" (950 mm)	810	900	27,49		
40" (1000 mm)	855	950	27,09		

Remarks regarding table 3

[1] If higher values are chosen for Q_{min} or Q_t and/or lower values for Q_{max} , it has to be taken into account that:

- If ratio $Q_{max} / Q_{min} \geq 50$ then: $Q_{max} / Q_t \geq 10$
- If ratio $Q_{max} / Q_{min} \geq 5$ and < 50 then: $Q_{max} / Q_t \geq 5$

[2] Depending on the internal bore, the flow rate in m^3/h can be calculated.

The corresponding flow rates can be calculated as follows:

$$Q = v \cdot \frac{1}{4} \cdot \pi \cdot D^2 \cdot 3600$$

Where:

- Q = flow rate [m^3/h]
- v = velocity [m/s]
- D = internal diameter [m]

[3] Example calculation for a 4" ultrasonic gas meter with an internal bore of 94,96 mm:

$$Q_{max} = 39,22 \cdot \frac{1}{4} \cdot 3,14159 \cdot 94,96^2 \cdot 3600 = 1000 \text{ m}^3/h$$

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Installation conditions:

Installation requirements

Any components which could affect the gas flow must be avoided within the prescribed inlet pipe length. The inlet pipe must be designed as a straight pipe section of the same nominal diameter as the gas meter. The necessary straight pipe length is stated on the name plate of the meter.

The installation requirements, based on accuracy class and mild and/or severe flow disturbance are specified in table 2. The used flow conditioner (if applicable) is of type: "PTB design flow conditioner", type FL600, as documented in drawing no. 9211779, dated 2014-05-19.

Working pressure

The spool piece and the transducers can be used up to the specified pressure as given in table 1.

The two pressures, at which the meter shall be calibrated, without intermediate adjustment over its full flow rate range during initial verification ($p_{\min \text{ calibration}}$ and $p_{\max \text{ calibration}}$), shall be equal to the operating pressure range (p_{\min} and p_{\max}) as given on the type plate.

In case the claimed minimum working pressure (p_{\min}) of the meter is ≥ 4 bar, the meter can be calibrated on one pressure. The working pressure range (p_{\min} and p_{\max}) is allowed to be within $\frac{1}{2} \cdot p_{\text{fix}}$ and $3 \cdot p_{\text{fix}}$.

The ultrasonic gas meter does not make use of an internal pressure or temperature sensor. The setting for pressure and temperature are a fixed value (fixed setting before calibration) in the parameter settings:

- In the menu sequence p_{fix} can be checked and represents the fixed pressure setting.
- In the menu sequence T_{fix} can be checked and represents the fixed temperature setting.

For a maximum working pressure (p_{\max}) of the ultrasonic gas meter above 60 bar(a), a maximum calibration pressure ($p_{\max \text{ calibration}}$) of around 60 bar(a) is allowed since this is the highest possible test pressure at any test location traceable to (inter)national standards.

Thermowell

A thermowell may be mounted at 2D - 5D from the outlet of the meter.

Bi-directional flow measurement

During conformity assessment it is sufficient to verify a bi-directional meter in one direction only. For bi-directional flow measurement the outlet pipe and flow conditioner shall be identical to the inlet. The installation of a temperature sensor is at 2-5D from the outlet of the meter.

For bi-directional applications an additional temperature sensor can be installed 2-5D upstream of the meter. For bi-directional applications the meter and pipe spools including the thermo well(s), shall be calibrated as a meter package during the examination for putting into use of the gas meter.

Alternative welded configuration of the gas meter

The central meter body can be welded directly onto the flanges or to inlet and outlet pipes. The welding may not cause more than a 3% diameter step. The meter shall be installed as stated in "Installation requirements". The central meter body, including welded piping or welded flanges, shall be calibrated as a meter package during the examination for putting into use of the gas meter.

Maintenance

A transducer path pair and the main electronics board can be exchanged without deterioration of the metrological performance.

Revision	Date	Description of the modification
Initial	4 August 2021	Initial issue