

Fluxi 2000/TZ

Turbine Gas Meter

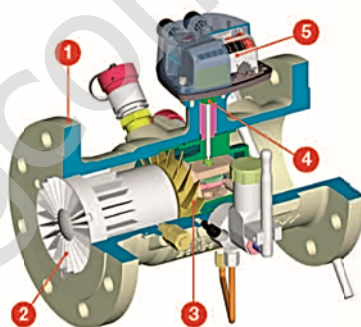
Turbine gas meters are flow meters. The flow of gas turns a turbine wheel, and thus, the rotating speed of the turbine is proportional to the linear speed of the gas.

The movement is mechanically transmitted to the totaliser through the magnetic coupling.

DESCRIPTION

The Fluxi 2000/TZ meter is composed of five main parts:

- ❶ a body containing all the components;
- ❷ a flow straightener to stabilise and accelerate the gas flow before the turbine wheel;
- ❸ a measuring unit including the turbine wheel;
- ❹ a magnetic coupling to transmit the movement of the turbine wheel to the totaliser;
- ❺ a totaliser to register the measured gas.



APPLICATIONS

Fluxi 2000/TZ meters are designed to measure natural gas, and various filtered, and non-corrosive gases. They are used to measure medium to high gas flow, at low, medium or high pressure.

The Fluxi 2000/TZ meters have been optimised for use in all applications related to the transportation and distribution of gas. Fluxi 2000/TZ meters are approved for fiscal use.

BASIC FEATURES

- » PTB approved with only 2 DN inlet straight pipe, 0 (zero) DN outlet pipe even with severe perturbations
- » MID approved
- » Go beyond compliance with all current European and International Standards
- » Reduced pressure loss for low pressure network
- » Excellent high-pressure behaviour
- » IP 67 protection of the totaliser
- » Equipped as standard with the cycle target.
- » Various options available: integrated thermowells, oil pump, pulse transmitters, etc

Technical Specifications

Metrological Approvals	Compliant with the Measuring Instrument Directive 2004/22/EC Approval number: DE-10-MI002-PTB001
Intrinsic Safety Approval	Compliant with the Directive 94/9/EC Approval number: LCIE 06 ATEX 6031 X
Flow Rate	From 5 m³/h to 10000 m³/h, G65 to G6500.
Nominal Diameters	From DN50 to DN500 mm (2" to 20").
Maximum Working Pressure	Up to 100 bar depending on the body material and flanging.
Mounting	The Fluxi 2000/TZ meters can be installed either horizontally or vertically, for the DN50 to DN300, and horizontally for the DN400 and DN500.
Body Materials	Ductile iron, cast steel or welded steel. Compliant with the Pressure Equipment Directive 97/23/EC Approval number: DVGW CE-0085BM 0417
Temperature Range	ATEX/PED: -30°C to +60°C MID: -25°C to +55°C Storage temperature: -40°C to +70°C

Totaliser:

- » 9-digit index to register a larger volume
- » 45° orientation for an easy reading
- » Free-rotating totaliser
- » Equipped as standard with the cyble target: it allows the installation of the cyble sensor at any time.
- » Equipped with 1 built-in silicagel cartridge; as an option, equipped with an external cartridge to enable easy maintenance even in extreme conditions
- » Fitted with a reflecting disc on the first drum.
- » Integrated optical disc to facilitate the periodic calibration of the meter.
- » Customised name plate (logo, bar-code, customer serial number...)
- » IP67 protection
- » UV resistant
- » Unit: m³

Universal totaliser fitted as standard with the Cyble target



METROLOGY

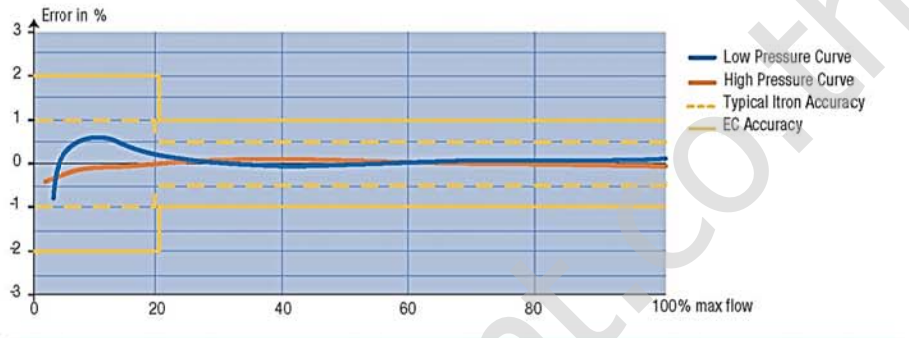
In accordance with the EC regulation and OIML.

Depending on the G size and the DN, the meters are available with a rangeability of 1:20 or 1:30. According to the PTB TR G7, for high-pressure tests, the rangeability can be extended to 1:50, depending on the pressure.

In line with EC regulation, the maximum permissible error is $\pm 2\%$, from Q_{min} to $0.2 Q_{max}$, and $\pm 1\%$ from $0.2 Q_{max}$ to Q_{max} . The WME (Weighted Measured Error) is less than 0.4%.

Typical Itron accuracy is:

$\pm 1\%$ from Q_{min} to $0.2 Q_{max}$, $\pm 0.5\%$ from $0.2 Q_{max}$ to Q_{max} .



Transmitters

- 1 Cyble sensor: It can be delivered mounted onto the meter or installed afterwards at any time. The Cyble sensor is a bounce-free transmitter. It allows also the counting of eventual back flows.
- 2 Low Frequency (LF): Two Reed switches are fitted as standard on the whole range. Anti-tampering (AT): this device is fitted as standard on the whole range.
- 3 Medium Frequency (MF): one transmitter is supplied as an option.
- 4 High Frequency (HF): up to 4 transmitters are supplied as an option on the whole range:
2 fitted close to the turbine wheel (HF3), and 1* close to a reference wheel (HF2).
*DN200 to DN500 ISO PN50/PN110, ANSI300/600 are also available as option with 2 HF2 and 2 HF3.
- 5 Mechanical drive: the totaliser can be fitted with this option, it may be used to drive removable accessories. The mechanical drive is designed according to EN 12261.

Oil pump

- 6 An oil pump is supplied as an option, which lubricates the main ball bearings in the measuring unit. The oiling can be done even when the meter is under pressure.

Turbine wheel

- 7 This is the most important component of the meter for achieving high accuracy at low and high pressure. It can be

made from aluminium for the whole range or in polyacetal for the $DN \leq 200$.

Depending of the G size, the blades of the turbine wheel are oriented at 45° or 60°.

Turbine wheel at 60° is used to avoid over-speed of the wheel.

When a HF3 is requested, the wheel must be in aluminium.

For high pressure use, or for measuring dirty gases, an aluminium wheel is recommended.

Flow Straightener

- 8 This device stabilises and accelerates the flow before the turbine wheel. It has been designed to meet the requirements of the 2 perturbation tests defined in the EN12261 (low level and high level perturbation).

All DN meet the requirements of the low level perturbation test without an additional device with only 2 DN inlet straight pipe, 0 DN outlet of the meter.

From DN50 to DN150, no additional device is required to fulfil the high level perturbation test with only 2 DN inlet, 0 DN outlet of the meter.

From DN200 to DN400, a flow conditioner has to be integrated in the inlet of the flow straightener to meet the requirements of the high level perturbation test when only 2 DN inlet pipe is available (see in § Accessories).

The large number of blades fitted in the flow straightener insures an optimal protection in case of perturbed flow.

OPTIONS:

Extension for the totaliser

- 9 This option allows the possibility of increasing the distance between the body of the meter and the index, to facilitate the reading when the meter is covered with ice due to measurement of gas at low temperatures.



Pressure tapping:

This device allows the gas pressure to be measured at the reference point. It is installed as standard. The standard pressure tapping is an Ermeto 6S.

Measurement of aggressive gases:

A version with a PTFE (Teflon) coating is available, as an option up to DN200.

ACCESSORIES

Bracket for mounting a volume converter

This device allows the Itron PTZ volume converter to be adapted directly onto the meter.

Thermowells

This device allows the temperature of the measured gas to be read at the reference point, downstream of the turbine.

The meter is prepared as standard for the installation of two thermowells which can be mounted in our factory or later when requested.

The meter does not need to be recalibrated after retrofitting of thermowell (as defined in the PTB type Approval).

Flow conditioner

For DN50 to DN200, a flow conditioner can be supplied for installation between 2 RF flanges in front of the meter, to further enhance the performance of the meter when subjected to severe perturbation.

For DN200 to DN400, the flow conditioner can be retrofitted directly in the inlet of the

flow straightener. The integration of the flow conditioner in the meter provides a very compact solution without need for any extra flanging.

External silicagel cartridge

This accessory is used to reinforce the protection of the totaliser against humidity when the meter is installed in extrem conditions.



Fluxi 2000/TZ with PTZ CORUS

CHARACTERISTICS

A) Technical data sheet

Rangeability and pulse values

With correction gears 32/40 (correction 0%)												
G size	DN (mm)	Max Flow (m³/h)	Range- ability	1 Imp LF & Cyble (m³/Imp)	Freq LF Qmax (Hz)	1 Imp MF (dm³/Imp)	Freq MF Qmax (Hz)	1 Imp HF2 (dm³/Imp)	Freq HF2 Qmax (Hz)	1 Imp HF3 (dm³/Imp)	Freq HF3 Qmax (Hz)	RPM Qmax (Rot/min)
G65	50	100	20	0.1	0.28	5.8947	4.71	-	-	0.00970	2864	14322
G100	80	160	20	1	0.04	23.07692	1.93	0.07593	585	0.03797	1171	5853
G160		250	20 or 30		0.07	23.07692	3.01	0.07593	915	0.03797	1829	9146
G250		400	20 or 30		0.11	39.11111	2.84	0.12869	863	0.06434	1727	8634
G160	100	250	20	1	0.07	23.07692	3.01	0.06271	1107	0.06271	1107	4153
G250		400	20 or 30		0.11	23.07692	4.81	0.06271	1772	0.06271	1772	6644
G400		650	20 or 30		0.18	39.11111	4.62	0.10628	1699	0.10628	1699	6371
G400	150	650	20	1	0.18	23.07692	7.82	0.15385	1174	0.15385	1174	3521
G650		1000	20 or 30		0.28	23.07692	12.04	0.15385	1806	0.15385	1806	5417
G1000		1600	20 or 30		0.44	39.11111	11.36	0.26074	1705	0.26074	1705	5114
G650	200	1000	20	10	0.03	230.7692	1.2	0.37661	738	0.37661	738	2213
G1000		1600	20 or 30		0.04	230.7692	1.93	0.37661	1180	0.37661	1180	3540
G1600		2500	20 or 30		0.07	391.1111	1.78	0.3829	1088	0.3829	1088	3264
G1000	250	1600	20	10	0.04	230.7692	1.93	0.5787	768	0.5787	768	1920
G1600		2500	20 or 30		0.07	230.7692	3.01	0.5787	1200	0.5787	1200	3000
G2500		4000	20 or 30		0.11	391.1111	2.84	0.9808	1133	0.9808	1133	2832
G1600	300	2500	20	10	0.07	218.1818	3.18	0.85763	810	0.85763	810	1735
G2500		4000	20 or 30		0.11	218.1818	5.09	0.85763	1296	0.85763	1296	2776
G4000		6500	20 or 30		0.18	391.1111	4.62	1.53739	1174	1.53739	1174	2517
G2500	400	4000	20	10	0.11	218.1818	5.09	2.04673	543	2.04673	543	1163
G4000		6500	20 or 30		0.18	218.1818	8.28	2.04673	882	2.04673	882	1890
G6500		10000	20 or 30		0.28	391.1111	7.1	3.66896	757	3.66896	757	1622
G4000	500	6500	20 or 30	10	0.18	218.1818	8.28	2.04673	882	2.04673	882	1890
G6500		10000	20 or 30		0.28	391.1111	7.1	3.66896	757	3.66896	757	1622

Body materials and approximate weight (Kg)

DN (mm)	Length of body (mm)	ISO PN 10	ISO PN 16	ISO PN 20	ISO PN 25	ISO PN 40	ISO PN 50	ISO PN 110	ANSI 150	ANSI 300	ANSI 600
50	150	A ⁽¹⁾	A ⁽¹⁾	A ⁽¹⁾ B ⁽¹⁾	A ⁽¹⁾	A ⁽¹⁾	B ⁽²⁾	B ⁽²⁾	A ⁽¹⁾ B ⁽¹⁾	B ⁽²⁾	B ⁽²⁾
		8	8	8	8	8	11	11	8	11	11
80	240	A ^c	A ^c	AB	A ^c	A ^c	B	B	AB	B	B
		19	19	19	19	19	30	37	19	30	37
100	300	A ^c	A ^c	AB	B	B	B	B	AB	B	B
		22	22	22	25	25	45	55	22	45	55
150	335	A ⁽³⁾	A ⁽³⁾	A ⁽³⁾	-	-	-	-	A ⁽³⁾	-	-
		46	46	46					46		
150	450	AB	AB	AB	B	B	B	B	AB	B	B
		54	54	54	54	54	80	95	54	80	95
200	600	A ^c	A ^c	AB	B	B	B ⁽⁴⁾	B ⁽⁴⁾	AB	B ⁽⁴⁾	B ⁽⁴⁾
		83	83	83	83	110	130	150	83	130	150
250	750	B	B	B	B	B	B ⁽⁴⁾	B ⁽⁴⁾	B	B ⁽⁴⁾	B ⁽⁴⁾
		120	120	120	120	140	220	245	120	220	245
300	900	B	B	B	B	B	B ⁽⁴⁾	B ⁽⁴⁾	B	B ⁽⁴⁾	B ⁽⁴⁾
		190	190	190	190	220	265	265	190	265	295
400	1200	B	B	B	B	B	B ⁽⁴⁾	B ⁽⁴⁾	B	B ⁽⁴⁾	B ⁽⁴⁾
		440	440	440	440	490	680	740	440	680	740
500	1500	B	B	B	B	B	B ⁽⁴⁾	B ⁽⁴⁾	B	B ⁽⁴⁾	B ⁽⁴⁾
		580	580	580	580	640	770	950	580	770	950

A: Ductile iron EN-GJS-400-18LT

B: Steel (Cast steel GS or welded steel)

c: Cast steel GS with minimum ordering quantity

⁽¹⁾HF2 not available, 1 thermowell only

⁽²⁾HF2 not available

⁽³⁾HF2 and thermowells not available

⁽⁴⁾2 HF2 & 2 HF3 available

Note: for the pressure and temperature range of the body material, please check your National Rules

B) Pressure loss of the Fluxi 2000/TZ meters

Pressure losses of the Fluxi 2000/TZ meter (mbar)				
G size	DN (mm)	Max. Flow (m³/h)	Standard ΔPr	With integrated flow conditioner ΔPr
			ρ = 0.83kg/m³, T = 0°C, Qmax	ρ = 0.83kg/m³, T = 0°C, Qmax
G65	50	100	9.1	-
G100	80	160	2.4	-
G160		250	5.9	
G250		400	12.8	
G160	100	250	2.2	-
G250		400	5.4	
G400		650	11.8	
G400	150	650	2.7	-
G650		1000	6.6	
G1000		1600	13.8	
G650	200	1000	1.6	2.6
G1000		1600	4.0	6.3
G1600		2500	8.7	13.7
G1000	250	1600	2.1	3.3
G1600		2500	5.0	8.0
G2500		4000	11.0	17.3

Pressure losses of the Fluxi 2000/TZ meter (mbar)				
G size	DN (mm)	Max. Flow (m³/h)	Standard ΔPr	With integrated flow conditioner ΔPr
			ρ = 0.83kg/m³, T = 0°C, Qmax	ρ = 0.83kg/m³, T = 0°C, Qmax
G1600	300	2500	2.0	3.2
G2500		4000	5.0	7.8
G4000		6500	9.5	17.0
G2500	400	4000	1.8	2.8
G4000		6500	4.4	6.8
G6500		10000	9.5	14.9
G4000	500	6500	4.4	6.8
G6500		10000	9.5	14.9

Where:

Δp: Pressure loss in the calculated conditions

Δpr: Pressure loss in the reference conditions

ρn: Gas density (kg/m³) at 0° C and 1013 mbar

Pb: Operating pressure (Bar gauge)

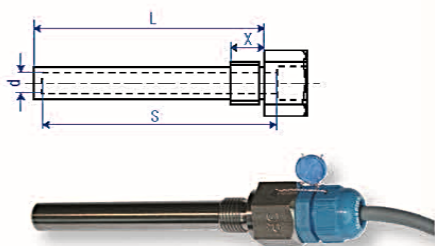
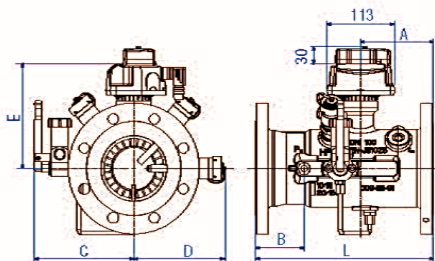
q: Flow rate (m³/h)

Qmax: Maximum flow rate (m³/h)

Tb: Gas temperature (°C).

Calculation of pressure loss:

$$\Delta p = \Delta p_r \times \frac{\rho n}{0.83} \times (P_b + 1) \times \left[\frac{q}{Q_{max}} \right]^2 \times \left[\frac{273}{(273 + T_b)} \right]$$



Thermowell fitted with sealing holes

C) Dimensions (mm)

DN	L	L short*	A	A short*	B	B short*	C	D	E
50	150	-	60	-	45	-	125	150	175
80	240	-	96	-	60	-	150	170	180
100	300	-	124	-	82	-	175	180	195
150	450	335	185	92	122	101	205	215	205
200	600	-	240	-	175	-	230	245	240
250	750	-	275	-	273	-	300	275	270
300	900	-	360	-	300	-	300	300	300
400	1200	-	450	-	540	-	350	355	350
500	1500	-	470	-	820	-	390	385	383

* Short version, same length as for the former NM meter

D) Thermowells sizes

DN	Thread	Order Number with stuffing box & o-ring	d bore mm	d Cable mm	Max. Setting Depth (S) Sensor (mm)	L mm	X mm
50(LP)/80/100	G 1/4 A	E952-014-04	7.5	4-8	60	59	12
50(HP)/150/200	G 1/4 A	E952-014-14	7.5	4-8	90	93	12
250/500	G 1/2 A	E952-014-05	8	4-8	150	147	14

E) Transmitter characteristics

Intrinsic safety approval: L.C.I.E. 06 ATEX 6031 X

Intrinsic safety level: Ex II 1/2 G Ex ia IIC T5 c T6

Low Frequency pulse transmitters (LF):

The LF transmitter consists of 2 dry Reed switches, normally open, and controlled by a magnet situated in the first drum of the totaliser. The LF connections are without polarity.

1) Internal Reed contacts

- » Hermetically sealed contacts
 - Maximum terminal voltage: 30 Volt and maximum current according to EN 60079-11.
- » Ambient temperature
Ta = -30°C to +60°C
- » Minimum pulse time: 0.4 s

2) Cyble sensor

- » It conforms to CENELEC standard EN 60079-11 with:
 - $U_i \leq 14.3$ Volt
 - $I_i \leq 50$ mA

Inductive transmitters (HF and MF):

They are inductive sensors actuated by a toothed disc. The frequency is proportional to the instantaneous flow. The polarity of the connections is indicated on the name plate of the meter.

1) High Frequency transmitters

- » Proximity detectors conform to EN 60947-5-6 (NAMUR) standards.
- » They conform to CENELEC standards (EN 60079-0 and EN 60079-11) with:
 - $U_i \leq 15$ Volt
 - $I_i \leq 50$ mA
 - $C_i \leq 90$ nF
 - $L_i \leq 100\mu H$
 - $P_i \leq 120$ mW
- » Ambient temperature
Ta = -30°C to +60°C

2) Medium Frequency transmitter

- » It conforms to CENELEC standards (EN 60079-0 and EN 60079-11) with:
 - $U_i \leq 16$ Volt
 - $I_i \leq 52$ mA
 - $C_i \leq 50$ nF
 - $L_i \leq 250\mu H$
 - $P_i \leq 64$ mW

F) Installation

Each meter is delivered with binder plugs for the installed transmitters and oil when an oil pump is installed. Please refer to the instruction manual supplied with the meter.

The advice given therein will ensure optimal use of the Fluxi 2000/TZ meter over the years.

Anti-tampering transmitter (AT):

This consists of one dry Reed switch, normally closed. Attempts at magnetic tampering will open the contact. The electrical characteristics are the same as those for the LF transmitter.