

# Quantometer MZ

## Turbine Gas Meter

MZ meters are flow meters. The flow of gas turns the 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 a magnetic coupling.

### APPLICATIONS

MZ meters are designed to measure natural gas, and various filtered, and non-corrosive gases.

They are used to measure low to medium and high flow, at low or medium, or high pressure.

They have been especially designed for industrial use and for secondary measurement.

The possibility of fitting various options such as the oil pump or the PTFE coating version, means that they are also suitable for use in heavy duty measurement.

### DESCRIPTION

The MZ meter is composed of five main parts:

- ❶ a body part containing all the components
- ❷ a flow straightener to stabilise and accelerate the 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

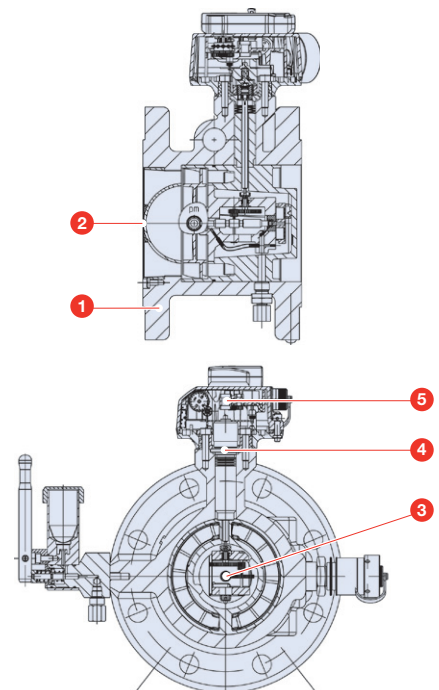
### Technical Specifications

Intrinsic Safety Approval	L.C.I.E. 06 ATEX 6031 X
Flow Rate	From 6 m <sup>3</sup> /h to 2500 m <sup>3</sup> /h
Nominal Diameters	From DN 2" to 8", DN50 to DN200
Material	Ductile iron Compliant with the Pressure Equipment Directive 97/23/EC
Maximum Working Pressure	Up to 40 bar depending on flanging
Temperature Range	Ambient: -30°C to +60°C Gas: -30°C to +60°C Storage temperature: -40°C to +70°C
Metrology	The tolerance of acceptance is +/-1.5% from Qmin to Qmax.



### KEY BENEFITS

- » High accuracy budget meter
- » Flow rate up to 2500 m<sup>3</sup>/h
- » Pressure range up to 40 bar
- » Equipped as standard with the cycle target
- » Various options available: Low and high frequency transmitters, thermowell, oil pump, version for aggressive gases, etc



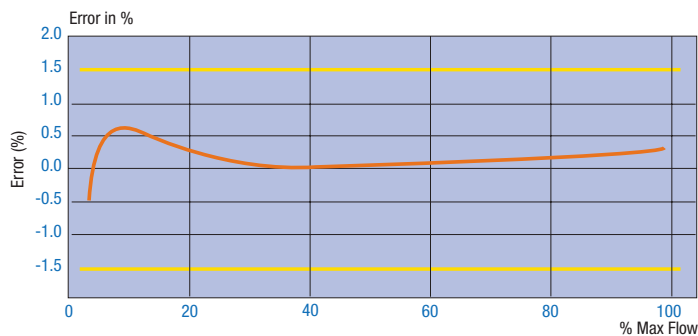


Quantometer MZ DN150, Qmax: 1600 m<sup>3</sup>/h



Universal totaliser fitted as standard with the Cyble target

### Typical calibration curve



### Totaliser:

- » 9-digit index to register a larger volume
- » 45° orientation for an easy reading
- » Equipped as standard with the cyble target: it allows the installation of the cyble sensor at any time
- » Free-rotating totaliser
- » Equipped with 1 built-in silicagel cartridge
- » Fitted with a reflecting disc on the first drum
- » IP67 protection
- » UV resistant cover
- » Unit: m<sup>3</sup>

### 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):** a transmitter is supplied as an option on the whole range, and it is fitted close to the turbine wheel.

### Oil pump

- 5 It lubricates the ball bearings in the measuring unit.  
The oiling can be done even when the meter is under pressure.  
The oil reservoir can be easily turned to fit with vertical installed meters.

### Turbine wheel

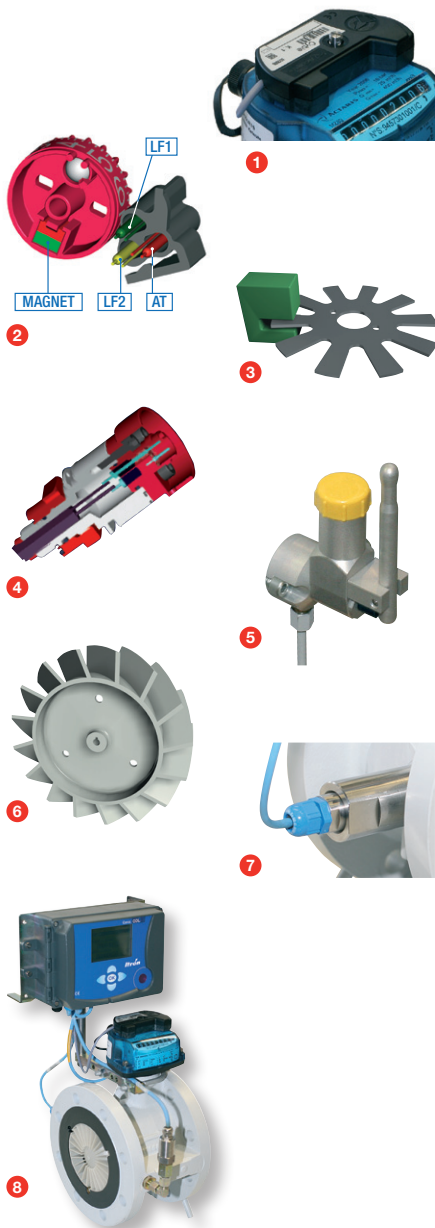
- 6 This is the most important component of the meter for achieving high accuracy at low and high pressure. It can be made in aluminium for the whole range or in polyacetal. Depending on the maximum flow rate, the blade of turbine wheel is oriented at 45° or 60°. Turbine wheel at 60° is used to avoid over-speed of the wheel. When a HF is requested, the wheel must be in aluminium. For high pressure use, or for measuring dirty gases, an aluminium wheel is recommended.

### Thermowell

- 7 A thermowell can be installed as an option into the meter. It allows the gas temperature to be measured at the reference point.  
(Installation of a thermowell cannot be done into a meter equipped with HF transmitter)

### Volume converter

- 8 It can be installed directly onto the meter thanks to a mounting kit



### Pressure tapping:

This device allows the gas pressure to be measured at the reference point. It is installed as standard.

### Measurement of aggressive gases:

A version with a PTFE (Teflon) coating, is available, as an option. The coating is applied on the internal parts of the meter.

## CHARACTERISTICS

### A) Technical data sheet

#### Rangeability and pulse values

With correction gears 32/40 (correction 0%)

DN (mm)	Max Flow (m³/h)	Min Flow (m³/h)	Pressure loss (mbar) $\rho = 0.8 \text{ kg/m}^3$	1 Imp LF & Cyble (m³/Imp)	Freq LF Qmax (Hz)	1 Imp MF (dm³/Imp)	Freq MF Qmax (Hz)	1 Imp HF (dm³/Imp)	Freq HF Qmax (Hz)	RPM Qmax (Rot/min)
50	100	6	8.1	0.1	0.28	5.8947	4.71	0.00970	2864	14322
80	250	10	4.8	1	0.07	23.07692	3.01	0.03797	1829	9146
	400	25	11	1	0.11	39.11111	2.84	0.06434	1727	8634
100	400	16	4.8	1	0.11	23.07692	4.81	0.06271	1772	6644
	650	40	11	1	0.18	39.11111	4.62	0.10628	1699	6371
150	1000	40	4.3	1	0.28	23.07692	12.04	0.15385	1806	5417
	1600	100	9	1	0.44	39.11111	11.36	0.26074	1705	5114
200	1600	65	4.3	10	0.04	230.7692	1.93	0.37661	1180	3540
	2500	160	9	10	0.07	391.1111	1.78	0.63829	1088	3264

#### Body construction

DN (mm)	ISO PN 10	ISO PN 16	ISO PN 20 ANSI 150	ISO PN 25	ISO PN 40
50	A	A	A	A	A
80	A	A	A	A	A
100	B	B	B	-	-
150	B	B	B	-	-
200	B	B	B	-	-

A: EN-GJS-400-18LT Sandwich body (the screws are delivered with the meter)

B: EN-GJS-400-18LT flanges body

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

### B) Calculation of the extended rangeability

When the density of the measured gas increases, the minimum measured flow rate decreases. This minimum flow rate in real conditions (QminRC) can be evaluated using the following formula:

Qmin<sub>1,2</sub>: minimum flowrate (m³/h) for a density of 1.2 kg/m³

$\rho_{RC}$ : density of the gas in real conditions (kg/m³)

$$Q_{min_{RC}} = Q_{min_{1,2}} \times \sqrt{\frac{1.2}{\rho_{RC}}}$$

### C) Pressure loss of the MZ meters Values: see table above

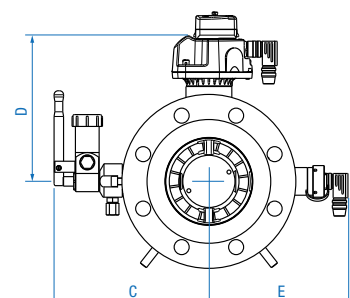
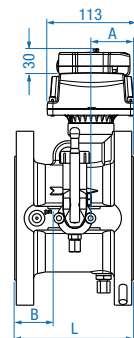
$$\text{Calculation of pressure loss: } \Delta p = \Delta p_r \times \frac{\rho n}{0.83} \times (P_b + 1) \times \left[ \frac{q}{Q_{max}} \right]^2 \times \left[ \frac{273}{(273 + T_b)} \right]$$

### D) Dimensions (mm) and Weights

DN	L	A	B	ISO PN 10 - ISO PN 40 ANSI 150			Kg
				C	D	E	
50	60	15	18	156	160	163	4
80	120	35	34	173	180	176	10
				ISO PN 10 - ISO PN 16 ANSI 150			
100	150	54	28	209	180	186	19
150	200	71	48	238	225	216	33
200	200	69	43	273	250	277	85

#### where:

- $\Delta p$ : Pressure loss in the calculated conditions
- $\Delta p_r$ : Pressure loss in the reference conditions
- $\rho n$ : Gas density (kg/m³) at 0° C and 1013 mbar
- $P_b$ : Operating pressure (Bar gauge)
- $q$ : Flow rate (m³/h)
- $Q_{max}$ : Maximum flow rate (m³/h)
- $T_b$ : Gas temperature (°C).



## 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:
  - Ui ≤ 14.3 Volt
  - Ii ≤ 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:
  - Ui ≤ 15 Volt
  - Li ≤ 100 µH
  - Ii ≤ 50 mA
  - Pi ≤ 120 mW
  - Ci ≤ 90 nF
- » 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:
  - Ui ≤ 16 Volt
  - Li ≤ 250 µH
  - Ii ≤ 52 mA
  - Pi ≤ 64 mW
  - Ci ≤ 50 nF

### 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.

## 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 MZ quantometer over the years.



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