ACD G10 and G16
Diaphragm Meters - High Accuracy Commercial Meters

Our new generation Itron Diaphragm G10-G16 meters combine accuracy and long life in a very compact casing. Through our proven know-how in gas measurement, combined with the use of modern engineering and production techniques, Itron has developed this smaller size, highly accurate meter, ensuring reduced shipping costs, and easier handling and simplified installation. Our range of ACD G10-G16 meters are designed for commercial use for gas suppliers and gas utilities worldwide.

**APPLICATION**
The ACD diaphragm meters are used for applications requiring high precision and large rangeability at low pressure (below 1 bar gauge). They are supplied in two versions - a compact and a standard version (single and two pipe). Due to the volumetric principle of the diaphragm meters, its metrology is not influenced by installation conditions. They are designed for use with natural gas, manufactured gas and other non-corrosive gases. The ACD diaphragm meters are approved for fiscal use.

**OPERATING PRINCIPLE**
The movement of the diaphragm is caused by the pressure difference between the inlet and the outlet of the meter. The reciprocal filling is controlled by means of two sliding valves. This oscillating movement is transformed into a rotational one and is mechanically transmitted to the totalizer through a magnetic coupling or a stuffing box.

**TYPICAL ERROR CURVE**

<table>
<thead>
<tr>
<th>Error in %</th>
<th>% Flow rate (m³/h)</th>
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</thead>
<tbody>
<tr>
<td>-4</td>
<td>0</td>
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<tr>
<td>-3</td>
<td>10</td>
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<tr>
<td>-2</td>
<td>20</td>
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<tr>
<td>-1</td>
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<td>4</td>
<td>80</td>
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<tr>
<td>5</td>
<td>90</td>
</tr>
<tr>
<td>6</td>
<td>100</td>
</tr>
</tbody>
</table>

**PRESSURE LOSS CURVE**

- **ACD G10**
- **ACD G16**

- Pressure loss Air (1.2 kg/m³)
- Pressure loss Natural Gas (0.8 kg/m³)

**KEY BENEFITS**
- Ready for remote reading and data management
- Long-term accuracy and reliability
- Robust, maintenance-free meter
- Compact design
- MID approved
- High resistance to corrosion

SPECIFICATIONS
ACD Measuring Unit

The ACD G10-G16 meters contain four main parts:

1. A measuring unit with:
   - Four measuring chambers.
   - Two sliding valves.
   - An outlet pipe.

2. A steel casing fitted with one or two connections

3. A magnetic coupling or stuffing box transmits the movement of the measuring unit to the totalizer

4. A totalizer is available in different versions depending on the application

“e” series: electronic index for a 2-way wired/wireless M-Bus communication and with optional electronic temperature conversion.

“c” series: mechanical index equipped with a Cyble target for retrofittable AMR communication systems. This Itron standardised meter interface allows the adaptation of different Cyble modules as a communication device.

“o” series: mechanical index available with a permanent magnet in an index drum. Can be refitted with a Low Frequency pulse transmitter (Reed switch).

Technical Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Type</td>
<td>Natural Gas, air, propane, butane, nitrogen and all non-corrosive gases</td>
</tr>
<tr>
<td>Cyclic Volume</td>
<td>5 dm³</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>Ambient: -25°C to +55°C</td>
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<tr>
<td></td>
<td>Gas: -25°C to +55°C</td>
</tr>
<tr>
<td></td>
<td>Storage: -40°C to +70°C</td>
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<tr>
<td>Maximum Operating Pressure</td>
<td>Compact version: 0.5 bar</td>
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<tr>
<td></td>
<td>Standard version: 0.5 bar (1 bar optional)</td>
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<tr>
<td>Measuring Range</td>
<td>G10: Qmin 0.10 m³/h, Qmax 16 m³/h</td>
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<tr>
<td></td>
<td>G16: Qmin 0.16 m³/h, Qmax 25 m³/h</td>
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<tr>
<td>Accuracy</td>
<td>Class 1.5</td>
</tr>
<tr>
<td>Approval</td>
<td>MID (04/22/EC) module B &amp; D</td>
</tr>
<tr>
<td>Metrology</td>
<td>In accordance with the EN1359:1998/A1:2006 and MID</td>
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<tr>
<td></td>
<td>Maximum permissible errors are +/-3% from Qmin to 0.1 Qmax and +/-1.5% from 0.1 Qmax to Qmax.</td>
</tr>
<tr>
<td>Starting Flow Rate</td>
<td>Typical value: &lt; 8 dm³/h</td>
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<tr>
<td>Totalizer</td>
<td>IP54</td>
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<tr>
<td></td>
<td>UV resistant cover</td>
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<tr>
<td></td>
<td>Fitted with a reflecting disc on the first drum to facilitate periodical checks</td>
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<tr>
<td></td>
<td>Customised name plate: bar code, customer serial number or logo</td>
</tr>
<tr>
<td>Magnetic Coupling Stuffing Box</td>
<td>The meter is equipped as standard with a magnetic coupling</td>
</tr>
<tr>
<td>Connections</td>
<td>Single pipe or 2 pipe connections</td>
</tr>
<tr>
<td></td>
<td>From DN32 to DN50 depending on the G-size</td>
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<tr>
<td></td>
<td>Other connections are available on request</td>
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<tr>
<td>Backrun Stop</td>
<td>Prevents the meter from running backwards in case of tampering</td>
</tr>
<tr>
<td>RPF (Resistant Power Factor)</td>
<td>According to PRS11 (&lt; 1.2)</td>
</tr>
<tr>
<td>Materials</td>
<td>Casing: aluminium-coated sheet steel</td>
</tr>
<tr>
<td></td>
<td>Measuring unit body: polyacetal (POM)</td>
</tr>
<tr>
<td></td>
<td>Diaphragms: polyester fabric coated with NBR-ECO</td>
</tr>
<tr>
<td></td>
<td>Distribution valves and grid: phenol resin</td>
</tr>
<tr>
<td>Colour</td>
<td>Light grey RAL7035</td>
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</table>

Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermowell</td>
<td>The meters can be fitted with a thermowell to allow electronic temperature compensation. A second thermowell for reference measurements is available on special request</td>
</tr>
<tr>
<td>High Temperature Loading (HTL)</td>
<td>The meters can be delivered in a HTL version following EN1359 PN0.1</td>
</tr>
<tr>
<td>Pressure Tapping</td>
<td>This device allows the gas pressure to be measured at a reference point.</td>
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</tbody>
</table>
TOTALIZER FEATURES
With the ECO series, Itron offers a complete portfolio to address today’s and future energy resource and environmental challenges.

“e” series
Supporting the prevailing European Communication Standards and ensuring interoperability
This smart meter equipped with an electronic index is designed to facilitate integration into wired and wireless fixed networks and has built-in communications capabilities which detects reversed operation, magnetic tampering and backflow.

- High accuracy error curve correction
- Optional temperature conversion
- Built-in 2-way wired/wireless M-Bus communication
- Safe data transmission with AES
- Tamper protection and detection

“c” series
Smart ready, allowing for future AMR capabilities
Itron’s latest-generation mechanical index meter comes standard with our Cyble™ target, and can be upgraded in the field to implement AMR and enable remote reading via different communication technologies.

- Smart reading possible with additional modules
- Can be retrofitted on site without recalibrating the meter
- Reliable of an electronic switch (no wear or bouncing)
- Proven, tested design backed by 20 years’ experience
- Protection against magnetic tampering

“o” series
Retrofit enabling smart upgrades to existing meter park

- The “o” series addresses traditional meters with a mechanical index, already installed in the field, to minimize stranded assets when AMR/AMI is required.
- LF transmitters - via a Reed switch - and a Pulse RF radio module transform pulses into transmittable data.

**Totalizer characteristics “e” series**

- **Meter Size**: G10 / G16
- **European Metrological Approval (04/22/EC - Module B)**: N° DK-0200-MI002-020
- **Temperature Range**: Temperature (converted): -10°C to +55°C (-25°C to +55°C optional for G10); Storage temperature: -40°C to +70°C (> 55°C for up to 4 hours)
- **ATEX Approval**: II 2G Ex ib IIB T3
- **Relative Humidity**: Maximum 93% non-condensing between -25°C and +55°C
- **Display**: LCD with 9 digits (3 decimals)
- **M-Bus Interface**: 300bps / 2400 bps / one bus load, wireless or dongle (up to four bus loads)
- **Battery**: Lithium battery with an average lifetime of min. 15 years under reference conditions
- **Standards**: EN12405-1: 2007-08, Directive 2004/108/EC (EMC) and OIML D11 (EMC), NTA8130-May 2007, DSMR V2.2+ (Netherlands)
- **Serial Bus**: M-Bus slave (wired: EN13757-2/3, wireless: EN13757-4)
- **Customer Port**: IR service interface (EN62056-21)
- **Mechanical Environment**: M1
- **Electronical Environment**: E2

**Totalizer characteristics “c” series**

- **Meter Size**: G10 / G16
- **European Metrological Approval (04/22/EC - Module B)**: N° DE-07-MI002-PTB013
- **Display**: Mechanical index with 8 drums (2 decimals)
- **Transmission Rate**: 0.1 m³ / rotation
- **Transmission System**: Cyble™ target
- **Mechanical Environment**: M2
- **Electronical Environment**: E2

**Totalizer characteristics “o” series**

- **Meter Size**: G10 / G16
- **European Metrological Approval (04/22/EC - Module B)**: N° DE-07-MI002-PTB013
- **Display**: Mechanical index with 8 drums (2 decimals)
- **Pulse Generator**: Standard 0.1 m³ / pulse (optional 1 m³ / pulse)
- **Pulse Transmitter**: Retrofittable LF system, 12 Vdc max – 10 mA max. standard 0.1 m³ / pulse, Different versions: with 1m cable, terminal block or binder plug (Double LF pulse transmitter)
- **Mechanical Environment**: M2
- **Electronical Environment**: E2

“o” series Totaliser with LF “cable”
**Dimensions and Weight**

<table>
<thead>
<tr>
<th>Model</th>
<th>G</th>
<th>Qmax m³/h</th>
<th>Qmin m³/h</th>
<th>Cyclic Volume dm³</th>
<th>DN mm</th>
<th>Threads Standard</th>
<th>Pmax HTL bar</th>
<th>Pressure Loss (Air) mbar</th>
<th>A mm</th>
<th>B mm</th>
<th>C mm</th>
<th>D mm</th>
<th>E mm</th>
<th>Weight kg</th>
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<td>0.1</td>
<td>1.9</td>
<td>250</td>
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<td>370</td>
<td>85</td>
<td>382</td>
<td>206</td>
</tr>
</tbody>
</table>

Our company is the world’s leading provider of smart metering, data collection and utility software systems, with over 8,000 utilities worldwide relying on our technology to optimize the delivery and use of energy and water.

To realize your smarter energy and water future, start here: www.itron.com

For more information, contact your local sales representative or agency:

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Hardeckstraße 2
D-76185 Karlsruhe
Germany

Phone: +49-721 5981 0
Fax: +49-721 5981 189
CORUS
Gas Volume Converter

CORUS is an electronic volume converter dedicated to commercial and industrial applications. It converts the actual volume measured by the gas meter to reference conditions. Thus, CORUS is a key element in the whole Itron chain, from the meter to billing data.

CORUS uses the measured working values of volume, pressure and temperature to provide:
» the converted volume
» the conversion factor
» the compressibility factor (several formulas available)
» a large database
» pulse retransmission

DESCRIPTION
The volume registered by the meter is converted to reference conditions using the formula:
\[ V_b = \frac{P_m}{P_b} \cdot \frac{T_b}{T_m} \cdot \frac{Z_b}{Z_m} \cdot V_m \]

Terminology
- \( V_m \): unconverted volume registered by the meter
- \( V_b \): converted volume in reference (base) conditions
- \( T_m \): gas temperature in operating conditions
- \( T_b \): reference (base) temperature
- \( P_m \): gas pressure in operating conditions
- \( P_b \): reference (base) pressure
- \( Z_m \): compressibility factor in operating conditions
- \( Z_b \): compressibility factor in reference (base) conditions

CORUS is built in an IP65 enclosure, for wall or meter mounting. Thanks to its accurate piezo-resistive pressure sensor and its 4 wires PT1000 temperature probe, CORUS provides an accurate conversion on the whole temperature range.

CORUS non-metrological firmware can be updated in the field without stopping operations and without breaking the metrological seals (MID). Its large integrated database can be customised to fit the customers’ needs. Recorded data and number records can be freely set.

CORUS is the base element of a complete and extremely flexible system, perfectly adaptable to the customer’s requirements:
» Consumption, pressure, temperature monitoring through its large database for billing purposes
» Monitoring functions for gas stations
» Remote reading solutions through PSTN, GSM, GPRS or TCP/IP with several integrated communication protocols:
  • IEC-62056-21 (IEC-61107)
  • MODBUS RTU
  • IDOM

KEY BENEFITS
» T, PT, PTZ Gas Volume Converter
» Conforms to European Standard EN 12405-1 and EN 12405-1/A1
» MID approval
» ATEX approval for installation in hazardous area (zone 0)
» Large integrated database
» Compressibility according to AGANX19, S-GERG, AGA 8 (gross or detailed methods) or Table of Z
» RS 232 and optical port for local / distant communication
» High accuracy on the whole temperature / pressure range
» Autonomous or external power supply
» Large graphic display
» Possibility to download new firmware in the field
» Internal optional slot for “Ex”:
  • PSTN modem
  • RS-485 ports (x2)
  • 2nd pressure sensor input

SPECIFICATIONS

version: 1.0
TECHNICAL FEATURES

Approvals
» MID:
  • Module B – T10323
  • Module D – PTB approval
» Metrology: approval according to EN12405-1 and EN12405-1/A1 (European Standard)
» ATEX: device of category 1 approved to be used in hazardous area zone 0, ia IIC T4 classification (zone1, ia emb IIC T4 classification with internal PSTN modem)
» CE Marking: compliant with 89/336/EEC (EMC), 94/9/EC (ATEX) and 2004/22/EC (MID Directive)

Temperature Sensor
» Platinum PT 1000 (1000Ω at 0° C) probe
» Class A accuracy according to EN60751
» Casing: stainless steel tube for insertion into a thermowell (Ø 6 mm)
» Cable length: 2.5m or 0.8 m

Pressure Sensor
» Absolute pressure sensor designed for CORUS application (gage pressure sensors available on request)
» Silicon piezo-resistive sensor
» Overpressure up to 150 % of Pmax
» Available in 3 ranges:
  • 0.9 to 10 bar absolute
  • 3 to 30 bar absolute
  • 7.2 to 80 bar absolute
» Connection adapter: ¼” BSP (Gas) male
» Typical Accuracy: <0.15 %rd over the whole pressure range

Volume Input
» Dry contact, passive LF Reed type switch
» Maximum frequency 2Hz
» Programmable input pulse weight (0.001, 0.01, 0.1, 1, 10, 100)
» Second LF input for coherence function
» Associated tampering detection input
» Cyble® sensor ATEX module

Compressibility
» Main formulas available:
  • S-GERG
  • AGA8 Gross method 2
  • AGA8 Detailed method
  • AGANX19
  • AGANX19 modified
  • Table of Z (16 coefficients formula)
  • Fixed Z (PT conversion)

Accuracy
According to EN12405, overall accuracy on conversion factor is better than ± 0.5 % at reference conditions and better than 1 % at rated operating conditions.
» Typical accuracy better than ± 0.2 %

Display and Keyboard
» Graphic display
» All metrologic data and alarm status available
» Translatable messages to any language
» Specifics icons for application (see page 3)
» Possibility to show graphs for P, T, Z, C, Qm, Qb, P2
» 5-Button keyboard
» Possibility to program main parameters by keyboard
» Possibility to display the whole database

Digital Inputs (On/Off1, On/Off2, Tamper)
» Station monitoring
» Normally open or normally closed programmable status
» Connection to any On/Off signal type (Station door contact, safety valve position, pressure switch,...) in hazardous areas.

Digital Outputs
2 Digital, isolated outputs fully programmable as:
» Unconverted volume pulse retransmission
» Converted volume pulse retransmission
» Alarm retransmission
» 4/20 mA output (through an external F/I “Ex” module)

Alarms
The following alarms are managed by the CORUS:
» Temperature (Min, Max, Sensor failure)
» Pressure (Min, Max, Sensor failure)
» Conversion factor (Min, Max)
» Unconverted and converted flow-rate (Min, Max)
» Coherence
» Interval consumption
» Tamper
» On/Off 1 and On/Off 2
» External power supply outage
» Warning thresholds (T, P, P2)

Accessories
» Configuration software (Wincor)
» Thermowell
» 3-Way pressure connection kit
» Optical head
» ISB+
» External supply “Ex” module
» F/I Converter for 4/20 mA output
» Additional boards:
  • PSTN modem
  • RS-485 ports (x2)
  • 2nd pressure sensor input
» Cyble® sensor ATEX module
SYSTEM OVERVIEW

Distant communication (Connection to CORUS RS 232 or RS 485 port)

GSM/GPRS data collection through FOCUS+ GSM/GPRS Modem

Direct connection to standard devices (RTU, TCP/IP interface, standard modem, PC...)

Distant communication through internal RS-485 board (up to 4 CORUS on the same bus)

Distant communication through internal “Ex” PSTN Modem

Upstream pressure monitoring with P2 internal board

Local communication through optical port

Graphic Display

Possibility to translate messages

<table>
<thead>
<tr>
<th>INDEX</th>
<th>VALUE</th>
<th>ALARM</th>
<th>DATA</th>
<th>CONFIG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Unconverted volume: 19348725.000 m³
Converted volume: 24284651.283 Nm³

Graphic display function

<table>
<thead>
<tr>
<th>INDEX</th>
<th>VALUE</th>
<th>ALARM</th>
<th>DATA</th>
<th>CONFIG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Specific icons for CORUS applications

- Battery supply mode and status
- External supply mode and status
- Alarm presence (active, memorized)
- Incoming pulse from meter
- Pressure alarm (active, memorized)
- Temperature alarm (active, memorized)
- Communication in progress
Technical Specifications

<table>
<thead>
<tr>
<th>Overall Accuracy of the C Factor</th>
<th>Maximum Error &lt; 0.5 % - Typical Error &lt; 0.2%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversion Range</td>
<td>Pressure: 0.9 bar to 80 bar - Temperature: according Z formula</td>
</tr>
<tr>
<td>Power Supply</td>
<td>Battery or external (through Ex module)</td>
</tr>
<tr>
<td>Autonomy</td>
<td>5 years (battery version) in typical conditions</td>
</tr>
<tr>
<td>Ambient Temperature Range</td>
<td>-25° C to +55° C</td>
</tr>
<tr>
<td>Enclosure</td>
<td>IP65 polycarbonate box</td>
</tr>
<tr>
<td>Volume Input</td>
<td>LF input (2 Hz max); Reed switch type or Cyble® sensor ATEX module Second input for coherence function</td>
</tr>
<tr>
<td>Temperature Sensor</td>
<td>PT1000 class A; 4 wires</td>
</tr>
<tr>
<td>Pressure Sensor Ranges</td>
<td>[0.9 /10] bara, [3 /30] bara and [7.2 /80] bara (gage pressure sensors available on request)</td>
</tr>
<tr>
<td>Pressure Sensor Type</td>
<td>Piezo-resistive sensor</td>
</tr>
<tr>
<td>Outputs</td>
<td>2 Channels fully configurable as pulse, alarm or 4/20 mA*</td>
</tr>
<tr>
<td>User Interface</td>
<td>Graphic display + 5 button keyboard</td>
</tr>
<tr>
<td>Communication</td>
<td>Optical serial port and RS232 serial port</td>
</tr>
<tr>
<td>Metrol. Cables Length (P, T, LF)</td>
<td>2.5 m</td>
</tr>
<tr>
<td>Option</td>
<td>Internal &quot;Ex&quot; PSTN modem (V32/bis) RS-485 dual port board P2 second pressure input board</td>
</tr>
</tbody>
</table>

* through external F/I converter

DATABASE

CORUS provides 6 different logs:
- Hourly log: last 1440 hours (2 months)
- Daily log: last 124 days (4 months)
- Monthly log: last 24 months
- Interval log:
  - from 3100 to 5900 records according selected data
  - interval programmable from 1 to 60 mn
- Events log: last 800 events
- Parameters log: last 200 records

POWER SUPPLY

- Battery operating or external supply mode (mains or solar)
- Battery:
  - Specific 16.5 A.h lithium battery pack including all required protections for intrinsic safety
  - Pack can be changed in hazardous area without interrupting the normal operation of the device
  - 5 years autonomy in typical conditions

External power:
- External “Ex” specific supply module required providing 6 to 12 V DC to the CORUS
- Main battery (16.5 A.h) remains in the product, acting as backup battery in case of mains cuts.

Dimensions

<table>
<thead>
<tr>
<th>Dimensions</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SAFE AREA</td>
<td>HAZARDOUS AREA</td>
<td></td>
</tr>
<tr>
<td>Power Module</td>
<td>F/I Converter</td>
<td></td>
</tr>
<tr>
<td>L ≤ 10 m</td>
<td>L ≤ 10 m</td>
<td></td>
</tr>
<tr>
<td>220 V AC</td>
<td>24 V DC</td>
<td></td>
</tr>
<tr>
<td>L ≤ 20 m</td>
<td>L ≤ 20 m</td>
<td></td>
</tr>
<tr>
<td>430 mA Data 1*</td>
<td>430 mA Data 2*</td>
<td></td>
</tr>
<tr>
<td>Ex isolator</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>220 V AC</td>
<td>24 V DC</td>
<td></td>
</tr>
</tbody>
</table>

For more information, contact your local sales representative or agency:

Our company is the world’s leading provider of smart metering, data collection and utility software systems, with over 8,000 utilities worldwide relying on our technology to optimize the delivery and use of energy and water.

To realize your smarter energy and water future, start here: www.itron.com

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Delta®
Commercial & Industrial Rotary Meter

Delta meters are volumetric meters. The flow of gas moves the pistons and each rotation traps and transfers a specific volume of gas. The movement is mechanically transmitted to the totaliser through the magnetic coupling.

APPLICATIONS
Delta meters are designed to measure natural gas and various filtered, and non-corrosive gases. They are used when very accurate measurement is required, when the gas flow can be low or irregular.

Due to the volumetric principle of the Delta meter, its metrology is not influenced by installation conditions. Consequently, it can be used to build very compact stations without installing a straight pipe inlet before the meter.

Delta meters are approved for fiscal use.

Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow rate</td>
<td>From 0.25 m³/h to 1000 m³/h, G10 to G650</td>
</tr>
<tr>
<td>Nominal Diameters</td>
<td>DN 25 to DN 150 (1” to 6”)</td>
</tr>
<tr>
<td>Maximum Working Pressure</td>
<td>Up to 100 bar depending on the body material and flanging</td>
</tr>
<tr>
<td>Body Materials</td>
<td>Aluminium, ductile iron or steel.</td>
</tr>
<tr>
<td>Compliant with the Pressure Equipment Directive 97/23/EC</td>
<td></td>
</tr>
<tr>
<td>Temperature Range</td>
<td>ATEX/PED: -30°C to +60°C</td>
</tr>
<tr>
<td>MID: -25°C to +55°C</td>
<td></td>
</tr>
<tr>
<td>Storage temperature: -40°C to +70°C</td>
<td></td>
</tr>
<tr>
<td>Metrology</td>
<td>In accordance with the EC and OIML, large rangeability up to 1:200, depending on the G-size Approvals EC (PTB): 1.33-3271.3-3-ROM-E11. Large rangeability (PTB): 1.33-3271.3-1-ROM-N05</td>
</tr>
<tr>
<td>Compliant with the Measuring Instrument Directive 04/22/EC</td>
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</tr>
<tr>
<td>Intrinsic Safety Approval</td>
<td>L.C.I.E. 06 ATEX 6031 X - Compliant with the Directive 94/9/EC.</td>
</tr>
</tbody>
</table>

In accordance with the EC regulation, the maximum permissible error is +/-2% from Qmin to 0.2 Qmax, and +/-1% from 0.2 Qmax to Qmax. The WME (Weighted Measured Error) is less than 0.4%.

Typical Iron accuracy is +/-1% from Qmin to 0.2 Qmax, +/-0.5% from 0.2 Qmax to Qmax.

KEY BENEFITS
» Excellent metrological stability attested by customers over the years
» No influence of installation conditions nor stop-and-go flow rate on the metrology
» MID approved
» Optimised pressure loss for low pressure network
» Available in aluminium, ductile iron, or steel, for all applications
» Equipped as standard with the Cyble target

DESCRIPTION
A Delta meter is made of 5 main parts:
» A measuring chamber that is limited by the body and the 2 base plates (1)
» 2 pistons, which are synchronised by 2 gears and which rotate in opposite directions (2)
» 2 lubricant covers (3)
» A magnetic coupling to transmit the movement of the pistons to the totaliser (4)
» A totaliser to register the measured gas (5)

Typical calibration curve

In accordance with the EC regulation, the maximum permissible error is +/-2% from Qmin to 0.2 Qmax, and +/-1% from 0.2 Qmax to Qmax. The WME (Weighted Measured Error) is less than 0.4%

Typical Iron accuracy is +/-1% from Qmin to 0.2 Qmax, +/-0.5% from 0.2 Qmax to Qmax.
Delta DN80 G100 in aluminium equipped with the Cyble sensor

Delta DN50 G65 S1-Flow equipped with extension for the totaliser and by-pass

Mechanical drive according to EN 12480

Thermowell fitted with sealing holes

Gasket filters from DN25 to DN150

Delta DN80 G100 with Corus PTZ

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

Transmitters:
» Double Low Frequency fitted as standard on the whole range.
» Anti-tampering is supplied as standard.
» Medium Frequency is supplied as an option on the DN50 to DN150.
» High Frequency is supplied as an option on the whole range.
» Mechanical drive according to EN 12480 is supplied as an option.

ACCESSORIES / OPTIONS
» 100 µm flat gasket-filter to fit between flanges DN25 to DN150.

External silicagel cartridge:
» Accessory for maintenance on the installed external silicagel cartridge for extreme conditions.

Pete’s plug®:
» Ideal device for filling lubricant in the cover of the meter while equipment is in service. It must be fitted instead of the tap plug of the cover.
Plugged on the pressure tapping, it can be used to measure the pressure and the temperature of the measured gas.
Connection size: ¼” NPT or ¼” BSP.
Maximum pressure of gas: 20 bar.

Bracket for mounting a volume converter:
» This device permits the Itron Corus PTZ volume converter to be adapted directly onto the meter, or at the most convenient place to the meter to enable the converter index to be easily read.

Thermowells:
» These threaded ¼” NPT thermowells, can be plugged onto the meter. They can be retrofitted on to the standard version (plugged onto the existing pressure tapping), or they can be installed on the versions equipped with extra-tapping. The internal diameter of the thermowell is 7 mm; it enables mounting of most standard temperature probes.

Extension for the totaliser:
» This option allows the possibility to increase 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 at low temperatures.

By-pass:
» It can be installed as an option on the steel version DN50. It enables the gas to flow even if the meter is blocked for any reason.

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.
DELTA COMPACT - ALUMINIUM

Main Characteristics
» The Itron Compact DELTA meter is ideal for installation in extremely small cabinets.
» Available in thread version (L=121mm) or flanged version (L=171mm).
» Index can be oriented as required, magnetic coupling.
» Multi-position meter, the flow orientation does not need to be specified when ordering the meter.
» Only the front cover has to be filled with lubricant.

Technical Features
Flow rate 0.25 m³/h to 65 m³/h
G size G10, G16, G25 and G40
Rangeability 1:20 to 1:200
Threaded version DN40 ½” BSP or NPT
Flanged version DN25, DN40 and DN50
(1”, 1½”, 2”)
ISO PN10/16, PN20 and ANSI125-ANSI150
Pressure range Up to 19.3 bar

<table>
<thead>
<tr>
<th>G size</th>
<th>Qmax (m³/h)</th>
<th>DN</th>
<th>Flange to flange distance Dim.: L</th>
<th>Rangeability</th>
<th>Starting flow (dm³/h)</th>
<th>Flow rate at: Error +10% Typical value (dm³/h)</th>
<th>Pressure loss Δpr (mbar)</th>
<th>1 Imp LF (dm³/Imp)</th>
<th>1 Imp HF (dm³/Imp) (Std. Gears 32/40)</th>
<th>Freq HF at Qmax (Hz)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Vc (dm³)</th>
<th>Weight (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>G10</td>
<td>16</td>
<td>40</td>
<td>121</td>
<td>20 to 50</td>
<td>25</td>
<td>60</td>
<td>0.3</td>
<td>0.218</td>
<td>20.4</td>
<td>126</td>
<td>46</td>
<td>172</td>
<td>126</td>
<td>0.19</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>G16</td>
<td>25</td>
<td>40</td>
<td>121</td>
<td>20 to 100</td>
<td>25</td>
<td>60</td>
<td>0.8</td>
<td>0.218</td>
<td>31.8</td>
<td>126</td>
<td>46</td>
<td>172</td>
<td>126</td>
<td>0.19</td>
<td>4</td>
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<tr>
<td>G25</td>
<td>40</td>
<td>40</td>
<td>121</td>
<td>20 to 160</td>
<td>25</td>
<td>60</td>
<td>1.0</td>
<td>0.218</td>
<td>50.9</td>
<td>126</td>
<td>46</td>
<td>172</td>
<td>126</td>
<td>0.19</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>G40</td>
<td>65</td>
<td>40</td>
<td>121</td>
<td>20 to 200</td>
<td>25</td>
<td>60</td>
<td>4.0</td>
<td>0.218</td>
<td>82.8</td>
<td>126</td>
<td>46</td>
<td>172</td>
<td>126</td>
<td>0.19</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

(1)Δpr: Pressure loss (mbar) with ρ = 0.83Kg/m³ and at Qmax

DELTA COMPACT - ALUMINIUM

THREADED VERSION - Aluminium Range DN40:

<table>
<thead>
<tr>
<th>G size</th>
<th>Qmax (m³/h)</th>
<th>DN</th>
<th>Flange to flange distance Dim.: L</th>
<th>Rangeability</th>
<th>Starting flow (dm³/h)</th>
<th>Flow rate at: Error ≈ -10% Typical value (dm³/h)</th>
<th>Pressure loss Δpr (mbar)</th>
<th>1 Imp LF (dm³/Imp)</th>
<th>1 Imp HF (dm³/Imp) (Std. Gears 32/40)</th>
<th>Freq HF at Qmax (Hz)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Vc (dm³)</th>
<th>Weight (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>G10</td>
<td>16</td>
<td>40</td>
<td>121</td>
<td>20 to 50</td>
<td>25</td>
<td>60</td>
<td>0.4</td>
<td>0.218</td>
<td>20.4</td>
<td>126</td>
<td>60</td>
<td>186</td>
<td>126</td>
<td>0.19</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>G16</td>
<td>25</td>
<td>40</td>
<td>121</td>
<td>20 to 100</td>
<td>25</td>
<td>60</td>
<td>0.8</td>
<td>0.218</td>
<td>31.8</td>
<td>126</td>
<td>60</td>
<td>186</td>
<td>126</td>
<td>0.19</td>
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<td></td>
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<tr>
<td>G25</td>
<td>40</td>
<td>40</td>
<td>121</td>
<td>20 to 160</td>
<td>25</td>
<td>60</td>
<td>1.2</td>
<td>0.218</td>
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<td>126</td>
<td>60</td>
<td>186</td>
<td>126</td>
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<td>G40</td>
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<td>40</td>
<td>121</td>
<td>20 to 200</td>
<td>25</td>
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<td>0.218</td>
<td>82.8</td>
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<td>60</td>
<td>186</td>
<td>126</td>
<td>0.19</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

(1)Δpr: Pressure loss (mbar) with ρ = 0.83Kg/m³ and at Qmax

Delta DN40 G16
Delta DN40 G16 fitted with Cyble sensor

FLANGED VERSION - Aluminium Range DN25/DN40/DN50:

<table>
<thead>
<tr>
<th>G size</th>
<th>Qmax (m³/h)</th>
<th>DN</th>
<th>Flange to flange distance Dim.: L</th>
<th>Rangeability</th>
<th>Starting flow (dm³/h)</th>
<th>Flow rate at: Error ≈ -10% Typical value (dm³/h)</th>
<th>Pressure loss Δpr (mbar)</th>
<th>1 Imp LF (dm³/Imp)</th>
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<th>Freq HF at Qmax (Hz)</th>
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<th>C</th>
<th>D</th>
<th>Vc (dm³)</th>
<th>Weight (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>G10</td>
<td>16</td>
<td>25</td>
<td>171</td>
<td>20 to 50</td>
<td>25</td>
<td>60</td>
<td>0.3</td>
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<td>20.4</td>
<td>126</td>
<td>60</td>
<td>186</td>
<td>126</td>
<td>0.19</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>G16</td>
<td>25</td>
<td>25</td>
<td>171</td>
<td>20 to 100</td>
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<td>60</td>
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<td>0.218</td>
<td>31.8</td>
<td>126</td>
<td>60</td>
<td>186</td>
<td>126</td>
<td>0.19</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>G16</td>
<td>25</td>
<td>50</td>
<td>171</td>
<td>20 to 100</td>
<td>25</td>
<td>60</td>
<td>0.7</td>
<td>0.218</td>
<td>31.8</td>
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<td>60</td>
<td>186</td>
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<tr>
<td>G16</td>
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<td>171</td>
<td>20 to 160</td>
<td>25</td>
<td>60</td>
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(1)Δpr: Pressure loss (mbar) with ρ = 0.83Kg/m³ and at Qmax

Delta DN50 G40
Delta DN50 G40 fitted with Cyble sensor
DELTA 2050/2080/2100 - ALUMINIUM

Main Characteristics

- Index can be oriented as required, magnetic coupling.
- Both front and rear covers must be filled with a lubricant.
- Multi-position meters, the flow orientation does not need to be specified when ordering the meter.
- Thermowells: supplied as an option, 2 tappings ¼" NPT allow an easy installation of thermowells.
- Double Low Frequency transmitter connected on a Binder 6 pins plug. Anti-tampering is supplied as a standard.
- MF is supplied as an option.
- HF is supplied as an option, connected on a 3 pin binder.
- A G100 DN50 is available to allow the possibility of increasing the station capacity; the use of the same flanged as the G65 DN50 does not require modification of the existing installation.
- Equipped as standard with the Cyble target.

Technical Features

- Flow rate: 0.4 m³/h to 650 m³/h
- G size: G16, G25, G40, G65, G100, G160, G250 and G400
- Rangeability: 1:20 to 1:200
- Nominal diameter: 50, 80 and 100 (2", 3" and 4"
- Flanging: PN 10/16, PN20 and ANSI125-ANSI150
- Pressure range: 16 bar (Option: 19.3 bar)

Aluminium Range DN50/DN80/DN100:

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<th>1 Imp MF at Qmax (m³/imp)</th>
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<th>1 Imp HF (dm³/Imp) (Std. Gears 32/40)</th>
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DELTA 2050/2080/2100 & S3-FLOW - DUCTILE IRON - EN-GJS-400-18LT

Main Characteristics

» Index can be oriented as required, magnetic coupling.
» Both front and rear covers must be filled with a lubricant.
» Multi-position meters, the flow orientation does not need to be specified when ordering the meter.
» Thermowells: supplied as an option, 2 tappings ¼” NPT allow an easy installation of thermowells.
» Double Low Frequency transmitter connected on a Binder 6 pins plug.
» Anti-tampering is supplied as a standard.
» MF is supplied as an option.
» HF is supplied as an option (up to 3 HF possible for the S3-Flow).
» High Temperature Loading: fire resistant PN5 is supplied as an option.
» Equipped as standard with the Cyble target.

Technical Features

Flow rate 0.4 m³/h to 1000 m³/h
G size G16, G25, G40, G65, G100, G160, G250, G400 and G650
Rangeability 1:20 to 1:200
Nominal diameter 50, 80, 100 and 150 (2”, 3”, 4” and 6”)
Flanging PN 10/16, PN20 and ANSI150
Pressure range 16 bar (Option: 19.3 bar)

DN50/DN80/DN100/DN150:

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<th>DN</th>
<th>Flange to flange distance Dim.: L</th>
<th>Rangeability</th>
<th>Starting flow (dm³/h)</th>
<th>Flow rate at: Error = -10% Typical value (dm³/h)</th>
<th>Pressure loss ∆pr (mbar)</th>
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<th>1 Imp MF at Qmax (Hz)</th>
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(1)∆pr: Pressure loss (mbar) with g = 0.83Kg/m³ and at Qmax
(2)S3-Flow meter

Delta DN80 G100 3xDN in Ductile iron equipped with Cyble sensor
**DELTA S1-FLOW - STEEL**

**Main Characteristics**
- Index can be oriented as required, magnetic coupling.
- Double Low Frequency transmitter connected on a 6 pin Binder plug. Anti-tampering is supplied as a standard.

**DN50**
- G16 to G100
- S-Flow technology
- Only the front cover must be filled with a lubricant.
- Multi-position meter
- MF is supplied as an option.
- 2 thermowells are supplied as option.
- A by-pass can be installed as an option.
  It enables the gas to flow even if the meter is blocked for any reason.
- An alarm can be remotely sent requesting for maintenance.
- Up to 2 HF are supplied as option.

**Technical Features**
- **Flow rate**: 0.4 m³/h to 160 m³/h
- **G size**: G16, G25, G40, G65 and G100
- **Rangeability**: 1:20 to 1:200
- **Nominal diameter**: 50 (2”)
- **Flanging**
  - PN 10/16 to PN110,
  - ANSI 150 to ANSI600
- **Pressure range**: 101.2 bar

**Steel Range DN50:**

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<th>Qmax (m³/h)</th>
<th>DN</th>
<th>Flange to flange distance Dim.:L</th>
<th>Rangeability</th>
<th>Starting flow (dm³/h)</th>
<th>Flow rate at: Error = -10% Typical value (dm³/h)</th>
<th>Pressure loss Δpr (mbar)</th>
<th>1 Imp LF &amp; Cyble (m³/lmp)</th>
<th>1 Imp MF (dm³/lmp)</th>
<th>Freq MF at Qmax (Hz)</th>
<th>1 Imp HF (dm³/Imp) (Std. Gears 32/40)</th>
<th>Freq HF at Qmax (Hz)</th>
<th>A</th>
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<td>150</td>
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</table>

\[\Delta p_r: \text{Pressure loss (mbar)} \text{ with } \rho = 0.83 Kg/m³ \text{ and at } Q_{max}\]

![Delta DN50 G65 S1 Flow in steel and equipped with by-pass](image-url)
**A) 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 $T_a = -30°C$ 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
     - $L_i \leq 100$ μH
     - $P_i \leq 120$ mW
   - Ambient temperature $T_a = -30°C$ 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
     - $L_i \leq 250$ μH
     - $P_i \leq 64$ mW

**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.

**B) PRESSURE LOSS OF THE DELTA METERS**

Calculation of pressure loss:
$$\Delta p = \Delta p_r \times \left( \frac{\rho_n}{0.83} \right) \times (P_b + 1) \times \left( \frac{\rho_n}{Q_{max}} \right) \times \left( \frac{273}{(273 + T_b)} \right)$$

**C) INSTALLATION**

Each meter is delivered with binder plugs for the installed transmitters and oil for the lubrication. Please refer to the instruction manual supplied with the meter. The advice given therein will ensure optimal use of the Delta meter over the years.

**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).
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Hardeckstraße
D-76185 Karlsruhe
Germany
Phone: +49-721 5981 0
Fax: +49-721 5981 189
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:
1. a body containing all the components;
2. a flow straightener to stabilise and accelerate the gas flow before the turbine wheel;
3. a measuring unit including the turbine wheel;
4. a magnetic coupling to transmit the movement of the turbine wheel to the totaliser;
5. 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 cyble target.
» Various options available: integrated thermowells, oil pump, pulse transmitters, etc

Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metrological Approvals</td>
<td>Compliant with the Measuring Instrument Directive 2004/22/EC Approval number: DE-10-M1002-PTB001</td>
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<td>Intrinsic Safety Approval</td>
<td>Compliant with the Directive 94/9/EC Approval number: LCIE 06 ATEX 6031 X</td>
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<td>Flow Rate</td>
<td>From 5 m³/h to 10000 m³/h, G65 to G6500.</td>
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<tr>
<td>Nominal Diameters</td>
<td>From DN50 to DN500 mm (2” to 20”).</td>
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<td>Maximum Working Pressure</td>
<td>Up to 100 bar depending on the body material and flanging.</td>
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<td>Mounting</td>
<td>The Fluxi 2000/TZ meters can be installed either horizontally or vertically, for the DN50 to DN300, and horizontally for the DN400 and DN500.</td>
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<tr>
<td>Body Materials</td>
<td>Ductile iron, cast steel or welded steel. Compliant with the Pressure Equipment Directive 97/23/EC Approval number: DVGW CE-0085BM 0417</td>
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<td>Temperature Range</td>
<td>ATEX/PED: -30°C to +60°C MID: -25°C to +55°C Storage temperature: -40°C to +70°C</td>
</tr>
</tbody>
</table>

knowledge to shape your future
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 +/-2 %, from Qmin to 0.2 Qmax, and +/-1% from 0.2 Qmax to Qmax. The WME (Weighted Measured Error) is less than 0.4%.

Typical Itron accuracy is:
+/-1% from Qmin to 0.2 Qmax, +/-0.5% from 0.2 Qmax to Qmax.

Transmitters
1. Cyble sensor: It can be delivered mounted on 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 DN800 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.

Flow Straightener
6. 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 fulfill 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 perturbated flow.

Oil pump
7. 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
8. 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≤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
1. 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 fulfill 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 perturbated flow.
CHARACTERISTICS

A) Technical data sheet

<table>
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<tr>
<th>G size</th>
<th>DN (mm)</th>
<th>Max Flow (m³/h)</th>
<th>Rangeability</th>
<th>1 Imp LF &amp; Cyble (m³/Imp)</th>
<th>Freq LF</th>
<th>1 Imp MF (dm³/Imp)</th>
<th>Freq MF (Hz)</th>
<th>1 Imp HF2 (dm³/Imp)</th>
<th>Freq HF2 (Hz)</th>
<th>1 Imp HF3 (dm³/Imp)</th>
<th>Freq HF3 (Hz)</th>
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</tbody>
</table>

Options:

Extension for the totaliser
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.

EXTERNAL ACCESSORIES

Bracket for mounting a volume converter
This device allows the Itron PTZ volume converter to be adapted directly onto the meter.

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.
### Body materials and approximate weight (Kg)

<table>
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<th>Length of body (mm)</th>
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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)

<table>
<thead>
<tr>
<th>G size</th>
<th>DN (mm)</th>
<th>Max. Flow (m³/h)</th>
<th>Standard ΔPr</th>
<th>With integrated flow conditioner ΔPr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ρ = 0.83kg/m³, T = 0°C, Qmax = 0.83kg/m³</td>
</tr>
<tr>
<td>G65</td>
<td>50</td>
<td>100</td>
<td>9.1</td>
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<tr>
<td>G100</td>
<td>80</td>
<td>160</td>
<td>2.4</td>
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<tr>
<td>G160</td>
<td>250</td>
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<td>5.9</td>
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<td>400</td>
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<td>12.8</td>
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<td>G160</td>
<td>100</td>
<td>250</td>
<td>2.2</td>
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<td>G250</td>
<td>400</td>
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<td>5.4</td>
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<tr>
<td>G400</td>
<td>650</td>
<td></td>
<td>11.8</td>
<td></td>
</tr>
<tr>
<td>G400</td>
<td>150</td>
<td>650</td>
<td>2.7</td>
<td>-</td>
</tr>
<tr>
<td>G650</td>
<td>1000</td>
<td></td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>G1000</td>
<td>1600</td>
<td></td>
<td>13.8</td>
<td></td>
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<tr>
<td>G650</td>
<td>200</td>
<td>1000</td>
<td>1.6</td>
<td>2.6</td>
</tr>
<tr>
<td>G1000</td>
<td>1600</td>
<td></td>
<td>4.0</td>
<td>6.3</td>
</tr>
<tr>
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<td>2500</td>
<td></td>
<td>8.7</td>
<td>13.7</td>
</tr>
<tr>
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<td>1600</td>
<td>2.1</td>
<td>3.3</td>
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<tr>
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<td>250</td>
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<td>5.0</td>
<td>8.0</td>
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<tr>
<td>G2500</td>
<td>400</td>
<td></td>
<td>11.0</td>
<td>17.3</td>
</tr>
</tbody>
</table>

Where:  
Δp: Pressure loss in the calculated conditions  
Δpr: Pressure loss in the reference conditions  
ρ: Gas density (kg/m³) at 0° C and 1013 mbar  
Pb: Operating pressure (Bar gauge)  
q: Flow rate (m³/h)  
Qmax: Maximum flow rate (m ³/h)  
Tb: Gas temperature (°C).

Calculation of pressure loss:

\[Δp = Δpr \times \frac{q}{0.83} \times \frac{Pb}{(Pb + 1)} \times \frac{Qmax}{Qmax} \times \frac{273}{(273 + Tb)}\]
C) Dimensions (mm)

<table>
<thead>
<tr>
<th>DN</th>
<th>L</th>
<th>L short*</th>
<th>A</th>
<th>A short*</th>
<th>B</th>
<th>B short*</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<tbody>
<tr>
<td>50</td>
<td>150</td>
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<td>60</td>
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<td>820</td>
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* Short version, same length as for the former NM meter

D) Thermowells sizes

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<tr>
<th>DN</th>
<th>Thread</th>
<th>Order Number with stuffing box &amp; o-ring</th>
<th>d bore mm</th>
<th>d cable mm</th>
<th>Max. Setting Depth (S) Sensor (mm)</th>
<th>L mm</th>
<th>X mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>50(LP)/80/100</td>
<td>G ¼ A</td>
<td>E952-014-04</td>
<td>7.5</td>
<td>4-8</td>
<td>60</td>
<td>59</td>
<td>12</td>
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<tr>
<td>50(HP)/150/200</td>
<td>G ¼ A</td>
<td>E952-014-14</td>
<td>7.5</td>
<td>4-8</td>
<td>90</td>
<td>93</td>
<td>12</td>
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<tr>
<td>250/500</td>
<td>G ½ A</td>
<td>E952-014-05</td>
<td>8</td>
<td>4-8</td>
<td>150</td>
<td>147</td>
<td>14</td>
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</tbody>
</table>

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
     • li ≤ 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 ≤ 50 mA
     • Ci ≤ 90 nF
     • Li ≤ 100μH
     • Pi ≤ 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:
     • Ui ≤ 16 Volt
     • li ≤ 52 mA
     • Ci ≤ 50 nF
     • Li ≤ 250μH
     • Pi ≤ 64 mW

**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
     • li ≤ 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 ≤ 50 mA
     • Ci ≤ 90 nF
     • Li ≤ 100μH
     • Pi ≤ 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:
     • Ui ≤ 16 Volt
     • li ≤ 52 mA
     • Ci ≤ 50 nF
     • Li ≤ 250μH
     • Pi ≤ 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.
Our company is the world’s leading provider of smart metering, data collection and utility software systems, with over 8,000 utilities worldwide relying on our technology to optimize the delivery and use of energy and water.

To realize your smarter energy and water future, start here: www.itron.com

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Fax: +49-721 5981 189

For more information, contact your local sales representative or agency: