

# Delta S-Flow

High Pressure and High Precision Resonance-Free Reference Rotary Meters



Delta S-Flow combines the precision and resonance-free operation of the S-Flow technology with a robust materials, including Steel series, suitable for pressures up to 101.2 bar, ensuring reliable performance in demanding industrial and hydrogen applications

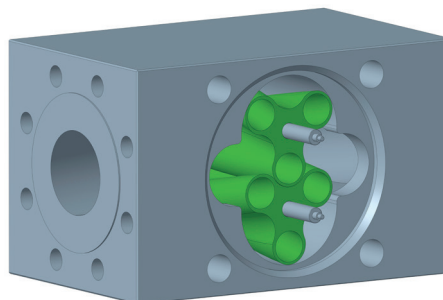
|               |                                           |
|---------------|-------------------------------------------|
| DN50          | – S1-Flow (Aluminium and Steel series)    |
| DN80 – DN100  | – S2-Flow (Steel series)                  |
| DN100 – DN150 | – S3-Flow (Ductile Iron and Steel series) |

## Key Features

- » Excellent metrological stability attested by customers over the years
- » Perfectly constant rotation speed of the pistons with the S-Flow Technology
- » Continuous and smooth transfer of the counted volume without **any resonance and noise** using 3-lobe, 60° twisted pistons
- » High accuracy and stability, compliant with MID
- » No impact on the calibration curve of the pressure pulsation (unlike in regular rotary meters)
- » Hydrogen-ready materials and seals
- » Optional bypass system maintaining flow continuity with alarm signal for S1-Flow and S2-Flow
- » No influence of installation conditions nor stop-and-go flow rate on the metrology
- » Extended rangeability up to 1:200.
- » Optimized pressure loss for low- or high-pressure networks
- » Multi-position meter, changeable on the field
- » 355° rotating totalizer
- » Cyble technology

## Operation Principle

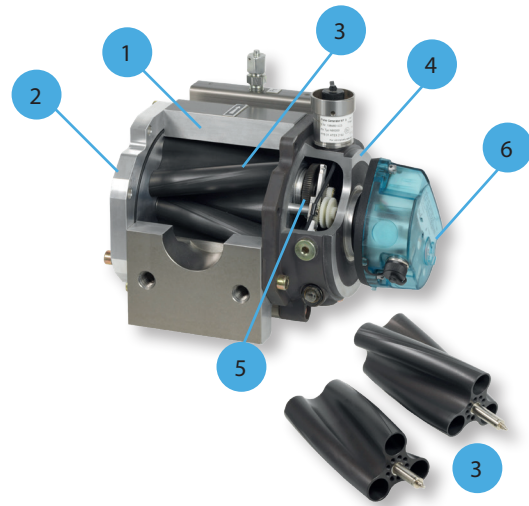
Delta meters are volumetric meters. The flow gas moves the pistons and each rotation traps and transfers a specific volume of gas. The movement is mechanically transmitted to the totalizer through magnetic coupling.



## Description

A Delta meter is made of 5 main parts:

- » A measuring chamber that is limited by the body (1) and the 2 base plates (2)
- » 2 pcs. of 3-lobe twisted by 60 degree pistons, which are synchronized by 2 gears and which rotate in opposite directions (3)
- » Lubricant cover (4)
- » A magnetic coupling to transmit the movement of the pistons to the totalizer (5)
- » A totalizer to register the measured gas (6)



## Technical Specifications

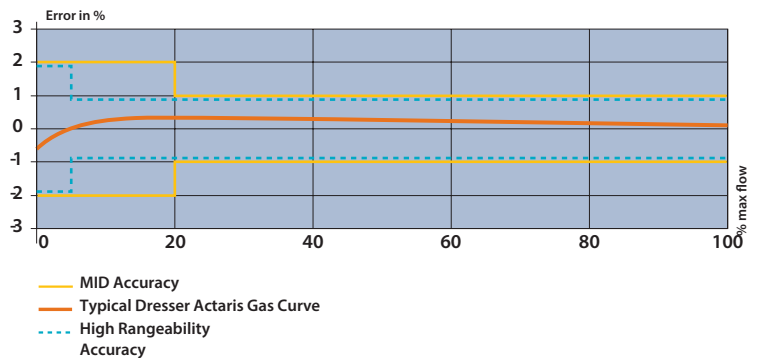
|                           |                                                                                                                         |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Flow rate                 | From 0.8 m <sup>3</sup> /h to 1000 m <sup>3</sup> /h, G16 to G650                                                       |
| Nominal Diameters         | DN50, DN80, DN100, DN150 (2" to 6")                                                                                     |
| Maximum Working Pressure  | Up to 101.2 bar depending on the body material and flanging (PN110 / ANSI 600)                                          |
| Body Materials            | Aluminium, ductile iron or steel.<br>Compliant with the Pressure Equipment Directive 2014/68/EU                         |
| Temperature Range         | ATEX/PED: -30 °C to + 60 °C<br>MID: -25 °C to + 55 °C<br>Storage temperature: -40 °C to + 70 °C                         |
| Metrology                 | In accordance with MID, large rangeability up to 1:200.<br>Compliant with the Measuring Instrument Directive 2014/32/EU |
| Intrinsic Safety Approval | Compliant with the Directive 2014/34/EU, ATEX and IECEx approved                                                        |

## 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.



## Compliance

- » MID 2014/32/EU
- » PED 2014/68/EU
- » ATEX 2014/34/EU
- » IECEx
- » EN 12480

## Delta S1-Flow Aluminium series reference Meter

In this meter, the classic pistons are replaced by 3-lobe and 60 °twisted pistons, eliminating the normal pulsations and resonance of the conventional rotary meter.

Developed to attend the highest requirements in terms of accuracy, stability and noise level, Delta reference meter is ideal for Metrology Institutes.

### Main Characteristics

- » S-flow technology.
- » Only front cover must be filled with lubricant.
- » Thermowells: supplied as an option.
- » Double Low Frequency transmitter connected on a Binder 6 pins plug and Anti-tampering are supplied as a standard.
- » MF is supplied as an option.
- » HF is supplied as an option, connected on a Binder 3 pin plug.

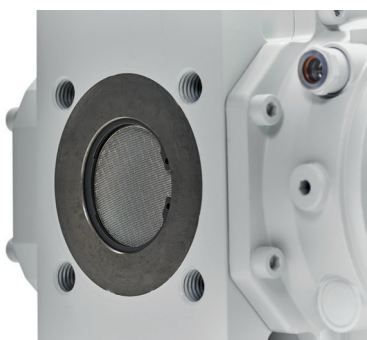
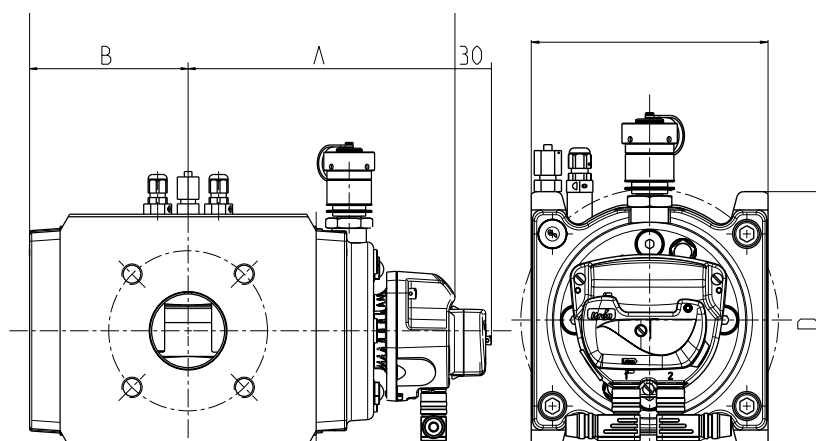
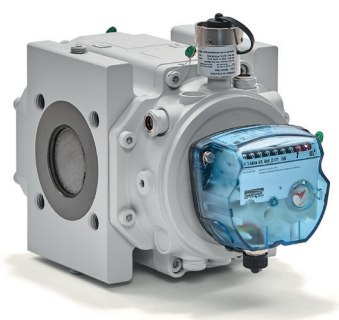
### Technical Features

|                  |                                                                                                                                                                           |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flow rate        | 0,8 m³/h to 160 m³/h                                                                                                                                                      |
| G size           | G16, G25, G40, G65 and G100                                                                                                                                               |
| Rangeability     | Standard (up to): 1:30 / 1:65 / 1:100 / 1:160 / 1:200<br>High (up to): 1:20 / 1:30 / 1:50 / 1:80 / 1:130<br>As a master meter (up to): 1:20 / 1:30 / 1:65 / 1:100 / 1:160 |
| Nominal diameter | 50 (2")                                                                                                                                                                   |
| Flanging         | PN 10/16 and Class 150 (125)                                                                                                                                              |
| Pressure range   | 16 bar                                                                                                                                                                    |

### DN50 :

| G size | Qmax (m³/h) | DN | Flange to flange distance Dim.: L | Rangeability | Pressure loss Δpr <sup>(1)</sup> (mbar) | 1 Imp LF & Cyble (m³/Imp) | 1 Imp MF (dm³/Imp) | Freq MF at Qmax (Hz) | 1 Imp HF (dm³/Imp) (Std. Gears 32/40) | Freq HF at Qmax (Hz) | A   | B  | C   | D   | Vc (dm³) | Weight (Kg) |
|--------|-------------|----|-----------------------------------|--------------|-----------------------------------------|---------------------------|--------------------|----------------------|---------------------------------------|----------------------|-----|----|-----|-----|----------|-------------|
| G16    | 25          | 50 | 171                               | 20 to 30     | 0.21                                    | 0.1                       | 2.31               | 3.01                 | 0.0496                                | 140                  | 172 | 87 | 259 | 182 | 0.49     | 10          |
| G25    | 40          | 50 | 171                               | 20 to 65     | 0.44                                    | 0.1                       | 2.31               | 4.81                 | 0.0496                                | 224                  | 172 | 87 | 259 | 182 | 0.49     | 10          |
| G40    | 65          | 50 | 171                               | 20 to 100    | 1.08                                    | 0.1                       | 2.31               | 7.82                 | 0.0496                                | 364                  | 172 | 87 | 259 | 182 | 0.49     | 10          |
| G65    | 100         | 50 | 171                               | 20 to 160    | 1.90                                    | 0.1                       | 2.31               | 12.0                 | 0.0496                                | 560                  | 172 | 87 | 259 | 182 | 0.49     | 10          |
| G100   | 160         | 50 | 171                               | 20 to 200    | 3.88                                    | 0.1                       | 2.31               | 19.3                 | 0.0496                                | 896                  | 172 | 87 | 259 | 182 | 0.49     | 10          |

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



## Delta S1-Flow Steel series reference Meter

Delta S1-Flow in steel is designed to meet the highest requirement, both in accurate measurement, due to S-flow technology, and high pressure conditions.

### Main Characteristics

- » Only the front cover must be filled with a lubricant.
- » 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.

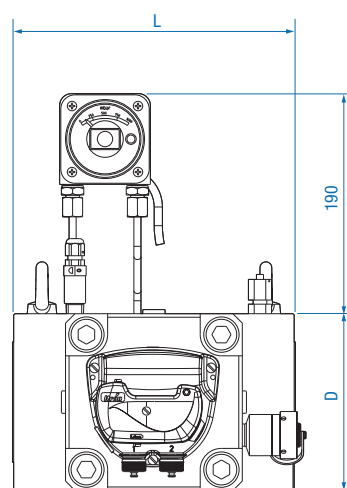
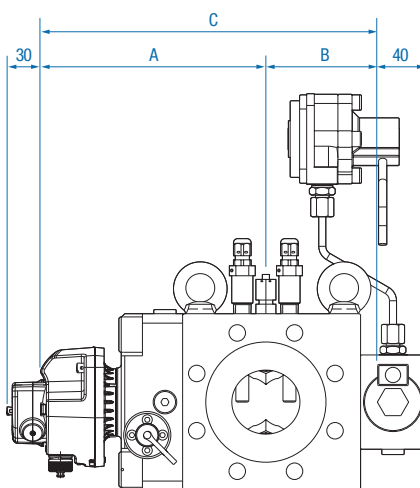
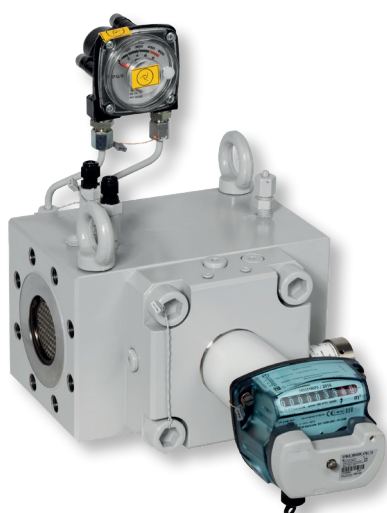
### Technical Features

|                  |                                                                                                                                                                           |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flow rate        | 0.8 m³/h to 160 m³/h                                                                                                                                                      |
| G size           | G16, G25, G40, G65 and G100                                                                                                                                               |
| Rangeability     | Standard (up to): 1:30 / 1:65 / 1:100 / 1:160 / 1:200<br>High (up to): 1:20 / 1:30 / 1:50 / 1:80 / 1:130<br>As a master meter (up to): 1:20 / 1:30 / 1:65 / 1:100 / 1:160 |
| Nominal diameter | 50 (2")                                                                                                                                                                   |
| Flanging         | PN 10/16 to PN40, Class 150 to Class 600                                                                                                                                  |
| Pressure range   | 101.2 bar                                                                                                                                                                 |

### DN50 :

| G size | Qmax (m³/h) | DN | Flange to flange distance Dim.: L | Rangeability | Pressure loss $\Delta p^{(1)}$ (mbar) | 1 Imp LF & Cyble (m³/Imp) | 1 Imp MF (dm³/Imp) | Freq MF at Qmax (Hz) | 1 Imp HF (dm³/Imp) (Std. Gears 32/40) | Freq HF at Qmax (Hz) | A   | B   | C   | D   | Vc (dm³) | Weight (Kg) |
|--------|-------------|----|-----------------------------------|--------------|---------------------------------------|---------------------------|--------------------|----------------------|---------------------------------------|----------------------|-----|-----|-----|-----|----------|-------------|
| G16    | 25          | 50 | 240                               | 20 to 30     | 0.21                                  | 0.1                       | 2.31               | 3.01                 | 0.0496                                | 140                  | 190 | 100 | 290 | 150 | 0.49     | 34          |
| G25    | 40          | 50 | 240                               | 20 to 65     | 0.44                                  | 0.1                       | 2.31               | 4.81                 | 0.0496                                | 224                  | 190 | 100 | 290 | 150 | 0.49     | 34          |
| G40    | 65          | 50 | 240                               | 20 to 100    | 1.08                                  | 0.1                       | 2.31               | 7.82                 | 0.0496                                | 364                  | 190 | 100 | 290 | 150 | 0.49     | 34          |
| G65    | 100         | 50 | 240                               | 20 to 160    | 1.90                                  | 0.1                       | 2.31               | 12.0                 | 0.0496                                | 560                  | 190 | 100 | 290 | 150 | 0.49     | 34          |
| G100   | 160         | 50 | 240                               | 20 to 200    | 3.88                                  | 0.1                       | 2.31               | 19.3                 | 0.0496                                | 896                  | 190 | 100 | 290 | 150 | 0.49     | 34          |

<sup>(1)</sup>  $\Delta p$ : Pressure loss (mbar) with  $\rho = 0.83 \text{ Kg/m}^3$  and at Qmax



Delta DN50 G100 S1 Flow in steel and equipped with by-pass, extension for the totalizer and cyble sensor



## Delta S2-Flow Steel series reference Meter

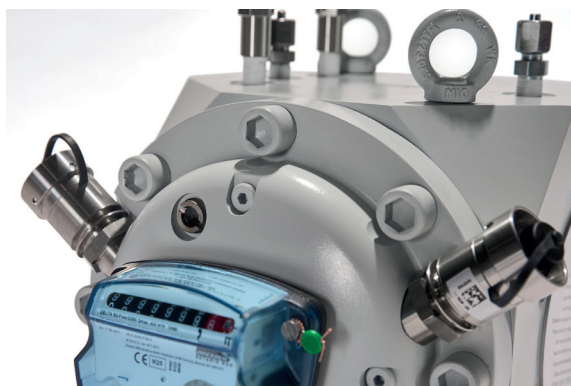
The Delta S2-Flow extends the proven Delta S-Flow family to cover high-pressure and reference applications in the DN80–DN100 (G65–G400) range. It combines the precision and resonance-free operation of the S-Flow technology with a robust steel design suitable for pressures up to 101.2 bar, ensuring reliable performance in demanding industrial and hydrogen applications

### Technical Specifications

|                          |                                                            |
|--------------------------|------------------------------------------------------------|
| Flow rate                | 100 - 650 m³/h                                             |
| Nominal Diameters        | DN80, DN100                                                |
| Meter sizes (G)          | G65 - G400                                                 |
| Rangeability             | Up to 1:200                                                |
| Maximum Working Pressure | Up to 101.2 bar (PN110 / ANSI 600)                         |
| Body Material            | Steel, corrosion-protected (EN 12480)                      |
| Flanging                 | PN10 – PN110 / ANSI 150–600 (RF / RJ)                      |
| Pressure Loss            | ≤ 4 mbar (@ $\rho = 0.83 \text{ kg/m}^3$ , DN100 650 m³/h) |
| By-Pass Option           | Opening 350 mbar / Alarm 250 mbar / Flow 650 m³/h at 1 bar |
| Thermowells              | 2 × ¼" NPT for Ø6 mm probes                                |
| Sight Glass              | High-pressure oil sight glass (PN110)                      |
| Lubrication              | Front cover only; Pete's Plug Optional                     |
| Protection Rating        | IP67 totalizer with Cyble compatibility                    |

### Applications

- » Calibration and test benches
- » Industrial gas and hydrogen networks
- » High-pressure and biomethane installations
- » Reference metering and custody transfer
- » Installations requiring by-pass continuity



## Delta S3-Flow Ductile Iron series reference Meter

S3-Flow is built up with S-flow technology to meet the highest requirements in accuracy measurement, being ideal to be used as a reference meter.

### Main Characteristics

- » Both front and rear covers must be filled with a lubricant.
- » Thermowells: supplied as an option.
- » 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.
- » High Temperature Loading: fire resistant PN5 is supplied as an option. Not offered along with HF.

### Technical Features

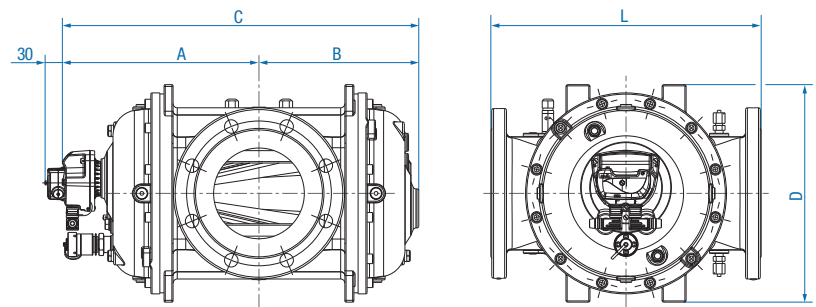
|                  |                                                                                                                                 |
|------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Flow rate        | 4 m³/h to 1000 m³/h                                                                                                             |
| G size           | G250, G400, G650                                                                                                                |
| Rangeability     | Standard (up to): 1:100 / 1:160 / 1:200<br>High (up to): 1:50 / 1:80 / 1:100<br>As a master meter (up to): 1:50 / 1:100 / 1:130 |
| Nominal diameter | 100 and 150 (4" and 6")                                                                                                         |
| Flanging         | PN 10/16 and Class 150 (125)                                                                                                    |
| Pressure range   | 16 bar (Option: 19.3 bar)                                                                                                       |

### DN80/DN100/DN150 :

| G size | Qmax (m³/h) | DN  | Flange to flange distance Dim.: L | Rangeability | Pressure loss $\Delta p^{(1)}$ (mbar) | 1 Imp LF & Cyble (m³/Imp) | 1 Imp MF (dm³/Imp) | Freq MF at Qmax (Hz) | 1 Imp HF (dm³/Imp) (Std. Gears 32/40) | Freq HF at Qmax (Hz) | A   | B   | C   | D   | Vc (dm³) | Weight (Kg) |
|--------|-------------|-----|-----------------------------------|--------------|---------------------------------------|---------------------------|--------------------|----------------------|---------------------------------------|----------------------|-----|-----|-----|-----|----------|-------------|
| G250   | 400         | 150 | 450                               | 20 to 100    | 0.77                                  | 1                         | 48.0               | 2.31                 | 0.595                                 | 187                  | 343 | 267 | 610 | 365 | 5.4      | 120         |
| G400   | 650         | 150 | 450                               | 20 to 160    | 2.03                                  | 1                         | 48.0               | 3.76                 | 0.595                                 | 303                  | 343 | 267 | 610 | 365 | 5.4      | 120         |
| G650   | 1000        | 150 | 450                               | 20 to 200    | 4.8                                   | 1                         | 48.0               | 5.79                 | 0.595                                 | 467                  | 343 | 267 | 610 | 365 | 5.4      | 120         |



Delta DN150 G650 S3-Flow



## Delta S3-Flow Steel series reference Meter

The Delta S3-Flow (Steel) is the high-capacity extension of the Delta S-Flow line, serving as a reference or master meter for high-pressure calibration systems, test benches, and hydrogen measurement applications. It integrates the S-Flow three-lobe twisted-piston design, ensuring resonance-free operation, superior accuracy, and mechanical stability under extreme conditions up to Class 600 / PN 100 bar.

### Main Characteristics

- » Reference-grade accuracy with S-Flow piston technology (3-lobe / 60° twist).
- » Steel construction for high-pressure hydrogen use.
- » Ideal as internal master meter for calibration benches and laboratory reference lines.
- » No mechanical totalizer, eliminating any mechanical hysteresis or signal delay.
- » Extended flow range: suitable for G250–G650 at DN100 / DN150.
- » Corrosion-protected epoxy coating (RAL 7035) ensures long-term durability.
- » Configurable dual HF outputs (NAMUR) for differential pulse verification.
- » Fully hydrogen-ready.

### Technical Specifications

|                          |                                                                            |
|--------------------------|----------------------------------------------------------------------------|
| Nominal Diameters        | DN100, DN150                                                               |
| Meter sizes (G)          | G250 - G650                                                                |
| Cyclic Volume (Vc)       | 5.4 dm <sup>3</sup>                                                        |
| Qmax (m <sup>3</sup> /h) | 1000                                                                       |
| Qmin (m <sup>3</sup> /h) | 8.1                                                                        |
| Body Material            | Steel, epoxy coated RAL 7035 or Water-Base painted                         |
| Pressure Class           | Class 600 / PN 100 bar (tested 101.2 bar)                                  |
| Flange-to-flange length  | 340 mm (DN100) and 450 mm (DN150)                                          |
| Flow direction           | Right-to-left or left-to-right                                             |
| Transmitters             | 2 × HF (NAMUR, 9 slot disc or optional special HF half-pulse with 20 slot) |
| Thermowells              | 2 × ¼" NPT for Ø6 mm probes                                                |
| Pressure Tappings        | 2 × ¼" NPT / Ermeto EO 6S                                                  |
| Accuracy Class           | Internal master / reference calibration                                    |
| Metrological Use         | Reference meter – not equipped for fiscal billing                          |
| Gas Compatibility        | Hydrogen (H <sub>2</sub> ), natural gas, test gases                        |

### Applications

- » Calibration benches and gas laboratories (internal master meters)
- » Hydrogen test systems (up to Class 600 pressure)
- » Industrial reference lines requiring high signal fidelity
- » Cross-checking and correlation of other meters technologies



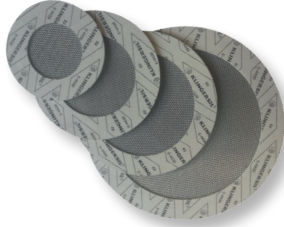
## Pressure loss of the Delta meters

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

## 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.



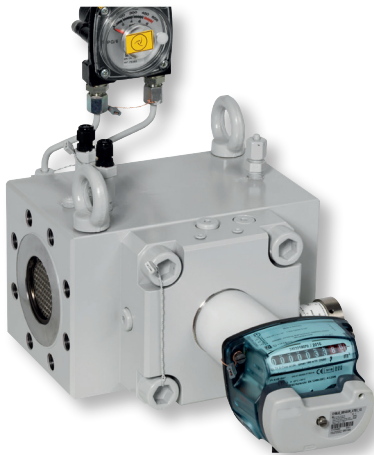
Flat gasket filters  
from DN25 to DN150



Corus Compact



Thermowell fitted with sealing holes



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

## Accessories / Options

### Flat gasket-filter:

- » Flat gasket-filter, to be fit between flanges DN25 to DN150, High Temperature Resistant and with a level of filtration of 100.

### 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: 1/4" NPT or 1/4" BSP. Maximum pressure of gas: 20 bar.

### Bracket for mounting a volume converter:

- » This device permits the Actaris Gas 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.

### where:

- $\Delta p$ : Pressure loss in the calculated conditions
- $\Delta p_r$ : Pressure loss in the reference conditions
- $\rho n$ : Gas density (kg/m<sup>3</sup>) at 0° C and 1013 mbar
- $P_b$ : Operating pressure (Bar gauge)
- $q$ : Flow rate (m<sup>3</sup>/h)
- $Q_{\max}$ : Maximum flow rate (m<sup>3</sup>/h)
- $T_b$ : Gas temperature (°C).

### Thermowells:

- » These threaded 1/4" 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.

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