- Integrated DP Flow measurement system
  - combines primary element with DP Transmitter in a single flowmeter assembly

- One-piece flowmeter, pressure tested as an assembly
  - improved reliability with no leaks to trace and rectify

- Mass Flow version with optional, integral temperature element
  - integral multivariable transmitter and RTD for direct reading of mass (liquids and steam) and corrected volume (gas) flowrates in a single unit

- Integral impulse connections
  - no impulse piping installation required
  - provides repeatable DP connection across installation locations

- Reduced cost of installation
  - only one piece to install
  - eliminates need to supply and connect separate manifold, transmitter and impulse piping

- Easy to specify
  - single ordering code covers complete flowmeter
  - only two orifice ratios for simple specification process

OriMaster – orifice-based flow metering made simple
OriMaster – the One-Piece DP Flow Meter

OriMaster is an orifice-based flow meter with a difference – its advanced design greatly simplifies installation and commissioning.

OriMaster is a stand-alone, orifice-based flow meter that incorporates all the following features:

- A wafer-bodied orifice carrier assembly with integral square-edged, concentric plate and corner tapping points
- Integral 3-valve manifold
- Integral direct connections between the carrier tappings and manifold
- DP transmitter, factory-mounted onto the manifold and pre-configured for the application
- Fully leak-tested and configured

Benefits

OriMaster avoids many of the difficulties involved in the sizing, selection, procurement, installation and commissioning of conventional orifice plate installations.

- With all the major components in one assembly, OriMaster eliminates the problems of sourcing multiple components. Large savings in cost and time due to the simplicity of design and installation.
- Integral transmitter and manifold with compact tapping connections eliminates the need to run and connect impulse piping and offers:
  - guaranteed accuracy of positioning and installation of the tapping points
  - reduced possibility of impulse line blockage
- The assembly is pressure tested in the factory, giving the user confidence that the connections between the tapping points and the transmitter are completely free of leaks
- Factory configuration of the meter saves the user time during commissioning and ensures that the flowmeter output span truly matches that of the application flowrate
- Choice of two discrete Beta ratio values, together with the free sizing, selection and coding software, simplifies the sizing and selection process
- Element centralizing system ensures every meter is concentric with its pipe, thus avoiding significant additional metering errors

Basic Principle of Operation

DP devices work on a principle based upon the Law of Conservation of Energy, where a restriction in the fluid path causes an acceleration in the fluid velocity with a corresponding increase in kinetic energy. The gain in kinetic energy is at the expense of pressure energy, resulting in a drop in fluid pressure across the narrowest part of the restriction. The drop in pressure and the flow rate are linked by the following (albeit simplified) relationship:

\[ Q = k \sqrt{DP} \]

where \( Q \) = fluid flow rate

\[ k \] = a constant for that DP device

\( DP \) = the pressure difference across the restriction

The DP generated for a given class of device depends on the bore of the restriction. Many calculation standards exist but in all cases the differential pressure produced by the restriction is larger than would normally be expected. This effect occurs because a stream is unable to follow the contours of a restriction perfectly, resulting in a flow stream whose narrowest diameter (known as the Vena Contracta) is less than the diameter of the restriction.

![Diagram of DP and Vena Contracta](image)

The Vena Contracta increases the velocity (and therefore the kinetic energy) and this produces a larger drop in pressure than would normally be expected. Some of the differential pressure generated is recovered downstream of the unit but all DP devices incur some loss, known as the ‘irrecoverable pressure loss’, and this is usually expressed as a percentage of the differential pressure.

To correct for the Vena Contracta effect, each device has a Discharge Coefficient; a multiplying factor of less than 1 that is part of the calculation. Typically, the smaller the Vena Contracta compared with the bore of the device, the larger the deviation from expectations and hence the smaller the coefficient.
Versions

OriMaster is available in two versions:

**OriMaster V** – a compact flow meter for general purpose measurement in volumetric units (actual volume). OriMaster V uses the ABB 364 transmitter to provide a flow rate and total display and a 4 to 20 mA output proportional to the actual volume flowrate. The transmitter case and meter body are all in stainless steel.

There are 3 DP sensor ranges available. For optimum accuracy select the sensor so that the full scale DP is in the shaded area and is as close as possible to the maximum range of the sensor.

**OriMaster M** – a compact flow meter, providing measurement directly in mass units for liquids and steam. Gas flow is measured directly in reduced volume units. OriMaster M uses the ABB 267 multivariable transmitter to measure DP, temperature and pressure, providing a flowrate display and a 4 to 20 mA output proportional to the mass or corrected volume flowrate. The body is stainless steel and the case is alloy (stainless steel optional). An optional internal temperature element is available.

There are 3 DP sensor ranges available. For optimum accuracy select the sensor so that the full scale DP is in the shaded area and is as close as possible to the maximum range of the sensor.
Compact Orifice Flow Meter

OriMaster DS/OM Issue 2

Specification – General

Fluids
Liquids, gases and saturated steam

Line Sizes
25 mm, 40 mm, 50 mm, 80 mm, 100 mm, 150 mm, 200 mm
(1 in., 1½ in., 2 in., 3 in., 4 in., 6 in., 8 in.)

Output Signal
Two-wire, 4 to 20 mA, selected for square-root output
Low flow cut-off facility
HART® communication provides digital process variable (%mA or engineering units) superimposed on 4 to 20 mA signal, with protocol based on Bell202 FSK standard
Optional Profibus PA, Foundation Fieldbus or Modbus communications (OriMaster M only)

Output current limits (to NAMUR standard)
Overload condition:
- Lower limit: 3.8 mA (configurable from 3.7 to 4 mA)
- Upper limit: 20.5 mA (configurable from 20 to 22.5 mA)

Alarm current
- Minimum alarm current: 3.8 mA (configurable from 3.7 to 4 mA)
- Maximum alarm current: 22 mA (configurable from 20 to 22.5 mA)
- Standard setting: maximum alarm current

Power Supply
The meter operates from 10.5 to 45 V DC with no load and is protected against reverse polarity connection (additional load allows operations over 45 V DC)
For EEx ia and other intrinsically safe approvals, the power supply must not exceed 30 V DC. Minimum operating voltage is 14 V DC with backlit display.

Load Limitations
\[ R(k) = \frac{\text{Supply voltage} - \text{min. operating voltage (V DC)}}{22.5} \]
A minimum of 250 is required for HART communication

Optional Indicators
OriMaster V integral display
Wide-screen LCD, 128 x 64 pixel, 52.5 x 27.2 mm (2.06 x 1.07 in.) dot matrix. Four keys for configuration and management of device.
Easy setup for quick commissioning.
Totalized and instantaneous flow indication.
Display also indicates in/out transfer function, static pressure, sensor temperature and diagnostic messages and provides configuration facilities.

OriMaster M integral display
2-line, 6-character, 19-segment alphanumeric display with additional bar-chart display. Back illumination optional. User-specific display, percentage of the output current, output current in mA or process variable. Diagnostic messages, alarms, measuring range infringements and changes in the configuration are also displayed.

Wetted Materials
Orifice assembly, stem and manifold: 316L stainless steel
Transmitter sensor housing:
- OriMaster V: 304L stainless steel
- OriMaster M: Aluminum alloy (316L stainless steel optional)
Process isolating diaphragms: Hastelloy C276 (NACE)
Seals (transmitter to manifold): PTFE

Process Connections
Wafer body to fit between the following flange drillings:
- ASME B16.5 (ANSI) Class 150, 300 or 600
- DIN PN16, PN25, PN40 or PN100
Pipeline centralization assured by centralizing tool(s) supplied with every unit as standard
Pressure limitations: 100 bar (1450 psi) or as flange rating, whichever is the lower

Temperature limitations
- Process: –20 to 121 °C (–4 to 250 °F) –20 to 230 °C (–4 to 446 °F) for steam applications
- Ambient: –20 to 70 °C (–4 to 158 °F)

Orifice plate bore at 20 °C (68 °F):

For Beta = 0.4
- 25 mm (1 in.): 10.66 mm (0.42 in.)
- 40 mm (1½ in.): 16.36 mm (0.644 in.)
- 50 mm (2 in.): 20.99 mm (0.826 in.)
- 80 mm (3 in.): 31.17 mm (1.227 in.)
- 100 mm (4 in.): 40.90 mm (1.610 in.)
- 150 mm (6 in.): 61.63 mm (2.426 in.)
- 200 mm (8 in.): 81.10 mm (3.193 in.)

For Beta = 0.65
- 25 mm (1 in.): 17.32 mm (0.682 in.)
- 40 mm (1½ in.): 26.58 mm (1.047 in.)
- 50 mm (2 in.): 34.11 mm (1.343 in.)
- 80 mm (3 in.): 50.65 mm (1.994 in.)
- 100 mm (4 in.): 66.47 mm (2.617 in.)
- 150 mm (6 in.): 100.15 mm (3.942 in.)
- 200 mm (8 in.): 131.78 mm (5.188 in.)
Weight in kg (lb) (approx)

<table>
<thead>
<tr>
<th>Size</th>
<th>OriMaster V</th>
<th>OriMaster M</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 mm (1 in.)</td>
<td>12 (26.5)</td>
<td>12.5 (27.6)</td>
</tr>
<tr>
<td>40 mm (1 1/2 in.)</td>
<td>14.5 (32)</td>
<td>15 (33.1)</td>
</tr>
<tr>
<td>50 mm (2 in.)</td>
<td>16.5 (36.4)</td>
<td>17 (37.5)</td>
</tr>
<tr>
<td>80 mm (3 in.)</td>
<td>19.5 (43)</td>
<td>20 (44.1)</td>
</tr>
<tr>
<td>100 mm (4 in.)</td>
<td>21 (46.3)</td>
<td>21.5 (47.4)</td>
</tr>
<tr>
<td>150 mm (6 in.)</td>
<td>24 (53)</td>
<td>24 (53)</td>
</tr>
<tr>
<td>200 mm (8 in.)</td>
<td>26 (57.3)</td>
<td>26 (57.3)</td>
</tr>
</tbody>
</table>

Upstream Straight Pipe Requirements to ISO 5167:2003

Vibration Limits to IEC60068-2-6

Maximum pipe vibration level <0.5g over frequency range 10 to 500Hz

Performance

System accuracy at reference conditions (for Re >10^5)

Uncalibrated

<table>
<thead>
<tr>
<th>Model</th>
<th>Beta</th>
<th>25 to 40 (1 to 1/2)</th>
<th>50 to 200 (2 to 8)</th>
<th>25 to 40 (1 to 1/2)</th>
<th>50 to 200 (2 to 8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OriMaster V</td>
<td>0.4</td>
<td>2</td>
<td>1.5</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>0.65</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OriMaster M</td>
<td>0.4</td>
<td>1.5</td>
<td>1.5</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>0.65</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Calibrated

ABB standard water calibration (3 points over a 5:1 flow range)

System accuracy: ± 1 % of flowrate

Repeatability

OriMaster V 0.1 %

OriMaster M 0.1 %

Turndown

OriMaster V up to 8:1

OriMaster M up to 8:1

OriMaster V

DP Span

<table>
<thead>
<tr>
<th>Sensor Code</th>
<th>Upper Range Limit (URL)</th>
<th>Minimum Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>16 kPa</td>
<td>0.16 kPa</td>
</tr>
<tr>
<td></td>
<td>160 mbar</td>
<td>1.6 mbar</td>
</tr>
<tr>
<td></td>
<td>64 in. H2O</td>
<td>0.65 in. H2O</td>
</tr>
<tr>
<td>G</td>
<td>65 kPa</td>
<td>0.65 kPa</td>
</tr>
<tr>
<td></td>
<td>650 mbar</td>
<td>6.5 mbar</td>
</tr>
<tr>
<td></td>
<td>260 in. H2O</td>
<td>2.6 in. H2O</td>
</tr>
<tr>
<td>H</td>
<td>160 kPa</td>
<td>1.6 kPa</td>
</tr>
<tr>
<td></td>
<td>1600 mbar</td>
<td>16 mbar</td>
</tr>
<tr>
<td></td>
<td>642 in. H2O</td>
<td>6.4 in. H2O</td>
</tr>
</tbody>
</table>

Temperature Limits

Ambient

Lower limit: –40 °C (–40 °F)

Upper limit: 85 °C (185 °F)

Storage

Lower limit: –50 °C (–58 °F)

Upper limit: 85 °C (185 °F)

Hazardous Atmospheres

With or without integral display – combined ATEX, FM and CSA

ATEX approval

INTRINSIC SAFETY (Category 1)

I ll GD T95 °C, EEx ia IIC T6 (–50 °C ≤ Ta ≤ 40 °C) respectively

II 1 GD T95 °C, EEx ia IIC T4 (–50 °C ≤ Ta ≤ 85 °C) or

II 1/2 GD T50 °C, EEx ia IIC T6 (–50 °C ≤ Ta ≤ 40 °C) respectively

II 1/2 GD T95 °C, EEx ia IIC T4 (–50 °C ≤ Ta ≤ 85 °C)

EXPLOSION PROOF (Category 2):

II 1/2 GD T50 °C, EEx d IIC T6/IP67 T85 °C (–50 °C ≤ Ta ≤ 75°C)

CANADIAN STANDARDS ASSOCIATION and FACTORY MUTUAL

Explosion proof Class I, Div. 1, Groups A, B, C, D

Dust ignition proof Class II, Div. 1, Groups E, F, G

Suitable for Class II, Div. 2, Groups F, G; Class III, Div. 1, 2

Non-incendive Class I, Div. 2, Groups A, B, C, D

Intrinsically safe Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G

AEx ia IIC T6/T4, Zone 0 (FM)
OriMaster M

Range and Span Limits

<table>
<thead>
<tr>
<th>Sensor Code</th>
<th>Upper Range Limit (URL)</th>
<th>Minimum Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>6 kPa</td>
<td>0.2 kPa</td>
</tr>
<tr>
<td></td>
<td>60 mbar</td>
<td>2 mbar</td>
</tr>
<tr>
<td></td>
<td>24 in. H2O</td>
<td>0.8 in. H2O</td>
</tr>
<tr>
<td>F</td>
<td>40 kPa</td>
<td>0.4 kPa</td>
</tr>
<tr>
<td></td>
<td>400 mbar</td>
<td>4 mbar</td>
</tr>
<tr>
<td></td>
<td>160 in. H2O</td>
<td>1.6 in. H2O</td>
</tr>
<tr>
<td>L</td>
<td>250 kPa</td>
<td>2.5 kPa</td>
</tr>
<tr>
<td></td>
<td>2500 mbar</td>
<td>25 mbar</td>
</tr>
<tr>
<td></td>
<td>1000 in. H2O</td>
<td>10 in. H2O</td>
</tr>
</tbody>
</table>

Temperature Limits

Ambient

Silicone oil filling

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>–40 to 85 ºC</td>
<td>–40 to 185 ºF</td>
</tr>
<tr>
<td>LCD display</td>
<td>–20 to 70 ºC</td>
</tr>
</tbody>
</table>

Lower ambient limit for Viton and PTFE gaskets: –20 ºC (–4 ºF)

Note. For Hazardous Atmosphere applications refer to the temperature range specified on the certificate/approval relevant to the required type of protection

Process

Lower limit refer to lower ambient limits

Upper limit 121 ºC (250 ºF) for working pressure above 10 kPa abs., 100 mbar abs., 1.45 psia

Storage

Lower limit 85ºC (185 ºF)

Upper limit –50 ºC (–58 ºF)

–40 ºC (–40 ºF) for LCD indicator

Temperature Element

Integral

100 Ω Platinum RTD, cabled directly to the transmitter

Remote (where supplied by ABB)

Element 100 Ω Platinum RTD

Cable 4-core screened, PTFE

Thermowell 3/4 in. NPT screwed pocket in 316L stainless steel

Hazardous Atmospheres – ATEX according to Directive 94/9/EC – ordering code EW (see page 11)

Transmitter of protection type 'Intrinsically safe EEx ia', 'Flameproof enclosure EEx d', Limited energy equipment EEx nL'

Transmitter with 4 to 20 mA output signal and HART communication

Identification

II 1/2 GD T50 ºC EEx ia IIC T6

II 1/2 GD T95 ºC EEx ia IIC T4

(refer to 'EEx ia' for additional data)

OR

Identification

II 1/2 GD T85 ºC EEx d IIC T6

Ambient temperature range

–40 to 75 ºC (–40 to 167 ºF)

OR

Identification

II 3 GD T50 ºC EEx nL IIC T6

II 3 GD T95 ºC EEx nL IIC T4

(refer to ‘EEx ia’ for additional data)

Hazardous Atmospheres – Factory Mutual (FM)

Intrinsically Safe – ordering code EA (see page 11)

Transmitter with 4 to 20 mA output signal and HART communication

Intrinsically safe Class I; Division 1; Groups A, B, C, D

Class I: Zone 0; Group IIC; AEx ia Group IIC

Degree of protection

NEMA Type 4X (indoor or outdoor)

Maximum permissible ambient temperatures depending on the temperature class:

<table>
<thead>
<tr>
<th>Ambient Temperature</th>
<th>Temperature Class</th>
<th>Imax</th>
<th>Pi</th>
</tr>
</thead>
<tbody>
<tr>
<td>–40 to 85 ºC</td>
<td>T4</td>
<td>200 mA</td>
<td>0.8 W</td>
</tr>
<tr>
<td>–40 to 70 ºC</td>
<td>T5</td>
<td>25 mA</td>
<td>0.75 W</td>
</tr>
<tr>
<td>–40 to 40 ºC</td>
<td>T6</td>
<td>5 mA</td>
<td>0.5 W</td>
</tr>
</tbody>
</table>

Fieldbus transmitters (PROFIBUS PA/FOUNDATION Fieldbus)

Intrinsically safe: Class I, II and III; Division 1;
Groups A, B, C, D, E, F, G

Class I: Zone 0; AEx ia Group IIC T6, T4;
Non-incendive Class I, II and III; Division 2;
Groups A, B, C, D, E, F, G
Hazardous Atmospheres – Factory Mutual (FM) Explosion Proof – ordering code EB (see page 11)
Transmitters with 4 to 20 mA output signal and HART communication and Fieldbus transmitter (PROFIBUS PA/FOUNDATION Fieldbus)

Explosion proof  Class I, Division 1; Groups A, B, C, D
Class II/III; Division 1; Groups E, F, G
Degree of protection  NEMA Type 4X (indoor or outdoor)

Hazardous Atmospheres – Canadian standard (CSA) – ordering code EE (see page 11)
Transmitter with 4 to 20 mA output signal and HART communication and Fieldbus transmitter (PROFIBUS PA/FOUNDATION Fieldbus)

Explosion proof  Class I, Division 1; Groups B, C, D
Class IIIC/III, Division 1 Groups E, F, G
Degree of protection  NEMA Type 4X (indoor or outdoor)

Operating Influences – OriMaster V

Ambient temperature
Per 20 K (36 °F) change between the limits of –20 to 65 °C (–4 to 150 °F):

<table>
<thead>
<tr>
<th>Sensor Code</th>
<th>for TD</th>
<th>Measuring Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>E, G, H</td>
<td>15:1</td>
<td>± (0.02 % URL + 0.026 % span)</td>
</tr>
</tbody>
</table>

but not greater than total ± 0.10 % of URL from –40 to 85 °C (–40 to 185 °F)

Static pressure (zero errors can be calibrated out at line pressure)
Per 7 MPa, 70 bar or 1015 psi:
Zero error : ±0.06 % of URL
Span error : ±0.06 % of reading

Supply voltage
Within voltage/load specified limits the total effect is less than 0.005 % of URL per volt

Load
Within voltage/load specified limits the total effect is negligible

Electromagnetic field
Total effect: less than 0.06 % of span from 20 to 1000 MHz and for field strengths up to 10 V/m when tested with unshielded conduit, with or without meter.

Common mode interference
No effect from 250 V rms @ 50 Hz or 50 V DC

Mounting position
Rotations in plane of diaphragm have negligible effect. A tilt from vertical causes a zero shift up to 0.6 kPa, 6 mbar or 2.4 in. H₂O; this can be corrected with the zero adjustment. No span effect.

Stability
±0.15 % of URL over a ten year period

Operating Influences – OriMaster M

Ambient temperature (for turndown up to 15:1)
Per 20 K (36 °F) change between the limits of –20 to 65 °C (–4 to 150 °F)

for differential pressure sensor
±(0.04 % URL + 0.065 % span)

Per 20 K (36 °F) change between the limits of –40 to 80 °C (–40 to 176 °F)

for absolute pressure sensor
±(0.08 % URL + 0.008 % span)

Limited to ±(0.1 % URL + 0.1 % span) per the complete temperature range of 120 K (216 °F)

Static pressure (zero errors can be calibrated out at line pressure)

<table>
<thead>
<tr>
<th>Measuring Range</th>
<th>Sensors C, F, L</th>
</tr>
</thead>
<tbody>
<tr>
<td>on zero</td>
<td>up to 100 bar:</td>
</tr>
<tr>
<td></td>
<td>0.05 % URL</td>
</tr>
<tr>
<td></td>
<td>&gt; 100 bar:</td>
</tr>
<tr>
<td></td>
<td>0.05 % URL/100 bar</td>
</tr>
<tr>
<td>on span</td>
<td>up to 100 bar:</td>
</tr>
<tr>
<td></td>
<td>0.05 % span</td>
</tr>
<tr>
<td></td>
<td>&gt; 100 bar:</td>
</tr>
<tr>
<td></td>
<td>0.05 % span/100 bar</td>
</tr>
</tbody>
</table>

Supply voltage
Within voltage/load specified limits the total effect is less than 0.001 % of URL per volt.

Load
Within load/voltage specified limits the total effect is negligible.

Electromagnetic field
Total effect: less than 0.05 % of span from 80 to 1000 MHz and for field strengths up to 10 V/m when tested with unshielded conduit, with or without meter.

Common mode interference
No effect from 250 V rms @ 50 Hz or 50 V DC

Mounting position
Rotations in plane of diaphragm have negligible effect. A tilt from vertical causes a zero shift of sin α x 0.35 kPa (3.5 mbar, 1.4 in. H₂O) of URL; this can be corrected with the zero adjustment. No span effect.

Stability
±0.15 % of URL over a sixty-month period
Overall Dimensions – OriMaster V

Dimensions in mm (in.)

<table>
<thead>
<tr>
<th>Size</th>
<th>H</th>
<th>J</th>
<th>E (J/2)</th>
<th>D (H – E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 (1)</td>
<td>180 (7.1)</td>
<td>50.8 ±1 (2 ±0.04)</td>
<td>25.4 ±0.5 (1 ±0.02)</td>
<td>154.6 ±5 (6.1 ±0.2)</td>
</tr>
<tr>
<td>40 (1(\frac{1}{2}))</td>
<td>203 (8)</td>
<td>73.2 ±1 (2.88 ±0.04)</td>
<td>36.6 ±0.5 (1.44 ±0.02)</td>
<td>166.4 ±5 (6.56 ±0.2)</td>
</tr>
<tr>
<td>50 (2)</td>
<td>221 (8.7)</td>
<td>92.1 ±1 (3.63 ±0.04)</td>
<td>46.05 ±0.5 (1.81 ±0.02)</td>
<td>174.95 ±5 (6.89 ±0.2)</td>
</tr>
<tr>
<td>80 (3)</td>
<td>257 (10.12)</td>
<td>127 ±1 (4.99 ±0.04)</td>
<td>63.5 ±0.5 (2.50 ±0.02)</td>
<td>193.5 ±5 (7.62 ±0.2)</td>
</tr>
<tr>
<td>100 (4)</td>
<td>314 (12.36)</td>
<td>157.2 ±1 (6.19 ±0.04)</td>
<td>78.6 ±0.5 (3.09 ±0.02)</td>
<td>235.4 ±5 (9.27 ±0.2)</td>
</tr>
<tr>
<td>150 (6)</td>
<td>372 (14.65)</td>
<td>215.9 ±1 (8.50 ±0.04)</td>
<td>107.95 ±0.5 (4.25 ±0.02)</td>
<td>264.05 ±5 (10.40 ±0.2)</td>
</tr>
<tr>
<td>200 (8)</td>
<td>426 (16.77)</td>
<td>269.9 ±1 (10.63 ±0.04)</td>
<td>134.95 ±0.5 (5.31 ±0.02)</td>
<td>291.05 ±5 (11.46 ±0.2)</td>
</tr>
</tbody>
</table>

Sizing Table – Dimensions in mm (in.)
## Overall Dimensions – OriMaster M

**Dimensions in mm (in.)**

<table>
<thead>
<tr>
<th>Size</th>
<th>H</th>
<th>J</th>
<th>E (J/2)</th>
<th>D (H – E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 (1)</td>
<td>180 (7.1)</td>
<td>50.8 ±1 (2 ±0.04)</td>
<td>25.4 ±0.5 (1 ±0.02)</td>
<td>154.6 ±5 (6.1 ±0.2)</td>
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<tr>
<td>40 (1½)</td>
<td>203 (8)</td>
<td>73.2 ±1 (2.88 ±0.04)</td>
<td>36.6 ±0.5 (1.44 ±0.02)</td>
<td>166.4 ±5 (6.56 ±0.2)</td>
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<tr>
<td>50 (2)</td>
<td>221 (8.7)</td>
<td>92.1 ±1 (3.63 ±0.04)</td>
<td>46.05 ±0.5 (1.81 ±0.02)</td>
<td>174.95 ±5 (6.89 ±0.2)</td>
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<tr>
<td>80 (3)</td>
<td>257 (10.12)</td>
<td>127 ±1 (4.99 ±0.04)</td>
<td>63.5 ±0.5 (2.50 ±0.02)</td>
<td>193.5 ±5 (7.62 ±0.2)</td>
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<tr>
<td>100 (4)</td>
<td>314 (12.36)</td>
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<td>235.4 ±5 (9.27 ±0.2)</td>
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<tr>
<td>150 (6)</td>
<td>372 (14.65)</td>
<td>215.9 ±1 (8.50 ±0.04)</td>
<td>107.95 ±0.5 (4.25 ±0.02)</td>
<td>264.05 ±5 (10.40 ±0.2)</td>
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<td>200 (8)</td>
<td>426 (16.77)</td>
<td>269.9 ±1 (10.63 ±0.04)</td>
<td>134.95 ±0.5 (5.31 ±0.02)</td>
<td>291.05 ±5 (11.46 ±0.2)</td>
</tr>
</tbody>
</table>

Sizing Table – Dimensions in mm (in.)
### Ordering Information

<table>
<thead>
<tr>
<th>Compact Orifice Flow Meter FPD500</th>
<th>Main Code</th>
<th>Optional Code</th>
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<tbody>
<tr>
<td><strong>Model</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volume Flow (OriMaster V)</td>
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<tr>
<td>Mass Flow (OriMaster M)</td>
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<tr>
<td>0.2 ... 6 kPa / 2 ... 60 mbar / 0.8 ... 24 in. H2O²</td>
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<tr>
<td>0.27 ... 16 kPa / 2.7 ... 160 mbar / 1.08 ... 64 in. H2O¹</td>
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<tr>
<td>0.4 ... 40 kPa / 4 ... 400 mbar / 1.6 ... 160 in. H2O²</td>
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<tr>
<td>0.65 ... 65 kPa / 6.5 ... 650 mbar / 2.6 ... 260 in. H2O¹</td>
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<tr>
<td>1.6 ... 160 kPa / 16 ... 1600 mbar / 6.4 ... 642 in. H2O¹</td>
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<td>Perbunan ²</td>
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<tr>
<td>Remote ²</td>
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<td>With integrated LCD display</td>
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<tr>
<td>With integrated LCD display (backlit) ²</td>
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</tbody>
</table>

1 OriMaster V only
2 OriMaster M only

Continued on next page
Compact Orifice Flow Meter

Electronic Housing Material/Electrical Connection
- Aluminium Alloy 1/2–14 NPT
- Aluminium Alloy M20 x 1.5
- AISI 304L SST 1/2–14 NPT
- AISI 304L SST M20 x 1.5
- AISI 316L SST 1/2–14 NPT
- AISI 316L SST M20 x 1.5

Output Signal
- HART digital communications and 4 … 20 mA
- PROFIBUS PA
- FOUNDATION Fieldbus
- Modbus RS485

Explosion Protection Certification
- ATEX + FM + CSA
- Factory Mutual (FM) – Intrinsically Safe
- Factory Mutual (FM) – Explosion Proof
- Canadian Standard Association – Explosion Proof
- ATEX II 1/2 GD, EEx ia + ATEX II 1/2 GD EEx d + ATEX EEx nL

Calibration
- Standard water calibration at reference conditions
- Other

Certificates
- Material monitoring with inspection certificate 3.1 in accordance with EN 10204
- Material monitoring NACE MR 01-75 with inspection certificate 3.1 in accordance with EN 10204

Pipeline Orientation
- Vertical

DP Measuring Range (free text entry)

Main Code | Optional Code
--- | ---
Compact Orifice Flow Meter FPD500 | X XX X X XX X X X X XX XX

Electronic Housing Material/Electrical Connection
- Aluminium Alloy 1/2–14 NPT
- Aluminium Alloy M20 x 1.5
- AISI 304L SST 1/2–14 NPT
- AISI 304L SST M20 x 1.5
- AISI 316L SST 1/2–14 NPT
- AISI 316L SST M20 x 1.5

Output Signal
- HART digital communications and 4 … 20 mA
- PROFIBUS PA
- FOUNDATION Fieldbus
- Modbus RS485

Explosion Protection Certification
- ATEX + FM + CSA
- Factory Mutual (FM) – Intrinsically Safe
- Factory Mutual (FM) – Explosion Proof
- Canadian Standard Association – Explosion Proof
- ATEX II 1/2 GD, EEx ia + ATEX II 1/2 GD EEx d + ATEX EEx nL

Calibration
- Standard water calibration at reference conditions
- Other

Certificates
- Material monitoring with inspection certificate 3.1 in accordance with EN 10204
- Material monitoring NACE MR 01-75 with inspection certificate 3.1 in accordance with EN 10204

Pipeline Orientation
- Vertical

DP Measuring Range (free text entry)

1 OriMaster V only
2 OriMaster M only
3 Not available for steam applications