Orifice plate flowmeters
Series PR

By-pass flowmeter for liquids, gases and steam

- By-pass flowmeter with orifice plate (compact system PRC and separate system PR) for big flow ranges
- Flow indication by means of by-pass flowmeter
- Scales calibrated in l/h, m³/h, kg/h, %, etc.
- Suitable for vertical and horizontal pipe
- Minimum straight pipe run required of 10 x DN and 7 x DN before and after the orifice plate
- Suitable for flow measurement of liquids, gases and steam
- Flow rate: 2 ... 20000 m³/h water
- Accuracy: ±4% f.s.
- Connections:
  - Orifice plates DN50 ... DN1000
    Pressure inlets: ¾” BSP
  - By-pass flowmeters:
    - Model 6001/PR: ¾” BSP thread
    - Model 6002/PR: EN 1092-1 DN20 flange
    - Model SC250/PR: EN 1092-1 DN15 flange
    - Model PS31/PR: ¾” BSP thread or solvent weld socket DN20/25E
- Materials: plastic coated steel, EN 1.4404 (AISI 316L), PVC, PP
- Local indication
- Options:
  - 1 or 2 limit switches
  - Model PR25 / PR31 / PRC31: electronic transmitter with 4-20 mA analog output for safe or hazardous area (Ex ia IIC T4 or T6 protection, ATEX certified). HART protocol available on request
  - Model PR25: Local volume totalizer. Remote volume totalizer by means of pulse output (not available for Ex transmitters)
Working principle

By means of variable differential pressure according to flow rate, obtained thanks to an orifice plate with constant section.

An orifice plate mounted in a pipe where fluid flows causes a differential pressure that changes according to a square function of the flow rate. A small section circuit with a flowmeter is connected to the pressure inlets of the orifice plate. The differential pressure makes the fluid flow by this circuit, so the flowmeter provides a local indication of the main pipe flow rate.

Applications

- Fire protection systems and cooling circuits
- Natural gas installations
- Desalination plants and process industry
- Checking of flow rate in pumps

Models

Separate system: The orifice plate and its carrier assembly are separate from the by-pass flowmeter. The union between both devices is made on site by means of pipe of 15/20 mm of diameter, connecting the positive pressure (+) of the orifice plate to the inlet (lower connector) of the by-pass flowmeter and the negative pressure (-) of the orifice plate to the outlet (upper connector) of the by-pass flowmeter:

- PR61 by-pass flowmeter model 6001/PR
- PR62 by-pass flowmeter model 6002/PR
- PR31 by-pass flowmeter model PS31/PR
- PR25 by-pass flowmeter model SC250/PR

For more info regarding the by-pass flowmeters, please refer to series PT/PS, 6000 and SC250 datasheets.

Compact system: The orifice plate and its carrier assembly are mounted together with the by-pass flowmeter:

- PRC61 by-pass flowmeter model 6001/PR
- PRC31 by-pass flowmeter model PS31/PR

Models PR61 ... 62 ... 31 ... 25

Technical data

- Accuracy: ±4% full scale
- Direct scales in engineering units or in %
- Minimum straight pipe run required of 10 x DN and 7 x DN before and after the orifice plate
- Scale range: 7:1
- Fluid temperature:
  - PR61 ... 62 / Fe ... SS: -20°C ... 80°C
  - PR31 / Fully Fe ... Fully SS: 0°C ... 100°C
  - PR61 ... 62 ... 31 / PVC: 0°C ... 60°C
  - PR61 ... 62 / PP: -20°C ... 80°C
  - PR31 / PP: 0°C ... 80°C
  - PR25 / SS: -50°C ... 300°C
  (on request -180°C ... 400°C)

- Working pressure:
  - PR61 ... 62 ... 31: 15 bar max.
  - PR25: PN16 (others on request)

- Connections:
  - Orifice plates DN50 ... DN1000
  - Pressure inlets: ¾” BSP
  - By-pass flowmeters:
    - Model 6001/PR: ¾” BSP thread
    - Model 6002/PR: EN 1092-1 DN20 flange
    - Model SC250/PR: EN 1092-1 DN15 flange
    - Model PS31/PR: ¾” BSP thread or solvent weld socket DN20/2SE

- Mounting in both vertical and horizontal pipes
- By-pass circuit and isolation valves not supplied

Limit switches and transmitters

Models PR61 ... 62 ... 31

- PT-AMR1 ... 2: 1 or 2 adjustable reed switches
- PT-TMUR: 4-20 mA output transmitter (only for PR31)

Model PR25

- SC-AMM1 ... 2: 1 or 2 adjustable micro-switches
- SC-AMD1 ... 2: 1 or 2 adjustable inductive detectors (+ relays on request)
- TH7 ... TH7H: 4-20 mA transmitter 2 wires + pulse output. HART protocol with model TH7H
- TH7T ... TH7TH: 4-20 mA transmitter + totalizer 2 wires + pulse output. HART protocol with model TH7TH
- TH7 Ex ... TH7H Ex: 4-20 mA transmitter 2 wires Ex ia IIC T4 or T6 (ATEX). HART protocol with model TH7H Ex
- TH7T Ex ... TH7TH Ex: 4-20 mA transmitter + totalizer 2 wires Ex ia IIC T4 or T6 (ATEX). HART protocol with model TH7TH Ex
Mounting

In the orifice plate flowmeters series PR it is necessary to keep a minimum straight pipe run of 10 x DN before and 7 x DN after the flowmeter. The required distance depends on the flow profile, which can be affected by the disturbing elements found in the installation before and after the flowmeter.

Likewise, in the separate orifice plate flowmeters models PR61 / PR62 / PR31 / PR25 mounting must be made by means of a by-pass circuit and isolation valves (not supplied). The length of this circuit must be the minimum possible in order to avoid increasing the pressure drop caused by the orifice plate and therefore provide false readings.

In the separate mounting, the by-pass flowmeter must always be installed below the orifice plate position.

Materials

Orifice plate

<table>
<thead>
<tr>
<th>Nº</th>
<th>Description</th>
<th>Materials</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Carrier assembly</td>
<td>Plastic coated steel</td>
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<tr>
<td>2</td>
<td>Orifice</td>
<td>EN 1.4404 (AISI 316L)</td>
</tr>
<tr>
<td>3</td>
<td>Carrier + orifice</td>
<td>EN 1.4404 (AISI 316L) PVC / PP</td>
</tr>
</tbody>
</table>

Materials for by-pass flowmeters, please refer to series PT/PS, 6000 and SC250 datasheets

Dimensions

<table>
<thead>
<tr>
<th>PR61</th>
<th>PR62</th>
<th>PR31</th>
<th>PR25</th>
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<tbody>
<tr>
<td>50</td>
<td>514x4</td>
<td>50</td>
<td>16 x 4</td>
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<tr>
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<td>380</td>
<td>345</td>
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<td>17</td>
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Flow ranges

<table>
<thead>
<tr>
<th>DN</th>
<th>External Ø carrier assembly</th>
<th>Flow scales m³/h water</th>
<th>Approximate differential pressure at maximum flow rate (mmH₂O)</th>
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<tbody>
<tr>
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<td>142</td>
<td>5-30</td>
<td>8-50</td>
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<tr>
<td>100</td>
<td>162</td>
<td>6-40</td>
<td>10-60</td>
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<td>1400-8600</td>
<td>2000-10500</td>
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</table>

¹ Minimum differential pressure for model PR25: 5000 mmH₂O

For an accurate calculation of the orifice it is necessary to provide the exact inner pipe diameter

* Differential pressure 14000 mmH₂O approx.

Models PRC61 ... 31

The PRC models are compact orifice plate flowmeters. The orifice plate and its carrier assembly are mounted together with the by-pass flowmeter. These flowmeters are delivered already assembled in the position required by the end user, according to the drawings at page 5. This set includes two isolation valves which allow removing the glass tube for maintenance purposes or for replacing under pressure.

Technical data

- Accuracy: ±4% full scale
- Direct scales in engineering units or in %
- Minimum straight pipe run required of 10 x DN and 7 x DN before and after the orifice plate
- Scale range: 7:1
- Fluid temperature:
  - PRC61: -20°C ... 80°C
  - PRC31: 0°C ... 60°C
- Working pressure: 15 bar max.
- Connections: direct mounting in main pipe. Orifice plates DN50 ... DN1000
- Mounting in both vertical and horizontal pipes

Limit switches and transmitters

- PT-AMR1 ... 2: 1 or 2 adjustable reed switches
- PT-TMUR: 4-20 mA output transmitter (only for PRC31)
Mounting

<table>
<thead>
<tr>
<th>Model</th>
<th>Pipe</th>
<th>Flow direction</th>
<th>By-pass</th>
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<tr>
<td>HDD</td>
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<td>DES</td>
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</tr>
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<td>HEBX</td>
<td>Horizontal</td>
<td>ED</td>
<td>Below</td>
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<tr>
<td>HDBX</td>
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</tr>
<tr>
<td>VDD</td>
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<td>DAB</td>
<td>Above</td>
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<td>VAD</td>
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<td>BD</td>
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<tr>
<td>VDBX</td>
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<td>DAB</td>
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<tr>
<td>VABX</td>
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Materials

Please refer to chart page 3

Dimensions

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Flow ranges

Please refer to chart page 4
Limit switches

Adjustable limit switch PT-AMR
Available for PR61 ... 62 ... 31 / PRC61 ... 31
Bi-stable SPST reed switch, actuated by a magnet inside the float and mounted in a PVC enclosure. Requires AISI 304 frame.
- PT-AMR1 ... 2: 1 ... 2 adjustable reed switches
- Contact rating: 0.5 A / 250 VAC / 12 VA
- Hysteresis: ±5% of full scale value
- Ambient temperature: -15°C ... +60°C
- DIN 43650-A connector, PG9 cable gland
- Suitable for hazardous area, considered as “Simple apparatus”

Adjustable limit switch SC-AMM
Available for PR25
Electrical micro-switch mounted in the indicator housing.
- SC-AMM1 ... 2: 1 ... 2 adjustable limit switches
- Ratings: 3(1) A, 250 V (VDE/CEE)
- Hysteresis: ±10% of full scale value
- Ambient temperature: -25°C ... +80°C
- Mechanical life: 10⁷ operations
- ATEX certificate Ex ia IIC T6
Gold plated contacts on request.

Adjustable limit switch SC-AMD
Available for PR25
NAMUR (EN 60947-5-6) 3.5 mm slot type inductive detector activated by vane, mounted in the indicator housing.
- SC-AMD1 ... 2: 1 ... 2 adjustable limit switches
- Power supply: 8 VDC
- Ambient temperature: -25°C ... +70°C
- ATEX certificate Ex ia IIC T6
Control relay on request.

Transmitters and totalizers

Transmitter PT-TMUR
Available for PR31 / PRC31
Technical data available at series PT/PS datasheet

Transmitter TH7
Available for PR25
The TH7 electronic transmitters provide an analog output proportional to the flow rate and a digital output selectable either as a pulse or an alarm output (except for the Ex versions). They can also include a display for volume totalization. They are based on the Hall effect and mounted inside the indicator housing.
- TH7 transmitter
- TH7H transmitter + HART protocol
- TH7T transmitter + totalizer
- TH7TH transmitter + totalizer + HART protocol

Technical data
- Power supply: 12 ... 36 VDC, 2-wire system
- 4-20 mA analog output
- Digital output: for pulse or alarm output
- Totalizer: 8 digits, 4.5 mm high
- Ambient temperature: -5ºC ... +70ºC
- Easy programmable by means of Tecfluid’s Winsmeter TH7 software, available for download at www.tecfluid.com

ATEX version (Ex ia IIC T4 or T6)
Technical data
- ATEX certificate Ex II 1 GD
- Power supply: 14 ... 30 VDC, 2-wire system
- 4-20 mA analog output:
- Totalizer: 8 digits, 4.5 mm high
- Ambient temperature: -5ºC ... +40ºC

Quality Management System ISO 9001 certified by
Pressure Equipment Directive 97/23/CE certified by
ATEX European Directive 94/9/CE certified by
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The technical data described in this specification sheet is subject to modification without notification if the technical innovations in the manufacturing processes so require.