

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: ¼" BSP
 - By-pass flowmeters:
 - Model 6001/PR: thread ¼" BSP
 - Model 6002/PR: flange EN 1092-1 DN20
 - Model SC250/PR: flange EN 1092-1 DN15
 - Model PS31/PR: thread ¼" BSP 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 or Ex d protection, ATEX certified, IECEx certified). HART, MODBUS protocols available on request
 - Model PR25: Local volume totalizer. Digital output programmable as a pulse output or as an alarm (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 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

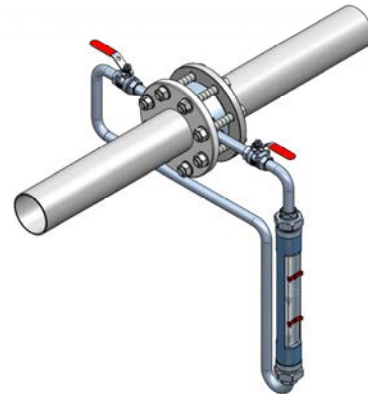
Models PR61 ... 62 ... 31 ... 25

Technical data

- **Accuracy:** $\pm 4\%$ 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)

- **Ambient temperature:** please consult datasheets for series PS, 6000, SC250
- **Working pressure:**
 - PR61 ... 62 ... 31: 15 bar max for the by-pass flowmeter. PN10/PN16 for the orifice plate, depending on its size
 - PR25: PN40 for the by-pass flowmeter. PN10/PN16 for the orifice plate, depending on its size
- **Connections:**
 - Orifice plates DN50 ... DN1000
Pressure inlets: $\frac{3}{4}$ " BSP
 - By-pass flowmeters:
 - Model 6001/PR: thread $\frac{3}{4}$ " BSP
 - Model 6002/PR: flange EN 1092-1 DN20
 - Model SC250/PR: flange EN 1092-1 DN15
 - Model PS31/PR: thread $\frac{3}{4}$ " BSP thread or solvent weld socket DN20/25E

- **Orifice plate width:** 50 mm
- **Mounting in both vertical and horizontal pipes**
- **By-pass circuit and isolation valves not supplied**, for PR separate models



Limit switches and transmitters

Models PR61 ... 62 ... 31

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

Model PR25

- **AMM1 ... 2:** 1 or 2 adjustable micro-switches
- **AMD1 ... 2:** 1 or 2 adjustable inductive detectors (+ relays on request)
- **TH7 ... TH7H:** 4-20 mA transmitter 2-wire system + digital output. **HART protocol** for model TH7H
- **TH7T ... TH7TH:** 4-20 mA transmitter + totalizer 2-wire system + digital output. **HART protocol** for model TH7TH

All switches and transmitters are available with **ATEX / IECEx Ex ia or Ex d certificate**

ATEX / IECEx Ex ia certified transmitters do not provide a digital output

- **MT03A:** electronic converter. **MODBUS RTU RS485 protocol** on request

Orifice plate flowmeters

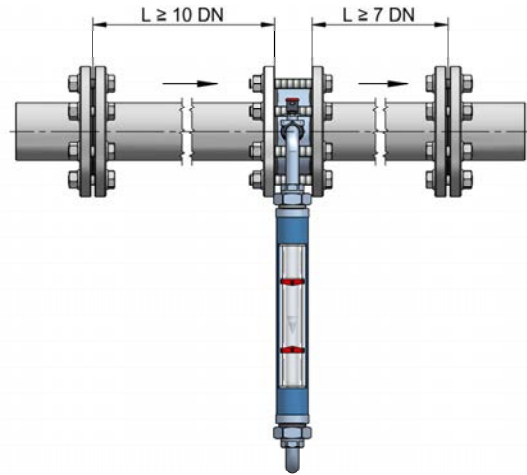
Series PR

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.

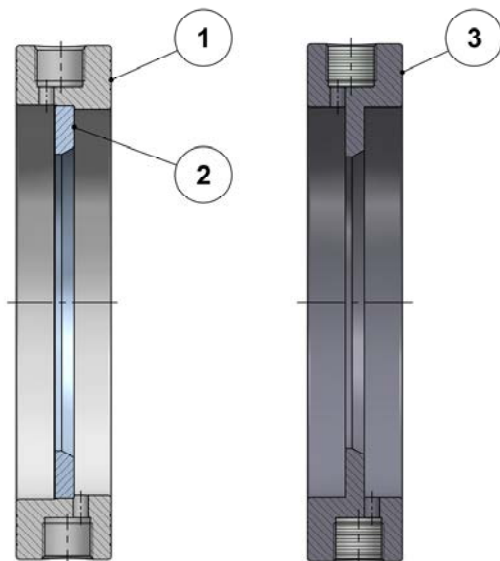


Materials

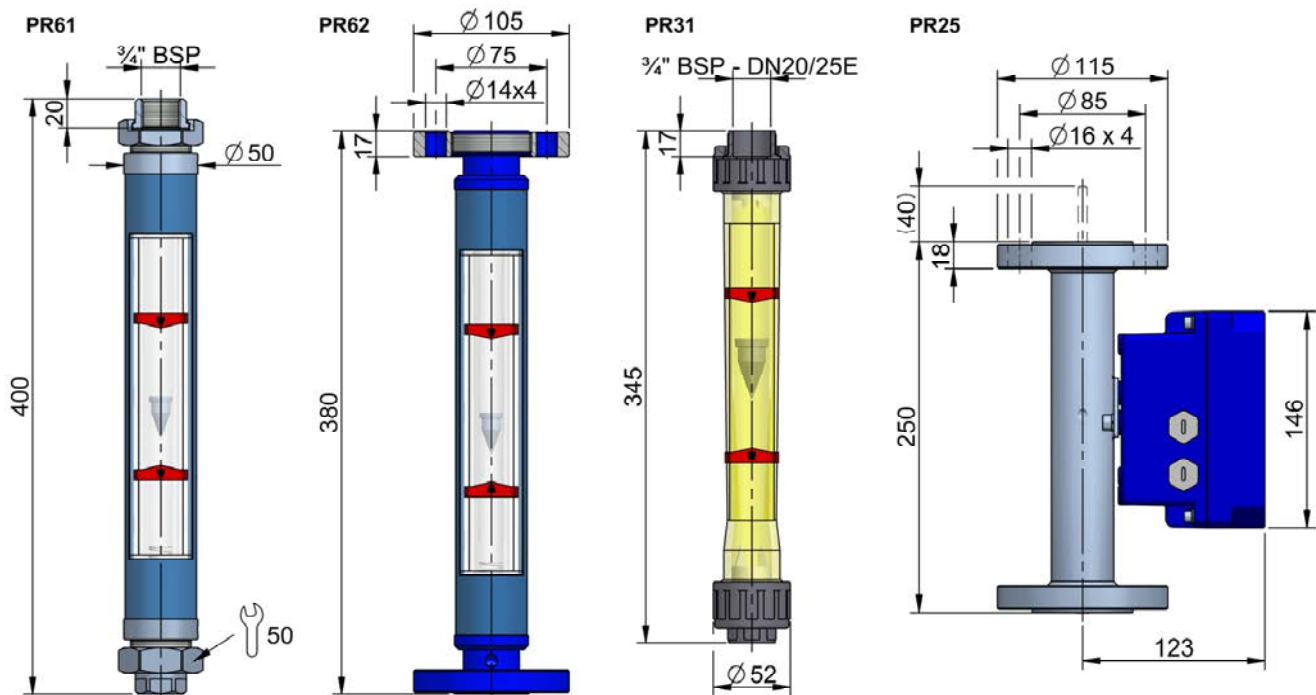
Orifice plate

N°	Description	Materials		
		Fe	EN 1.4404	PVC / PP
1	Carrier assembly	Plastic coated steel	---	---
2	Orifice	EN 1.4404 (AISI 316L)	---	---
3	Carrier + orifice	---	EN 1.4404 (AISI 316L)	PVC / PP

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



Dimensions



Flow ranges

DN	External Ø carrier assembly		Flow scales m ³ /h water						
	PN10	PN16	Approximate differential pressure at maximum flow rate (mmH ₂ O)						
			2000	2600	4000	5000 ⁽¹⁾	6000	8000	10000
50		107	2-15	3-20	5-30	6-35	7-40	8-45	10-50
65		127	6-30	6-40	8-50	10-60	10-70	12-80	14-90
80		142	5-30	8-50	10-70	12-90	14-100	14-110	20-120
100		162	6-40	10-60	12-80	14-100	14-110	16-120	20-140
125		192	18-100	20-130	25-150	30-200	40-260	50-300	50-400 *
150		218	20-160	25-200	40-250	50-300	50-350	60-400	60-450
200		273	40-280	50-350	60-460	80-560	80-600	100-700	120-800
250		329	30-250	70-500	90-680	120-800	150-900	160-1060	180-1200
300	378		70-500	90-650	150-1000	180-1100	200-1300	250-1500	300-1700
350	438		90-600	150-1000	180-1400	200-1600	250-1800	300-2100	400-2400
400	489		100-700	250-1500	350-1800	360-2100	400-2300	450-2600	500-3000
450	539		200-1200	300-2000	400-2500	500-2800	550-3000	600-3500	650-4000
500	594		350-2000	400-2500	500-3100	600-3500	650-3800	700-4400	800-5000
600	695		550-3000	600-3600	700-4200	800-4800	900-5200	1000-6000	1100-7000
700	810		800-3800	800-4600		1000-6000		1100-7500	1500-9000
800	917		1000-5000	1000-6200	1300-7500		1500-9000		2000-12000
900	1017		1000-6800	1500-8200	1600-10000		2200-12500		3000-16000
1000	1124		1400-8600	2000-10500	2500-12500		3000-16000		3500-20000
Max. fluid speed m/s			2	3,3	4	5	5,5	6	7

⁽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)

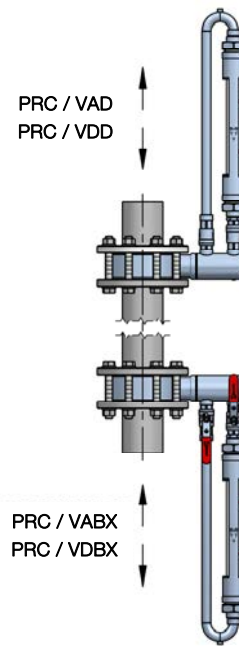
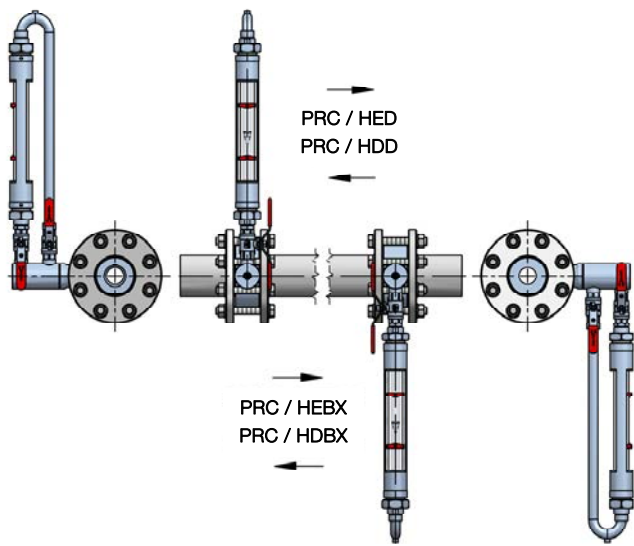


Models PRC31/PVC and PRC61/FULLY SS

Orifice plate flowmeters

Series PR

Mounting



Model	Pipe	Flow direction	By-pass
HED	Horizontal	ED	Above
HDD		DES	
HEBX		ED	Below
HDBX		DES	
VDD	Vertical	DAB	Above
VAD		BD	
VDBX		DAB	Below
VABX		BD	

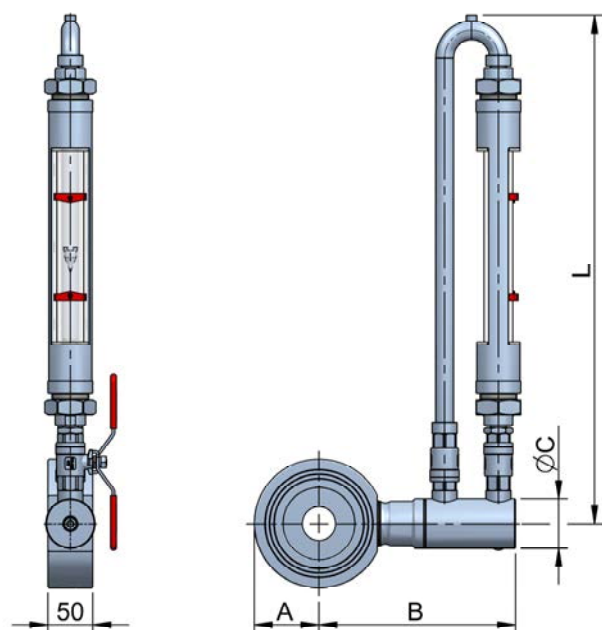
ED: flow from left to right
 DES: flow from right to left
 DAB: downwards flow
 BD: upwards flow

Materials

Please refer to chart page 3

Dimensions

DN	A	B	PRC61		PRC31	
			ØC	L	ØC	L
50	54	201				
65	64	212				
80	72	219				
100	81	229				
125	96	246				
150	109	260				
200	137	288	55	570	90	545
250	165	315				
300	189	341				
350	219	371				
400	245	396				
450	270	422				
500	297	448				



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. AISI 304 frame is required for models PR61 ... 62.

- PT-AMR1 ... 2: 1 ... 2 adjustable limit switches
- Contact rating: 0.5 A / 250 V / 12 VA
- Hysteresis: $\pm 5\%$ of full scale value
- Ambient temperature: -25°C ... $+80^{\circ}\text{C}$
- DIN 43650-A connector, PG9 cable gland
- Suitable for ATEX hazardous area "Simple apparatus"

Adjustable limit switch AMM

Available for PR25



Electrical micro-switch.

- AMM1 ... 2: 1 ... 2 adjustable limit switches
- Ratings: 3(1) A, 250 V (EN 61058)
- Hysteresis: $\pm 10\%$ of full scale value
- Ambient temperature: -25°C ... $+100^{\circ}\text{C}$
- Mechanical life: 10^7 operations
- ATEX / IECEx certificate Ex ia IIC T6 Ga / Ex ia IIIC T $^{\circ}\text{C}$ Da
- Gold plated contacts on request.

Adjustable limit switch AMD

Available for PR25



NAMUR (EN 60947-5-6) 3.5 mm slot type inductive detector activated by vane.

- AMD1 ... 2: 1 ... 2 adjustable limit switches
- Nominal voltage: 8,2 V / Working voltage: 5 ... 25 V
- Ambient temperature: -25°C ... $+100^{\circ}\text{C}$
- ATEX / IECEx certificate Ex ia IIC T6 Ga / Ex ia IIIC T $^{\circ}\text{C}$ Da

Control relay on request.

Transmitters and totalizers

Transmitter PT-TMUR

Available for PR31 / PRC31

Technical data available at series PS datasheet

Transmitter TH7

Available for PR25



Technical data available at series SC250 datasheet

Electronic converter

Model MT03A



- Electronic converter for flow applications
- Resistance and current inputs
- Programmable via USB cable by means of Tecfluid S.A. Winsmeter MT03 software or by means of keyboard and graphic display with intuitive menus
- Panel mounting with dimensions 96 x 96 mm DIN 43700
- Power supply: 100 ... 240 VAC 50 / 60 Hz
18 ... 36 VDC
- Full diagnosis. User selectable password protection
- 5 digits local flow rate indication and 8 digits totalizer and partial totalizer. Possibility of remote reset
- Programmable 4-20 mA analog output
- 2 x relay outputs programmable as flow rate alarms
- Mass flow rate can be measured programming the product density
- Ingress protection: IP50 front, IP30 back
(Optional IP65 front with silicone cover)
- Ambient temperature: -20°C ... $+60^{\circ}\text{C}$
- MODBUS RTU RS485 protocol on request



MT03A



Tecfluid S.A.

Narcís Monturiol 33
08960 Sant Just Desvern
Barcelona
Tel: +34 93 372 45 11
tecfluid@tecfluid.com
www.tecfluid.com

Quality Management System ISO 9001 certified by



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