



Instructions manual

## Series PR Orifice plate flowmeter



**HART**  
COMMUNICATION FOUNDATION



The art of measuring

## PREFACE

Thank you for choosing a product from Tecfluid S.A.

This instruction manual allows the installation, configuration, programming and maintenance. It is recommended to read it before using the equipment.

## WARNINGS

- This document shall not be copied or disclosed in whole or in any part by any means, without the written permission of Tecfluid S.A.
- Tecfluid S.A. reserve the right to make changes as deemed necessary at any time and without notice, in order to improve the quality and safety, with no obligation to update this manual.
- Make sure this manual goes to the end user.
- Keep this manual in a place where you can find it when you need it.
- In case of loss, ask for a new manual or download it directly from our website [www.tecfluid.com](http://www.tecfluid.com) Downloads section.
- Any deviation from the procedures described in this instruction manual, may cause user safety risks, damage of the unit or cause errors in the equipment performance.
- Do not modify the equipment without permission. Tecfluid S.A. are not responsible for any problems caused by a change not allowed. If you need to modify the equipment for any reason, please contact us in advance.

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## 1 INTRODUCTION

The series PR are flowmeters for liquids, gases and steam.

They can measure indirectly the flow rate in big size pipes by means of a by-pass flowmeter.

The by-pass flowmeters have local flow rate indication, with scales calibrated in l/h, m<sup>3</sup>/h, kg/h, t/h, %, etc.

They can incorporate switches or electronic transmitters that allow to provide an alarm and flow rate signals to a remote device.

## 2 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 a fluid flows causes a differential pressure that changes according to a square function of the flow rate. A small by-pass 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.

## 3 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.

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 instructions manuals.

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

PRC61 by-pass flowmeter model 6001/PR

PRC31 by-pass flowmeter model PS31/PR

## 4 RECEPTION

The series PR flowmeters are supplied conveniently packaged for their protection during transportation and storage, together with their instructions manual for installation and operation.

If the supplied device is a separate system, the by-pass flowmeter and the orifice plate are supplied separately. Tecfluid S.A. DO NOT supply neither the by-pass circuit nor the isolation valves.

Before installing the flowmeter, remove all the blocking elements.

## 5 INSTALLATION

The orifice plate can be installed in vertical, horizontal or inclined position.

The point of installation must guarantee that the pipe is always completely full.

Avoid high points of the pipes where air pockets usually form, or pipes with falling flow where vacuums can occur.

Partially full pipes can involve important reading errors.

Flow rate measurement with open discharge makes it necessary to install the flowmeter in a pipe section with a siphon which avoids stagnation of air in the system.

The flow direction should be as marked by the arrow on the orifice plate support. If the orifice plate is placed in the wrong direction, reading errors of up to 100% can occur.

### 5.1 Separate system

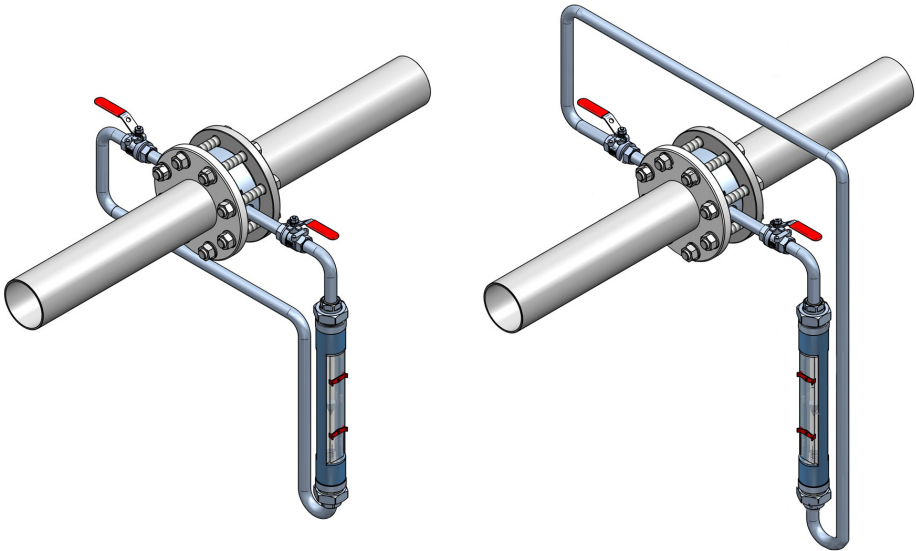
The orifice plate and its carrier assembly are separate from the by-pass flowmeter. The union between both devices is made on site by means of pipe of 15/20 mm of diameter (not supplied).

These pipe sections are not supplied, so that the installer fits the lengths depending on the space limitations of the installation.

It is recommended to install valves at the inlet and outlet of the orifice plate in order to ease maintenance.



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



Correct

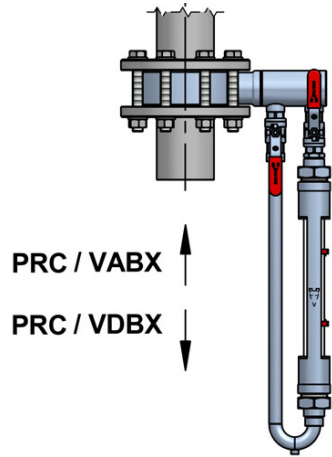
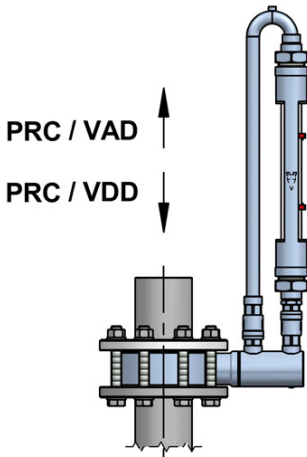
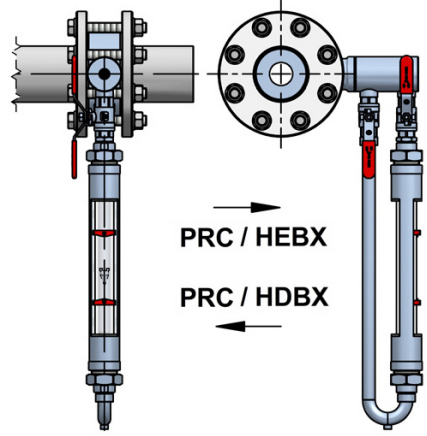
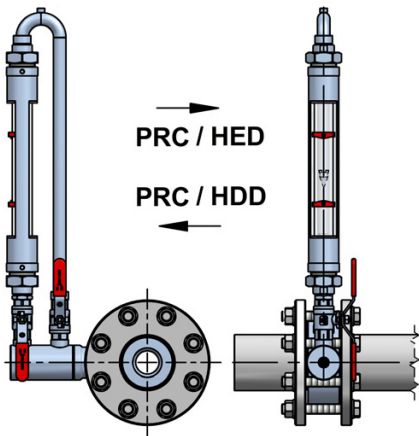
Incorrect

Connect 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:

### 5.2 Compact system

The orifice plate, the carrier assembly and the isolation valves are mounted together with the by-pass flowmeter.

PRC models are delivered already assembled in the position required by the end user. There are four possibilities:



Model	Pipe	Flow direction	By-pass
HED	Horizontal	From left to right	Above
HDD		From right to left	
HEBX		From left to right	Below
HDBX		From right to left	
VDD	Vertical	Downwards	Above
VAD		Upwards	
VDBX		Downwards	Below
VABX		Upwards	

The set includes two isolation valves which allow its maintenance without interruption of the flow.

### 5.3 Filters

The installation of a filter before the instrument is important, this will avoid possible obstructions and breakdowns in the measuring system.

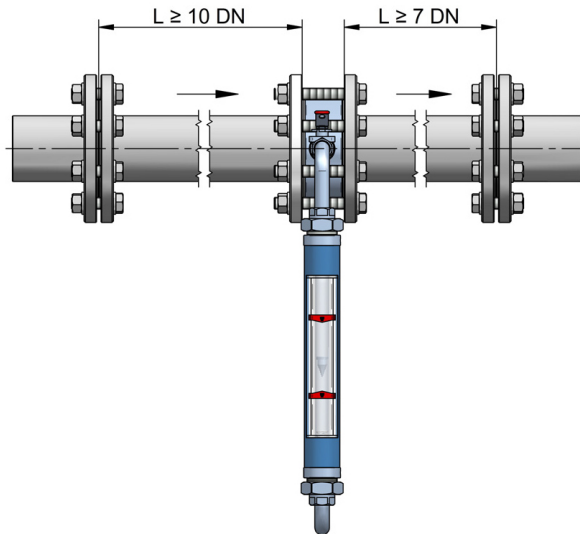
The mesh of the filter should be maximum 2 mm.

In case of having abundant magnetic particles in suspension, it is necessary to mount a magnetic filter at the inlet of the instrument to avoid the accumulation of particles around the float in cases where this is magnetised (SC250/PR or other by-pass flowmeters with limit switches and/or transmitters).

### 5.4 Straight pipe sections

In order to have stable readings, it is essential to avoid turbulences. To do this, it is necessary to install the instrument in a straight pipe section. This section should have the same inner diameter as the flowmeter. The required minimum distances upstream and downstream of the sensor are the following:

Upstream	10 DN
Downstream	7 DN



These distances must be free from disturbing elements of the flow profile, such as elbows, diameter changes, valves, etc.

## 6 OPERATION

Once the meter is installed, slowly open the valves at the inlet and outlet of the orifice plate. Flow will remove air in the circuit and will displace the float until it reaches the scale point where it indicates the flow rate through the orifice plate.

## 7 MAINTENANCE

### 7.1 Separate system

The orifice plate together with the by-pass circuit and the associated flowmeter should be removed.

Clean the pressure inlets of the orifice plate until ensuring the free pass of fluid through them. Partial or total obstruction of these pressure inlets could result in reading errors or non operation of the meter.

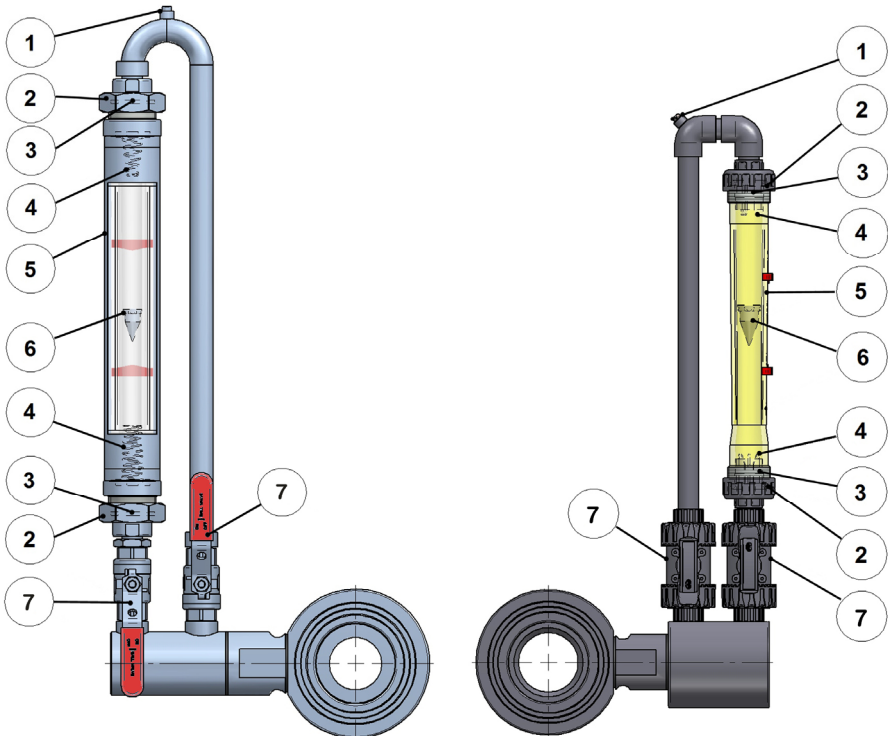
Ensure that the by-pass circuit has no obstructions along its entire length.

Disassemble the by-pass flowmeter and perform its maintenance as indicated in the instructions manuals of the series PT/PS, 6000 or SC250.

### 7.2 Compact system

To perform the maintenance of the meter, it is necessary to remove some parts of the flowmeter. Check below drawings for reference.

Close the valves (7) at both sides of the flowmeter and empty the pipe.



Gradually slacken the purge (1) in order to empty the measuring tube. Once the tube is empty, tighten the purge again.

Unscrew the clamping head of the measuring tube (2) to release it.

Remove the gasket (3), which is normally attached to the head.

Remove the measuring tube (5). If it is a glass tube, remove the measuring tube holder.



Remove the top and bottom springs (or stops) (4).

**NOTE:** The upper and lower springs are different. They should not be exchanged.

Extract the float (6) from inside the measuring tube.

To remove adhered chemical dirt to the float (6) or the measuring tube (5), clean the parts with suitable products or solvents and soft brushes. Never use metallic utensils.



Before assembling the instrument, check that the gaskets (3) are in good working condition. Otherwise, replace them.

Place the measuring tube into its holder. Insert the bottom spring or stop (4). Introduce the float (6) and finally the top spring or stop (4).

Insert the assembly between the two gaskets (3) and thread the heads (1).

Before tighten the heads, rotate the metering tube so that the scale is visible.



## 8 TECHNICAL CHARACTERISTICS

<b>Accuracy:</b>	±4% full scale
<b>Scales:</b>	Direct in engineering units or in %
<b>Scale range:</b>	7:1

### Working temperature:

Standard:

- PR61 ... 62 / Fe ... SS:	-20°C ... +80°C
- PR31 / Fe ... Fully SS:	0°C ... +100°C
- PR61 ... 62 / 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 DN20/25E

**Orifice plate/Carrier assembly thickness:** 50 mm

## 9 FLOW RANGES AND SPEEDS

DN	Flow scales m <sup>3</sup> /h water						
	Approximate differential pressure at maximum flow rate (mmH <sub>2</sub> O)						
	2000	2600	4000	5000 <sup>(1)</sup>	6000	8000	10000
50	2-15	3-20	5-30	6-35	7-40	8-45	10-50
65	6-30	6-40	8-50	10-60	10-70	12-80	14-90
80	5-30	8-50	10-70	12-90	14-110	16-120	20-120
100	6-40	10-60	12-80	14-100	14-110	16-120	20-140
125	18-100	20-130	25-150	30-200	40-260	50-300	60-400 *
150	20-160	25-200	40-250	50-300	50-350	60-400	60-450
200	40-280	50-350	80-460	80-560	80-600	100-700	120-800
250	60-400	70-500	90-680	120-800	150-900	160-1060	180-1200
300	70-500	90-650	150-1000	180-1100	200-1300	250-1500	300-1700
350	120-800	150-1000	180-1400	200-1600	250-1800	300-2100	400-2400
400	170-1200	250-1500	350-1800	360-2100	400-2300	450-2600	500-3000
450	230-1600	300-2000	400-2500	500-2800	550-3000	600-3500	650-4000
500	350-2000	400-2500	500-3100	600-3500	650-3800	700-4400	800-5000
600	550-3000	600-3600	700-4200	800-4800	900-5200	1000-6000	1100-7000
700	800-3800	800-4600		1000-6000		1100-7500	1500-9000
800	1000-5000	1000-6200	1300-7500	1400-8200	1500-9000		2000-12000
900	1000-6800	1500-8200	1600-10000		2200-12500		3000-16000
1000	1400-8600	2000-10500	2500-12500		3000-16000		3500-20000

<sup>(1)</sup> Minimum differential pressure for model PR25: 5000 mmH<sub>2</sub>O

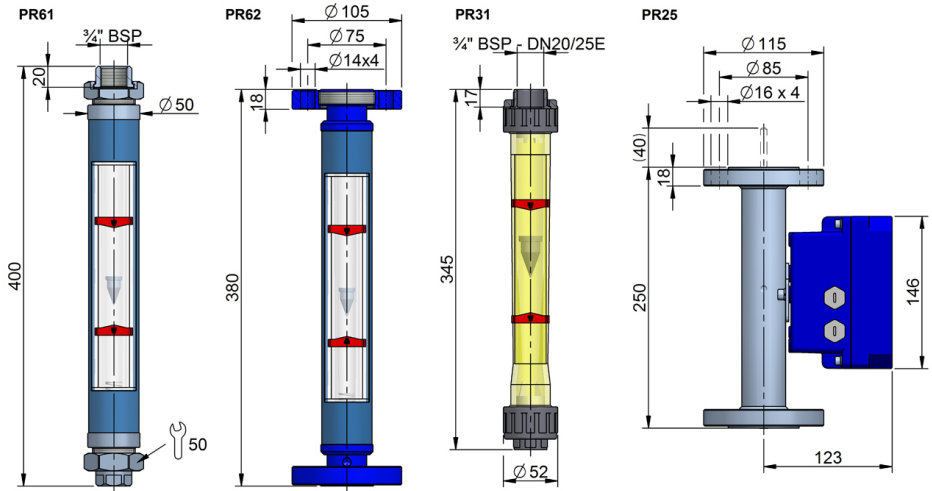
For an accurate calculation of the orifice it is necessary to provide the exact inner pipe diameter

\* Differential pressure 14000 mmH<sub>2</sub>O approx.

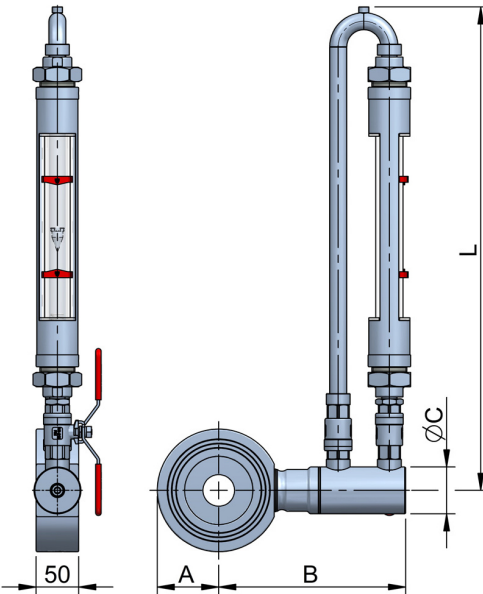
Maximum fluid speed m/s						
Approximate differential pressure at maximum flow rate (mmH <sub>2</sub> O)						
2000	2600	4000	5000	6000	8000	10000
2	3,3	4	5	5,5	6	7

# 10 DIMENSIONS

## 10.1 PR (separate)



## 10.2 PRC (compact)



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				

## WARRANTY

Tecfluid S.A. guarantee all the products for a period of 24 months from their sale, against all faulty materials, manufacturing or performance. This warranty does not cover failures which might be imputed to misuse, use in an application different to that specified in the order, the result of service or modification carried out by personnel not authorized by Tecfluid S.A., wrong handling or accident.

This warranty is limited to cover the replacement or repair of the defective parts which have not damaged due to misuse, being excluded all responsibility due to any other damage or the effects of wear caused by the normal use of the devices.

Any consignment of devices for repair must observe a procedure which can be consulted in the website [www.tecfluid.com](http://www.tecfluid.com), "After-Sales" section.

All materials sent to our factory must be correctly packaged, clean and completely exempt of any liquid, grease or toxic substances.

The devices sent for repair must enclose the corresponding form, which can be filled in via website from the same "After-Sales" section.

Warranty for repaired or replaced components applies 6 months from repair or replacement date. Anyway, the warranty period will last at least until the initial supply warranty period is over.

## TRANSPORTATION

All consignments from the Buyer to the Seller's installations for their credit, repair or replacement must always be done at freight cost paid unless previous agreement.

The Seller will not accept any responsibility for possible damages caused on the devices during transportation.



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