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RUBINETTERIE INDUSTRIALI s.r.l.

EN	DATASHEET	rev. B
	ST00178	
615	**616**	**617.1**
615.1	**616.1**	**617.1.N**

DIFFERENTIAL BY-PASS VALVES

615
616

615.1
616.1

617.1

617.1.N

Description

In variable flow rate systems, managed by regulating valves (for example: thermostatic valves, thermo-electric actuators, zone valves), the modulation and closing of terminals lead to a decrease of the requested flow rate and, as a consequence, an increase of the head on the still open terminals.
The differential by-pass valve:
- limits, at the setting value, the differential pressure between the two installation points, allowing the pump to work closer to the design head conditions and higher efficiency zones;
- by-passes, towards the return, an excess flow rate amount which is proportional to the number of circuits in modulation or closing phase;
- avoids wear and noise (usually hisses and whistles) of the devices in modulation, caused by the speed increase of the fluid when passing through the regulating devices.

The differential by-pass valve can be installed for example across a pump, between the flow and return of a boiler circuit, at the basis or top of risers, between the flow and return of distribution and regulating groups, at the end of the distribution manifolds. The valve setting corresponds to the head losses of the most disadvantaged circuit downstream of the valve or, when installed close to the pump, to the pump design head. In order to by-pass high flow rate values, it's possible to install several valves in parallel.

Range of articles

Series 615	Differential by-pass valve, running nuts, setting range 0,2–2,5 m w.g., connection distance 65 mm
Series 615.1	Differential by-pass valve, running nuts, setting range 0,2–2,5 m w.g., connection distance 55 mm
Series 616	Differential by-pass valve, running nuts, setting range 2–6,5 m w.g., connection distance 65 mm
Series 616.1	Differential by-pass valve, running nuts, setting range 2–6,5 m w.g., connection distance 55 mm
Series 617.1	Differential by-pass valve, compression end and running nut, setting range 2–6,5 m w.g., connection distance 55 mm
Series 617.1.N	Differential by-pass valve, compression end and running nut, setting range 2–6,5 m w.g., connection distance 55 mm, nickel plated

Features

Working temperature range: **0** *(no frost)***–90 °C**
Max working pressure: **10 bar**
Setting: - 615-615.1 series: **0,2–2,5 m w.g**
- 616-616.1-617.1-617.1.N series: **2–6,5 m w.g.**
Connection distance:
- 615-616 series: **65 mm**
- 615.1-616.1-617.1-617.1.N series: **55 mm**
Suitable fluids: **water for thermal systems, glycol solutions (max 50%)**
Threaded connections: **ISO 228-1**

Materials

Body, headwork and nuts: **brass EN 12165 CW617N**
Obturator and locking nut: **brass EN 12164 CW614N**
Spring: **stainless steel**
Knob and graduated scale: **ABS**
Obturator gasket: **NBR**
Gaskets: **NBR**
Nut gaskets: **non asbestos fiber**

Dimensions

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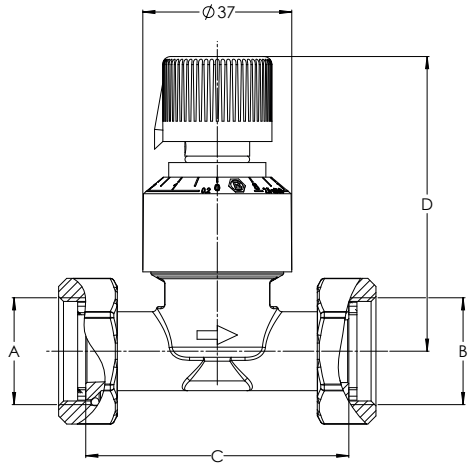

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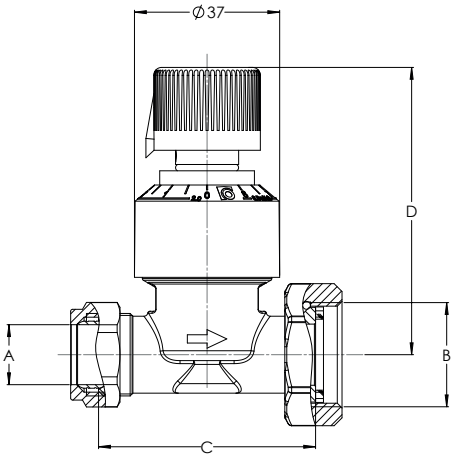

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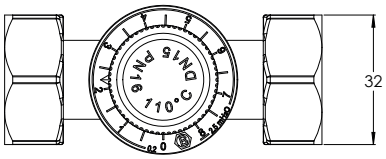
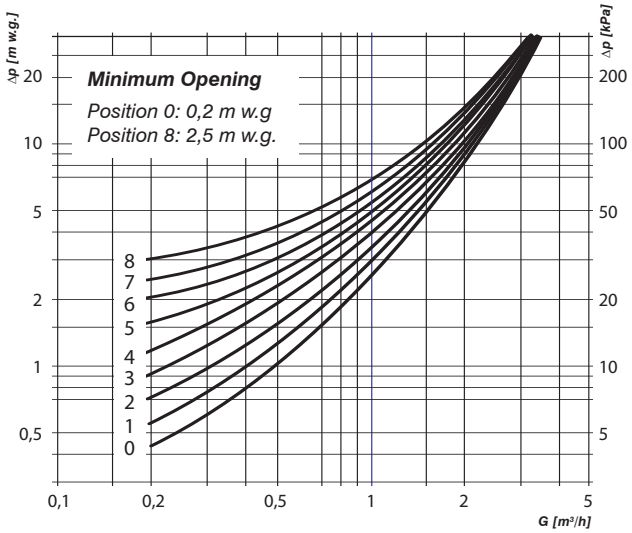
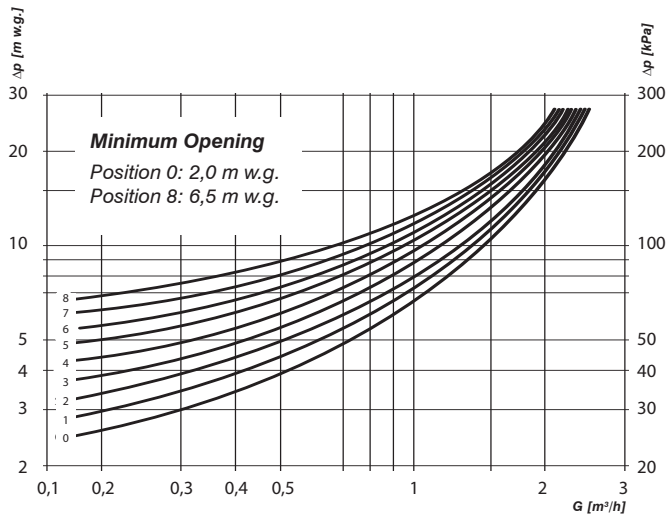


Code	A	B	C	D	Setting [m w.g.]	Weight [kg]	N. P/B	N. P/C
615015000	G 3/4 RN	G 3/4 RN	65	73	0,2-2,5	0,36	1	40
615015000001	G 3/4 RN	G 3/4 RN	55	73	0,2-2,5	0,35	1	40
616015000	G 3/4 RN	G 3/4 RN	65	73	2-6,5	0,36	1	40
6160150001	G 3/4 RN	G 3/4 RN	55	73	2-6,5	0,35	1	40
6170150001	15 mm	G 3/4 RN	55	73	2-6,5	0,32	1	40
617015N001	15 mm	G 3/4 RN	55	73	2-6,5	0,32	1	40

N. P/B: number of pieces in box - N. P/C: number of pieces in carton

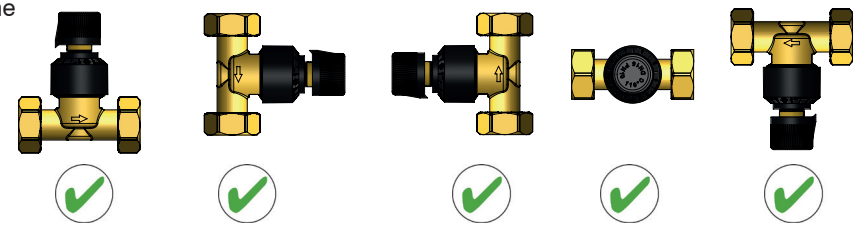
Diagrams





Installation

Differential by-pass valves can be installed in one of the following positions.

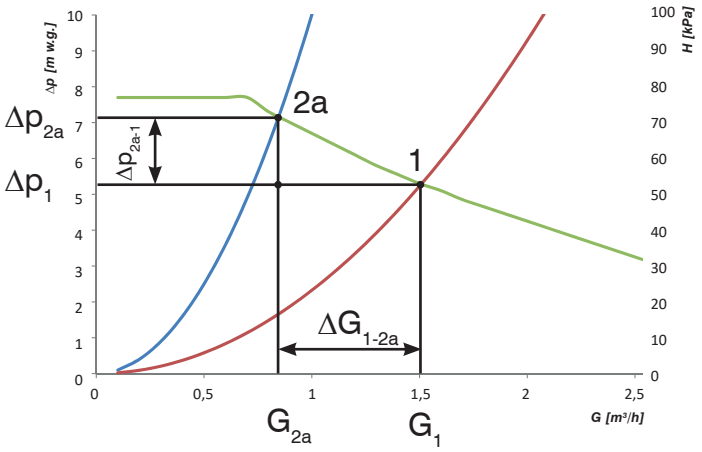


Working way

Set on the knob the differential pressure value at which the valve obturator begins to open, by-passing the excess flow rate toward the return circuit.

Phase1: design conditions. The pump works at the design point 1, intersection between the pump head (green curve) and the circuit resistance (red curve).

Phase 2a: modulation/closing of terminals without differential by-pass valve. Due to the modulation and/or closing of the regulating devices on the terminals (thermostatic valves, thermo-electric actuators, zone valves), the system resistance increases (blue curve), the flow rate decreases (not in proportional way) and the pump working point moves along the curve towards the new point 2a. In this point, the still open terminals work under a higher head (Δp_{2a}), running the risk to give origin to noise (hisses and whistles) on the devices in modulation (tipical example: whistle of the thermostatic radiator valves), because of the speed increase of the fluid flowing through the devices, as well as causing component wear and lack of thermal comfort.



Phase 2b: modulation/closing of terminals with differential by-pass valve. A differential by-pass valve can be installed, by using the following setting:

- installation on the boiler circuit or on the distribution and regulating groups: valve setting at the same value of the design pump head (Δp_1);
- installation at the base or top of risers, at the manifolds: valve setting at the same value of the head losses of the most disadvantaged circuit downstream.

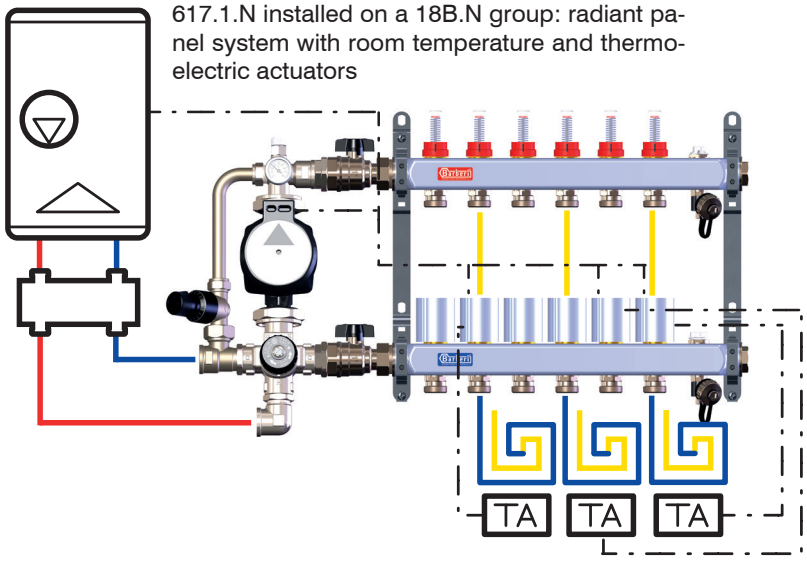
When the terminals are fully open, the differential pressure, between the installation points, is lower than the valve setting. Therefore the obturator remains closed, since pushed against its seat by the inner counteracting spring, all the flow rate is delivered to the terminals and the pump works at the desing point 1. Later, due to the modulation and/or closing of the regulating devices on the terminals (thermostatic valves, thermo-electric actuators, zone valves), the differential by-pass valves opens when the differential pressure, between the installation points, is equal to the valve setting value. We obtain:

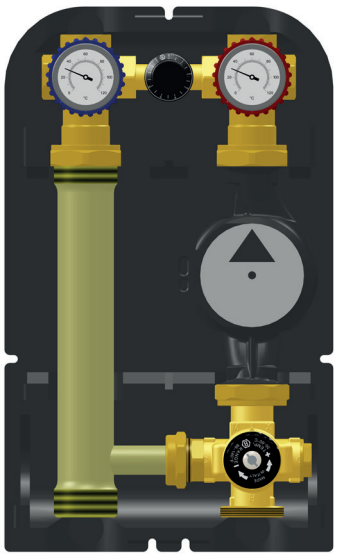
- the differential pressure, downstream of the valve installation points, is equal to the valve setting (Δp_1)
- the pump keeps working at the design flow rate and head (G_1 and Δp_1), therefore at higher efficiency conditions;
- The excess flow rate, which is proportional to the number of circuits in modulation or closing phase, is by-passed towards the return ($\Delta G_{1\text{-}2a}$);
- wear and noise on modulating devices are avoided.

Therefore, the installation of a differential by-pass valve is strongly recommended with constant velocity pumps or in systems with wide flow rate modulation. According to the needs, it can be applied to the primary or secondary circuit.

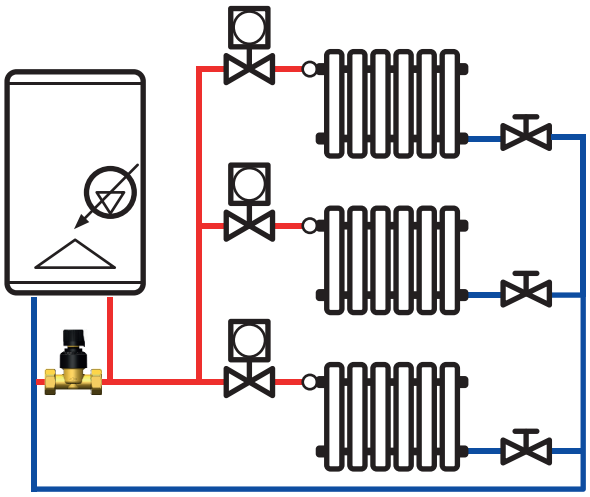
System diagrams

617.1.N installed on a 18B.N group: radiant panel system with room temperature and thermo-electric actuators

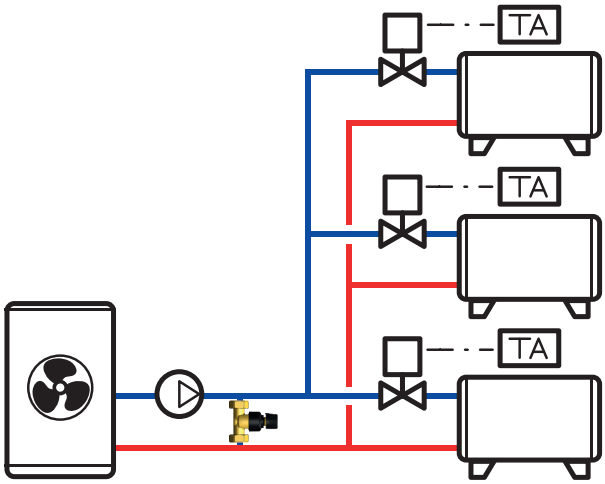




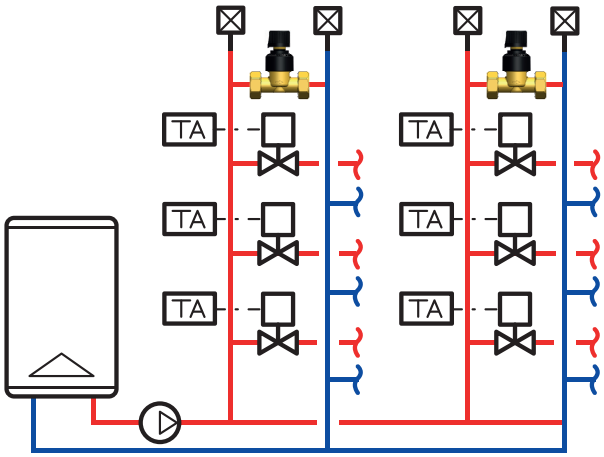
615 installed on a DN 25 group



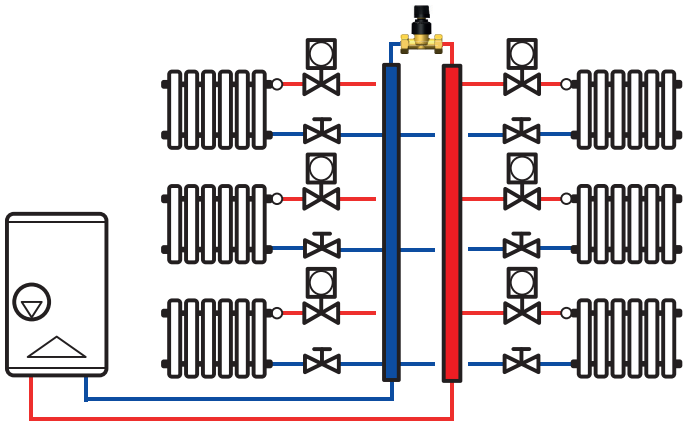
Differential by-pass valve at the boiler with radiator system and thermostatic valves



Differential by-pass valve at the chiller with fancoil system and zone valves



Differential by-pass valve at the riser top



Differential by-pass valve at the manifold

Specifications

Series 615-615.1
Differential by-pass valve with running nuts. Setting range 0,2–2,5 m w.g., connection distance 65 mm (series 615.1: 55 mm). Threaded connections G 3/4 RN. Body, headwork, nuts, obturator, locking ring in brass; stainless steel spring; knob and gratuated scale in ABS; obturator gasket and inner gaskets in EPDM; nut gaskets in non asbestos fiber. Working temperature range 0–110 °C; maximum working pressure 10 bar. Suitable fluids water for thermal systems, glycol solutions (max 50%).

Series 616-616.1
Differential by-pass valve with running nuts. Setting range 2–6,5 m w.g., connection distance 65 mm (series 616.1: 55 mm). Threaded connections G 3/4 RN. Body, headwork, nuts, obturator, locking ring in brass; stainless steel spring; knob and gratuated scale in ABS; obturator gasket and inner gaskets in EPDM; nut gaskets in non asbestos fiber. Working temperature range 0–110 °C; maximum working pressure 10 bar. Suitable fluids water for thermal systems, glycol solutions (max 50%).

Series 617.1-617.1.N
Differential by-pass valve with compression end and running nut. Setting range 2–6,5 m w.g., connection distance 55 mm. Threaded connections 15 mm for copper pipe - G 3/4 RN. Body, headwork, nuts, obturator, locking ring in brass (series 617.1.N: nickel plated); stainless steel spring; knob and gratuated scale in ABS; obturator gasket and inner gaskets in EPDM; nut gaskets in non asbestos fiber. Working temperature range 0–110 °C; maximum working pressure 10 bar. Suitable fluids water for thermal systems, glycol solutions (max 50%).

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