Differential by-pass valve

518 series

01410/24 EN

Function

The differential by-pass valve is used in systems that can work with variable flow rates, for example in those making widespread use of thermostatic valves or two-way motorised valves. It ensures a flow recirculation proportional to the number of valves being closed, while limiting the maximum differential pressure value generated by the pump.
In heat pump systems, the differential by-pass valve is used to guarantee the minimum flow rate value required for the machine or variable-speed circulators to work properly.

Product range

Code 518500 Adjustable differential by-pass valve with graduated scale, setting range: 1–6 m w.g. ..... size 3/4”
Code 518015 Adjustable differential by-pass valve, straight, with graduated scale, setting range: 1–6 m w.g. ..... size 3/4”
Code 518002 Adjustable differential by-pass valve with graduated scale, setting range: 1–6 m w.g. ..... size Ø 22

Technical specifications

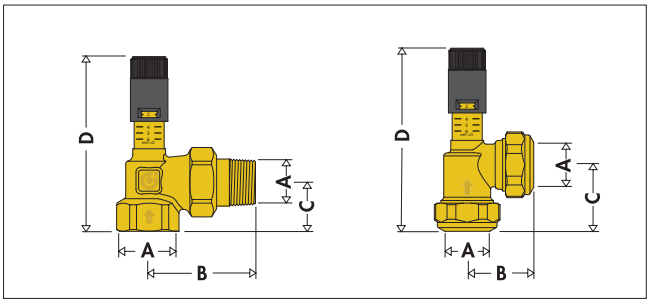
Materials

Body:	brass EN 12165 CW617N (code 518015) brass EN 12165 CB7535
Obturator:	PA6G30
Obturator seals:	EPDM
O-Ring seals:	EPDM
Union seals (code 518500, 518015):	non-asbestos fibre
Knob:	ABS
Spring:	stainless steel

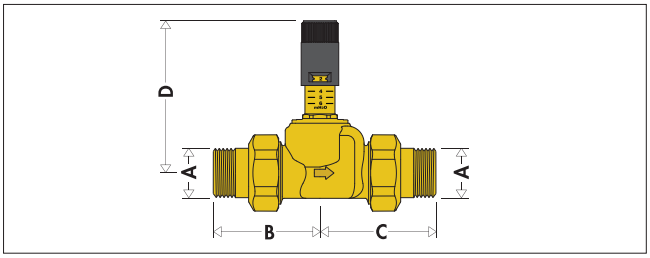
Performance

Medium: water, glycol solutions	
Maximum percentage of glycol:	30 %
Working temperature range:	0–100 °C
Maximum working pressure:	10 bar
Setting value:	10–60 kPa (1–6 m w.g.)
Connections:	
- 518500:	3/4” F (ISO 228-1) x M with union
- 518015:	3/4” M (ISO 228-1) x M with union
- 518002:	Ø 22

Dimensions



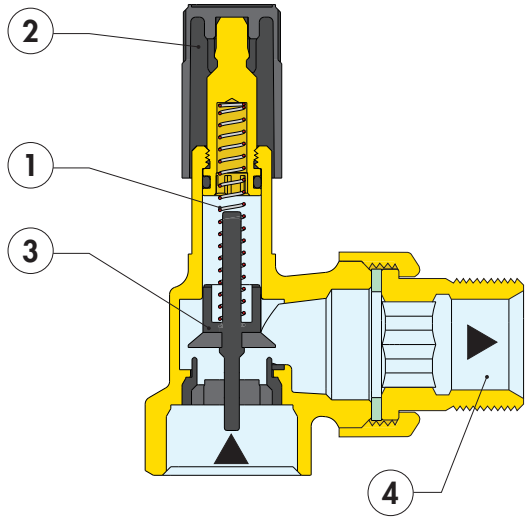
Code	A	B	C	D	Mass (kg)
518500	3/4”	58,5	26	93	0,33
518002	Ø22	35,5	35,5	97,5	0,22

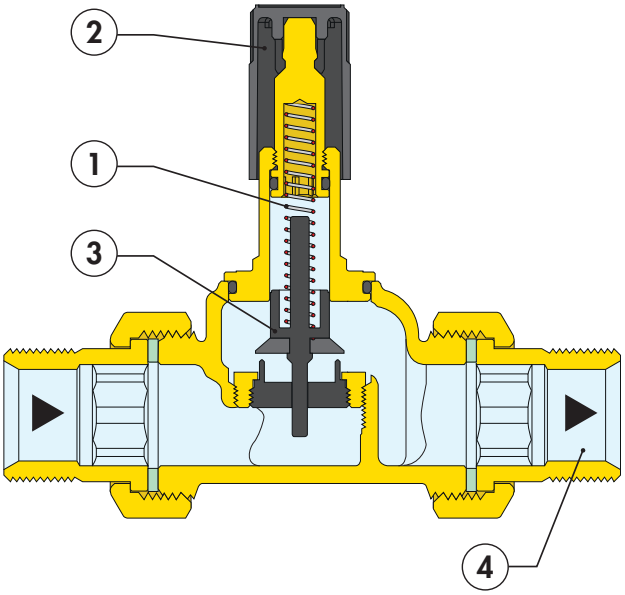


Code	A	B	C	D	Mass (Kg)
518015	3/4”	59	64	81	0,55

Operating principle

When the compression spring (1) is adjusted using the control knob (2), the force acting on the obturator (3) changes, thus modifying the trigger pressure value of the valve. The obturator only opens, activating the by-pass circuit, when it is subjected to a differential pressure sufficient to generate a greater thrust than that exerted by the counter-spring. This allows flow discharge through the outlet (4), limiting the difference in pressure in the section downstream of the point at which the valve is fitted.

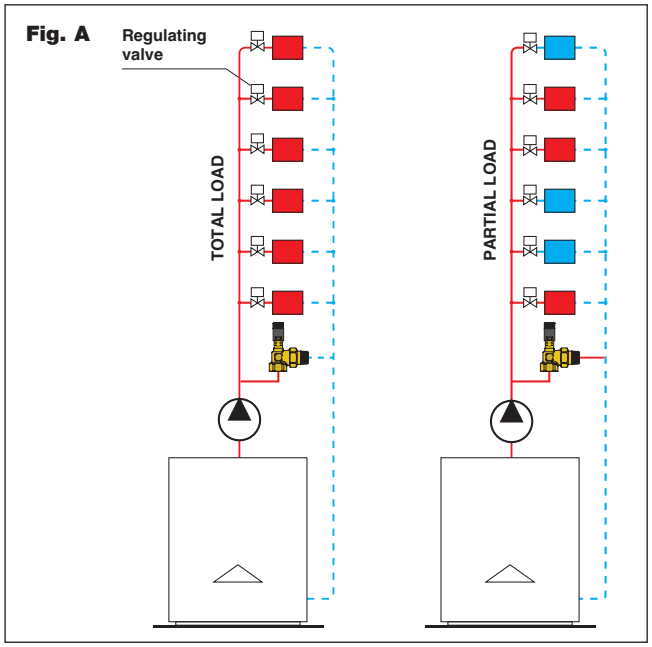




System operation

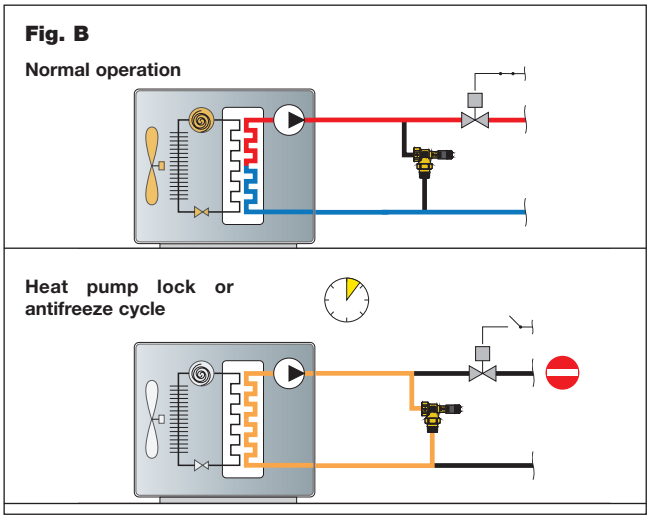
The job of the by-pass valve is to maintain the pump operating point as close as possible to its nominal value (point A on the graph shown below). If the by-pass valve is not used, when the flow rate in the circuit decreases due to partial closure of the two-way valves, the pressure drop in the circuit increases (point B).
The by-pass valve, set to the nominal head value of the pump, makes it possible to limit the pressure increase, by-passing flow rate ΔG. This behaviour is guaranteed at any closing condition of the system regulating valves. In fact, once the position of the valve control knob has been established, the trigger pressure value is more or less constant as the discharge flow rate varies (see diagrams giving hydraulic characteristics).
Correct valve sizing must guarantee the by-passing of a flow rate sufficient to maintain the pump at its nominal operating point in all system operating conditions, for example when the first thermostatic valves are closed.

Fig. A



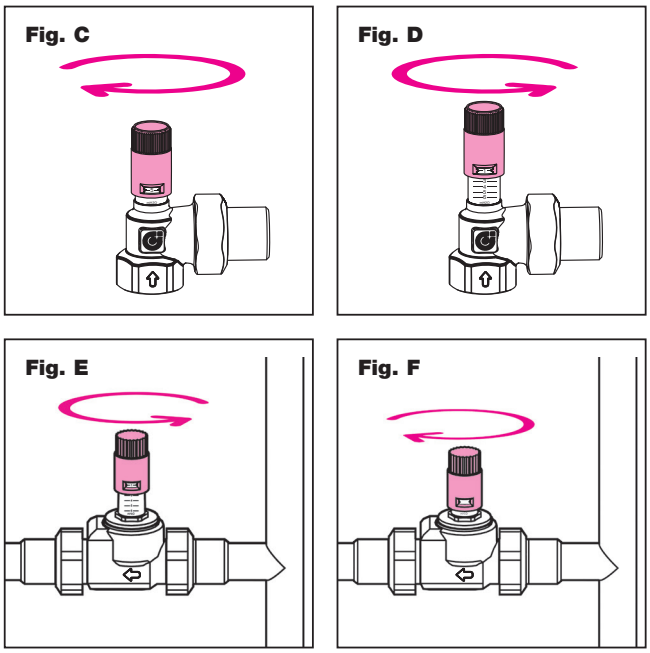
In heat pump systems (fig. B), differential by-pass valves are used to guarantee the minimum flow rate value required for the machine or variable-speed circulators to work properly.

Fig. B



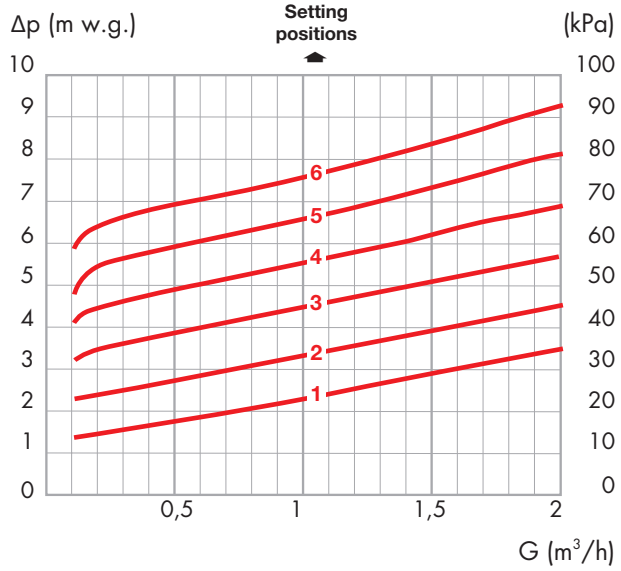
Setting

To regulate the valve, turn the knob to the value required on the graduated scale: the values correspond to the differential pressure in metres w.g. at which the by-pass is opened.
Use the following practical methods to carry out by-pass valve adjustment quickly:
Example 1: system for an apartment fitted with thermostatic valves.
The system must be operating, the regulating valves must be fully open and the by-pass valve must be set to the maximum value (C). Close approximately 30 % of the thermostatic valve. Gradually open the valve using the control knob. Use a temperature gauge – or simply your hand – to make sure that the hot water is flowing into the by-pass circuit (D). As soon as a temperature rise is noted, open the thermostatic valves again and make sure that the hot water stops flowing into the by-pass (E).
Example 2: heat pump system (maintaining the minimum flow rate).
The valve should be selected and calibrated according to the heat pump circulator data plate.

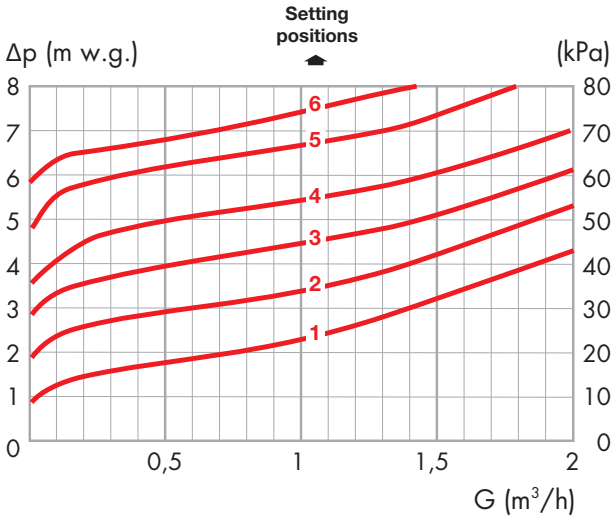


Hydraulic characteristics

code 518500 - code 518002



code 518015



Installation

The differential by-pass valve can be fitted in any position, respecting the flow direction indicated by the arrow on the valve body.
In systems with a condensing boiler, it is preferable to fit the by-pass directly between the upstream and downstream sections of the pump, as this allows a higher ΔT in the circuit, with lower return temperatures and therefore better system operation. In heat pump systems, it is useful to guarantee the minimum flow rate to the machine and circulation even while the user system is shut off, during the defrost phase.

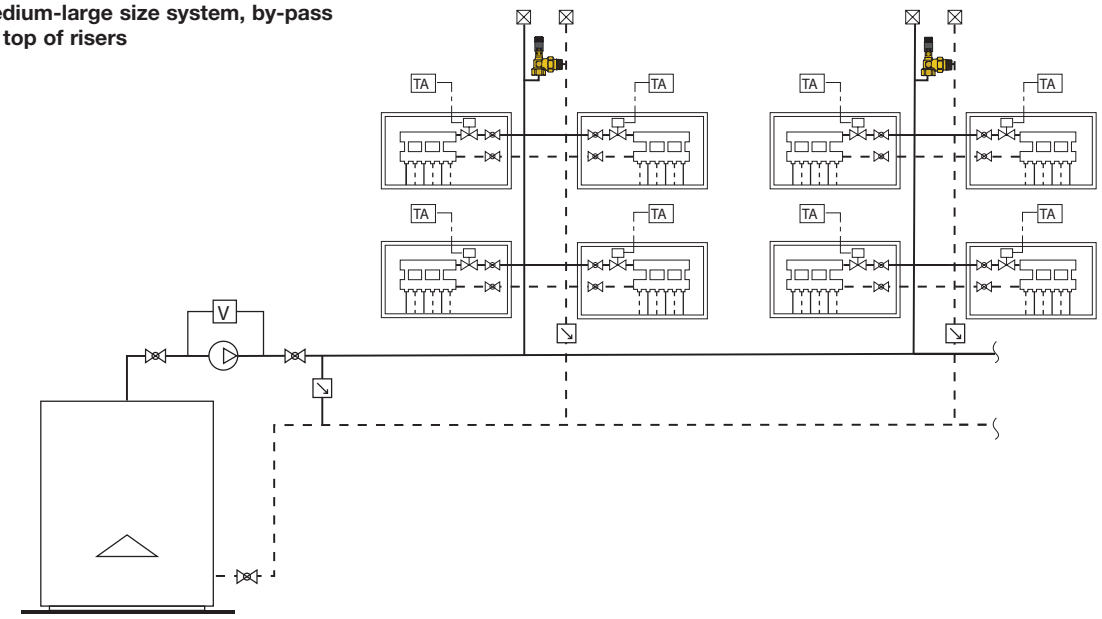
Sizing

The by-pass valve should be selected according to the **opening start setting value** and the **flow rate to be by-passed**. When making the selection, refer to the graphs relating to hydraulic characteristics.

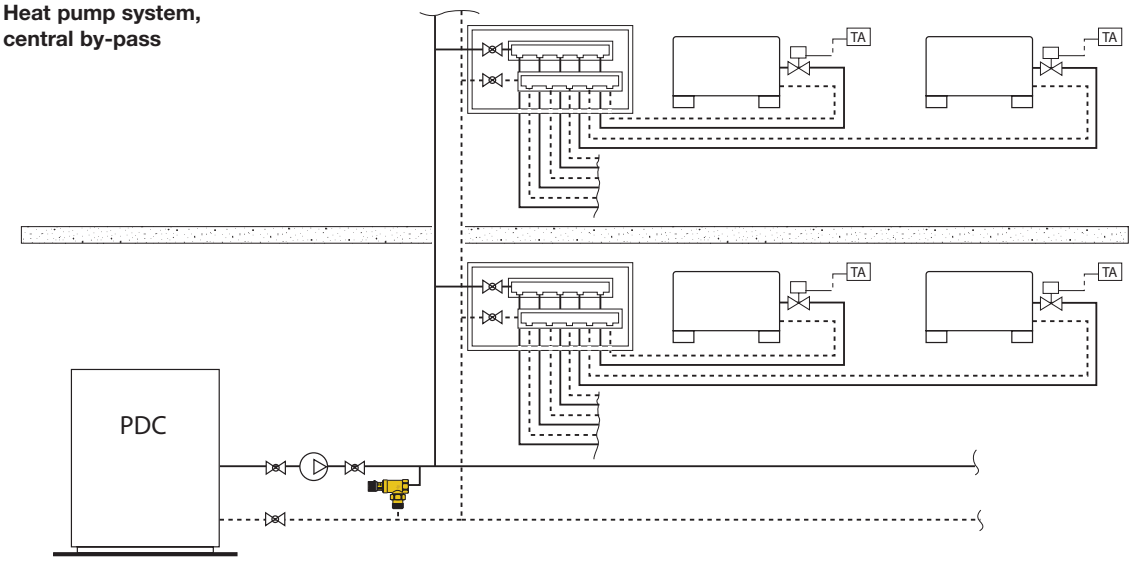
In the case of very high by-pass flow rates, we recommend installing the valves between the flow and return in for each column, consider the Δp values corresponding to the column alone, and not the entire system load. If this is not possible, we recommend installing several valves in parallel in the central heating system, set to the same opening value.

Application diagrams

Medium-large size system, by-pass on top of risers



Heat pump system, central by-pass



SPECIFICATION SUMMARY

Code 518500

Differential by-pass valve, angled body. 3/4" F threaded connections (ISO 228-1) x M with union. Brass body. PA6G30 obturator. EPDM obturator seal. EPDM O-Ring seals. Non-asbestos fibre union seals. ABS control knob. Stainless steel spring. Medium: water, glycol solutions. Max. percentage of glycol 30 %. Working temperature range 0–100 °C. Maximum working pressure 10 bar. Setting range 10–60 kPa.

Code 518002

Differential by-pass valve, angled body with fittings for Ø 22 copper pipe. Brass body. PA6G30 obturator. EPDM obturator seal. EPDM O-Ring seals. ABS control knob. Stainless steel spring. Medium: water, glycol solutions. Max. percentage of glycol 30 %. Working temperature range 0–100 °C. Maximum working pressure 10 bar. Setting range 10–60 kPa.

Code 518015

Differential by-pass valve, in-line body. 3/4" M threaded connections (ISO 228-1) x M with union. Brass body. PA6G30 obturator. EPDM obturator seal. EPDM O-Ring seals. Non-asbestos fibre union seals. ABS control knob. Stainless steel spring. Medium: water, glycol solutions. Max. percentage of glycol 30 %. Working temperature range 0–100 °C. Maximum working pressure 10 bar. Setting range 10–60 kPa.

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