

Differential pressure by-pass valve

519 series



01007/12 NA

Replaces 01007/09 NA



519709A



519599A

Function

The differential pressure by-pass valve is used in systems with a fixed speed circulating pump supplying several zones controlled by two way zone valves. This valve ensures that the head pressure of the pump is proportional to the number of two way valves being closed. It will bypass the differential pressure created by the pump as the zone valves close, thus eliminating water hammer noise.

Product range

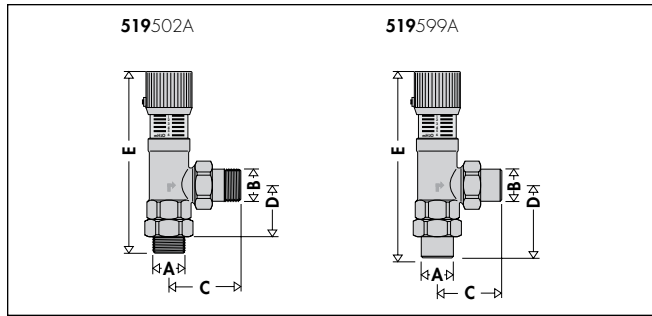
Code 519502A	Adjustable differential pressure by-pass valve with graduated scale, flow up to 9 gpm connections 3/4" MNPT union inlet x 3/4" MNPT union outlet
Code 519599A	Adjustable differential pressure by-pass valve with graduated scale, flow up to 9 gpmconnections 3/4" sweat union inlet x 3/4" sweat union outlet
Code 519600A	Adjustable differential pressure by-pass valve with graduated scale, flow up to 40 gpm connections 1" FNPT inlet x 1" MNPT union outlet
Code 519609A	Adjustable differential pressure by-pass valve with graduated scale, flow up to 40 gpmconnections 1" FNPT x 1" sweat union outlet
Code 519700A	Adjustable differential pressure by-pass valve with graduated scale, flow up to 45 gpmconnections 1-1/4" FNPT inlet x 1-1/4" MNPT union outlet
Code 519709A	Adjustable differential pressure by-pass valve with graduated scale, flow up to 45 gpmconnections 1-1/4" FNPT inlet x 1-1/4" sweat union outlet

Technical specification

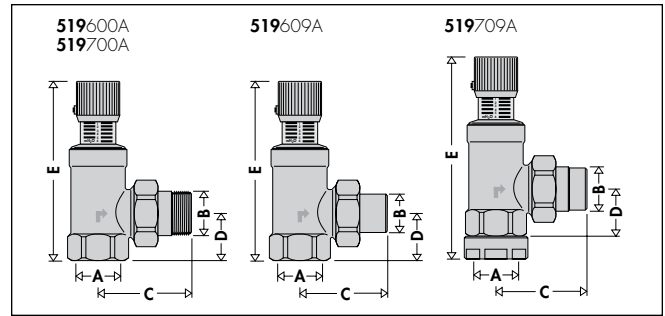
Materials	- body:	brass
	- valve plug:	brass
	- valve plug gasket:	EPDM
	- O-Ring seals:	EPDM
	- union seals:	asbestos free NBR
	- control knob:	ABS
	- spring:	stainless steel

Performance	Suitable fluids:	water, glycol solutions
	Max. percentage of glycol:	30%
	Temperature range:	32–230°F (0–110°C)
	Max. working pressure:	150 psi (10 bar)
	Flow rates:	3/4" flow up to 9 gpm 1" flow up to 40 gpm 1-1/4" flow up to 45 gpm
	Setting range:	1–6 m w.g. (2–10 psi)

Dimensions



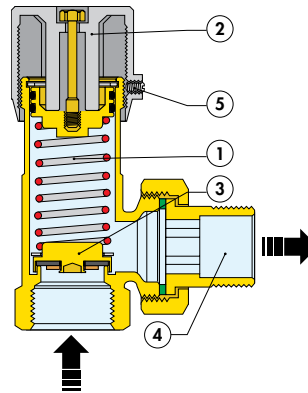
Code	A	B	C	D	E	Wt. (lb.)
519502A	3/4" MNPT	3/4" MNPT	2 1/4"	2 5/8"	5 11/16"	1
519599A	3/4" SWT	3/4" SWT	2 1/8"	2 1/2"	5 9/16"	1



Code	A	B	C	D	E	Wt. (lb.)
519600A	1" FNPT	1" MNPT	3 13/16"	2 1/16"	6 5/8"	1.4
519609A	1" FNPT	1" SWT	2 13/16"	2 1/16"	6 5/8"	1.4
519700A	1 1/4" FNPT	1 1/4" MNPT	3 15/16"	2 1/16"	7 3/8"	1.5
519709A	1 1/4" FNPT	1 1/4" MNPT	3"	2 1/16"	7 3/8"	1.5

Operating principal

When the spring (1) compression is adjusted using the control knob (2), the force balance acting on the valve plug (3) changes, thus modifying the threshold pressure value of the valve. The valve plug opens, activating the by-pass circuit, only when it is subjected to a differential pressure sufficient to generate a thrust greater than the thrust exerted by the spring. This allows the flow discharge through the outlet (4), limiting the difference in pressure between the two points in the system where the valve is fitted.

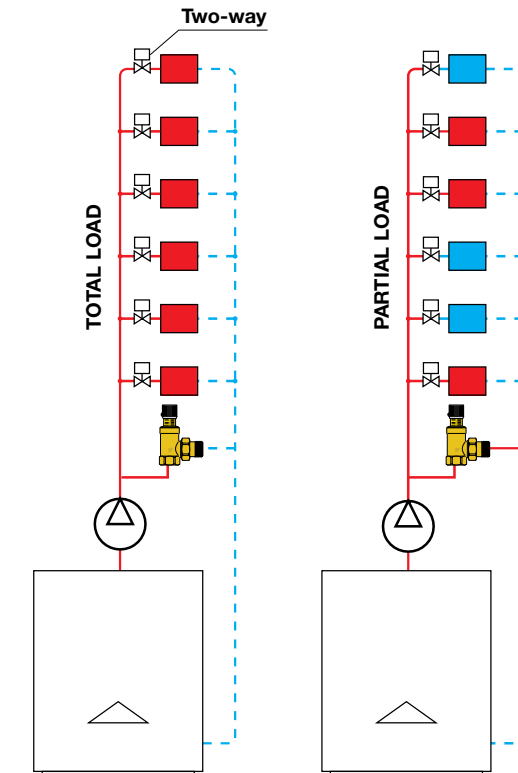
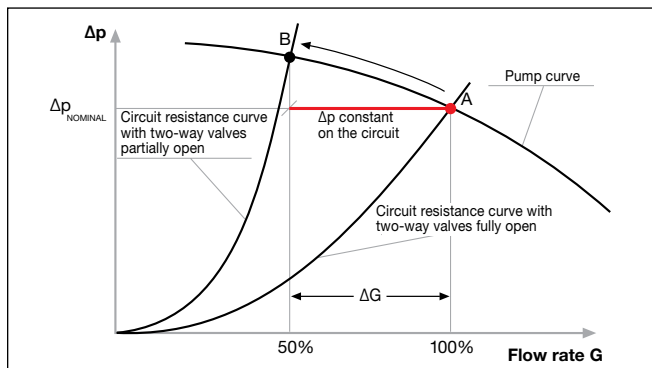


System operation

The job of the differential pressure 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 zone valves, the head loss in the circuit increases, point B.

The by-pass valve, set to the nominal head value of the pump, limits the increase in pressure, by-passing the flow rate ΔG . This behavior is guaranteed at any closing condition of the system two-way zone valves. In fact, once the position of the valve control knob has been established, the threshold pressure value is more or less constant as the discharge flow rate varies (see hydraulic characteristic diagrams).

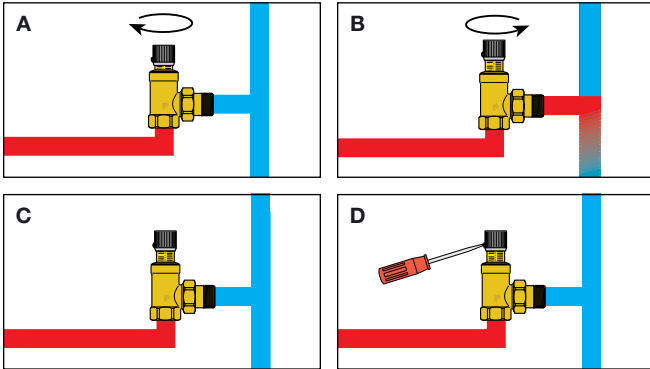
A proper valve sizing must guarantee a sufficient flow rate by-pass to keep the pump at its nominal operating point in all system operating conditions, for example when the first zone valves are closed.



Setting

To regulate the valve, turn the knob to the required value on the graduated scale: the values correspond to the differential pressure in psi or meters w.g. to open the by-pass.

For a quick setup adjustment of the differential pressure by-pass valve, use the following manual method. As an example, a hydronic system with several zone valves: the system must be operating, the zone valves must be fully open and the by-pass valve must be set to the maximum value (a) (clockwise). Gradually open the differential pressure by-pass valve using the control knob (counterclockwise). Use a thermometer, or simply your hand, to check that the hot water is flowing into the by-pass circuit (b). As soon as a rise in the temperature is noted, turn control knob (clockwise) one half turn closed so hot water stops flowing into the by-pass (c). Lock the knob in this position (d) with the locking screw.



Installation

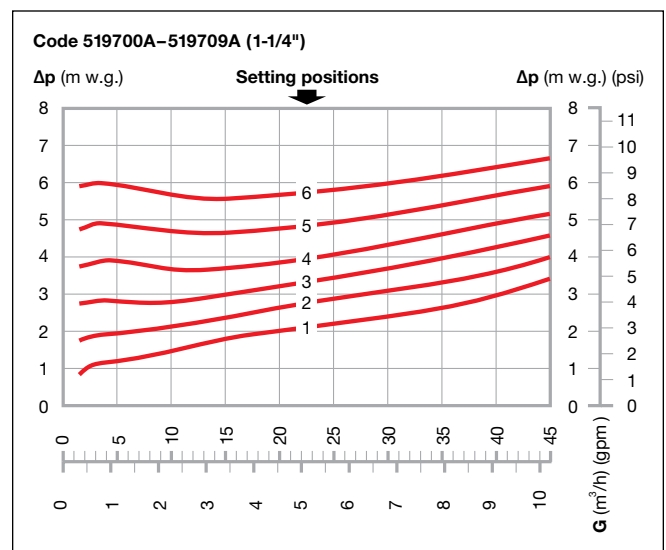
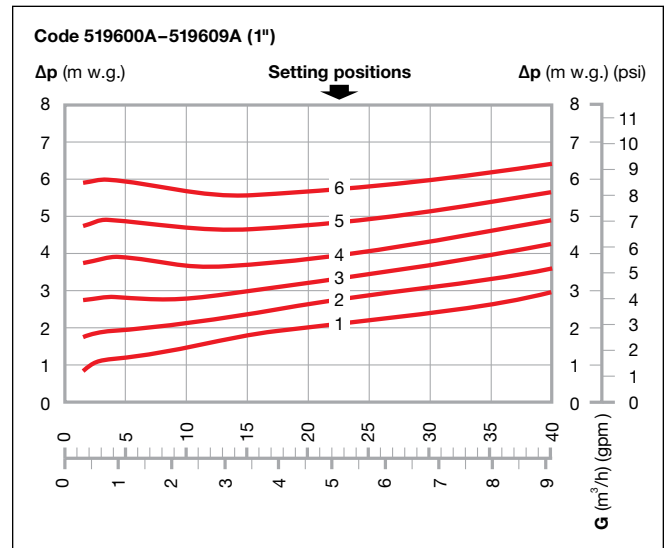
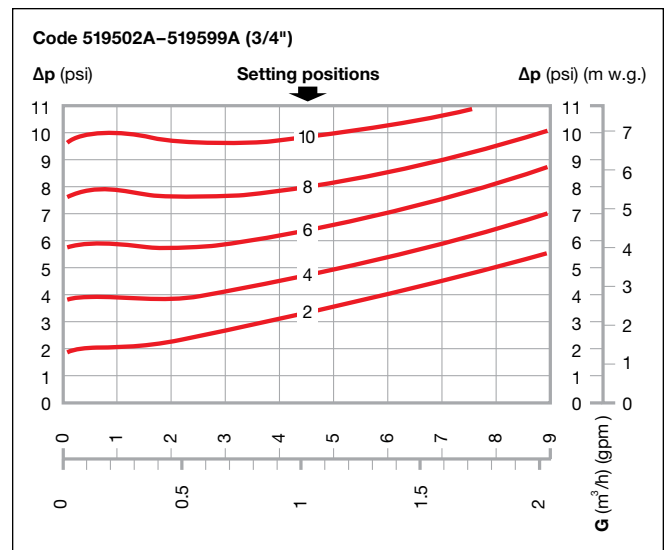
The differential pressure by-pass valve can be fitted in any position, respecting the flow direction indicated by the arrow on the valve body.

In systems with a traditional boiler it is normally fitted between the system flow and return ends, which allows the control of the pressure and the passage of a minimum flow through the heat generator.

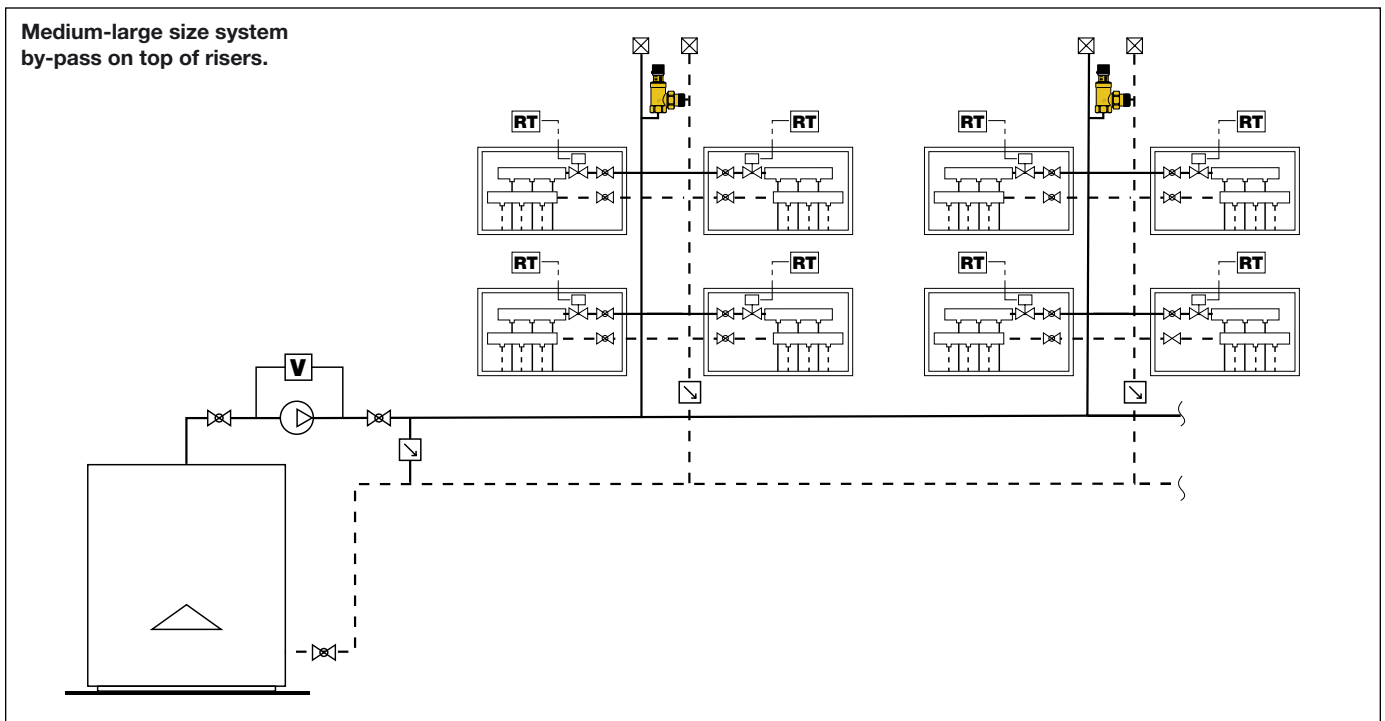
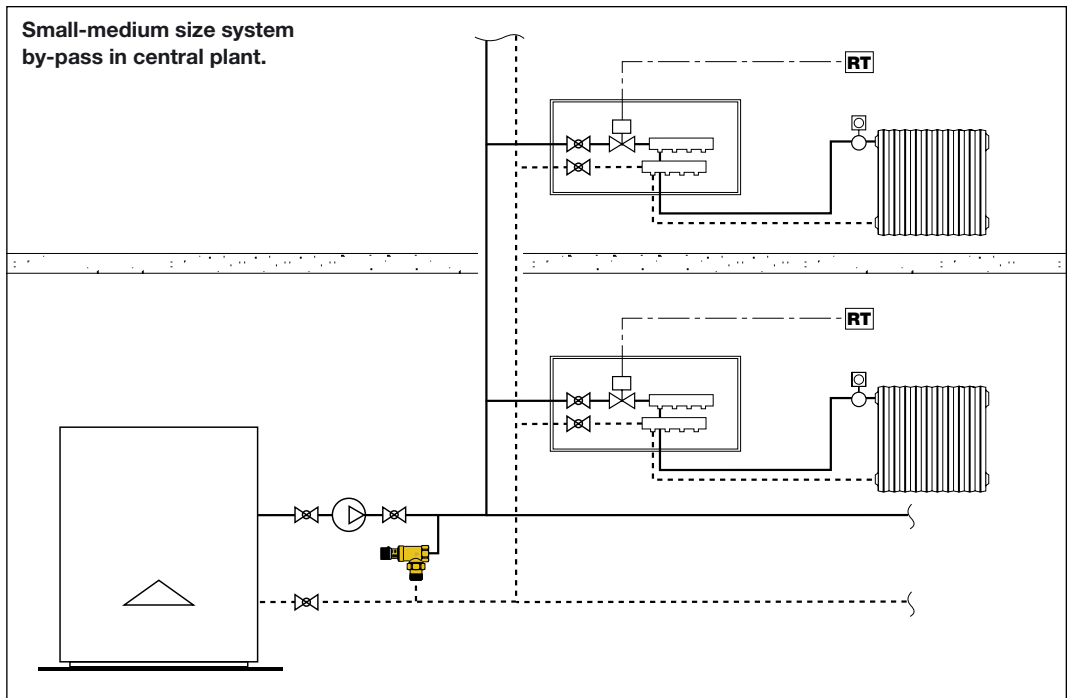
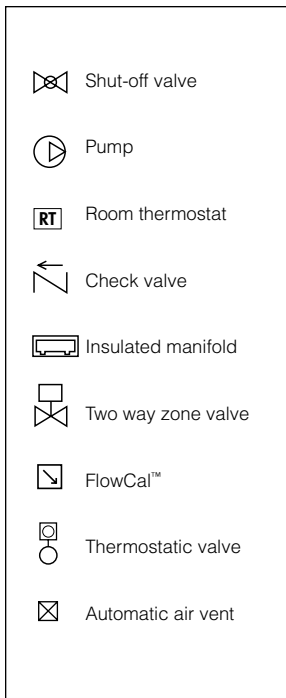
In systems with a condensation boiler, it is preferable to fit the by-pass directly between the upstream and downstream sections of the pump, as this allows a higher ΔT in the circuit, with lower return temperatures and therefore better operation of the system.

In the event of high by-pass flow rate levels, it is recommended to fit the valve between the flow and return ends of each column, rather than fitting a number of valves in parallel at the central boiler.

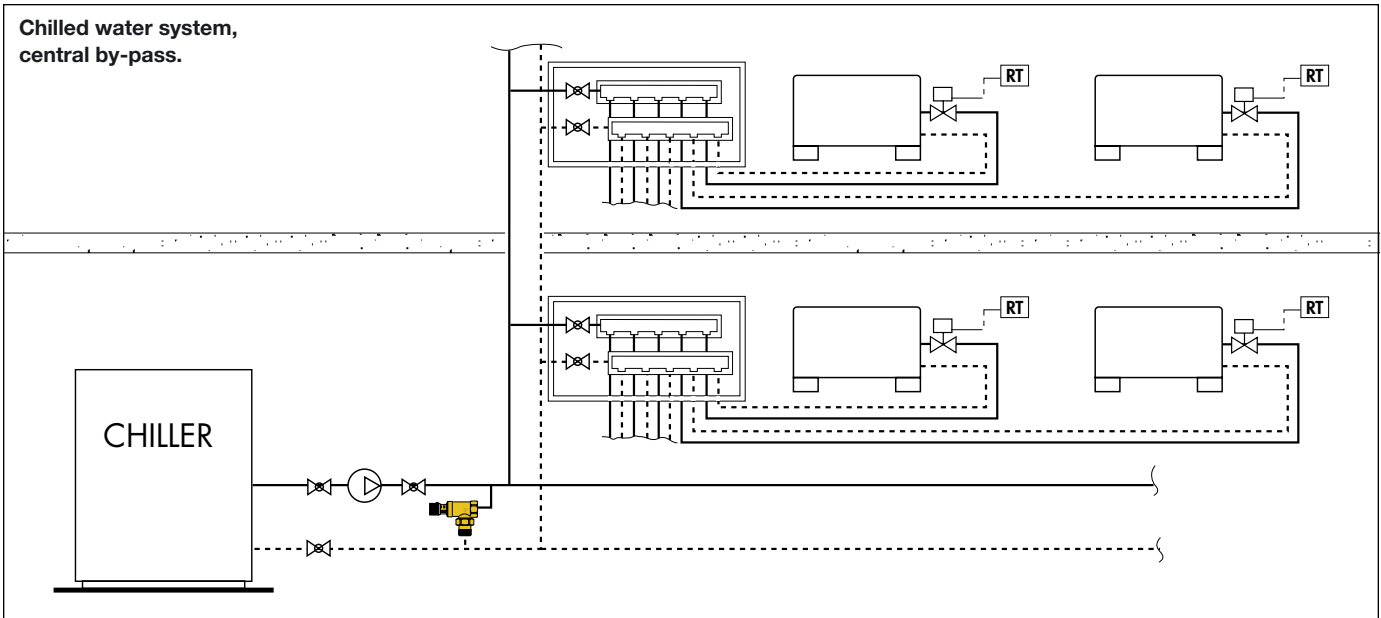
Hydraulic characteristics



Application diagrams



**Chilled water system,
central by-pass.**



SPECIFICATION SUMMARIES

519 series

Differential pressure by-pass valve. Union connections: 3/4" MNPT union inlet x 3/4" MNPT union outlet, 3/4" sweat union inlet x 3/4" sweat union outlet, 1" FNPT inlet x 1" MNPT union outlet, 1" FNPT inlet x 1" sweat union outlet, 1-1/4" FNPT inlet x 1-1/4" MNPT union outlet and 1-1/4" FNPT inlet x 1-1/4" sweat union outlet. Brass body. Brass valve plug. EPDM valve plug gasket. EPDM O-Ring seals. Asbestos free NBR union seals. ABS control knob. Stainless steel spring. Suitable fluids: water, or 30% glycol solution. Temperature range 32–230°F (0–110°C). Maximum working pressure 150 psi (10 bar). Setting range is 1–6 m w.g. (2–10 psi) and flow rates 3/4" flow up to 9 gpm, 1" flow up to 40 gpm and 1-1/4" flow up to 45 gpm.

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