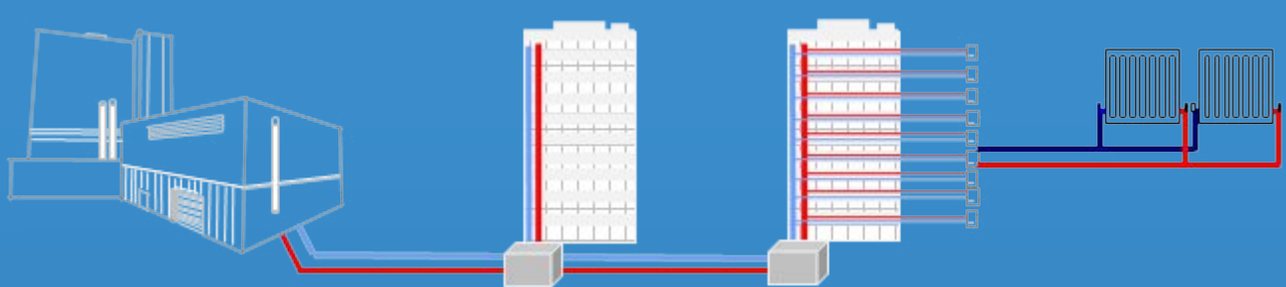
How to control heating return temperatures



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It’s a fact that consistent low return temperatures reduce costs, for the developer, the installer and the network operators.

The challenge for the heating system designer is to satisfy the expectations and needs of everyone, including that of the user who is used to traditional, high temperature radiant heating.

As a starting point for the designer, the relevant code of practice - CP1 2020 - lists the following components.

- Wall mounted room thermostat
- Electronic TRV heads to add timed heating periods
- TRV heads must incorporate gas or liquid sensors
- Tamper-proof return temperature limiters
- Pressure independent thermostatic radiator valves

The reasons why the inclusion of these key elements in any design is desirable are as follows.

Using a programmable room thermostat is an effective way to add timed control to a single zone heating system. The incorporation of a zoned heating system is only required on larger apartments and homes where the floor area is greater than 150m² (part L - Building Regulations).

The maximum flow temperatures are to be 70°C, with the return temperature not exceeding 40°C.

Bypasses and automatic bypasses are not recommended.

In order to achieve the design return temperatures consistently, the system should be properly balanced at the time of commissioning, and be fitted with control valves which will maintain that balance during operation.

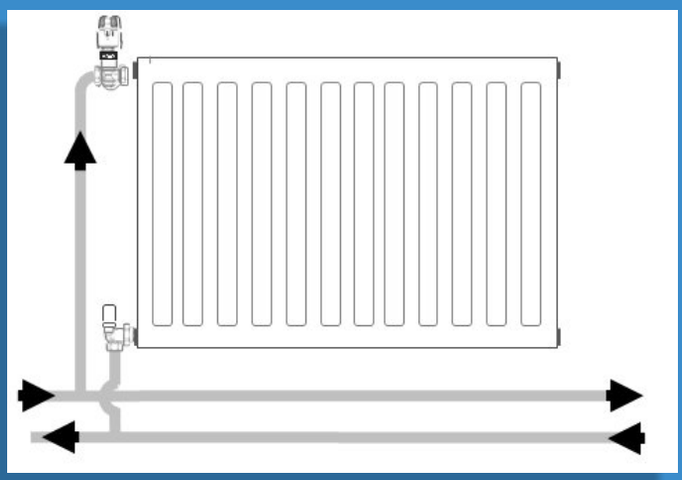
Pressure Independent Thermostatic Radiator Valves

The Inta PTRV is a radiator valve that performs the functions of a thermostatic valve and a differential pressure regulator.

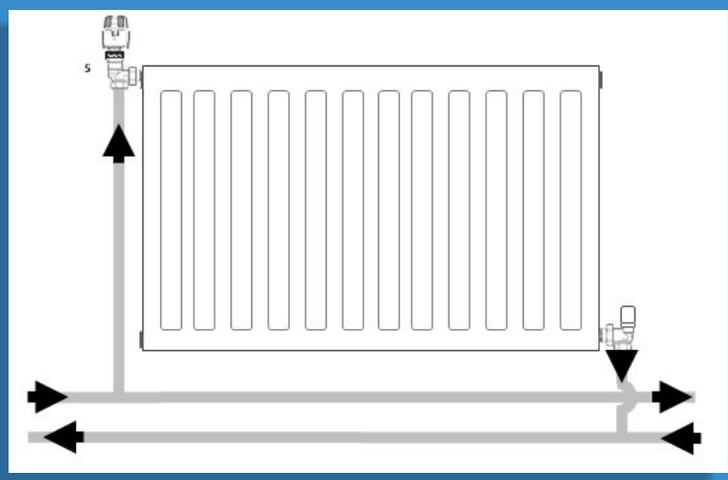
Each pre-settable thermostatic valve comes with six pre-set Kv values.

The valve comes complete with the EN215, class A efficiency rated Inta i-therm TRV valve head.

To achieve the best levels of efficiency, positioning of the valves is key



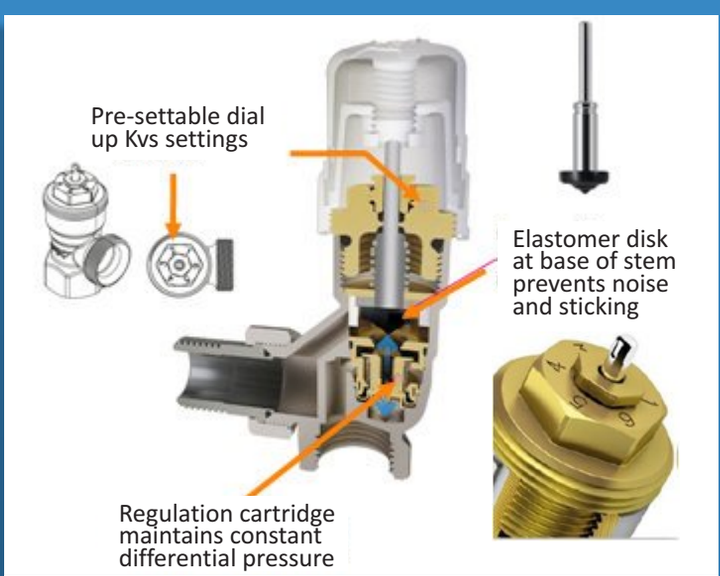
The most efficient solution
Inlet at top, outlet at bottom
Both valves on the same side of the radiator



For longer radiators, the inlet is always at the top with valves positioned at opposite ends

The positioning of these valves is as recommended by the CP1 2020 code of practice. The code advises against both connections at the bottom of the radiator, as efficiency drops by over 10%.

The flow rate pre-setting limits the maximum flow passing through the radiator and thereby ensures simple and effective radiator circuit balancing. The differential pressure regulator integral with the radiator valve maintains a constant pressure differential, therefore maintaining the set flow rate.



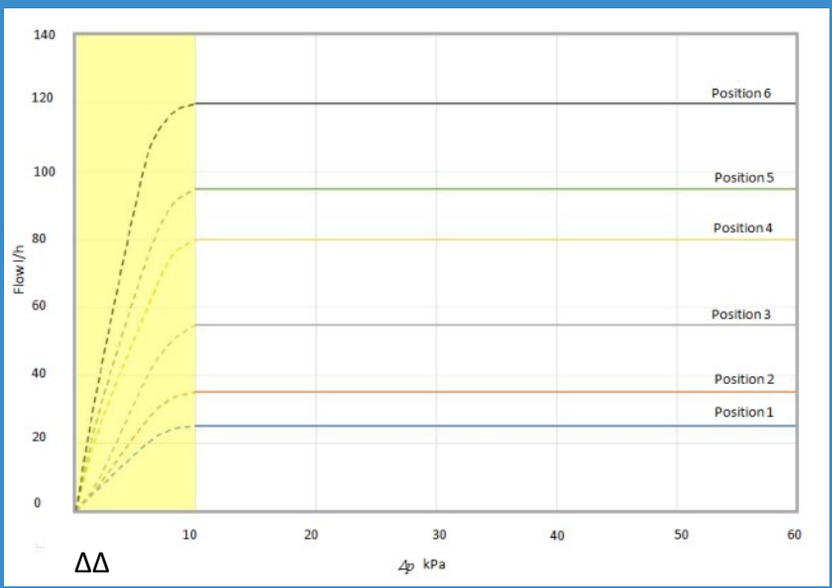
Pre-settable dial up Kvs settings for PRTV		Thermostatic head temperature settings	
1	25l/h	*	7°C
2	35l/h	1	10°C
3	55l/h	2	15°C
4	80l/h	3	20°C
5	95l/h	4	25°C
6	120l/h	5	30°C

Heat Load: W		Flow: l/h	Kv setting
600W	20°C	25	1
800W	20°C	34.5	2
1200W	20°C	53.88	3
1800W	20°C	77.58	4
2200W	20°C	94.8	5
2800W	20°C	120.68	6

Examples for setting the PTRV, min pressure for constant flow 0.1bar. Heating is 60/40 with calculated *flow rated using the formula;

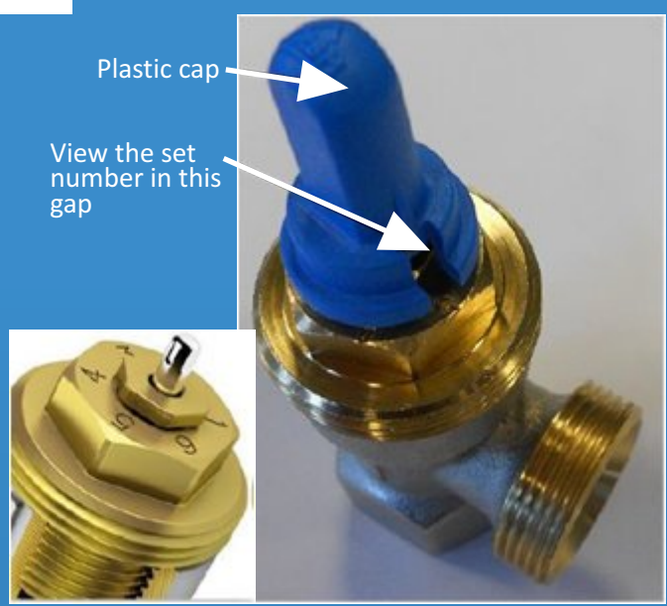
$$Q = \frac{P}{1.16 * \Delta T}$$

Technical



ΔΔ

Position	Flow rate l/h
1	25
2	35
3	55
4	80
5	95
6	120



Pre-setting instructions
The values required for pre-setting the PTRV can be easily set by using the adjustment tool available as an accessory. Set the flow rate which is to be kept at a constant value by selecting the corresponding number on the pre-setting scale on the body of the valve.

1) Remove the plastic cap.
2) Turn with the tool clockwise to the position to be selected.
3) The position will be seen on the tool through the viewing gap
4) Refer to the tables and graph for the flow rates aligned with the position value.

Example calculation

Heating load = 600W
For this example, the ΔT is 15°C

$$Q = \frac{P}{1.16 \times \Delta T} \qquad \frac{600}{1.16 \times 15} = 35 l/h$$

Minimum pressure to maintain constant flow = 10 kPa (0.1bar)
Set position 3

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