

# Thermostatic radiator valves for NPT threaded radiators

## 220 series



01034/13 NA



ISO 9001 No. 0003



### Product range

#### VALVES:

220 series	Angled thermostatic radiator valve body	.....	.....	connections 1/2", 3/4"
221 series	Straight thermostatic radiator valve body	.....	.....	connections 1/2", 3/4"

#### THERMOSTATIC CONTROL HEADS:

200 series	Thermostatic control head, built-in sensor with liquid-filled element	.....	graduated scale *-5 corresponding to 45-82°F (7-28°C)
201 series	Thermostatic control head, remote sensor with liquid-filled element	.....	graduated scale *-5 corresponding to 45-82°F (7-28°C)
203 series	Thermostatic control head with contact probe	.....	graduated scale 68-122°F (20-50°C)
472 series	Thermostatic control head with remote adjusting knob, liquid-filled element	.....	graduated scale *-5 corresponding to 43-82°F (6-28°C)

### Technical specification of valve bodies

<b>Materials</b> - body:	brass chrome plated
- valve control stem:	stainless steel
- seals:	EPDM
- control knob and cap:	ABS (RAL 9010)

#### Performance

Suitable fluids:	water, glycol solutions
Max. percentage of glycol:	30%
Max. differential pressure assembled with control head:	15 psi (1 bar)
Max. working pressure:	150 psi (10 bar)

Temperature range: 40-212°F (5-100°C)

### Technical specification of control heads 200/201 series

Scale of adjustment:	*-5
Setting temperature range:	45-82°F (7-28°C)
Frost protection cut-in:	45°F (7°C)
Max. ambient temperature:	120°F (50°C)
Length of capillary, 201 series:	78" (2m)

Approval:

In compliance with EN 215 (KEYMARK)

Thermostatic Efficiency Label (TELL): Lev. A, Reg. 10428/9-20110527

### Control adjustment scale, 200/201 series

0	*	1	2	3	4	5
32°F 0°C	45°F 7°C	55°F 12°C	60°F 16°C	68°F 20°C	75°F 24°C	82°F 28°C

### Function

Thermostatic valves are typically used for controlling the fluid flow to the radiators of hydronic heating systems. They are composed of two parts: a control head and valve body.

The control contains a liquid-filled thermostatic element that automatically controls the opening of the valve to maintain room temperature at the set value. This prevents unwanted room temperature rises, providing considerable energy savings.

The valve body has NPT threaded connections: female threads to connect to the system and union male threads to connect to the radiator. These valves can also be used for isolating and balancing.



### Technical specification of control heads 203 series

Setting temperature range: - code 203502	68-122°F (20-50°C)
Max. sensor temperature:	212°F (100°C)
Max. pocket pressure:	150 psi (10 bar)
Length of capillary:	78" (2 m)

### Control adjustment scale, 203 series

68°F 20°C	75°F 25°C	85°F 30°C	95°F 35°C	105°F 40°C	110°F 45°C	122°F 50°C
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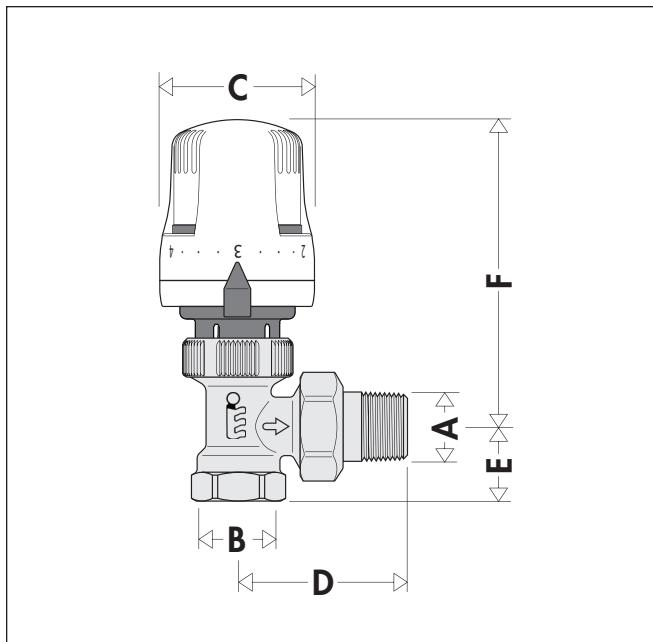
### Technical specification of control heads 472 series

Scale of adjustment:	0-5
Setting temperature range: - code 47200	43-82°F (6-28°C)
Frost protection cut-in:	43°F (6°C)
Accuracy:	±0.7°F (0.4°C)
Max. sensor temperature:	120°F (50°C)
Length of capillary:	78" (2 m)

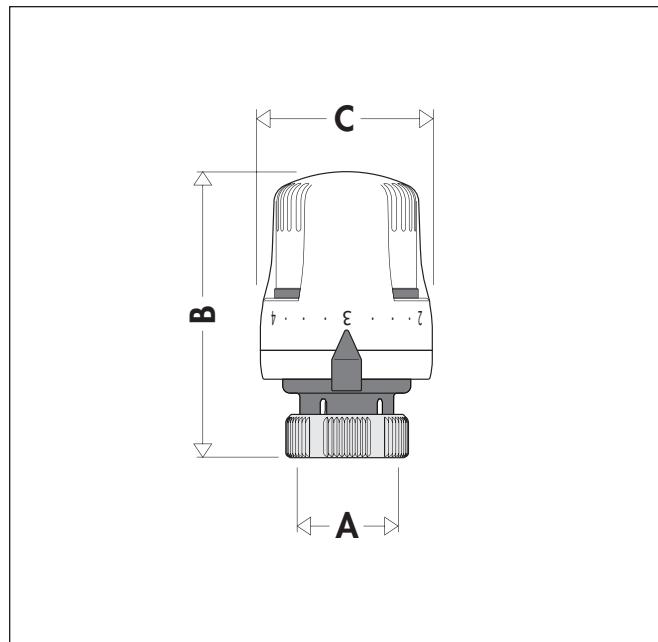
### Control adjustment scale, 472 series

0	*	1	2	3	4	5
32°F 0°C	43°F 6°C	54°F 12°C	61°F 16°C	68°F 20°C	75°F 24°C	82°F 28°C

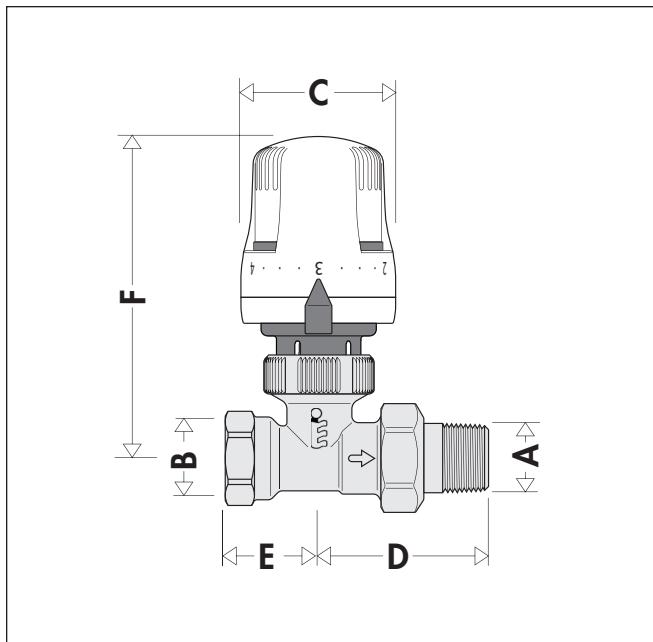
## Dimensions



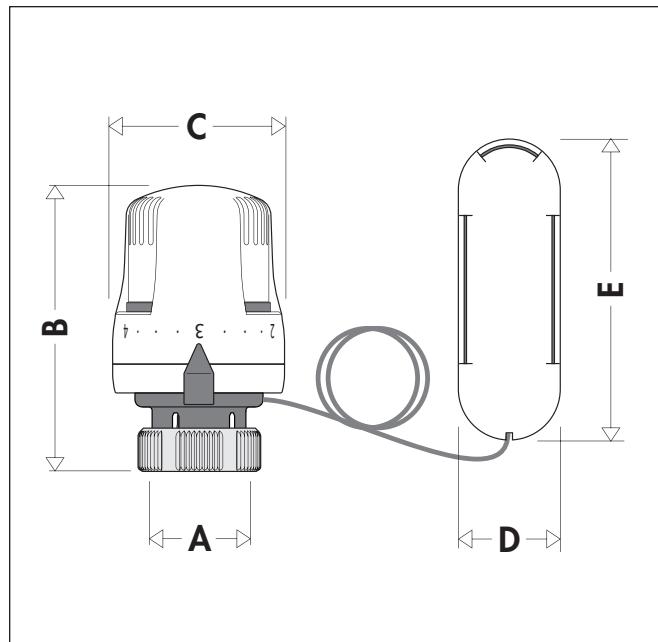
Code	A	B	C	D	E	F
<b>220400A + 200000</b>	1/2" NPT	1/2" NPT	2"	1 1/16"	1"	4"
<b>220500A + 200000</b>	3/4" NPT	3/4" NPT	2"	2 1/2"	1"	4"



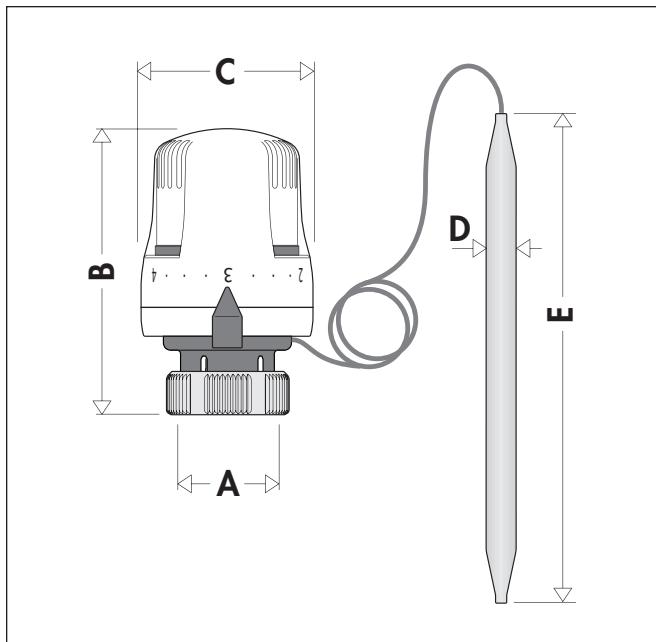
Code	A	B	C
<b>200000</b>	M30 x 1.5	3 1/8"	2"



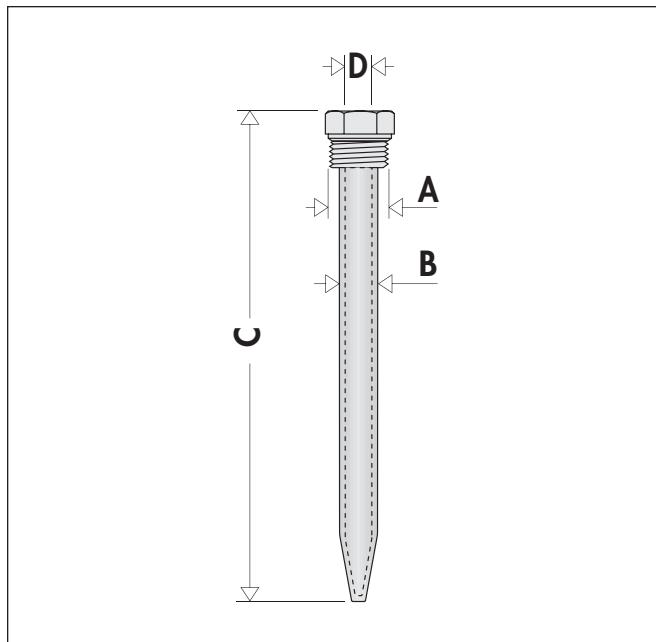
Code	A	B	C	D	E	F
<b>221400A + 200000</b>	1/2" NPT	1/2" NPT	2"	1 1/16"	1 1/8"	4 1/2"
<b>221500A + 200000</b>	3/4" NPT	3/4" NPT	2"	2 1/2"	1 1/8"	4 1/2"



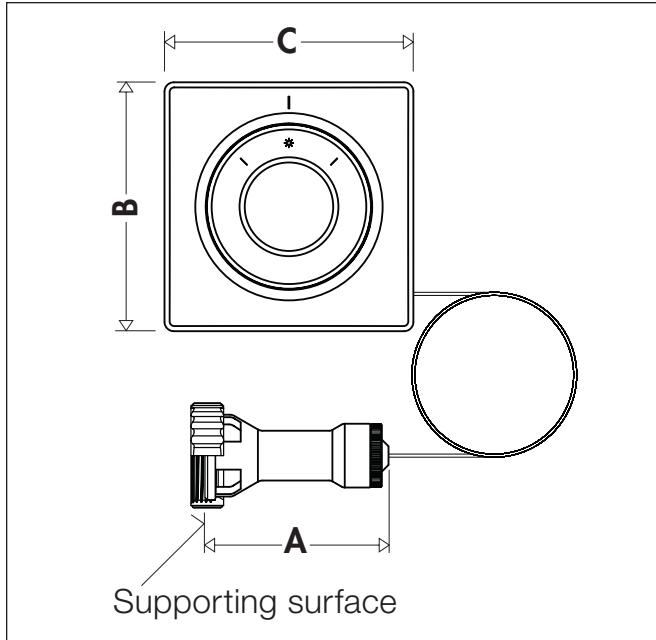
Code	A	B	C	D	E
<b>201000</b>	M30 x 1.5	3 1/8"	2"	1 1/8"	3 3/4"



Code	A	B	C	D	E
203502	M30 x 1.5	3 1/8"	2"	Ø 7/16"	6 1/4"



Code	A	B	C	D
NA475002	3/4" NPT male	Ø 1/2"	7 5/8"	15 15/32"



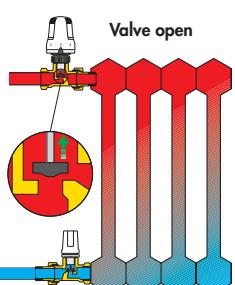
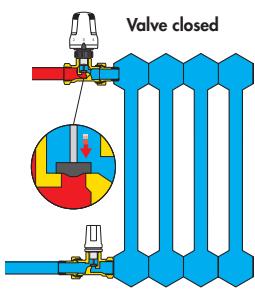
Code	A	B	C
472000	2 3/8"	3 1/8"	3 1/8"

## Principle of Operation

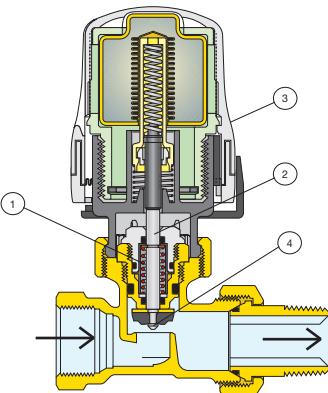
The thermostatic control head is a proportional temperature controller, containing a liquid-filled bellows thermostatic sensor.

The valve plug is normally in the (1) spring-to-open (normally open) position without the control head, or when the control head is in the maximum open position (setting 5). Under operation the ambient room temperature of air passing around the sensor rises causing the liquid in the bellows to expand, pushing the valve control stem down against the return spring. This closes the valve, reducing fluid flow to the radiator to cool the room, in proportion to the deviation from the desired temperature setting. When the room temperature decreases, the reverse occurs; the bellows contracts, which in turn allows the valve spring to open the valve, increasing the fluid flow to the radiator to warm the room.

The valve control stem (2) is stainless steel with an EPDM o-ring double seal.



This allows for replacement of the control head (3) even with the system operating. The valve plug (4) is shaped to provide an optimal flow characteristic throughout the opening and closing stroke under proportional thermostatic operation. The wide passageway between the seat and the valve plug causes reduced head losses in manual operation.

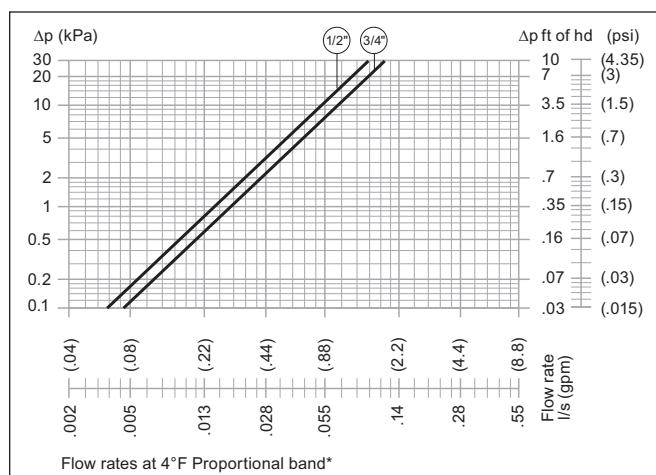
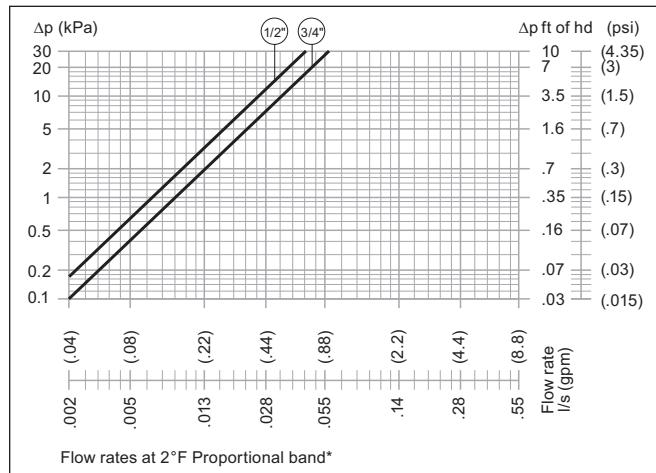


The Caleffi 200 series thermostatic control head features an exclusive liquid-filled element, liquid being an incompressible fluid. As a result, the 220 and 221 series valve bodies utilize a very strong return spring. This ensures that after a long 'off-season', when the actuator operates for the first time, the spring reliably lifts the plug seal off the seat without sticking.

The Caleffi 220 and 221 series can also be used for isolation and balancing and can be adjusted to either shutoff (isolation) or modulate flow (balancing) with either the standard cap or with optional code 449010 manual knob.

## Hydraulic characteristics

**Thermostatic valves with angled connections 220 series and straight connections 221 series with thermostatic control head 200 or 201 series\***



\*Proportional band is the difference between the thermostatic radiator valve control head setting and the actual room temperature.

### Valves with angled connections

Code	Size	Cv Proportional band (°F)				
		2	2.7	4	5.4	Cv Max.
<b>220400A</b>	1/2"	0.4	0.6	0.7	1.0	2.8
<b>220500A</b>	3/4"	0.5	0.7	0.9	1.3	3.7

### Valves with straight connections

Code	Size	Cv Proportional band (°F)				
		2	2.7	4	5.4	Cv Max.
<b>221400A</b>	1/2"	0.4	0.6	0.8	1.0	1.7
<b>221500A</b>	3/4"	0.5	0.7	0.95	1.2	2.6

**Cv** = Volume flow in gpm producing pressure drop 1 psi

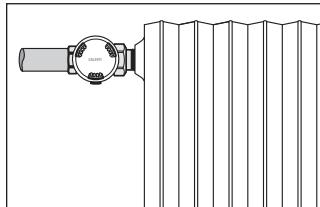
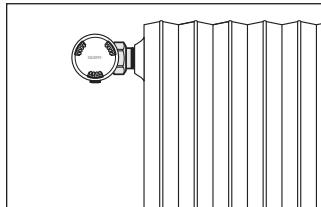
**Cv Max.** = Cv with valve totally open

### \*Certifications

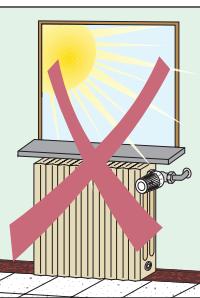
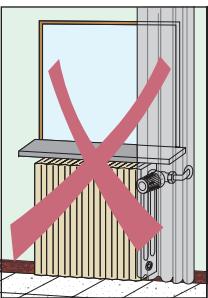
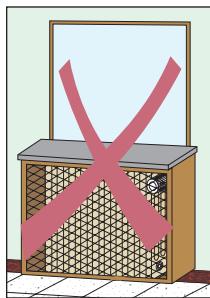
Caleffi valves 220, 221 series sizes 1/2" and 3/4", in combination with control heads 200 and 201 series, are approved to standard EN 215.

## Installation

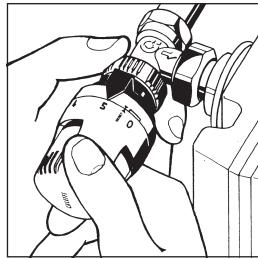
Thermostatic control heads should be installed in the horizontal position.



The sensitive element of the thermostatic control head must not be installed in niches, alcoves, behind curtains or directly exposed to sunlight, any of which would sense incorrect temperature values.

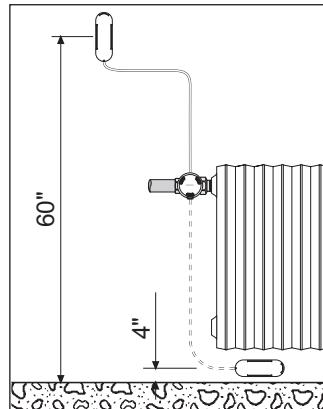


Before installing the thermostatic control head, turn the control knob to the number 5 position.



## Remote sensor control

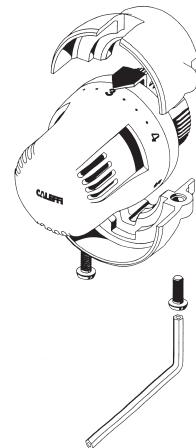
Refer to the dimensions shown to properly install the thermostatic control head with remote sensor, code 203502.



## Tamper-proof cap

The thermostatic control head can be protected against tampering and theft by mounting the tamper-proof cap, code 209000, on the knob as shown.

The cover is fastened with two screws with special heads that can only be tightened or loosened with the special hex key, code 209001.

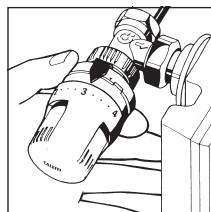


## Locking and restricting the thermostat control temperature

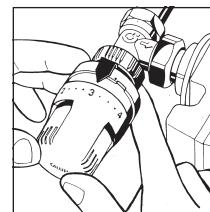
### Temperature restriction



1. Turn the knob to the fully open position (Pos. 5). Using a screw-driver, unlock the ring, pressing it fully towards the valve body.



2. Turn the knob to the new maximum open position required (e.g. Pos. 3). Turn the ring **counter-clockwise** up to the stop.

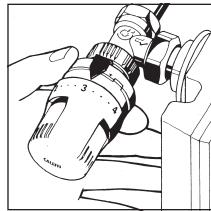


3. Re-lock the ring. The valve will now have a temperature range restriction from 0 to the set value.

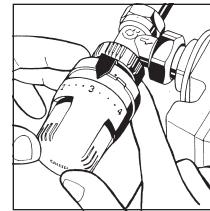
### Locking the temperature



1. Turn the knob to the fully open position (Pos. 5). Using a screw-driver, unlock the ring, pressing it fully towards the valve body.



2. Position the valve at the required temperature and turn the ring **clockwise** up to the stop.

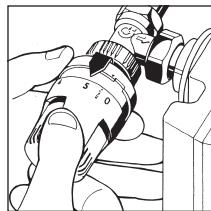


3. Re-lock the ring. The valve will now be locked at the set temperature.

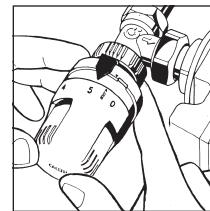
### Resetting the temperature restriction and temperature lock



1. Using a screw-driver, unlock the ring, pressing it fully towards the valve body.



2. Turn the knob to the fully open position and the ring **counter-clockwise**, up to the stop. The RESET arrows will match up.



3. Re-lock the ring. The valve will now no longer have any temperature restriction or lock.

## Accessories



### 209

Tamper-proof cap for public installations. For thermostatic control head 200 and 201 series. To be used with special hex key code 209001.

Code	Description
209000	Tamperproof cap



### NA475

Pocket well for 203502. Length: 7 3/8" (187 mm).

Code	Description
NA475002	3/4" NPT male



### 209

Special hex key for tamper-proof cap. To be used with tamper-proof caps 209 series.

Code	Description
209001	Hex key



### 4490

Manual knob for thermostatic radiator valves. For valves 220 and 221 series.

Code	Description
449010	Manual knob

## SPECIFICATION SUMMARIES

### 220 series

Thermostatic valve for radiators suitable for thermo-electric and thermostatic control heads. Angled connections for steel pipes 1/2" and 3/4" NPT female. Radiator connection 1/2" and 3/4" NPT male with tailpiece. Brass body. Chrome plated. Control knob in ABS white RAL 9010. Double seal on valve control stem with EPDM O-Rings. Maximum working temperature 212°F (100°C). Maximum working pressure 150 psi (10 bar). Provide with code 4490101 manual knob. Combined with 200000 and 201000 control heads certified to UNI EN 215.

### 221 series

Thermostatic valve for radiators suitable for thermo-electric and thermostatic control heads. Straight connections for steel pipes 1/2" and 3/4" NPT female. Radiator connection 1/2" and 3/4" NPT male with tailpiece. Brass body. Chrome plated. Control knob in ABS white RAL 9010. Double seal on valve control stem with EPDM O-Rings. Maximum working temperature 212°F (100°C). Maximum working pressure 150 psi (10 bar). Provide with code 4490101 manual knob. Combined with 200000 and 201000 control heads certified to UNI EN 215.

### 200 series

Thermostatic control head for thermostatic and convertible radiator valves. Sensor incorporated with liquid-filled element. Maximum ambient temperature 120°F (50°C). Graduated scale from \* to 5 corresponding to a temperature range of 45 to 82°F (7 to 28°C), with possibility of temperature restriction and locking. Frost protection cut-in at 45°F (7°C). Combined with 220 series, 221 series valves certified to UNI EN 215.

### 201 series

Thermostatic control head for thermostatic and convertible radiator valves. Remote sensor incorporated with liquid-filled element. Maximum ambient temperature 120°F (50°C). Graduated scale from \* to 5 corresponding to a temperature range of 45 to 82°F (7 to 28°C), with possibility of temperature restriction and locking. Frost protection cut-in at 45°F (7°C). Combined with 220 series, 221 series valves certified to UNI EN 215.

### 203 series

Thermostatic control head with contact probe. Setting temperature range 68–122°F (20–50°C). Maximum sensor temperature 212°F (100°C). Pre-set scale corresponds to adjustment temperature range of 68–122°F (20–50°C), with possibility of temperature restriction and locking. Length of capillary 78" (2 m).

### 209 series

Tamper-proof cap for thermostatic control head 200 series, for use in public places.

### 472 series

Thermostatic control head with remote adjusting knob, liquid-filled element. Setting temperature range 43–82°F (6–28°C). Maximum sensor temperature 120°F (50°C). Graduated scale from \* to 5 corresponding to a temperature range of 43 to 82°F (6 to 28°C). Frost protection cut-in at 43°F (6°C). Length of capillary 78" (2 m).

We reserve the right to change our products and their relevant technical data, contained in this publication, at any time and without prior notice.