

# Temperature relief valve certified and calibrated to INAIL standards



01001/23 EN

replaces dp 01001/18 EN

## 542 series



### General

The temperature relief valves are made by Caleffi S.p.A. in compliance with the essential safety requirements laid down by Directive 2014/68/EU of the European Parliament and the Council of the European Union for harmonisation of member states with regard to pressurised equipment.

### Function

The temperature relief valves are used in heating systems to discharge water from the system when the set temperature is reached. The valves have positive action, which means that they will always work, even if the sensitive element fails.



### Product range

542 series Temperature relief valve with positive action, certified and calibrated to INAIL standards \_\_\_\_\_ sizes 1 1/2" M x 1 1/4" F, 1 1/2" M x 1 1/2" F

### Technical specifications

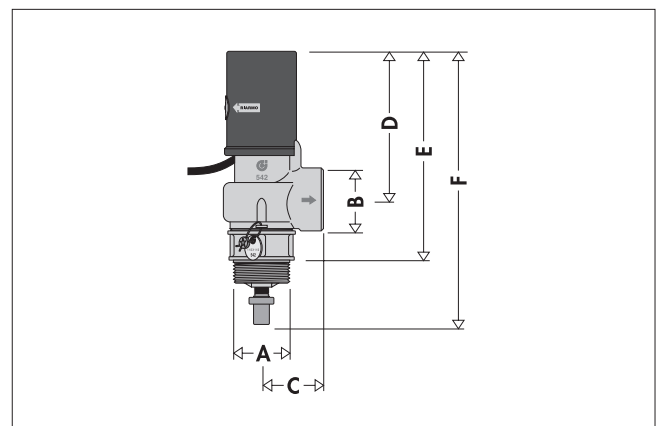
#### Materials

Body:	brass EN 12165 CW617N
Actuator stem:	brass EN 12164 CW614N
Obturator seal:	EPDM
Seals:	EPDM
Springs:	stainless steel
Protective cover:	PP

#### Performance

Medium:	water
PED category:	IV
Working pressure:	$0,3 \leq P \leq 10$ bar
Setting temperature:	- 1 1/2" x 1 1/4": 98 °C - 1 1/2" x 1 1/2": 99 °C
Operating temperature range:	5–100 °C
Auxiliary microswitch contact rating:	15 A
Threaded connections:	1 1/2" M x 1 1/4" F 1 1/2" M x 1 1/2" F

### Dimensions



Code	A	B	C	D	E	F	Mass (kg)
542870	1 1/2"	1 1/4"	45	115	158	209	1,3
542880	1 1/2"	1 1/2"	53	131	183	239	1,7

## Operating principle

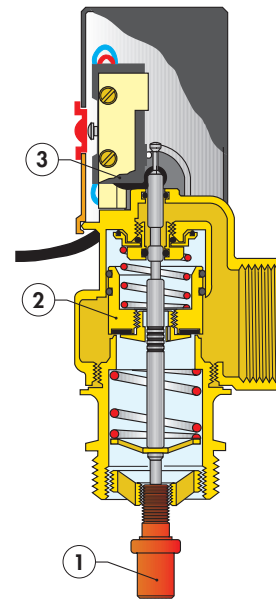
A temperature-sensitive element (1), immersed directly in the system medium, acts on the obturator (2) of the valve.

On reaching the set temperature, the valve opens and discharges the water from the system.

The obturator movement actuates an electric switch (3), which can be used to stop the fuel supply to the burner or to turn on the refilling device.

The obturator position, and therefore the valve flow rate, vary according to the temperature of the medium. On reaching the set closing temperature, the valve closes automatically.

Moreover, the valves have positive action, which means that they will always open the drain, even if the sensitive element fails.



## Reference standards

According to the provisions of Collection R Ed. 2009, technical application specifications of Heading II of Italian Ministerial Decree 1/12/75 regarding central heating systems using hot water with temperatures no greater than 110°C and a maximum nominal heat output from the firebox (or maximum total heat capacity of the firebox) greater than 35 kW, a temperature relief valve must be used in the following cases:

### Open vessel systems

- Systems with generators supplied with non-pulverized solid fuel, in place of the consumption water heater or emergency heat exchanger (Chap. R.3.C., point 2.1).

### Closed vessel systems

- Systems with closed expansion tanks (Chap. R.3.B., point 1, letter b).
- Heating systems with generators supplied with non-pulverized solid fuel (Chap. R.3.C., point 3.2) not including "assemblies" (pressure equipment provided by the manufacturer as an integrated functional assembly) covered by point C, paragraph 2, art. 3 of Italian Legislative Decree 25.02.2000 no. 93 (implementation of the 2014/68/EU - PED Directive). For systems with nominal powers up to 100 kW and partial cut-off, the residual power dissipation device may consist of temperature relief valves alone.
- Systems with heat exchangers whose primary circuits are supplied with a medium at temperatures above 110°C (Chap. R.3.D., point 2.2.1, letter g)).
- Direct contact water heaters for domestic and technological use (Chap. R.3.E.). Follow the requirement of Chap. R.3.B..
- Systems with modular heat generators (Chap. R.3.F. point 2.2). In addition to the requirements of point 2.1, unless they are installed inside the outer jacket, the safety, protection and control devices, including the expansion system referred to in Chap. R.3.A. and Chap. R.3.B., must be installed on the flow pipe, immediately after the last module and no more than 1 m from the jacket, as long as the temperature and pressure in the single modules does not exceed the respective rated values.
- Solar panel systems (Chap. R.3.H., point 3.2.2., letter C)). See 542 SOL series (Tech. broch. 01244).

## Certified CE mark



## Certification

### CE Mark

The 542 series temperature relief valves meet the requirements of Directive 2014/68/CE for pressurised equipment (also referred to as PED). They are therefore classified as category IV and are CE marked. Moreover, the electrical components comply with the requirements of Directive 2014/35/EU.

### Collection R Ed. 2009

The provisions of point 7, chapter R.2.A of Collection R Ed. 2009, further reiterated by INAIL circular no. 1539 of 11 March 2011, establish that safety devices certified according to Directive 2014/68/EU (PED) shall be accepted automatically for the use covered by the Collection.

Also pursuant to Collection R Ed. 2009, such devices, and therefore also temperature relief valves, must be accompanied by the following documents: manufacturer's certificate and bench calibration report.

**The manufacturer's certificate** is a document that provides the technical specifications of the valve, which are derived from testing carried out during certification.

The manufacturer's certificate also contains details of the certification document.

**Each part in the series covered by the manufacturer's certificate, manufactured in the period for which the PED certification is valid, is certified indefinitely (there is no expiry date).**

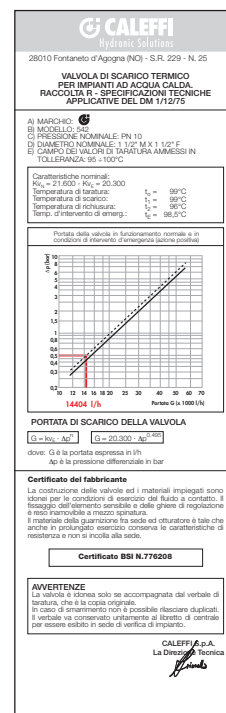
**The bench calibration report** is a document that attests that the set temperature was tested for each single temperature relief valve.

This check is carried out in the presence of an INAIL official, who draws up and signs the report following a successful outcome.

The report indicates the serial number of the valve, which is also given on a plate secured to the valve body.

**There is only one copy of the report, so it must be kept together with the valve.**

## Manufacturer's certificate



## Bench test report



## Operating specifications

1 1/2" x 1 1/4"

1 1/2" x 1 1/2"

The following are average results from the qualification tests and are given on the certificates issued by INAIL:

- temperature setting, at which the valve starts to open: _____	t <sub>0</sub> = 98 °C	t <sub>0</sub> = 99 °C
- discharge temperature, at which the nominal flow rate occurs: _____	t <sub>1</sub> = 104 °C	t <sub>1</sub> = 99 °C
- closing temperature, at which the valve closes as the temperature drops: _____	t <sub>2</sub> = 95 °C	t <sub>2</sub> = 96 °C
- emergency trip temperature, at which the valve starts to open if the thermostatic element fails (positive action): _____	t <sub>e</sub> = 99 °C	t <sub>e</sub> = 98,5 °C
- discharge flow rate given by the graph that accompanies each valve, from the equation G= K <sub>v</sub> · Δp <sup>n</sup> where		

**G** is the flow rate in l/h of water at a temperature of t<sub>1</sub>, discharged by the valve;

<b>K<sub>v</sub></b> is the valve flow coefficient, i.e. its characteristic nominal flow, equal to: (the value given is the smallest among those measured during normal operation K <sub>vN</sub> and during positive action K <sub>vE</sub> with Δp = 1 bar, values derived from the manufacturer's certificate).	6.100 l/h	20.300 l/h
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The following definitions apply:

- Normal flow coefficient K <sub>vN</sub> : the valve flow rate in l/h at the discharge temperature with a pressure difference of 1 bar at the drain. _____	6.650 l/h	21.600 l/h
- Emergency flow coefficient K <sub>vE</sub> : the valve flow rate in l/h at the emergency trip temperature with a pressure difference of 1 bar at the drain. _____	6.100 l/h	20.300 l/h

**Δp** is the different in pressure before and after the valve. If there is refilling, Δp hydrostatic pressure at the point in which the valve is installed, otherwise, Δp is given a conventional set value of 0,5 bar;

<b>n</b> is the exponent of the variable Δp and has a value of: _____	0,382	0,495
- heat flow P without refilling: _____	<b>136 kW</b> <b>(117.000 kcal/h)</b>	<b>419 kW</b> <b>(360.100 kcal/h)</b>
- flow rate without refilling (K <sub>v</sub> = K <sub>vE</sub> , Δp=0,5 bar) _____	4.680 l/h	14.404 l/h

## Sizing

For sizing, refer to Collection R Ed. 2009, chap. R.2.A., point 3 and related sub-points indicated in brackets.

### With refilling

If there is total refilling from the water mains the following formula is used to calculate the discharge flow rate, unless using an autoclave (point 3.7.1):

$$G = P/0,093 \quad \text{Discharge flow rate [l/h]}$$

where P is the nominal heat power of the generator expressed in kW. This flow rate value must not be higher than that obtained from the temperature relief valve diagram at the effective system operating temperature, or using the formula

$$G = K_v \cdot \Delta p^n.$$

### Partial or no refilling

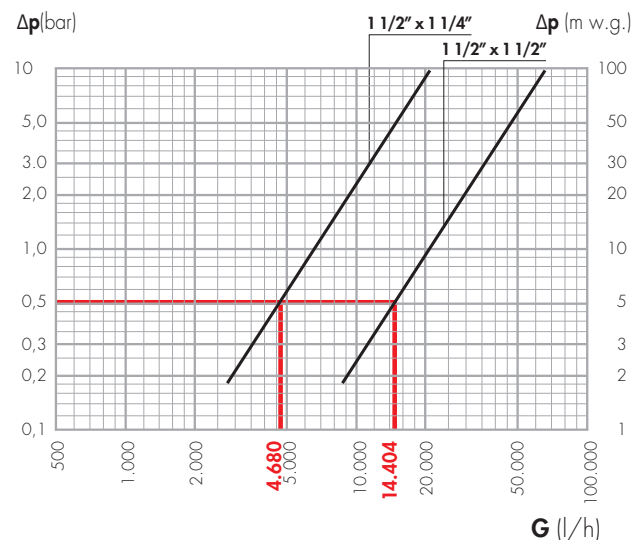
Collection R Ed. 2009 considers partial refilling to be the same as no refilling (point 3.7.2.).

The discharge flow rate is calculated as:

$$G = P/0,029 \quad \text{Discharge flow rate [l/h]}$$

where P is the nominal heat power of the generator expressed in kW with an assumed conventional pressure of 0,5 bar.

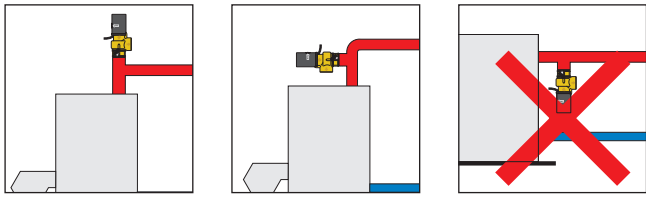
This flow rate value must not be higher than that obtained from the temperature relief valve diagram at a discharge pressure of 0,5 bar, or using the formula  $G = K_v \cdot \Delta p^n$ , with a discharge pressure of 0,5 bar.



Size	1 1/2" x 1 1/4"	1 1/2" x 1 1/2"
K <sub>v</sub> = K <sub>vE</sub> (l/h)	6.100	20.300

## Mounting

Temperature relief valves can be fitted vertically or horizontally, but not upside down. This prevents deposits of impurities from affecting correct functioning.

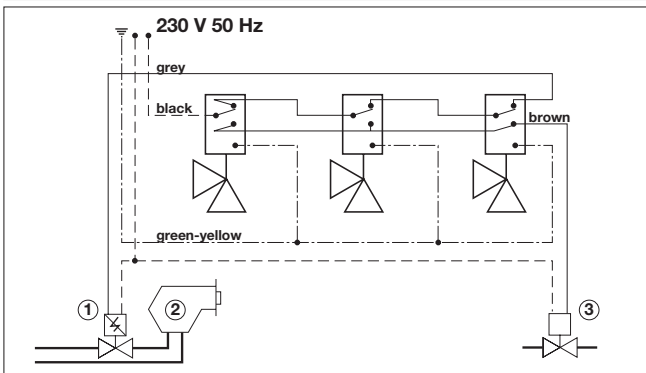
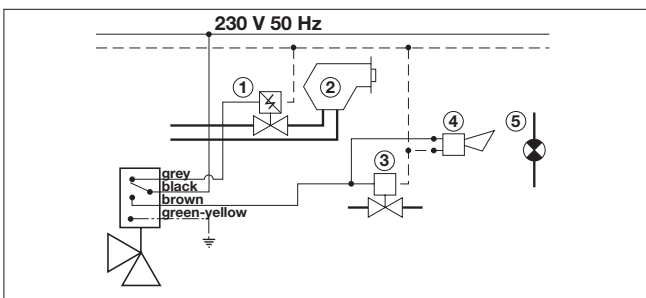


## Auxiliary microswitch

The temperature relief valve has a microswitch with a changeover contact that switches when the discharge opens. It can be used, for example, to stop the burner or activate the refilling device. After the microswitch has tripped, it must be reset manually using the button on the top cover.

## Electric connections

1. solenoid valve on the fuel supply;
2. burner;
3. possible motorised valve to supply the refilling water;
4. audible and/or visible alarm (5).



## Installation

Before installing a temperature relief valve, it must be correctly sized by qualified technical personnel in accordance with the current regulations governing the specific applications. Any use other than the intended use is prohibited.

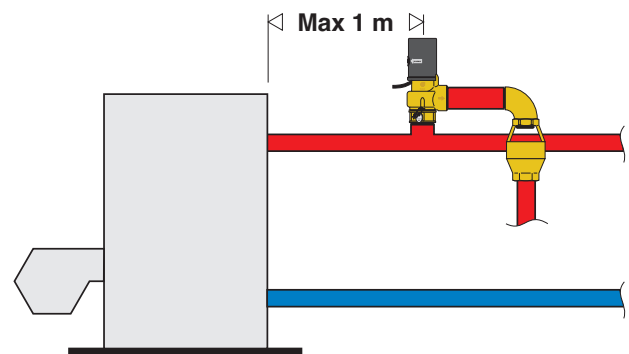
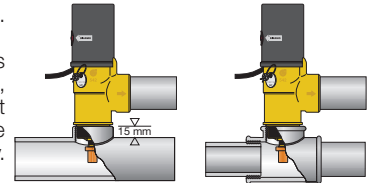
Temperature relief valves must be installed by qualified technical personnel in accordance with current regulations.

The temperature relief valve must be installed in accordance with the flow direction indicated by the arrow on the valve body.

The temperature relief valve should be installed as close as possible to the generator, at the top of it, or no more than 1 m away on the flow pipe, before any shut-off device.

- a) For pipes up to 2", we recommend using a T fitting.

- b) For pipes over 2", it is possible to solder a sleeve, which should be at a height of 15 mm to position the sensitive element properly.

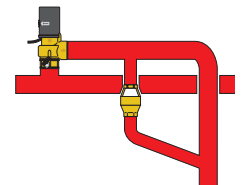


## Discharge pipe

Since the temperature relief valve is built to discharge significant water flow rates, considering the pressures involved, it is necessary to provide discharge pipes that are as short as possible, with a diameter at least as big as that of the valve outlet.

The temperature relief valve discharge pipe must not obstruct normal valve operation and must not endanger people or things.

In accordance with applicable regulations, the temperature relief valve drain must be visible and piped using suitable collection pipes.



## SPECIFICATION SUMMARY

### 542 series

Temperature relief valve certified and calibrated to INAIL standards. CE marked in accordance with directives 2014/68/EU and 2014/35/EU. With positive action. 1 1/2" M x 1 1/4" F (1 1/2" M x 1 1/2" F) threaded connections. Brass body. Stainless steel springs. EPDM seals. PP protective cover. Medium: water Complete with 4-wire cable and electric changeover switch with manual reset. Microswitch auxiliary contact rating 15 A. Operating temperature range 5–100 °C. Temperature setting at which the valve starts to open 98 °C (1 1/2" x 1 1/4"), 99 °C (1 1/2" x 1 1/2"). Maximum operating temperature 10 bar.

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