

## T 2040 EN

### Type 1/..., Type 4/..., Type 9/... Typetested Safety Devices Self-operated Temperature Regulators



#### Application

Control, limitation, safety monitoring and safety limitation of the energy supplied to heat generators or heat exchangers which must be equipped with typetested devices.

The safety devices are used to control and protect indirectly heated heat generators in heating and service water heating installations.

**Note:** Typetested devices are available for installations complying with DIN 4747-1, DIN EN 12828 and DIN 4753.

The temperature regulators, temperature limiters, safety temperature monitors and safety temperature limiters are compulsory according to the relevant regulations (e.g. DIN 4747-1, DIN EN 12828 and DIN 4753) for installations with heat generators or heat exchangers which are heated by steam, hot fluids or by district heating systems. These devices must be tested for reliability and certified accordingly. Therefore, the devices listed in this Information Sheet have been tested by TÜV (German technical surveillance association) and approved with a register number.

#### Device designations

The designation of safety devices is stipulated in DIN EN 14597 (temperature control devices and temperature limiters for heat generating systems). The temperatures specified in Fig. 1 to Fig. 3 are intended only as a guide to the typical application ranges of the devices shown. The devices needed in each case must meet the requirements of the installation and comply with the relevant safety regulations.

**Temperature regulators (TR)**, which are typetested, are necessary in many installations. They constantly measure the temperature as a controlled variable, compare it with a given set point, correct the actual temperature according to the set point and interrupt the energy supply when the temperature exceeds the set point.

**Safety temperature monitors (STM)** interrupt the energy supply when the temperature reaches the adjusted limit, when the capillary tube ruptures or when there is a leak in the sensor (Fig. 2 and Fig. 3). They reset themselves automatically when the temperature has fallen below the limit and the fault has been remedied.

**Safety temperature limiters (STL)** interrupt and block the energy supply when the temperature reaches the adjusted limit, when the capillary tube ruptures or when there is a leak in the sensor (Fig. 1). They can only be reset and put back into operation with a tool when the temperature has fallen below the limit and the fault has been remedied.

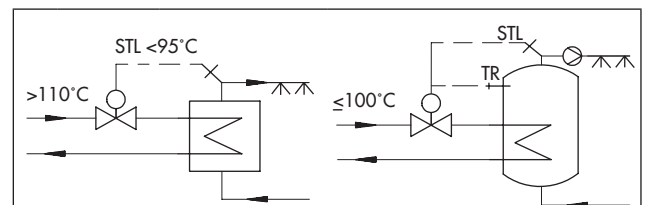


Fig. 1: DHW heating according to DIN 4753

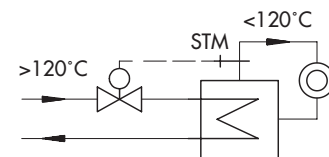


Fig. 2: Heating system with safety temperature monitor according to DIN 4747-1

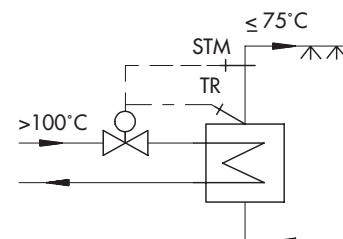


Fig. 3: DHW heating with temperature regulator and safety temperature monitor according to DIN 4747-1

<b>TR</b>	Temperature regulator
<b>STM</b>	Safety temperature monitor
<b>STL</b>	Safety temperature limiter

**Pressure limiters (PL)** interrupt and block the energy supply when the pressure reaches the adjusted limit. They can only be reset and put back into operation when the pressure has fallen below the limit and the fault has been remedied.

## Typetested safety devices

### Versions for DN 15 to 150 · PN 16 to 40 · Limits up to 120 °C

The temperature sensors of the regulators and limiters function according to the liquid expansion principle or the adsorption principle.

The temperature-dependent pressure change in the sensor causes the valve plug position to change, thus changing the flow rate of the heating medium.

Safety devices are available with globe or three-way valves (Table 1).

### Dynamic behavior of control thermostats

The dynamics of the regulator are mainly determined by the response of the sensor with its characteristic time constant.

Table 2 lists the response times of SAMSON control thermostats operating according to different principles measured in water.

### Temperature regulators (TR) (Fig. 4)

These devices consist of a Type 2231 to 2234 Control Thermostat and a Type 2111, 2422 or 2119 Valve.

They control the temperature and interrupt the energy supply when the temperature exceeds the adjusted set point.

### Typetested regulators

Typetested temperature regulators (TR) are available. The register number is available on request.

### Safety temperature monitors (STM) (Fig. 5)

These devices consist of a Type 2213 Safety Temperature Monitor and a Type 2111, 2422 or 2119 Valve.

The safety temperature monitor does not only close the valve when the temperature reaches its limit (adjustable between -10 to 90 °C or 20 to 120 °C), but also when the capillary tube ruptures or when there is a leak in the sensor. It resets itself automatically when the fault has been remedied and the temperature has fallen below the limit.

### Temperature regulators with safety temperature monitors (TR/STM) (Fig. 6)

The attached control thermostat takes on the task of a temperature regulator (TR) in the TR/STM combination. A three-way valve can also be used instead of a globe valve in this version.

### Typetested regulators

Typetested Type 2213 Safety Temperature Monitors are available. The register number is available on request.

For more details refer to Data Sheet ► T 2043.

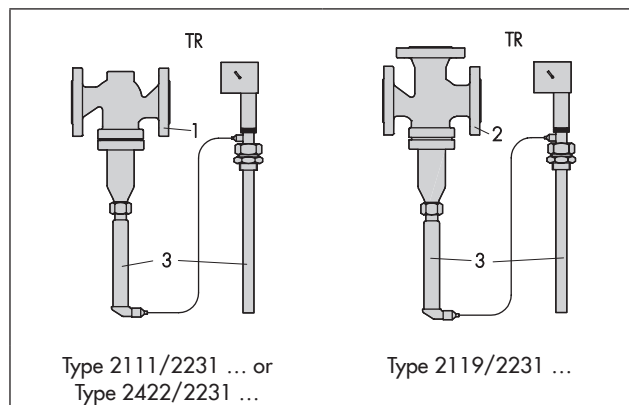
**Table 1:** Overview of temperature regulators

Type ...	With Type ... Valve · DN/G	Data sheet
1/...	2111 · DN 15 to 50	► T 2111
4/...	2422 · DN 15 to 150	► T 2121
4u/...		► T 2123
9/...	2119 · DN 15 to 150	► T 2133

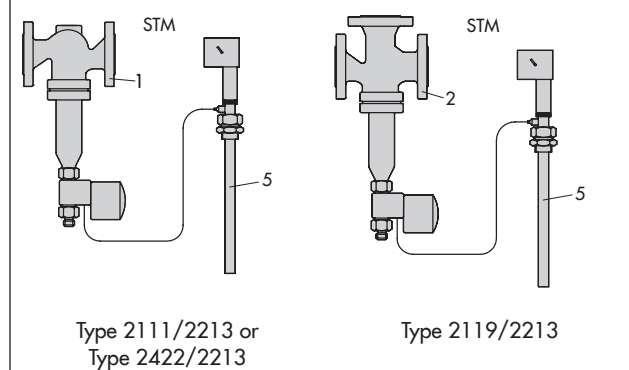
**Table 2:** Time constants of control thermostats

Functional principle	Type ... Control Thermostat	Time constant [s]	
		Without	With
		Thermowell	
Liquid expansion	2231	70	120
	2232	65	110
	2234	15	- 1)
	2213	70	120
Adsorption	2212	- 1)	40

1) Not permissible



**Fig. 4:** Temperature regulator (TR) with Type 2231 Control Thermostat and Type ...



**Fig. 5:** Type 2213 Safety Temperature Monitor (STM)

### Safety temperature limiters (STL) (Fig. 7)

These devices consist of a Type 2212 Safety Temperature Lim-

iter and a Type 2111, 2422 or 2119 Valve.

The spring mechanism in the safety temperature monitor closes and locks the valve when the temperature reaches its limit (adjustable between 10 to 95 °C, 20 to 120 °C or 30 to 170 °C), when the capillary tube ruptures or when there is a leak in the sensor. The attachable pressure element also closes and locks the valve when the safety interlock circuit is interrupted, when the pressure exceeds the adjusted limit or when the device or the power fails.

The limiters can only be unlocked and put back into operation with a special tool after the fault has been remedied and the temperature has fallen below the limit.

### Combination of temperature regulators (TR)

#### with safety temperature limiter (TR/STL)

#### with safety temperature limiter and pressure limiter (TR/STL/PL)

The control thermostat, additionally attached to the safety temperature limiter, functions in the combinations TR/STL (Fig. 8) and TR/STL/PL (Fig. 9) as a temperature regulator (TR) and the pressure element (Type 2401) as a pressure limiter (PL).

The globe valve can be replaced by a three-way valve in all versions.

### Typetested regulators

The register number is available on request for the typetested versions with the **Type 2212 Safety Thermostat** or **Type 2401 Pressure Element**.

For more details refer to Data Sheet ► T 2046.

### Extended safety according to DIN EN 14597

Safety temperature monitors (STM) and safety temperature limiters (STL) are designed for extended safety according to DIN EN 14597 since they are also effective even when a device fails.

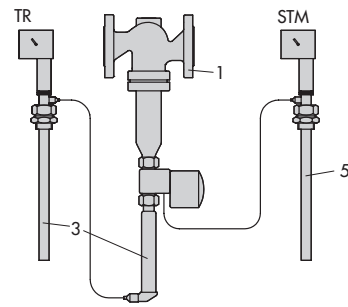
### Special version

The safety temperature limiters and pressure limiters can be equipped with an electric signal transmitter.

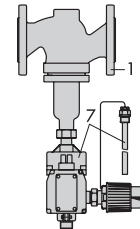
The signal transmitter contains a microswitch (max. load 230 V~, 10 A at ohmic load) which generates a signal when the temperature limit is exceeded or when the sensor fails (capillary tube rupture).

#### Legend for Fig. 4 to Fig. 10

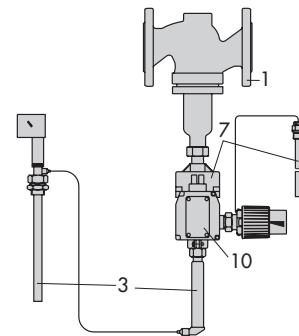
- 1 Type 2111 or Type 2422 Globe Valve
- 2 Type 2119 Three-way Valve
- 3 Type 2231 Control Thermostat (optionally also Type 2232 or Type 2234)
- 5 Type 2213 Safety Thermostat
- 7 Type 2212 Safety Thermostat
- 8 Type 2401 Pressure Element
- 10 Electric signal transmitter (optional)



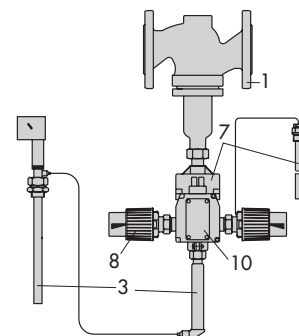
**Fig. 6:** Temperature regulator and safety temperature limiter (TR/STL) with control thermostat and Type 2213 Safety Temperature Monitor (STM), Type 2422/2231/2213



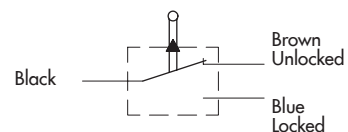
**Fig. 7:** Safety temperature limiter (STL) with Type 2212 Safety Temperature Limiter (STL), Type 2111/2212 or Type 2422/2212



**Fig. 8:** Temperature regulator and safety temperature limiter (TR/STL) with control thermostat and Type 2212 Safety Temperature Limiter (STL), Type 2422/2231/2212



**Fig. 9:** Temperature regulator, safety temperature limiter and pressure limiter (TR/STL/PL) with control thermostat, Type 2212 Safety Temperature Limiter (STL) and Type 2401 Pressure Limiter, Type 2422/2231/2212/2401



**Fig. 10:** Circuit diagram of the signal transmitter

