Boiler controllers
Steam traps
Air vents

Edition September 2008

Data Sheet **T 0500 EN**

Boiler Controllers, typetested

Type 5 D

Type 5 S · With overheating protection®

Application

Type 5 D · Flow temperature control in hot water boilers using solid fuels · Horizontal or vertical installation.

Type 5 S · Same as Type 5 D · Additional closing of the fire control damper in the event of boiler overheating caused by excessive draft.

Both versions are typetested in accordance with DIN EN 14597 for plants conforming to DIN EN 12828.

Versions

Type 5 D · Type 5 S

The controllers operate according to the liquid expansion principle. Any temperature changes at the thermostat result in a proportional change in lever travel.

The boiler controllers essentially consist of a thermostat, a thermowell, a set point adjustment knob, an actuating lever, and a chain.

The **Type 5 S** Controllers are equipped additionally with a safety element, consisting of two brass sleeves which are joined by a soldered link. When the temperature reaches the adjusted limit, the solder melts. The brass sleeves are displaced, the fire control damper at the boiler is closed via the lever, and the energy supplied to the boiler is reduced.

Principle of operation

The thermowell contains the liquid-filled thermostat (6) which senses the flow water temperature in the boiler. A pin (5) fastened to the bottom of the metal bellows (4) projects from the thermostat and is fixed inside the temperature adjustment knob (1). The system consisting of thermostat and pin is pressed against a bearing in the rotary knob by a spring (3). This mechanism allows set point adjustment.

The thermostat is connected to a pivot joint (2) where the actuating lever for damper control (8) is screwed on. The force of the spring (3) is calculated such that the weight of the control damper is balanced and does not change the plug position. The spring also acts as an excess temperature device.

When the flow temperature rises, the liquid contained in the temperature sensor (6) expands, forcing the thermostat downwards since the pin (5) is fixed inside the rotary knob (1). The pivot joint is moved, the actuating lever is turned axially and the chain (9) closes the damper. In this way, energy supplied to the boiler is reduced, causing the boiler temperature to fall.

If the flow temperature decreases, the damper opens as described above in accordance with the adjusted set point.

The temperature set point can be changed by turning the set point adjustment knob. When turning the knob, the thermostat and the pin are moved axially. Adjustment of a higher set point temperature, for example, will cause the damper to open until the temperature has reached the adjusted set point.

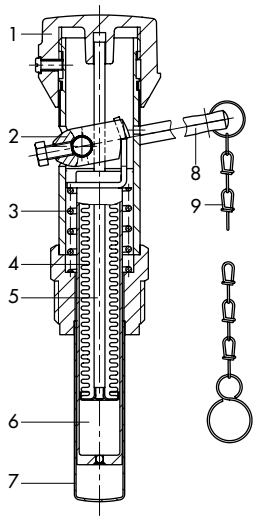


Fig. 1 · Type 5 D

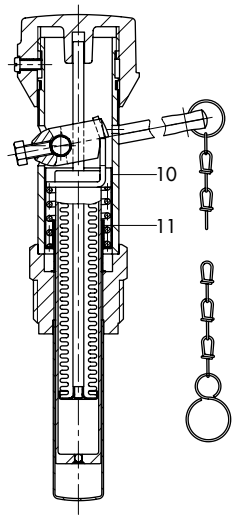


Fig. 2 · Type 5 S

1	Rotary knob for set point adjustment	6	Temperature sensor filled with expansion liquid
2	Pivot joint	7	Thermowell
3	Spring for temperature override and for balancing of the damper weight	8	Actuating lever
		9	Chain
4	Metal bellows	10	Spring sleeve
5	Pin	11	Soldering link

Example of application

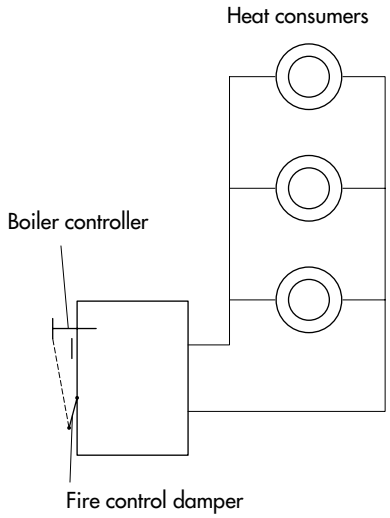


Fig. 3 · Example of application

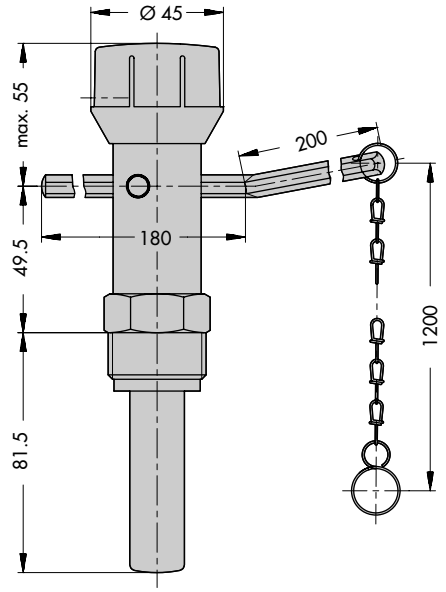
Table 1 · Technical data

Type 5 D/Type 5 S Boiler Controllers	
Function acc. to DIN EN 14597	Type 1
Connection	G ¾, G 1
Set point range	30 to 100 °C
Excess temp. protection	50 °C above the adjusted set point
Max. perm. temperature	130 °C
Max. perm. pressure at sensor	10 bar
Transfer coefficient	0.3 °/K
Torque	1.9 Nm

Table 2 · Materials

Thermowell	Brass
Set point adjustment knob	Plastic
Actuating lever	Steel, lacquered
Chain	Steel, zinc-coated (bright)

Dimensions in mm and weight



Connection thread G ¾ or G 1
Weight, approx. 0.6 kg

Fig. 4 · Dimensions

Installation

– Suitable for vertical or horizontal installation. The red figures on the set point adjustment knob apply for horizontal installation, whereas the white figures apply for vertical installation.

Special version (available upon customer request)

The thermowell, chain and actuating lever have to be adapted to the boiler construction and are therefore available in different sizes upon customer request.

Ordering text

Type 5 D/Type 5 S Boiler Controllers
Connection thread G ¾/G 1

Steam Traps

Type 13 E Steam Trap

Application

Discharge of condensate from steam-heated systems, heat exchangers, heating batteries, radiators, steam pipes and similar equipment · Liquid evaporation principle · **PN 16** · Operating range **0.01 to 10 bar** · **200 °C** · Usable as either angle or straight-through valve · Threaded connections

Fig. 5 · Type 13 E Steam Trap

Versions

The steam traps essentially consist of a body, an operating element and a seat and plug. They are controlled by temperature and pressure and operate according to the vapor-pressure principle (liquid evaporation). Steam traps are commonly referred to as quick-acting condensate drains.

The operating element of the steam trap is a metal bellows which is filled with a water/alcohol mixture. Any temperature changes at the metal bellows result in a corresponding change in valve plug position, meaning either a restriction or increase of the free area between the seat and plug.

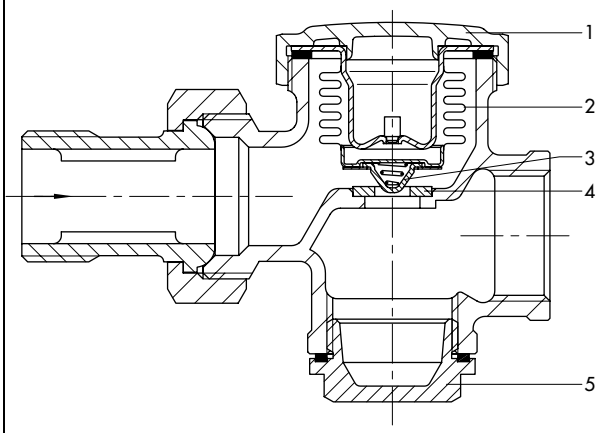


Fig. 6 · Principle of operation

1 Cover
2 Operating element
3 Plug
4 Seat
5 Screw plug

Principle of operation

The steam pressure curve related to the liquid/steam mixture in the metal bellows largely corresponds to that of water. When the temperature of the water/alcohol mixture increases, the pressure in the operating element rises. The plug closes the seat orifice. When the steam trap is closed, the accumulated condensate as well as the water/alcohol mixture cool down. The pressure in the operating element decreases, the valve opens and the condensate and any entrained air can escape. The temperature of the discharged condensate is approx. 5 to 10 °C below the saturated steam temperature.

Flow diagram

The diagram refers to condensate at a temperature of 20 °C. The pressure stated in bar is the differential pressure between the inlet and outlet of the steam trap.

Installation

By changing the location of the screw plug (5), the valve can be used as either straight-through or angle valve.

– Only install the steam trap in horizontal pipelines
– The direction of medium flow must coincide with the arrow on the body
– Install the condensate discharge pipe with a downward slope of approx. 1 %
– The steam traps are to be installed directly at the outlet of the aggregate
– In aggregates where the heating batteries are to be kept free from condensate, install the steam trap approx. 1 m downstream of the outlet in the non-insulated pipeline

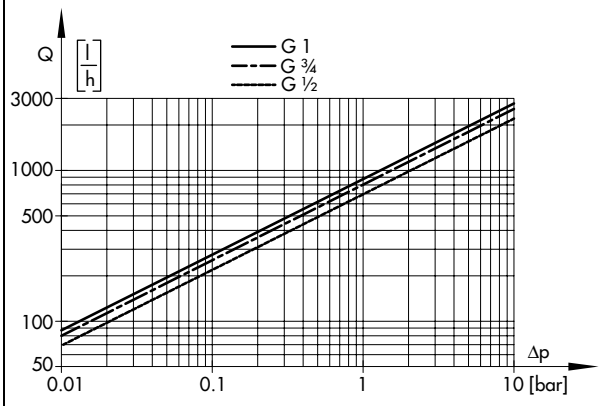


Fig. 7 · Flow diagram

Table 3 · Technical data
All pressures in bar (gauge)

Type 13 E Steam Trap	
Connection	G ½ · G ¾ · G 1
Operating range	0.01 to 10 bar
Max. perm. temperature	200 °C
Temperature of discharged condensate	≤ Temperature of saturated steam
Max. permissible ambient temperature	40 °C

Table 4 · Materials · Material number acc. to DIN EN

Body	Malleable iron GTW-35-04 (EN-GJMW-350-4)
Cover or upper screw plug	Malleable iron GTW-35-04 (EN-GJMW-350-4)
Seat	Stainless steel 1.4104
Plug	Stainless steel 1.4301
Operating element	Stainless steel 1.4541

Dimensions in mm

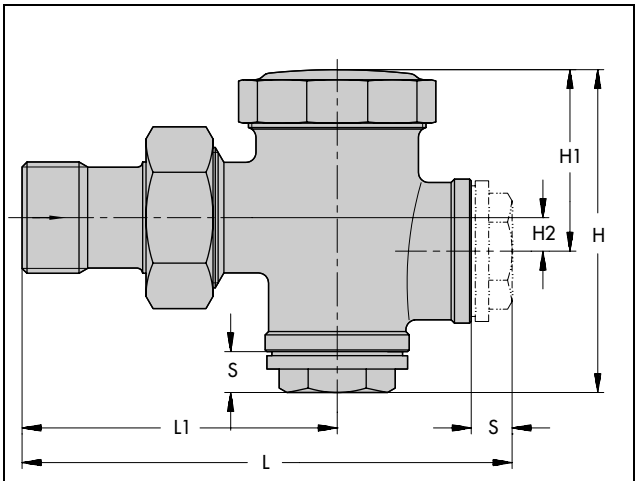


Fig. 8 · Dimensions of Type 13 E

Table 5 · Dimensions and weights

Connection	**G ½**	**G ¾**	**G 1**
L	132	138	151
L1	80	85	95
H	85	90	98
H1	38	40	43
H2	10	10	10
S	12	12	15
Weight, approx. in kg	0.8	0.9	1.3

Ordering text
Type 13 E Steam Trap
Connection thread G ½ / G ¾ / G 1

Examples of application

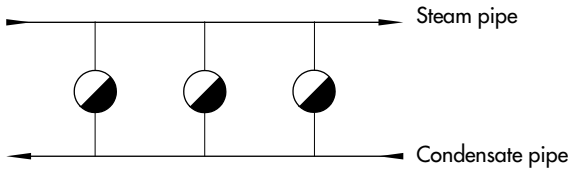


Fig. 9.1 · Condensate drainage from a main steam pipe

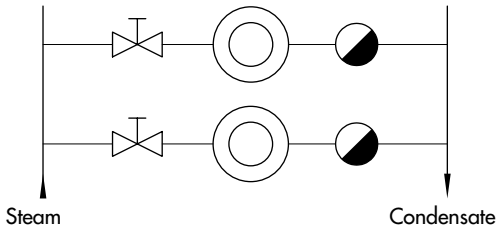


Fig. 9.2 · Condensate discharge from radiators and convectors

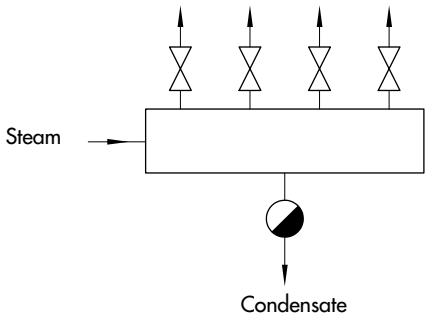


Fig. 9.3 · Condensate drainage from a steam manifold

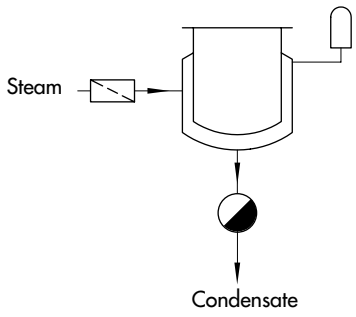


Fig. 9.4 · Condensate discharge from a boiling vessel with steam jacket

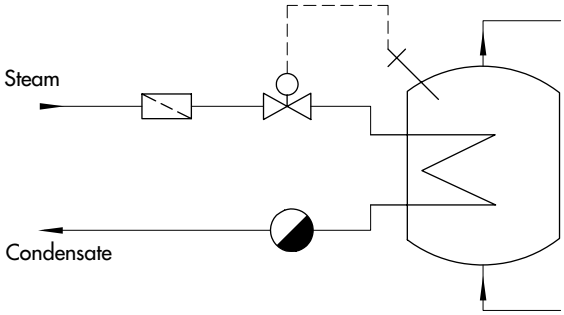


Fig. 9.5 · Condensate discharge from a steam-heated boiler

Fig. 9 · Examples of application

Type 3 Air Vent for steam-operated systems

Application

Venting of, e.g. steam-operated pipe systems, heating systems, radiators, heating equipment · Max. **170 °C** · Max. perm. pressure **8 bar** · Threaded connection.

Versions

The air vents for steam-operated systems essentially consist of a thermostat with a seat and plug.

The air vents operate according to the liquid expansion principle. Any changes in temperature at the thermostat cause the plug to move in either closing or opening direction.

Principle of operation

The air vents for steam-operated systems operate with a thermostat which is filled with an expansion liquid. When the temperature at the thermostat increases, the liquid expands and moves the plug stem with the attached plug in the closing direction, causing the plug to close the seat tightly.

When taking the steam system into operation, the cold air can escape until the incoming steam has heated the thermostat, thus closing the vent. When shutting down the system, the thermostat cools down and the vent opens. In this way, neither air pockets nor a vacuum can occur.

Installation

– Vertically upright, at the highest point of the part of the pipe or system to be vented

Table 6 · **Technical data** · All pressures in bar (gauge)

Type 3 Air Vent for steam-operated systems					
Thermostatic operating principle, limit value adjustable between 95 and 160 °C					
Connection thread	G ½				
Max. perm. temperature	170 °C				
Max. perm. pressure	8 bar				
Weight, approx.	0.18 kg				
Flow rate					
Pressure bar	0.5	1	2	4	6
Air flow rate m_n^3/h	12	18	27	42	60

Table 7 · **Materials** · Material number acc. to DIN EN

Body	CW617N (CuZn40Pb2)
Seat	
Plug	

Ordering text

Type 3 Air Vent, G ½

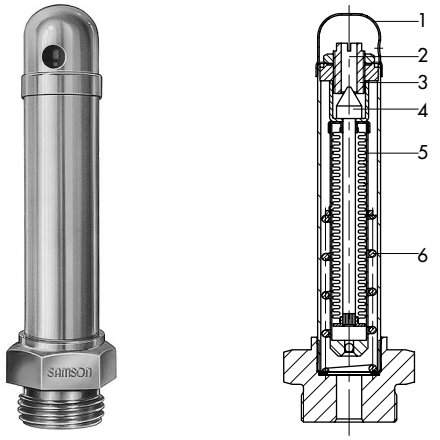


Fig. 10 · Principle of operation

1 Protective cover
2 Air outlet
3 Seat
4 Plug
5 Thermostat
6 Excess temperature protection

Examples of application

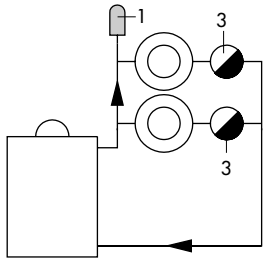


Fig. 11.1 · Air vent in a low-pressure steam heating system

1 Type 3 Air Vent
2 Type 6 Air Vent
3 Type 13 E Steam Trap
4 Temperature regulator
5 Strainer

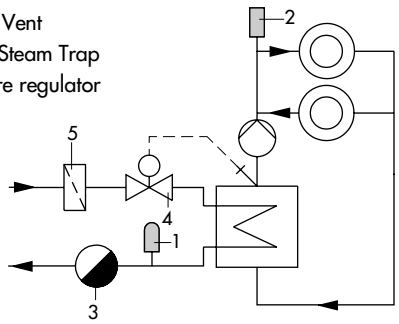
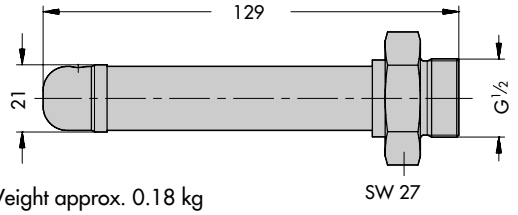


Fig. 11.2 · Venting of a steam-heated heating battery of a heat exchanger

Fig 11 · Examples of application

Dimensions in mm and weights



Weight approx. 0.18 kg

SW = width across flats

Fig. 12 · Dimensions in mm

Air vents for water-operated systems, drains for air-operated systems · Type 6

Application

Air vents for venting of, e.g. water-operated pipe systems, heating systems, radiators and heating batteries · Draining of water from air-operated systems in all branches of industry · Max. **180 °C** · Max. permissible pressure **16 bar** (air vents)/**8 bar** (drains).

Versions

The air vents for water-operated systems essentially consist of a float, a lever, a seat and plug. Their operating principle is based on a change in liquid level, causing a corresponding float movement.

Because of this float principle, air vents for water-operated systems can generally be used also for draining water from air-operated systems.

Principle of operation

The operating element of air vents for water-operated systems is an air-filled float. The air outlet is sealed by the plug (3) which is moved by the float (4) via the link system. The plug closes the air outlet when the water level rises and opens the outlet when the water level drops.

When the device is used to drain water from air-operated systems, the accumulating liquid lifts the float (4), causing the outlet to open. When there is no liquid, the weight of the float causes the plug to close the seat tightly.

Installation

Air vents

– Vertically upright, at the highest point of the part of the system to be vented

Drains

– Vertically suspended with an overflow pipe, at the lowest point of the system

Table 8 · **Technical data**
All pressures in bar (gauge)

Type 6	**Air vent**				Drain			
Connection thread	G ½							
Max. perm. temperature	180 °C							
Max. perm. pressure	16 bar				8 bar			
Weight, approx.	1.3 kg							
Flow rate								
Pressure in bar	0.5	1	2	4	6	8	12	16
Air flow rate in m_n^3/h	2	3.5	5	9	13	17	25	33
Water flow rate in m^3/h	0.1	0.15	0.2	0.3	0.4	0.45	–	–

Table 9 · **Materials** · Material number acc. to DIN EN

Body	S 235 G 2 T (1.0308), zinc-coated
Seat	Stainless steel 1.4006
Plug	EPDM
Float	Stainless steel 1.4006

Ordering text

Type 6 Air Vent or Drain, G ½

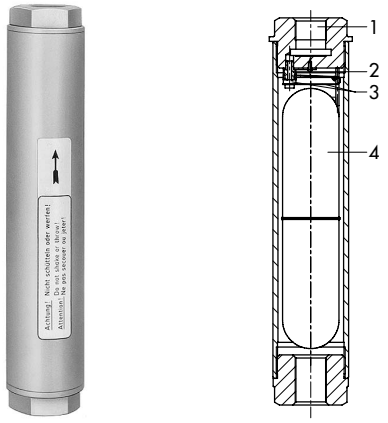


Fig. 13 · Principle of operation

1 Protective cover
2 Air outlet
3 Seat
4 Float

Examples of application

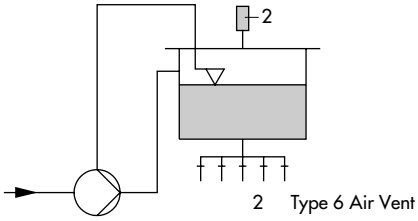


Fig. 14.1 · Type 6 Air Vent on a high-level tank

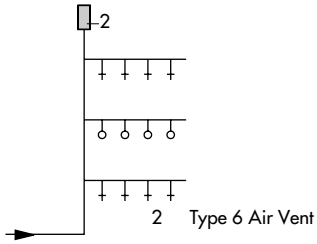


Fig. 14.2 · Type 6 Air Vent in a water supply system

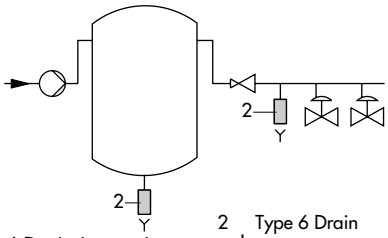
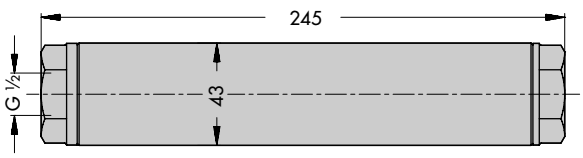


Fig. 14.3 · Type 6 Drain in an air-operated system
Fig. 14 · Examples of application

Dimensions in mm and weight



Weight approx. 1.3 kg

Fig. 15 · Dimensions in mm

Specifications subject to change without notice.

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