

Combined Self-Operated Regulators



Type 2488 · Flow regulator with connection for additional electric actuator

Type 2489 · Flow regulator with connection for additional electric actuator and thermostat

Application

Self-operated regulators for controlling the flow rate in district heating systems. Combined with an electric actuator used to transmit the control signal of an electric control device as well as optional connection of a thermostat.



Valve sizes **DN 15 to DN 50** · Nominal pressure **PN 16/25** for liquids up to **150 °C**

The **Type 2488/... Regulators** close as the flow rate rises or when the output signal issued by the electric control device increases.

These combined regulators consist of a valve, a diaphragm actuator and an adjustable orifice (with an electric actuator connected to it). A maximum flow rate can also be adjusted mechanically at the orifice.

The **Type 2489/... Regulators** additionally have a connection to mount a thermostat.

Special features

- Low-maintenance P regulators requiring no auxiliary energy
- Compact design
- Single-seated valve with a balanced valve plug provides high accuracy of the adjusted maximum flow rate
- Control quality independent of the network differential pressure, for example for temperature control with weather-compensated control equipment
- Suitable for water and other liquids, provided these do not cause the materials used to corrode
- The additional mounting of a thermostat in Type 2489 allows emergency operation to continue controlling the temperature in the event the electric control device fails

Versions (Figs. 1 and 2)

Valve body made of red brass with screwed ends DN 15 to 50 DN 32 to 50 also available with flanged body made spheroidal graphite iron.

Type 2488/... Flow Regulator

Versions tested according to DIN EN 14597 are available with Type 5825 Electric Actuator for temperature control and safeguarding purposes.

Version not tested according to DIN EN 14597 are available with Type 5824 and Type 5857 Actuators for valves up to DN 25. For valves in sizes DN 32 and larger, the Type 5824 Actuator must be used.

Valves up to DN 25 can also be used together with a Type 5757 or Type 5757-7 Controller with Electric Actuator (actuator with integrated digital controller).



Fig. 1 · Flow regulator with connection for an additional electric actuator (Type 2488/5824) (versions DN 15 to 25)

Valves in sizes DN 32 and larger can also be used together with Type 5724 Controller with Electric Actuator.

Versions tested according to DIN EN 14597 can only be combined with a Type 5725 in all nominal sizes.

Type 2489/... Flow Regulator

By additionally mounting a Type 2430 K Thermostat, for example, the temperature being controlled can be kept at a higher temperature than in normal operation in case the electric control device fails. In place of Type 2430 K, in this case Type 2403 can be connected as a safety temperature monitor to safeguard the controlled temperature.

Principle of operation

The medium flows through the valve of the combined Type 2488(89)/... Regulator in the direction indicated by the arrow on the body. The areas released by the orifice (1.2) and the valve plug (3) determine the flow rate.

A differential pressure $\Delta p_{\text{restriction}}$ is created at the orifice by the medium flow. This differential pressure is transmitted over the control line (11) and the hole in the valve plug to the operating diaphragm (6.1) where it is converted into a positioning force. The diaphragm actuator controls the $\Delta p_{\text{restriction}}$ at the orifice as well as the flow rate determined by the orifice setting by ensuring that the forces between the plug spring force and the actuator force remain in equilibrium. The maximum flow rate is adjusted at the set point adjuster (12), which adjusts the maximum orifice opening. If a slower flow rate is needed in the plant than the maximum flow rate adjusted, the electric actuator positions the orifice accordingly.

As the differential pressure across the orifice (restriction) has to be kept constant even when the network pressure drop changes, the valve (based on the electrically operated orifice) has a valve authority of 1. As a result, for example, the control quality of weather-compensated temperature control equipment is not affected by the pressure drop across the network.

Type 2489/... Regulators have an additional connection for mounting a thermostat. The temperature of the controlled medium creates a pressure in the sensor (25) which is proportional to the measured temperature. This pressure is transmitted over a capillary tube (24) to the bellows (23) of the control thermostat (20) where it is converted into a positioning force. This force acts on the valve plug over the actuator stem of the control thermostat (20) and affects the valve position and flow rate with it.

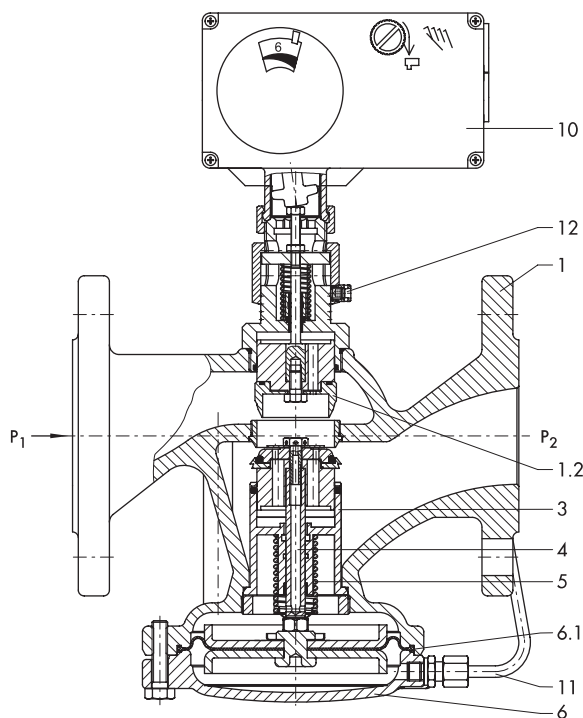


Fig. 2.1 · Type 2488/5825, PN 25, DN 32 to 50
– version with flanged body –

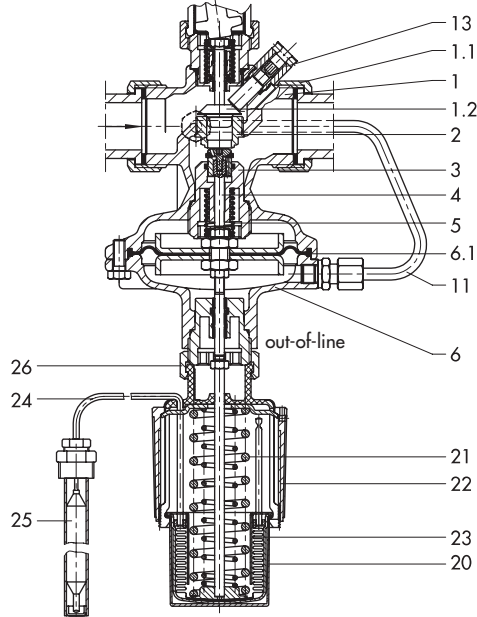


Fig. 2.2 · Type 2489/5825, PN 25
– version with screwed ends –

- | | | |
|---|--|---|
| 1 Valve body | 6 Diaphragm actuator (housing) | 20 Control thermostat |
| 1.1 Connection nut with seal and welding end | 6.1 Operating diaphragm | 21 Spring |
| 1.2 Orifice to adjust the flow rate set point | 8 Set point springs (assembly) | 22 Set point adjuster |
| 2 Valve seat | 10 Electric actuator | 23 Bellows with actuator stem |
| 3 Plug | 11 Control line | 24 Capillary tube |
| 4 Plug stem | 12 Set point adjuster with lead-seal (DN 32 to 50) | 25 Temperature sensor |
| 5 Positioning springs | 13 Set point adjustment screw (DN 15 to 25) | 26 Connection for thermostat (connection nut) |

Fig. 2 · Regulator versions

Installation

- Install a SAMSON strainer (e.g. Type 1N or 2N) upstream of the regulator.
DN 15 to 25: 0.5 mm mesh width
DN 32 to 50: 0.75 mm mesh width
- The regulators are only suitable for installation in horizontal pipelines. Regulators in nominal sizes DN 15 to 25 may also be installed in vertical pipelines.
- When installed in horizontal pipes, the electric actuator must always be located above the valve body.
- The medium must flow through the valve in the direction indicated by the arrow on the valve body.
- Install the regulator preferably in the return flow pipe of the plant.
- Prior to assembling the actuator and valve:
Retract the actuator stem!
- When the valve is insulated, use an intermediate insulating piece. The insulating limit is in this case approx. 25 mm above the top of the valve body.
Do **not** insulate the actuator and the coupling nut as well!
- Observe the maximum permissible ambient temperature range!

Refer to EB 3135-1 EN for more details.

Version with control thermostat

- The temperature sensor may be installed in any desired position. Its entire length must be immersed in the medium.
- It should be installed in a location where overheating or considerable idling times cannot occur.
- The capillary tube should be run in such a way that the ambient temperature range cannot be exceeded, any deviations in temperature cannot occur and that the tube cannot be damaged. The smallest permissible bending radius is 50 mm.

Differential pressure across the valve

The minimum required differential pressure Δp_{\min} across the valve is calculated as follows:

$$\Delta p_{\min} = \Delta p_{\text{restriction}} + \left(\frac{\dot{V}}{K_{VS}} \right)^2$$

Δp_{\min}	Minimum differential pressure across the valve in bar
$\Delta p_{\text{restriction}}$	Differential pressure created at the restriction for measuring the flow rate in bar
\dot{V}	Flow rate, adjusted, in m ³ /h
K_{VS}	Valve flow coefficient in m ³ /h

Typical applications

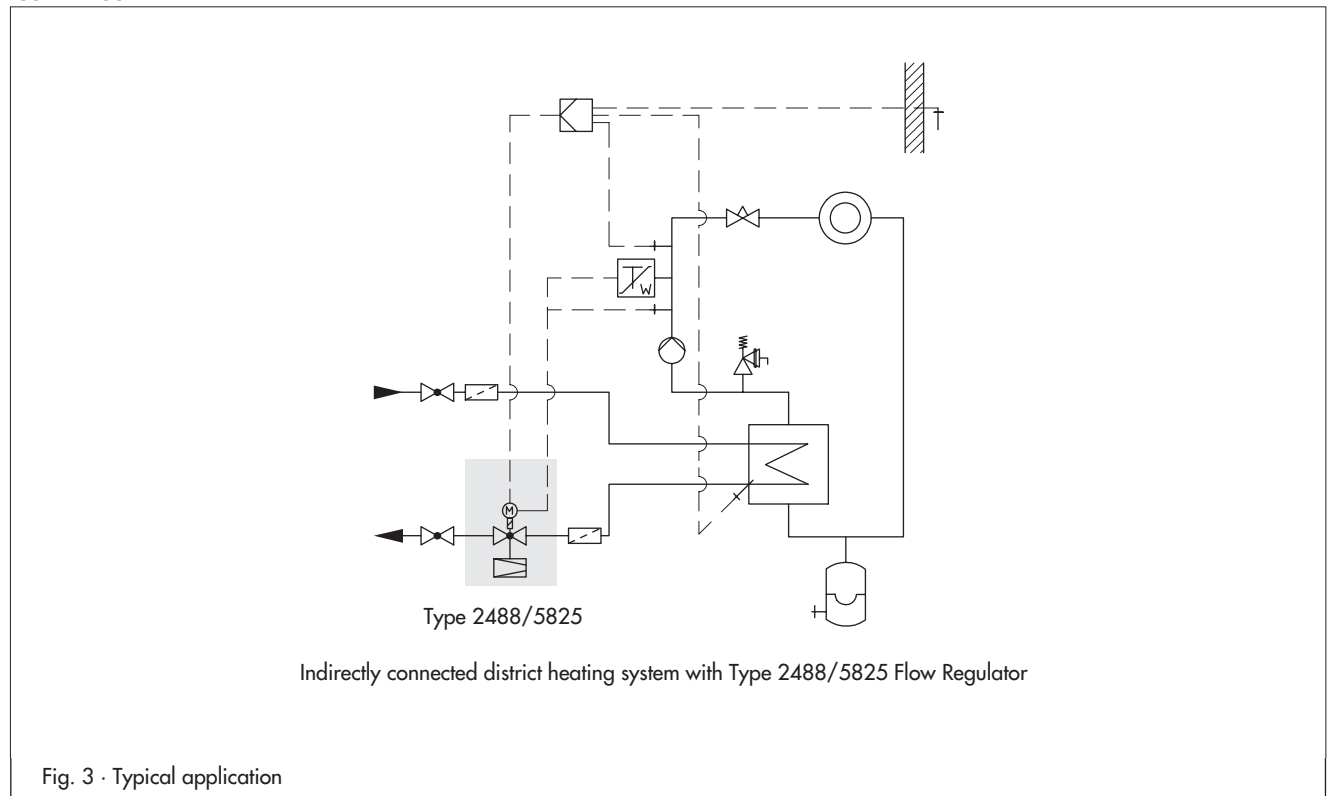


Table 1 · Technical data · Type 2469 Valve · All pressures in bar (gauge)

Nominal size	DN	15/20/25			15	20	25	32 ²⁾	40 ²⁾	50 ²⁾
		K _{VS} coefficient	Valve w. screwed ends	0.4 ¹⁾	1 ¹⁾	2.5	4 ¹⁾	6.3	8	12.5
Flanged valve body	-						12.5	20	25	
z value	Valve w. screwed ends	0.6				0.55		0.5		0.45
	Flanged valve body	-						0.45	0.45	0.40
Nominal pressure		PN 16 ³⁾ /25					PN 25			
Max. perm. differential pressure Δp at valve		10 ⁴⁾ /20 bar						16 bar		
Max. perm. temperature		For liquids 130 °C (PN 16)/150 °C (PN 25) · For air and non-flammable gases 80 °C								
Flow rate set point ranges for water in m³/h										
Flow rate set point range/limitation for water with an upper differential pressure of 0.2 bar		0.03 to 0.2	0.12 to 0.64	0.2 to 1.2	0.6 to 1.3 ⁵⁾ 0.6 to 2.5	0.8 to 2.3 ⁵⁾ 0.8 to 3.6	0.8 to 3.5 ⁵⁾ 0.8 to 5	2 to 5.8 ⁵⁾ 2 to 10	3 to 9.1 ⁵⁾ 3 to 12.5	4 to 14.1 ⁵⁾ 4 to 15

1) Special versions

2) Additional version: Valve with flanged body made of spheroidal graphite iron (EN-JS1049)

3) Not for Type 2489

4) For version with PN 16

5) When the indicated flow rates are exceeded, it must be expected that the noise level also increases, even if cavitation does not occur in the flow

Table 2 · Technical data · Electric actuators

Electric actuator	Type 5824-...		Type 5825-...		Type 5757	Type 5857	
	- without fail-safe action -		- with fail-safe action -		- without fail-safe action -		
	10	20	10	20	-		
Rated travel	Valve DN 15 to 25	6 mm	-	6 mm	-	6 mm	
	Valve DN 32 to 50	-	12 mm	-	12 mm	-	
Transit time for rated travel		45 s	70 s	45 s	70 s	20 s	
Transit time in case of fail-safe action		-		4 s	8 s	-	
Nominal thrust		700 N		-		300 N	
Nominal thrust of return spring		-		500 N		-	
Power supply		230 V, 50 Hz (on request 24 V, 50 Hz)				230 V/24 V ($\pm 10\%$), 50 Hz	
Power consumption		Approx. 3 VA		Approx. 3 VA + 1 VA		Approx. 3 VA	
Override		With		Possible ¹⁾		With	
Perm. ambient temperature		0 to +50 °C					
Perm. temperature at connecting stem		0 to +110 °C					
Degree of protection (upright position acc. to IEC 60529)		IP 54				IP 42	IP 42
Further details in Data Sheet		T 5824 EN				T 5757 EN	T 5857 EN

1) Override with 4 mm hexagonal wrench with housing cover removed. Valve always returns to fail-safe position after fail-safe action has been activated.

Table 3 · Technical data · Type 2430 K Control Thermostat

Type 2430 K Control Thermostat	
Set point range	Continuously adjustable: 0 to 35 °C, 25 to 70 °C, 40 to 100 °C, 50 to 120 °C, 70 to 150 °C
Ambient temperature	-20 to +80 °C
Temperature at sensor	Max. 50 K above adjusted set point
Pressure at sensor	Max. 40 bar
Capillary tube	2 m (5 m special version)

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

Body		Red brass CC491K (G-CuSn5ZnPb, Rg 5) · Spheroidal graphite iron EN-JS1049 (GGG-40.3) ¹⁾
Seat		Stainless steel 1.4305
Plug	PN 25	Brass, free of dezincification, with EPDM soft sealing ²⁾
	PN 16	Brass, free of dezincification and plastic with EPDM soft sealing
Upper section	PN 25	Red brass CC491K (G-CuSn5ZnPb, Rg 5) · Spheroidal graphite iron EN-JS1049 (GGG-40.3) ¹⁾
	PN 16	Stainless steel 1.4301
Valve spring		Stainless steel 1.4310
Restriction		Brass, free of dezincification
Operating diaphragm		EPDM with fabric reinforcement ²⁾
Seals		EPDM ²⁾
Type 5824, Type 5825, Type 5857 and Type 5757 Electric Actuators		
Housing		Plastic (PPO glass fiber reinforced)
Coupling nut		Brass
Type 2430 K Control Thermostat		
Sensor and capillary tube		Copper
Thermowell		Copper or stainless steel 1.4571

¹⁾ Additional version for DN 32, 40 and 50: Valve with flanged body made of spheroidal graphite iron

²⁾ Special version for oils (ASTM I, II, III): FPM (FKM)

Dimensions and weights

Table 5 · Dimensions in mm and weights in kg

Nominal size	DN	15	20	25	32 ¹⁾	40 ¹⁾	50 ¹⁾
Pipe Ø d		21.3	26.8	32.7	42	48	60
Thread size R		G ¾	G 1	G 1¼	G 1¾	G 2	G 2½
Width across flats SW		30	36	46	59	65	82
Length L		65	70	75	100	110	130
Height H		155			216		
Height H3		122			163		
Height H1	Type 2488/...	85			105	140	
	Type 2489/...	245			265	295	
Length L1 with welding ends		210	234	244	268	294	330
Weight ³⁾ , approx. in kg	Type 2488/...	3.0	3.1	3.2	4.4	6.9	7.4
	Type 2489/...	3.9	4.0	4.1	5.2	7.9	8.4
Special versions							
with threaded ends							
Length L2		129	144	159	180	196	228
Male thread A		G ½	G ¾	G 1	G 1¼	G 1½	G 2
Weight		See version with welding ends					
with flanges²⁾ (PN 16/25) or with flanged body (DN 32 to 50)							
Height H4		-			196		
Height H5		-			105	140	
Length L3		130	150	160	180	200	230
Weight ³⁾ , approx. in kg	Type 2488/...	4.4	5.1	5.7	7.6	10.9	12.4
	Type 2489/...	5.3	6.0	6.6	8.4	11.9	13.4

¹⁾ Additional version: Valve with flanged body

²⁾ Flanges are already mounted on valves in DN 40 and 50

³⁾ Type 2489/582...: Weights for version with bulb sensor and thermowell. Minus 0.2 kg for version with thermowell

Ordering text

Flow Regulator

Type 2488/5824(5825),

Type 2488/5857,

Type 2488/5757,

Type 2489/5824(5825)

With valve DN ..., PN ...,

perm. temperature ... °C, K_{VS} ...

With welding ends/threaded ends/flanges

with flanged valve body

Upper differential pressure at the restriction ... bar

With Electric Actuator Type 5824-.../Type 5825-.../

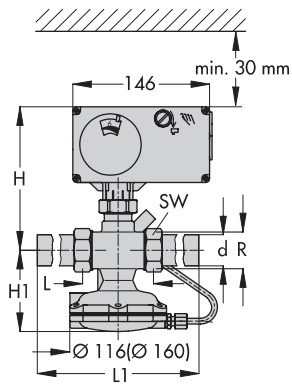
Type 5857/Type 5757

With Control Thermostat Type 2430 K

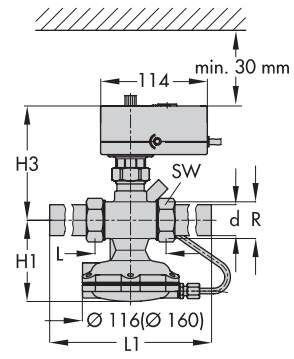
Set point range... °C

On option, accessories .../special version ...

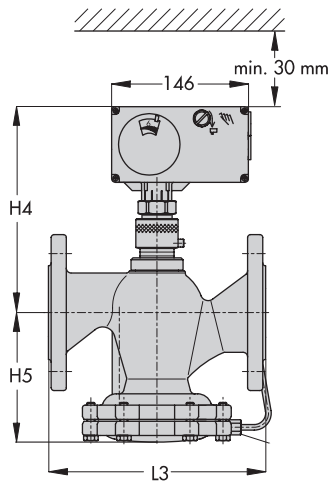
Dimensional diagrams



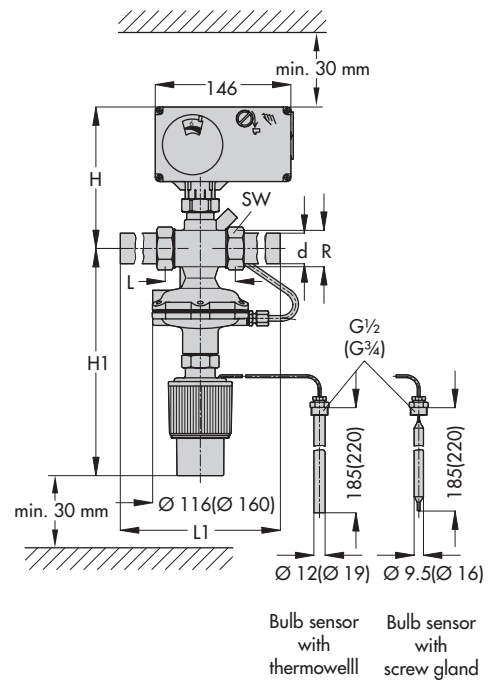
Type 2488/5824(5825)
with welding ends



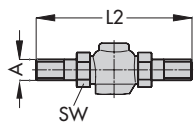
Type 2488/5857 or 5757
with welding ends



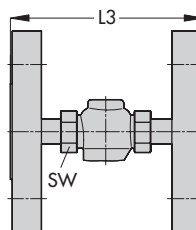
Type 2488/5824(5825/5724)
with flanged body (DN 32 to 50 only)



Type 2489/5824(5825)
with welding ends



with threaded ends



with flanges

Dimensions in parentheses apply to DN 40 and DN 50!

Fig. 4 · Dimensions

Specifications subject to change without notice.



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