Combined Self-Operated Regulators for Differential Pressure or Flow Rate with additional electric actuator

Application

Self-operated regulators for controlling the differential pressure and/or the flow rate in district heating systems. Combined with an electric actuator used to transmit the control signal of an electric controller. Valve sizes **DN 15 to DN 50** · **Nominal pressure PN 16/25** for liquids up to **150 °C**

The valve closes when the differential pressure, flow rate or the output signal issued of the electric controller increase.

These combined regulators consist of a valve, a diaphragm actuator and a Type 5824 or Type 5825 Electric Actuator (with fail-safe action) or Type 5857 or Type 5757 Electric Actuator.

Special features

- Low-maintenance regulators requiring no auxiliary energy
- Single-seated valve with a balanced valve plug
- Suitable for water and other liquids, provided these do not cause the materials used to corrode
- Available with adapter for attachment of the electric actuator to the valve and for adjustment of the flow rate

Versions (Figs. 1 to 3)

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 2488/5824(25) (Fig. 3.1), **Type 2488/5857** or **Type 2488/5757 Flow Regulator**
with either a Type 5824, Type 5825, Type 5857 or Type 5757 Electric Actuator · Type 5857 or Type 5757 Actuator for DN 15 to 32 only

Type 2489/582.. Flow Regulator (Fig. 3.5)
with either a Type 5824 or Type 5825 Electric Actuator and an additional Type 2430 K Control Thermostat

Type 2491/582.. Flow and Differential Pressure or Pressure Regulator (Fig. 3.3)
with adjustable differential pressure or pressure set point and either a Type 5824 or Type 5825 Electric Actuator

Type 2494/582.. Flow and Differential Pressure or Pressure Regulator (Fig. 3.4)
with fixed differential pressure or pressure set point and either a Type 5824 or Type 5825 Electric Actuator

Type 2487/582.. Flow and Differential Pressure Regulator (Fig. 3.2) · With internal force limiter and overload protection (excess pressure limiter) in the actuator · With adjustable differential pressure set point and either a Type 5824 or Type 5825 Electric Actuator

Type 2495/582.. Flow and Differential Pressure Regulator
With internal force limiting device and overload protection (excess pressure limiter) in the actuator · With fixed differential pressure or pressure set point and either a Type 5824 or Type 5825 Electric Actuator

Fig. 1 · Type 2488/5824 Flow Regulator with electric actuator (DN 15 to 25 version)

Fig. 2 · Type 2487/5825 Differential Pressure and Flow Regulator with electric actuator (DN 32 to 50 only)

Typetested control equipment with Type 5825 Actuator according to DIN 32730 are available.

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

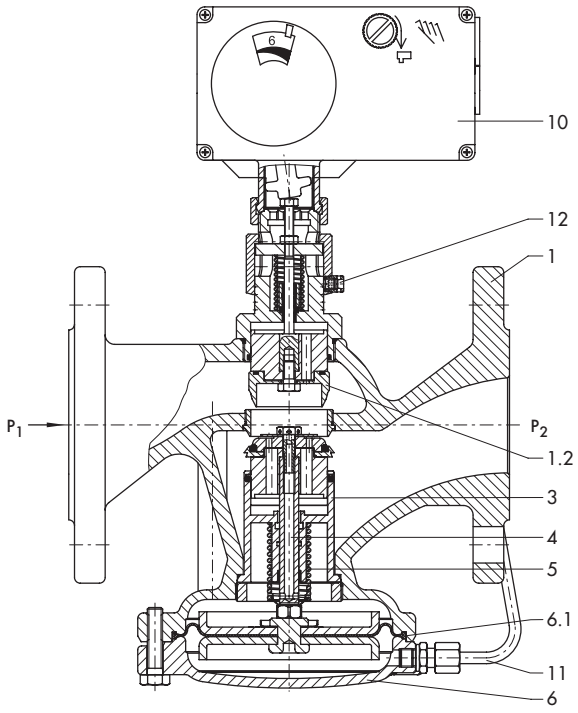


Fig. 3.1 · Type 2488/5825, PN 25
(flow regulator)

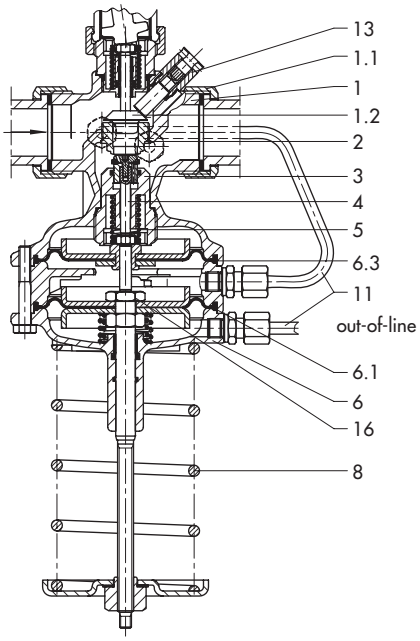


Fig. 3.2 · Type 2487/5825, PN 25
(flow and differential pressure regulator)

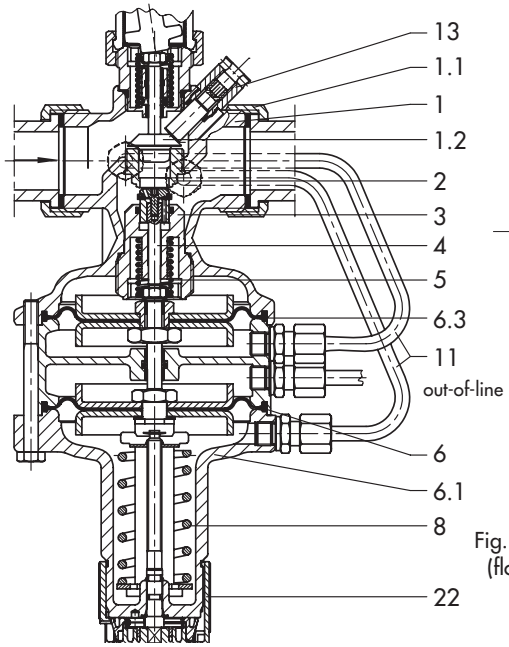


Fig. 3.3 · Type 2491/5825, PN 25,
set point range up to 1 bar
(flow and differential pressure or
pressure regulator)

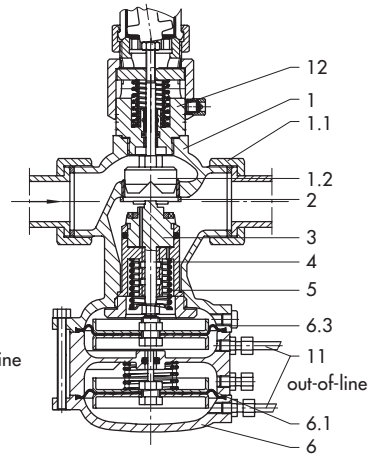


Fig. 3.4 · Type 2494/5825, PN 25
(flow and differential pressure or
pressure regulator

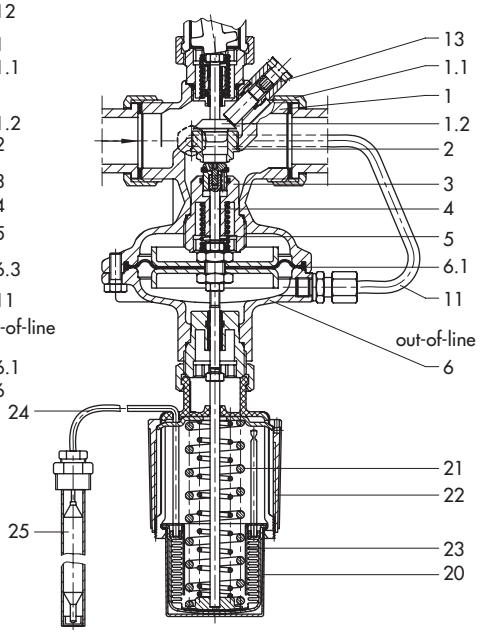


Fig. 3.5 · Type 2489/5825, PN 25
(flow regulator with thermostat)

Fig. 3 · Various versions of the regulators

Principle of operation

The regulators consist of a standard instrument for flow and differential pressure control. Their principle of operation is described in the Data Sheets listed in the Selection Guide.

The electric actuator is mounted to the control valve assembly over the adapter. Depending on the nominal size, the flow rate set point (without actuator) is set at the adjustment screw (13) or at the set point adjuster (12) which can be lead-sealed.

The Type 5824, Type 5757 [1] and Type 5857 [1] Actuator do not have a fail-safe action. The Type 5825 Actuator, however, has fail-safe action, i.e. the valve is closed when the power supply is interrupted.

These actuators are operated by control signals from an electric control device. As a result, the orifice (1.2) is adjusted, thus controlling the flow rate across the valve.

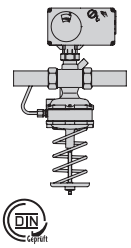
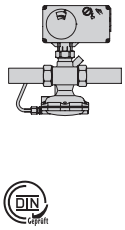
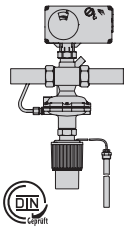
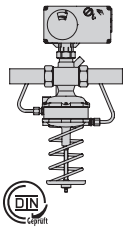
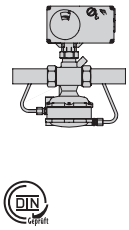
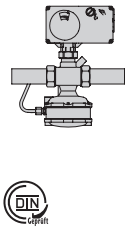
The Type 2489/582.. instrument combination is equipped with an additional Type 2430 K Control Thermostat.

This thermostat operates without auxiliary energy and allows the additional control of a temperature variable.

An internal excess pressure limiter functions as an overload protection (16) in the actuator of Type 2487/582.. and Type 2495/582.. Regulators to protect the seat and plug from overload during exceptional conditions that could lead to damaging the valve or plant.

[1] Type 2488/5857 or Type 2488/5757: DN 15 to 25 only

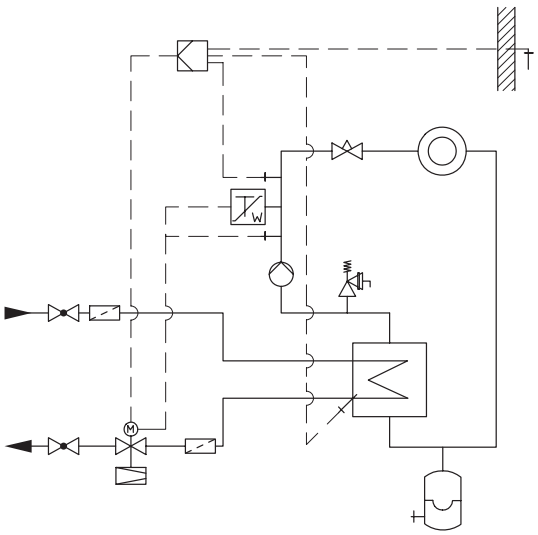
Selection guide for Type 24../5824, Type 24../5825, Type 2488/5857 or Type 2488/5757 instrument combinations
This table shows the various versions of the combined regulators and their possible scope of application. Refer to the data sheets listed for a detailed description of the standard regulator.

Regulator	**Type**	**2487/5824 2487/5825**	**2488/5824 2488/5825 2488/5857 2488/5757**	**2489/5824 2489/5825**	**2491/5824 2491/5825**	**2494/5824 2494/5825**	**2495/5824 2495/5825**
Standard device	**Type**	**46-7**	**45-9**	**2469/2430 K**	**47-1**	**47-4**	**47-5**
	See Data Sheet	T 3131 EN	T 3128 EN	T 3132 EN	T 3131 EN		
Application for							
	Diff. pressure control Δp	•			•	•	•
	Flow control $\dot{V}$	•	•	•	•	•	•
	Temperature control			•			
Installation in	Flow pipe		•	•	•	•	
	Return pipe	•	•	•			•
Set point Δp	Fixed					•	•
	Adjustable	•			•		
	Δp (bar) Min.	0.1 [1] / 0.2 [2]			0.1 [1] / 0.2 [2]	0.2	0.2
	Δp (bar) Max.	2.0			2.0	0.5	0.5
$\dot{V}$	Adjustable	•	•	•	•	•	•
Type 2430 K Control Thermostat				•			
Type 5824 Electric Actuator		•	•	•	•	•	•
Type 5825 Electric Actuator with fail-safe action		•	•	•	•	•	•
Type 5857 [1] or **Type 5757** [1] Electric Actuator			•				

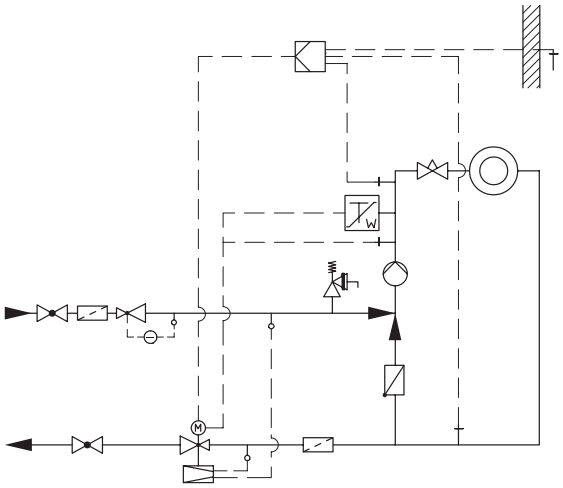
[1] DN 15 to 32

[2] DN 40 to 50

Typical applications



Indirectly connected district heating system with
Type 2488/5825 Flow Regulator



Directly connected district heating system with
Type 2495/5825 Differential Pressure and Flow Regulator

Fig. 4 · Typical applications

Table 1 · Technical data · Valves · All pressures in bar (gauge)

Nominal size	**DN**	**15/20/25**			**15**	**20**	**25**	**32** [2]	**40** [2]	**50** [2]
K_{VS}	Valve with screwed ends	0.4 [1]	1 [1]	2.5	4 [1]	6.3	8	12.5	16	20
	Flanged valve body	–						12.5	20	25
z value	Valve with 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. diff. 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 m^3/h										
Flow rate set point range/limitation for water with an upper differential pressure of 0.2 bar	m^3/h	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 version
[2] Additional version: Valve with flanged body made of spheroidal graphite iron (EN-JS1049)
[3] Not for Types 2489/... and 2491/...
[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 · Differential pressure set points

Type		**2487/....**	**2491/....**	**2494/....**	**2495/....**
Differential pressure set points Δp fixed		–	–	0.2/0.3 bar 0.4/0.5 bar	0.2/0.3 bar 0.4/0.5 bar
continuously adjustable	DN 15 to 32	0.1 to 0.5 bar 0.1 to 1.0 bar 0.5 to 2.0 bar	0.1 to 0.5 bar 0.1 to 1.0 bar 0.5 to 2.0 bar	–	–
	DN 40 to 50	0.2 to 0.5 bar 0.2 to 1.0 bar 0.5 to 2.0 bar	0.2 to 0.5 bar 0.2 to 1.0 bar 0.5 to 2.0 bar	–	–

Table 3 · Technical data · Electric actuators

Electric actuator		Type 5824-... - without fail-safe action -			Type 5825-... - with fail-safe action -			Type 5757	Type 5857
		10	11	20	10	11	20	–	
Rated travel	Valve DN 15 to 25	7.5 mm	7.5 mm	–	7.5 mm	7.5 mm	–	6 mm	
	Valve DN 32 to 50	–	–	12 mm	–	–	12 mm	–	
Transit time for rated travel		45 s	90 s	70 s	45 s	90 s	70 s	20 s	
Transit time in case of fail-safe action		–			4 s	5 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 (±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 DIN IEC 529)		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 4 · 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 5 · 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

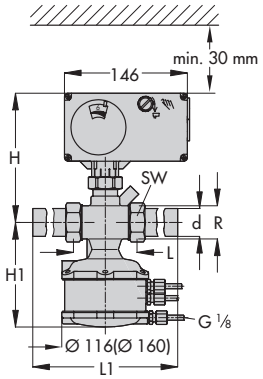
Dimensions in mm and weights in kg

Nominal size DN		**15**	**20**	**25**	**32**[1]	**40**[1]	**50**[1]
Pipe diameter **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 ac. 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 (H2)**	Type 2488/...	85			105	140	
	Type 2494/...	122			140	192	
	Type 2495/...	108			125	175	
	Type 2487/...	248 (185)			265 (205)	415	
	Type 2491/...	265 (200)			285 (220)	425	
	Type 2489/...	245			265	295	
Length **L1** with welding ends		210	234	244	268	294	330
Weight, approx. in kg[3]	Type 2488/...	3.0	3.1	3.2	4.4	6.9	7.4
	Type 2494/... Typ 2495/...	3.6	3.7	3.8	4.9	7.6	8.1
	Type 2489/...	3.9	4.0	4.1	5.2	7.9	8.4
	Type 2487/... Type 2491/...	4.0	4.1	4.2	5.4	13.4	13.9
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 flanges[2] (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, approx. in kg[3]	Type 2488/...	4.4	5.1	5.7	7.6	10.9	12.4
	Type 2494/... Type 2495/...	5.0	5.7	6.3	8.1	11.6	13.1
	Type 2489/...	5.3	6.0	6.6	8.4	11.9	13.4
	Type 2487/... Type 2491/...	5.4	6.1	6.7	8.6	17.4	18.9

[1] Additional version: Valve with flanged body

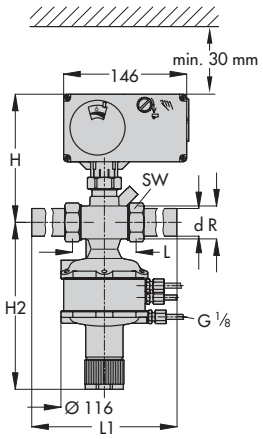
[2] Flanges are already mounted on valves in DN 40 and 50

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



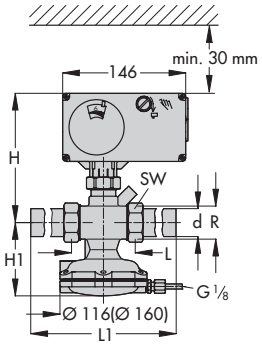
Type 2494/5824(5825)
Type 2495/5824(5825)

- Dimensions in parentheses apply to DN 40 and DN 50! -

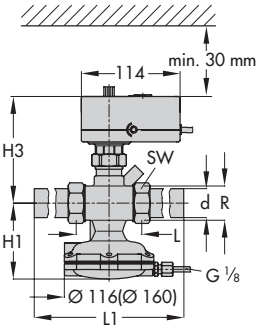


Type 2487/5824(5825)
Type 2491/5824(5825)
0.1 to 0.5 bar or
0.1 to 1.0 bar

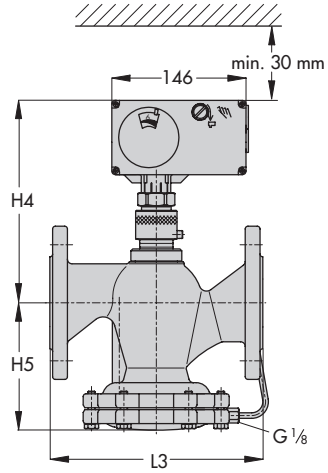
Fig. 5 · Regulator dimensions



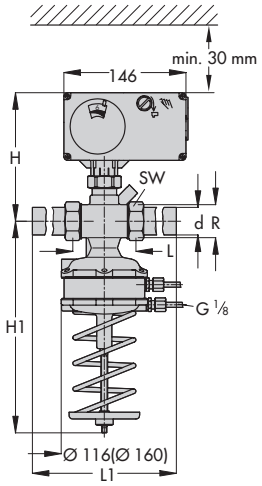
Type 2488/5824(5825)
with welding ends



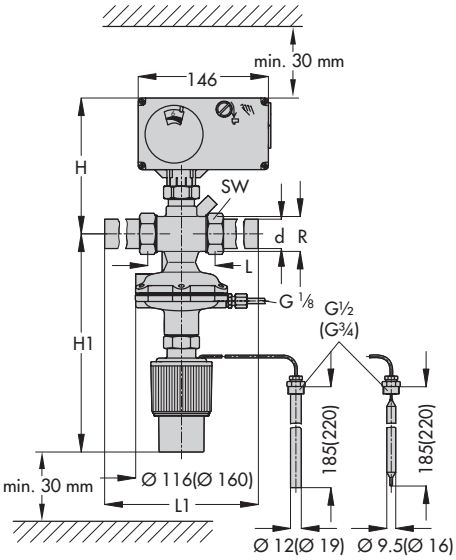
Type 2488/5857 or 5757
with welding ends



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



Type 2487/5824(5825)
Type 2491/5824(5825)

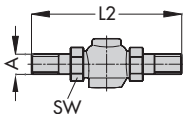


Bulb sensor with thermowelll

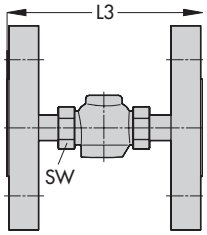
Bulb sensor with screw gland

- Dimensions in parentheses apply to DN 40 and DN 50! -

Type 2489/5824(5825)
with welding ends



with **threaded ends**



with **flanges**

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 horizontally running pipelines. Regulators in nominal sizes DN 15 to 25 may also be installed in vertically running pipelines.
- The medium must flow through the valve in the direction indicated by the arrow on the valve body.
- Prior to assembling the actuator and valve:
  Retract the actuator stem!
- The electric actuator must always be located above the valve body.
- 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!

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.

Ordering text

Flow Regulator
Type 2488/5824(5825); Type 2488/5857;
Type 2488/5757; Type 2489/5824(5825)
Flow and **Differential Pressure** or **Pressure Regulator**
Type 2491/5824(5825); Type 2494/5824(5825);
Type 2487/5824(5825);
Flow and **Differential Pressure Regulator**
Type 2495/5824(5825)
With valve DN …, PN …,
perm. temperature … °C, K_{VS} …
With welding ends/threaded ends/flanges
with flanged valve body
Differential pressure set point … bar
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 …

Specifications subject to change without notice.

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