INFORMATION SHEET

T 3120 EN

Series 45, 46, 47 and 48 Self-operated Differential Pressure and Flow Regulators as well as Combined Reguators

PN 10 to 25

G ⅜ to G 2

DN 15 to 50

–10 to 150 °C

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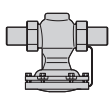
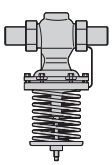
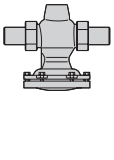
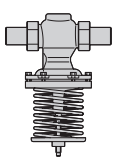
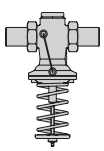
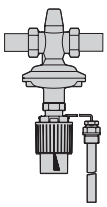
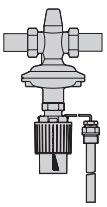
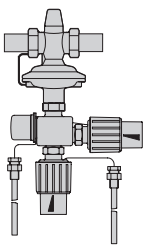
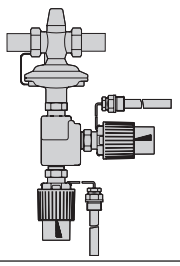
Table 1: *Differential pressure and flow regulators*

Valve	Can be used for	Water, liquids	•	•	•	•	•	•	•	
		Mineral oil	• [1]	•	• [1]	•	•			
		Air, non-flammable gases	•	•	•	•				
	Valve size	Welding ends Threaded ends	DN 15 to 50 (CC499K)					DN 15		
		Flanges	DN 32 to 50 (EN-GJS-400-18-LT)					–		
	Pressure rating PN		16 [2] · 25	25	16 [2] · 25	25		10		
	Body material	CC499K	•	•	•	•	•	•	•	
		EN-GJS-400-18-LT	•	•	•	•	•	–		
	Max. permissible temperature		Liquids up to 150 °C (PN 25) or 130 °C (PN 16) Non-flammable gases up to 80 °C					110 °C · 80 °C		
Application	Differential pressure Δp	Control	•	•	•	•	•	•	•	
		Limitation								
	Flow rate $\dot{V}$	Control								
		Limitation								
	Installation in	Flow pipe	•	•			Short circuit/ bypass	•		
		Return flow pipe			•	•			•	
	Set point	Fixed set point	•		•			•	•	
		Adjustable		•		•	•			
	Δp in bar	Min.	0.1	0.2 [3]	0.1	0.1 [3]		0.15		
		Max.	0.5	4.0	0.5	4.0		0.3		
Type			**45-1**	**45-2**	**45-3**	**45-4**	**45-6**	**45-1 N**	**45-3 N**	
Data Sheet			▶ **T 3124**				▶ **T 3226**	▶ **T 3140**		
										

[1] PN 16 not for mineral oil
[2] DN 15 to 25 only
[3] For valve sizes DN 32 to 50, the lower range value of the set point range is 0.2 bar
[4] Flow rate control of water from 0.01 to 15 m³/h

Table 2: Combined regulators for differential pressure, flow rate and temperature

Type 2430 Control Thermostat		Adjustable set point from 0 to 35 °C · 25 to 70 °C · 75 to 100 °C · 100 to 120 °C			
Safety thermostat	Type 2403	–		•	–
		Safety temperature monitors (STM) · Limits 60 to 75 °C · 75 to 100 °C · 100 to 120 °C			
	Type 2439	–			•
		Safety temperature limiters (STL) · Limits 40 to 95 °C · 70 to 120 °C			
Type		**2469/2430**	**2479/2430**	**2469/2430/2403**	**2469/2430/2439**
Data Sheet		▶ **T 3132**			
					

Differential pressure and flow regulators

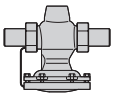
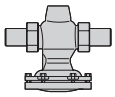
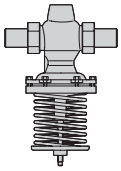
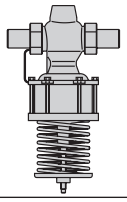
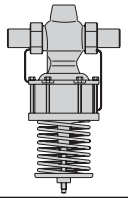
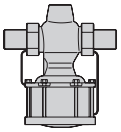
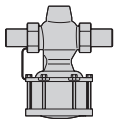
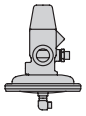
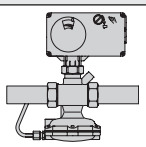
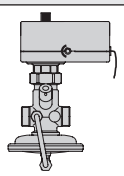
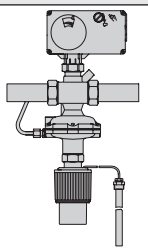
	•	•	•	•	•	•	•	•
	• [1]	• [1]	• [1]	• [1]	• [1]	• [1]	• [1]	•
	•	•	•	•	•	•	•	•
	DN 15 to 50 (CC499K)							DN 15
	DN 32 to 50 (EN-GJS-400-18-LT)							–
	16 [2] · 25							10
	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	–
	Liquids up to 150 °C (PN 25) or 130 °C (PN 16) Non-flammable gases up to 80 °C							110 °C · 80 °C
				•	•	•	•	
		•	•					•
	•			•	•	•	•	
		•	•					•
	•				•	•		•
	•	•	•	•			•	•
		•				•	•	•
	•		•	•	•			
	– [4]	0.2		0.1 [3]		0.2		
	– [4]	0.5	2.0			0.5		
	45-9	**46-5**	**46-6**	**46-7**	**47-1**	**47-4**	**47-5**	**46-5 N**
	▶ **T 3128**	▶ **T 3130**		▶ **T 3131**				▶ **T 3134**
								

Table 3: *Combined self-operated regulator for flow rate and temperature with additional electric actuator*

Flow control $\dot{V}$		•	•	•
Temperature control				•
Installation in	Flow pipe	•	•	•
	Return flow pipe	•	•	•
Set point $\dot{V}$	Adjustable	•	•	•
Type 2430 Control Thermostat				•
Type 5857 Electric Actuator		–	•	–
Type 5824 Electric Actuator		•	–	•
Type 5825 Electric Actuator with fail-safe action		•	–	•
Type		**2488/582x**	**2488 N/5857**	**2489/582x**
Data Sheet		▶ **T 3135**	▶ **T 3136**	▶ **T 3135**
				

Design and principle of operation (see Fig. 1)

Design

The Series 45, 46, 47 and 48 Regulators are proportional regulators controlled by the process medium. Each deviation from the adjusted set point is assigned a certain plug position.

The differential pressure Δp to be controlled generates a force F_m at the diaphragm surface of the actuator which is proportional to the actual value (controlled variable x). This force is compared to the spring force F_S (set point w) at the plug stem. It can be adjusted at the set point adjuster. The spring force corresponds to the set point and can be adjusted at the set point adjuster. When the differential pressure Δp and thus the force F_m change, the plug stem is moved until $F_m = F_S$.

The flow rate is controlled according to the differential pressure method.

The control accuracy and stability depend on the disturbances that occur. The regulators are designed in such a way that the effect of these disturbances is relatively small. Amongst other things, this is also achieved by balancing the plug. The force acting on the plug, which depends on the upstream or differential pressure, is eliminated by an equal opposing force.

The regulators can be designed to function as:

- Differential pressure regulators
- Flow regulators
- Differential pressure and flow regulators
- Differential pressure regulators with flow limitation
- Differential pressure, flow and temperature regulators
- Combined self-operated regulators for differential pressure or flow rate with additional electric actuator

Differential pressure regulators with closing actuator (see Fig. 1.1)

This actuator closes the valve when the adjusted differential pressure set point is exceeded. The top of the diagram shows a closing actuator with an adjustable set point, the bottom an actuator with a fixed set point determined by the installed set point spring.

Differential pressure regulators with opening actuator (see Fig. 1.2)

This actuator opens the valve when the differential pressure rises. The valve is closed when relieved of pressure (Δp = 0).

Flow control (see Fig. 1.3)

Principle of flow control according to the differential pressure method. The differential pressure $\Delta p_{restriction}$ generated at the restriction is transferred to the diaphragm surface of the actuator. The difference between the force at the diaphragm and the spring force of the set point spring causes the plug position to change. For the flow rate, the differential pressure $\Delta p_{restriction}$ acting on the restriction and the force F_m acting on the diaphragm, the following applies:

$$\dot{V} = K \cdot \sqrt{\Delta p_{restriction}} \triangleq K \cdot \sqrt{F_m} \text{ or } \dot{V}^2 = K' \cdot \Delta p \triangleq K' \cdot F_m$$

$$\Delta p_{restriction} = \frac{F_m}{A}$$

$\dot{V}$	=	Flow rate
F_m	=	Force at the actuator area
K, K´	=	Constants
A	=	Actuator area
$\Delta p_{restriction}$	=	Differential pressure created at the restriction for measuring the flow rate

Flow regulators (see Fig. 1.4)

The set point is adjusted at the restriction. The regulators are particularly suitable for district heating supply networks.

Differential pressure regulators with flow limitation (see Fig. 1.5)

These have a restriction for adjusting the set point for the maximum flow rate. The set point is adjusted to a flow rate that should not be exceeded.

The pressure downstream of the restriction (not the low pressure of the plant) and the high pressure of the plant act on the diaphragm. On sizing the plant, it is therefore important to take into consideration that the plant differential pressure is a sum of the pressure drop across the restriction and the pressure drop across the fully opened plant:

$$\Delta p_{set\ point} = \Delta p_{plant} + \Delta p_{restriction}$$

$\Delta p_{set\ point}$	=	Differential pressure set point
Δp_{plant}	=	Pressure drop across the fully opened plant
$\Delta p_{restriction}$	=	Differential pressure created at the restriction for measuring the flow rate

Differential pressure regulators with flow limitation are especially suitable for use in the primary circuit of an indirectly connected district heating supply network.

Differential pressure and flow regulators (see Fig. 1.6)

These regulators are equipped with two diaphragms. The top diaphragm is used to control the flow rate, the bottom diaphragm is used to control the differential pressure. The largest signal is always used to control the regulator.

Depending on the intended application, these regulators are equipped with the necessary control lines.

The top of the diagram shows a closing actuator with an adjustable set point, the bottom an actuator with a fixed set point.

Differential pressure or temperature regulators (see Fig. 1.7)

In differential pressure and temperature regulators, the largest signal is used to move the plug.

Fig. 1.1: *Differential pressure regulator with closing actuator and adjustable set point (top) and fixed set point (bottom)*

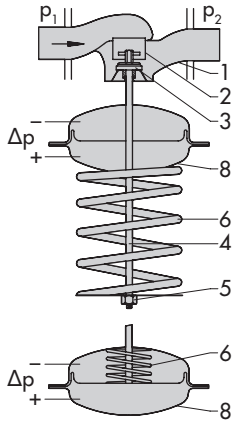


Fig. 1.2: *Differential pressure regulator with opening actuator and adjustable set point*

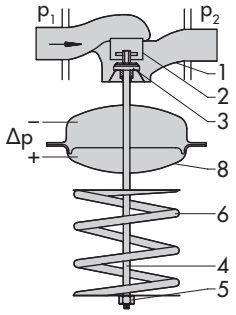


Fig. 1.3: *Flow control*

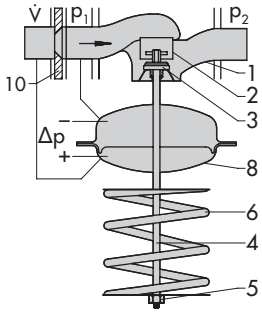


Fig. 1.4: *Flow regulator*

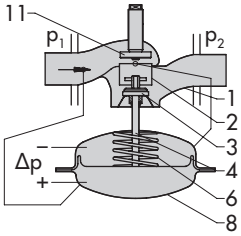


Fig. 1.5: *Differential pressure regulator with flow limitation*

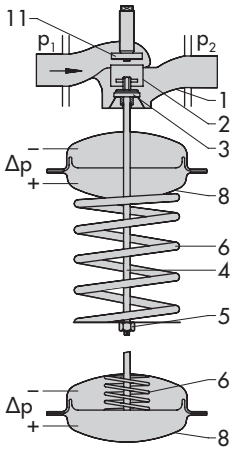


Fig. 1.6: *Differential pressure and flow regulator with adjustable set point (top) and fixed set point (bottom)*

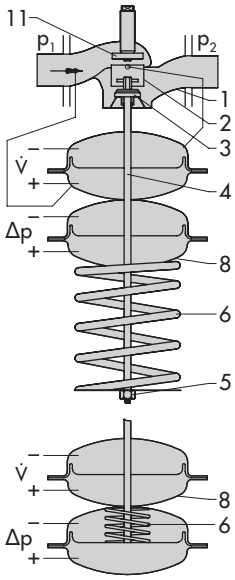
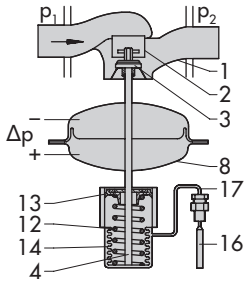


Fig. 1.7: *Differential pressure and temperature regulator*



1	Valve body	6	Set point spring	13	Set point adjuster
2	Valve seat	8	Actuator	14	Operating bellows
3	Plug	10	External restriction	15	Control thermostat
4	Plug stem	11	Adjustable restriction	16	Temperature sensor
5	Set point adjuster	12	Spring	17	Capillary tube

Fig. 1: *Schematic diagrams of regulators*

Principle of operation

Differential pressure and flow regulators

The self-operated differential pressure and flow regulators consist of a valve and an actuator, which closes or opens the valve when the differential pressure/flow rate increases.

The medium flows through the valve in the direction indicated by the arrow. The areas released by the valve plug determine the differential pressure/flow rate.

The Type 45-4 is used to illustrate how differential pressure control works and Type 45-9 serves to demonstrate the principle of flow control.

Type 45-4 Differential Pressure Regulator

The regulator is used to limit the differential pressure to the adjusted set point.

It is designed for the installation in the low-pressure line (return flow pipe) of the plant.

The valve closes when the differential pressure rises.

The pressure upstream of the valve (low pressure) is transmitted to the top diaphragm chamber of the actuator through the internal hole (12). The high pressure (flow pipe) is transferred to the bottom diaphragm chamber of the actuator over the external control line (11).

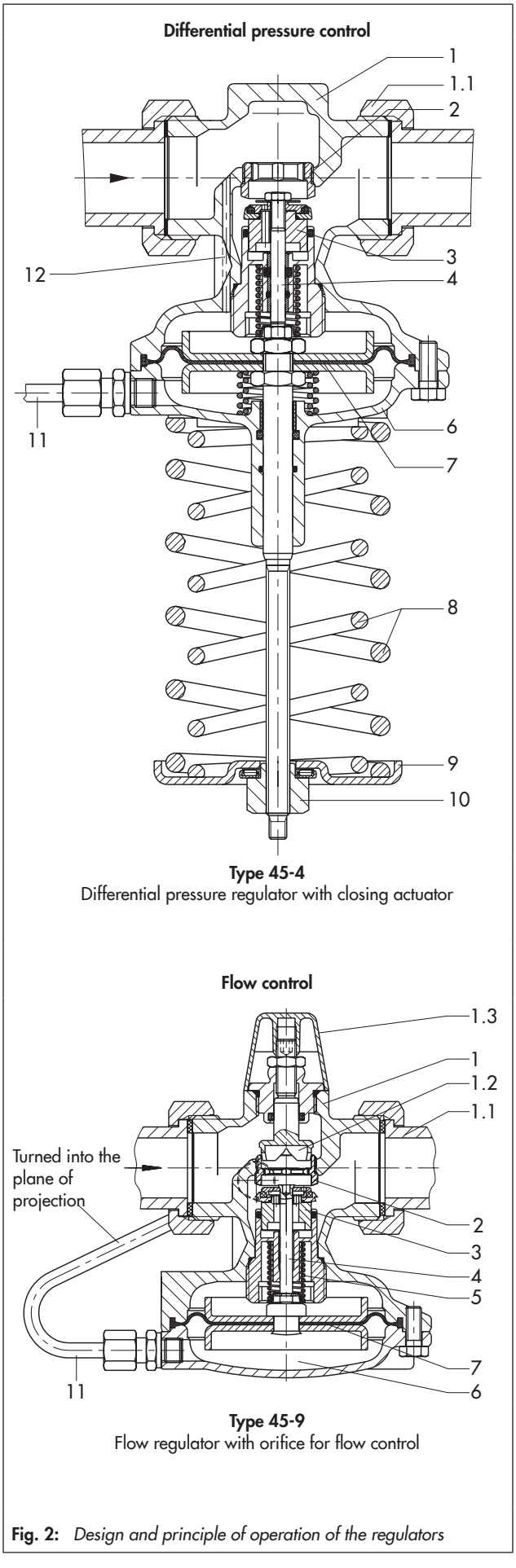
The differential pressure generates a positioning force at the diaphragm, which is used to position the plug (3) according to the spring rate of the set point springs of the spring assembly (8) and the set point adjusted at the set point adjuster (10).

Type 45-9 Flow Regulator

The flow rate is determined according to the differential pressure method.

The areas released by the restriction (1.2) and valve plug (3) determine the flow rate. In this case, the high pressure upstream of the restriction is transferred through the control line (11) to the high-pressure side of the diaphragm, whereas the low pressure downstream of the restriction is transferred to the low-pressure side of the diaphragm.

If the pressure difference acting on the operating diaphragm (7) exceeds the differential pressure set point of the set point spring (5), i.e. the flow rate increases, the diaphragm moves together with the plug stem (4) and the plug (3). The cross-sectional area of flow is reduced until the pressure drop created above the restriction and the differential pressure created to measure flow are identical.



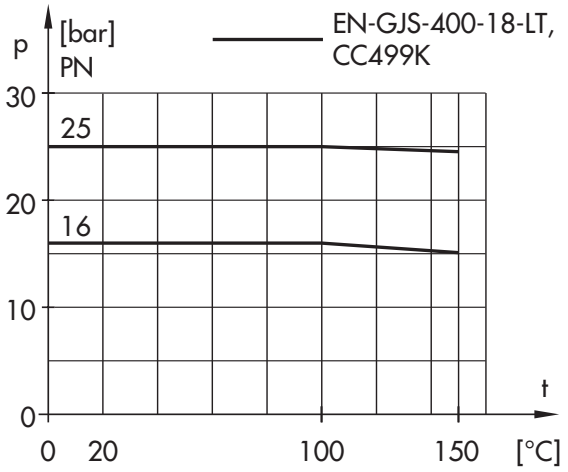
Type 45-4
Differential pressure regulator with closing actuator

Type 45-9
Flow regulator with orifice for flow control

Fig. 2: *Design and principle of operation of the regulators*

Pressure-temperature diagram (DIN)

For DIN materials, the diagrams were created based on DIN EN 12516-1. For materials in accordance with US standards, these were created in compliance with ASME B16.1 and ASME B16.34.



The diagram below applies to the use of regulators for district heating (see DIN 4747-1)

Pressure-temperature diagram according to DIN 4747-1 for selected materials

The materials for valves and connecting pieces must be suitable for sizing and the operating conditions.

In this case, material is selected according to DIN 4747-1.

Depending on the valve material, various pressure ratings are also permissible at different temperatures.

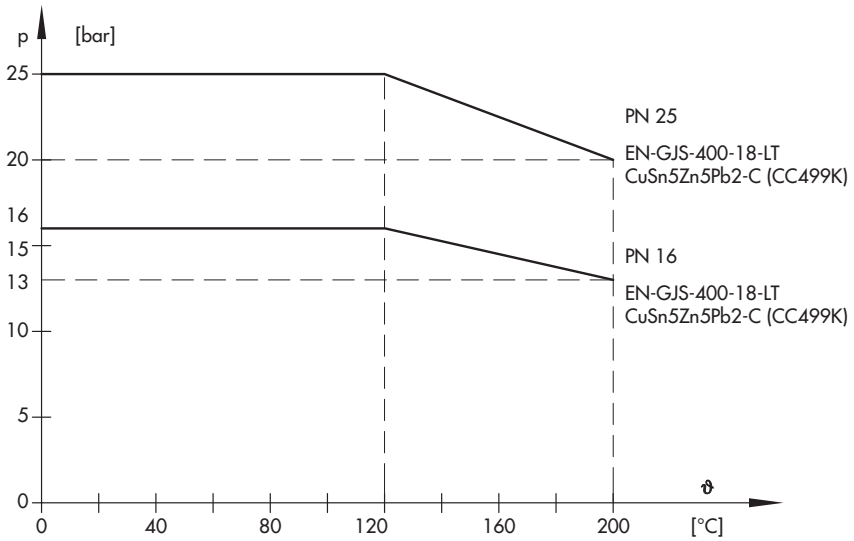


Fig. 3: *Pressure-temperature diagrams (DIN EN material number)*

Series 45, 46, 47 and 48 Self-operated Regulators

Differential pressure and flow regulators

Self-operated differential pressure and flow regulators are control devices whose measuring units draw their energy from the process medium which creates sufficient force to move the final control element (plug with plug stem). The released force moves the plug when the set point differs from the actual value.

The regulators are suitable for industrial, public and domestic applications, especially for district heating supply systems. They comply with AGFW (German District Heating Association) regulations.

- Low-maintenance proportional regulators requiring no auxiliary energy
- Red brass body
- Suitable for water and other liquids or gases, provided these do not cause corrosion.
- Single-seated valve with balanced plug
- Special version for mineral oils (other oils on request)
- Connection with welding ends, threaded ends or with flanges

Series 45

Differential pressure regulators

Type 45-1 · Type 45-2 · Installation in the flow pipe
Type 45-3 · Type 45-4 · Installation in the return flow pipe

- Differential pressure regulators with closing actuator
- Only one control line needs to be installed on mounting the regulator

Technical data

Types 45-1 · 45-2 · 45-3 45-4		**Data Sheet ▶ T 3124**
Valve size	CC499K EN-GJS-400-18-LT	DN 15 to 50 (male thread) DN 32 to 50 (flanged valve body)
Pressure rating		PN 16 and 25
Set point range	Types 45-1 and 45-3	0.1 · 0.2 · 0.3 · 0.4 and 0.5 bar (fixed set point)
	Types 45-2 and 45-4	0.1 to 4 bar (adjustable)
Temperature range	Liquids Gases	Up to 150 °C Up to 80 °C

Type 45-6 · Installation in the short-circuit or bypass line

- Differential pressure regulator with opening actuator
- No control line needs to be installed on mounting the regulator
- Exchangeable operating diaphragm

Technical data

Type 45-6		**Data Sheet ▶ T 3226**
Valve size	CC499K EN-GJS-400-18-LT	DN 15 to 50 (male thread) DN 32 to 50 (flanged valve body)
Pressure rating		PN 25
Set point range		0.1 to 4 bar (adjustable)
Temperature range	Liquids Gases	Up to 150 °C Up to 80 °C

Flow regulators

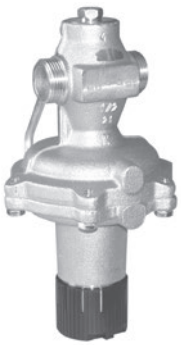
Type 45-9 · Installation in the flow or return flow pipe

- Flow regulator with closing actuator
- No control line needs to be installed on mounting the regulator
- Exchangeable operating diaphragm

Technical data

Type 45-9		**Data Sheet ▶ T 3128**
Valve size	CC499K EN-GJS-400-18-LT	DN 15 to 50 (male thread) DN 32 to 50 (flanged valve body)
Pressure rating		PN 16 and 25
Flow set point range with a differential pressure across the restriction of 0.2/0.3 bar		0.01 to 15 m³/h (adjustable)
Temperature range	Liquids Gases	Up to 150 °C Up to 80 °C

Types 45-3 Differential Pressure Regulator with closing actuator



Type 45-6 Differential Pressure Regulator with opening actuator

Type 45-9 Flow Regulator with closing actuator

Fig. 4: *Series 45 Regulators*

Series 45-/46- … N

The regulators are especially suitable for local heat supply networks and and large heating networks.

- Low-maintenance proportional regulators requiring no auxiliary energy
- Red brass body
- G ¾ B connecting threads on both sides
- Single-seated valve with soft-seated unbalanced plug
- Suitable for treated water and non-flammable gases

Differential pressure regulators

Type 45-1 N · Installation in the flow pipe
Type 45-3 N · Installation in the return flow pipe

- Differential pressure regulators with closing actuator
- Fixed set point

Technical data

Types 45-1 N · 45-3 N		**Data Sheet ▶ T 3140**
Valve size		DN 15
Pressure rating		PN 10
Set point range		0.15 or 0.3 bar (fixed set point)
Temperature range	Treated water	Up to 110 °C
	Non-flammable gases	Up to 80 °C

Differential pressure regulator with flow limitation

Type 46-5 N · Installation in the return flow pipe

- Differential pressure regulator with flow limitation with closing actuator

Technical data

Type 46-5 N		**Data Sheet ▶ T 3134**
Valve size		DN 15
Pressure rating		PN 10
Flow rate set point range for water with a differential pressure at the restriction of 0.2 bar		0.1 to 1.0 m³/h (adjustable)
Special version		0.12 to 0.5 m³/h (adjustable)
Differential pressure set point, optionally		0.2, 0.3 or 0.5 bar
Temperature range	Treated water	Up to 110 °C
	Non-flammable gases	Up to 80 °C

Type 45-1 N Differential Pressure Regulator

Type 45-3 N Differential Pressure Regulator

Type 46-5 N Differential Pressure Regulator with Flow Limitation

Fig. 5: *Type 45-1 N · Type 45-3 N · Type 46-5 N*

Series 46 and 47

Flow and differential pressure or pressure regulators

Type 46-7 · Installation in the return flow pipe
Type 47-1 · Installation in the flow pipe

- Closing actuator with two diaphragms for flow rate and differential pressure control
- Adjustable differential pressure set point

Type 47-5 · Installation in return flow pipe
Type 47-4 · Installation in the flow pipe

- Closing actuator with two diaphragms for flow rate and differential pressure or pressure control
- Fixed differential pressure set point

Technical data

Types 46-7 · 47-1 · 47-4 · 47-5		**Data Sheet ▶ T 3131**
Valve size	CC499K EN-GJS-400-18-LT	DN 15 to 50 (male thread) DN 32 to 50 (flanged valve body)
Pressure rating		PN 16 and 25
Differential pressure set point range	Types 47-4 and 47-5	0.2 · 0.3 · 0.4 and 0.5 bar (fixed set point)
	Types 46-7 and 47-1	0.1 to 2 bar (adjustable)
Flow set point range with a differential pressure at the restriction of 0.2 bar		0.01 to 15 m³/h
Temperature range	Liquids	Up to 150 °C
	Non-flammable gases	Up to 80 °C

Differential pressure regulators with flow limitation

Type 46-5 and Type 46-6 · Installation in the return flow pipe

- Differential pressure regulators with flow limitation with closing actuator
- Restriction for adjusting the flow rate limitation

Technical data

Types 46-5 · 46-6		**Data Sheet ▶ T 3130**
Valve size	CC499K EN-GJS-400-18-LT	DN 15 to 50 (male thread) DN 32 to 50 (flanged valve body)
Pressure rating		PN 16 and 25
Differential pressure set point range	Type 46-5	0.2 · 0.3 · 0.4 and 0.5 bar (fixed set point)
	Type 46-6	0.2 to 2 bar (adjustable)
Flow set point range with a differential pressure at the restriction of 0.1/0.2 bar		0.01 to 15 m³/h
Temperature range	Liquids	Up to 150 °C
	Non-flammable gases	Up to 80 °C

Type 46-5 Differential Pressure Regulator with Flow Limitation

Type 46-6 Differential Pressure Regulator with Flow Limitation

Type 46-7 Flow and Differential Pressure or Pressure Regulator

Type 47-1 Flow and Differential Pressure Regulator with manual adjuster (DN 15 to 32)

Fig. 6: *Series 46 and 47 Regulators*

Differential pressure, flow and temperature regulators

The regulators consist of:

- Valve
- Actuator
- Control thermostat with set point adjuster, capillary tube and temperature sensor

In versions with double adapter and locking, the valve is locked when the temperature rises above the limit adjusted at the second control thermostat.

In versions with safety temperature monitors (STM) and safety temperature limiters (STL), a safety thermostat closes the valve in the event of malfunction or when the temperature exceeds the limit. The valve of safety temperature limiters is additionally locked.

Flow and temperature regulator

Type 2469/2430 · Installation in the flow or return flow pipe

- Flow and temperature regulator with Type 2430 Control Thermostat for temperature set point adjustment
- Continuously adjustable flow set point using an integrated restriction

Differential pressure and temperature regulator with flow limitation

Type 2479/2430 · Installation in the return flow pipe

- Differential pressure regulator with flow limitation and temperature regulator with Type 2430 Control Thermostat for temperature set point adjustment
- Fixed differential pressure set point
- Continuously adjustable flow limitation

Flow and temperature regulator and safety temperature limiter

Type 2469/2430/2439 · Installation in the flow or return flow pipe

- Flow and temperature regulator with Type 2430 Control Thermostat for temperature set point adjustment
- Fixed differential pressure set point
- Continuously adjustable flow limitation
- Type 2439 Safety Thermostat closes and locks the valve when the pressure reaches the adjusted limit

Flow and temperature regulator and safety temperature monitor

Type 2469/2430/2403 · Installation in the flow or return flow pipe

- Flow and temperature regulator with Type 2430 Control Thermostat for temperature set point adjustment
- Fixed differential pressure set point
- Continuously adjustable flow limitation
- Type 2403 Safety Thermostat closes the valve when the pressure reaches the adjusted limit

Technical data

Types 2469/2430 · 2469/2430/2439 · Types 2469/2430/2403 · 2479/2430		**Data Sheet ▶ T 3132**
Valve size	CC499K EN-GJS-400-18-LT	DN 15 to 50 (male thread) DN 32 to 50 (flanged valve body)
Pressure rating		PN 25
Differential pressure set point range	Type 2479/…	0.2 bar (fixed set point)
Flow rate set point range	Type 2469/... with differential pressure across the restriction of 0.2 bar Type 2479/... with differential pressure across the restriction of 0.1/0.2 bar	0.01 to 15 m³/h
Temperature range	Liquids Non-flammable gases	Up to 150 °C Up to 80 °C

Fig. 7: *Type 2469/2430 Flow and Temperature Regulator*

Series 48

Pressure-independent control valve/combined self-operated regulator for flow rate with an additional electric actuator. The control accuracy is independent from the differential pressure across the valve. Combined self-operated regulator for flow rate and temperature with additional electric actuator.

The regulators consist of:

– A valve, diaphragm actuator and an electric actuator

Type 5825 and TROVIS 5725 Electric Actuators with fail-safe action as well as Type 5824, Type 5857 and TROVIS 5724, 5757 Electric Actuators without fail-safe action can be used.

Type 2489/… is additionally fitted with a Type 2430 Control Thermostat with set point adjuster, capillary tube and temperature sensor.

The largest signal is always used to control the regulator.

Pressure-independent control valve with electric actuator

Type 2488 N/5857 or 5757 · Installation in the flow or return flow pipe

- Flow rate set point adjustable
- Type 5857 or TROVIS 5757 Electric Actuator
- Type 45-9 as basic regulator

Technical data

Type 2488 N/5857		**Data Sheet ▶ T 3136**
Valve size		DN 15
Pressure rating		PN 10
Flow rate set point range Differential pressure at restriction: 0.2 bar		0.3 to 1.0 m³/h (adjustable)
Temperature range	Treated water	Up to 110 °C
	Non-flammable gases	Up to 80 °C

Pressure-independent control valve with electric actuator

Type 2488/… · Installation in the flow or return flow pipe

- Flow rate set point adjustable
- Type 5824, 5825, 5857 or TROVIS 5725, 5724, 5757 Electric Actuator
- Type 45-9 as basic regulator

Pressure-independent control valve with electric actuator and control thermostat

Type 2489/…/2430 · Installation in the flow or return flow pipe

- Flow rate set point adjustable
- Temperature control with Type 2430 Control Thermostat
- Type 5824, 5825, 5857 or TROVIS 5725, 5724, 5757 Electric Actuator
- Type 2469/2430 as basic regulator

Control equipment tested according to DIN EN 14597 is available.

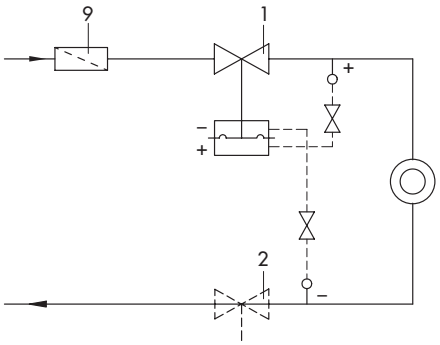
Technical data

Type 2488/… · 2489/…/2430		**Data Sheet ▶ T 3135**
Valve size	CC499K	DN 15 to 50 (male thread)
	EN-GJS-400-18-LT	DN 32 to 50 (flanged valve body)
Pressure rating		PN 16 and 25
Flow set point range with a differential pressure at the restriction of 0.2 bar		0.03 to 15 m³/h (adjustable)
Temperature set point ranges		0 to 150 °C
Temperature range	Treated water	Up to 150 °C
	Non-flammable gases	Up to 80 °C
TROVIS 5724 · 5725 · 5757 · Type 5824 · 5825 · 5857		**Data Sheet ▶ T 5724 · Data Sheet ▶ T 5724-8 Data Sheet ▶ T 5725-7 Data Sheet ▶ T 5757 · Data Sheet ▶ T 5757-7 Data Sheet ▶ T 5824 · Data Sheet ▶ T 5825 Data Sheet ▶ T 5857**
Permissible ambient temperature		0 to 50 °C
Supply voltage	TROVIS 57xx	230 V, 50 Hz
	Type 58xx	230 V, 50 Hz; 24 V, 50/60 Hz; 24 V DC
Fail-safe action	Without	TROVIS 5724 · 5757 · Type 5824 · 5857
	With	TROVIS 5725 · Type 5825

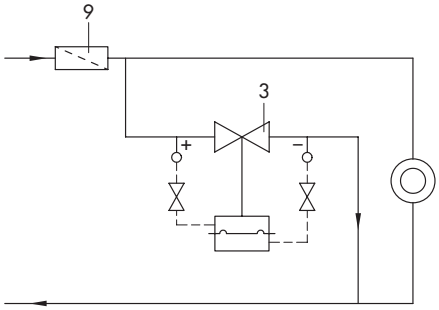
Type 2488 N/5857 Pressure-independent Control Valve with electric actuator

Type 2488/5824 Pressure-independent Control Valve with electric actuator

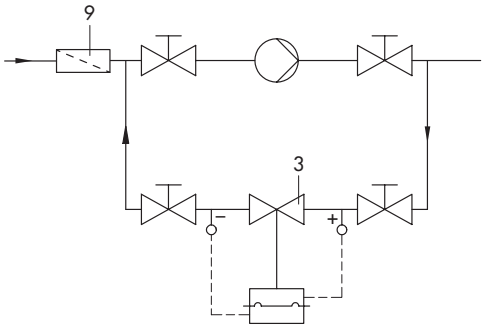
Fig. 8: *Series 48 Combined Self-operated Regulators with additional electric actuator*



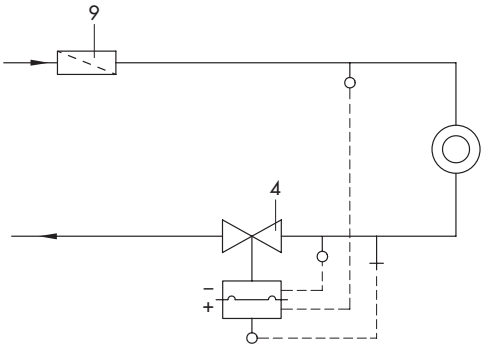
Differential pressure control in the flow or return flow pipe of a cooling system



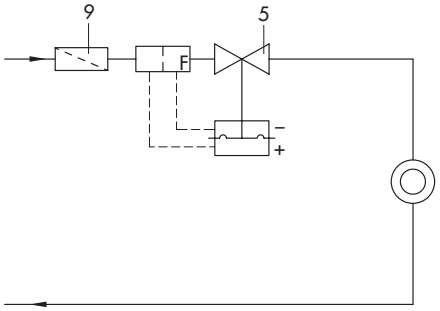
Differential pressure control in the bypass pipe of a heating or cooling system (not district heating)



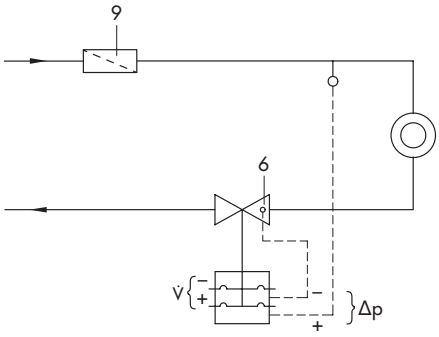
Differential pressure control in the bypass pipe of a rotary pump



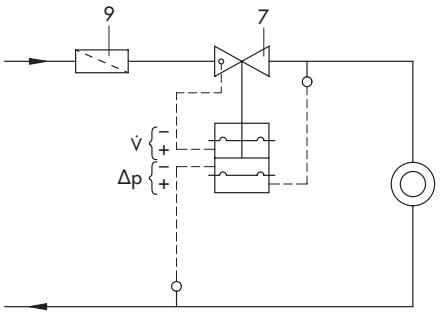
Differential pressure and temperature control



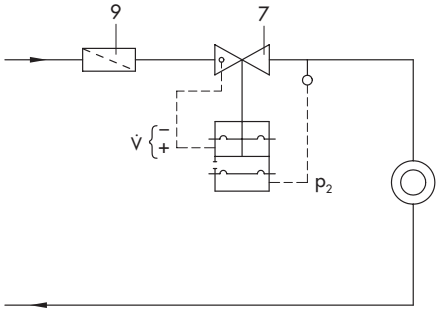
Flow control with external orifice



Combined flow rate and differential pressure control in the return flow pipe of a heating or cooling system



Combined flow rate and differential pressure control in the flow pipe of a heating or cooling system



Combined flow rate and pressure control

1 Type 45-1 · Type 45-2
2 Type 45-3 · Type 45-4
3 Type 45-6
4 Type 2469/2430
5 Type 45-1 · Type 45-2
6 Type 46-7 · Type 47-5
7 Type 47-1 · Type 47-4
9 SAMSON strainer

Fig. 9: *Sample applications*