

# SAMSON PRODUCT RANGE

PRODUCT CATALOG

# Products

Edition February 2019

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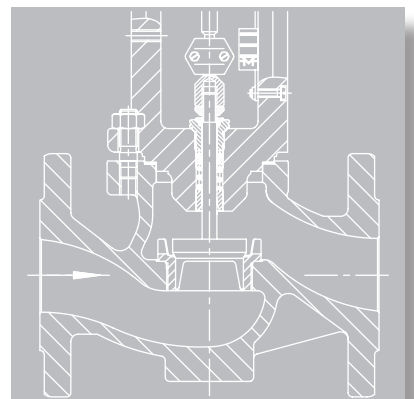
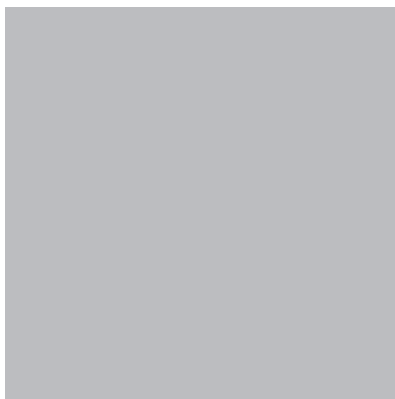
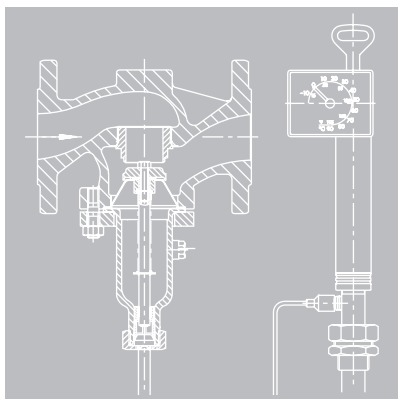
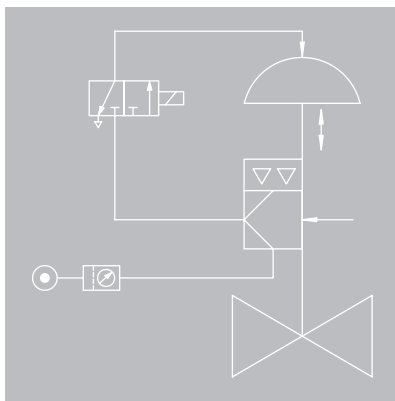
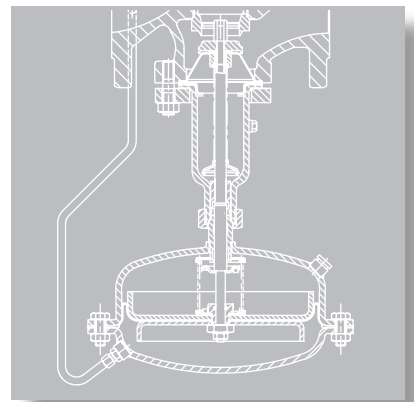
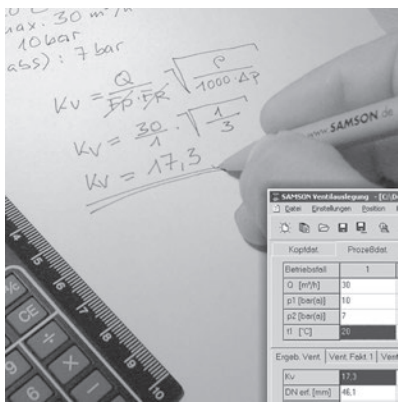
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# Technical Basics







## 1 SAMSON control valves

SAMSON Series 240, 250, 280 and 290 Control Valves include pneumatic and electric globe valves, three-way valves and angle valves. Their application range covers control tasks in process engineering and industrial applications as well as in supply and power plant engineering.

The modular system allows easy retrofitting and servicing.

The control valves consist of the valve and actuator. They can be equipped either with pneumatic, electric, electrohydraulic or hand-operated actuators.

For controlling purposes and travel indication, accessories, such as positioners, limit switches and solenoid valves, can either be attached directly or according to IEC 60534-6 (NAMUR rib) (see Information Sheet ► T 8350).

The valve bodies are available in cast iron, spheroidal graphite iron, cast steel, cast stainless steel, cold-resisting steel, forged steel or forged stainless steel as well as special alloys. All parts of the valve and the pneumatic actuator housing in the completely corrosion-resistant version are made of stainless steel. Refer to the associated data sheets for details.

### Series 240

Series 240 Control Valves are primarily used in the chemical industry. The valves are available as globe and three-way valves in valve sizes ranging from DN 15 to 300 (NPS ½ to 12) and up to a pressure rating of PN 40 (Class 300).

Standard versions of the valves are suitable for temperature ranges between -10 and +220 °C (15 and 430 °F). An insulating section allows the temperature range to be extended to -196 and +450 °C (ANSI: -325 and +840 °F).

The plug stem is sealed either by a self-adjusting PTFE V-ring packing or an adjustable packing. To meet stricter emissions control requirements, a stainless steel bellows is used. The Type 3241 Valve can be equipped with a heating jacket that may also include the bellows seal.

### Series 250

Series 250 Control Valves are used when large valve sizes and/or high pressures are involved in process engineering, power plant or supply engineering.

They are manufactured in valve sizes DN 15 to 500 (NPS ½ to 20) and pressure ratings of PN 16 to 400 (Class 150 to 2500). In addition to globe, three-way and angle valves, customized valve constructions can be engineered.

Standard versions of the valves are suitable for temperature ranges between -10 and +220 °C (15 and 430 °F). The temperature range can, however, be extended by using an adjustable high-temperature packing to a temperature range between -10 and +350 °C (15 and 660 °F) and by using a bellows seal or an insulating section to a temperature range between -196 and +550 °C (ANSI: -325 and +1022 °F).

Series 250 Valves can be equipped with a heating jacket.

### Series 280

Series 280 Steam-conditioning Valves are used to reduce both the steam pressure and steam temperature to optimize plant operation and heat efficiency in process plants, for example in refineries, food and beverage, tobacco or pulp and paper industries.

Steam-conditioning valves are based on Series 250 Valves fitted with a flow divider ST 3 and an additional cooling water connection.

Steam conditioning valves are available in valve sizes ranging from DN 50 to 500 (NPS 2 to 20), for pressure ratings of PN 16 to 160 (Class 150 to 900) and for temperatures up to 500 °C (930 °F).

### Series 290

Series 290 Control Valves are primarily used in the petrochemical industry and process engineering due to their maintenance-friendly properties. The seat is clamped into the valves to facilitate quick service.

Series 290 Valves are only available in ANSI versions in valve sizes NPS ½ to 8 and pressure ratings of Class 150 to 900. A bellows seal or insulating section allows the valves to be used in temperature ranges between -196 and +450 °C (-325 and +842 °F) depending on the material used.

Additional equipment includes flow dividers, heating jackets and balanced plugs. Furthermore, Series 290 Valves can be designed to meet NACE requirements for sour gas.

### Series V2001

The Series V2001 Valves are available as globe valves or as three-way valves for mixing or diverting service. They are manufactured in valve sizes DN 15 to 100 (NPS ½ to 4) and pressure ratings of PN 16 to 400 (Class 150 and 300). The standard versions of these valves are suitable for temperature ranges from -10 to +220 °C (14 to 430 °F). The use of an insulating section extends the temperature range to 300 °C (572 °F).

Series V2001 Valves are primarily designed for use in mechanical and plant engineering. A special attribute of the Type 3531 and Type 3535 Valves is their use in heat transfer applications using organic media (e.g. heat transfer oil). The Type 3321 and Type 3323 Valves are suitable for liquids, gases and steam up to 350 °C (660 °F).

The standard version can also be fitted with additional equipment, such as bellows seals, insulating sections and flow dividers.

### Valves for special applications

These valves are designed for special requirements. Such valves include cryogenic, diaphragm and micro-flow valves as well as valves for the food and pharmaceutical industries.

## 1.1 Valves

### 1.1.1 Valve body styles

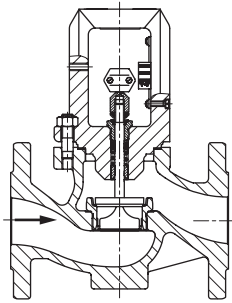
The valve body, valve bonnet and, in some cases, the bottom flange are subject to internal stress caused by the process medium flowing through the valve. Consequently, the valves must be designed to be sufficiently resistant to mechanical and chemical stress.

Under the influence of the operating temperature, the material strength changes. This behavior can be improved by combining certain alloys. For this reason, heat-resisting materials are used at high temperatures (e.g. according to DIN EN 10213) and cold-resisting materials are used for cryogenic service. The materials table on page 21 and the Information Sheet ► T 8000-2 provide a summary.

#### Globe valve

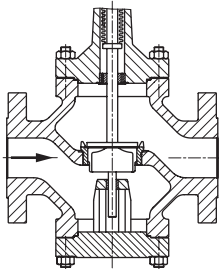
Globe valves allow easy installation in straight pipelines. For nominal pressures up to PN 40 and valve sizes up to DN 300, three-flanged bodies of the Series 240 are mainly used. The plug stem is guided in the valve bonnet and the V-port plug in the screwed-in seat.

The ports of the V-port plug are asymmetric in order to suppress any oscillations. Unguided parabolic plugs are used for small  $K_{VS}$  coefficients.



Type 3241 Globe Valve

To handle higher loads and when larger seat diameters are used, the Type 3254 Globe Valve (Series 250) is provided with an additional plug stem guide in the bottom flange.

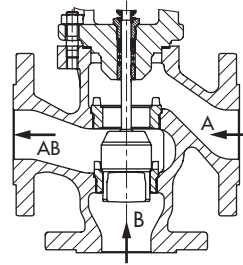


Additional plug stem guide in Type 3254

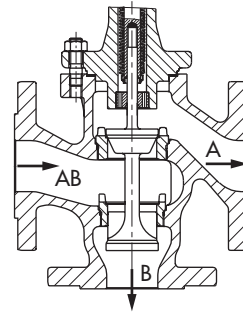
More details on globe valves in Data Sheets ► T 8015 and ► T 8060

#### Three-way valve

Three-way valves are used for mixing or flow-diverting service. The mode of operation depends on how the two plugs are arranged. The direction of flow is indicated by arrows.



Mixing service with Type 3244 Three-way Valve



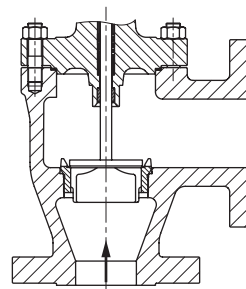
Flow-diverting service with Type 3244 Three-way Valve

More details on three-ways valves in Data Sheet ► T 8026.

#### Angle valve

Angle valves are ideally installed when a vertical pipeline and a horizontal pipeline need to be connected. The process medium is only diverted once. Angle valves allow the condensate to be optimally treated and are practically entirely self draining.

In case the process medium flows in the flow-to-close direction, wear in the valve outlet can be reduced by the use of an anti-wear sleeve.

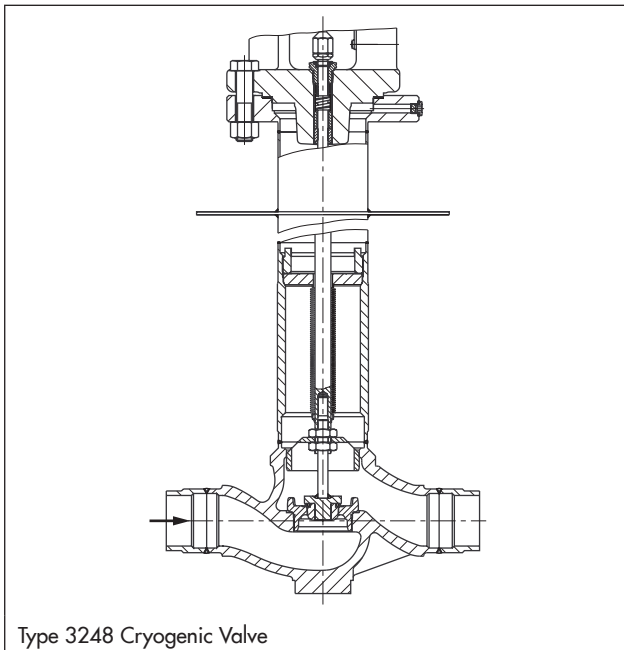


Type 3256 Angle Valve

More details on angle valves in Data Sheet ► T 8065

### Cryogenic valve

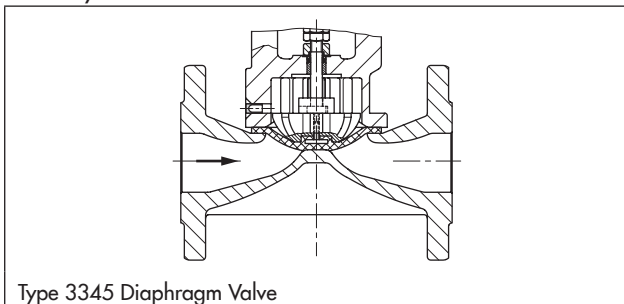
Plants that produce liquefied, cryogenic air separation gases, often use vacuum-insulated pipelines to prevent environmental heat being transferred to the medium. The valves can be integrated into the vacuum jacket using a connecting flange. The valve is designed to widely prevent thermal conduction to the effect that the stem remains free of ice. A bellows seal serves as the primary sealing. The jacketed pipeline is evacuated of air and sealed off after installation of the components. The cryogenic extension bonnet of the valve is often welded to the jacketed pipeline over a flange, meaning considerable work is involved to remove the valve from the pipeline. However, to make maintenance possible, the internal parts can be accessed through the cryogenic extension bonnet without having to remove the valve from the pipeline.



More details on cryogenic valves in Data Sheet ► T 8093

### Diaphragm valve

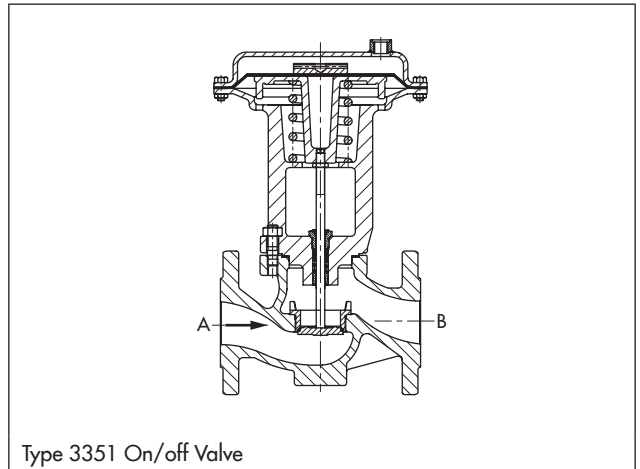
For viscous or corrosive media possibly containing solids, diaphragm valves that are free of dead space and without stuffing boxes are an economical solution. The diaphragm may be made of rubber, nitrile, butyl or PTFE. The valve body may additionally be lined with rubber or ETFE.



More details on diaphragm valves in Data Sheet ► T 8031

### On/off valves

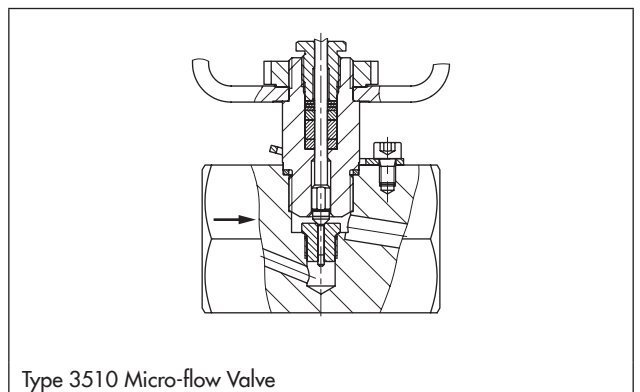
The valve for on/off service is used for tight shut-off of liquids, non-flammable gases and steam. As the valve plug is equipped with both a metal seal and a soft seal, the leakage class VI is achieved.



More details on on/off valves in Data Sheet ► T 8039

### Micro-flow valve

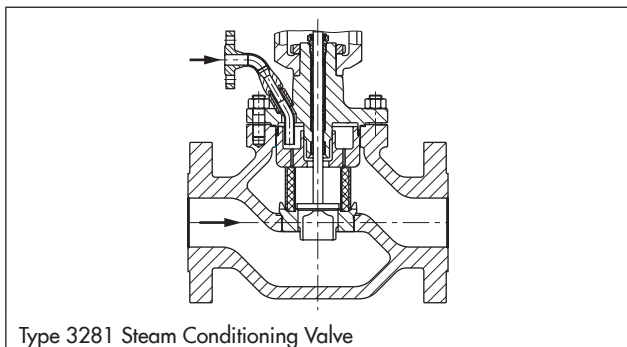
Micro-flow valves are used for very low flow rates ( $K_v$  coefficients  $<1.6$  to  $10^{-5}$  m<sup>3</sup>/h). The parts exposed to the process medium are made of stainless steel 1.4404. All valve parts are made of semi-finished products. As a result, special materials can be used in a particularly cost-effective manner and the valve covers a wide range of applications.



More details on micro-flow valves in Data Sheet ► T 8091

## Steam conditioning valve

Steam-conditioning valves are used to reduce the steam pressure and the steam temperature simultaneously. A connecting pipe supplies the cooling water to the flow divider ST 3. At its inner wall, the cooling water comes into contact with the steam flow. The steam flow and the entrained water are mixed in the narrow wire mesh of the flow divider. As the supplied cooling water does not come into contact with the valve body, neither erosion nor thermal shock occur. The flow divider ensures low-noise and low-vibration operation.



More details on steam-conditioning valves in Data Sheets

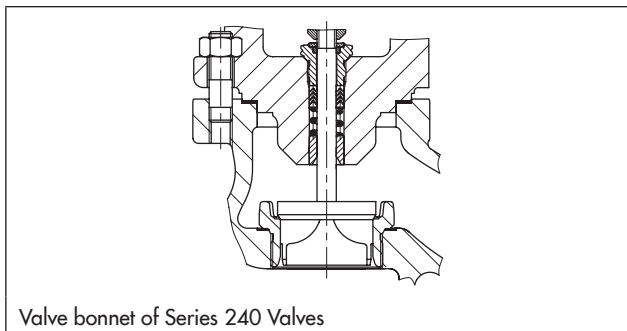
► T 8251 and ► T 8256

### 1.1.2 Valve bonnet

The valve bonnet seals off the valve at the top and accommodates the packing and the plug stem guide. The valve bonnet and the yoke of Series 240 Valves are incorporated in one piece. The valve bonnet and the yoke of Series 250 and 280 Valves are bolted together. The NAMUR rib standardized in IEC 60534-6 located on the yoke allows easy, standardized attachment of a positioner or other accessories. The valve bonnet is a pressurized part that is exposed to the process medium, therefore its material is subject to the same design requirements as the valve body.

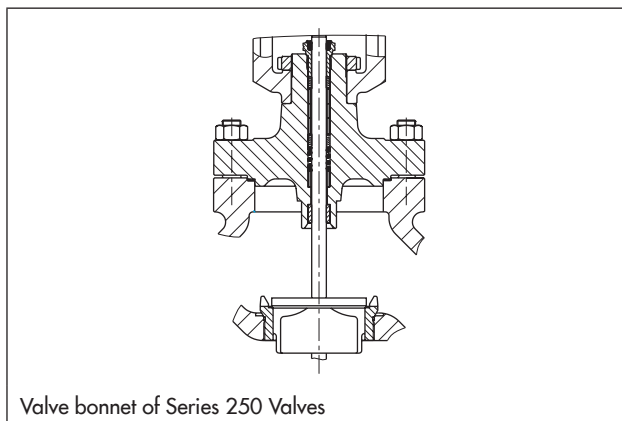
### Packing

The plug stem is sealed by the packing. The standard packing is used for standard versions, versions with bellows seal or insulating section or when the packing functions as a backup packing.



The temperature range of the standard packing is between  $-10$  and  $+220$  °C and can be extended by the use of an insulating section on the valve bonnet.

Other packings can be installed for special applications.



The packings meet the fugitive emission requirements according to VDI 2440 and, as a result, fulfill the requirements of TA Luft (German technical instructions on air quality control). SAMSON's ISO packings are tested based on EN ISO 15848 and comply with the external leakage rates depending on the temperature, load and pressure even in continuous operation. SAMSON issues corresponding manufacturer's declarations for the valve series and models.

### Packing forms

#### Standard packing form

Temperature range:  $-10$  to  $+220$  °C

Self-adjusting, spring-loaded V-ring packing made of PTFE-carbon for valve sizes DN 15 to 150. Self-adjusting PTFE compound and PTFE-silk packing for valve sizes DN 200 to 500.

Suitable for all applications that require a high level of sealing performance, yet requiring hardly any maintenance.

#### Form A

Adjustable, cavity-free PTFE-silk/PTFE-carbon packing. Especially suitable for process media that crystallize out or polymerize.

#### Form B

Adjustable, cavity-free PTFE-silk/pure PTFE packing. PTFE-silk for valve sizes DN 200 to 500.

Suitable for process media that crystallize out or polymerize and in cases where the carbon particles would contaminate the process medium.

#### Form C

Adjustable, cavity-free packing made of woven PTFE-silk. Application for all chemicals including hot acids and alkaline solutions.

#### Form D

Spring-loaded V-ring packing made of pure PTFE.

Suitable for pure process media where the carbon particles would contaminate the process medium.

### Form W

Adjustable, cavity-free packing made of PTFE-graphite thread and carbon for fresh and service water. The carbon bushings serve as wipers.

Especially suitable for hard water and any process media that may cause deposits to form on the plug stem.

### NACE standard

Spring-loaded V-ring packing made of PTFE-carbon according to NACE standard.

Suitable for sour gas or sour water.

### ADSEAL

Spring-loaded V-ring packing made of PTFE-carbon with ADSEAL emergency adjusting function.

### ZELETEC 4.000

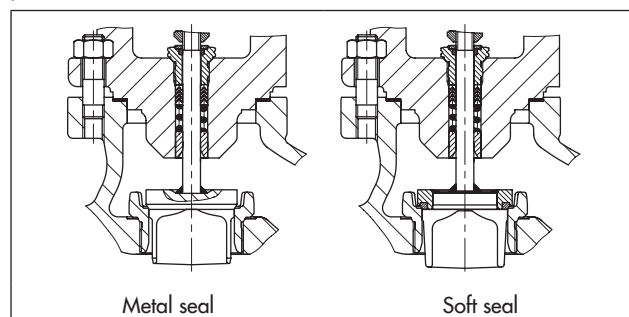
Self-adjusting, spring-loaded packing made of pure PTFE with intermediate FFKM V-rings for valve sizes DN 200 and larger. The ZELETEC (**Z**ero **L**eakage **T**echnology) packing is maintenance-free and is especially designed for valves that are difficult to access and must have a high level of sealing performance.

Packing versions for extended operating conditions available on request.

### 1.1.3 Seat and plug

The design of the seat and the plug determines the  $K_{VS}$  ( $C_V$ ) coefficient, characteristic and, seat leakage of a valve.

The drawings show seat-guided V-port plugs with asymmetric ports with metal seal and soft seal.



The seat, plug and plug stem are made of stainless steel. In some cases, the trims are subject to high stress due to high differential pressures, cavitation, flashing or in cases where the process media contains solids. In order to increase the service life, seats and metal-seated plugs can have a Stellite® facing and plugs up to DN 100 can be made of solid Stellite.

The seats are screwed into place, allowing them to be easily exchanged. They may also be made of other materials.

### Perforated plug

An optimized trim with perforated plug is available for Series 240 and 250 Valves. Perforated plugs are mainly used in severe service, e.g. in steam applications, two-phase medium flows, liquid media which vaporize on the outlet side (flashing valves) or emergency relief valves (blow-off valves) involving gas relief. In these applications, flow velocities lower than 0.3 Mach cannot usually be kept. The medium flows through the perforated plug, splitting up the jet stream into numerous smaller jets to ensure low-noise energy transfer to the surrounding medium.

More details on valves with perforated plugs in Data Sheet ► T 8086

### Clamped-in seat

Series 290 Valves are fitted with a clamped-in seat which has two major benefits: in comparison to screwed seats, it cannot become undone. Furthermore, the clamped-in seat can be quickly removed and reinstalled using standard tools. This facilitates maintenance which meets the requirements of the oil and gas industry. Most plants in this industry cannot be shut down for servicing, meaning easy-to-service components are required. Furthermore, these seats are suitable for use in the steam and condensate area.

More details on Series 290 in Data Sheets ► T 8072-1 and ► T 8074-1.

### Seat leakage

The seat leakage is determined according to IEC 60534, which specifies the maximum amount of the test process medium (gas or water) that may flow through the closed control valve under test conditions.

For special applications (e.g. using Type 3241-Gas) or with shut-off valves (Type 3351), a high leakage class can be achieved by using a high-performance metal seal or a soft seal for seat and plug.

### Plug seal and seat leakage rate

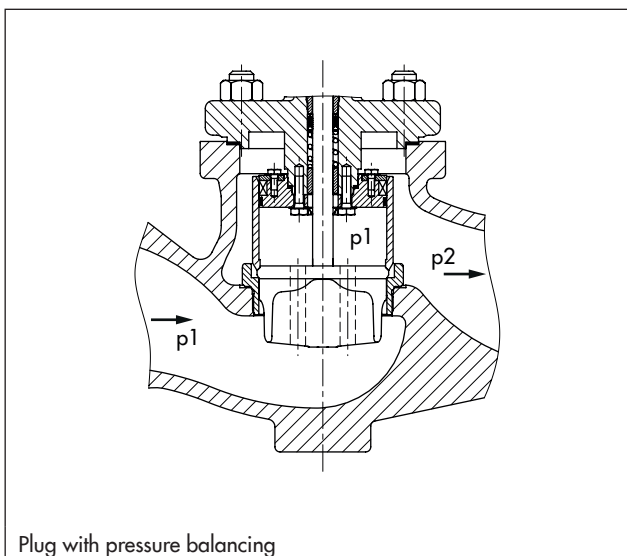
Seat-plug seal	Leakage class IEC 60534-4 ANSI/FCI 70-2	Seat leakage % of $K_{VS}$ ( $C_V$ )
Metal seal	IV	$\leq 0.01$
High-performance metal seal	V	See IEC 60534-4, table 3
Soft seal	VI	$0.3 \cdot \Delta p \cdot f_L^{1)}$
Pressure balancing with PTFE ring	V	See IEC 60534-4, table 3
Pressure balancing with graphite ring	IV	$\leq 0.01$

1) Leakage factor IEC 60534-4, section 5.5

## Pressure balancing

If the actuator thrust is not sufficient to handle the differential pressure, pressure-balanced plugs are a good solution. The plug is designed to function as a piston. The upstream pressure  $p_1$  is transferred to the back of the plug through a hole in the bottom of the plug. The forces acting on the plug are compensated for, with exception of the area around the plug stem.

Pressure-balanced plugs are additionally sealed with a PTFE ring or a graphite ring. The pressure-balanced components are subject to wear. As a result, the seat leakage rate (see table on page 13) and the amount of maintenance needed for these valves increase. Pressure-balanced plugs should not be used, if at all possible, for high-temperature process media or for media that contain solids or crystallize out. In these cases, we recommend to use a more powerful actuator.



Plug with pressure balancing

## Carbide or ceramic trims

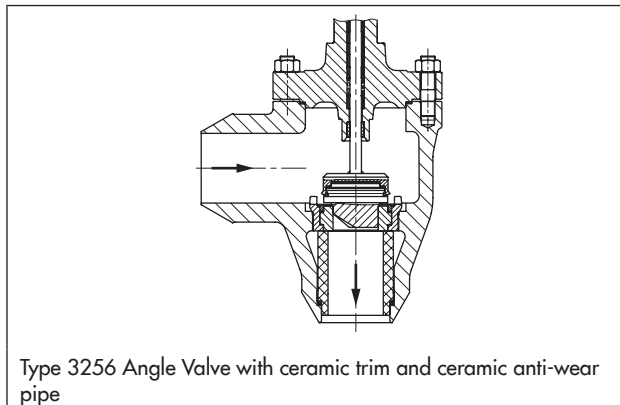
Control valves with extremely resistant carbide or ceramic trims are used when the valve body and trim are subject to considerable erosion and abrasion.

The following valves can be fitted with carbide or ceramic trims:

- Type 3251 Globe Valve
- Type 3256 Angle Valve

The Type 3256 Angle Valve can be fitted with a ceramic wear-resistant pipe. When the process medium flows in the flow-to-close (FTC) direction, this version is suitable for extreme erosive and abrasive conditions caused by process medium containing solids.

Details on ceramic materials and their properties are available on request.



Type 3256 Angle Valve with ceramic trim and ceramic anti-wear pipe

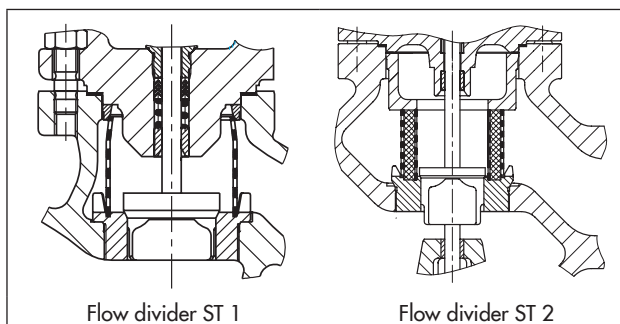
More details on ceramic trims in Data Sheet ► T 8071

## 1.1.4 Low-noise operation

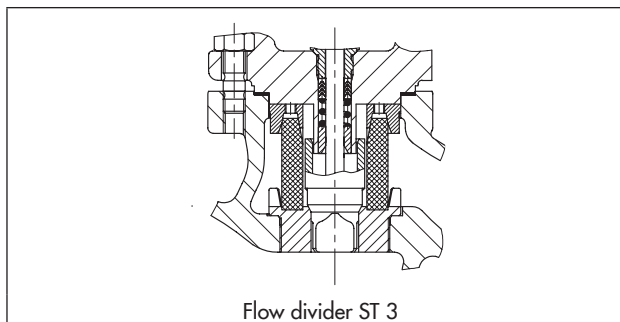
### Flow dividers

The flow dividers serve to reduce the noise emission of gases and vapors. The process medium reaches its maximum velocity after passing the restriction between seat and plug. Before it starts to create a noise-intensive, turbulent mixing zone, the process medium hits the inner wall of the flow divider. The flow is divided and a low-noise impulse exchange with the surrounding medium takes place.

The flow divider ST 1 has a single-ply perforated sheet steel and flow divider ST 2 a two-ply perforated sheet steel.



The flow divider ST 3 consists of a corrosion-resistant wire mesh, which can be additionally fitted with an internal and external perforated sheet steel for Series 250 Valves.



Flow divider ST 3

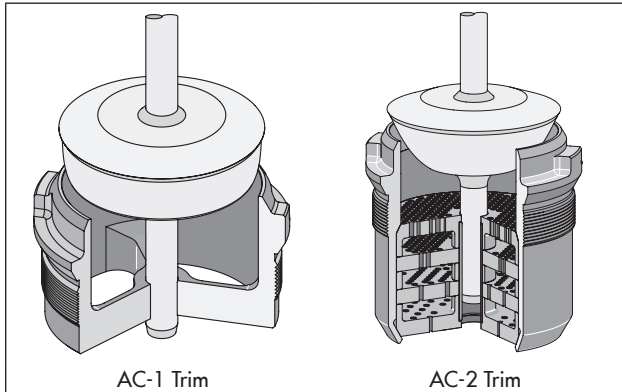
The valve-specific correction values for gases and vapors are required for noise calculation according to VDMA 24422, Edition 1989 and IEC 60534 when flow dividers are used. See the diagrams on page 20 for details.

The  $K_{VS}$  ( $C_V$ ) coefficient of the valve trim is reduced by the flow divider. The  $K_{VS}$  ( $C_V$ ) coefficients for the flow dividers ST 1, ST 2 and ST 3 are listed in the associated data sheet.

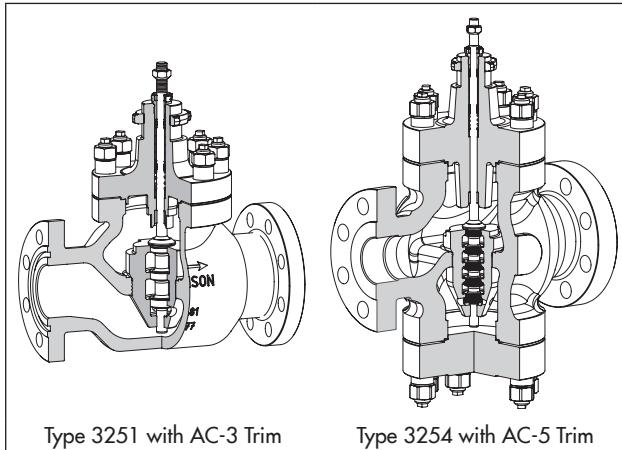
More details on flow dividers in Data Sheet ► T 8081

### AC trims

AC-1 and AC-2 Trims are optimized trims for low-noise pressure letdown of liquids at differential pressures up to 40 bar. The seat is raised and the parabolic plug is additionally guided in the seat. The AC-2 Trim additionally has up to four attenuation plates.



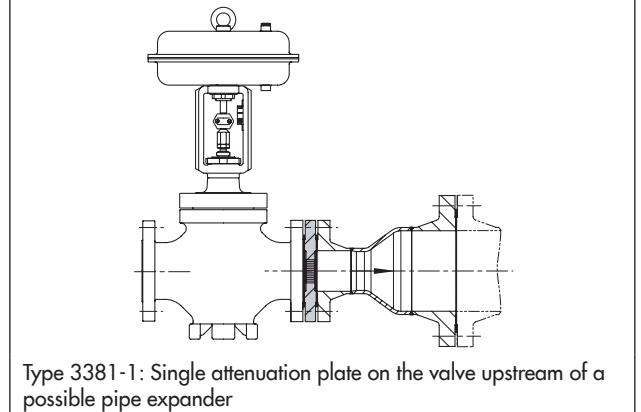
The three-staged AC-3 Trim is used for differential pressures up to 100 bar. Optionally, Stellite® facings or hardened trims are available. For differential pressures over 100 bar, the five-staged AC-5 Trim is available.



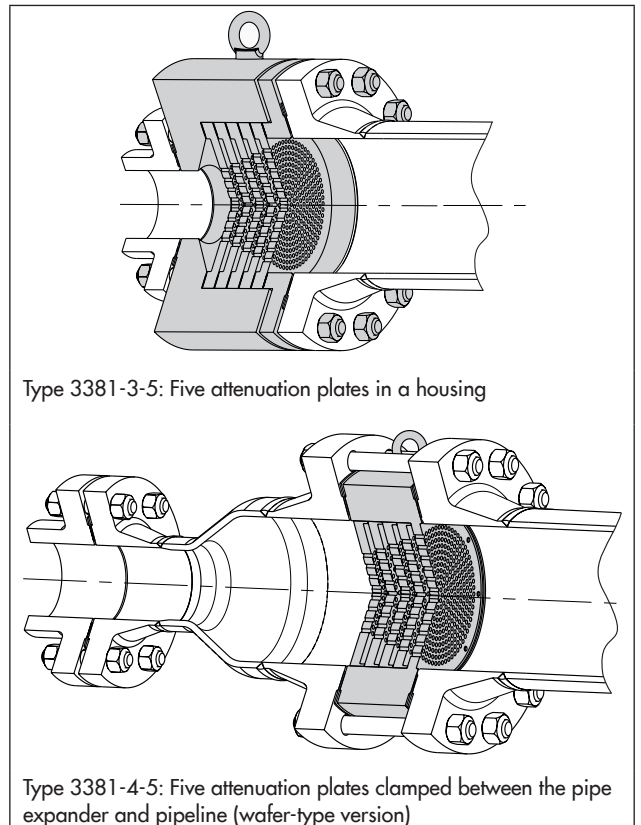
More details on AC trims in Data Sheets ► T 8082 and ► T 8083

### Silencers

The silencer acts as a fixed restrictor package that can be installed downstream of the valve with one to five attenuation plates for applications with gases or vapors. The silencer increases the backpressure downstream of the valve which leads to a reduction in the valve outlet velocity and sound pressure level. Additionally, the nominal outlet size can be extended. A pipe expander may be required depending on the version.



In Type 3381-3-X, two to five attenuation plates can be installed one after the other in a housing integrated into the pipe expander.



More details on silencers in Data Sheet ► T 8084



### 1.1.5 Additional components

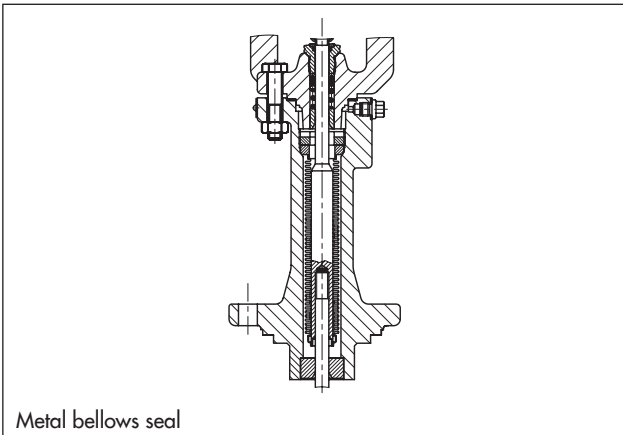
#### Metal bellows seal

In case very strict emission control requirements must be met, e.g. TA Luft or in vacuum applications, a metal bellows is used to seal the plug stem. The plug stem is additionally sealed with a packing at the top flange. This packing serves as a backup packing.

The metal bellows can be monitored for leakage or a sealing medium can be applied by means of a test connection.

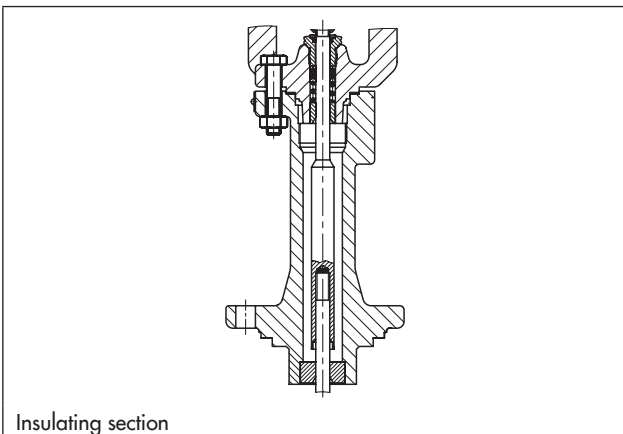
The bellows seal can be used for valves of Series 240 and 290 from  $-196$  to  $+450$  °C and Series 250 and 280 from  $-196$  to  $+550$  °C.

Higher temperatures for Series 250 and 280 on request



#### Insulating section

The application range of a standard packing can be extended to an operating temperature of less than  $-10$  °C or over  $+220$  °C by using an insulating section.



The temperature ranges of the various valves series are:

Series 240:  $-196$  to  $+450$  °C with long insulating section  
 $-50$  to  $+450$  °C with short insulating section

Series 250:  $-196$  to  $+550$  °C

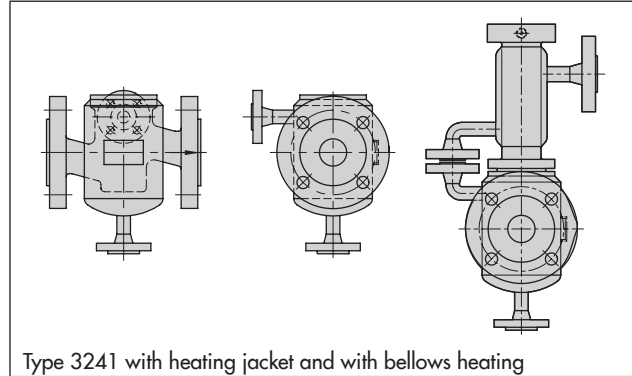
Series 280: Max.  $500$  °C

Series 290:  $-196$  to  $+450$  °C

The specified temperature ranges may be restricted by the materials used as specified in the pressure-temperature diagram (Information Sheet ▶ T 8000-2).

#### Heating jacket

Some process media only flow easily above a certain temperature. Below this temperature they start to solidify or crystallize out. The valve bodies are fitted with a heating jacket to ensure that the process medium remains at a certain temperature and can flow freely. The valve bonnet may also be equipped with a heating jacket when the plug stem is sealed by a bellows seal.



A heat transfer medium flowing between valve body and heating jacket ensures that the process medium is kept at a certain temperature. If steam is used as heating transfer medium, proper condensate discharge must be ensured.

Versions with heating of the connecting flanges or with heating of larger connecting flanges for the body are available on request.

### 1.1.6 Face-to-face dimensions

SAMSON valves with flanges have the same face-to-face dimensions as valves with welding ends.

#### Face-to-face dimensions according to DIN EN

PN	Globe valves Types 3241, 3251, 3254, 3281 and 3284
10 to 40	DIN EN 558, Series 1
63 to 100	DIN EN 558, Series 2
160	DIN EN 558, Series 2
250	DIN EN 558, Series 2
320	DIN EN 558, Series 2
400	Based on ASME B16.10 Class 2500, column 4
Angle valves Types 3256 and 3286	
10 to 40	DIN EN 558, Series 8
63 to 100	DIN EN 558, Series 9
160	DIN EN 558, Series 9
250	DIN EN 558, Series 93
320	DIN EN 558, Series 93
400	Based on ASME B16.10 Class 2500, column 6

#### Face-to-face dimensions according to ANSI

Class	Globe valves Types 3241, 3251, 3254, 3281 and 3291 <sup>1)</sup>
125/150	ANSI/ISA-75.08.01
250/300	ANSI/ISA-75.08.01
600	ANSI/ISA-75.08.01
900	ASME B16.10 Class 900, column 5
1500	ASME B16.10 Class 1500, column 5
2500	ASME B16.10 Class 2500, column 4
Angle valves Types 3256 and 3296 <sup>1)</sup>	
125/150	0.5 · ANSI/ISA-75.08.01
250/300	0.5 · ANSI/ISA-75.08.01
600	0.5 · ANSI/ISA-75.08.01
900	ASME B16.10 Class 900, column 7
1500	ASME B16.10 Class 1500, column 7
2500	ASME B16.10 Class 2500, column 6

<sup>1)</sup> Depending on the valve series, the pressure ratings are restricted as follows:  
Series 240: only up to Class 300  
Series 280 and 290: only up to Class 900

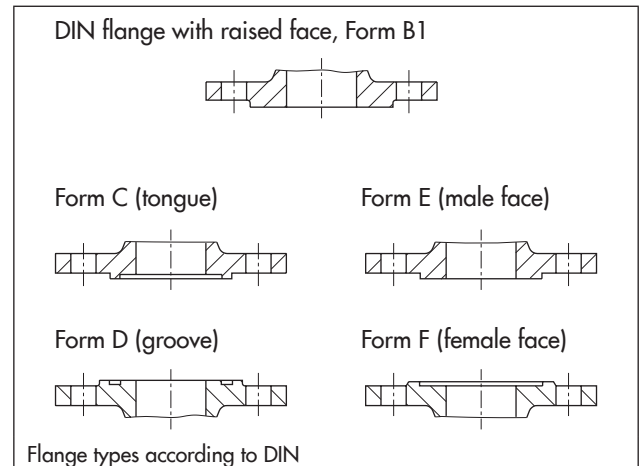
Versions with welding-neck ends are not standardized. Consult SAMSON first concerning their face-to-face dimensions.

### 1.1.7 Types of pipe connections

Flanged connections are most frequently used in industrial plants as they allow easy mounting and removal of valves and their milled facings provide excellent sealing reliability and quality.

A summary of flanges according to DIN EN standards, their connection dimensions and types of flange faces is provided in DIN EN 1092-1 for steel flanges and DIN EN 1092-2 for cast iron flanges.

The standard version of SAMSON valves has flanges with raised faces (Form B1). Other flange types are available on request.

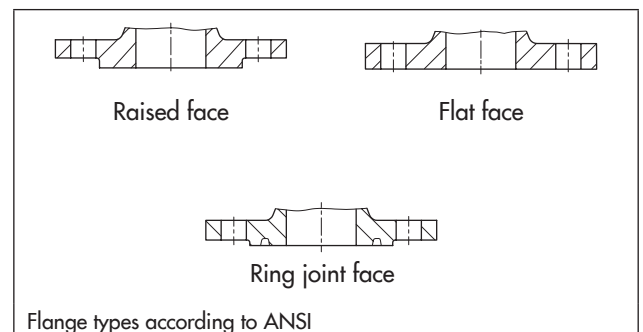


The US standard for cast iron flanges is ASME B16.1, ASME B16.42 for spheroidal graphite iron flanges and ASME B16.5 for steel flanges.

The standard version of cast iron valves with a pressure rating of Class 125 has flanges with flat faces.

Valves with a pressure rating of Class 300 have flanges with raised faces (0.06" height) and valves with higher pressure ratings have flanges with raised faces (0.25" height).

Other versions are available. Details available on request.



For critical process media and/or high pressure ratings, the valve bodies can be supplied with welding ends or welding-neck ends. For control valves according to DIN standards, the welding ends conform to DIN EN 12627. For control valves according to US standards, the welding ends are specified in ASME B16.25.

For installation methods according to US standards, valves of the Series 240 are available with NPT female thread in sizes 1/2" to 2".

## 1.2 Rotary valves

### Principle of operation

The actuator opens the closure member of a rotary valve from 0 to 270°. This causes the medium flow through the valve to be either throttled or shut off.

### Special features

Rotary valves have a more compact design than globe valves. Consequently, these valves are more cost-efficient in large valve sizes. Additionally, they have a higher flow capacities. The advantages and disadvantages as well as the fields of application depend on the rotary valve design.

### Designs

#### Butterfly valves

The shaft turns the butterfly disk used to shut off or to control the medium flow by up to 90°. The various butterfly valve designs, in particular the bearing design of the disk, allows the valves to be used for throttling or on/off service.

Butterfly valves in the wafer-type or lug-type design are cost-effective and use less material. They are primarily used for large valve sizes.

Butterfly valves are only suitable in applications where the pressure drop is relatively low. Higher differential pressures cause higher noise emissions and increase the load on the valve components. Possible countermeasures are restricted by the valve construction and space available in the valve.

#### Ball valves

Either a ball with a cylindrical passage or a segmented V-notch ball is used in ball valves to control the flow rate or shut off the process medium. The ball is located between two metal or PTFE seat rings. The ball can be rotated by 90° (quarter-turn ball valve). The seat rings press against the ball and the sharp edges of the hole through the ball help wipe off particles that stick to the ball and cut off any long fibers.

When the valve is open, the full pipe cross-section is released, which causes a negligible loss in pressure and allows its use in pigging systems.

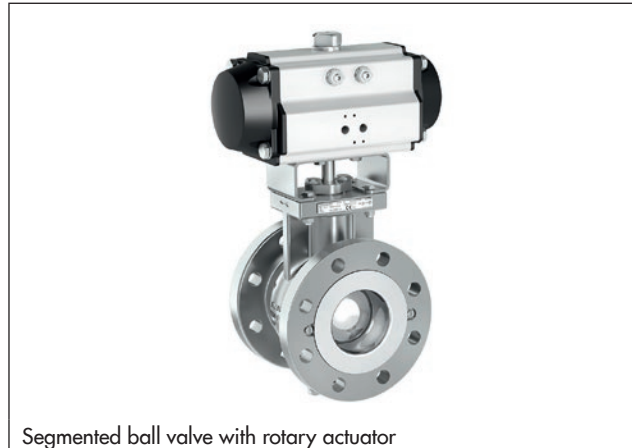
Careful machining of valve inside surfaces ensures that a gas-tight shut-off can be achieved even at high pressure drops. Due to the high friction torques and gas-tight shut-off, ball valves are mainly used in on/off service.

There are two types of ball valves: floating and trunnion-mounted ball valves. The ball of the trunnion-mounted ball valve is mounted on both sides, resulting in less friction torque which means smaller actuators can be used. Additionally, higher torques can be transferred which allows higher differential pressures to be controlled. However, mounting the ball on both sides makes the construction more complicated.

### Segmented ball valves

The design of the segmented ball valve is based on the trunnion-mounted ball valve. In place of a solid ball, a segmented ball with either a linear or equal percentage characteristic is used. To reduce the wear on the body when controlling abrasive media, the direction of flow can be reversed. Special alloys can also be used on request. The segmented ball is sealed by a spring-loaded seat.

Segmented ball valves are characterized by low friction torque, high flow coefficients and a closure member with its own characteristic. As a result, they are often used for throttling service where the pressure drop is low in the open position.



Segmented ball valve with rotary actuator

### Tank bottom valves

In tank bottom valves, the ball with its cylindrical bore rotates around the center axis. The rotary angle of the ball determines the flow rate across the free area between the body and the ball channel. PTFE-lined tank bottom valves are mainly suited for corrosive media.

In the standard version, these ball valves have a shaft which is located at an angle away from the tank. This allows the optimal position of the actuator to the tank.



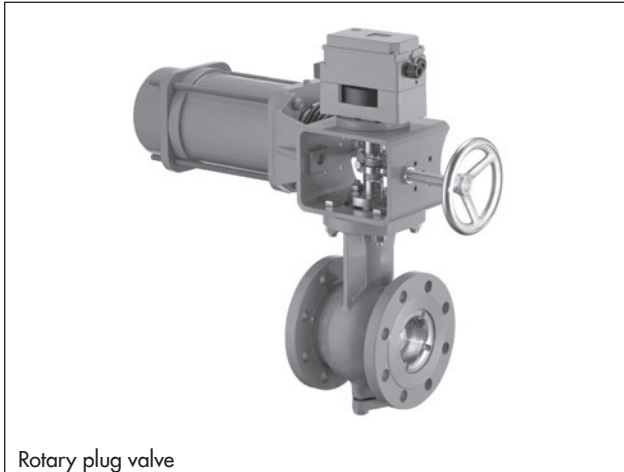
Tank bottom valve

### Rotary plug valves

A double offset is created in rotary plug valves: the center line of the shaft and plug (first offset) and the pivot of the plug (second offset). This double offset causes the plug to be immediately lifted out of the seat resulting in no friction or initial breakaway torque when the shaft turns from the closed to open position. The valve shows a stable control response even at small opening angles.

The flow coefficient can be reduced by a smaller seat diameter. As a result, throttling service is possible when the valve is open even with medium differential pressures.

Rotary plug valves are mainly used for throttling service, especially for media containing solids.



Rotary plug valve

## 1.3 Valve-specific parameters

### $K_{VS}$ or $C_V$ coefficient

The  $K_V$  ( $C_V$ ) coefficient is calculated according to IEC 60534 from the specified operating data.

The  $K_{VS}$  ( $C_V$ ) coefficient is specified in the data sheets to identify the valves. It corresponds to the  $K_V$  coefficient at the rated travel  $H_{100}$ . In order to increase control accuracy and with regard to manufacturing tolerances, the selected  $K_{VS}$  ( $C_V$ ) coefficient must be higher than the  $K_V$  coefficient.

### Rangeability

The rangeability is the quotient of  $K_{VS}/K_{VR}$ .  $K_{VR}$  being the smallest  $K_V$  where the characteristic still lies within the permissible gradient tolerance of the characteristic (IEC 60534-2-4). See Information Sheet ► T 8000-3.

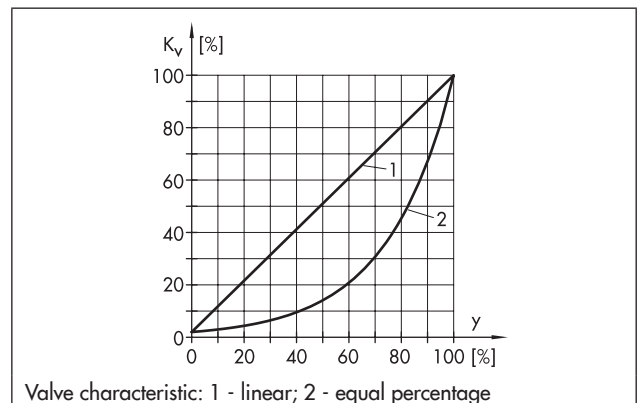
### Inherent characteristic

The characteristic shows the relationship between the  $K_V$  flow coefficient and the travel ( $H$ ).

Valves are either designed with an equal percentage or with a linear characteristic.

The equal percentage characteristic can be identified by equal increments of travel that yield equal percentage increments of the  $K_V$  flow coefficient.

Whereas, in a linear characteristic, equal increments of travel yield equal increments of the  $K_V$  flow coefficient.



### 1.3.1 Calculation of noise emission

#### Gases and vapors

The noise emitted by gases in single-stage and multi-stage valves is determined according to IEC 60534-8-3. This calculation method, however, does not apply to valves containing noise-reducing elements, such as flow dividers ST 1 to ST 3. In this case, calculation is performed according to VDMA 24422, Edition 1989.

The calculation is based upon the jet power reached on expansion. The noise emission is determined by means of an acoustical conversion coefficient  $\eta_G$ .

Diagram 1 illustrates the difference between the conversion coefficients  $\eta_G$  depending on the differential pressure ratio. Assuming a differential pressure ratio of  $x = 0.5$ , the difference in sound pressure level is  $-20$  dB between a valve without flow divider and a valve with a flow divider ST 3. The sound pressure level can be reduced considerably by the use of flow dividers.

#### Liquids

The noise emissions produced by valves used in throttling service of liquids are calculated according to IEC 60534-8-4. This calculation is consistent with the calculation according to VDMA 24422, Edition 1989. It is based on the jet power reached in the valve and also on the valve-specific acoustical conversion coefficient  $\eta_F$  empirically determined according to VDMA 24423 for turbulent flows as well as the valve-specific pressure ratio  $x_{Fz}$  for incipient cavitation.

The sound power level and the sound pressure level difference at a distance of 1 m for the valves with different  $x_{Fz}$  values can be seen in the diagram 2.

For a pressure ratio of  $x_F = 0.5$  and a valve with  $x_{Fz} = 0.6$ , the sound pressure level is 20 dB less than that of a valve with  $x_{Fz} = 0.3$ .

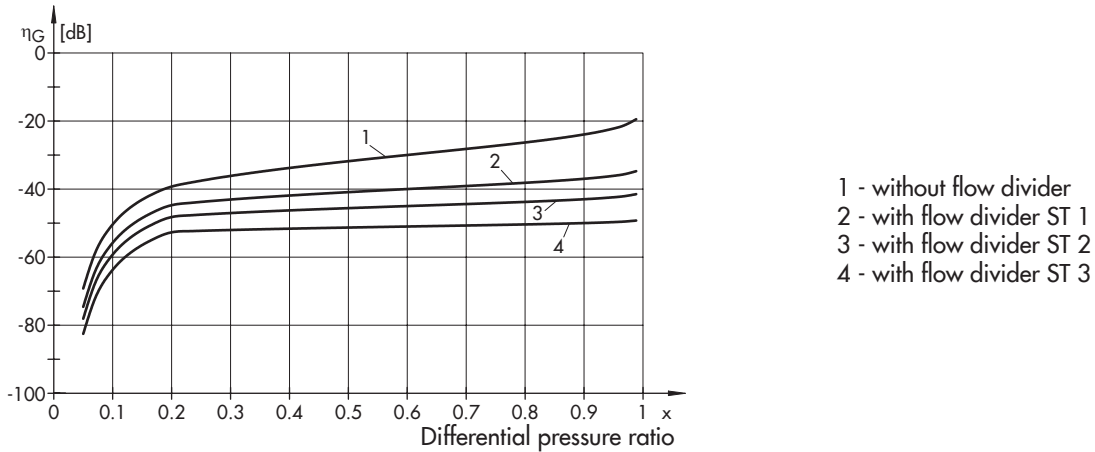


Diagram 1: Noise reduction with gases depending on the differential pressure using flow dividers

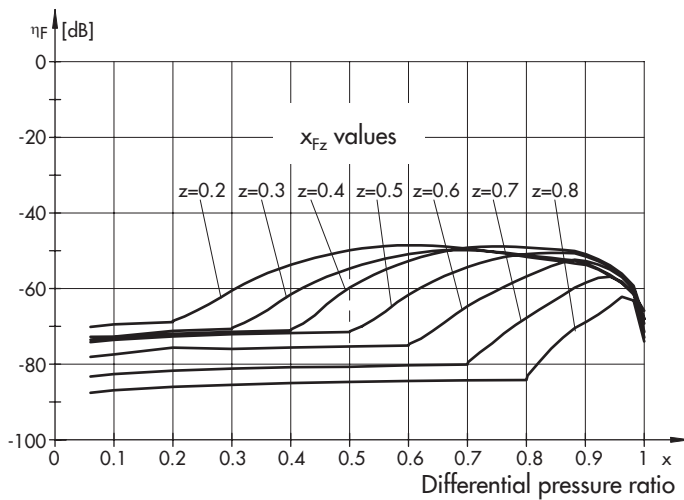


Diagram 2: Noise reduction with liquids depending on the differential pressure using flow dividers

### 1.3.2 Materials according to DIN and ANSI/ASME

The body materials mainly used and their temperature ranges are listed in the table below.

The associated pressure-temperature diagrams in Part 2 of this Information Sheet (► T 8000-2) include the materials' limits of application.

Temperature in °C	-200	-150	-100	-50	0	+50	+100	+150	+200	+250	+300	+350	+400	+450	+500	+550	+600	
<b>Body materials</b>																		
Cast iron	EN-JL1040																	
	A 126 B																	
Spheroidal graphite iron	EN-JS1049																	
Cast steel	1.0619																	
	1.5638																	
	1.6220																	
	1.7357																	
	1.7379																	
	A216 WCC																	
	A217 WC6																	
	A217 WC9																	
	A352 LCC																	
	A352 LC3																	
	Cast stainless steel	1.4408																
1.4581																		
1.4308																		
A351 CF8M																		
A351 CF8																		
Forged steel	1.0460																	
Forged stainless steel	1.4404																	
	1.4571																	
	A 316 L																	
<b>Seat-plug seal</b>																		
Metal Leakage class IV																		
Metal Leakage class V																		
Soft Leakage class VI																		
<b>Pressure balancing</b>																		
PTFE																		
Graphite																		
Cryogenic																		
<b>Bonnet</b>																		
Standard																		
Short insulating section																		
Long insulating section																		
Short bellows seal																		
Long bellows seal																		

### 1.3.3 Selection and ordering

#### Selection and sizing of the control valve

1. Calculate the required  $K_V$  ( $C_V$ ) coefficient according to IEC 60534. You may use, for example the SAMSON valve sizing software. This sizing usually is carried out by SAMSON. If real operating data are used for the calculation, the following generally applies:  $K_{V_{max}} = 0.7$  to  $0.8 \times K_{VS}$ .
2. Select the  $K_{VS}$  coefficient and the nominal size DN according to the table in the corresponding data sheet.
3. Select the appropriate valve characteristic on the basis of the behavior of the controlled system.
4. Determine the permissible differential pressure  $\Delta p$  and select a suitable actuator using the differential pressure tables included in the associated data sheet.
5. Select the materials to be used with regard to corrosion, erosion, pressure and temperature using the materials tables and the associated pressure-temperature diagram.
6. Select the additional equipment, such as positioner and/or limit switch.

#### Ordering data

Order specifications:

Valve model	... <sup>1)</sup>
Valve size DN	... <sup>1)</sup>
Pressure rating PN	... <sup>1)</sup>
Body material	... <sup>1)</sup>
Type of connection	Flanges/welding ends/welding-neck ends
Plug <sup>1)</sup>	Standard, balanced, metal seal, soft seal, high-performance metal seal Hard facing, if required
Characteristic	Equal percentage or linear
Pneumatic actuator	Versions according to ▶ T 8310-1, ▶ T 8310-2, ▶ T 8310-3 and ▶ T 8310-8
Fail-safe position	Fail-open or fail-close
Transit time	Specifications only for special stroking speed requirements
Process medium	Density in $\text{kg}/\text{m}^3$ in standard or operating state
Pressure	$p_1$ in bar (absolute pressure $p_{abs}$ ) $p_2$ in bar (absolute pressure $p_{abs}$ ) with minimum, normal and maximum flow rate
Valve accessories	Positioner and/or limit switch, position transmitter, solenoid valve, pneumatic lock-up valve, volume booster, supply pressure regulator

<sup>1)</sup> When no specifications are made, we provide possible specifications

### 1.3.4 Specification sheet for control valves

		Specification sheet for control valves according to IEC 60534-7			
		<input checked="" type="checkbox"/> - Details that must be specified to select and size the valve			
	1	Installation site			
	2	Control task			
	7	Pipeline	DN <input type="text"/>	PN <input type="text"/>	NPS <input type="text"/> Class <input type="text"/>
	8	Pipe material			
	12	Process medium			
	13	State at the valve inlet	<input type="checkbox"/> Liquid	<input type="checkbox"/> Vapor	<input type="checkbox"/> Gas
	15		Min.	Usual	Max.
	16	Flow rate	<input type="text"/>	<input type="text"/>	<input type="text"/>
	17	Input pressure $p_1$	<input type="text"/>	<input type="text"/>	<input type="text"/>
	18	Output pressure $p_2$	<input type="text"/>	<input type="text"/>	<input type="text"/>
	19	Temperature $T_1$	<input type="text"/>	<input type="text"/>	<input type="text"/>
	20	Input density $\rho_1$ or M	<input type="text"/>	<input type="text"/>	<input type="text"/>
	21	Vapor pressure $P_v$	<input type="text"/>	<input type="text"/>	<input type="text"/>
	22	Critical pressure $P_c$	<input type="text"/>	<input type="text"/>	<input type="text"/>
	23	Kinematic viscosity $\nu$	<input type="text"/>	<input type="text"/>	<input type="text"/>
	31	Calculation of max. flow coefficient $K_v$ ( $C_v$ )			
	32	Calculation of min. flow coefficient $K_v$ ( $C_v$ )			
	33	Selected flow coefficient $K_{vs}$ or $C_v$			
	34	Calculated sound pressure level	<input type="text"/> dB(A)		
	35	Type ... Valve			
	36	Style			
	38	Pressure rating	PN <input type="text"/>	Class <input type="text"/>	
	39	Valve size	DN <input type="text"/>	NPS <input type="text"/>	
	40	Type of end connections	<input type="checkbox"/> Flanges	<input type="checkbox"/> Welding ends	<input type="checkbox"/> Welding-neck end <input type="checkbox"/> DIN/ <input type="checkbox"/> ANSI
	43	Type of bonnet	<input type="checkbox"/> Normal	<input type="checkbox"/> Insulating section	<input type="checkbox"/> Bellows seal <input type="checkbox"/> Heating jacket
	45	Body/bonnet material			
	47	Characteristic	<input type="checkbox"/> Linear	<input type="checkbox"/> Equal percentage	
	48	Plug/stem material			
	49	Bushing/seat material			
	52	Hard facing	<input type="checkbox"/> None	<input type="checkbox"/> Stellite® facing	<input type="checkbox"/> Completely of Stellite® <input type="checkbox"/> Hardened
	54	Leakage class	<input type="checkbox"/> % $K_{vs}$	Class <input type="text"/>	
	55	Packing material	<input type="checkbox"/> Standard	Form <input type="text"/>	
	57	Actuator type	<input type="checkbox"/> Pneumatic		
	60	Actuator area	<input type="text"/> cm <sup>2</sup>		
	62	Supply pressure	Min. <input type="text"/>	Max. <input type="text"/>	
	63	Signal pressure range			
	64	Fail-safe action	<input type="checkbox"/> Fail-close	<input type="checkbox"/> Fail-open	<input type="checkbox"/> Fail in place
	66	Other actuator types	<input type="checkbox"/> Electric	<input type="checkbox"/> Electrohydraulic	<input type="checkbox"/> Hand-operated
	67	Fail-safe position for three-way valves			
	68	Additional manual override	<input type="checkbox"/> No	<input type="checkbox"/> Yes	
	70	Positioner type			
	71	Input signal	<input type="checkbox"/> Pneumatic	<input type="checkbox"/> Electric	
	72	Control valve OPEN at	<input type="text"/> bar	<input type="text"/> mA	
	73	Control valve CLOSED at	<input type="text"/> bar	<input type="text"/> mA	
	76	Air connection, max.	<input type="text"/> bar		
	78	Explosion protection	<input type="checkbox"/> Ex i	<input type="checkbox"/> Ex d	
	80	Type ... Limit Switch			
	81	Limit switches	<input type="checkbox"/> Electric	<input type="checkbox"/> Inductive	<input type="checkbox"/> Pneumatic
	82	Switching position	<input type="checkbox"/> Closed	<input type="checkbox"/> % travel	<input type="checkbox"/> Open
	83	Switching function	<input type="checkbox"/> Closing	<input type="checkbox"/> Opening	
	84	Explosion protection	<input type="checkbox"/> Ex i	<input type="checkbox"/> Ex d	



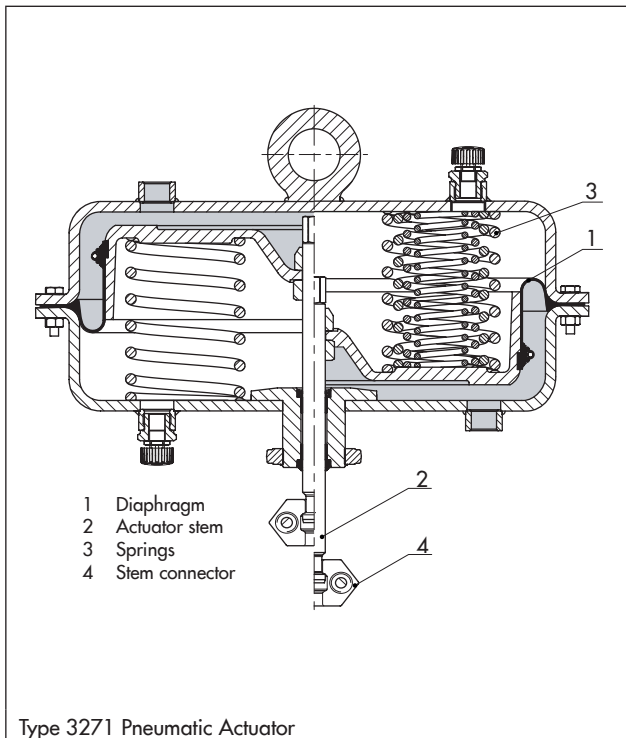
## 1.4 Actuators

Actuators convert the control signal from, for example a positioner into a travel motion carried out by the valve (plug stem with valve plug).

Pneumatic, electric and electrohydraulic actuators as well as hand-operated actuators are available (see Information Sheet ► T 8300).

### Pneumatic actuators

Pneumatic actuators are used for pneumatic or electropneumatic instrumentation. The pneumatic actuators are diaphragm actuators with a rolling diaphragm and internally fitted springs. The benefits of pneumatic actuators include their low overall height, powerful thrust and stroking speed.



Different signal pressure ranges are available. Pneumatic actuators are suitable for use in hazardous areas and feature fail-safe action (upon air supply failure, the control valve is either closed or opened).

The Type 3277 Pneumatic Actuators allow direct attachment of positioners or limit switches. The travel linkage is protected as it is located within the yoke below the diaphragm cases.

Pneumatic actuators can additionally be equipped with a handwheel (► T 8310-1 and ► T 8312).

### Electric actuators

The benefits of electric actuators include their powerful thrust and large travel. Furthermore, a series of modules can also be added to these actuators, permitting them to be adapted to the specific control task.

The actuators are available in versions for three-step control, with integrated digital positioner or as electric actuator with process controller. The electric actuators with process controller come with a digital controller and are suitable for diverse control tasks.

### Electrohydraulic actuators

Electrohydraulic actuators are connected to an analog signal over three-step controllers or electric positioners. Versions with fail-safe action are available (► T 8340).

### Hand-operated actuators

These actuators are mounted onto Series 240 and 250 Valves, which are used as hand-operated control valves with 15 or 30 mm rated travels (► T 8312). Hand-operated actuators for larger travels are available on request (Type 3273-5/-6).

## 2 Valve accessories

### 2.1 Positioners

#### Principle of operation

Positioners ensure a predetermined assignment of the valve position (controlled variable  $x$ ) to the input signal (reference variable  $w$ ). They compare the control signal issued by pneumatic or electric automation equipment (controller, control station, process control system) to the position or opening angle of the control valve and supply a corresponding output signal pressure ( $p_{st}$ , output variable  $y$ ). Positioners are often used as servo-booster as they convert low-energy signals into strong proportional signal pressures up to the maximum supply pressure (6 bar/90 psi). They can be used in standard and split-range operation.

#### Pneumatic and electropneumatic positioners

Depending on the input signal, a distinction is made between pneumatic (p/p) and electropneumatic (i/p) positioners:

- **Pneumatic (p/p) positioners:**  
Pneumatic positioners accept an input signal of 0.2 to 1 bar (3 to 15 psi) and issue an output signal pressure ( $p_{st}$ ) of maximum 6 bar (90 psi).
- **Electropneumatic (i/p) positioners:**  
Electropneumatic positioners use an analog DC signal of 0/4 to 20 mA or 1 to 5 mA as the input variable and issue an output signal pressure ( $p_{st}$ ) up to 6 bar (90 psi).

#### Digital positioners

SAMSON digital positioners are single-acting or double-acting positioners for attachment to pneumatic linear or rotary actuators.

Due to their digital signal processing technology, these positioners have the following advantages over conventional positioners:

- Simple operation
- LCD with rotatable reading direction
- Automatic zero and span calibration during initialization (except for Type 3730-0)
- Automatic detection of faults in the actuator
- Direction of action independent of mounting position
- Continuous zero monitoring
- Low air consumption
- All parameters saved in non-volatile EEPROM

Digital positioners can be fitted with additional functions:

- Inductive limit switches
- Solenoid valve
- Position transmitter
- External position sensor
- Analog input
- Binary input/binary output
- Forced venting
- Leakage sensor

### 2.2 Limit switches

Limit switches issue a signal when an adjusted limit is exceeded or not reached. This signal is suitable for initiating visual or audible alarms as well as actuating valves or other switching units. Moreover, the limit switches can be connected to central control or alarm systems.

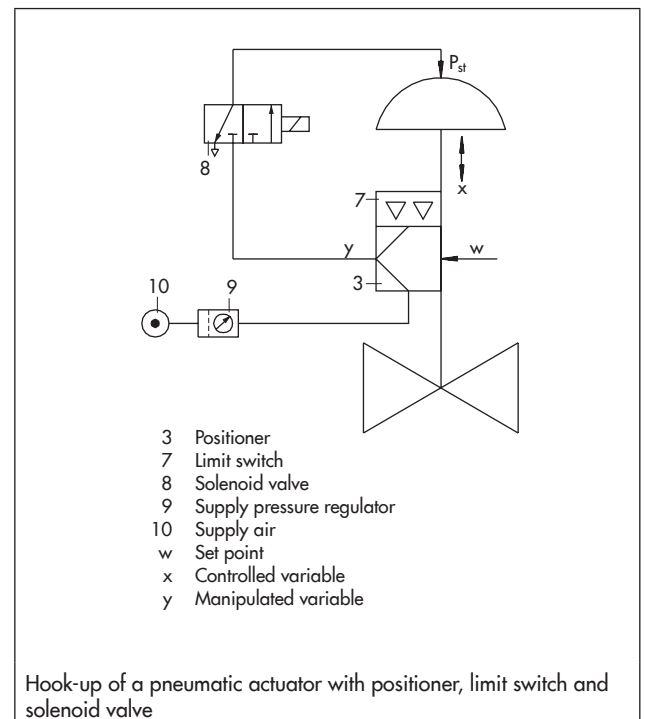
The installed limit contacts are either:

- Inductive
- Electric
- Pneumatic

It is possible to override the limit contacts. They can be adjusted to be either an NC or NO contact. A maximum of three contacts can be used in limit switches.

They can be attached to control valves with linear actuators or directly to rotary actuator as well as pneumatic and electro-pneumatic positioners. The limit switch is linked axially over the shaft of rotary actuators or linked over a lever to linear actuators.

An optional solenoid valve allows the monitored actuator also to be controlled.



## 2.3 Solenoid valves

Solenoid valves convert binary signals issued by electric control equipment into binary pneumatic control signals which close or open the control valve.

The principle of operation is similar to an electropneumatic converter unit (e/p converter) and a valve configuration corresponding with the valve's switching function. Intrinsically safe, low-power binary signals issued by automation equipment or fieldbus systems can be used for controlling purposes.

3/2, 5/2, 5/3 or 6/2-way functions can be implemented depending on the solenoid valve version used. Different flow rates and connection types allow the solenoid valve to be tailor-made for the various tasks.

## 2.4 Pneumatic lock-up valve

Pneumatic lock-up valves shut off the signal pressure line either when the air supply falls below an adjusted value or upon complete air supply failure. As a result, the pressure in the actuator is blocked. The actuator remains in its last position until the defect is eliminated.

## 2.5 Pneumatic remote adjuster

The remote adjuster is a precision pressure regulator which can be adjusted manually. It is designed for use in pneumatic control loops as either a set point adjuster or manual remote adjuster and can be used as an adjustable precision pressure regulator for measuring, calibration and testing equipment.

## 2.6 Supply pressure regulators

Supply pressure regulators provide pneumatic control instruments with a constant air supply. The supply pressure regulator reduces and controls the pressure of a compressed air network to the pressure adjusted at the set point adjuster.

Versions are available for installation in pipelines or control panels or for direct attachment to positioners or pneumatic actuators.

The air pressure reducing station consists of a supply pressure regulator and an upstream filter with condensate drain.

## 2.7 Filter regulator

The filter regulator is used to supply compressed air to pneumatic volume boosters for large actuators. It cleans the compressed air, removing any dirt particles, water and oil. In addition, it regulates the air pressure to a constant output pressure.

## 2.8 Service unit for purifying and controlling compressed air

The service unit is used to supply compressed air to pneumatic transmitters, controllers and positioners. It cleans the compressed air, removing any dirt particles, water and oil. In addition, it regulates the air pressure to a constant output pressure.

## 2.9 Reversing amplifiers

The reversing amplifier allows double-acting pneumatic actuators to be operated using single-acting pneumatic/electropneumatic positioners or limit switches.

The positioner creates an output signal pressure  $Y_1$ , to which the air pressure  $Y_2$  is added.

The reversing amplifier uses the supply pressure  $Z$  as auxiliary power. The following rule applies:

$$Y_1 + Y_2 = Z$$

## 2.10 Pneumatic volume booster

Volume boosters are used together with positioners to increase the positioning speeds of pneumatic actuators. The pneumatic booster supplies the actuator with an air flow output whose pressure corresponds exactly to the signal pressure, except that it has a much higher volume output.

## 2.11 Quick exhaust valves

The quick exhaust valves are mounted between the positioner or solenoid valve and the actuator. They are used to vent the actuator more quickly.

### 3 Self-operated regulators

#### General

Self-operated pressure 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).

#### 3.1 Pressure regulators

##### Principle of operation

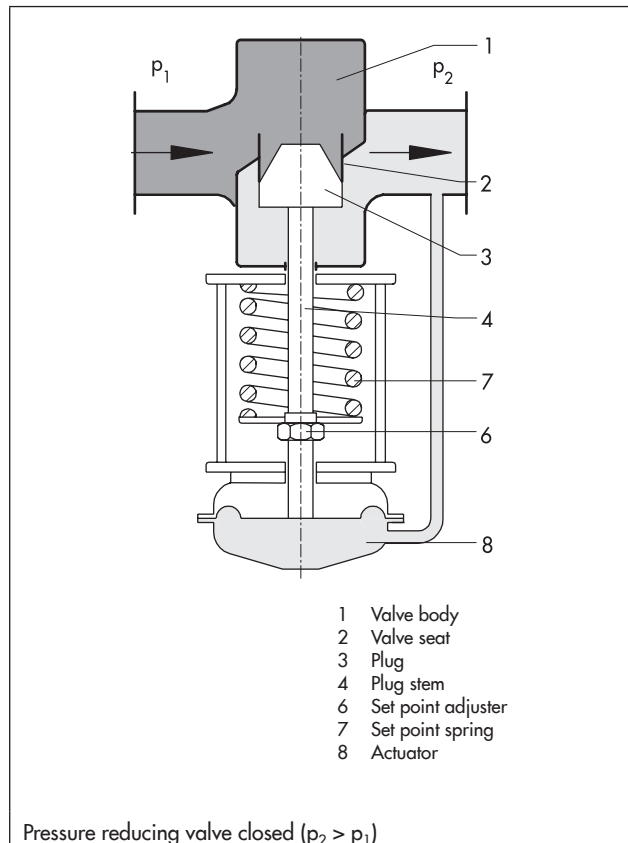
The regulators consist of a valve and an actuator, which either opens or closes the valve when the pressure increases. The regulators are proportional regulators controlled by the process medium. Each deviation from the adjusted set point is assigned a certain valve plug position.

##### Pressure reducing valves

Pressure reducing valves or pressure reducing stations withdraw as much energy from a pressure vessel with a higher pressure level as needed to maintain a nearly constant pressure level in downstream equipment, although consumption fluctuates.

The pressure  $p_2$  to be controlled (controlled variable  $x$ ) produces the force  $F_m = p_2 \times A$ , which is proportional to the controlled variable, on the diaphragm area  $A$ . This force corresponds to the actual value and is compared at the plug stem with the spring force  $F_s = \text{set point } w$ .  $F_s$  is adjustable at the set point adjuster. If the pressure  $p_2$  changes and in this way also the force  $F_m$ , the valve plug is being adjusted until  $F_m = F_s$ .

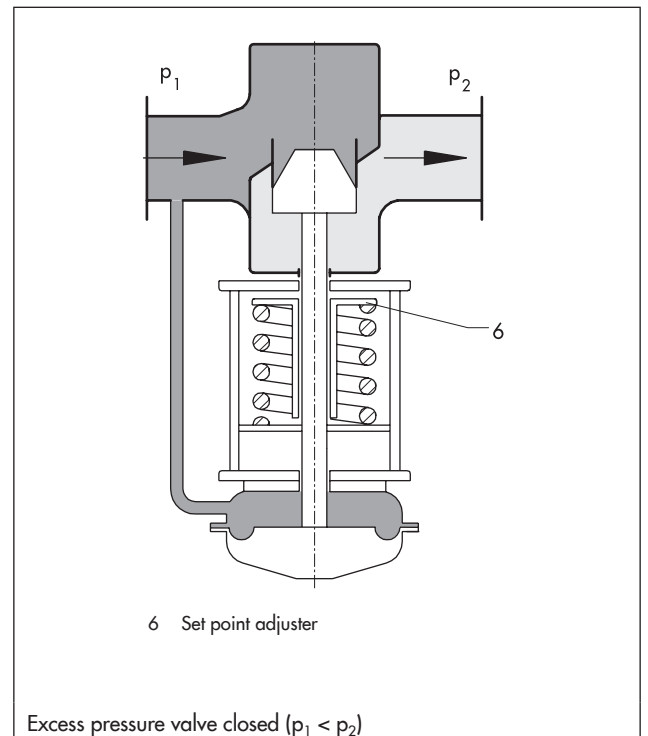
In the version illustrated, the valve closes when the pressure to be maintained constant rises. The regulator, in this case a pressure reducing valve, regulates the pressure  $p_2$  downstream of the valve to the value adjusted at the set point adjuster.



##### Excess pressure valve

The pressure  $p_1$  to be controlled (controlled variable  $x$ ) is picked up in the valve body and applied to one side of the actuator diaphragm. The force of the actuator  $F_m = p_1 \times A$  is compared over the plug stem to the force  $F_s = \text{set point } w$  of the set point spring. In steady state ( $x = w$ )  $F_m$  is equal to  $F_s$ . If the pressure  $p_1$  increases, the actuator force increases and the travel of the plug increases against the force of the set point spring. This causes the outlet flow to increase and the pressure  $p_1$  to decrease until a new equilibrium is reached between actuator and spring force.

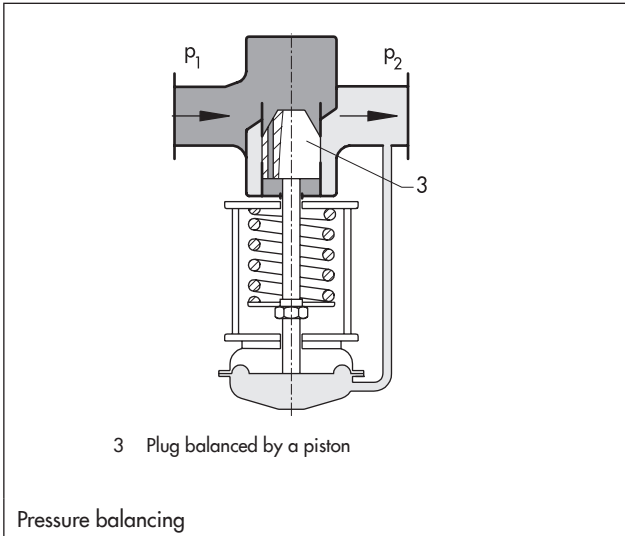
In the version illustrated, the valve opens when the pressure to be maintained constant rises. The regulator, in this case an excess pressure valve, regulates the pressure  $p_1$  upstream of the valve to the value adjusted at the set point adjuster.



### 3.1.1 Details concerning pressure regulators

#### Pressure balancing

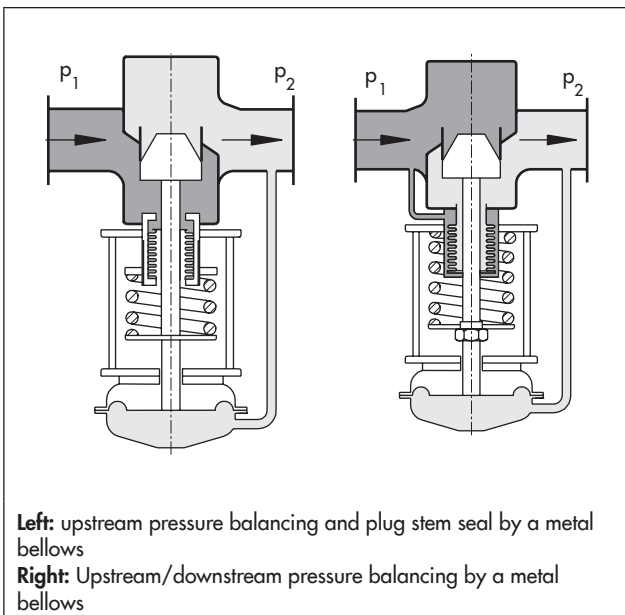
The control accuracy (offset) and stability of the control process depend on the disturbances occurring in the loop (for example, changes in upstream pressure and flow rate). The regulators are designed in such a way that the effect of these disturbances is relatively small. The force acting on the valve plug depending on, for example either the upstream or differential pressure can be eliminated by balancing the plug correspondingly. In unbalanced valves, the effect on the plug is a force resulting from the cross-sectional seat area and the differential pressure ( $\Delta p = p_1 - p_2$ ). In regulators with pressure-balanced plugs, this effect is largely neutralized. This version is, therefore, suitable for handling large pressure drops. The drawing shows a plug balanced by a piston.



#### Upstream/downstream pressure balancing

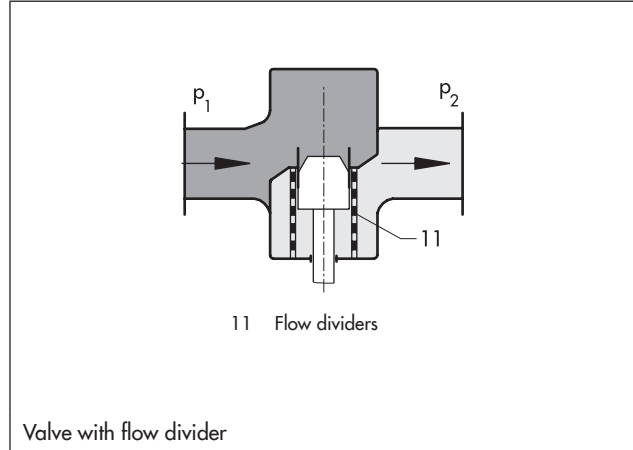
In the regulator (left), the metal bellows balances the upstream pressure and provides an absolutely tight and frictionless plug stem seal.

The right drawing shows a bellows arrangement for upstream and downstream pressure balancing.



#### Low-noise operation with a flow divider

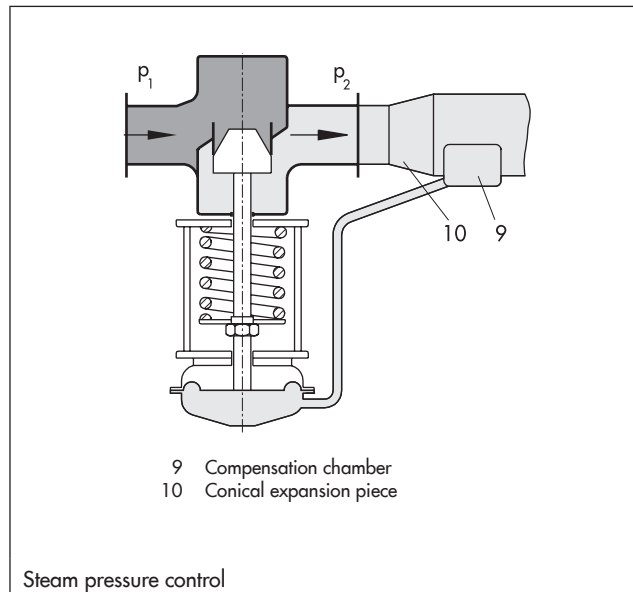
All regulators come with low-noise valve plugs. The valves used in the Type 39-2, Type 41-23, Type 2422/2424, Type 41-73 and Type 2422/2425 Regulators can be equipped with a flow divider in special versions. Flow dividers are effective and reliable components used to reduce the noise level or to avoid critical conditions inside the valve. The maximum flow rate is restricted on using a flow divider.



For noise calculation according to VDMA 24422, the correction terms  $\Delta L_G$  for gases and vapors as well as  $\Delta L_f$  for liquids are required on using flow dividers. Refer to the associated data sheet of the pressure regulator for more details.

#### Steam pressure control

In a steam pressure control application, a compensation chamber is installed at the point of measurement. It allows steam to condense and protects the connected diaphragm system against high temperatures. Since the steam volume increases as the steam pressure decreases, it is often necessary to enlarge the piping diameter downstream of the regulator by installing a conical expansion piece. This expansion piece (accessories) can double the nominal outlet diameter of the pipeline (e.g. DN 100 to 200).



### 3.1.2 Regulators and equipment for safety requirements

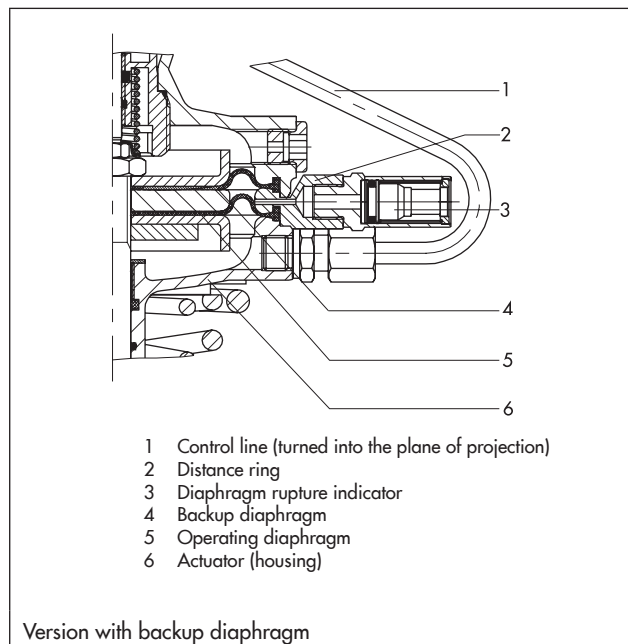
#### Safety shut-off valves (SSV) and safety excess pressure valves (SEV)

These regulators meet enhanced safety requirements.

- Low-maintenance proportional regulators requiring no auxiliary energy
- Especially suitable for applications in district heating plants designed in accordance with DIN 4747-1. The regulators comply with AGFW (German District Heating Association) regulations for regulators with backup diaphragm.

#### Backup diaphragm

The regulators are equipped with two operating diaphragms. In case the actual operating diaphragm ruptures, the backup diaphragm ensures emergency operation or the regulator moves to the fail-safe position. To monitor the diaphragm condition, the intermediate ring is equipped with a visual diaphragm rupture indicator or a pressure switch can be optionally used to indicate the condition.



#### Pressure regulators with pilot valves

Regardless of whether a pressure reducing valve or excess pressure valve is used, the upstream pressure  $p_1$  is transmitted to the pilot valve as auxiliary energy.

The pilot valve regulates the pressure to create a control pressure  $p_s$  dependent on the set point adjustment, which is compared to the pressure to be controlled acting from the top of the operating diaphragm.

- Pilot operated by the process medium
- Convenient set point adjustment at the pilot valve
- High dynamic response and small system deviation, i.e. excellent control accuracy

### 3.2 Differential pressure and flow regulators (Series 42)

SAMSON differential pressure and flow regulators are suitable for industrial, public and domestic applications, especially for district heating supply systems, for heating, ventilation and air-conditioning systems, for steam and heat generators, heat exchangers, energy supply units in power plants and chemical plants as well as for large pipeline systems.

- Low-noise, self-operated proportional regulators requiring little maintenance
- Body optionally available in cast iron, spheroidal graphite iron, cast steel, cast stainless steel or forged steel
- Suitable for water, steam, air and other liquids or gases, provided they do not influence the properties of the operating diaphragm
- Special version for mineral oils/heat transfer oils
- Flanges

#### Regulators and their control methods

The Series 42 Self-operated Differential Pressure and Flow Regulators consist of a valve with flanges 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.

In pressure-balanced regulators, the plug is largely unaffected by pressure changes in the medium. This is achieved by using either valves balanced by a bellows or a diaphragm. The valves balanced by a diaphragm have a balancing diaphragm instead of a balancing bellows. In both cases, the forces created by the upstream and downstream pressures that act on the plug are balanced out.

The actuators can be equipped with force limiters to limit the force acting on the plug stem and protect the seat and plug against damage.

A similar effect is achieved by an excess pressure limiter integrated into the actuator. A bypass opens, if necessary and balances the forces which prevents excessive positioning forces.

## Flow control

The flow rate is determined according to the differential pressure method. This is achieved by a standard orifice plate in the pipe through which the medium flows or by an adjustable restriction integrated into the valve.

The areas released by the restriction and the valve plug influence the flow rate. In this case, the high pressure upstream of the restriction is transferred through the control line to the high-pressure side of the diaphragm, whereas the low pressure downstream of the restriction is transferred through a bore in the valve plug to the low-pressure side of the diaphragm.

If the pressure difference acting on the operating diaphragm exceeds the differential pressure set point of the set point spring, i.e. the flow rate increases, the diaphragm moves together with the plug stem and the plug. 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.

Combined regulators applicable for differential pressure/pressure and flow control as well as regulators suitable for one or more of these control tasks are commonly used.

## Design · Principle of operation and application

Self-operated differential pressure and flow regulators are medium-controlled proportional regulators. Each deviation from the adjusted set point is assigned to a certain valve plug position.

The medium to be controlled delivers the necessary energy to adjust the valve. The released force moves the plug when the set point differs from the actual value.

The differential pressure  $\Delta p$  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  $\Delta p$  and thus the force  $F_m$  change, the plug stem is moved until  $F_m = F_s$ . With a predetermined diaphragm area  $A$ , the spring rate of the set point spring determines the rated travel and thus also the proportional-action coefficient  $K_p$  and the proportional band  $x_p$ .

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 with a metal bellows. As a result, the force acting on the plug, which depends on the upstream or differential pressure, is eliminated by an equal opposing force. In unbalanced versions, the disturbance effect is a force resulting from the cross-section of the seat and the differential pressure.

The regulators can be designed to function as:

Differential pressure regulators

- Flow regulators
- Differential pressure and flow regulators
- Differential pressure and flow limiters
- Differential pressure, flow and temperature regulators
- Combined self-operated regulator for flow rate with additional electric actuator

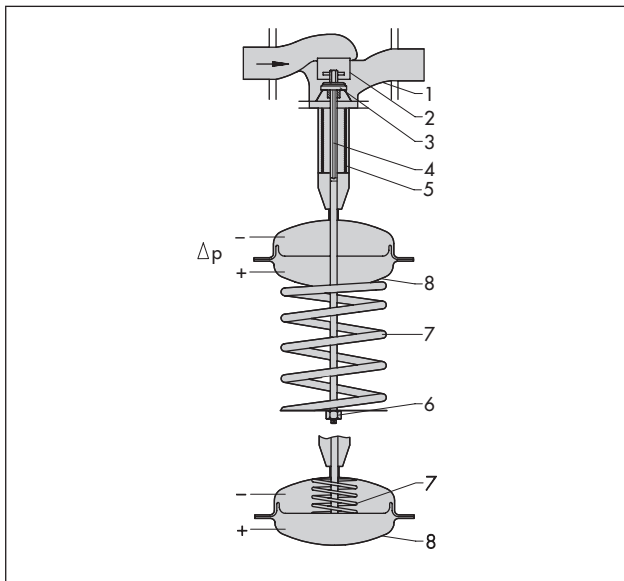
### Legend for the following diagrams

- 1 Valve body
- 2 Seat
- 3 Plug
- 4 Plug stem
- 5 Balancing bellows
- 6 Set point adjustment
- 7 Set point spring
- 8 Actuator
- 11 Adjustable orifice

### Differential pressure regulators with closing actuator

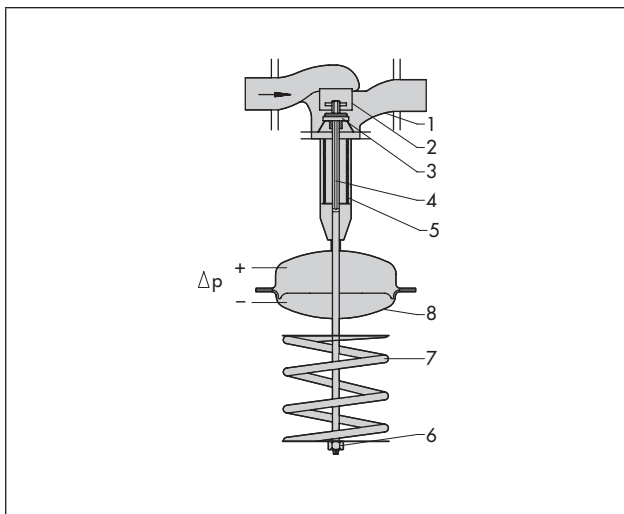
This actuator closes the valve when the adjusted differential pressure set point is exceeded. The top of the diagram shows a closing actuator with an adjustable set point, the bottom an actuator with a fixed set point.

Actuators with a fixed set point determined by the set point spring are appropriately suitable for closed loops with a constant set point.



### Differential pressure regulators with opening actuator

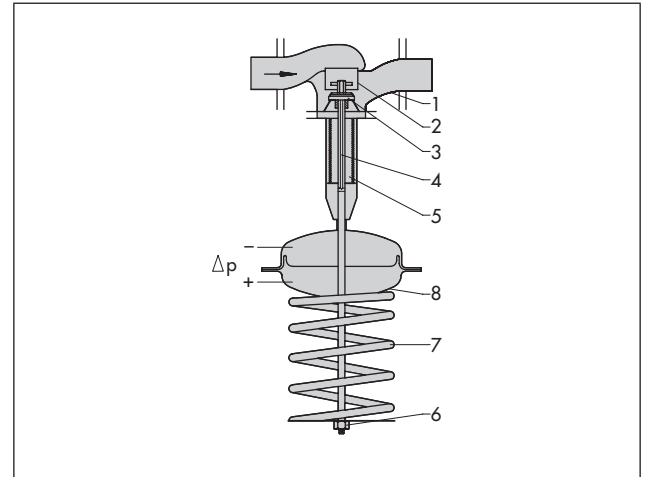
This actuator opens the valve when the differential pressure rises. The valve is closed when relieved of pressure ( $\Delta p = 0$ ).



### Valves with bellows seal

The downstream pressure acts on the inside bellows surface, while the upstream pressure acts on the outside bellows surface. As a result, the forces acting on the plug are balanced, the plug is fully balanced and not affected by any pressure or flow rate changes in the process medium.

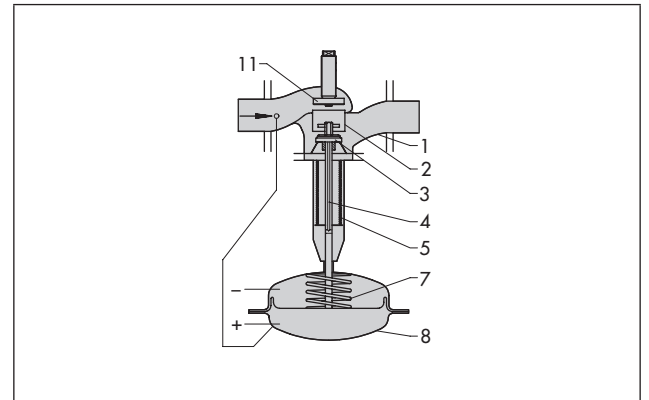
The fully balanced valves in the Series 42 Regulators allow these regulators to be used for valve sizes up to DN 250 and flow rates up to 520 m<sup>3</sup>/h.



### Flow regulators

Flow regulators are particularly suitable for district heating supply networks. The measuring system is designed for a fixed differential pressure at the restriction of, for example 0.2 bar.

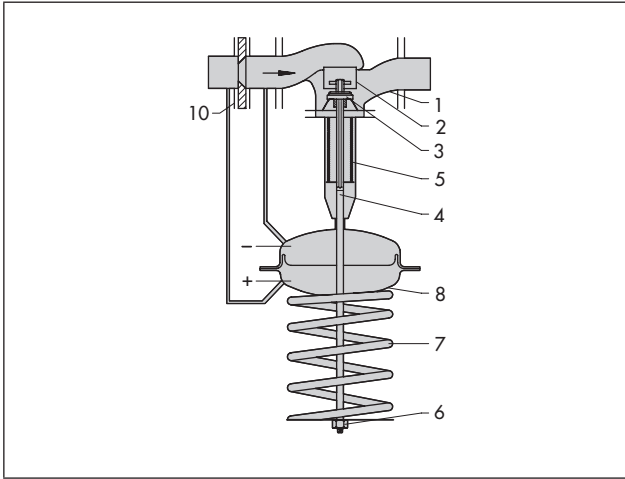
The set point is adjusted at the restriction. As a result, the regulator operates with an *adjustable orifice bore*, i.e. with an opening ratio which is adapted to the set point.





### Principle of flow control according to the differential pressure method

The differential pressure  $\Delta p_{\text{restriction}}$  generated across 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  $\Delta p_{\text{restriction}}$  acting on the restriction and the force  $F_m$  acting on the diaphragm, the following applies:

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

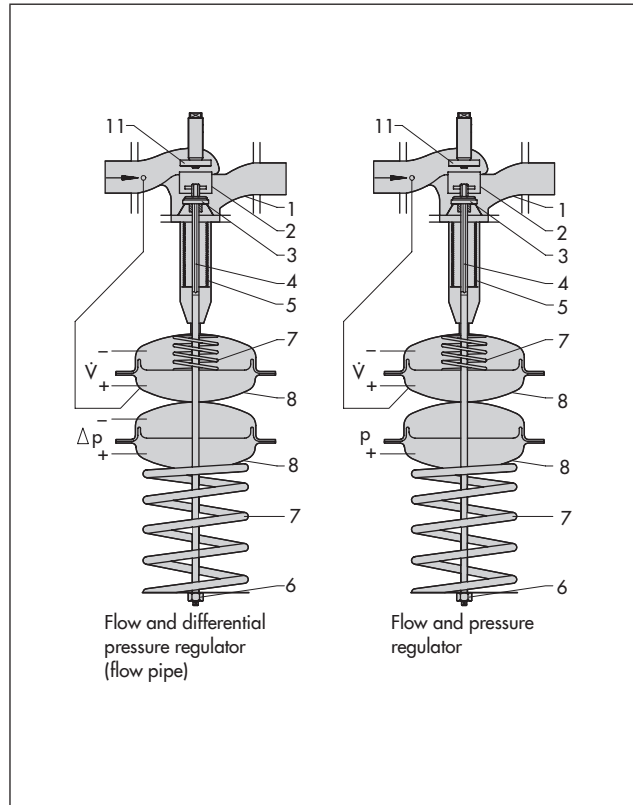
$$\Delta p_{\text{restriction}} = \frac{F_m}{A}$$

- $\dot{V}$  = Flow rate
- $F_m$  = Force acting on the diaphragm surface
- $\Delta p_{\text{restriction}}$  = Differential pressure created at the restriction for measuring the flow rate
- $K, K'$  = Constants
- $A$  = Diaphragm area

### Flow and differential pressure or pressure regulators

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 or 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.



### 3.3 Temperature regulators (Type 1 to Type 9)

#### Principle of operation

The temperature regulators shown in the schematic diagrams operate according to the liquid expansion principle. They consist of a valve and a control thermostat.

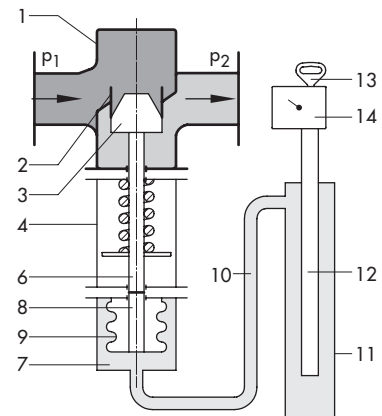
The control thermostat comprises a temperature sensor (11), set point adjuster (13), capillary tube (10) and a hydraulic actuator termed the operating element (7). The sensor is filled with an expansion liquid, which acts over the positioning bellows (9) and the positioning pin (8) upon the valve plug (3) attached to the plug stem (6). The temperature-dependent change in volume of the liquid contained in the sensor and the displacement of the piston (12) located in the set point adjuster cause the bellows and the plug to move.

The hydraulic actuator and the valve, which does not contain a packing, ensure high operating reliability of the regulators. Since the regulators operate on the liquid expansion principle, the temperature sensor and the control thermostat can be adapted to different operating conditions. Therefore, the easy-to-install version (top and middle diagrams) and the version in bottom diagram are used in most cases for temperatures exceeding 150 °C (300 °F) and in applications where separate installation of the sensor and the set point adjuster is appropriate. The selection of a Type 2231, 2232, 2333, 2234 or 2235 Temperature Sensor depends on the medium, required time constant and installation situation.

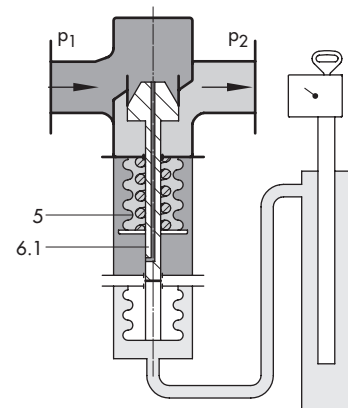
The regulators are proportional regulators controlled by the process medium. Each deviation from the adjusted set point is assigned a certain valve plug position. The control accuracy and stability of the control process depend on the disturbances occurring in the loop (for example, changes in upstream pressure and flow rate). The regulators are designed in such a way that the effect of these disturbances is relatively small. The force acting on the valve plug depending on, for example either the upstream or differential pressure can be eliminated by balancing the plug correspondingly.

In unbalanced valves (top diagram), the effect on the plug is a force resulting from the cross-sectional seat area and the differential pressure.

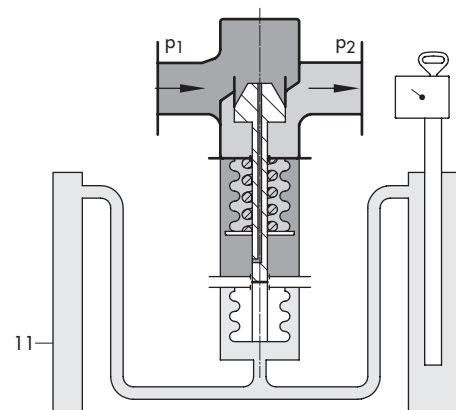
In versions balanced by a bellows, the upstream pressure  $p_1$  is transferred through a hole in the plug stem and acts on the outside of the balancing bellows, whereas the pressure downstream of the plug  $p_2$  acts on the inside of the bellows. As a result, the forces acting on the valve plug are balanced out. The fully balanced valves allow the self-operated regulators to be used for valve sizes up to DN 250 (valves up to NPS 10 on request).



Temperature regulator with unbalanced valve and compact thermostat



Temperature regulator with balanced valve and compact thermostat



Temperature regulator with balanced valve and a thermostat with separate set point adjustment

#### Valve

- |                   |  |
|-------------------|--|
| 1 Valve body      | 5 Balancing bellows                            |
| 2 Seat            | 6 Plug stem                                    |
| 3 Plug            | 6.1 Plug stem with hole for pressure balancing |
| 4 Bellows housing |  |

#### Control thermostat

- |                     |                         |
|---------------------|-------------------------|
| 7 Operating element | 11 Temperature sensor   |
| 8 Positioning pin   | 12 Piston               |
| 9 Operating bellows | 13 Set point adjustment |
| 10 Capillary tube   | 14 Set point dial       |

## Dynamic behavior of the thermostats

The dynamics of the regulators are mainly determined by the response of the sensor and its characteristic time constant.

The following table lists the response times of SAMSON thermostats operating according to different principles measured in water for Type 1 to Type 9 Temperature Regulators.

Functional principle	Control thermostat	Time constant [s]	
		Without Thermowell	With Thermowell
Liquid expansion	Type 2231	70	120
	Type 2232	65	110
	Type 2233	25	- <sup>1)</sup>
	Type 2234	15	- <sup>1)</sup>
	Type 2235	10	- <sup>1)</sup>
	Type 2213	70	120
Adsorption	Type 2212	- <sup>1)</sup>	40

<sup>1)</sup> Not permissible

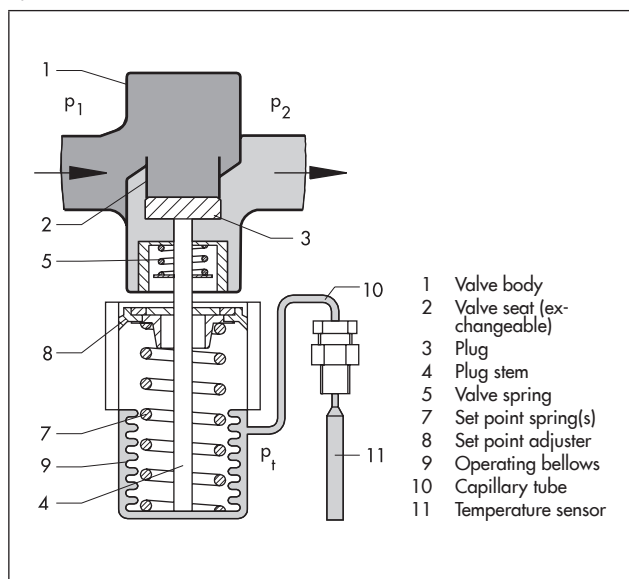
## 3.4 Temperature regulators (Series 43)

### Principle of operation

The regulators illustrated consist of a valve (1) and a control thermostat with set point adjuster (8), capillary tube (10) and temperature sensor (11) operating according to the adsorption principle.

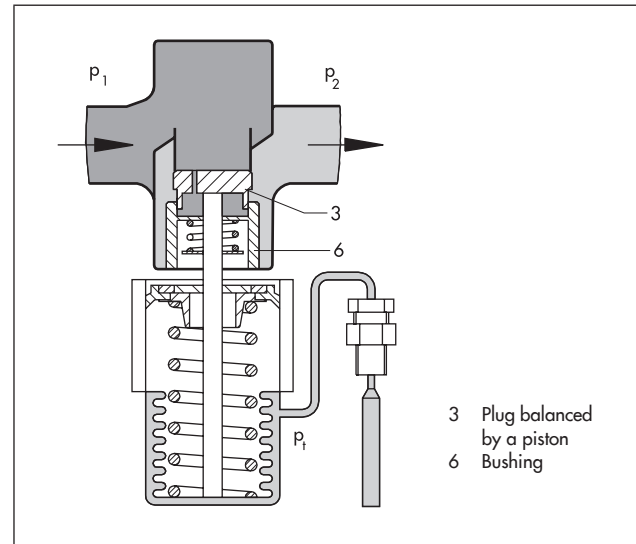
The medium temperature creates the pressure  $p_t$  in the sensor (11) that corresponds to the actual value. This pressure is transferred over the capillary tube (10) to the positioning bellows (9) where the force  $F_t = p_t \times A$  is created at the effective bellows area  $A$ . This force that corresponds to the controlled variable  $x$  is compared at the bottom of the bellows with the spring force  $F_s$  (= set point  $w$ ) dependent on the set point adjustment.

When the temperature changes, the plug (3) moves until  $F_t = F_s$ .



## Pressure balancing

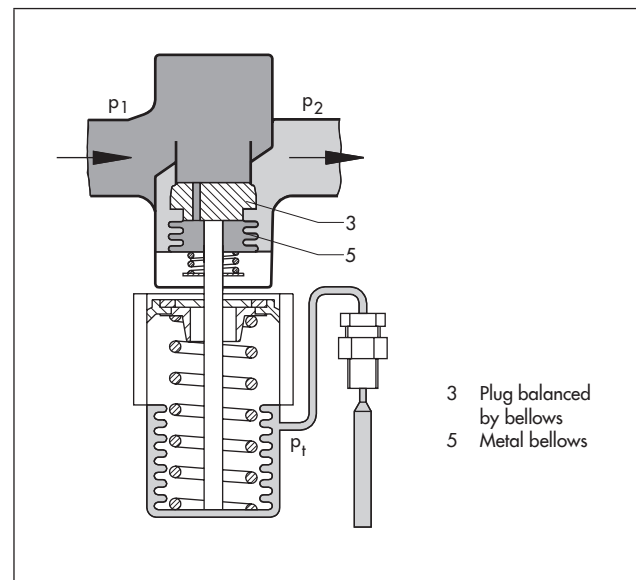
The control accuracy and stability of the control process depend on the disturbances occurring in the loop (for example, changes in upstream pressure and flow rate). The regulators are designed in such a way that the effect of these disturbances is relatively small. The force acting on the valve plug depending on, for example the upstream pressure, can be eliminated by balancing the plug correspondingly.



The valve plug has a hole through it to allow the upstream pressure to be applied to the front and back of the plug. The downstream pressure is separated from the plug either by the bushing of a piston plug or a metal bellows.

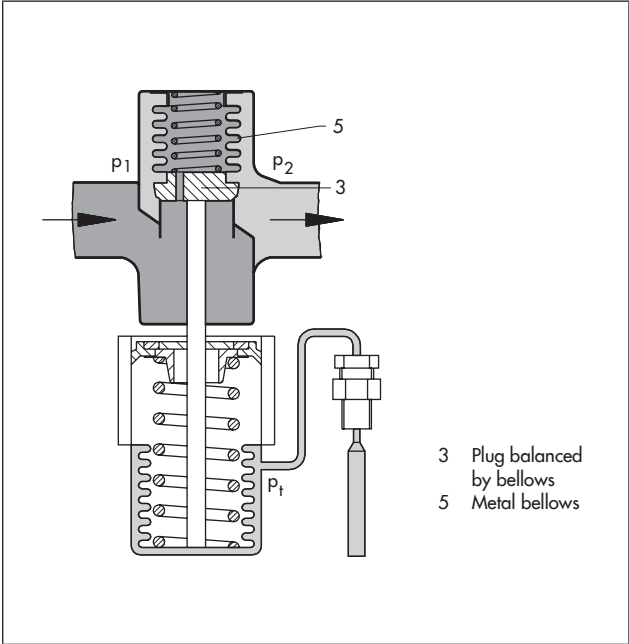
## Regulators for plants to be heated

The valve **closes** as soon as the temperature at the sensor rises.



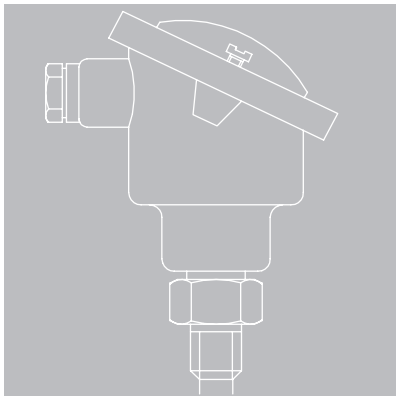
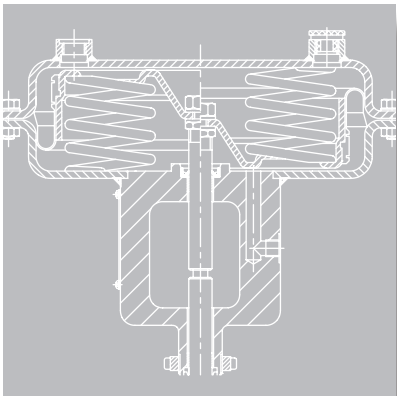
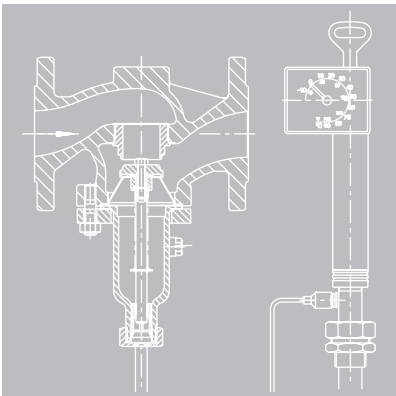
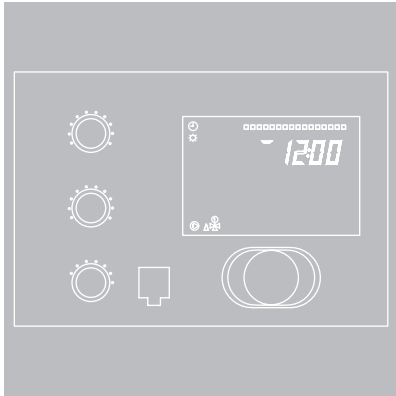
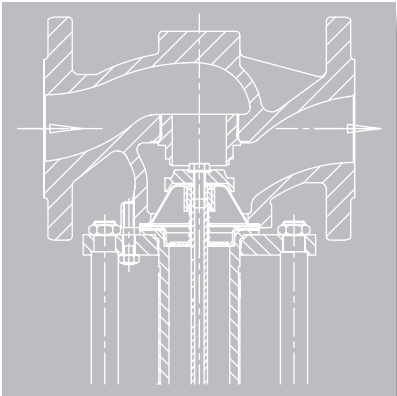
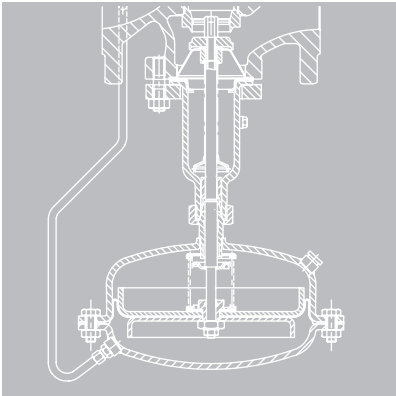
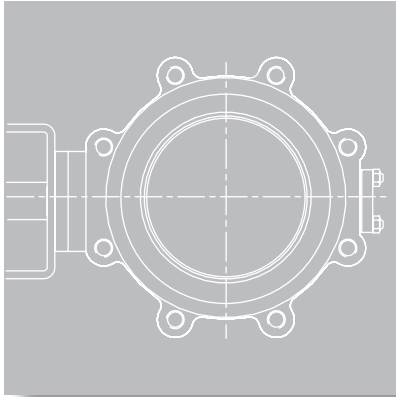
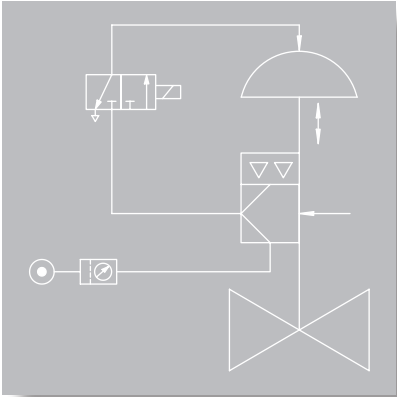
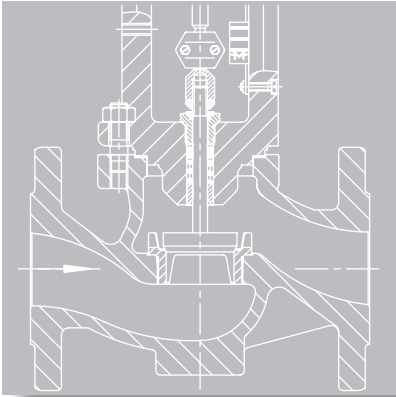
**Regulators for plants to be cooled**

The valve **opens** as soon as the temperature at the sensor rises.





# Product Range





# Pneumatic Control Valves · Series 240

Globe valve · Type 3241



## Application

Control valves for process engineering and industrial applications according to DIN, ANSI and JIS standards

- Valve size DN 15 to 300 · NPS ½ to 12 · DN 15A to 300A
- Pressure rating PN 10 to 40 · Class 125 to 300 · JIS 10K/20K
- Temperatures from –196 to +450 °C · –325 to +842 °F

## Special features

- Globe valve with pneumatic or electric actuator
- Valve body optionally made of cast iron, spheroidal graphite iron, cast steel, forged steel, cold-resisting and high-alloy steels or special materials
- Valve plug with metal seal, soft seal or high-performance metal seal

## Versions

- **Type 3241-7** · Valve with Type 3277 Pneumatic Actuator (see page 66)
- **Type 3241-1** · Valve with Type 3271 Pneumatic Actuator (see page 66)

Accessories · Positioners, limit switches, solenoid valves

## Technical data

Valve size	DN 15 to 300 (NPS ½ to 12)				
Body material	DIN	Cast iron EN-GJL-250	Spheroidal graphite iron EN-GJS-400- 18-LT	Cast steel 1.0619 1.0460 <sup>1)</sup>	Cast stainless steel 1.4408 1.4571 <sup>1)</sup>
	ANSI	A126 B	–	A216 WCC A105 <sup>1)</sup>	A351 CF8M A182 F316 <sup>1)</sup>
Pressure rating	PN	10, 16	16, 25	10 to 40	
	Class	125/250	–	150/300	
End connections	DIN	Flanges, welding ends according to EN 12627			
	ANSI	ANSI B16.25/flanges FF, RF · NPT thread			
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2		Metal seal: IV Soft seal: VI High-performance metal seal: V			
Characteristic		Equal percentage, linear			
Rangeability		50:1 up to DN 50 (NPS 2) · 30:1 for DN 65 (NPS 2½) and larger 50:1 for DN 200 (NPS 8) and larger			
Temperature range		–10 to +220 °C (14 to 430 °F)			
With insulating section		–196 to +450 °C (–325 to +842 °F)			
Compliance		<b>CE · EAC</b>			
Data sheets		DIN/ANSI: <b>T 8015/T 8012</b> · Actuators: <b>T 8310-1/-2/-3</b>			

<sup>1)</sup> Forged steel version up to DN 80 (ANSI: up to NPS 2 only) in PN 40 (Class 300)



Type 3241-7 up to DN 150 with Type 3277 Actuator



Type 3241-7 up to DN 80 with Type 3277 Actuator



Type 3241-1 with Type 3271 Actuator



#### Further versions

- Welding ends for versions according to DIN and ANSI
- Adjustable packing
- Flow divider or AC-trim for noise reduction · See Data Sheets T 8081 and T 8082
- Insulating section or bellows seal · See Data Sheets T 8015 and T 8012
- Heating jacket · On request
- Actuator made of stainless steel · See Data Sheet T 8310-1
- Additional handwheel · See Data Sheets T 8310-1 and T 8312
- Electric actuator for plant engineering and HVAC · See T 5870, T 5871, T 5874

#### Valves for special applications

**Type 3241-1 and Type 3241-7:** with safety function for water and steam · Tested according to DIN EN 14597 · See Data Sheet T 8016

**Type 3241-4:** with safety function to protect heating systems against excess temperatures or pressures · Tested according to DIN EN 14597 · See Data Sheet T 5871

**Type 3241-1 Gas and Type 3241-7 Gas:** pneumatic control and quick-acting shut-off valves for gases · Typetested according to DIN EN 161 · See Data Sheet T 8020-1, T 8020-2

#### Valves for higher pressures

**Series 250** according to DIN and ANSI · See page 43  
Pressure rating up to PN 400 (Class 2500) · Valve size up to DN 500 (NPS 20)  
Temperatures up to 550 °C (1022 °F) · See Data Sheet T 8051 ff.

#### Steam-conditioning valves

**Series 280** according to DIN and ANSI · See page 45  
Pressure rating up to PN 160 (Class 600) · Valve size up to DN 500 (NPS 20)  
Temperatures up to 500 °C (930 °F) · See Data Sheets T 8251 and T 8256



Type 3241-7 with Type 3277 Actuator and heating jacket including bellows heating



Type 3241-4 with Type 3274 Actuator

# Pneumatic Control Valves · Series 240

## Three-way valve · Type 3244



### Application

Mixing or diverting valve for process engineering and industrial applications according to DIN, ANSI and JIS standards

- Valve size DN 15 to 150 · NPS ½ to 6
- Pressure rating PN 10 to 40 · Class 150 to 300
- Temperatures from –196 to +450 °C · –325 to +842 °F

### Special features

- Three-way valve with pneumatic or electric actuator
- Valve body optionally made of cast iron (DIN version only), cast steel or cast stainless steel
- Metal-seated valve plug

### Versions

Standard version for temperatures ranging from –10 to +220 °C

- **Type 3244-7** · Valve with Type 3277 Pneumatic Actuator (see page 66)
- **Type 3244-1** · Valve with Type 3271 Pneumatic Actuator (see page 66)

### Technical data

Valve size		DN 15 to 150 (NPS ½ to 6)		
Body material	DIN	Cast iron EN-GJL-250	Cast steel 1.0619	Cast steel 1.4408
	ANSI	–	A216 WCC	A351 CF8M
Pressure rating	PN	10 to 40		
	Class	–	150/300	
End connections	DIN	All flanges according to DIN		
	ANSI	Flanges RF		
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2		Metal seal Class: I 0.05 % K <sub>Vs</sub>		
Characteristic		Linear		
Rangeability		50:1 up to DN 50 (NPS 2) · 30:1 for DN 65 (NPS 2½) and larger		
Temperature range		–10 to +220 °C (14 to 430 °F)		
	With insulating section	–196 to +450 °C (–325 to +842 °F)		
Compliance		CE · EAC		
Data sheets		DIN/ANSI valve: <b>T 8026</b> · Actuators: <b>T 8310-1</b>		

Accessories · Positioners, limit switches, solenoid valves

### Further versions

- Insulating section or bellows seal · See Data Sheet T 8026
- Heating jacket · On request
- Additional handwheel · See Data Sheets T 8310-1 and T 8312
- Electric actuator for plant engineering and HVAC



Type 3244-7 with Type 3277 Actuator



Type 3244-1 with Type 3271 Actuator

# Pneumatic Control Valves

Micro-flow valve · Type 3510

High-pressure valve · Type 3252

## Application

Control valve to control very low flow rates according to DIN and ANSI standards

## Special features

- Globe or angle valve with pneumatic actuator
- Valve body and wetted parts made of stainless steel
- Metal-seated valve plug
- Connections: G/NPT thread, welding ends or flanges

## Versions

- **Type 3510-7:** micro-flow valve with Type 3277-5 Pneumatic Actuator
- **Type 3510-1:** micro-flow valve with Type 3271-5 Pneumatic Actuator (120 cm<sup>2</sup>)
- **Type 3252-7:** high-pressure valve with Type 3277-5 Pneumatic Actuator (120 cm<sup>2</sup>) or Type 3277 Pneumatic Actuator (350 cm<sup>2</sup>)
- **Type 3252-1:** high-pressure valve with Type 3271-5 Pneumatic Actuator (120 cm<sup>2</sup>) or Type 3271 Pneumatic Actuator (350 cm<sup>2</sup>)

See page 66 for more details on Type 3277 and Type 3271 Pneumatic Actuators

## Technical data

Type		3510	3252
Valve size	DN	10 to 25	15 to 25
	NPS	½ to 1	½ to 1
Female thread	G/NPT	⅛ to ¾	½ to 1
	Rc	⅛ to ¾	–
Flow coefficients	K <sub>vs</sub>	0.0001 to 1.6	0.1 to 4.0
	C <sub>v</sub>	0.00012 to 2.0	0.12 to 5.0
Body material	DIN	1.4404	1.4404
	ANSI	A 316 L	A 316 L
Pressure rating	PN	40 to 400	40 to 400
	Class	150 to 2500	300 to 2500
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2		Metal seal: IV High-performance metal seal: V	Metal seal: IV High-performance metal seal: V Soft seal: VI
Characteristic		Equal percentage for K <sub>vs</sub> 0.01 and higher, linear, on/off	Equal percentage, linear, quick opening
Rangeability		Max. 50:1	Max. 50:1
Temperature range		–10 to +220 °C 14 to 428 °F	–10 to +220 °C 14 to 428 °F
	With insulating section	–196 to +450 °C –325 to +842 °F	–196 to +450 °C –325 to +842 °F
Compliance		<b>ERC</b>	
Data sheets		<b>T 8091, T 8091-1</b>	<b>T 8053</b>

Accessories · Positioners, limit switches, solenoid valves



Type 3510-7 with Type 3725 Positioner

Type 3252-7 with Type 3767 Positioner

# Pneumatic Control Valves · Series 250

Globe valve · Type 3251

Angle valve · Type 3256



## Application

Control valve for process engineering applications with high industrial requirements according to DIN and ANSI standards

- Valve size DN 15 to 500 · NPS ½ to 20
- Pressure rating PN 16 to 400 · Class 150 to 2500
- Temperatures from -196 to +550 °C · -325 to +1022 °F

## Special features

- Globe or angle valve with pneumatic actuator

## Versions

Standard version for temperatures from -10 to +220 °C (14 to 428 °F), with adjustable high-temperature packing from -10 to +350 °C (15 to 662 °F)

- **Type 3251-1** or **Type 3256-1**: valve with Type 3271 Pneumatic Actuator (page 66)
- **Type 3251-7** or **Type 3256-7**: valve with Type 3277 Pneumatic Actuator (page 66)

## Technical data

Valve	Type	3251		3256	
Valve size	DN	15 to 500		15 to 500	
	NPS	½ to 20		½ to 20	
Body material	DIN	Cast steel 1.0619	Cast steel 1.7357	Cast stainless steel 1.4408	
	ANSI	A216 WCC	A217 WC6		A351 CF8M
Pressure rating		PN 16 to 400 (Class 150 to 2500) <sup>1)</sup>			
End connections	DIN	Flanges, welding ends according to EN 12627			
	ANSI	Flanges RF, RTJ · Welding ends B16.25			
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2		Metal seal: IV Soft seal: VI High-performance metal seal: V			
Characteristic		Equal percentage, linear, quick opening			
Rangeability		50:1			
Temperature range		-10 to +220 °C (14 to 428 °F)			
With high-temperature packing		220 to 350 °C (430 to 662 °F)			
With insulating section		-196 to +550 °C (-325 to +1022 °F)			
Compliance		<b>CE · EAC</b>			
Data sheets		DIN/ANSI: T 8051/T 8052		DIN/ANSI: T 8065/T 8066	

<sup>1)</sup> On request

Accessories · Positioners, limit switches, solenoid valves

**Further versions** with flow divider or special AC-trim



Type 3251-1 with Type 3271 Actuator



Type 3256-1 with Type 3271 Actuator

# Pneumatic Control Valves · Series 250

Three-way valve · Type 3253

Globe valve · Type 3254 with additional plug stem guide in the bottom body flange



## Application

Control valve for process engineering applications with high industrial requirements according to DIN and ANSI standards

## Technical data

Valve	Type	3253 <sup>1)</sup>		
Valve size		DN 15 to 500 (NPS ½ to 20)		
Body material	DIN	Cast iron EN-GJL-250	Cast steel 1.0619	Cast stainless steel 1.4408
	ANSI	–	A216 WCC	A351 CF8M
Pressure rating		PN 16 to 160 (Class 150 to 900) <sup>2)</sup>		
End connections		Flanges according to DIN EN · Raised face, ring joint		
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2		Metal seal Class: I 0.05 % K <sub>V5</sub>		
Characteristic		Linear		
Rangeability		50:1		
Temperature range		–10 to +220 °C (14 to 428 °F)		
With high-temperature packing		220 to 350 °C (428 to 662 °F)		
With insulating section		–196 to +550 °C (–325 to +1022 °F)		
Compliance		<b>CE · EAC</b>		
Data sheets		DIN/ANSI: T 8055/T 8056		

<sup>1)</sup> Depending on plug arrangement as mixing or diverting valve

<sup>2)</sup> Higher pressures on request

## Technical data

Valve	Type	3254		
Valve size		DN 80 to 500 (NPS 3 to 20)		
Body material	DIN	Cast steel 1.0619	Cast steel 1.7357	Cast stainless steel 1.4408
	ANSI	A216 WCC	A217 WC6	A351 CF8M
Pressure rating		PN 16 to 400 (Class 150 to 2500)		
End connections	DIN	Flanges, welding ends according to EN 12627		
	ANSI	Flanges RF, RTJ · Welding ends B16.25		
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2		Metal seal: IV Soft seal: VI High-performance metal seal: V		
Characteristic		Equal percentage, linear, quick opening		
Rangeability		50:1		
Temperature range		–10 to +220 °C (14 to 428 °F)		
With high-temperature packing		220 to 350 °C (428 to 662 °F)		
With insulating section		–196 to +550 °C (–325 to +1022 °F)		
Compliance		<b>CE · EAC</b>		
Data sheets		DIN/ANSI: T 8060/T 8061		



Type 3253-1 with Type 3271 Actuator



Type 3254-1 with Type 3271 Actuator

# Pneumatic Steam-conditioning Valves · Series 280

Steam-conditioning valves · Type 3281 and Type 3286



## Application

Steam converters (globe valve or angle valve) for process engineering applications and thermal plants

## Technical data

Steam conditioning valve		Type 3281 Globe Valve	Type 3286 Angle Valve
Valve size	DN	50 to 500	50 to 300
	NPS	2 to 20	2 to 12
Body material	DIN	Cast steel: 1.0619/1.7357	
	ANSI	Cast steel: A216 WCC/A217 WC6	
Pressure rating		PN 16 to 160 (Class 150 to 900)	
End connections		Flanges, welding ends	
Seat-plug seal, Leakage class according to IEC 60534-4 or ANSI/FCI 70-2		Metal seal: IV High-performance metal seal: V Balanced: min. IV (depending on version)	
Characteristic		Equal percentage, linear	
Rangeability		50:1	
Temperature range		-10 to +220 °C (14 to 428 °F)	
With high-temperature packing up to		350 °C (660 °F)	
With insulating section up to		500 °C (932 °F)	500 °C (932 °F)
Compliance		<b>CE · EAC</b>	
Data sheets		<b>T 8251/T 8252</b>	<b>T 8256/T 8257</b>



Type 3281-1 with Type 3271 Actuator



Type 3286-1 with Type 3271 Actuator

# Pneumatic Control Valves

Components to reduce noise and wear

Flow dividers · AC trims · Perforated plug

Silencer · Type 3381



## Application

The noise emission of the control valves and the attached pipeline is determined by the free jet exiting the restriction and the jet's turbulent mixing zone in applications with gases and vapors. When cavitation occurs, the noise level is influenced to a large extent by the pressure waves induced by the implosion of the cavitation bubbles.

The following components are used to reduce noise:

**Flow dividers ST 1, ST 2 or ST 3** · Effective and cost-efficient components made of perforated sheet steel or hard-faced wire mesh

- Shorten the free jet in applications with gases and vapors
- Accelerate the exchange of energy in the mixing zone
- Protect the valve body

Flow dividers are suitable for SAMSON Series 240, 250, 280 and 290 Globe Valves as well as for globe valves of self-operated regulators (see Data Sheet T 8081).

**AC trims** · Optimized trims for SAMSON control valves for low-noise pressure letdown of liquids (see T 8082 and T 8083)

- Double-guided plug stem to prevent vibration
- Additional attenuation plates in the seat with AC-2 Trim
- AC-3 to AC-5 Trims: multi-stage pressure reduction at high differential pressures

## Versions

- **AC-1 Trim:** noise-optimized trim, parabolic plug with double plug stem guide. Suitable for DN 50 to 300 and PN 16 to 160 (see T 8082)
- **AC-2 Trim:** trim same as AC-1 Trim, but with fixed attenuation plates integrated into the seat on the upstream side, for DN 80 to 250 and PN 16 to 160 (see T 8082)
- **AC-3 Trim:** multi-stage parabolic plug for DN 15 to 300 and PN 40 to 400 (see T 8083)

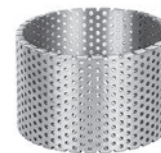
Control valves with perforated plug · Mainly used for valves in steam applications, particularly for operation in the wet steam region, the control of two-phase medium flow, liquid media which vaporize on the outlet side (flashing valves) or emergency relief valves (blow-off valves). The perforated plug splits up the jet stream into numerous smaller jets and ensures low-noise energy transfer to the surrounding medium. Suitable for Types 3241, 3246, 3248, 3251, 3254 and 3256 Valves (see T 8086), Type 3291 (see T 8072-1) and Type 3296 (see T 8074-1).

**Type 3381 Silencer** · Fixed restrictor package that can be installed downstream of the valve with one to five attenuation plates for applications with liquids, gases or vapors. The silencer increases the backpressure downstream of the valve. With gases and vapors this leads to a reduction in the valve outlet velocity and sound pressure level. With liquids this leads to a reduction in the sound pressure level (see T 8084).

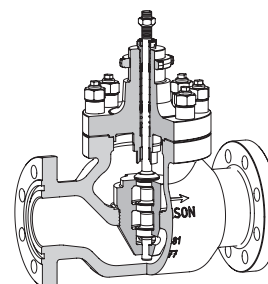
- DN 40 to 800 (NPS 1½ to 32) · PN 10 to 400 (Class 150 to 2500)

## Versions

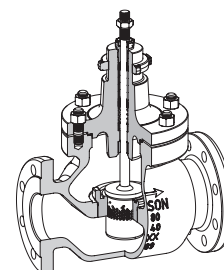
- Sandwich-style version for clamping between flanges with one attenuation plate · Body for two to five attenuation plates attachable using flanges (see Data Sheet T 8084)



Flow divider ST 1



Type 3251 with AC-3 Trim



Type 3251 with perforated plug



Type 3381, flanged to control valve with heating jacket

# Pneumatic Control Valves · Series 240

Diaphragm valve · Type 3345

On/off valve · Type 3351

## Type 3345 Diaphragm Valve

Control valve for viscous, corrosive and abrasive fluids conforming to DIN, BS or ANSI standards

### Technical data

Version	DIN	ANSI
Valve size	DN 15 to 150	NPS ½ to 6
Body material	EN-GJL-250, EN-JS1025 1.4408, 1.4435	A126 B, A 395 A351 CF8M, A316 L
Maximum pressure	16 bar	230 psi
End connections	Flanges, threaded ends Clamps, welding ends	
Diaphragm sealing Leakage class according to IEC 60534-4 or ANSI/FCI 70-2	Butyl, PTFE/EPM, EPDM Class: VI	
Characteristic	Linear	
Rangeability	30:1	
Temperature range	-30 to +160 °C <sup>1)</sup>	-22 to +320 °F <sup>1)</sup>
Compliance	<b>ERC</b>	
<b>Data sheet</b>	<b>T 8031</b>	

<sup>1)</sup> Temperature range depending on the diaphragm used

## Type 3351 On/off Valve

Shut-off valve

- With tight shutoff for liquids, gases and steam
- According to DIN and ANSI standards

### Technical data · DIN

Valve size	DN 15 to 100			
Body material	Cast iron EN-GJL-250	Spheroidal graphite iron EN-GJS-400- 18-LT	Cast steel 1.0619	Cast stainless steel 1.4408
Pressure rating	PN 16	PN 16, 25	PN 16, 25, 40	
Connecting flanges	Form B according to EN 1092-2		All forms according to EN 1092-1	
Leakage class	IEC 60534-4: VI			
Medium temperatures	-10 to +220 °C (14 to 428 °F)			
Compliance	<b>CE · ERC</b>			
<b>Data sheet</b>	<b>T 8039</b>			



Type 3345-1



**Technical data - ANSI**

Valve size	NPS ½ to 4		
Body material	Cast iron A126B	Cast steel A216 WCC	Cast stainless steel A351 CF8M
Pressure rating	Class 125	Class 150, 300	Class 150, 300
Connecting flanges	FF according to ASME B16.1	All forms according to ASME B16.5	All forms according to ASME B16.5
Leakage class	ANSI/FCI 70-2: Class VI		
Medium temperatures	-10 to +220 °C (14 to 428 °F)		
Compliance	<b>CE EAC</b>		
Data sheet	<b>T 8039</b>		



Type 3351

# Pneumatic Control Valves for Hygienic and Aseptic Applications

Angle valves · Type 3347 and Type 3349



## Application

Cavity-free angle valves for the food processing and pharmaceutical industries

- **Type 3347:** For hygienic service according to DIN, ANSI or BS standards

## Technical data

Body version	Cast	Bar stock	Micro-flow valve
Valve size	DN	25 to 100	15 to 125
	NPS	1 to 4	½ to 5
Body material	Cast stainless steel, stainless steel		
Maximum pressure	16 bar (230 psi)	16 bar (230 psi) <sup>1)</sup>	16 bar (230 psi)
End connections	Welding ends, threaded ends, clamps, flanges		
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2	Metal seal: IV Soft seal: VI		
Characteristic	Equal percentage, linear		
Rangeability	50:1 up to DN 50 (NPS 2) 30:1 for DN 65 (NPS 2½) and larger		15:1 to 50:1
Max. temperature range	0 to 150 °C (32 to 300 °F)		
Compliance	<b>EHEDG</b>		
Data sheets	With Type 3271/3277 Actuators: <b>T 8097</b> With Type 3379 Actuator: <b>T 8097-3</b>		

<sup>1)</sup> 40 bar (580 psi) flanged when made of bar stock

- **Type 3349:** aseptic angle valve with USP-VI diaphragm according to DIN or ANSI standards · Stem guide sealed by a diaphragm and with test connection

## Technical data

Version	DIN	ANSI
Valve size	DN 15 to 100	NPS ½ to 4
Body material	1.4435	A 316 L
Diaphragm material	PTFE	
Maximum pressure	10 bar	150 psi
End connections	Welding ends, aseptic flanges, connecting thread and clamp connections	
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2	Metal seal: IV Soft seal: VI	
Characteristic	Equal percentage, linear	
Rangeability	50:1 up to DN 100 (NPS 4) · 30:1 for $\leq K_{VS} 0.63$ ( $C_V 0.75$ )	
Operating temperature	0 to 160 °C	32 to 320 °F
Compliance	<b>EHEDG</b>	
Data sheets	With Type 3271/3277 Actuators: <b>T 8048-2</b> With Type 3379 Actuator: <b>T 8048-3</b>	



Type 3347-7 with Type 3277 Actuator



Type 3347 with Type 3379 Actuator



Type 3349

# Pneumatic Control Valves

## Cryogenic valves

### Type 3248

#### Type 3246 with long insulating section and circulation inhibitor



#### Application

Control valve for use in cryogenic applications for liquids and gases

#### Special features

- Globe or angle valve with pneumatic actuator
- Valve body made of cold-resisting stainless steel with welding ends, angle valve also available made of aluminum
- Insulating section with integrated bellows seal to protect the stem guide from freezing up. As a result, the valve can be mounted in any desired position
- Prepared for installation in cold-box systems
- Valve trim can be exchanged without having to remove the valve

#### Versions

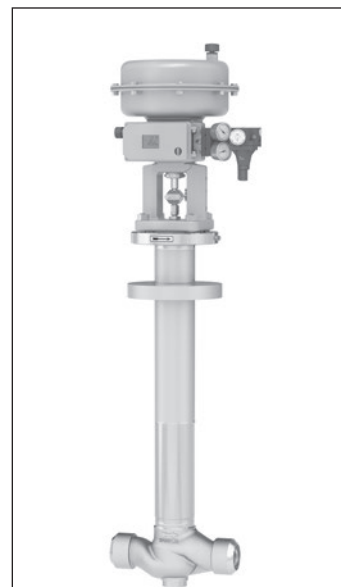
Globe or angle-style valve body with welding-neck ends and cryogenic extension bonnet, self-adjusting PTFE or PTFE/carbon V-ring packing, metal or soft-seated valve plug

- **Type 3248-7:** cryogenic valve with Type 3277 Pneumatic Actuator (page 66)
- **Type 3248-1:** cryogenic valve with Type 3271 Pneumatic Actuator (page 66)

#### Technical data

Valve size	DN 25 to 150 (NPS 1 to 6)	
Body style	Globe valve	Angle valve
Body material	1.4308 A351 CF8	1.4571 or AlMg4, 5MnF27
Pressure rating	PN 16 to 100 (Class 150 to 600)	
End connections	Welding ends, welding-neck ends	
Seat-plug seal, Leakage class according to IEC 60534-4 or ANSI/FCI 70-2	Metal seal: IV Soft seal: VI High-performance metal seal: V	
Characteristic	Equal percentage, linear	
Rangeability	50:1 up to DN 50 (NPS 2) 30:1 for DN 80 (NPS 3) and larger	
Temperature range	Standard: -196 to +65 °C (-321 to +149 °F) Cryogenic: down to -273 °C, ANSI: down to -254 °C (-425 °F)	
Compliance	CE · EAC	
Data sheets	DIN/ANSI: T 8093/T 8093-1 · Actuators: T 8310-1	

Accessories · Positioners, limit switches, solenoid valves



Type 3248-7, steel globe valve with positioner and supply pressure regulator



Type 3248-1 Cryogenic Valve, aluminum angle valve with positioner, supply pressure regulator, pressure gauges and additional handwheel

**Type 3246 Cryogenic Valve with long insulating section and circulation inhibitor, ANSI version**

**Application**

Globe valve for cryogenic applications

**Special features**

- Globe or three-way valve with pneumatic actuator
- Valve body made of cast stainless steel
- Valve plug with metal seal or high-performance metal seal
- Long insulating section
- Circulation inhibitor to prevent the flow conditions of the process medium from having any effect in the insulating section

**Versions**

Standard version for temperatures from  $-196$  to  $+65$  °C ( $-325$  to  $+149$  °F) with long insulating section, cover plate with collar and circulation inhibitor

- **Type 3246-1:** valve with Type 3271 Pneumatic Actuator (see page 66)
- **Type 3246-7:** valve with Type 3277 Pneumatic Actuator (see page 66)

**Technical data**

Body style		Globe valve		Three-way valve
Valve size	NPS	½ to 10	½ to 8	½ to 6
Pressure rating	Class	150/300	600/900	150/300
Body material		A351 CF8		A351 CF8M
End connections		Welding ends/ANSI flanges RF		ANSI flanges RF
Seat-plug seal		Metal seal		
		High-performance metal seal, Stellite®		–
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2		Metal seal: IV High-performance metal seal: V		0.05 % of $C_v$
Characteristic		Equal percentage, linear, quick opening		Linear
Rangeability		50:1 30:1 for NPS 3 and larger	50:1	50:1 30:1 for NPS 3 and larger
Temperature range		$-196$ to $+65$ °C ( $-325$ to $+149$ °F)		$-196$ to $+65$ °C ( $-325$ to $+149$ °F)
Compliance		<b>CE · EAC</b>		
Data sheets		<b>T 8046-1</b>	<b>T 8046-2</b>	<b>T 8046-3</b>



Type 3246-7, Class 150/300



Type 3246-1, Class 600



Type 3246-7, Class 150/300

# Pneumatic Butterfly Valves

Butterfly valve · Type 3331

High-pressure butterfly valve · LEUSCH Type LTR 43

Control butterfly valves · PFEIFFER Types 10a, 10e and 14b/31a

## Application

Control valves for process engineering and industrial applications

## Versions

- **Type 3331:** swing-through or angle-seated disk for liquids, vapors and gases with Type 31a Pneumatic Actuator
- **LEUSCH Type LTR 43:** triple-eccentric, tight-closing, high-pressure butterfly valve with zero seat leakage in both directions of medium flow at full differential pressure. Optionally TA Luft packing, fire-safe version, extension for cryogenic or high temperatures

## Technical data

Type		3331	LTR 43
Valve size	DN	50 to 400	80 to 2500
	NPS	2 to 16	3 to 100
Body material	DIN	1.0425, 1.4404, 1.4408 DN 150 and larger: 1.0619, 1.4581	1.4408 1.0619
	ANSI	A414 Gr D, 316L NPS 6 and larger: A216 WCC	A216 WCC/WCB A351 CF8M
Pressure rating	PN	10 to 40 ISO 20, 50	10 to 420
	Class	150, 300	150 to 2500
Body style		Wafer-type	Between flanges, lug-type, Double flange
Butterfly disk Material		1.4581	A216 WCC/WCB A351 CF8M
Gasket		Metal to metal	Graphite on metal core Stellite® faced, PTFE
Leakage		≤ 1 %	Class VI DIN EN 1349/ ANSI/FCI 70-2
Opening angle		90°, 70°	80° (90°)
Throttling service up to		70°	70°
Rangeability		50:1	> 50:1
Temperature range	°C	-10 to +400	-196 to +1000
	°F	14 to 752	-320 to +1830
Actuator	Type	Type 31a/Type 3278	On request
Data sheets		<b>T 8227</b>	<b>T 9923</b>

Accessories · Positioners, limit switches, solenoid valves



Type 3331 with Type 31a Actuator



Type LTR 43, double-flanged body in NPS 10, Class 1500 with pneumatic actuator and positioner



Type LTR 43 lug-type body version with manual gear

- **PFEIFFER Type 10a:** double-eccentric control butterfly valve with min. 8 to 12 mm thick M-PTFE lining
- **PFEIFFER Type 10e:** centric control and shut-off butterfly valve with minimum 3 mm thick isostatic PTFE lining
- **PFEIFFER Type 14b/31a:** double-eccentric butterfly valve with Type 31a Pneumatic Piston Actuator

#### Technical data

Type		Type 10a	Type 10e	Type 14b
Valve size	DN	100 to 800	50 to 400	50 to 800
	NPS	4 to 32	2 to 16	2 to 32
Body material	DIN	EN-GJS-400-18-LT St 52-3 PTFE lining	EN-GJS-400-18-LT PTFE lining	1.4408 1.0619
	ANSI	A395		A216 WCB A351 CF8M
Pressure rating	PN	10	10/16	10 to 40
	Class	150		150, 300
Body style		Wafer-type Lug-type	Wafer-type Lug-type	Wafer-type Lug-type
Butterfly disk Material		1.4313 coated	1.4313 coated	1.4408
Gasket		PTFE		Metal seal: IV/V IEC 60534-4 Soft seal: A according to DIN EN 12266-1
Leakage		A according to DIN EN 12266-1 IV IEC 60534-4		IV/V DIN EN 60534-4
Opening angle		90°		
Temperature range	°C	-40 to +200	-35 to +200	-60 to +350
	°F	-40 to 392	-31 to +392	-76 to 482
Actuator	Type	Type 31a/30a	Type 31a/30a	Type 31a/30a
<b>PFEIFFER data sheets</b>		<b>TB 10a</b>	<b>TB 10e</b>	<b>TB 14b</b>

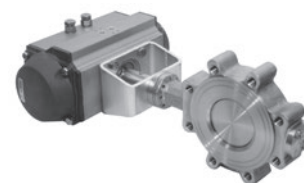
Accessories · Positioners, limit switches, solenoid valves



Type 10a



Type 10e/31a



Type BR 14b/31a

# PTFE or PFA-lined Control Valves

Globe valves · PFEIFFER Types 1a, 1b and 6a

Angle valve · PFEIFFER Type 8a

## Application

Lined control valves to control corrosive liquids in the chemical industry

## Special features

- Globe or angle valves with pneumatic actuator
- PTFE or PFA lining
- PTFE lining with min. 5 mm thickness
- PTFE bellows seal

## Versions

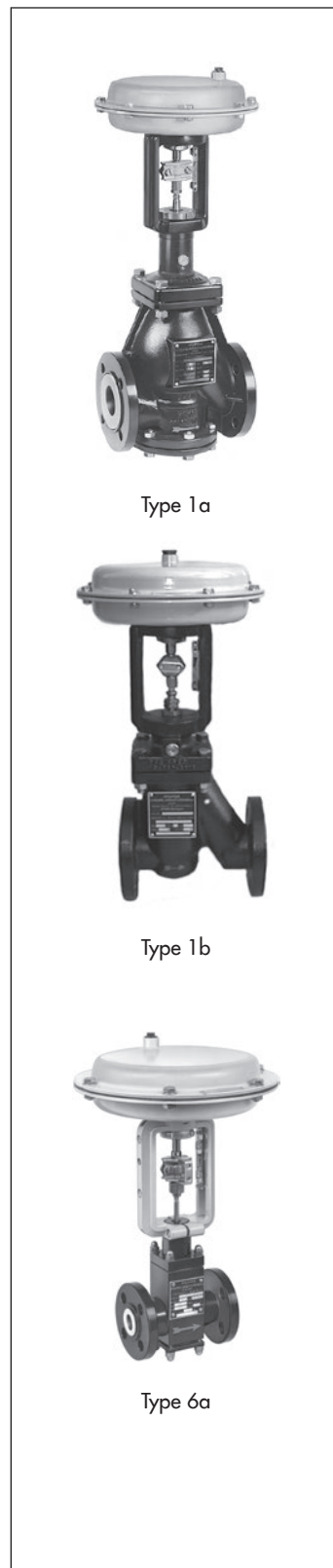
- **PFEIFFER Type 1a:** PTFE-lined globe valve
- **PFEIFFER Type 1b:** PFA-lined globe valve
- **PFEIFFER Type 6a:** PTFE-lined micro-flow valve with  $K_{VS}$  coefficients between 0.005 and 2.5
- **PFEIFFER Type 8a:** PTFE-lined angle valve

## Technical data

Type		Type 1a	Type 1b	Type 6a	Type 8a
Body style		Globe valve			Angle valve
Valve size	DN	25 to 150	25 to 100	6 to 15	15 to 50
	NPS	1 to 6	1 to 4	–	½ to 2
Body material	DIN	EN-GJS-400-18-LT			
	ANSI	A395			–
Lining		PTFE	PFA	PTFE	PTFE
Pressure rating	PN	10/16	10/16	10	10/16
	Class	150	150	125	150
Connection		For flanges according to DIN EN 1092-1			
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2		PTFE, VI	PFA, VI	PTFE, VI	
Characteristic		Equal percentage, linear			
Rangeability		30:1	50:1	30:1	30:1
Temperatures		Up to 200 °C (390 °F)		Up to 150 °C (300 °F)	
<b>PFEIFFER data sheets</b>		<b>TB 01a</b>	<b>TB 01b</b>	<b>TB 06a</b>	<b>TB 08a</b>

Accessories · Positioner, limit switch, solenoid valve, resistance transmitter

**Further versions with hand-operated actuator**



Type 1a

Type 1b

Type 6a

# Ball Valves and Pigging Valves

Lined ball valves · PFEIFFER Types 20a and 20b

Stainless steel ball valves · PFEIFFER Types 22a, 26d and 26s

Pigging valves · PFEIFFER Types 28 and 29

Sampling valve · PFEIFFER Type 27

## Application

Tight-closing lined valves for process engineering and industrial applications, especially for use with corrosive media

- **PFEIFFER Type 20a:** PTFE-lined ball valve
- **PFEIFFER Type 20b:** PFA-lined ball valve

## Technical data

Type	Type 20a	Type 20b
Style/end connections	Flanges	Flanges
Valve size DN/NPS	15 to 200/0.5 to 8	15 to 100/0.5 to 4
Body material	EN-GJS-400-18-LT/A395	EN-GJS-400-18-LT/A395
Lining	White PTFE	PFA
Pressure rating PN	16	16
Closure member	PTFE-coated	PFA-coated
Leakage rate	A according to DIN EN 12266-1	
Temperature range	-10 to +200 °C (14 to 392 °F)	
<b>PFEIFFER data sheets</b>	<b>TB 20a</b>	<b>TB 20b</b>

## Application

Tight-closing ball valves for process engineering and industrial applications, especially for use with corrosive media

- **PFEIFFER Type 22a:** Stainless steel tank bottom valve
- **PFEIFFER Type 26d:** Stainless steel ball valve
- **PFEIFFER Type 26s:** Flanged ball valve

## Technical data

Type	Type 22a	Type 26d	Type 26s
Valve size	DN	50 to 300	15 to 100
	NPS	2 to 12	½ to 4
Body material	DIN	1.4408, 1.4571, 1.4581	1.4408, 1.4571, 1.0619
	ANSI	F316 Ti, A351 CF8M	A351 CF8M, A216 WCB
Pressure rating	PN	16 to 40	16 to 40
	Class	150/300	150/300
Connecting flanges	According to EN 1092	According to EN 1092	According to EN 1092
Ball seal	1.4571 with PTFE	TFM	PTFE, HSB
Leakage rate	A according to DIN EN 12266-1		A/B according to DIN EN 12266-1
Temperature range	-10 to +200 °C (14 to 392 °F)		-10 to +400 °C (14 to 752 °F)
<b>PFEIFFER data sheets</b>	<b>TB 22a</b>	<b>TB 26d</b>	<b>TB 26s</b>

Accessories · Positioner, limit switch, solenoid valve, resistance transmitter

**Further versions** with hand-operated actuator, pneumatic, electric or hydraulic actuator



Type 20a



Type 22a



Type 26d/31a



Type 26s/31a



## Application

Pigging valves for the chemical industry used to convey gases and liquids as well as to efficiently pig the pipeline using the minimum amount of solvents

## Special features

- High surface quality
- Cavity-filled seat rings
- Special precision flanges

## Versions

- **PFEIFFER Type 28:** valves designed for use as launch or receiving stations, for dosing, as pig trap or pig rinsing station
- **PFEIFFER Type 29:** multi-way valves, for example 3/4 or 5/4-way manifolds

## Technical data

Type		Type 28	Type 29
Valve size	DN	50, 80, 100, 150	
Body material		1.4408, 1.4571	
Pressure rating	PN	25/40	
Connection		Flanges	
Ball seal		PTFE	
<b>PFEIFFER data sheets</b>		<b>TB 28a</b>	<b>TB 29a</b>

**Additionally available:** turnkey pigging systems including pipework and control engineering

## Application

Valves for continuous or intermittent sampling

- **PFEIFFER Type 27:** sampling valve

Special features of intermittent sampling:

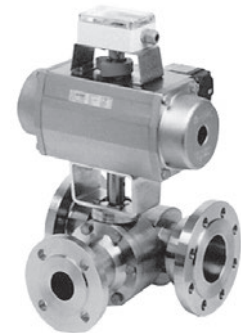
- No direct exposure to the environment
- Sealing liners allows for sampling free of dead space
- Representative samples due to the direct installation of the valve in the pipeline
- Pressureless sampling of liquids
- Known sample quantity per cycle

## Technical data

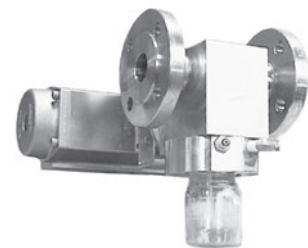
Type	Type 27a	Type 27c	Type 27d	Type 27e	Type 27f
Valve size	DN	25 to 100 (NPS 1 to 4)	25 to 50 (NPS 1 to 2)		25 to 100
Body material		1.4408	EN-GJS-400-18-LT/PFA		1.4571
Sampling element		Ball	Ball		Needle
Sampling principle		Intermittent	Intermittent	Continuous	Continuous
<b>PFEIFFER data sheets</b>		<b>TB 27a</b>	<b>TB 27d</b>		<b>TB 27f</b>

## Further versions

- Dead man's control
- Protective casing
- Control or automation (except for Type 27f)
- Other valve sizes and materials on request



Type 28a



Type 27a with Type AT Actuator

# Pneumatic Control Valves

Rotary plug valves · VETEC Type 72.3 and Type 72.4

## Application

Control valves for process engineering and industrial applications

## Special features

- Valve body made of cast steel, cast stainless steel or special materials

## Versions

- **Type 72.3:** double-eccentric rotary plug valve, flanged version, DN 25 to 500
- **Type 72.4:** double-eccentric rotary plug valve, sandwich-style version, DN 25 to 300

## Technical data

Type		72.3	72.4
Valve size	DN	25 to 500	25 to 300
	NPS	1 to 20	1 to 12
Body material	DIN	1.0619, 1.4408	
	ANSI	A216 WCC, A351 CF8M	
Pressure rating	PN	10 to 40 See Type 73.x for higher pressure ratings	
	Class	150, 300	
Body version		Flange	Wafer-type
Flange		DIN/ANSI	
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2		Metal seal: IV-L1 Soft seal: VI-G1	
Characteristic (cam disk in positioner)		Equal percentage, linear	
Rangeability		≥ 200:1	
Temperature range	Metal	–100 to +400 °C (–148 to +752 °F)	
	Soft	–100 to +220 °C (–148 to +430 °F)	
Actuator		Type AT/R	
<b>VETEC data sheets</b>		<b>72.3</b>	<b>72.4</b>

## Further versions

- With additional handwheel
- TA Luft packing (for VETEC Type 72)
- Noise-reducing measures
- Heating jacket



Type 72.3/AT



Type 72.4/R

# Pneumatic Control Valves

## Rotary plug valves - VETEC Type 62.7 and Type 82.7

### Application

Double-eccentric control valves for process engineering and industrial applications

### Special features

- Valve body made of cast steel or cast stainless steel
- Seat with metal seal with or without hard facing or seat with soft seal

### Versions

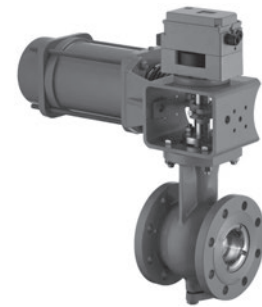
- **Type 62.7/AT:** double-eccentric rotary plug valve with Type AT Pneumatic Rotary Actuator
- **Type 82.7/AT or Type 82.7/R:** double-eccentric rotary plug valve with Type R or Type AT Pneumatic Rotary Actuator

### Technical data

Type		62.7	82.7
Valve size	DN	25 to 200	25 to 250
	NPS	1 to 8	1 to 10
Body material	DIN	1.0619, 1.4408	
	ANSI	A216 WCC, A351 CF8M	
Pressure rating	PN	10 to 40 See Type 73.x for higher pressure ratings	
	Class	150, 300	
Flanges		DIN EN 1092 B1/ ASME B16.5	DIN EN 1591-1/ ASME B16.5/DIN 2500
Face-to-face dimensions	DIN	EN 558-1, Tab. 16, S 36	
	ANSI	EN 558-2, Tab. 16, S 36	
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2		Metal seal: IV Soft seal: VI	
Characteristic (cam disk in positioner)		Equal percentage, linear	
Rangeability		200:1	
Medium temperature range		-60 to +220 °C (-76 to +428°F)	-100 to +400 °C (-148 to +752°F)
Actuator		Type AT	Type AT/R
Data sheets		<a href="http://www.vetec.de">www.vetec.de</a>	

### Further versions (Type 82.7 only)

- TA Luft packing
- Special materials
- Noise-reducing measures
- Flange version with tongue/groove, male face/female face acc. to DIN EN 1092-1
- Versions for higher and lower temperatures on request



Type 82.7 Rotary Plug Valve with Type R Rotary Actuator and Type 3730 Positioner



Type 82.7 Rotary Plug Valve with Type AT Rotary Actuator and Type 3730 Positioner

# Pneumatic Control Valves

## High-pressure Valve Series

### Rotary plug valves · VETEC Type 73.x/R and Type 73.x/M

#### Application

Double-eccentric control valves for process engineering, industrial applications and refineries

#### Special features

- Valve body made of cast steel, cast stainless steel or special materials
- Sandwich-style or flanged version

#### Versions

**Standard version** · Double-eccentric rotary plug valve with single-acting rotary actuator

Valve sizes DN 25 to 250

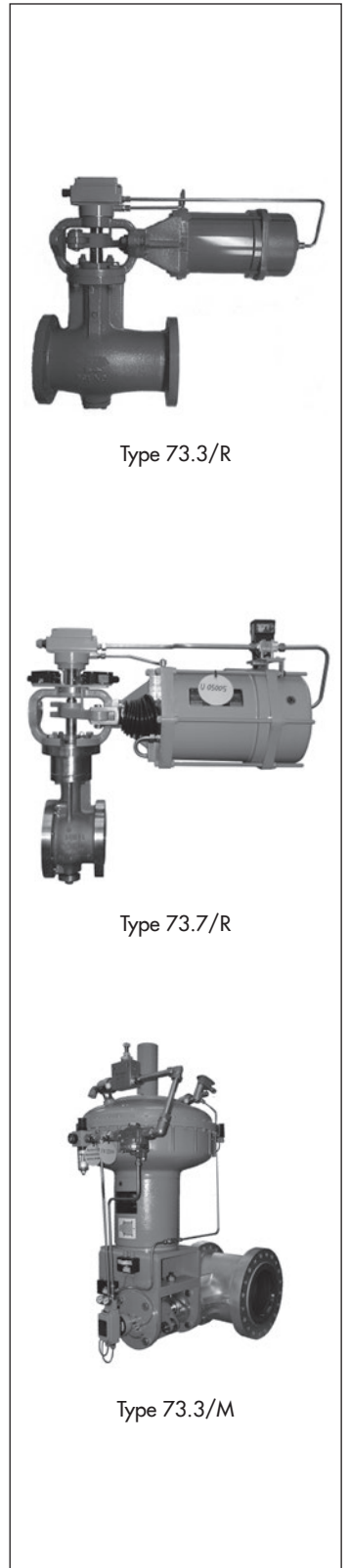
- **Type 73.3/x**: rotary plug valve DN 25 to 250 with Type R or Type M Rotary Actuator, flanged version with flanges with through holes, face-to-face dimensions according to EN 558-1 Series 2
- **Type 73.7/x**: rotary plug valve DN 25 to 400 (NPS 1 to 16) with Type R or Type M Rotary Actuator, flanged version with flanges with through holes, face-to-face dimensions according to EN 558-1 Series 15

#### Technical data

Type		73.3	73.7
Valve size	DN	25 to 250	25 to 500
	NPS	–	1 to 20
Body material	DIN	1.0619, 1.4581	
	ANSI	–	A216 WCC, A351 CF8M
Pressure rating	PN	63 to 160	
	Class	–	600, 900
End connections		Flanges with through holes	Flanges with tapped holes
Face-to-face dimensions		EN 558-1, Series 2	EN 558-1, Series 15
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2		Metal seal: IV-L1	
Characteristic (cam disk in positioner)		Equal percentage, linear	
Rangeability		≥ 200:1	
Temperature range		–100 to +400 °C (–148 to +752 °F)	
Actuator		Type R, Type M	
<b>Data sheets</b>		<b>T 9919</b>	<b>T 9920</b>

#### Further versions

- Double packing or TA Luft packing
- Flange version with groove or tongue
- Lens gasket according to DIN 2696
- Seat, plug and lining made of ceramic



# Pneumatic Control Valves

## Segmented ball valve · Type 3310/31a

### Application

Control valves for process engineering and industrial applications

### Special features

- Valve body in flanged design made of cast steel, cast stainless steel or special alloys
- Metal or soft-seated segmented ball

### Versions

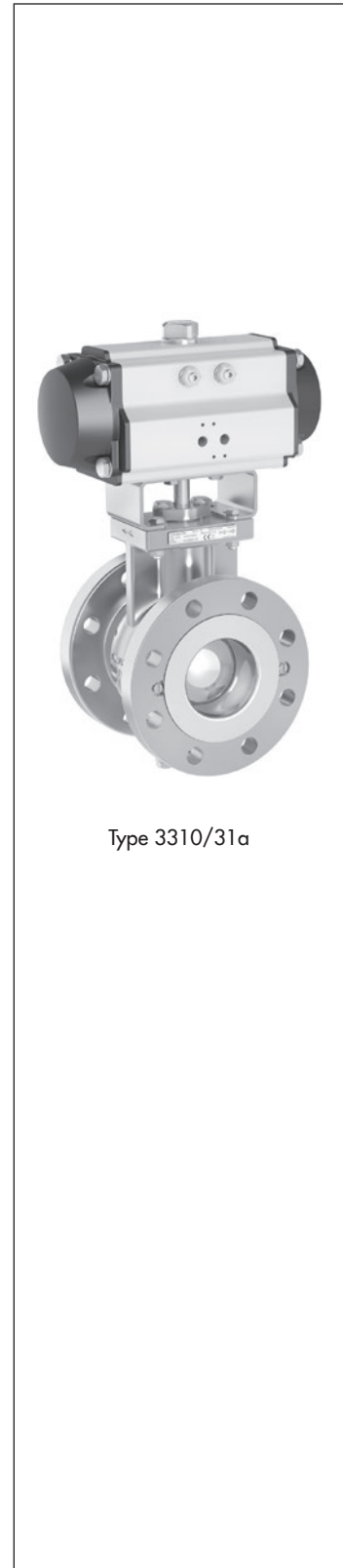
- **Type 3310/31a:** segmented ball valve with single-acting or double-acting Type 31a Pneumatic Piston Actuator
- **Type 3310/3278:** segmented ball valve with single-acting Type 3278 Rotary Actuator

### Technical data

Version	DIN	ANSI
Valve size	DN 25 to 300	NPS 1 to 12
Body material	A216 WCC, A351 CF8M	
Pressure rating	PN 40	Class 150/300
End connections	Flanges according to DIN EN 1092	Flanges according to ASME B16.5
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2	Metal: IV, soft: VI	
Characteristic	Equal percentage, linear	
Rangeability	≥ 100:1	
Temperature ranges	-10 to +220 °C (14 to 752 °F)	-20 to +428 °F (-29 to +220 °C)
Compliance	<b>EN</b>	
Actuator	Type 31a, Type 3278	
Data sheets	<b>T 8222, T 9929, T 8321</b>	

### Further versions

- Double packing with or without leak monitoring
- Manual override or with additional manual override
- Heating jacket
- With insulating section for temperature range from -46 to +450 °C



Type 3310/31a

# Series V2001 Valves

Control valves with pneumatic or electric actuator

Globe valve · Type 3321

Three-way valve · Type 3323



## Application

Control valves designed for mechanical and plant engineering. Suitable for liquids, gases and steam

Optionally as globe or three-way valve according to DIN or ANSI standards

## Versions

- **Type 3321/3323-IP · Electropneumatic control valve:**  
Electropneumatic positioner integrated in Type 3372 Actuator or Type 3725 Positioner, tight-closing function, 4 to 20 mA set point, max. 6 bar supply air, fail-safe action
- **Type 3321/3323-PP · Pneumatic control valve:**  
Pneumatic actuator with fail-safe action
- **Type 3321/3323-E1: · Electric control valve:**  
Type 5824 Electric Actuator for 230/50 Hz and 24 V/50 Hz
- **Type 3321/3323-E3: · Electric control valve:**  
Type 3374 Electric Actuator for 230 V/50 Hz or 60 Hz, 24 V/50 Hz or 60 Hz, optionally with fail-safe action

## Technical data

Body style		Globe valve Type 3321	Three-way valve Type 3323
Valve size	DN	15 to 100	15 to 100
	NPS	½ to 4	½ to 4
Body material	DIN	EN-GJL-250, EN-GJS-400-18-LT, 1.0619, 1.4408	
	ANSI	A216 WCC, A351 CF8M, A126 B	
Pressure rating	PN	16 to 40	
	Class	150, 300	
End connections	DIN	Flanges according to EN 1092	
	ANSI	Flanges RF/FF	
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2		Metal seal: IV Soft seal: VI	Metal seal: I (0.05 % $K_{vs}$ )
Characteristic		Inherent	Linear
Rangeability		Up to 50:1	
Temperature range		-10 to +300 °C (14 to 572 °F)	
Compliance		<b>CE · EAC</b>	
Actuators		Versions for Types 3321/3323-IP, -PP, -E1, -E3	
Data sheets		<b>T 8111, T 8112</b>	<b>T 8113, T 8114</b>

## Further versions

- Insulating section
- Flow divider ST 1 for noise reduction (on request)



Type 3321-IP with integral positioner



Type 3321-IP with 350 cm<sup>2</sup> actuator and Type 3725 Positioner



Type 3323-E1 with Type 5824 Actuator

# Series V2001 Valves

Control valves with pneumatic or electric actuator

Globe valve for heat transfer oil · Type 3531

Three-way valve for heat transfer oil · Type 3535



## Application

Control valves for heat transfer applications using organic media according to DIN 4745  
Optionally as globe or three-way valve according to DIN or ANSI standards

## Versions

- **Type 3531/3535-IP · Electropneumatic control valve for heat transfer oil:**  
Electropneumatic positioner integrated in Type 3372 Actuator or Type 3725 Positioner, tight-closing function, 4 to 20 mA set point, max. 6 bar supply air, fail-safe action
- **Type 3531/3535-PP Pneumatic control valve for heat transfer oil:**  
Pneumatic actuator with fail-safe action
- **Type 3531/3535-E1 · Electric control valve for heat transfer oil:**  
Type 5824 Electric Actuator for 230/50 Hz and 24 V/50 Hz
- **Type 3531/3535-E3 · Electric control valve for heat transfer oil:**  
Type 3374 Electric Actuator for 230 V/50 Hz or 60 Hz, 24 V/50 Hz or 60 Hz, optionally with fail-safe action

## Technical data

Body style		Globe valve Type 3531	Three-way valve Type 3535
Valve size	DN	15 to 80	
	NPS	½ to 3	
Body material	DIN	EN-GJS-400-18-LT, 1.0619, 1.4408	
	ANSI	A395, A216 WCC, A351 CF8M	
Pressure rating	PN	16, 25	
	Class	125, 150	
End connections	DIN	Flanges according to EN 1092	
	ANSI	Flanges RF	
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2		Metal seal: IV	Metal seal: I (0.05 % K <sub>V5</sub> )
Characteristic		Equal percentage	Linear
Rangeability		50:1	Up to 50:1
Temperature range		-10 to +350 °C (14 to 660 °F), on request: up to -70 °C (-94 °F)	
Compliance		<b>CE · EAC</b>	
Recommended actuators		Versions for Types 3531/3535-IP, -PP, -E1, -E3	
Data sheets		<b>T 8131, T 8132</b>	<b>T 8135, T 8136</b>

## Further versions

- Explosion-protected version with electric actuators (on request)



Type 3531-PP with actuator and  
Type 4744-2 Limit Switch



Type 3535-E3 with Type 3374  
Actuator

# Electric and Pneumatic Control Valves

Globe valves · Types 3213/3214/3222/3222 N/3260

Three-way valves · Types 3260 and 3226



## Application

Globe and three-way valves for heating, ventilation and air-conditioning

Electric or pneumatic control valves with:

- Electric actuators
- Electric actuators with process controllers
- Pneumatic actuators

The electric actuators with process controller have integrated digital controller. The controlled variable is measured by a directly connected Pt 1000 sensor and the output signal is transferred to the actuator stem as the positioning force.

## Recommended valve/electric actuator combinations

Actuator type	5824	5825 <sup>1)</sup>	5857	3374 <sup>1)</sup>	3375	3274 <sup>1)</sup>
<b>Globe valve in valve size DN</b>						
<b>Type 3213</b>	15 to 50 <sup>2)</sup>	15 to 50 <sup>2)</sup>	15 to 25	–	–	–
<b>Type 3214</b>	15 to 50	15 to 50	–	65 to 250	300 to 400	125 to 250
<b>Type 3222</b>	15 to 50	15 to 50	15 to 25	–	–	–
<b>Type 3222 N</b>	–	–	15	–	–	–
<b>Type 3260</b>	–	–	–	65 to 150	–	65 to 150
<b>Three-way valve in valve size DN</b>						
<b>Type 3226</b>	15 to 50	15 to 50	15 to 25	–	–	–
<b>Type 3260</b>	15 to 80	15 to 50	15 to 25	65 to 150	200 to 300	65 to 150

<sup>1)</sup> Electric globe valves tested according to DIN EN 14597 with Type 5825, Type 3374 or Type 3274 Actuator (with fail-safe action "actuator stem extends"). See Data Sheet T 5869 (electric control valves with Type 5825, Type 3374 or Type 3274 Actuators with fail-safe action)

<sup>2)</sup> DN 15 to 25 with PN 25 pressure rating, DN 32 to 50 with PN 16 pressure rating

## Recommended valve/electric actuator with process controller combinations

TROVIS	5724-3	5725-3 <sup>1)</sup>	5725-7 <sup>1)</sup>	5757-3	5757-7	5724-8	5725-8
<b>Globe valve in valve size DN</b>							
<b>Type 3213</b>	15 to 50 <sup>2)</sup>	15 to 50 <sup>2)</sup>	15 to 50 <sup>2)</sup>	15 to 25	–	15 to 50 <sup>2)</sup>	15 to 50 <sup>2)</sup>
<b>Type 3214</b>	15 to 50	15 to 50	15 to 50	–	–	15 to 50	15 to 50
<b>Type 3222</b>	15 to 50	15 to 50	15 to 50	15 to 25	15 to 25	15 to 50	15 to 50
<b>Type 3222 N</b>	–	–	–	15	15	–	–
<b>Three-way valve in valve size DN</b>							
<b>Type 3226</b>	–	–	15 to 50	–	15 to 25	15 to 50	15 to 50
<b>Type 3260</b>	–	–	15 to 50	–	15 to 25	15 to 50	15 to 50

<sup>1)</sup> The TROVIS 5725-3, 5725-7 and 5725-8 Actuators combined with the listed globe valves are tested according to DIN EN 14597 (for fail-safe action "actuator stem extends"). See Data Sheet T 5869

<sup>2)</sup> DN 15 to 25 with PN 25 pressure rating, DN 32 to 50 with PN 16 pressure rating



Type 3213 with Type 5825 Actuator



Type 3214 with Type 3374 Actuator



Type 3260 with Type 5824 Actuator



## Recommended valve/pneumatic actuator combinations

Actuator type	2780-1	2780-2	3271	3277	3372
<b>Globe valve in valve size DN</b>					
Type 3213	15 to 50 <sup>1)</sup>	15 to 50 <sup>1)</sup>	–	–	–
Type 3214	–	65 to 100	–	–	–
Type 3222	15 to 50	15 to 50	–	–	–
Type 3222 N	–	–	–	–	–
Type 3260	–	–	65 to 150	65 to 150	65, 80
<b>Three-way valve in valve size DN</b>					
Type 3226	15 to 50	15 to 50	–	–	–
Type 3260	15 to 50	15 to 50	65 to 300	65 to 150	–

<sup>1)</sup> DN 15 to 25 with PN 25 pressure rating, DN 32 to 50 with PN 16 pressure rating

## Type 3213 and Type 3214 Globe Valves

### Technical data

Globe valve	Type	3213	3214
Valve size	DN	15 to 50	15 to 400
Pressure rating	PN	16, 25	16 to 40
Body material		EN-GJL-250 EN-GJS-400-18-LT	EN-GJL-250 EN-GJS-400-18-LT 1.0619
End connections	DIN	Flanges	
Seat-plug seal, Leakage class according to IEC 60534-4		I	I
Temperature range		Up to 200 °C	Up to 220 °C
Compliance		<b>CE · EAC</b>	
Data sheets		<b>T 5868, T 5869</b>	

## Type 3222 and Type 3222 N Globe Valves

### Technical data

Globe valve	Type	3222	3222 N
Valve size	DN	15 to 50	15
Pressure rating	PN	25	16
Body material		Red brass CC499K, EN-GJS-400-18-LT	Brass, CW602N
End connections	DIN	Welding ends, threaded ends, flanges, female thread	ISO 228/1-G ¾ B, welding ends, threaded ends, soldering ends
Leakage class according to IEC 60534-4		I	
Temperature range		Up to 200 °C	Up to 120 °C
Compliance		<b>CE · EAC</b>	
Data sheets		<b>T 5866</b>	<b>T 5867</b>

### Further versions

- **Type 3222:** globe valve with balanced plug



Type 3222/2780-2



Type 3222/5825  
Version with flanged body



Type 3222/5824




Type 3214/5825

## Type 3260 Three-way Valve

## Type 3226 Three-way Valve

### Technical data

Type		3260 Globe valve	3260 Three-way valve	3226 Three-way valve
Valve size	DN	65 to 150	15 to 300	15 to 50
Pressure rating	PN	16		25
Body material		EN-GJL-250		Red brass CC499K
End connections	DIN	Flanges		Welding ends, threaded ends, flanges, female thread
Leakage class according to IEC 60534-4		IV		
Temperature range		Up to 150 °C		Up to 150 °C
Compliance				
Data sheets		T 5862	T 5861	T 5863

### Further versions

- Type 3226 also available as DVGW version in PN 10 for temperatures up to 90 °C



Type 3222/5757 with welding ends



Type 3222/5725 with flanged body



Type 3222 N/5757



Type 3226/5757 with female thread



Type 3226/5724 with female thread

# Pneumatic Actuators

## Pneumatic actuators · Type 3277 and Type 3271

### Application

Single-acting linear actuators for control valves used in process engineering and industrial applications as well as in heating, ventilation and air-conditioning systems, especially for attachment to SAMSON Types 3213, 3222, 3321, 3531, 3226, 3260, 3323, 3535 Valves and valves of the Series 240, 250, 280, 290 and 590.

### Special features

- Diaphragm actuators with internal compression springs
- Fail-safe action "Actuator stem extends" or "Actuator stem retracts"
- Easily reversible direction of action
- Low friction due to rolling diaphragm
- Direct attachment to Type 3277 guarantees accurate attachment of accessories as well as concealed linkage

### Versions

- **Type 3277:** pneumatic actuator for direct attachment of a positioner, limit switch or position transmitter
- **Type 3271:** pneumatic actuator with diaphragm areas from 120 cm<sup>2</sup> used for the micro-flow valve up to 2 x 2800 cm<sup>2</sup> with tandem actuators

### Technical data

Type	3277 · 3271			
Actuator area	cm <sup>2</sup>	120	175v2, 355v2, 750v2	240, 350, 700
Diaphragm <sup>1)</sup>		–	Full	Clamped-in
Max. supply pressure	bar	6 <sup>2)</sup>		
Rated travel	mm	7.5 to 30		
Fail-safe action		Reversible		
Temperature range with diaphragm material	NBR	–35 to +80 °C <sup>3), 5)</sup>	–35 to +90 °C <sup>3), 5)</sup>	–35 to +90 °C <sup>3), 5)</sup>
	EPDM	–	–50 to +120 °C <sup>4), 5)</sup>	–50 to +120 °C <sup>4), 5)</sup>
	PVMQ	–	–60 to +90 °C <sup>5)</sup>	–
Compliance		<b>ERC</b>		
<b>Materials</b>				
Actuator stem		1.4305	1.4404	1.4404
Actuator stem sealing		NBR	NBR	NBR
			EPDM	EPDM
Painted diaphragm cases		Die-cast aluminum	Sheet steel	
<b>Data sheet</b>		<b>T 8310-1</b>		



Type 3277 for direct attachment



Type 3271 Actuator



Type 3277-5 Actuator (120 cm<sup>2</sup>) with Type 3510 Valve and Type 3725 Positioner

Type		3271			
Actuator area	cm <sup>2</sup>	1000	1400-120	2800	2x 2800
Max. supply pressure	bar	6			
Rated travel	mm	Up to 120 mm			
Fail-safe action		Reversible			
Temperature range with diaphragm material	NBR	-35 to +90 °C			
	PVMQ	-60 to +90 °C			
Compliance		EAC			
<b>Materials</b>					
Actuator stem		1.4548.4	1.4404	1.4548.4	1.4548.4
Actuator stem sealing		NBR	NBR	NBR	NBR
		EPDM	PVMQ	PVMQ	PVMQ
Housing		Sheet steel, sheet stainless steel	Painted cast steel		
Data sheet		T 8310-2			

Type		3271			
Actuator area	cm <sup>2</sup>	1400-60			
Max. supply pressure	bar	6			
Rated travel	mm	Up to 60 mm			
Fail-safe action		Reversible			
Temperature range with diaphragm material	NBR	-35 to +90 °C			
	EPDM	-50 to +120 °C			
Compliance		EAC			
<b>Materials</b>					
Actuator stem		1.4404			
Actuator stem sealing		NBR			
		EPDM			
Housing		Sheet steel, plastic-coated			
Data sheet		T 8310-3			

**Further versions with** additional handwheel or travel stop for Types 3277 and 3271 Actuators



Type 3271 (1000 cm<sup>2</sup>)



Type 3271 (1400-60 cm<sup>2</sup>)  
on Type 3251 Valve

- 1) **v2** is added to the diaphragm area (e.g. 175v2 cm<sup>2</sup>) to indicate actuators with a full diaphragm
- 2) Observe supply pressure restrictions. See Data Sheet T 8310-1.
- 3) In on/off service, lowest temperature restricted to -20 °C
- 4) In on/off service, lowest temperature restricted to -40 °C
- 5) Install vent plug for temperatures below -20 °C. See Application Notes AB 07.

# Pneumatic Actuators for the Food and Pharmaceutical Industries

## Pneumatic actuator · Type 3379

### Application

The Type 3379 Pneumatic Actuator (with spring-return mechanism) is used in conjunction with a valve suitable for the food and pharmaceutical industries.

### Special features

- Can be combined with Type 3347 Hygienic Valve or Type 3349 Aseptic Valve
- Smooth stainless steel surfaces for easy cleaning
- All moving parts located inside the housing to improve safety
- Visual indicator for the valve position
- Internal air routing to prevent air or water from entering the device

### Versions

- **Type 3379-00:** combined with Type 3724 Electropneumatic Positioner
- **Type 3379-01:** actuator for on/off service
- **Type 3379-02:** combined with Type 4740 Electric Limit Switch

### Technical data

Type	3379	63 mm piston diameter · 31 cm <sup>2</sup> diaphragm area			
Rated travel	mm	15			
Permissible ambient temperature	°C	0 to 60			
Max. supply pressure	bar	7			
Hysteresis	bar	0.4			
Fail-safe position		Stem extends (FA)		Stem retracts (FE)	
Number of springs		1		1	
Travel	mm	15	7.5	15	7.5
Thrust	N	720			
<b>EB</b>		<b>EB 8315</b>			

Type	3379	90 mm piston diameter · 63 cm <sup>2</sup> diaphragm area							
Rated travel	mm	15							
Permissible ambient temperature	°C	0 to 60							
Max. supply pressure	bar	7							
Hysteresis	bar	0.3/0.5/0.6							
Fail-safe position		Stem extends (FA)				Stem retracts (FE)			
Number of springs		2		1		1		1	
Travel	mm	15	7.5	15	7.5	15	7.5	15	7.5
Thrust	N	2090		1590		2580		1320	
<b>EB</b>		<b>EB 8315</b>							



Type 3379



Type 3379 with Type 3724 Positioner

# Pneumatic Actuators

## Pneumatic rotary actuators · Type 3278 and PFEIFFER Type 31a

### Application

Pneumatic actuators for butterfly valves and other final control elements with rotating closure member. Suitable for throttling or on/off service.

### Special features

- Various signal pressure ranges
- Attachment of positioners, limit switches or solenoid valves and other accessories according to VDI/VDE 3845
- Travel stops externally adjustable to limit the opening angle
- No special tools required for mounting and conversion

### Versions

- **Type 3278:** single-acting pneumatic rotary actuator with rolling diaphragm and internal compression springs, operating direction (fail-open or fail-close) as required
- **PFEIFFER Type 31a:** pneumatic piston actuator with clearance-free power transmission achieved by using involute gearing and special surface finish  
SRP - single acting with fail-safe action  
DAP - double acting without fail-safe action

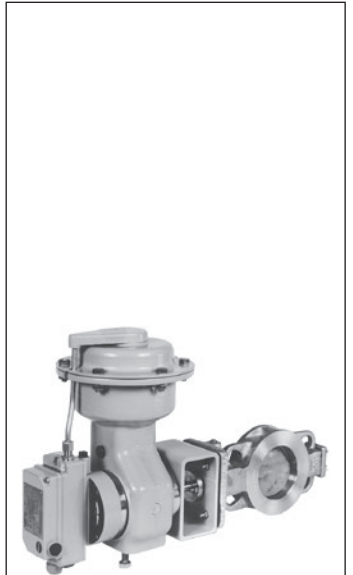
### Technical data

Type	3278	Type 31a	
Version and principle of operation	Single-acting	SRP Single-acting	DAP Double-acting
Connection	Key drive	Square drive	
Diaphragm area/size	Diaphragm area 160 cm <sup>2</sup> , 320 cm <sup>2</sup>	Size 15 to 10000	
Max. supply pressure bar	6	10	
Opening angle	90°	90°/120°/180°	
Fail-safe action	Reversible	Reversible	Without
Temperature range	-35 to +90 °C	-40 to +80 °C	
With special material		-20 to +150 °C, -50 to +80 °C	
Compliance	<b>ERC</b>		
<b>Materials</b>			
Housing	EN-GJS-400-18-LT	AlMgSi0.5 F25	
Diaphragm/piston	NBR	GD AlSi8Cu3	
<b>Data sheets</b>	<b>T 8321</b>	<b>T 9929</b>	

### Accessories

The pneumatic actuators can be equipped with positioners, limit switches, resistance transmitters and solenoid valves.

**Further versions** with additional handwheel



Type 3278 with butterfly valve and positioner



Type 31a

# Electric Actuators

Electric actuators · Types 5824, 5825, 5857, 3374 and 3375

Electrohydraulic actuator · Type 3274



## Application

Electric actuators designed for attachment to valves used in HVAC, process engineering and industrial energy transfer systems

## Versions

- **Type 5824:** Electric actuator
- **Type 5825:** Electric actuator with fail-safe action
- **Type 5857:** Electric actuator
- **Type 3374:** Electric actuator optionally with fail-safe action
- **Type 3375:** Electric actuator with manual override (handwheel)
- **Type 3274:** Electrohydraulic actuator, optionally with fail-safe action

## Technical data for Types 5824, 5825 and 5857

Type	5824	5825	5857	
Rated travel	mm	6, 12, 15	6	
Max. thrust	N	700	280, 500	300
Fail-safe action	–	•	–	
Manual override	•	• 1)	•	
Supply voltage	230 V, 50 Hz 24 V, 50 Hz 120 V, 60 Hz		230 V, 50 Hz 24 V, 50 Hz	
Permissible ambient temperature	0 to 50 °C			
Compliance	CE · EAC			
<b>Additional electrical equipment</b>				
Positioner	Digital		Digital	
Limit contacts	2		–	
Resistance transmitters	1		–	
<b>Data sheets</b>	<b>T 5824</b>		<b>T 5857</b>	

1) With an Allen key after removing the cover



Type 5824/5825



Type 5857

## Technical data for Types 3374, 3375 and 3274

Type		3374	3375	3274
Rated travel	mm	15, 30	30, 60	15, 30
Max. thrust	N	2500	12500	7700
Fail-safe action		•	– <sup>1)</sup>	•
Manual override		•	•	•
Supply voltage		230 V/50 or 60 Hz 24 V/50 or 60 Hz 120 V/60 Hz	230 V/50 or 60 Hz	230 V/50 or 60 Hz 24 V/50 or 60 Hz 120 V/50 or 60 Hz
Permissible ambient temperature		5 to 60 °C	5 to 60 °C	–10 to +60 °C
Compliance		<b>CE · ENEC</b>		
<b>Additional electrical equipment</b>				
Positioner		Digital	Digital	Analog
Limit contacts		2	2	Max. 3
Resistance transmitters		2	2	Max. 2
<b>Data sheets</b>		<b>T 8331</b>	<b>T 8332</b>	<b>T 8340</b>

<sup>1)</sup> Version with fail-safe action in preparation

### Further versions

The Types 5825, 3274 and 3374 Actuators with fail-safe action "actuator stem extends" are tested by the German technical surveillance association (TÜV) according to DIN EN 14597 in combination with various SAMSON valves.



Type 3374



Type 3375



Type 3274



# Electric Actuators with Process Controllers

## DHW heating

TROVIS 5724-3 · TROVIS 5725-3 with fail-safe action · TROVIS 5757-3

## Heating and cooling applications

TROVIS 5757-7 · TROVIS 5725-7 with fail-safe action

TROVIS 5724-8 · TROVIS 5725-8 with fail-safe action



### Application

Electric actuators with integrated digital controller for heating, ventilation and air-conditioning systems · TROVIS 5724-8 and TROVIS 5725-8 also suitable for light industrial applications

### Special features

- Linear actuator with integrated digital controller
- Easy installation
- Torque-dependent limit contacts
- Temperature measured by Pt 1000 sensor
- Configuration, parameterization, diagnostic function and direct connection for monitoring using the TROVIS-VIEW software
- Data transmission using a memory pen

### Versions for domestic hot water heating

- **TROVIS 5724-3 and TROVIS 5725-3:** designed for DHW heating in instantaneous heating systems for small to medium-sized buildings connected to local supply or district heating networks.

Suitable for Types 3213, 3214 and 3222 Valves in DN 15 to 50.

TROVIS 5725 with fail-safe action

Details in Data Sheet T 5724

- **TROVIS 5757-3:** suitable for Types 3222, 3222 N, 2488 and 3267 Valves in DN 15 to 25.

Details in Data Sheet T 5757

### Version for heating and cooling applications

- **TROVIS 5757-7:** designed for installations in small to medium-sized buildings for outdoor-temperature-compensated control, fixed set point control or fixed set point control with room temperature sensors.

Suitable for Types 3222, 3222 N, 2488, 3267, 3266 and 3260 Valves in DN 15 to 25.

Details in Data Sheet T 5757-7

- **TROVIS 5725-7:** with fail-safe action "actuator stem extends" or "actuator stem retracts"

Suitable for Types 3213, 3214, 3260, 3222 and 3226 Valves in DN 15 to 50.

Details in Data Sheet T 5725-7

- **TROVIS 5724-8 and TROVIS 5725-8:** universal process control unit with two PID control modules for fixed set point, follow-up, override and cascade control · Fast start-up using system code numbers · Ready-wired sensors and control line · Communication over Bluetooth® · Suitable for Types 3213, 3214, 3260, 3222 and 3226 Valves in DN 15 to 50

Details in Data Sheet T 5724-8



TROVIS 5724



TROVIS 5757-3



TROVIS 5757-7



TROVIS 5724-8

### **Accessories for communication**

- TROVIS-VIEW software
- Memory pen-64 (order no. 1400-9753)
- Connecting cable (order no. 1400-7699)
- Modular adapter (order no. 1400-7698)
- USB to RS-232 adapter (order no. 8812-2001)

### **Accessories for domestic hot water heating**

(ready-wired in TROVIS 5724-8 and TROVIS 5725-8)

- Type 5207-0060 Pt 1000 Sensor (fast response)
- Sensor pocket (order no. 1400-9249)
- Water flow sensor (1400-9246)

### **Accessories for heating and cooling applications**

- Type 5267-2 Contact Sensor (Pt 1000)
- Type 5257-2 Room Sensor (Pt 1000) with potentiometer
- Type 5257-7 Room Panel (Pt 1000) with potentiometer and mode selector switch
- Type 5227-2 Outdoor Sensor (Pt 1000)
- Mounting kit for a Pt 1000 cable sensor as contact sensor, order no. 8524-0020
- Brass thermowell, G ½, immersion length 80 mm, PN 16, order no. 1099-0807
- CrNiMo steel thermowell, G ½, immersion length 80 mm, PN 40, order no. 1099-0805
- CrNiMo steel thermowell, G ½, immersion length 250 mm, PN 40, order no. 1099-0806
- Brass thermowell, G ½, immersion length 160 mm, PN 16, order no. 8525-5005
- CrNiMo steel thermowell, G ½, immersion length 160 mm, PN 40, order no. 8525-5011

### **Accessories for binary control (TROVIS 5724-8 and TROVIS 5725-8)**

- Single-channel digital time switch with weekly program, Theben TR610 top2 G, order no. 1402-1017

# Pneumatic and Electropneumatic Positioners

Positioners · Types 4765/4763 and Types 3766/3767



## Application

Positioners for attachment to pneumatic control valves

## Versions

- **Type 4765/4763:** positioners for attachment according to IEC 60534
- **Type 3766/3767:** positioners for direct attachment to Type 3277 Actuators as well as for attachment according to IEC 60534 or for attachment to rotary actuators according to VDI/VDE 3845

## Technical data

Type	4765	4763	3766	3767
Principle of operation				
Pneumatic	•	–	•	–
Electropneumatic	–	•	–	•
Rated travel	mm 7.5 to 90		7.5 to 120	
Opening angle	–		Up to 90°	
Set point				
0.2 to 1 bar	•	–	•	–
0/4 to 20 mA	–	•	–	•
1 to 5 mA	–	•	–	•
Supply air	Supply air	1.4 to 6 bar (20 to 90 psi)		
Max. output	Signal pressure	0 to 6 bar (0 to 90 psi)		
Characteristic	Linear			
Permissible ambient temperature	–20 to +80 °C	–20 to +70 °C <sup>3)</sup>	–20 to +80 °C	
	Extended temperature range down to –40 °C on request			
Degree of protection	IP 54/IP 65		IP 54/IP 65/NEMA 4X	
Compliance	EAC		CE · EAC	
<b>Explosion protection</b> (further approvals according to national and international guidelines listed in data sheet)				
ATEX Ex ia	–	•	•	•
ATEX Ex d	• <sup>1)</sup>	• <sup>2)</sup>	• <sup>1)</sup>	• <sup>2)</sup>
FM/CSA	–	•	•	•
<b>Additional electrical equipment</b>				
Limit contact	–	–	2 (inductive)	
Solenoid valve	–	–	•	
Position transmitter	–	–	• <sup>4)</sup>	
<b>Options</b>				
Pressure gauge	•	•	–	–
Data sheets	T 8359		T 8355	

- 1) Flameproof enclosure in combination with Type 6116 i/p Converter
- 2) Flameproof enclosure in combination with Type 3770 Field Barrier
- 3) Maximum temperature range depending on which i/p converter is used. See T 8359
- 4) Available until March 2011



Type 4763



Type 3766 with  
Type 6116 i/p Converter (Ex d)

# Electronic and Digital Positioners

Electropneumatic positioners · TROVIS 3730-1, Types 3725, 3730-0, 3730-1 and 3730-2

Electropneumatic positioners (HART®) · TROVIS 3730-3, TROVIS 3793, Types 3730-3, 3731-3, 3730-6

Electropneumatic positioner (PROFIBUS-PA) · Type 3730-4

Electropneumatic positioners (FOUNDATION™ fieldbus) · Types 3730-5 and 3731-5

EXPERTplus valve diagnostics · Type 3770 Field Barrier



## Application

Single-acting or double-acting positioners for attachment to pneumatic linear or rotary actuators. Self-calibrating, automatic adaptation to the control valve (except for Type 3730-0), for SAMSON direct attachment, attachment to NAMUR rib or attachment to rod-type yoke according to IEC 60534 as well as attachment to rotary actuators according to VDI/VDE.

### Electropneumatic positioners (see overview on p. 76 for technical data)

- **TROVIS 3730-1:** positioner from the latest generation of positioners. No-wear, non-contact position sensing for attachment to pneumatic globe and rotary valves. On-site operation over rotary pushbutton, multilingual plain-text display. Start-up with automatic initialization procedure. Configuration options over serial interface and the TROVIS-VIEW software, optional additional functions, such as limit contacts or position transmitter. Housing identical to Type 3730-x (identical attachment dimensions).
- **Type 3725:** positioner for attachment to pneumatic globe and rotary valves
- **Type 3730-0:** low-priced positioner version for all globe valves. Travel range setting over DIP switches
- **Type 3730-1:** universal positioner with LCD and on-site operation over rotary pushbutton for globe valves and rotary valves. Start-up with automatic initialization procedure.
- **Type 3730-2:** positioner same as Type 3730-1, but additionally with integrated EXPERTplus valve diagnostics, configuration options over serial interface and the TROVIS-VIEW software

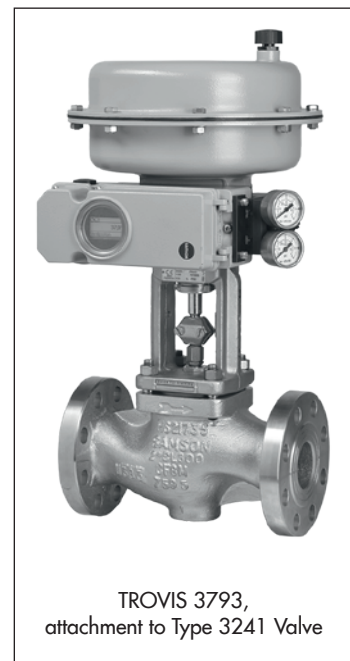
### Electropneumatic positioners with HART® communication (see overview on p. 76 for technical data)

- **TROVIS 3730-3:** positioner from the latest generation of positioners. No-wear, non-contact position sensing for attachment to pneumatic globe and rotary valves. On-site operation over rotary pushbutton, multilingual plain-text display. Start-up with automatic initialization procedure, additionally with integrated EXPERTplus valve diagnostics. Configuration options over serial interface and the TROVIS-VIEW software, optional additional functions, such as limit contacts or position transmitter. Housing identical to Type 3730-x (identical attachment dimensions).
- **TROVIS 3793:** electropneumatic positioner in modular design, with high air capacity, on-site operation over rotary pushbutton, multilingual plain-text display. Start-up with automatic initialization procedure, additionally with integrated EXPERTplus valve diagnostics, configuration options over serial interface and the TROVIS-VIEW software, optional additional functions, such as limit contacts, position feedback or binary inputs and outputs, retrofittable as option modules, pressure sensors.
- **Type 3730-0:** universal electropneumatic positioner with LCD and on-site operation over rotary pushbutton for globe valves and rotary valves. Start-up with automatic initialization procedure, additionally with integrated EXPERTplus valve diagnostics, configuration options over serial interface and the TROVIS-VIEW software
- **Type 3731-3:** flameproof electropneumatic positioner, local communication with SSP interface, operable on site with LCD, integrated EXPERTplus valve diagnostics
- **Type 3730-6:** electropneumatic positioner same as Type 3730-3, but additionally with pressure sensors



### Positioners with PROFIBUS-PA communication

- **Type 3730-4:** universal electropneumatic positioner with LCD and on-site operation over rotary pushbutton for globe valves and rotary valves. Start-up with automatic initialization procedure, additionally with integrated EXPERTplus valve diagnostics, configuration options over serial interface and the TROVIS-VIEW software, transmission technology according to IEC 61158-2, Profile Class B (version 3.0)



TROVIS 3793,  
attachment to Type 3241 Valve

### Technical data · Overview of electropneumatic positioners

Positioners	TROVIS 3730-1	TROVIS 3730-3	TROVIS 3793	Type 3725	Type 3730-0	Type 3730-1	
Rated travel mm	3.5 to 300	3.6 to 300	3.6 to 300	3.75 to 50	5.3 to 200	3.75 to 200	
Opening angle	24 to 100°	24 to 100°	24 to 170°	24 to 100°	–	24 to 100°	
Set point	4 to 20 mA	4 to 20 mA	4 to 20 mA	4 to 20 mA	4 to 20 mA	4 to 20 mA	
Supply air	1.4 to 7 bar (20 to 105 psi)	1.4 to 7 bar (20 to 105 psi)	2.5 to 10 bar 30 to 150 psi	1.4 to 7 bar (20 to 105 psi)	1.4 to 7 bar (20 to 105 psi)	1.4 to 7 bar (20 to 105 psi)	
Signal pressure output (max.)	0 to 7 bar (0 to 105 psi)	0 to 7 bar (0 to 105 psi)	0 to 10 bar 0 to 150 psi	0 to 7 bar (0 to 105 psi)	0 to 7 bar (0 to 105 psi)	0 to 7 bar (0 to 105 psi)	
Characteristic	Adjustable	Adjustable	Adjustable	Adjustable	Linear	Adjustable	
Permissible ambient temperature	–55 to +85 °C	–55 to +85 °C	–55 to +85 °C	–25 to +80 °C	–45 to +80 °C	–45 to +80 °C	
Degree of protection	IP 66/NEMA 4X	IP 66/NEMA 4X	IP 66	IP 66	IP 66/NEMA 4X	IP 66/NEMA 4X	
Compliance	<b>CE</b>	<b>CE</b>	<b>CE · EAC</b>	<b>CE · EAC</b>	<b>CE · EAC</b>	<b>CE · EAC</b>	
Communication	–	HART®	HART®	–	–	–	
<b>Explosion protection</b> (further approvals according to national and international guidelines listed in data sheet)							
ATEX Ex ia	•	•	•	•	•	•	
ATEX Ex d	–	–	–	–	• 1)	• 1)	
IECEX	–	•	•	–	–	•	
FM	–	–	•	–	•	•	
CSA	–	–	–	•	•	•	
<b>Additional electrical equipment</b>							
Limit contact	•	•	•	–	–	•	
Position transmitter	•	•	•	–	–	–	
Solenoid valve	–	–	–	–	–	–	
Forced venting function	–	•	•	–	–	–	
Ext. position sensor	–	•	–	–	–	–	
Analog input	–	–	–	–	–	–	
Binary input	–	•	•	–	–	–	
Binary output	–	•	•	–	–	–	
Leakage sensor	–	–	–	–	–	–	
<b>Data sheets</b>	<b>T 8484-1</b>	<b>T 8484-3</b>	<b>T 8493</b>	<b>T 8394</b>	<b>T 8384-0</b>	<b>T 8384-1</b>	

1) Flameproof enclosure in combination with Type 3770 Field Barrier

### Electropneumatic positioners with FOUNDATION™ fieldbus communication

- **Type 3730-5:** positioner same as Type 3730-4, IEC 61158-2 transmission technology  
Integrated function blocks: PID Process Controller, Analog Output (AO), two Discrete Inputs (DI) and Link Master Capability
- **Type 3731-5:** flameproof, bus-powered positioner with communication according to FOUNDATION™ fieldbus specification, integrated EXPERTplus valve diagnostics



	Type 3730-2	Type 3730-3	Type 3730-4	Type 3730-5	Type 3730-6	Type 3731-3	Type 3731-5
	3.6 to 300	3.6 to 300	3.6 to 300	3.6 to 300	3.6 to 300	3.6 to 200	3.6 to 200
	24 to 100°	24 to 100°	24 to 100°	24 to 100°	24 to 100°	24 to 100°	24 to 100°
	4 to 20 mA	4 to 20 mA	15 mA	15 mA	4 to 20 mA	4 to 20 mA	15 mA
	1.4 to 7 bar (20 to 105 psi)	1.4 to 7 bar (20 to 105 psi)	1.4 to 7 bar (20 to 105 psi)	1.4 to 7 bar (20 to 105 psi)	1.4 to 7 bar (20 to 105 psi)	1.4 to 6 bar (20 to 90 psi)	1.4 to 6 bar (20 to 90 psi)
	0 to 7 bar (0 to 105 psi)	0 to 7 bar (0 to 105 psi)	0 to 7 bar (0 to 105 psi)	0 to 7 bar (0 to 105 psi)	0 to 7 bar (0 to 105 psi)	0 to 6 bar (0 to 90 psi)	0 to 6 bar (0 to 90 psi)
	Adjustable	Adjustable	Adjustable	Adjustable	Adjustable	Adjustable	Adjustable
	–45 to +80 °C	–45 to +80 °C	–45 to +80 °C	–45 to +80 °C	–45 to +80 °C	–40 to +80 °C	–40 to +80 °C
	IP 66/NEMA 4X	IP 66/NEMA 4X	IP 66/NEMA 4X	IP 66/NEMA 4X	IP 66/NEMA 4X	IP 66/NEMA 4X	IP 66/NEMA 4X
	<b>CE · EAC</b>	<b>CE · EAC</b>	<b>CE · EAC</b>	<b>CE · EAC</b>	<b>CE · EAC</b>	<b>CE · EAC</b>	<b>CE · EAC</b>
	–	HART®	PROFIBUS	FOUNDATION™ fieldbus	HART®	HART®	FOUNDATION™ fieldbus
	•	•	•	•	•	–	–
	• 1)	• 1)	–	–	• 1)	•	•
	•	•	•	•	•	•	•
	•	•	•	•	•	–	–
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	<b>T 8384-2</b>	<b>T 8384-3</b>	<b>T 8384-4</b>	<b>T 8384-5</b>	<b>T 8384-6</b>	<b>T 8387-3</b>	<b>T 8387-5</b>

## TROVIS-VIEW

Universal configuration and user interface for various smart SAMSON instruments, such as positioners, industrial and heating controllers, electric actuators, electric actuators with process controller and differential pressure meters.

The TROVIS-VIEW software is available for downloading free of charge from our website ([www.samson.de](http://www.samson.de)) at Service & Support > Downloads > TROVIS-VIEW.

See Data Sheet T 6661 for more details.

Positioners	Operation using TROVIS-VIEW
TROVIS 3730-1	•
TROVIS 3730-3	•
TROVIS 3793	•
Type 3725	–
Type 3730-0	–
Type 3730-1	–
Type 3730-2	–
Type 3730-3	•
Type 3730-4	•
Type 3730-5	•
Type 3730-6	•
Type 3731-3	•
Type 3731-6	•

## EXPERTplus valve diagnostics

Firmware for Series 3730, 3731 and 3793 Positioners for early recognition of valve faults, issuing recommended action for predictive maintenance. The diagnostic functions are completely integrated into the positioner (see T 8389 and T 8389-1).

The TROVIS-VIEW software (see T 6661) and FDT/DTM engineering tools allow operation and compiled data to be viewed.

## Type 3770 Field Barrier with explosion protection Ex d/Ex i

Field barrier with flameproof enclosure serving as an interface between intrinsically safe and non-intrinsically safe circuits in hazardous areas. The field barrier is suitable for operating positioners, smart positioners with HART® communication, i/p converters, solenoid valves or limit switches (see Data Sheet T 8379).



Type 3770

# Digital Positioners for Safety-instrumented Systems

Electropneumatic positioners (HART®) · TROVIS SAFE 3730-6, TROVIS SAFE 3731-3 and TROVIS SAFE 3793



## Application

Single-acting or double-acting positioners for attachment to pneumatic linear or rotary actuators. Self-calibrating, automatic adaptation to the control valve. Discrete analysis of the set point with automated partial stroke testing. Use in safety-instrumented systems according to IEC 61511 up to SIL 2 (single device/HFT = 0) and SIL 3 (redundant configuration/HFT = 1)

- **TROVIS SAFE 3730-6:** positioner same as Type 3730-6 with special use for control of on/off valves in safety-instrumented systems
- **TROVIS SAFE 3731-3:** flameproof positioner same as Type 3731-3 with special use for control of on/off valves in safety-instrumented systems
- **TROVIS SAFE 3730-6:** positioner same as Type 3730-6 with special use for control of on/off valves in safety-instrumented systems

## Technical data

TROVIS SAFE	3730-6	3731-3	3793
Rated travel	3.6 to 300 mm	3.6 to 200 mm	3.6 to 300 mm
Opening angle	24 to 100°	24 to 100°	24 to 170°
Set point	4 to 20 mA	4 to 20 mA	4 to 20 mA
Communication	HART®	HART®	HART®
Supply air	1.4 to 7 bar (20 to 105 psi)	6 bar (105 psi)	2.5 to 10 bar (30 to 150 psi)
Signal pressure output (max.)	7 bar (105 psi)	6 bar (105 psi)	10 bar (150 psi)
Characteristic	Adjustable	Adjustable	Adjustable
Ambient temperature	-45 to +80 °C	-45 to +80 °C	-55 to +85 °C
Degree of protection	IP 66	IP 66	IP 66
Compliance	<b>CE · EAC</b>	<b>CE · EAC</b>	<b>CE · EAC</b>
Partial stroke testing	✓	✓	✓
<b>Explosion protection</b> (further approvals according to national and international guidelines listed in data sheet)			
ATEX Ex ia	•	–	•
ATEX Ex d	• <sup>1)</sup>	•	–
FM	•	•	–
CSA	•	•	–
<b>Additional electrical equipment</b>			
Limit contact	•	–	•
Position transmitter	•	•	•
Solenoid valve	•	–	–
Forced venting function	•	•	•
External position sensor	•	–	–
Analog input	–	–	•
Binary input	•	•	•
Binary output	–	–	•
Leakage sensor	•	–	–
<b>Data sheets</b>	<b>T 8384-6S</b>	<b>T 8387-3S</b>	<b>T 8493S</b>

<sup>1)</sup> Flameproof enclosure in combination with Type 3770 Field Barrier

## TROVIS SAFE



TROVIS SAFE 3730-6



TROVIS SAFE 3731-3



TROVIS SAFE 3793



# Electronic Positioners for the Food and Pharmaceutical Industries

Electropneumatic positioner · Type 3724 combined with Type 3379 Pneumatic Actuator



## Application

Single-acting positioner combined with Type 3379 Pneumatic Actuator. Self-calibrating, automatic adaptation to valve and actuator.

## Special features

- Compact unit by combining it with Type 3379 Pneumatic Actuator
- Can be combined with Type 3347 Hygienic Valve or Type 3349 Aseptic Valve
- Smooth, robust stainless steel surfaces
- Valve position reading easy to read
- Internal air routing with automatic purging of the spring chamber
- Modified PID controller for high control accuracy
- Easy, intuitive operation using keys and an LCD
- Two software limit contacts

## Version

- **Type 3724:** electropneumatic positioner with on-site operation and LCD

## Technical data

Type	3724
Rated travel	4 to 16 mm, adjustable in steps of 0.5 mm
Set point	4 to 20 mA
Supply air Air quality acc. to ISO 8573-1	Supply air: 1.4 to 7 bar (20 to 105 psi) Maximum particle size and density: Class 4, oil content: Class 3 Pressure dew point: Class 3 or at least 10 K below the lowest ambient temperature to be expected
Signal pressure (output)	0 bar up to the supply pressure minus 0.4 bar Can be limited to approx. 2.3 bar by software
Characteristic	Adjustable
Permissible ambient temperature	-20 to +80 °C
Degree of protection	IP 65 <sup>1)</sup> , only applies in combination with Type 3379 Pneumatic Actuator
Compliance	<b>CE</b>
<b>Additional electrical equipment</b>	
Limit contact	Two software limit contacts (min., max.), reverse polarity protection, galvanic isolation
Data sheet	<b>T 8395</b>

<sup>1)</sup> In preparation



Type 3724 (cover removed)

Type 3724 with Type 3379 Actuator

# Software

## TROVIS-VIEW 6661 Software

### Calculation and sizing of valves

#### Valve sizing



#### TROVIS-VIEW

Universal configuration and user interface for various smart SAMSON instruments, such as positioners, industrial and heating controllers, electric actuators, electric actuators with process controller and differential pressure meters.

- Simple operation
- Selectable language
- Modular structure with user interface, communications server and device-specific database modules containing characteristic properties, e.g. parameters, data points, user levels etc.
- This means that data can be changed in the device immediately or they can be saved on the computer first and downloaded to the device on site.
- Direct operation and monitoring in online operation · In addition to cyclical refreshment of data points, freely definable data points can also be logged. Data can be viewed both as a graph and in tables. Data can be imported and exported.
- Communication can be operated over a network

See Data Sheet T 6661 for more details.

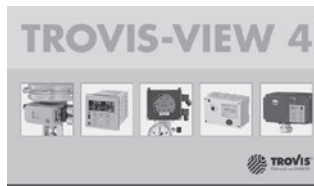
The TROVIS-VIEW software is available for downloading free of charge from our website ([www.samson.de](http://www.samson.de)) at Service & Support > Downloads > TROVIS-VIEW.

#### Valve sizing

The SAMSON Valve Sizing Program is a software for calculating and sizing control valves. This program calculates the valve-specific data (Kvs coefficients, required valve size etc.) for up to three cases using the process and medium data entered by the user. Afterwards, these data are used to determine a valve which is then suggested by the program. Finally, the sound emission and other operating data are calculated for the selected valve. The software includes many additional user-friendly functions for valve sizing.

#### New features included in version 4.7 of the SAMSON Valve Sizing:

- Medium database with over 1000 process media including functions to calculate the process media in relation to pressure and temperature.
- Automatic assignment of media properties, such as density, viscosity, vapor pressure.
- Automatic assignment of enthalpy, flashing data, isentropic exponents and phases
- Missing data are estimated using approximation equations
- Graphs for valve sizing analysis:
  - Valve characteristics measured on the SAMSON test bench can be used
  - Pressure-temperature graphs for the selected valve body material and pressure rating
  - Medium data with isobars for the maximum temperature range are displayed for all media in the media explorer.
- New units for conversion as well as new noise prediction standards (IEC 60534 8-3 and 8-4) have been added.



Operating and monitoring using TROVIS-VIEW



Calculation and sizing using valve sizing program

# Valve Accessories

Limit switches · Type 4746, Type 4747, Type 3776, Ex d Type 4744, Type 3738-20/-50, Type 3768

Supply pressure regulator · Type 4708

Solenoid valves · Type 3963, Type 3966, Type 3967 and Type 3969

Solenoid valve island · Type 3965

Pneumatic lock-up valve · Type 3709

Reversing amplifier · Type 3710

Pneumatic volume booster · Type 3755

Quick exhaust valve · Type 3711



## Limit switches

Limit switches issue an electric or pneumatic signal when an adjusted limit value is exceeded or not reached.

### Versions

- **Type 4746-x2:** Inductive limit switch
- **Type 4746-x3:** Electric limit switch
- **Type 4746-x4:** Pneumatic limit switch
- **Type 4747:** Inductive or mechanical limit switch with explosion protection
- **Type 4744:** Electric limit switch with explosion protection

### Technical data

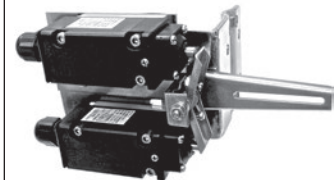
Type	4746			4747		4744	
	-x2	-x3	-x4	-1	-2	-	-2
Version							
Rated travel mm	7.5 to 180			7.5 to 200		7.5 to 150	15
Opening angle	-			0 to 100		-	
Max. perm. ambient temperature							
°C	-50 to +100	-40 to +85	-20 to +60	-25 to +80	-40 to +80	-55 to +70	-20 to +75
Compliance	<b>CE · ENEC</b>						
<b>Switching element</b>							
Inductive	•			•	•		
Electric		•			•	•	•
Pneumatic			•				
<b>Explosion protection</b>							
ATEX	•	•		Ex ia	Ex d	Ex ed	Ex d
FM/CSA	•	•			•		
EAC	•	•		•	•	•	
NEPSI	•				•		
IECEX					•		
STCC	On request				•		
Data sheets	T 8365			T 4747		T 8367	



Type 4746



Type 4747



Type 4744 (cover removed)

## Versions

- **Type 3776-0:** Inductive or electric limit switch
- **Type 3776-1:** Limit switch with explosion protection
- **Type 3738-20:** Electronic limit switch for valves used in on/off applications
- **Type 3738-50:** Electronic limit switch for valves used in on/off applications with FOUNDATION™ fieldbus communication
- **Type 3768:** Inductive limit switch

## Technical data

Type	3776	3738		3768
Version	-x	-20	-50	-x
Rated travel mm	7.5 to 120	7.5 to 200		7.5 to 120
Opening angle	0 to 90/180°	0 to 30/170°		
Max. perm. ambient temperature	-45 to +80 °C	-40 to +80 °C		-45 to +80 °C
Compliance	<b>CE · EAC</b>			
Optional internal solenoid valve	•	•		•
<b>Switching element</b>				
Inductive	•			•
Mechanical	•			
Electronic		•	•	
<b>Explosion protection</b>				
ATEX Ex ia	• <sup>1)</sup>	•	•	•
FM Ex ia	• <sup>1)</sup>			•
STCC Ex ia	•			
CCoE Ex ia	•			
EAC Ex ia	•	•	•	•
NEPSI Ex ia		•		•
CSA Ex ia				•
<b>Data sheets</b>	<b>T 3776</b>	<b>T 8390</b>	<b>T 8390-5</b>	<b>T 8356</b>

<sup>1)</sup> Depending on version

## Type 4708 Supply Pressure Regulator

Supply pressure regulators provide pneumatic control instruments with a constant air supply. The supply pressure regulator reduces and controls the pressure of a compressed air network to the pressure adjusted at the set point adjuster. Versions are available for installation in pipelines or control panels or for direct attachment to positioners or pneumatic actuators. The air pressure reducing station consists of a supply pressure regulator and an upstream filter with condensate drain.

- **Type 4708-45 Supply Pressure Regulator:** with increased air capacity

## Technical data

Type	4708-xx
Operating pressure	Max. 12 bar (174 psi)
Set point range	0.2 to 1.6 bar (3 to 24 psi), 0.5 to 6 bar (8 to 90 psi)
Version	Aluminum or stainless steel body
Max. perm. ambient temperature	Depending on version: -25 to +80 °C (standard), -50 to +80 °C (low-temperature version)
Air filtering	15 to 20 µm mesh size (5 µm as special version)
Options	Pressure gauge, manual/automatic switchover for positioners
Compliance	<b>EAC</b>
<b>Data sheet</b>	<b>T 8546</b>



Type 3776



Types 3738-20/-50



Type 3768



Type 4708-53



Type 4708-45

## Solenoid valves - Type 3963, Type 3966, Type 3967, Type 3969

Solenoid valves for high operational reliability and short actuating times for controlling pneumatic actuators also in hazardous areas.

A variety of device versions to suit individual applications are available due to the various switching functions, flow rates and different connections.

### Technical data

Type	3963		3969 <sup>2)</sup>	
	No explosion protection	With explosion protection	No explosion protection	With explosion protection
Nominal signal	V DC	6/12/24	6/12/24	14 to 24
	V AC	115/230	–	–
Power consumption <sup>1)</sup>	6 to 27 mW		71 mW	
	0.04 to 0.46 VA			
Pilot supply	1.4 to 6 bar		1.4 to 10 bar	
Output signal	Max. 10 bar		Max. 10 bar	
Service life	Up to 2 x 10 <sup>7</sup> switching cycles		Up to 2 x 10 <sup>7</sup> switching cycles	
Max. perm. ambient temperature	–45 to +80 °C		–45 to +80 °C	
Compliance	CE · EAC		CE	
<b>Explosion protection</b>				
ATEX	–	•	–	•
EAC		•		•
CSA		•		
FM		•		
NEPSI		•		
STCC		•		
KCS		•		
<b>Data sheets</b>		<b>T 3963</b>		<b>T 3969</b>

<sup>1)</sup> Depending on nominal signal

<sup>2)</sup> No air consumption

Type	3966		3967 <sup>2)</sup>		
	No explosion protection	With explosion protection	No explosion protection	With explosion protection	
Nominal signal	V DC	6/12/24/120	6/12/24	6/12/24	
	V AC	120/240	–	–	
Power consumption <sup>1)</sup>	6 to 460 mW		6 to 27 mW		
Pilot supply	1.4 to 6 bar		1.4 to 10 bar		
Output signal	Max. 10 bar		Max. 10 bar		
Service life	Up to 2 x 10 <sup>7</sup> switching cycles		Up to 2 x 10 <sup>7</sup> switching cycles		
Max. perm. ambient temperature	–45 to +80 °C		–45 to +80 °C		
Compliance	CE · EAC				
<b>Explosion protection</b>					
ATEX	–	•	–	•	
Flameproof enclosure		✓			
Intrinsic safety		✓			✓
EAC		•			•
CSA		•			
IECEX					•
FM		•			
NEPSI					•
<b>Data sheets</b>	<b>T 3966</b>		<b>T 3967</b>		

<sup>1)</sup> Depending on nominal signal

<sup>2)</sup> Permanent air purging of the actuator's spring chamber



Type 3963



Type 3966



Type 3967



Type 3969 (K<sub>vs</sub> 4.3)

## Type 3965 Solenoid Valve Island

The Type 3965 Solenoid Valve Island is a compact solution for the central control of pneumatic actuators in chemical and pharmaceutical plants. The modular design with various switching functions and connection options allows the solenoid valves to be configured to meet the individual requirements of a control task. The solenoid valve island provides a high level of operating safety in hazardous areas. Due to the low power input, low-power binary signals issued over fieldbus or remote I/Os can be used for controlling.

### Special features

- Compact modular design with up to 16 switching functions
- Less wiring required thanks to common cable, multi-pole connector or bus connection for PROFIBUS-DP (Ex ia)
- Corrosion-resistant housing
- Manual override
- 2/2-way, 3/2-way or 5/2-way function
- $K_{VS}$  0.13
- Threaded connections G (NPT)  $\frac{1}{8}$  and  $\frac{1}{4}$

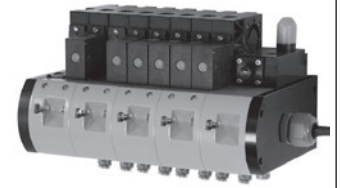
### Technical data

Type	3965	
	No explosion protection	With explosion protection
Nominal signal	6, 12, 24 V DC	6, 12, 24 V DC
Power consumption <sup>1)</sup>	6 to 27 mW	
Pilot supply	2.2 to 6.0 bar	
Output signal	Max. 6 bar	
Service life	Up to $2 \times 10^7$ switching cycles	
Max. perm. ambient temperature	-25 to +80 °C	
Degree of protection	IP 54 <sup>2)</sup>	
Compliance	CE · ENEC	
<b>Explosion protection</b>		
ATEX	–	•
IECE <sub>x</sub>	–	• <sup>3)</sup>
<b>Data sheet</b>	<b>T 3965</b>	

<sup>1)</sup> Depending on nominal signal

<sup>2)</sup> IP 40 for PROFIBUS-DP version

<sup>3)</sup> Not for PROFIBUS-DP version



Type 3965

## Type 3709 Pneumatic Lock-Up Valve

The pneumatic lock-up valve shuts off the signal pressure line either when the air supply falls below an adjusted value or upon complete air supply failure. This causes the actuator to remain in its last position.

### Versions

- **Type 3709-1:** pneumatic lock-up valve for direct attachment to a positioner
- **Type 3709-2:** pneumatic lock-up valve for installation in the signal pressure line in any position as required
- **Type 3709-4:** pneumatic lock-up valve with booster for installation in the signal pressure line as required with connecting thread
- **Type 3709-5 and Type 3709-6:** pneumatic lock-up valve with booster for attachment to single-acting rotary actuators according to VDI/VDE 3848, input hook-up as required
- **Type 3709-7 and Type 3709-8:** pneumatic lock-up valve with booster for attachment to single-acting rotary actuators according to VDI/VDE 3848, sandwich style

### Technical data

Type		3709-1	3709-2
Attachment		Positioner	Hooked up as required
Supply air	Max.	12 bar	12 bar
Signal pressure	Max.	6 bar	6 bar
K <sub>vs</sub> coefficient	Approx.	0.2	0.2
Set point range (adjustable)		0.5 to 6 bar	0.5 to 6 bar
Permissible ambient temperature		-25 to +80 °C	
Compliance		<b>ERC</b>	
Data sheet		<b>T 8391</b>	

Type	Pneumatic lock-up valve with booster					
	3709-4	3709-5	3709-6 <sup>1)</sup>	3709-7	3709-8 <sup>1)</sup>	
Attachment	Hooked up as required	VDI/VDE 3845				
		Input hooked-up as required		Sandwich style		
Supply air	Max.	6 bar	6 bar	6 bar	6 bar	6 bar
Signal pressure	Max.	6 bar	6 bar	6 bar	6 bar	6 bar
K <sub>vs</sub> coefficient	Approx.	4.3	2.0	4.3	2.0	4.3
Set point range (adjustable)		1.5 to 6 bar				
Permissible ambient temperature		-40 to +80 °C				
Compliance		<b>ERC</b>				
Data sheet		<b>T 8391</b>				

<sup>1)</sup> On request



Type 3709-1



Type 3709-4



Type 3709-7

### Type 3710 Reversing Amplifier

Reversing amplifier to operate a double-acting pneumatic actuator using a single-acting pneumatic or electropneumatic positioner (e.g. Series 3730 and 3731 Positioners). The positioner is mounted either with or without pressure gauge.

<b>Type</b>	<b>3710</b>	
Permissible supply pressure	6 bar	
K <sub>v</sub> coefficient	Supply	0.11
	Exhaust	0.12
Connections	1/4-18 NPT, ISO 228/1-G 1/4	
Degree of protection	IP 65	
Permissible ambient temperature	-25 to +80 °C (-13 to +176 °F)	
	Low-temperature version	-50 to +80 °C (-58 to +176 °F) -60 to +80 °C (-76 to +176 °F)
Compliance	<b>ERC</b>	
Options		
Pressure gauge Ø 40 mm	0 to 6 bar (0 to 90 psi)	
<b>Data sheet</b>	<b>T 8392</b>	

### Type 3755 Pneumatic Volume Booster

The pneumatic volume booster is mounted between the positioner and actuator. It supplies the actuator with an air flow output whose pressure corresponds exactly to the signal pressure, except that it has a much higher volume output.

- Fast dynamic response due to low hysteresis
- Bypass restriction with linear characteristic
- Sintered polyethylene filter disk ensures low noise emissions
- Constant reversing pressure
- Exhaust air feedback possible
- Version with G or NPT thread

#### Versions

- **Type 3755-1:** pneumatic volume booster (aluminum body) with low-noise sintered polyethylene filter disk
- **Type 3755-2:** pneumatic volume booster (aluminum body) with flanged-on threaded exhaust port
- **Type 3755-2:** pneumatic volume booster (stainless steel body), threaded exhaust port

#### Technical data

Type	3755-1	3755-2
K <sub>vS</sub> Supply	2.5	2.5
K <sub>vS</sub> Exhaust	2.5	2.5
K <sub>vS</sub> Bypass	0.3	0.3
Pressure ratio	Signal:output = 1:1	
Response pressure	Standard temperature range: 80 mbar	
	Low temperature range: 100 mbar	
Supply pressure	Max. 10 bar (145 psi)	
Actuator pressure	Max. 7 bar (101.5 psi)	
Signal pressure	Max. 7 bar (101.5 psi)	
Permissible ambient temperature	Standard temperature range: -40 to +80 °C	
	Low temperature range: -55 to +60 °C	
Degree of protection	IP 44	IP 66
Compliance	<b>ERC</b>	
Service life	≥1 x 10 <sup>7</sup> full strokes	
<b>Data sheet</b>	<b>T 8393</b>	



Type 3710



Type 3755-1



Type 3755-2



Type 3755-2 (stainless steel body)



### Type 3711 Quick Exhaust Valve

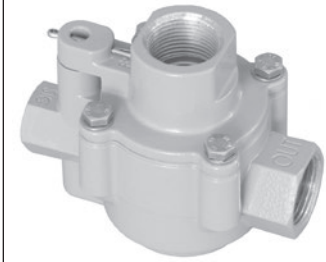
The Type 3711 Quick Exhaust Valve is mounted between the positioner or solenoid valve and the actuator. It is used to vent the actuator more quickly.

- Compact design
- Flow coefficient:  $K_v$  10.0
- Closing hysteresis of check valve < 0.02 bar
- Integrated restriction to adjust the dynamic response

#### Technical data

Type	3711
Operating pressure	0 to 7 bar
Differential pressure between air supply and exhaust	55 % of control pressure
$K_{vS}$ Exhaust	10.0 <sup>1)</sup>
$K_{vS}$ Supply	1.3 (restriction screw closed)
	1.9 (restriction screw open)
$K_{vS}$ Bypass	Max. 0.75
Permissible leakage at 6 bar	$\leq 25 \text{ l}_n/\text{h}$
Permissible ambient temperature	-40 to +80 °C
Closing hysteresis of check valve	<0.02 bar
Weight	Approx. 0.5 kg <sup>1)</sup>
Compliance	<b>ERC</b>
Data sheet	<b>T 8547</b>

<sup>1)</sup> Without silencer



Type 3711

# Converters

i/p converters · Type 6111, Type 6116 and Type 6126

p/i converters · Type 6132 and Type 6134



## Application

Used to convert direct current signals or pneumatic signals

## Versions

Electropneumatic converters accept a current signal from electric control equipment and convert it into a pneumatic signal for measuring or control tasks.

- **Type 6111:** i/p converter, rail-mounting unit for supply air manifold or stainless steel field unit
- **Type 6116:** i/p converter, field unit
- **Type 6126:** i/p converter, industrial unit

## Technical data

Type	6111	6116	6126
Input	0/4 to 20 mA	0/4 to 20 mA	0/4 to 20 mA, 0/2 to 10 V
Output	0.2 to 1 bar <sup>1)</sup>		
Output signal	Max. 8 bar		Max. 5 bar
Supply air	0.4 bar above upper range value <sup>2)</sup>		
	Max. 10 bar		Max. 5.4 bar
Permissible ambient temperature	–20 to +70 °C	–30 to +60 °C, –40 to +70 °C Special version: –45 °C	–25 to +70 °C
Degree of protection	IP 20, IP 65	IP 54, IP 65	IP 54, IP 65
Compliance	<b>CE · EAC</b>		
<b>Explosion protection</b>			
ATEX		•	•
Ex ia		✓	✓
Ex d			✓
EAC			•
CSA			•
FM	–	–	•
IECEX			•
KCS			•
JIS			•
STCC			•
<b>Data sheets</b>	<b>T 6111</b>	<b>T 6116</b>	<b>T 6126</b>

<sup>1)</sup> Further ranges in data sheet

<sup>2)</sup> Restricted pressure ranges for explosion-protected devices (see data sheet)



Type 6111, rail-mounting unit



Type 6111, stainless steel enclosure



Type 6116, field unit



Type 6126 with pressure gauge

p/i converters accept a pneumatic signal from control equipment and convert it into an electric signal.

- **Type 6132:** p/i converter for four-wire connection, available as rail-mounting unit
- **Type 6134:** p/i converter for two-wire connection, available as either a rail-mounting or field unit

**Technical data**

Type	6132 (four-wire)	6134 (two-wire)	
Explosion-protected version	–	–	Ex ia/Ex d
Input	0.2 to 1 bar		
Output	0/4 to 20 mA 0/2 to 10 V	4 to 20 mA	
Supply voltage	230, 115, 24 V AC 24 V DC	12 to 30 V DC	
Permissible ambient temperature	–20 to +70 °C	–20 to +70 °C	
Degree of protection	IP 20		IP 54 IP 65
Compliance	<b>CE · ENEC</b>		
Data sheets	<b>T 6132</b>	<b>T 6134</b>	



Type 6132-04, rail-mounting unit



Type 6134-03, field unit



Type 6134-04, rail-mounting unit

# Media Series

Differential pressure, flow and liquid level meters

Media 5 · Media 05



## Application

Instruments designed to measure differential pressure and measured variables derived from it. Suitable for liquids, gases and vapors

- Liquid level meters for cryogenic service
- Liquid level measurement in pressure vessels, especially for cryogenic gases
- Differential pressure measurement between flow and return flow pipe
- Pressure drop measurement across valves and filters
- Flow rate measurement according to the differential pressure method

## Special features

- Suitable for field installation and panel mounting
- Directly connected valve block
- Zero adjustment from the front
- Limit switch easily retrofitted
- Optionally with 4 to 20 mA current output

## Versions with

- Differential pressure cell made of brass (CW617N) or CrNi steel
- Scales: linear, square, according to DIN 19204, detachable, special
- Inductive limit switch with up to three alarm contacts

## Technical data

Type	Media 5	Media 05
Pressure rating	PN 50, overloadable on one side up to 50 bar	
Measuring range	0 to 3600 mbar	
Degree of protection	IP 54	
Permissible ambient temperature	-40 to +80 °C	
Characteristic	Reading linear to the differential pressure	
Indicator Ø	160 mm	100 mm
Compliance	<b>CE · EAC</b>	
Data sheets	T 9519	T 9520

## Materials

dp cell	CW617N (brass) or CrNi steel
Indicator housing unit	Polycarbonate
Springs, diaphragm plates and functional parts	CrNi steel
Measuring diaphragm and seals	ECO, NBR, FKM, EPDM

Special versions on request



Media 5 with limit switches, valve block and pressure gauge for operating pressure



Media 5 with 4 to 20 mA current output (optional)



Media 05 with limit switches, valve block and pressure gauge for operating pressure

# Media Series

Indicating digital transmitters for differential pressure

Media 6 · Media 6 Z



## Application

Microprocessor-controlled transmitters for measuring and indicating the differential pressure or measured variables derived from it. Suitable for liquids, gases and vapors

## Special features

- Liquid level meters for cryogenic service
- Transmitter with digital display in two-wire connection
- Gas selected using switch
- Proportional 4 to 20 mA current signal
- LCD with 100 % bar graph, blinking alarm and warning markers
- Zero and span adjustment activated by key without influencing each other
- On-site configuration and programming over the RS-232 interface using a memory pen or the TROVIS-VIEW software
- Optional explosion protection ATEX Ex ia

## Versions

- **Media 6:** transmitter with digital display, measuring range between 100 and 3600 mbar, two software limit contacts according to NAMUR
- **Media 6 Z:** same as above, but additionally with a pulse output proportional to quantity for controlling an external counter, one software limit contact

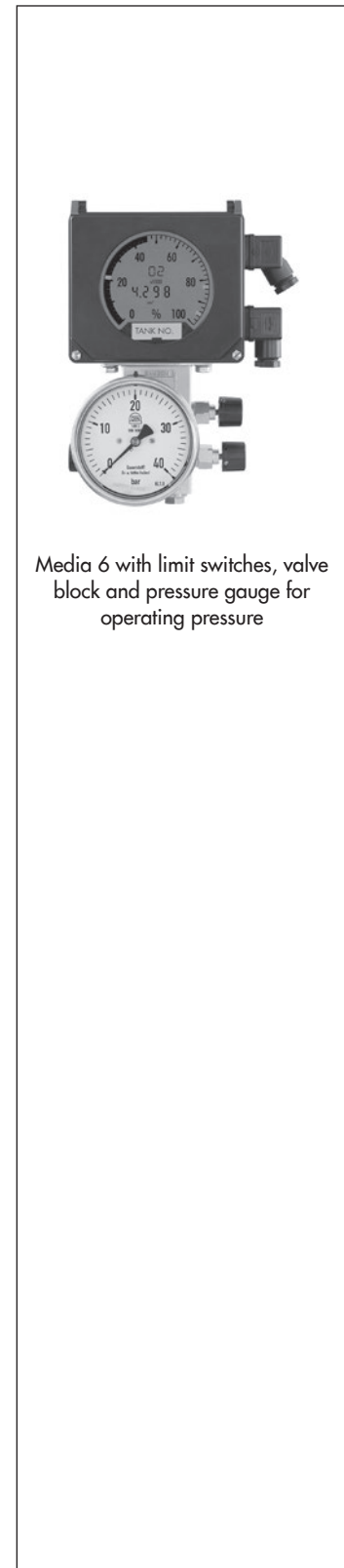
## Technical data

Type	Media 6	Media 6 Z
Pressure rating	PN 50, overloadable on one side up to 50 bar	
Measuring range	0 to 3600 mbar	
Characteristic	Output and reading proportional to the tank content, linear or square root extraction depending on operating mode	
Limit contacts	Two software limit contacts or one software limit contact according to pulse output	
Display	Display Ø 90 mm	
Degree of protection	IP 65	
Permissible ambient temperature	-40 to +70 °C	
Two-wire system	4 to 20 mA output	
Power supply (battery operation)	12 to 36 V DC (9 V DC)	
Compliance	CE · EAC	
Data sheet	T 9527	

## Materials

dp cell	CW617N (brass) or CrNi steel
Indicator housing unit	Polycarbonate
Springs, diaphragm plates and functional parts	CrNi steel
Measuring diaphragm and seals	ECO, NBR, FKM, EPDM

Special versions on request



Media 6 with limit switches, valve block and pressure gauge for operating pressure

# Media Series

Microprocessor-controlled transmitter for differential pressure with remote data transmission

## Media 7

### Application

Microprocessor-controlled transmitter with dp cell for measuring and indicating the differential pressure, pressure or measured variables derived from them

### Properties

- Modular design: easy to install or exchange optional additional functions by inserting option modules (four slots in the device)
- Cabled data transmission or optional remote data transmission over the integrated GSM module, connection to the SAM TANK MANAGEMENT web interface
- Internal absolute pressure sensor
- Modular power supply unit with standby power supply (SPS)
- 4" backlit graphical display
- Certification for Zone 0 (flammable gases and liquids)
- Configuration and programming using the TROVIS-VIEW software
- Easy operation using capacitive keys, start-up wizard

### Versions

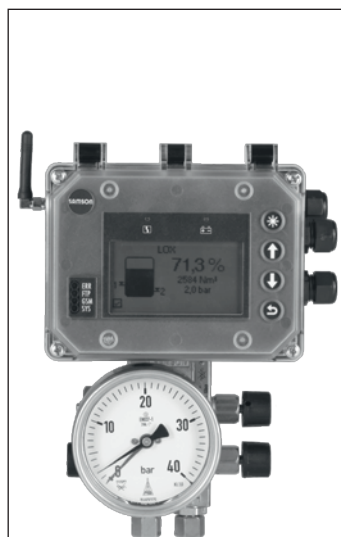
- **Two-wire version:** 4 to 20 mA signal supplied from a current source
- **24 V version:** wider ambient temperature range, illuminated display, remote data transmission through the use of a retrofittable GSM module

### Technical data

Type	Media 7
Pressure rating	PN 60, overloadable on one side up to 60 bar
Measuring range	0 to 3600 mbar
Characteristic	Differential pressure proportional to the tank geometry
Deviation from terminal-based linearity	$<\pm 1.6\%$ (including hysteresis)
Sensitivity	$\leq 0.25\%$ or $<\pm 0.5\%$ depending on measuring span selected
Internal absolute pressure sensor	Measuring range: 0 to 60 bar; deviation from terminal-based linearity: $<0.4\%$
Display	LCD 128 x 64 (90 x 40 mm)
Degree of protection	IP 67
Permissible ambient temperature	$-20$ to $+70\text{ }^{\circ}\text{C}$ ( $-40$ to $+70\text{ }^{\circ}\text{C}$ with heating)
Two-wire version	Output: 4 to 20 mA
24 V version	Input: 12 to 36 V DC, output: 12 V DC
Communication	Local: SSP interface and serial interface adapter Remote data transmission: (2G) GSM module
<b>Data sheet</b>	<b>T 9510</b>

### Materials

dp cell housing	Brass CW617N-H070
Housing, device cover	UV-stabilized polycarbonate
Springs and diaphragm plate	Corrosion-resistant steel



Media 7 with integrated GSM module, valve block and pressure gauge for operating pressure

# Differential Pressure and Flow Meters

Orifice flange · Type 5090

## Application

Orifice plate assemblies for flow measurement · Generation of a defined differential pressure

In combination with a differential pressure meter, for example Media 5, the orifice plates measure the flow rates of liquids, gases and vapors.

## Versions

- **Type 5090:** orifice flange with standard orifice plate and annular chamber · DN 32 to 400 (NPS 1¼ to 16) · PN 6 to 40 (Class 150 to 300)

Differential pressure connections: compression fittings for 12 x 1 mm or 12 x 1.5 mm pipes

## Technical data

Type 5090 Orifice Flange	
Valve size	DN 32 to 500 (NPS 1¼ to 20)
Pressure rating	PN 6, 10, 16, 25, 40 (Class 150 to 300)
Data Sheet	T 9550

## Materials

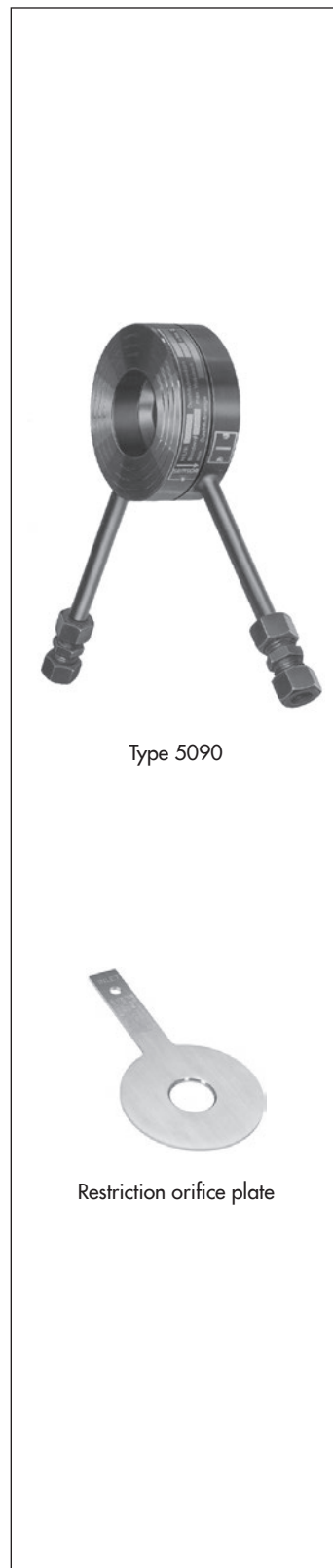
Standard orifice plate	1.4404
Annular chamber	Max. 300 °C 1.0566/SA 516-70
	Max. 400 °C 1.4404/316L, 1.5415
Pipe	Chromated steel or 1.4404/316L
Differential pressure connections	
Gasket	Fiber gasket (max. 200 °C) Graphite on metal core (max. 450 °C)

## Accessories

- The **restriction orifice plate** is used to limit the mass flow in process engineering plants.

## Special version

- Form D grooved flanges, DIN EN 1092-1
- Other materials
- Other sizes



Type 5090

Restriction orifice plate

# Electronic Process Controllers

Compact controller · TROVIS 6493

Industrial controller · TROVIS 6495-2



## Application

Digital controllers to automate industrial and process plants for general and more complex control tasks. The controllers are suitable for control of continuous-action, on/off or pulsing final control elements (e.g pneumatic actuators with electropneumatic positioners, motorized actuators, electric heating systems, refrigerating machines etc.).

## Versions

- **TROVIS 6493:** compact controller for panel mounting

## Special features

- Configuration and parameterization using keys or the TROVIS-VIEW software
- Permanently stored function blocks
- One control circuit

- **TROVIS 6495-2:** industrial controller for panel mounting

## Special features

- Configuration using keys with plain text display or the TROVIS-VIEW software
- Standard control circuits with permanently stored function blocks
- Two control circuits, operated separately or combined
- Split-range control
- Output tracking (DDC backup)
- Optional RS-232/USB and RS-485/USB interface boards for SSP and Modbus RTU



TROVIS 6493 Compact Controller

TROVIS 6495-2 Industrial Controller



## Technical data

TROVIS		6493	6495-2	
Design	Panel-mounting unit	•	•	
	Front frame W x H (mm)	48x96	96x96	
	Degree of protection (front)	IP 65	IP 65	
	Display	LCD	Graphics	
	Keys	6	9	
Functions	Control circuits	1	2	
	P, PI, PD, PID control	•	•	
	Fixed set point and follow-up control	•	•	
	Ratio control		•	
	Cascade control		•	
	Override control		•	
	Linking of input variables	•	•	
Input	Analog inputs	2	4	
	0/4 to 20 mA	•	•	
	0/2 to 10 V	•	•	
	Pt 100 resistance thermometer	•	•	
	Pt 1000 resistance thermometer	•	•	
	Resistance transmitters	•	•	
	Transmitter supply	•	•	
	Binary inputs	1	4	
	Output	Analog outputs	1	3
0/4 to 20 mA		•	•	
0/2 to 10 V		•	•	
Relay		2	4	
Transistor outputs		1	3	
On/off and three-step		1	2	
Limit		2	4	
Communication	Interface	Infrared	•	•
		USB		• <sup>1)</sup>
		RS-232		• <sup>1)</sup>
		RS-485		• <sup>1)</sup>
	Protocol	SSP (TROVIS-VIEW)	•	•
Modbus RTU			• <sup>1)</sup>	
Supply voltage	85 to 264 V AC, 50/60 Hz		•	
	90 to 250 V AC, 50/60 Hz		•	
	24 V AC/DC, 50/60 Hz		•	
Compliance	<b>CE EAC</b>			
Data sheets	<b>T 6493</b>		<b>T 6495-2</b>	

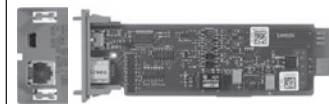
<sup>1)</sup> Optional



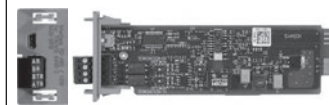
TROVIS 6493 Compact Controller with infrared adapter and bracket (accessories)



TROVIS 6495-2 Industrial Controller with infrared adapter and bracket (accessories)



RS-232/USB interface board (accessories)



RS-485/USB interface board (accessories)



Memory pen-64 for TROVIS 6495-2 Controller (accessories)

# Control Valves for Cryogenic Service

Pressure build-up regulator · Type 2357-1

Excess pressure valve · Type 2357-2



## Application

Pressure regulators for cryogenic gases and liquids as well as other liquids, gases and vapors

## Special features

The regulators consist of a valve, operating diaphragm and set point adjuster.

- Low-maintenance proportional regulators requiring no auxiliary energy
- Wide set point range and convenient set point adjustment
- Rugged design and low overall height
- Cleaned and packed for oxygen service

## Versions

### Type 2357-1 · Pressure build-up regulator or pressure reducing valve

Principle of operation as pressure build-up regulator: the valve opens when the upstream pressure drops (direction of flow from port B to port A).

Principle of operation as pressure reducing valve: the valve closes when the downstream pressure rises (direction of flow from port A to port B).

Type	2357-1	
$K_{VS}$ coefficient	0.25	0.8
Set point range	1 to 25 bar 10 to 36 bar	1 to 8 bar 5 to 25 bar 8 to 40 bar
Permissible operating pressure	40 bar	50 bar
Max. perm. differential pressure $\Delta p$	Gases: 30 bar · Liquids: 6 bar	
Connections	G $\frac{3}{4}$ A conical joint	
Temperature range	-196 to +200 °C <sup>1)</sup>	
Compliance	CE · EAC	
Data sheet	T 2557	

<sup>1)</sup> For oxygen max. 60 °C

### Type 2357-2 · Excess pressure valve

The valve opens when the upstream pressure rises.

Type	2357-2	
$K_{VS}$ coefficient	1.25	0.4
Set point range	1 to 8 bar 5 to 25 bar 8 to 40 bar	1 to 25 bar 10 to 36 bar
Permissible operating pressure	50 bar	40 bar
Max. perm. differential pressure $\Delta p$	3 bar <sup>1)</sup>	
Connections	Inlet: G $\frac{3}{4}$ A conical joint Outlet: G $\frac{3}{4}$ female thread	
Temperature range	-196 to +200 °C	
Compliance	CE · EAC	
Data sheet	T 2557	

<sup>1)</sup> >3 bar only with special accessories



Type 2357-1



Type 2357-2

# Control Valves for Cryogenic Service

Pressure build-up regulator · Type 2357-11

Excess pressure valve · Type 2357-21



## Application

Pressure regulators for cryogenic gases and liquids as well as other liquids, gases and vapors

## Special features

- Low-maintenance proportional regulators requiring no auxiliary energy
- Wide set point range and convenient set point adjustment
- Rugged design and low overall height
- Suitable for oxygen service
- Wetted parts free of non-ferrous metal

## Versions

The regulators consist of a valve, operating diaphragm and set point adjuster.

### Type 2357-11 Pressure Build-up Regulator with safety function

Pressure regulator with globe valve · Direction of flow from port B to port A · The upstream pressure is transmitted to the operating diaphragm. The valve opens when the upstream pressure falls below the adjusted set point.

**Safety function:** the plug in the pressure build-up regulator operates like a safety valve and relieves the pressure chamber. The pressure acts from below against the plug surface. The valve opens to equalize the pressures.

### Type 2357-11 Pressure Reducing Valve

Pressure regulator with globe valve · Direction of flow from port A to port B · The valve regulates the downstream pressure to the adjusted set point. The valve closes when the downstream pressure rises above the adjusted set point.

### Type 2357-21 Excess Pressure Valve

Pressure regulator with globe valve: direction of flow from port B to port A · The valve regulates the upstream pressure to the pressure adjusted at the set point adjuster. The valve opens when the pressure increases until the set point is reached. The valve opens when the pressure increases until the set point is reached. The regulator is additionally equipped with an integrated non-return unit that prevents the medium from flowing back.

## Technical data

Type	2357-11	2357-21
$K_{VS}$ coefficient	0.8	1.25
Set point ranges in bar	1 to 8, 5 to 25, 8 to 40	
Permissible operating pressure	63 bar <sup>1)</sup>	
Temperature range	-200 to +200 °C <sup>2)</sup>	
Compliance	CE · EAC	
Data sheet	T 2560	

<sup>1)</sup> For oxygen max. 40 bar

<sup>2)</sup> For oxygen max. 60 °C

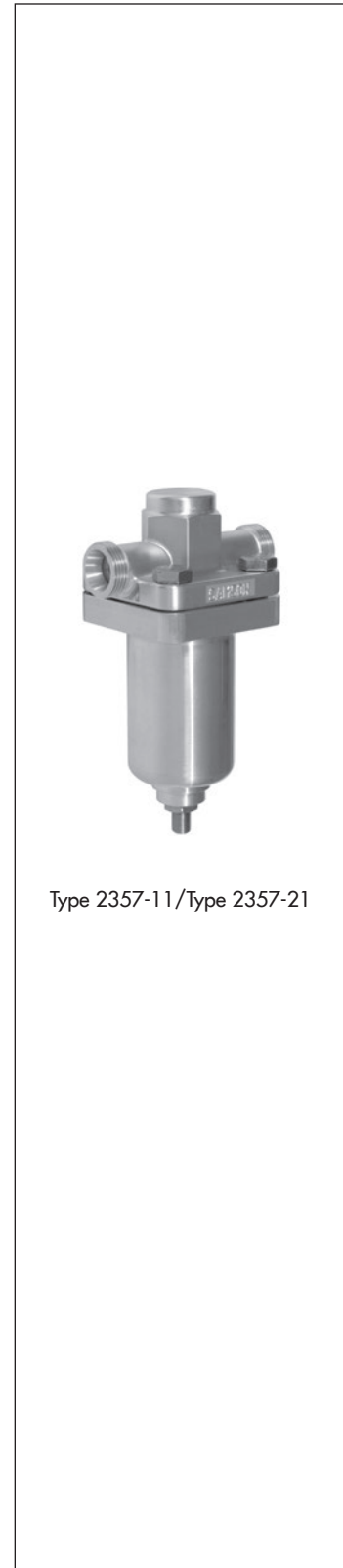
## Special versions

Version for liquid hydrogen · With welding ends · Suitable for flammable gases

## Accessories

Coupling nut with ball-type bushing and welding nipple for 21.3x1.6 mm pipe diameter

Coupling nut with ball-type bushing and flanges



Type 2357-11/Type 2357-21

# Control Valves for Cryogenic Service

Pressure build-up regulator · Type 2357-3  
with safety function and integrated excess pressure valve



## Application

- **Type 2357-3:** pressure regulator for cryogenic gases as well as liquids, gases and vapors

## Special features

- Low-maintenance proportional regulators requiring no auxiliary energy
- Wide set point range and convenient set point adjustment
- Rugged design and low overall height
- Cleaned and packed for oxygen service

## Versions

The pressure regulator consists of a valve with three ports (A, B and C), a spring-loaded operating bellows and a set point adjuster.

## Pressure build-up regulator with safety function

### Operating direction from port A to port B (closing)

The tubular plug in the pressure build-up regulator operates like a safety valve and relieves the pressure chamber at port A of pressure when the pressure exceeds the set point by 5 bar. The difference in pressure at the bellows between the inside pressure at port C and outside pressure at port A creates a positioning force. This force opens the plug, opposing the force of the closing spring. As a result, the pressures are equalized and the pressure chamber upstream of port A is relieved of pressure.

### Direction of flow from port B to port C (opening)

When no pressure is applied, the passage from port B to C is closed. The tubular plug does not open the valve until the pressure becomes 0.5 bar higher than the set point (pressure build-up). Port C can be additionally equipped with a non-return unit.

## Technical data

Type	2357-3 Process medium in the gas phase
K <sub>VS</sub> coefficient	Pressure build-up: 3.2 · Pressure reduction: 0.8
Set point range bar	2 to 10, 8 to 26, 25 to 40
Permissible operating pressure	40 bar
Temperature range	-196 to +200 °C <sup>1)</sup>
Compliance	CE · EAC
Data sheets	T 2559

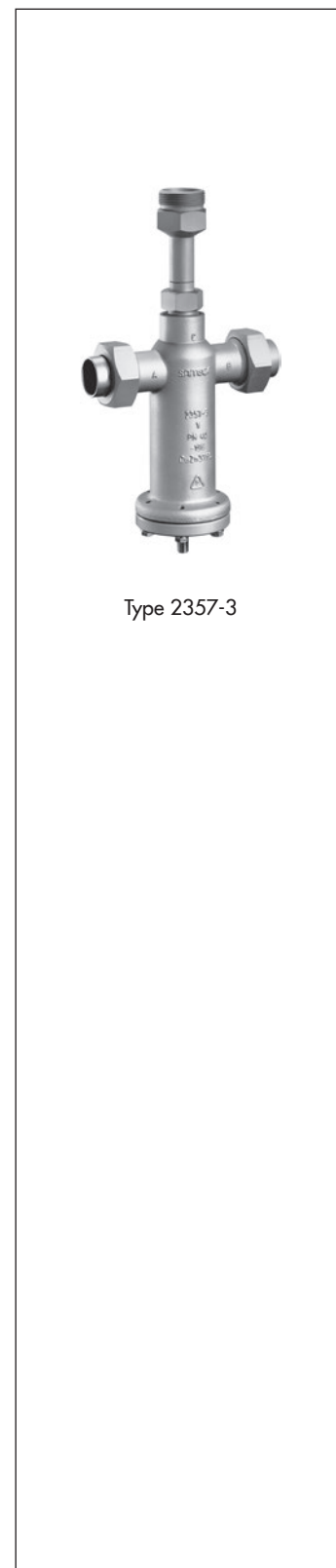
<sup>1)</sup> For oxygen max. 60 °C

## Accessories

Soldering nipple with ball-type bushing: port A and B for connection to Ø 28 mm pipes  
Port C for Ø 18 mm pipes: optionally non-return unit

## Special versions

- All wetted parts made of CrNiMo steel
- Type 2357-3: for use with process medium in the liquid phase



Type 2357-3

# Self-operated Temperature Regulators

for cryogenic applications

Safety temperature monitor (STM) · Type 2040



## Application

Pressure regulator for cryogenic gases and liquids as well as other liquids, gases and vapors

## Special features

- Self-operated regulator with integrated temperature sensor
- Convenient set point adjustment
- Free of oil and grease for oxygen
- Rugged, compact design featuring small dimensions

## Versions

The Type 2040 Safety Temperature Monitor consists of a body, an integrated temperature sensor with a set point adjuster and the connecting body with G 1¼ A conical joints at both the inlet and outlet.

Connection parts: soldering nipples and welding ends including connection nuts

## Technical data

Type	2040
Body connection	G 1¼
K <sub>VS</sub> coefficient	5
Set point ranges	-30 to +10 °C -45 to -10 °C
Permissible operating pressure	40 bar
Perm. differential pressure	25 bar
Leakage class according to IEC 60534-4	≤0.05 % of K <sub>VS</sub> at -10 °C ≤0.1 % of K <sub>VS</sub> at -45 °C
Hysteresis	2 K
Accuracy	±1 °C
Permissible ambient temperature	-60 to +60 °C <sup>1)</sup>
Temperature open/closed differential	17 K
Compliance	CE · ENEC
Data sheet	T 2090

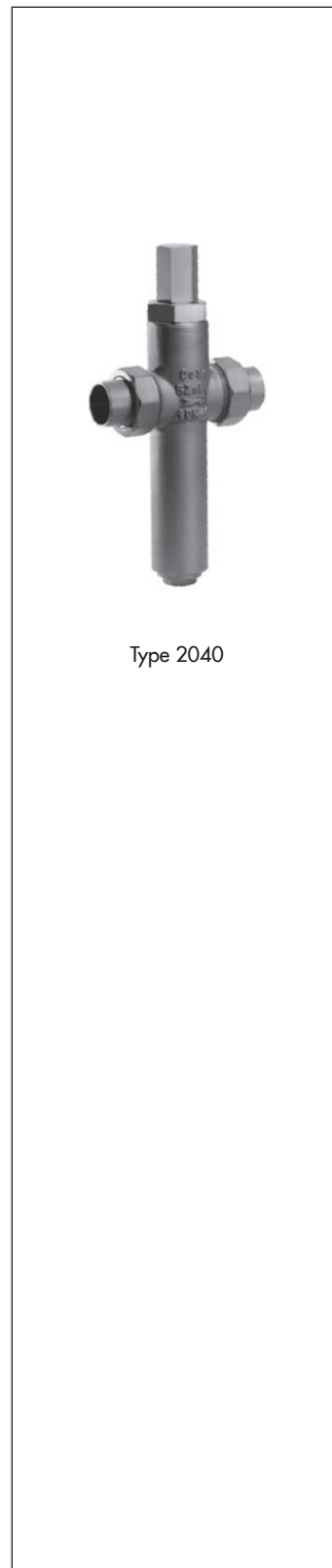
<sup>1)</sup> To adjust the set point properly, the ambient temperature must be at least 15 K above the target temperature to be adjusted.

## Special version

Set point adjuster with set point markers · Reading in steps of 10 °C indicated by ring marks on the set point adjuster.

## Accessories

Connecting parts: connection nut with soldering nipple/welding ends with either a spherical liner or gasket. See T 2090 for details.



Type 2040

# Electronic Controllers for Heating, District Heating and Ventilation

Heating and district heating controllers

TROVIS 5573 · TROVIS 5575 · TROVIS 5576 · TROVIS 5578 · TROVIS 5579

SAM LAN Gateway · SAM MOBILE Gateway · SAM HOME Gateway

Modbus to meter bus gateway

Converter or repeater CoRe02



## Application

Outdoor-temperature-compensated flow temperature control in hot water heating systems and domestic hot water heating systems

## Special features

- Easy start-up using default settings
- Connection to room panels for single heating circuits
- Heating characteristics optionally based on the gradient or based on four points
- Calculation of the best possible activation and deactivation times for the heating (optimization)
- Automatic adaptation of the heating characteristic (adaptation)
- Delayed outdoor temperature adaptation
- Demand-driven control using the set points of downstream control circuits demanded by device bus or a 0 to 10 V signal
- Annual clock for maximum four time schedules and three time-of-use periods
- TROVIS-VIEW software for configuration and parameterization of controllers

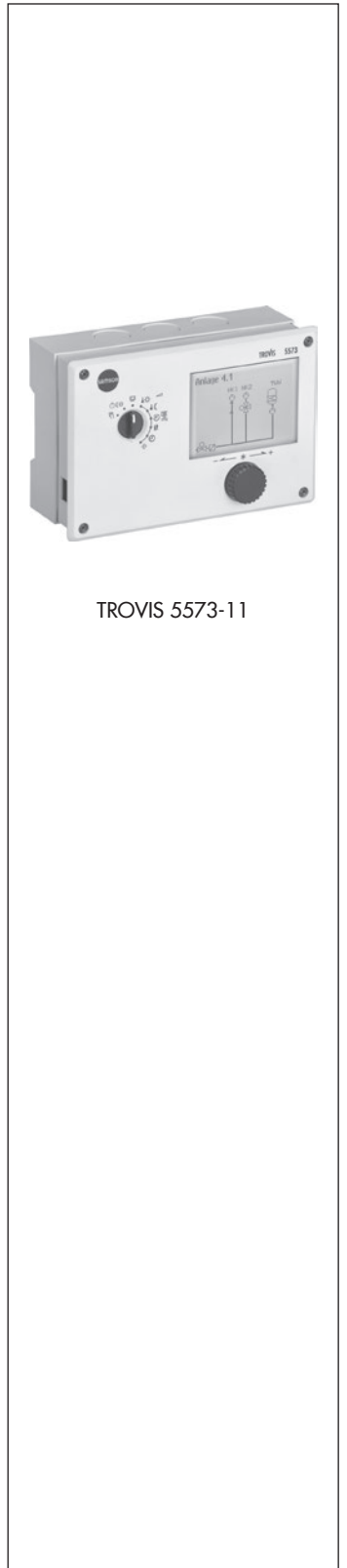
**TROVIS 557x:** heating and district heating controllers for wall, panel or top-hat rail mounting

Two control circuits (three with TROVIS 5579) for controlling a primary heat exchanger or boiler and a supplementary heating circuit plus a DHW heating circuit, a heating circuit and a DHW circuit or two heating circuits (three with TROVIS 5579)

Configuration of solar/buffer storage tank systems.

Historical data storage and graphics analysis on a computer using data logging viewer software

- **TROVIS 5573-000x:** display with icon readings, interface for optional external communications module or meter bus/Modbus gateway
- **TROVIS 5573-100x:** graphical display with plain-text readings, interface for optional external communications module or meter bus/Modbus gateway
- **TROVIS 5573-110x:** graphical display with plain-text readings, M-bus interface for three M-bus units
- **TROVIS 5575:** display with icon readings · Multi-circuit systems possible by interconnecting controllers over device bus



TROVIS 5573-11

**TROVIS 5576:** display with icon readings

- Multi-circuit systems possible by interconnecting controllers over device bus
- RS-232 Modbus interface for modem operation or for connection to RS-232/RS-485 cable converter for bus operation
- Alarm notification by text message (modem required)
- Prepared for meter bus plug-in module for communication with a maximum of six heat meters

**TROVIS 5578:** graphical display with plain-text readings

- Three control circuits
- Control of a primary heat exchanger or boiler. Max. two mixing and one non-mixing heating circuit. Control of DHW heating in the secondary circuit.
- Outdoor-temperature-compensated buffer storage tank control with solid fuel boiler and solar circuit control and max. two mixing heating circuits.
- Control of two outdoor-temperature-compensated heating circuits and a DHW heating with three valves in the primary circuit.
- Control of three outdoor-temperature-compensated heating circuits with three valves in the primary circuit.

**TROVIS 5579:** display with icon readings

- Three control circuits for controlling a primary heat exchanger or boiler and two supplementary heating circuits plus DHW heating, two heating circuits and one DHW circuit or three heating circuits
- Multi-circuit systems possible by interconnecting controllers over device bus
- RS-232 Modbus interface for modem operation or for connection to RS-232/RS-485 cable converter for bus operation
- Alarm notification by text message (modem required)
- Prepared for meter bus plug-in module for communication with a maximum of six heat meters

**Technical data (excerpt)**

TROVIS	5573	5575	5576	5579	5578
Control circuits, max.	2	2	2	3	3
Heating, max.	2	2	2	3	3
DHW, max.	1	1	1	1	1
Inputs					
Sensors	8	8	15	17	17
alternatively binary	1	1	14	14	•
alternatively 0 to 10 V	–	1 <sup>1)</sup>	1	1	1 <sup>1)</sup>
alternatively 0/4 to 20 mA	–	1 <sup>1)</sup>	14	15	1 <sup>1)</sup>
additionally binary	2	2	–	–	–
additionally 0 to 10 V	1	–	–	–	–
usable sensor types	Pt 1000	Pt 100/500/1000, Ni 1000, PTC, NTC			Pt 1000

<sup>1)</sup> V and mA input cannot be used at the same time



TROVIS 5575



TROVIS 5576



TROVIS 5579



TROVIS 5578

TROVIS	5573	5575	5576	5579	5578
Outputs					
Control signal					
On/off or three-step, max.	2	2	2	3	3
Binary	3	3	4	5	5
0 to 10 V	1	–	2	3	1
Interfaces · Partly optional					
Device bus	–	•	•	•	•
Meter bus	•	–	•	•	•
Modbus slave					
RS-232	•	–	•	•	•
RS-485	•	–	•	•	•
Modbus master					
RS-485	–	–	–	–	–
Ethernet	•	–	•	•	•
Data transmission and data logging					
TROVIS-VIEW software module	•	•	•	•	•
Data transmission					
with memory pen	–	–	–	–	–
with memory module	•	•	•	•	–
Direct	Using USB converter 3				
Data logging viewer/module	•	•	•	•	•
Supply voltage	165 to 250 V~				
Compliance	CE · EAC				
Data sheets	T 5573	T 5575	T 5576	T 5579	T 5578



TROVIS 5578



### SAM LAN Gateway

Wireless networking with a mesh structure for remote polling and control of TROVIS heating and district heating controllers and/or utility meters using unlicensed radio frequency bands

- Wireless technology using 869 MHz ISM band
- Integration of TROVIS 5573, 5576, 5578 and 5579 Controllers over RS-232 or TTL
- Consumption metering with max. three meter bus loads
- Simultaneous logging of heating and meter data
- Wall, panel or top-hat rail mounting
- Access to SAM DISTRICT ENERGY over Internet connection (on site) or LTE router (SAMSON)
- Also available as rental version including data connection and further accessories

### SAM MOBILE Gateway

Communication gateway to access the SAM DISTRICT ENERGY portal. Polling (including remote maintenance and visualization) of TROVIS heating and district heating controllers and/or utility meters over mobile network

- Integration of TROVIS 5573, 5576, 5578 and 5579 Controllers as well as Types 3374/3375 and Types 5724-8/5725-8 over RS-232, RS-485 or TTL
- Connection of utility meters (max. three meter bus loads)
- Simultaneous logging of heating and meter data
- Further physical interface (2x DI, 1x DO, 1x AI)
- Wall, panel or top-hat rail mounting
- Also available as rental version including data connection and further accessories

### SAM HOME Gateway

Communication gateway to access the SAM DISTRICT ENERGY portal. Polling (including remote maintenance and visualization) of TROVIS heating and district heating controllers and/or utility meters over LAN (Ethernet).

- Integration of TROVIS 5573, 5576, 5578 and 5579 Controllers over RS-232, RS-485 or TTL
- Simultaneous access to several Modbus-TCP masters in LAN
- Connection of utility meters (max. three meter bus loads)
- Further physical interface (2x DI, 1x DO, 1x AI)
- Wall, panel or top-hat rail mounting
- Also available as rental version including data connection and further accessories

### Modbus to meter bus gateway

Used in HVAC networks to integrate M-bus meters into a control system.

- Maximum six heat, electricity or water meters according to EN 1434-3
- Conversion of input data into Modbus data

### Converter or repeater CoRe02

Converter (RS-232/RS-485) or repeater for RS-485 bus networks (two-wire/four-wire)

- RS-485 interfaces optionally connected over RJ-11/RJ-45 jacks or over plug-in screw terminals
- Slide switches to select the operating mode, transmission rate, termination and bus bias voltage
- LED to monitor communication
- Wall, panel or top-hat rail mounting



SAM LAN Gateway



SAM MOBILE Gateway



SAM HOME Gateway



Modbus to meter bus gateway



Universal bus unit CoRe02

# Solar Controllers and Heat Pump Controllers

Solar controllers · ZPR · ZPR-D · SOL3-1 · SOL3-7 · SOL71

Heat pump controllers · WPR3 · WPR71

## Versions and special features

### Solar controllers

The solar controllers are used in solar thermal systems to monitor the collector and storage tank temperatures. The applications covered by the controllers range from simple to complex solar systems.

- **ZPR:** on/off controller for simple heating and water control systems
  - Microprocessor-controlled controller for simple solar thermal systems
  - Differential temperature control for solar heating systems, solar-heated swimming pools, boiler thermostats, fan control and solid fuel boilers
  - Two sensor inputs, one relay contact
  
- **ZPR-D:** on/off controller for simple heating and water control systems
  - LED temperature display
  - Microprocessor-controlled controller for simple solar thermal systems
  - Differential temperature control for solar heating systems, solar-heated swimming pools, boiler thermostats, fan control and solid fuel boilers
  - Two sensor inputs, one relay contact
  
- **SOL3-1:** solar heating controller for simple systems
  - Convenient operation with rotary pushbutton
  - Plant scheme selection using graphics
  - Logging of all measured data and switching states
  - Interface for remote polling, remote configuration and visualization
  - Two sensor inputs, two relay contacts
  
- **SOL3-7:** solar heating controller for complex systems
  - Controller for solar thermal systems with up to two collector arrays, two storage tanks, heat exchanger, additional heating system and a heating circuit
  - Support of 117 ready-configured hydraulic plant schemes
  - Operation using rotary pushbutton
  - Large display for operating states
  - Logging of all measured data and switching states
  - Interface for remote polling, remote configuration and visualization
  - Nine sensor inputs, seven relay contacts and one analog output



ZPR and ZPR-D On/off Controllers



SOL3-x Solar Controller

- **SOL71:** freely programmable solar heating controller for complex systems
- The SOL71 solar heating control is an application used to control complex solar heating systems.
- 104 hydraulic plant schemes
- Graphical display for settings and displaying current operating parameters
- Display icons used to represent the plant in operation
- Inputs and outputs extendable for subsequent addition of control tasks
- Interfaces for communication with other field devices
- 17 universal inputs, 12 binary outputs and four analog outputs

### Heat pump controller

The heat pump controllers are used to control heating systems with heat pumps.

- **WPR3:** controller for complex heat pump systems
  - 9 hydraulic plant schemes
  - Operation using rotary pushbutton
  - Large LCD for plant settings and information
  - Logging of all measured data and switching states
  - Interface for remote polling, remote configuration and visualization
  - Nine sensor inputs, one pulse input, one output, seven relay outputs
- 
- **WPR71:** freely programmable controller for complex heat pump systems
  - Application used to control complex heat pump systems
  - Convenient and simple plain-text operation
  - Various applications for hydraulic plant schemes
  - Inputs and outputs extendable for subsequent addition of control tasks
  - Data logger function and communication interfaces
  - 17 universal inputs, 12 relay outputs, two pulse outputs for flow rate measurement, four outputs 0 to 10 V for pump speed control



WPR3 heat pump controller

**Overview** · (o = optional)

	ZPR	ZPR-D	SOL3-1	SOL3-7	SOL71	WPR3	WPR71
On/off controller	•	•					
Solar controllers			•	•	•		
Heat pump controller						•	•
<b>Operation</b>							
Rotary switch	•	•					
Menu-driven Turn and push			•	•		•	
Freely programmable					•		•
<b>Display</b>							
Status LEDs	•	•					
Temperature		•					
Plain text/graphics			•	•	•	•	•
<b>Inputs</b>							
Pt 1000	2	2	2	9		9	
Universal (Pt, Ni, PTC, NTC, mA, V, binary)					17		17
Pulse input				1	2	1	2
0 to 10 V					4		4
<b>Outputs</b>							
Relay (250 V AC, 2 A)	•	•	2	7	10	7	10
Low voltage (50 V DC, 100 mA)					2		2
0 to 10 V				1	4	1	4
<b>Interfaces</b>							
Jack for memory module			•	•	•	•	•
Data logger			o	o	o	o	o
Communication interface			o	o	•	o	•
<b>Optional extension</b>							
Universal inputs					6		6
Relay outputs					4		4
<b>Mounting</b>							
Wall mounting			•	•	•	•	•
Rail mounting	•	•	•	•	•	•	•
Panel mounting			•	•	•	•	•
<b>Voltage supply</b>							
85 to 250 V AC	•	•	•	•	•	•	•
Power consumption, max.	0.7 W		3 VA	3 VA	8 W	3 W	8 W



Data logging module

# TROVIS 6600 Automation System

TROVIS 6611-2 Control and Automation Unit

I/O module · TROVIS 6620

Input module · TROVIS 6625

Web terminal · TROVIS 6616



## Application

Control and monitoring of autonomous automation stations

## Versions and special features

- **TROVIS 6611-2 Control and Automation Unit:** freely programmable control unit for autonomous operation and management of 32 I/O modules
- Programming with SAMSON graphical project management tool (logic circuits, menu navigation, visualization and start-up) or the use of ready-made applications
- Simple operation over touch screen (3.5")
- Fast and easy start-up using a USB flash drive
- With user-defined event protocol
- Memory extension for logging purposes over USB
- Protocols: Modbus-TCP/IP, Modbus-RTU, MQTT (client) and BACnet IP
- Encrypted protocols and user role administration ensures highest security standard
- Integrated web interface
- Physical inputs and outputs at I/O bus only over modules (e.g. TROVIS 6620)

## Common features of the modules

- Connection to TROVIS 6611-2 Control and Automation Unit over RS-485
  - Power supply and I/O bus galvanically isolated from the module
  - Inputs and outputs can be connected directly to the module's terminals
  - LEDs for binary inputs and outputs
  - Status LEDs for module operation or malfunction
- **TROVIS 6620 I/O Module**
  - Analog inputs as Pt 1000 (two-wire), 0 to 10 V DC, 0 to 2000  $\Omega$ , 0/4 to 20 mA
  - Binary inputs optionally as normally closed or normally open contacts, status indicated by LEDs, binary inputs 1 and 2 as counter inputs (1 kHz)
  - Six binary outputs including 250 V AC/3 A coupling relay, status indicated by LEDs
  - Four analog 0 to 10 V DC outputs
- **TROVIS 6625 Input Module**
  - Binary inputs optionally as normally closed or normally open contacts, status indicated by LEDs
  - Use with internal or external power supply
    - Internal power supply: 18 to 33 V DC
    - External power supply: max. 24 V DC (+15 %)



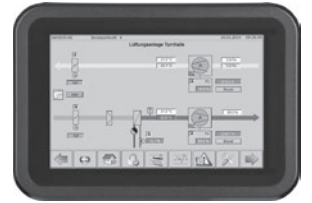
TROVIS 6611-2

TROVIS 6620

TROVIS 6625

– **TROVIS 6616 Web Terminal**

- Indication and operation of all relevant operating data in conjunction with TROVIS 6611-2 Control and Automation Unit
- Fully graphical display
- Operation, e.g. setting parameters or changing set points, on a touch screen
- Android operating system
- 7" widescreen LED-TFT monitor, projected capacitive touch screen,, 800 x 480 pixels
- 1x USB 2.0 A
- Ethernet 10/100 with 802.3af PoE



TROVIS 6616

# Temperature Sensors

Resistors with Pt 100 · Pt 1000



## Application

Sensors for measuring temperatures in heating, ventilation and air-conditioning systems as well as thermal plants

### Types 5204 to 5256 · Temperature sensors with Pt 100 resistor

Type	5204/5205/5206	5215/5216	5225/5226	5255
Screw-in sensor	•			
Duct sensor		•		
Outdoor sensor			•	
Room sensor				•
Operating temp. range	-20 to +150 °C -60 to +400 °C	-35 to +200 °C	-20 to +50 °C	-35 to +85 °C
Compliance	<b>CE</b>			
Data sheet	T 5203			

### Types 5207 to 5277 · Temperature sensors with Pt 1000 resistor

Type	5207-xx	5217	5227-2	5257-x
Screw-in sensor	•			
Duct sensor		•		
Immersion sensor				
Contact sensor				
Outdoor sensor			•	
Room sensor				•
Operating temperature range	-60 to +400 °C -50 to +180 °C -15 to +180 °C -20 to +150 °C -5 to +90 °C	-20 to +150 °C	-35 to +85 °C	-20 to +60 °C -35 to +70 °C
Compliance	<b>CE · EAC</b>			
Data sheet	T 5220/T5221/T5222			

Type	5267-2	5277-2	5277-3/-5
Screw-in sensor			
Duct sensor			
Immersion sensor		•	•
Contact sensor	•		
Outdoor sensor			
Room sensor			
Operating temp. range	-20 to +120 °C	-50 to +180 °C	-50 to +180 °C
Compliance	<b>CE · EAC</b>		
Data sheet	T 5220		

Types 5207-60, 5207-61, 5207-64 and 5207-65 also available as fast-response versions with Pt 1000 resistor (see T 5221 and T 5222)



# Thermostats

Safety temperature monitor · Type 5343

Temperatur regulator · Type 5344

Safety temperature limiter · Type 5345

Double thermostats · Type 5347, Type 5348 and Type 5349

Frost protection thermostat · Type 5312-2



## Types 5343, 5344, 5345, 5347, 5348, 5349

- Can be mounted either as a contact thermostat or as a thermostat with thermowell
- Easy to wire using spring-clamp terminals
- Switching capacity 16 A, 230 V
- Stable switching point thanks to ambient temperature compensation
- Degree of protection IP 54

### Application

The thermostats are tested by the German technical surveillance association (TÜV) according to DIN EN 14597 for temperature control in heat-generating plants and for use in HVAC applications as:

- Safety temperature monitor (STM)
- Temperature regulator (TR)
- Safety temperature limiter (STL)
- Temperature regulator with safety temperature limiter (TR/STL) or
- Temperature regulator with safety temperature monitor (TR/STM)

### Type 5312-2 Frost Protection Thermostat

The frost protection thermostat is used to monitor the temperature in air ducts containing non-corrosive gases.

### Single thermostats

Type	5312-2	5343	5344	5345
Function	TM	STM	TR	STL
Set point range [°C]	-10 to +12	0 to 60 40 to 100 70 to 130 35 to 95	0 to 120 20 to 150	70 to 130 30 to 90
Sensor length [mm]	6000	2000		
Max. medium temperature [°C]	200	85, 125, 155, 120	145, 175	155, 115
Compliance	<b>CE</b>	<b>CE · EAC</b>		
Data sheets	<b>T 5207</b>	<b>T 5206</b>		

### Double thermostats

Type	5347	5348	5349
Function	TR/STL	TR/STM	STM/STL
Set point range [°C]	TR	0 to 120	0 to 120
	STL	70 to 130 30 to 90	–
	STM	–	70 to 130/40 to 100
Sensor length [mm]	2000		
Max. medium temperature [°C]	145 or 115	145 or 125	145
Compliance	<b>CE · EAC</b>		<b>CE</b>
Data sheet	<b>T 5206</b>		



Type 5312-2



Types 5343, 5344 and 5345



Type 5347



Type 5348



Type 5349



# Self-operated Temperature Regulators

Temperature regulators with

Globe valves · Types 1/4 · Type 4u

Three-way valve · Type 9



## Application

Temperature regulators with globe or three-way valves and Types 2231 to 2235 Control Thermostats, tested according to DIN EN 14597. Suitable for liquids, gases and vapors, especially for heat transfer media, such as water, oil and steam or for coolants, such as cooling water.

## Special features

The regulators consist of a:

- Type 2111, Type 2422 or Type 2119 Valve
- either a Type 2231, 2232, 2233, 2234 or 2235 Control Thermostat

## Versions

### – Type 1 · Flanges

Unbalanced globe valve

The valve **closes** when the temperature rises

Body materials according to DIN and ANSI: cast iron (EN-GJL-250), spheroidal graphite iron (EN-GJS-400-18-LT), cast steel (1.0619), cast stainless steel (1.4408) or A126 Class B, A216 WCC, A351 CF8M

### – Type 4 · Flanges

Balanced globe valve

The valve **closes** when the temperature rises

Body materials according to DIN and ANSI: cast iron (EN-GJL-250), spheroidal graphite iron (EN-GJS-400-18-LT), cast steel (1.0619), cast stainless steel (1.4408) or A126 Class B, A216 WCC, A351 CF8M

### – Type 4u · Same as Type 4

The valve **opens** when the temperature rises.

### – Type 9 · Flanges

Balanced three-way valve

Mixing or diverting service for liquids

Body materials according to DIN and ANSI: cast iron (EN-GJL-250), spheroidal graphite iron (EN-GJS-400-18-LT), cast steel (1.0619), cast stainless steel (1.4408) or A126 Class B, A216 WCC, A351 CF8M



Type 4 with Type 2231 Control Thermostat

Type 1 with Type 2231 Control Thermostat

## Technical data

Valve	Type	2111		2422
Pressure balancing		Without <sup>1)</sup>		With
Connection	DN	DN 15 to 50	DN 15 to 50	DN 15 to 150
	NPS	½ to 2	½ to 2	½ to 10
Pressure rating	PN	16 to 40	25	16 to 40
	Class	125 to 300	125 to 300	125 to 300
Max. permissible temperature		350 °C	150 °C	350 °C
		660 °F	300 °F	660 °F
Compliance		<b>CE · EAC</b>		
Data sheets		T 2111 T 2115	T 2113	T 2121 T 2025    T 2123

<sup>1)</sup> Type 2121 in DN 32, 40 and 50 also available with balanced valve

## Materials · Valve body

	Type 2111	Type 2422
DIN	EN-GJL-250, 1.0619, Cast stainless steel (1.4408)	EN-GJL-250, 1.0619, Cast stainless steel (1.4408)
ANSI	A126 Class B A216 A351 CF8M	A126 Class B, A216, A351 CF8M

## Technical data

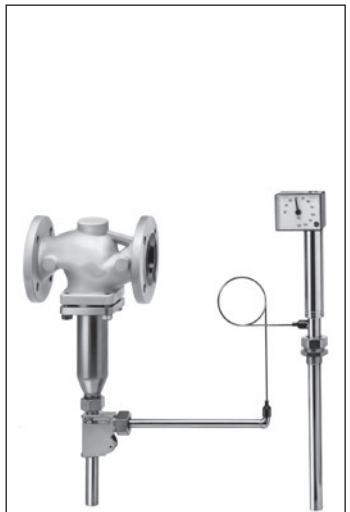
Valve	Type	2119
Pressure balancing		DN 32 and larger
Valve size		DN 15 to 150 (NPS ½ to 6)
Pressure rating		PN 16 to 40 (Class 125 and 300)
Max. permissible temperature		350 °C (660 °F)
Compliance		<b>CE · EAC</b>
Data sheets		T 2133, T 2134

## Materials · Valve body

	Type 2119
DIN	EN-GJL-250, 1.0619, 1.4581
ANSI	A216, A351 CF8M

## Special versions

- Valve entirely of stainless steel
- Reduced  $K_{VS}$  coefficient
- Valve with flow divider ST 1 for noise reduction with steam and non-flammable gases
- Version free of non-ferrous metal



Type 4u with Type 2231 Control Thermostat



Type 9 with Type 2231 Control Thermostat

## Types 2231, 2232, 2233, 2234, 2235 Control Thermostats

### Application

Temperature regulation for heating or cooling installations

### Special features

- The control thermostats consist of a temperature sensor, a set point adjuster with temperature scale and excess temperature safety device, a capillary tube and an operating element.
- They regulate the medium temperature by causing the connected valve to open or close.
- The control thermostats operate according to the liquid expansion principle.

### Versions

- **Type 2231:** set points from  $-10$  to  $150$  °C ( $15$  to  $300$  °F), set point adjustment at the sensor, suitable for liquids and steam · Installation in pipelines, vessels, heating or cooling systems
- **Type 2232:** set points from  $-10$  to  $250$  °C ( $15$  to  $480$  °F), separate set point adjustment, application same as Type 2231
- **Type 2233:** set points from  $-10$  to  $150$  °C ( $15$  to  $300$  °F), set point adjustment at the sensor, suitable for liquids, air and gases, liquid regulation with quick response times, installation in air ducts, vessels, pipelines, heating or cooling systems
- **Type 2234:** set points from  $-10$  to  $250$  °C ( $15$  to  $480$  °F), separate set point adjustment, suitable for liquids, air and gases, application same as Type 2233
- **Type 2235:** set points from  $-10$  to  $250$  °C ( $15$  to  $480$  °F), separate set point adjustment, capillary tube can be installed as required by the user to measure different temperature layers, installation in air-heated storerooms as well as drying, climatic and heating cabinets

### Technical data

Type	2231	2232	2233	2234	2235
Set point span	–10 to +90, 20 to 120 or 50 to 150 °C For Types 2232, 2234, 2235 also 100 to 200, 150 to 250 °C				
	15 to 195, 70 to 250 or 120 to 300 °F For Types 2232, 2234, 2235 also 210 to 390, 300 to 480 °F				
Permissible ambient temperature	–40 to +80 °C (–40 to +175 °F) at the set point adjuster				
Permissible sensor temperature	100 K above the adjusted set point				
Capillary tube length	5 m (16 ft)				
Compliance	<b>ERC</b>				
Data sheets	T 2111/2115, T 2112, T 2113, T 2121/2025, T 2123/2131, T 2133/2134				

### Materials

Type	2231	2232	2233	2234	2235
Sensor	Bronze	Bronze	Copper	Copper	Copper
Capillary tube	Nickel-plated copper				

### Special versions

- Sensor of CrNiMo steel
- Capillary tube made of CrNiMo steel or plastic-coated copper
- 10 m (50 ft) capillary tube



Type 2233

Type 2232

Type 2231

# Self-operated Temperature Regulators

Typetested safety devices

Type 1/..., Type 4/..., Type 9/...

Safety temperature limiter (STL) · Type 2212



## Application

Temperature limitation in heating and water heating installations according to DIN 4753 and DIN 4747-1 · Tested according to DIN EN 14597

## Special features

- Interrupts and locks the energy supply when an adjusted limit value is reached, when the capillary tube breaks or when leakage occurs in the sensor system
- Can only be reset or started-up with a tool, provided the defect has been eliminated and the temperature has fallen below the limit value

**Versions: safety temperature limiter (STL) consisting of:**

- **Type 2111/Type 2422** Globe Valve and **Type 2212** Safety Temperature Limiter with temperature sensor and thermowell, limit adjuster, capillary tube and connecting element with spring mechanism

Safety temperature limiters (STL) with a valve operating without auxiliary energy and designed for extended safety according to DIN EN 14597. Devices tested according to DIN EN 14597 are available for installations according to DIN 4753.

## Technical data

Safety temperature limiter	Type 2212 STL (size 50 <sup>1)</sup> , size 150 <sup>2)</sup> )
Adjustable limit range	10 to 95, 20 to 120 or 40 to 170 °C
Max. perm. ambient temperature	80 °C (60 °C with electromagnetic release)
Min. permissible sensor temperature <sup>3)</sup> at 0 °C ambient temperature	Smallest adjustable limit temperature of the selected limit range
Min. permissible temperature of the STL including sensor during plant shutdown <sup>3)</sup>	10 to 95 °C limit range : -10 °C 20 to 120 °C limit range : 0 °C 40 to 170 °C limit range : +10 °C
Permissible temperature at sensor	Max. 50 K above the adjusted set point
Capillary tube length	5 m
Compliance	<b>CE · EAC</b>
<b>Data sheet</b>	<b>T 2046</b>

<sup>1)</sup> For valves up to DN 50

<sup>2)</sup> For valves larger than DN 50

<sup>3)</sup> The STL is triggered when the temperature falls below the specified temperature

## Materials

Connecting element with spring mechanism	GD AlSi12 (230), connecting piece 1.4104
Sensor	Copper
Thermowell	Copper or CrNiMo
Capillary tube	Copper

## Special versions

- Electric signal transmitter for remote transmission of the plant status
- With Type 2401 Pressure Element
- 10 m capillary tube length (**not** tested according to DIN EN)



STL with Type 2422 Valve, Type 2231 Control Thermostat and Type 2212 Safety Temperature Limiter

# Self-operated Temperature Regulators

Typetested safety devices

Type 1/..., Type 4/..., Type 9/...

Safety temperature monitor (STM) · Type 2213



## Application

Temperature monitoring in heating and water heating installations according to DIN 4747-1 and DIN EN 12828 · Tested according to DIN EN 14597

## Special features

- Interrupts and locks the energy supply when an adjusted limit value is reached, when the capillary tube breaks or when leakage occurs in the sensor system
- Automatic reset or start-up, provided the defect has been eliminated and the temperature has fallen below the limit value

## Versions: Safety temperature monitor (STM) consists of:

- Type 2111/Type 2422 Globe Valve or Type 2118/Type 2119 Three-way Valve and **Type 2213** Safety Temperature Monitor with temperature sensor, limit adjuster, capillary tube and connecting element with spring mechanism

Safety temperature monitors (STM) with a valve operating without auxiliary energy and designed for extended safety according to DIN EN 14597. Devices tested according to DIN EN 14597 are available for installations according to DIN 4747 or DIN EN 12828.

## Technical data

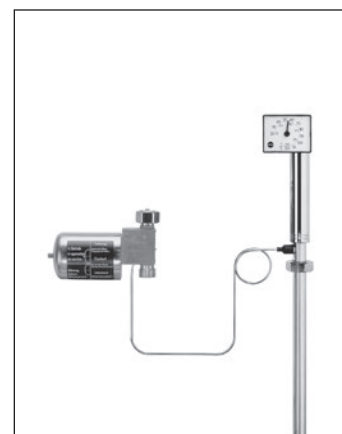
Safety temperature monitor	Type 2213 Safety Temperature Monitor
Limit range	-10 to 90 °C or 20 to 120 °C
Permissible ambient temperature at the limit value adjuster	-40 to +80 °C
Permissible temperature at sensor	Max. 100 K above the adjusted set point
Capillary tube length	5 m
Compliance	<b>CE · EAC</b>
Data sheet	<b>T 2043</b>

## Materials

Connecting element with spring mechanism	Nickel-plated brass
Sensor	Bronze
Thermowell with conductive plate	Bronze, copper or CrNiMo steel
Capillary tube	Nickel-plated copper

## Special versions

- Electric signal transmitter for remote transmission of the plant status
- Capillary tube 10 m, made of copper (**not** tested according to DIN EN)



Type 2213



STM with Type 2422 Valve, Type 2213 Safety Temperature Monitor and Type 2232 Control Thermostat

# Self-operated Temperature Regulators

Temperature regulators · Type 43-1 to Type 43-7

Valve closes when the temperature rises · Type 43-1 · Type 43-2 · Type 43-5 · Type 43-7

Valve opens when the temperature rises · Type 43-6

Three-way valve for mixing and diverting service · Type 43-3



## Application

Regulators for district heating systems, heat generators, heat exchangers and other HVAC and industrial applications. Suitable for liquids, gases and vapors at operating pressures up to 25 bar.

**For heating service:** Types 43-1, 43-2, 43-5, 43-7

**For cooling service:** Type 43-6

For mixing or diverting service, **heating or cooling service:** Type 43-3

## Special features

- Low-maintenance proportional regulators requiring no auxiliary energy
- Temperature sensors suitable for any desired mounting position and high permissible ambient temperatures, especially suitable for district heating networks

## Versions

The regulators consist of a valve, a Type 2430 Control Thermostat with set point adjuster, a capillary tube and temperature sensor operating according to the adsorption principle.

## Technical data

Type	43-1	43-2	43-3
Valve	2431	2432	2433
Pressure balancing	Plug balanced by a piston		–
Flanged body	–	DN 15 to 50	–
Set point range	0 to 35, 25 to 70, 40 to 100, 50 to 120, 70 to 150 °C		
	30 to 95, 75 to 160, 105 to 210, 160 to 300 °F		
Max. permissible temperature [°C/°F]	Liquids: 150/300, non-flammable gases: 80/175		Water: 150/300
Compliance	CE · EAC		
Data sheets	T 2171/T 2175		T 2173/T 2177

Type	43-5	43-7	43-6
Valve	2435	2437	2436
Pressure balancing	Plug balanced by bellows		
Flanged body	–	DN 15 to 50	
Set point range	0 to 35, 25 to 70, 40 to 100, 50 to 120, 70 to 150 °C		
	30 to 95, 75 to 160, 105 to 210, 160 to 300 °F		
Max. permissible temperature [°C/°F]	Liquids, steam: 200/390		Liquids: 150/300 Non-flammable gases: 80/175
Compliance	CE · EAC		
Data sheets	T 2172, T 2174		



Type 43-1



Type 43-2



Type 43-3

## Connections

	G			DIN						ANSI NPT <sup>1)</sup>		
	1/2	3/4	1	DN						1/2	3/4	1
				15	20	25	32	40	50			
Type 43-1	•	•	•							•	•	•
Type 43-2				•	•	•	•	•	•			
Type 43-3	•	•	•	•	•	•	•	•	•			
Type 43-5	•	•	•									
Type 43-6	•	•	•				•	•	•	•	•	•
Type 43-7				•	•	•	•	•	•			

<sup>1)</sup> Material 1.4408 or A351 CF8M

## Materials

Body	Red brass <sup>1)</sup> · 1.4408 <sup>2)</sup> or A351 CF8M (Types 2431 and 2436 only) · EN-GJS-400-18-LT <sup>3)</sup>
Sensor	
Thermowell	Copper or 1.4310
Capillary tube	Copper or 1.4310

<sup>1)</sup> Not for ANSI

<sup>2)</sup> Special version of Type 43-1 (G 1/2, G 3/4, G 1 and DN 15, DN 25)

<sup>3)</sup> Flanged body

## Special versions

- Versions tested according to DIN EN 14597 (see T 2181)
- Capillary tube
- Internal parts resistant to mineral oils
- Fast-responding thermostats (vapor pressure principle)
- Small  $K_{VS}$  in DN 15 or G 1/2
- Stainless steel body for Type 43-1
- Flanged valve body of EN-GJS-400-18-LT for Type 43-2



Type 43-5

# Self-operated Temperature Regulators

Typetested safety devices

Safety temperature limiter · Type 2439



## Application

Temperature limitation in heating and water heating installations according to DIN 4747-1, DIN EN 12828, DIN EN 12953-6 and DIN 4753 · Tested according to DIN EN 14597

## Special features

- Safety temperature limitation of the energy supply by closing and locking a valve using a spring mechanism
- The valve closes when the adjusted set point is reached, when the capillary tube breaks or when leakage occurs in the system
- Reset or start-up using a screwdriver, provided the defect has been eliminated and the temperature has fallen below the limit value

## Versions

### Safety temperature limiter (STL) consisting of:

- Type 2431/2432/2433/2435/2436/2437 Valve and **Type 2439** Safety Temperature Limiter with temperature sensor and thermowell, limit adjuster, capillary tube and connecting element with spring mechanism

## Technical data

Safety temperature limiter	Type 2439 STL
Limit range	10 to 95 °C or 20 to 120 °C
Permissible ambient temperature	80 °C
Permissible temperature at sensor	Max. 20 K above the adjusted set point
Capillary tube length	2 m
Compliance	CE · EAC
Data sheet	T 2185

## Materials

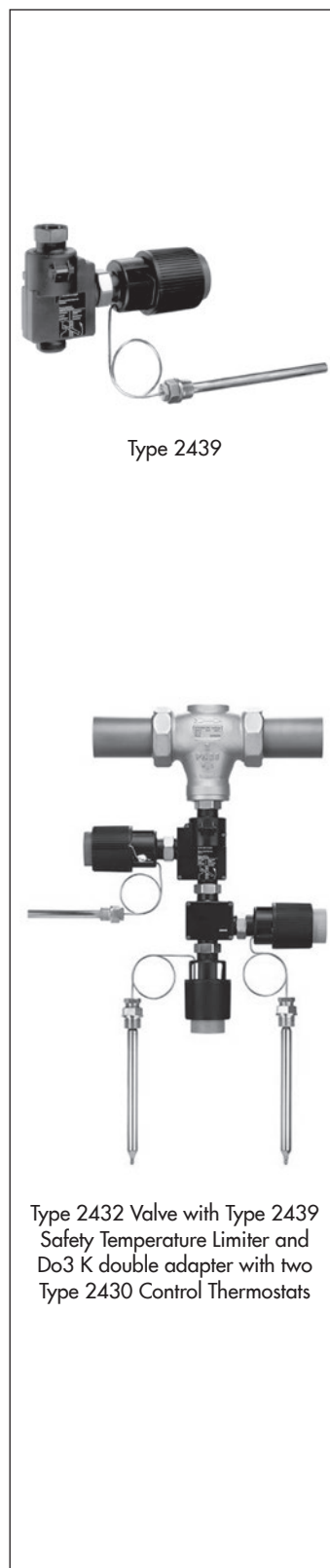
Connecting element with spring mechanism	PTFE, glass fiber reinforced
Sensor	Copper
Thermowell	Copper or CrNiMo steel
Capillary tube	Copper

## Special versions with

- G ½ thermowell of CrNiMo steel
- 5 m capillary tube
- Electric signal transmitter
- Reduced  $K_{VS}$  coefficient in DN 15 or G ½

## Combinations

- The safety temperature limiter can be combined with a Type 2430 Control Thermostat (TR/STL).
- Safety temperature monitor with differential pressure/flow rate regulation



Type 2439

Type 2432 Valve with Type 2439 Safety Temperature Limiter and Do3 K double adapter with two Type 2430 Control Thermostats



# Self-operated Temperature Regulators

Typetested safety devices

Safety temperature monitor · Type 2403



## Application

Temperature monitoring in heating and water heating installations according to DIN 4747-1, DIN EN 12828 and DIN 4735 · Tested according to DIN EN 14597

## Special features

- The valve closes when the adjusted set point is reached, when the capillary tube breaks or when leakage occurs in the system
- Automatic reset or start-up, provided the defect has been eliminated and the temperature has fallen below the limit value.

## Versions

Safety temperature monitor (STM) consists of:

- Type 2431/2432/2433/2435/2436/2437 Valve and **Type 2403** Safety Temperature Monitor with temperature sensor, limit adjuster, capillary tube and connecting element with spring mechanism

## Technical data

Safety temperature monitor	Type 2403 STM
Limit range	60 to 75 °C, 75 to 100 °C, 100 to 120 °C
Permissible ambient temperature	Max. 50 °C
Permissible temperature at sensor	Max. 25 K above the adjusted set point
Capillary tube length	5 m
Compliance	<b>CE · ENEC</b>
Data sheet	<b>T 2183</b>

## Materials

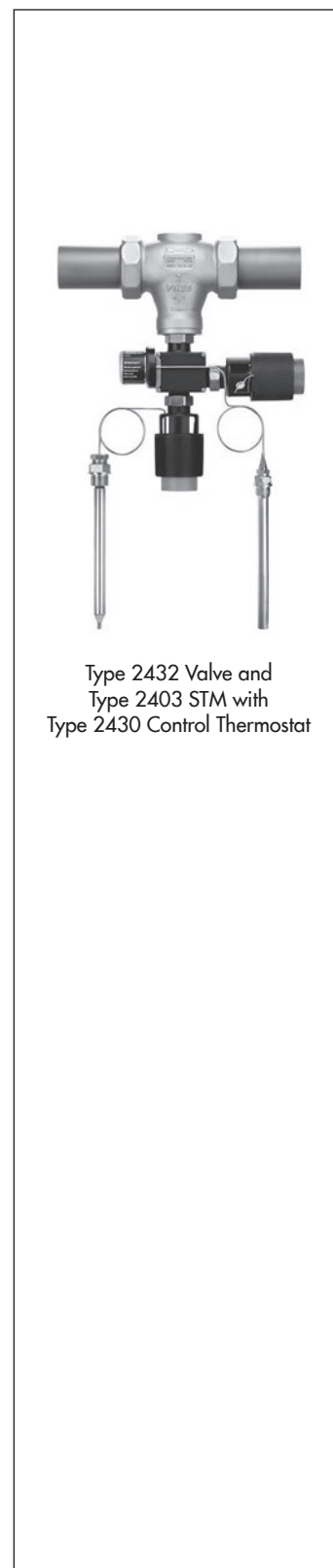
Connecting element	PPO with brass connection nut
Set point adjuster	PTFE, glass fiber reinforced
Sensor	1.4571
Capillary tube	Copper

## Combinations

- The safety temperature monitor can be combined with a Type 2430 Control Thermostat (TR/STM).
- Safety temperature monitor with differential pressure/flow rate regulation

## Further self-operated temperature regulators:

- **Type 2040** · Safety temperature monitor for cryogenic applications, see page 100



Type 2432 Valve and  
Type 2403 STM with  
Type 2430 Control Thermostat

# Self-operated Pressure Regulators

Pressure reducing valve · Type 2405

Excess pressure valve · Type 2406



## Application

Pressure regulation of flammable gases used as a source of energy or to control compressed air supply in process engineering applications

## Special features

- Low-maintenance proportional regulators
- Compact regulator design providing excellent control accuracy
- Internal set point springs with set point adjustment using a nut on the actuator
- Fulfills strict fugitive emission requirements (TA Luft)
- Minimum leakage class IV
- Suitable for vacuum

## Versions

- **Pressure reducing valve** or **excess pressure valve** with flange or threaded connections  
Soft-seated plug · DIN and ANSI versions

## Technical data

Type	2405	2406
Pressure reducing valve	•	
Excess pressure valve		•
Set point range	5 mbar to 10 bar	
K <sub>VS</sub> coefficient	0.016 to 32	
Valve size	DN 15 to 50	
Pressure rating	PN 16 to 40	
Medium temperature range	-20 to +60 °C <sup>1)</sup>	
Compliance	CE · ENEC	
<b>Data sheets</b>	<b>T 2520</b>	<b>T 2522</b>

<sup>1)</sup> 0 to 150 °C: for unbalanced version with FKM diaphragm/soft seal

## Materials

Body	EN-GJL-250, EN-GJS-400-18-LT · 1.0619, 1.4571, 1.4408
Seat	1.4112, 1.4404
Plug	1.4305
Plug seal, diaphragm	EPDM, FKM, NBR
Springs	1.4310
Actuator housing	1.0332, 1.4301

## Special versions

- FDA-compliant materials for the food processing and pharmaceutical industries
- Version according to NACE (sour gas)
- With seal and leakage line connection
- With directly connected control line



Type 2405 or Type 2406 with flanges

# Self-operated Pressure Regulators

Pressure reducing valve · Type 41-23

Excess pressure valve · Type 41-73



## Application

Pressure set points from 0.05 to 28 bar (0.75 to 400 psi) · Suitable for liquids, gases and vapors up to 350 °C (600 °F)

## Special features

- Low-maintenance, medium-controlled proportional regulators requiring no auxiliary energy
- Frictionless plug stem seal with stainless steel bellows
- Exchangeable positioning springs and actuator
- Single-seated valve with upstream and downstream pressure balancing

## Versions

- **Type 41-23 Pressure Reducing Valve:** Type 2412 Valve and Type 2413 Actuator with EPDM rolling diaphragm
- **Type 41-73 Excess Pressure Valve:** Type 2417 Valve and Type 2413 Actuator with EPDM rolling diaphragm

## Technical data

Valve	Type	2412, 2417		
Valve size	DN	15 to 50	65 to 80	100
	NPS	½ to 2	2½ and 3	4
Max. Δp		25 bar (360 psi)	20 bar (290 psi)	16 bar (230 psi)
Actuator	Type	2413		
Set point range		0.05 to 0.25 bar, 0,1 to 0.6 bar, 0,2 to 1.2 bar, 0.8 to 2.5 bar, 2 to 5 bar, 4.5 to 10 bar, 8 to 16 bar		
		0.75 to 3.5 psi, 1.5 to 8.5 psi, 3 to 17 psi, 10 to 35 psi, 30 to 75 psi, 65 to 145 psi, 115 to 230 psi		
Max. permissible temperature		Gases 350 °C (660 °F), at the actuator max. 80 °C (175 °F) Liquids 150 °C (300 °F), with compensation chamber 350 °C (660 °F) Steam with compensation chamber 350 °C (660 °F)		
Compliance		<b>CE · EAC</b>		
Data sheets		<b>T 2512, T 2513, T 2517, T 2518</b>		



Type 41-23



Type 41-23, stainless steel version

## Materials

Valve	Type	2412, 2417			
Pressure rating	PN	16	25	40	40
	Class	125	150	300	300
Max. permissible temperature	°C	300	350	350	350
	°F	570	660	660	660
Body	DIN	EN-GJL-250	EN-GJS-400-18-LT	1.0619	1.4408
	ANSI	A126 B	A216 WCC		A351 CF8M
Seat, plug		CrNiMo steel/CrNiMo steel			CrNiMo steel
Actuator	Type	2413			
Diaphragm cases		Sheet steel DD11 <sup>1)</sup>			
Diaphragm		EPDM with fabric reinforcement, FKM for mineral oils NBR, EPDM with PTFE foil			

<sup>1)</sup> In corrosion-resistant version (CrNi steel)

### Special versions

- Control line kit for tapping the pressure directly at the valve body (accessories)
- With internal parts made of FKM, e.g. for use with mineral oils
- Free of oil and grease for oxygen with FKM diaphragm
- EPDM diaphragm with PTFE protective facing
- Actuator for remote set point adjustment (autoclave control)
- Bellows actuator for valves DN 15 to 100, set point ranges 2 to 6, 5 to 10, 10 to 22 or 20 to 28 bar
- Valve with flow divider ST 1 or ST 3 (DN 65 to 100) for particularly low-noise operation with gases and vapors
- Seat and plug with Stellite® facing · Plug with PTFE/EPDM/FKM/NBR soft seal
- Wetted plastic parts conforming to FDA regulations (max. 60 °C)
- Lubricants for ultrapure water or gas



Type 41-73

# Self-operated Pressure Regulators

Pressure reducing valves · Type 44-0 B and Type 44-1 B

Excess pressure valve · Type 44-6 B



## Application

Pressure set points from 0.2 to 20 bar (3 to 290 psi), suitable for non-flammable gases, liquids and steam

## Special features

- Low-maintenance proportional regulators requiring no auxiliary energy
- Stainless steel operating bellows as operating element
- Compact design with particularly low overall height
- Spring-loaded, single-seated valve with balanced plug

## Versions

- **Type 44-0 B Pressure Reducing Valve:** valve PN 25 (Class 300), for steam up to 200 °C (390 °F) · Unbalanced or balanced
- **Type 44-1 B Pressure Reducing Valve:** valve PN 25 (Class 300) for air up to 150 °C (300 °F) · Nitrogen up to 200 °C (390 °F), other gases up to 80 °C (175 °F) · Liquids up to 150 °C (300 °F) · Unbalanced or balanced
- **Type 44-6 B Excess Pressure Valve:** valve PN 25 (Class 300) for air up to 150 °C (300 °F) · Nitrogen up to 200 °C (390 °F), other gases up to 80 °C (175 °F) · Liquids up to 150 °C (300 °F) and steam up to 200 °C (390 °F) · Unbalanced or balanced (standard)

## Technical data

Regulator	Pressure reducing valve		Excess pressure valve
	Type 44-0 B	Type 44-1 B	Type 44-6 B
Connection (female thread or flanges)	G ½, G ¾, G 1, ½ NPT, ¾ NPT, 1 NPT, DN 15 to 50 (NPS ½, NPS 1)		
Pressure rating	PN 25 (Class 300)		
Set point range	0.2 to 2/1 to 4/2 to 6/4 to 10/8 to 20 <sup>1)</sup>		
	3 to 30/15 to 60/30 to 90/60 to 150/120 to 290 <sup>1)</sup>		
Compliance	CE · ENEC		
Data sheets	T 2626, T 2627, T 2628		

<sup>1)</sup> Set point range not for DN 40 and 50

## K<sub>VS</sub> or C<sub>V</sub> coefficients

Body with screwed ends: Type 44-1 B, Type 44-6 B, Type 44-0 B			
Connection	G ½, ½ NPT	G ¾, ¾ NPT	G 1 (1 NPT)
K <sub>VS</sub> <sup>2)</sup>	3.2	4	5
C <sub>V</sub>	4	5	6

Flanges: Type 44-1 B, Type 44-6 B, Type 44-0 B				
Connection	DN 15, NPS ½	DN 25 (NPS 1)	DN 40	DN 50
K <sub>VS</sub> <sup>2)</sup>	3.2	5	16	20
C <sub>V</sub>	4	6	–	–

<sup>2)</sup> Special K<sub>VS</sub> coefficients on request



Type 44-0 B, body with screwed ends



Type 44-1 B, body with screwed ends



Type 44-1 B, flanged body



Type 44-6 B, flanged body

## Materials

Body	Red brass CC491K/CC499K C83600	Spheroidal graphite iron EN-GJS- 400-18-LT	Stainless steel 1.4408
Seat	Stainless steel 1.4305		1.4404
Plug			
Type 44-1 B	Brass (free of dezincification), soft seal		1.4404, metal or soft seal
Type 44-6 B	Brass (free of dezincification), soft seal		1.4404, metal or soft seal
Type 44-6 B (steam regulator)	Brass (resistant to dezincification) with PTFE soft seal or metal seal		1.4404, with PTFE soft seal or metal seal
Type 44-0 B	Brass (resistant to dezincification) with PTFE soft seal Balanced: 1.4404, metal seal		1.4404, with PTFE soft seal
Operating/ balancing bel- lows	Steel: 1.4571		1.4571

## Connections: Type 44-0 B, Type 44-1 B and Type 44-6 B

Body material	Connection	DIN							ANSI				
		G			DN				NPT			NPS	
		1/2	3/4	1	15	25	40	50	1/2	3/4	1	1/2	1
Stainless steel/red brass	Female thread	•	•	•									
Stainless steel	Flange				•	•							
Spheroidal graphite iron	Flange				•	•	•	•					
A351 CF8M	Female thread								•	•	•		
A351 CF8M	Flange											•	•



Type 44-6 B, body with screwed ends

# Self-operated Pressure Regulators

Pressure reducing valve with pilot valve · Type 2333

Excess pressure valve with pilot valve · Type 2335



## Application

Pressure set points from 2 to 28 bar, suitable for liquids, gases and vapors up to 350 °C  
The attached pilot valve (either a pressure reducing valve or excess pressure valve) determines the function of the regulator.

## Special features

- Pressure regulator, pilot operated by the process medium with excellent control properties
- High control accuracy
- Set point adjustment at the pilot valve

## Versions

- **Type 2422 Valve:** modified, with suitable pilot valve with set point adjuster, valve conforming with DIN, ANSI or JIS standards
- **Type 2333 Pressure Reducing Valve:** to regulate the downstream pressure  $p_2$  to the adjusted set point. Suitable pilot valves: Type 44-1 B or Type 44-0 B, Type 44-2, Type 41-23, Type 2405
- **Type 2335 Excess Pressure Valve:** to regulate the upstream pressure  $p_1$  to the adjusted set point. Suitable pilot valves: Type 44-6 B, Type 44-7, Type 41-73, Type 2406

## Technical data

Valve	Type	2422					
Valve size	DN	125	150	200	250	300	400
$K_{VS}$ coefficient		200	360	520	620	–	–
$K_{VS1}$ <sup>1)</sup>	Balanced by a bellows	150	270	400	500	–	–
$K_{VS3}$ <sup>2)</sup>		100	180	260	310	–	–
$K_{VS}$ coefficient	Balanced by a diaphragm	250	380	650	800	1250	2000
Set point range	Depending on the pilot valve used						
Compliance	CE · EAC						
Data sheets	T 2552, T 2554						

<sup>1)</sup> With flow divider ST 1    <sup>2)</sup> With flow divider ST 3

## Materials

Valve	Type	Type 2422 · Balanced by a bellows · Balanced by a diaphragm			
Pressure rating	PN	16	16/25	16/25/40	
Body	DIN	EN-GJL-250	EN-GJS-400-18-LT	1.0619	CrNiMo steel
	ANSI	A126 B	–	A216 WCC	A351 CF8M
Valve seat	1.4006				1.4404
Plug (standard)	1.4301 with PTFE soft seal				

## Special versions

With flow divider for noise reduction · Version resistant to mineral oils · Version for flammable gases · Free of non-ferrous metal · Lower minimum differential pressure · Larger valve sizes · Reduced  $K_{VS}$  · Version for deionized water · Version for oxygen · With solenoid valve for emergency function



Type 2333 (DN 150)  
with Type 50 ES Pilot Valve

Type 2335 (DN 150)  
with Type 44-7 Pilot Valve

# Self-operated Pressure Regulators

Pressure reducing valve · Type 44-2

Safety shut-off valves (SSV) · Type 44-3 and Type 44-9

Excess pressure valve · Type 44-7

Safety excess pressure valves (SEV) · Type 44-8 and Type 44-4



## Application

Pressure set points from 0.2 to 11 bar, suitable for liquids, air and nitrogen · SSV and SEV to protect district heating systems

## Special features

- Low-maintenance proportional regulators requiring no auxiliary energy
- Tight-closing single-seated valve with balanced plug
- SEV and SSV: typetested for water by the German technical surveillance association (TÜV)

## Versions

Series 44 Pressure Regulators with set point ranges from 0.2 to 11 bar

Valve sizes DN 15 to 50 with welding ends and DN 32 to 50 with flanged valve body

- **Type 44-2 Pressure Reducing Valve:** with one operating diaphragm
- **Type 44-3 Safety Shut-off Valve (SSV):** with pressure reducing valve and two operating diaphragms · Typetested for water by TÜV · In the event of a diaphragm rupture, the valve continues to function.
- **Type 44-9 Safety Shut-off Valve (SSV):** with pressure reducing valve and two operating diaphragms · Typetested for water by TÜV · In the event of a diaphragm rupture, the valve closes.
- **Type 44-7 Excess Pressure Valve:** with one operating diaphragm
- **Type 44-8 Safety Excess Pressure Valve (SEV):** with two operating diaphragms · Typetested for water by TÜV · In the event of a diaphragm rupture, the valve continues to function.
- **Type 44-4 Safety Excess Pressure Valve (SEV):** with two operating diaphragms · Typetested for water by TÜV · In the event of a diaphragm rupture, the valve opens.

## Technical data

Valve size	DN	15	20	25	32	40	50
$K_{VS}$ coefficient		1/2.5/4	6.3	8	12.5	16	20
Max. permissible temperature		150 °C					
Set point range							
Type 44-2	bar	0.5 to 2/1 to 4/2 to 4.2/2.4 to 6.3/6 to 10.5					
Type 44-3 (SSV)	bar	1 to 4 <sup>1)</sup> /2 to 4.2/2.4 to 6.3/6 to 10.5					
Type 44-9 (SSV)	bar	1 to 4 <sup>1)</sup> /2 to 4.2/2.4 to 6.3/6 to 10.5					
Type 44-7	bar	0.1 to 1/0.5 to 2/1 to 4/2 to 4.4/2.4 to 6.6/6 to 11					
Type 44-8 (SEV)	bar	1 to 4 <sup>1)</sup> /2 to 4.4/2.4 to 6.6/6 to 11					
Type 44-4 (SEV)	bar	1 to 4 <sup>1)</sup> /2 to 4.4/2.4 to 6.6/6 to 11					
Compliance		<b>CE · EAC</b>					
Data sheets		<b>T 2623, T 2723, T 2630, T 2632</b>					

<sup>1)</sup> Without typetesting



Types 44-3/-9



Types 44-8/-4 (SEV)



## Materials

Body	Red brass CC499K, EN-GJS-400-18-LT <sup>1)</sup>
Seat	Stainless steel 1.4305
Plug	Brass 2.0402 and 1.4305 with EPDM soft seal

<sup>1)</sup> Additional version for Type 44-3, DN 32 to 50: valve with flanged body

## Special version

- Internal parts resistant to mineral oils
- Special  $K_{VS}$  coefficients for DN 15

# Series 2371 Pressure Regulators for the food and pharmaceutical industries

Pressure reducing valves · Type 2371-10 and Type 2371-11

Excess pressure valves · Type 2371-00 and Type 2371-01



## Application

Pressure reducing valve or excess pressure valves for the food and pharmaceutical industries for liquids and gases

## Special features

- Proportional pressure regulators
- Wetted inside surfaces with a surface roughness  $R_a \leq 0.8 \mu\text{m}$ ; outside surface glass bead blasted
- Stainless steel 1.4404 (316L) or 1.4409 (CF3M)
- FDA-approved materials
- Cavity-free angle-style body
- Test bore to monitor the diaphragm for leakage
- Optional stem locking facility to keep valve open during CIP or SIP

## Versions

- **Type 2371-11 and Type 2371-11:** pressure reducing valves with diaphragm to regulate the outlet pressure · Set point of Type 2371-10 adjusted pneumatically, Type 2371-11 adjusted by the set point spring
- **Type 2371-00 and Type 2371-01:** excess pressure valves with diaphragm to regulate the inlet pressure  
Set point of Type 2371-00 adjusted pneumatically, Type 2371-01 adjusted by the set point spring

## Technical data

Regulator	Type 2371 Pressure Reducing Valve		Type 2371 Excess Pressure Valve	
	-10	-11	-00	-01
Valve size	DN 15 to 50 (NPS ½ to 2)			
Connection	Clamps, threaded connections, flanges		Clamps, threaded connections, flanges Welding ends	
Set point range	bar 0.3 to 1.2/1 to 3/2.5 to 4.5/4 to 6			
	psi 5 to 18/15 to 45/35 to 65/60 to 90			
Maximum pressure	10 bar (150 psi)			
Permissible temperature	-10 to +160 °C (14 to 320 °F)			
Leakage class according to DIN EN/ANSI	Metal seal: $\leq 0.05\%$ of $K_{VS}/C_V$			
	Soft seal: $\leq 0.01\%$ of $K_{VS}/C_V$			
Compliance	EAC			
Data sheets	T 2640		T 2642	

## Special versions

- Body made of 1.4435, others on request
- DN 50 body with DN 65 connections



Type 2371-11



Type 2371-00



Type 2371-01 with manual stem locking

# Self-operated Pressure Regulators

Pressure reducing valve · Type 2422/2424

Excess pressure valve · Type 2422/2425



## Application

Pressure regulators for set points from 0.05 to 2.5 bar · Valve sizes DN 125 to 250  
Pressure rating PN 16 to 40 · Suitable for liquids, gases and vapors up to 350 °C

## Special features

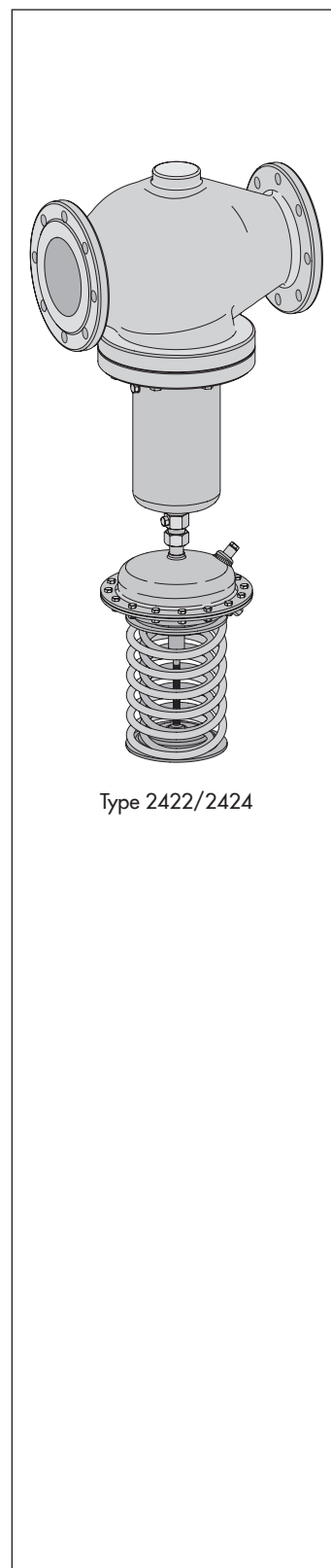
- Low-maintenance, medium-controlled proportional regulators requiring no auxiliary energy
- Wide set point range and convenient set point adjustment using a nut
- Exchangeable set point springs and actuator
- Spring-loaded, single-seated valve with upstream and downstream pressures balanced by a stainless steel bellows or by a balancing diaphragm
- Standard low-noise plug · Special version with flow divider ST 1 or ST 3 for further noise level reduction
- Reduced  $K_{VS}$  coefficients to adapt the regulator to the operating conditions

## Versions

- **Type 2422/2424 Pressure Reducing Valve:** Type 2422 Valve balanced by a bellows or a diaphragm with soft-seated plug · Body of cast iron, spheroidal graphite iron, cast steel or cast stainless steel · Type 2424 Actuator with EPDM rolling diaphragm
- **Type 2422/2425 Excess Pressure Valve:** Type 2422 Valve balanced by a bellows or a diaphragm with soft-seated plug · Body of cast iron, spheroidal graphite iron, cast steel or cast stainless steel · Type 2425 Actuator with EPDM rolling diaphragm

## Technical data

Type 2422 Valve		
Valve size	DN 125/150/250 (NPS 6/8/10)	
Pressure rating	PN 16/25/40 (Class 125/150/300)	
Max. permissible temperature	Valve body	Up to 350 °C
	Plug balanced by a bellows	Metal seal: 350 °C, PTFE soft seal: 220 °C, EPDM or FKM soft seal: 150 °C, NBR soft seal: 80 °C
	Plug balanced by a diaphragm	150 °C
$K_{VS}$ coefficient	40 to 800	
Max. $\Delta p$	10 to 20 bar	
Leakage class according to IEC 60534-4	$\leq 0.05$ % of $K_{VS}$ coefficient	
Compliance	<b>CE · EAC</b>	
Type 2424/Type 2425 Actuator		
Set point ranges	0.05 to 0.25 bar/0.1 to 0.6 bar/0.2 to 1 bar/ 0.5 to 1.5 bar/1 to 2.5 bar	
Max. permissible pressure	320 cm <sup>2</sup> actuator area: 3 bar, 640 cm <sup>2</sup> actuator area: 1.5 bar	
Max. permissible temperature	Gases at the actuator 80 °C · Liquids 150 °C, with compensation chamber 350 °C · Steam with compensation chamber 350 °C	
Data sheets	<b>T 2547/T 2548/T 2549/T 2550</b>	



Type 2422/2424

### Special versions

- With flow divider ST 1 or ST 3 for particularly low-noise operation
- With metal-seated plug
- With FKM rolling diaphragm, e.g. for mineral oils or flammable gases
- With NBR rolling diaphragm for flammable gases
- Version completely in stainless steel for pressure rating PN 16 to 40
- Versions for oxygen service
- Actuator with two diaphragms
- With metal cover to protect the set point springs

### Materials

Type 2422 Valve · Balanced by a bellows				
Pressure rating	PN 16	PN 25	PN 16, 25 and 40	
Valve body	Cast iron EN-GJL-250	Spheroidal graphite iron EN-GJS-400-18-LT	Cast steel 1.0619	Stainless steel 1.4408
Seat	1.4006			1.4404
Plug	1.4404			1.4404 with PTFE seal
Seal for soft-seated plug	PTFE · EPDM/FKM · NBR			
Plug stem	1.4301			
Metal bellows	1.4571			
Bottom section	1.0305			1.4571
Body gasket	Graphite on metal core			
Type 2422 Valve · Balanced by a diaphragm				
Pressure rating	PN 16	PN 16/25	PN 16, 25 and 40	
Valve body	Cast iron EN-GJL-250	Spheroidal graphite iron EN-GJS-400-18-LT	Cast steel 1.0619	Stainless steel 1.4408
Valve seat	Red brass <sup>1)</sup>			
Plug	Red brass <sup>1)</sup> · With EPDM soft seal or with PTFE soft seal			
Pressure balancing	Balancing cases made of sheet steel DD11 · EPDM balancing diaphragm for liquids and non-flammable gases or NBR diaphragm for flammable gases			
Seal	Graphite on metal core			
Type 2424/Type 2425 Actuator				
Diaphragm cases	DD 11			1.4301
Diaphragm	EPDM with fabric reinforcement · FKM · NBR			
Guide bushing	DU bushing			PTFE
Seals	EPDM · FKM · NBR			

<sup>1)</sup> Special version 1.4409



Type 2422/2425

# Self-operated Pressure Regulators

Type 2404-1 Pressure Reducing Valve with pilot valve for small set point ranges (mbar)



## Application

Pressure reducing valve for set points from 3 to 100 mbar (0.045 to 1.5 psi) · Valve size DN 25 to 150 (NPS 1 to 6) · Suitable for gases at temperatures from -20 to +90 °C (-5 to 195 °F)

## Special features

- Pilot control provides excellent control accuracy
- Soft-seat plug provides bubble-tight shut-off performance
- Meets strict emission requirements (TA Luft)
- Suitable for sour gas service (NACE)

## Versions

- **Type 2404-1**, pilot-operated pressure reducing valve consisting of: Type 2406 Main Valve, Type 2405 Pilot Valve, Type 2441 Input Pressure Regulator, M2404-1 mounting kit

## Technical data

Valve size	DN 25 to 150 (NPS 1 to 6)
Pressure rating	PN 16 to 40 (Class 125, 150, 300)
$K_{VS}$ coefficient	8 to 380 ( $C_v$ 9.4 to 450)
Permissible ambient temperature	-20 to +90 °C/-5 to +195 °F <sup>1)</sup>
Set point ranges	3 to 10 mbar/5 to 30 mbar/25 to 100 mbar 0.045 to 0.15 psi/0.075 to 0.45 psi/0.35 to 1.5 psi
Leakage class according to ANSI/FCI 70-2 or IEC 60534-4	Soft-seated, minimum Class IV
Max. input pressure	12 bar (175 psi) <sup>1)</sup>
Differential pressure $\Delta p_{min}$	1 bar (15 psi)
Compliance	
Data sheet	T 2538

<sup>1)</sup> Higher values on request

## Materials

Body	A126B, A216WCC, A351CF8M · EN-GJL-250, 1.0619, 1.4408
Seat	316L <sup>1)</sup>
Plug	316L <sup>1)</sup>

<sup>1)</sup> NPS 6 (DN 150): CF3M (1.4409)

## Special version

- With FDA-compliant materials
- For sour gas service (NACE)
- Actuator of pilot valve with seal and leakage line connection



Type 2404-1

# Self-operated Pressure Regulators

Type 2404-2 Excess Pressure Valve with pilot valve for small set point ranges (mbar)



## Application

Excess pressure valve for set points from 5 to 200 mbar (0.075 to 3 psi) · Valve size DN 65 to 400 (NPS 2½ to 16) · Suitable for gases at temperatures from -20 to +90 °C (-5 to +195 °F)

## Special features

- Pilot control provides excellent control accuracy
- Soft-seat plug provides bubble-tight shut-off performance
- Meets strict emission requirements (TA Luft)
- Suitable for sour gas service (NACE)

## Versions

- **Type 2404-2**, pilot-operated excess pressure valve consisting of: Type 2406 or Type 2422 Main Valve, Type 2406 Pilot Valve, Type 2441 Input Pressure Regulator, M2404-2 mounting kit

## Technical data

Valve size	DN 65 to 150 (NPS 2½ to 6)
Pressure rating	PN 16, 40 (Class 150, 300)
K <sub>VS</sub> coefficient	50 to 380 (C <sub>v</sub> 60 to 450)
Permissible ambient temperature	-20 to +90 °C (-5 to +195 °F) <sup>1)</sup>
Set point ranges	5 to 15 mbar/10 to 30 mbar/25 to 60 mbar/ 50 to 200 mbar 0.07 to 0.2 psi/0.15 to 0.4 psi/0.3 to 0.9 psi/0.7 to 3 psi
Leakage class according to ANSI/FCI 70-2 or IEC 60534-4	Soft-seated, minimum Class IV
Differential pressure Δp <sub>min</sub>	12 bar (175 psi)
Compliance	<b>CE · EAC</b>
Data sheet	<b>T 2540</b>

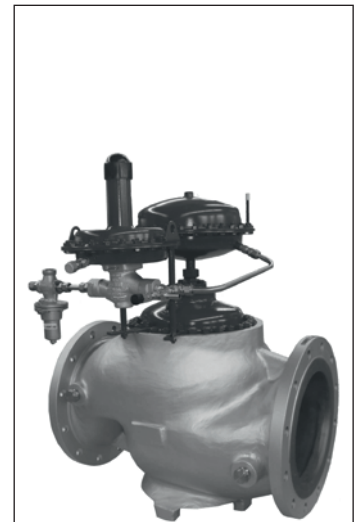
<sup>1)</sup> Higher values on request

## Materials

Body	A126B, A216WCC, A351CF8M · EN-GJL-250, 1.0619, 1.4408
Seat	316L
Plug	316L

## Special version

- Version with FDA-compliant materials
- Versions for sour gas service (NACE)
- Actuator of pilot valve with seal and leakage line connection



Type 2404-2

# Type 42-10 RS Check Valve (backflow protection)

## Application

For safeguarding nitrogen and compressed air networks against backflow from directly connected systems. The regulator is open, provided the upstream pressure is at least 0.2 bar greater than the downstream pressure. It closes automatically when the downstream pressure rises to or above the value of the upstream pressure.

## Special features

- Low-maintenance, medium-controlled proportional regulators requiring no auxiliary energy
- Fixed set point, external adjustment not possible
- Regulators delivered ready to install without supplementary devices, meaning no additional installations or start-ups are necessary
- Reliable functioning even in the event of a power failure or when other instruments in the control circuit malfunction
- Diaphragm rupture indicator, in the event of a diaphragm rupture, the undamaged operating diaphragm takes over the function of the damaged diaphragm
- Backflow only leads to a minimum amount of leakage due to the soft-seated plug
- Increasing downstream pressure supports tight shut-off of the valve
- Valve body optionally available in cast steel, cast stainless steel or forged stainless steel
- Wetted parts free of non-ferrous metal

## Versions

Check valve in supply pipelines

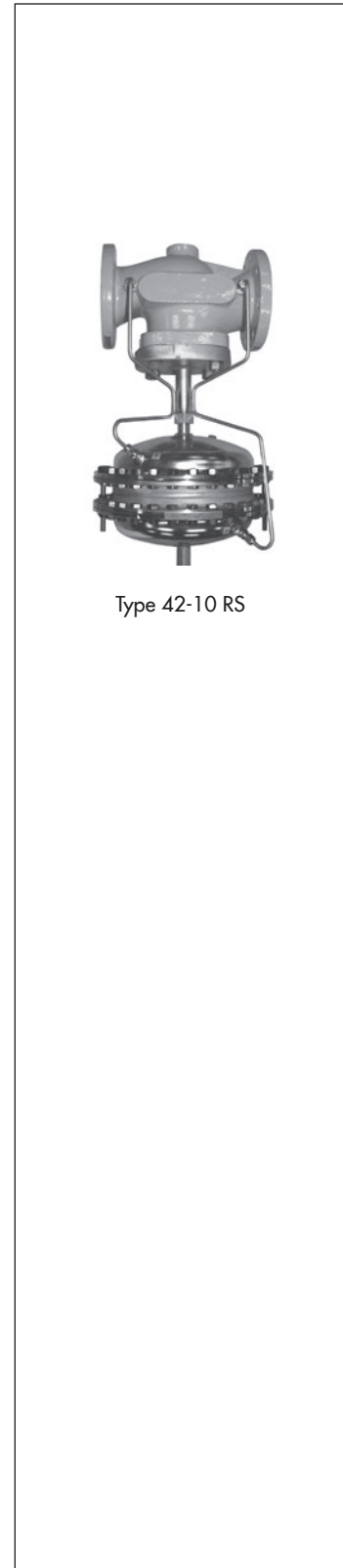
- **Type 42-10 RS:** Type 2421 RS Valve and Type 2420 RS Actuator with two diaphragms  
Fixed set point at 0.2 bar

## Technical data

Valve	Type	2421 RS	
Valve size		DN 15 to 250 (NPS ½ to 10)	
$K_{VS}$ coefficient ( $C_V$ coefficient)		4 to 500 (4.5 to 585)	
Pressure rating		PN 25/40 (Class 150/300)	
Max. constant operating pressure		25 bar	
Max. perm. pressure acting on one side		45 bar	
Actuator	Type	2420 RS	
Diaphragm area		320 cm <sup>2</sup>	640 cm <sup>2</sup>
$\Delta p$ set point, fixed		DN 15 to 150: 0.2 bar, DN 200 to 250: 0.3 bar	
Max. permissible temperature		Air and gases: 80 °C Water: 150 °C Steam with compensation chamber: 220 °C	
Compliance		<b>EN</b>	
Data sheets		<b>T 3009, T 3010</b>	

## Further versions

- Diaphragm rupture indication with pressure switch (optional)
- Stainless steel version (optional)
- Version for steam (on request)



Type 42-10 RS

# Self-operated Flow Regulators

## Flow regulator · Type 42-36

### Application

For district heating supply networks and large heating systems. The devices regulate the flow rate of liquids to the adjusted set point.

### Special features

- The valve closes when the flow rate rises
- Medium-controlled proportional regulators requiring no auxiliary energy
- Single-seated valve with a plug balanced by a stainless steel bellows or a balancing diaphragm (DN 65 to 250)

### Versions

- **Type 42-36:** Type 2423 Valve with Type 2426 Actuator, integrated restriction for adjusting the flow rate set point

### Technical data

Type	42-36
Valve size	DN 15 to 250 (NPS ½ to 10)
Pressure rating	PN 16, 25, 40 Class 125, 250, 150, 300
Flow rate set point ranges	
Differential pressure at restriction: 0.2 bar	0.05 to 220 m <sup>3</sup> /h (0.2 to 970 US gal/min), balanced by a bellows: max. 350 m <sup>3</sup> /h (1540 US gal/min)
Differential pressure at restriction: 0.5 bar	0.15 to 300 m <sup>3</sup> /h (0.7 to 1300 US gal/min), balanced by a bellows: max. 520 m <sup>3</sup> /h (2290 US gal/min)
Max. permissible medium temperature	Steam and liquids with compensation chamber: 220 °C (430 °F), without compensation chamber: 150 °C (300 °F), air <sup>1)</sup> : 80 °C (175 °F)
K <sub>VS</sub> coefficient	4 <sup>2)</sup> to 800
Data sheets	<b>T 3015, T 3016</b>

<sup>1)</sup> Special restriction for air and nitrogen up to 150 °C (300 °F) on request

<sup>2)</sup> Special restriction for very low flow rates on request

**Special version** for mineral oils



Type 42-36



## Materials

Valve	Type	2423			
Body material	DIN	EN-GJL-250	EN-GJS-400-18-LT	1.0619	1.4408
	ANSI	A126 B	–	A216 WCC	A351 CF8M
Pressure rating	PN	16	25	16/25/40	
	Class	125/250	–	150/300	
Seat					
Balanced by a bellows		1.4104, 1.4006			1.4404
Balanced by a diaphragm (max. 150 °C)		Red brass, 1.4006 (DN 65 to 100)			1.4409
Plug					
Balanced by a bellows		Up to DN 100: 1.4112, 1.4104, 1.4006 DN 125 and larger: 1.4404 with EPDM soft seal			1.4404
Balanced by a diaphragm (max. 150 °C)		Red brass, 1.4104 and 1.4006 (DN 65 to 100)			1.4409 <sup>1)</sup>
Balancing bellows		DN 15 to 100: 1.4571, DN 125 and larger: 1.4404			
Balancing diaphragm		EPDM with fabric reinforcement			
Actuator	Type	2426			
Diaphragm cases		DD11			1.4301
Diaphragm		EPDM with fabric reinforcement			

<sup>1)</sup> DN 65 to 100: 1.4404

# Self-operated Flow and Differential Pressure Regulators

Flow and differential pressure regulators · Type 42-37 and Type 42-39

## Application

Flow and differential pressure regulators or flow and pressure regulators for district heating and extended heating systems

## Special features

- The valve closes when the differential pressure or flow rate rises
- Low-noise, self-operated proportional regulators requiring little maintenance
- Single-seated valve with a plug balanced by a stainless steel bellows or a balancing diaphragm (DN 65 to 250)

## Versions

- **Type 42-37:** Flow and differential pressure regulator consisting of a Type 2423 Valve (DN 15 to 250) with integrated restriction and a Type 2427 Actuator. Flow rate set point adjustable at the restriction; differential pressure set point adjustable at the actuator
- **Type 42-39:** Flow and differential pressure or pressure regulator consisting of a Type 2423 Valve (DN 15 to 250) with integrated restriction and a Type 2429 Actuator. Flow rate set point adjustable at the restriction; differential pressure or pressure set point adjustable at the actuator

## Technical data

Type	42-37, 42-39
Valve size	DN 15 to 250
Pressure rating	PN 16, 25, 40
Flow rate set point ranges	
Differential pressure at restriction: 0.2 bar	0.05 to 220 m <sup>3</sup> /h, balanced by a diaphragm up to 350 m <sup>3</sup> /h
Differential pressure at restriction: 0.5 bar	0.15 to 300 m <sup>3</sup> /h, balanced by a diaphragm up to 520 m <sup>3</sup> /h
Differential pressure or differential pressure set point ranges	0.1 to 2.5 bar <sup>1)</sup>
Perm. medium temperature	Steam and liquids with compensation chamber: 220 °C, without compensation chamber: 150 °C
K <sub>VS</sub> coefficient	4 <sup>2)</sup> to 800
Data sheet	T 3017

<sup>1)</sup> Set point ranges up to 10 bar on request

<sup>2)</sup> Special restriction for very low flow rates on request

Special ANSI and JIS versions (on request)



Type 42-37

## Materials

Valve	Type	2423			
Body material	DIN	EN-GJL-250	EN-GJS-400-18-LT	1.0619	1.4408
Pressure rating	PN	16	25	16/25/40	
Seat					
Balanced by a bellows		1.4104, 1.4006			1.4404
Balanced by a diaphragm (max. 150 °C)		Red brass, DN 65 to 100: 1.4006			1.4409
Plug					
Balanced by a bellows		Up to DN 100: 1.4112, 1.4104, 1.4006 DN 125 and larger: 1.4404 with EPDM soft seal			1.4404
Balanced by a diaphragm (max. 150 °C)		Red brass, 1.4104 and 1.4006 (DN 65 to 100)			1.4409 <sup>1)</sup>
Balancing bellows		DN 15 to 100: 1.4571, DN 125 and larger: 1.4404			
Balancing diaphragm		EPDM with fabric reinforcement			
Actuator	Type	2427, 2429			
Diaphragm cases		DD11			1.4301
Diaphragm		EPDM with fabric reinforcement			

<sup>1)</sup> DN 65 to 100: 1.4404



Type 42-39

# Self-operated Flow and Differential Pressure Regulators

Differential pressure regulators with closing actuator · Type 42-24 and Type 42-28

Differential pressure regulators with opening actuator · Type 42-20 and Type 42-25

## Application

For district heating systems, extended heating systems and industrial applications. To regulate differential pressures from 0.05 to 10 bar (0.75 to 145 psi). Suitable for liquids and vapors as well as air and other non-flammable gases

## Special features

- Proportional regulators for district heating supply networks. Single-seated valve balanced by a stainless steel bellows or a balancing diaphragm. Low noise and low maintenance
- Types 42-24 and 42-28 · Valve closes when the differential pressure rises
- Types 42-20 and 42-25 · Valve opens when the differential pressure rises

## Versions

- **Type 42-20/Type 42-28:** Type 2422 Valve, DN 15 to 100 (NPS ½ to 4), Type 2420/Type 2428 Actuator, fixed set point
- **Type 42-25/Type 42-24:** Type 2422 Valve, DN 15 to 250 (NPS ½ to 10), Type 2425/Type 2424 Actuator, adjustable set point

## Technical data

Type	42-24	42-25	42-28	42-20
Valve size	DN 15 to 250 (NPS ½ to 10)		DN 15 to 100 (NPS ½ to 4)	
Set point range $\Delta p$	bar		0.05 to 10	
	psi		0.75 to 145	
Data sheets	T 3003, T 3004, T 3007, T 3008			

## Materials

Valve <sup>1)</sup>	Type	2422				
Valve body <sup>2)</sup>	DIN	EN-GJL-250	EN-GJS-400-18-LT	1.0619	1.4571	1.4408
	ANSI	A126 B	–	A216 WCC	A351 CF8M	
Pressure rating	PN	16	25	16/25/40		
	Class	125/250	–	125/150/300		
Actuator	Type	2420/2424/2425/2428				
Diaphragm cases		DD11			1.4301	
Diaphragm		EPDM <sup>3)</sup> , NBR <sup>4)</sup> or FKM <sup>3)</sup>				

<sup>1)</sup> Balanced by a bellows/diaphragm

<sup>2)</sup> Also in forged stainless steel 1.4571 for DN 15, 25, 40 and 50

<sup>3)</sup> Max. 150 °C

<sup>4)</sup> Max. 80 °C



Type 42-24



Type 42-25



Type 42-28

# Self-operated Flow and Differential Pressure Regulators

Differential pressure regulators with closing actuator · Types 45-1, 45-2, 45-3, 45-4

Flow regulator · Type 45-9



## Application

Differential pressure/flow regulators for district heating supply networks, large pipeline systems and industrial plants for liquids and gases

## Special features

- The valve closes when the differential pressure or flow rate rises
- Low-maintenance, medium-controlled proportional regulators requiring no auxiliary energy
- Only one control line due to fixed connection to the actuator;  
Type 45-9 requires no external control line

## Versions

The regulators consist of a valve with integrated (closing) actuator. Valve in DN 15 to 50 with welding ends, DN 32, 40 and 50 also available with flanged valve body  
The valve of Type 45-9 is fitted with an adjustable restriction.

- **Type 45-1:** differential pressure regulator with fixed set point  
Installation in the high-pressure pipe
- **Type 45-2:** differential pressure regulator with adjustable set point  
Installation in the high-pressure pipe
- **Type 45-3:** differential pressure regulator with fixed set point  
For installation in the low-pressure line
- **Type 45-4:** differential pressure regulator with adjustable set point  
For installation in the low-pressure line
- **Type 45-9:** flow regulator with restriction to adjust the flow rate set point for differential pressure at the restriction of either 0.2 or 0.3 bar

## Technical data

Valve size	DN	15	20	25	32	40	50
K <sub>VS</sub> coefficient		2.5	6.3	8	12.5	16	20
Flanged body		–			12.5	20	25
Differential pressure set point range							
Types 45-1 and 45-3	bar	0.1, 0.2, 0.3, 0.4 or 0.5 fixed					
Types 45-2 and 45-4	bar	0.1 to 4				0.2 to 1	
<b>Data sheet</b>		<b>T 3124</b>					
Adjustable flow rate set points (for differential pressure at restriction of 0.2 bar)							
Type 45-9		0.01 to 15 m <sup>3</sup> /h					
Permissible temperature		Liquids: 130 °C, nitrogen and air: 150 °C <sup>1)</sup>					
Compliance		<b>CE · EAC</b>					
<b>Data sheet</b>		<b>T 3128</b>					

<sup>1)</sup> Diaphragm and seals made of FKM, PN 25 version only

## Materials

Body		Red brass CC499K	EN-GJS-400-18-LT <sup>1)</sup>
Seat		Stainless steel 1.4305	
Plug	PN 16	Brass (resistant to dezincification) and plastic with EPDM <sup>2)</sup> soft seal	
	PN 25	Brass (resistant to dezincification) with EPDM <sup>2)</sup> soft seal	
Operating diaphragm		EPDM <sup>2)</sup> with fabric reinforcement	

<sup>1)</sup> For flanged valve body DN 32 to 50

<sup>2)</sup> FKM in special version for mineral oils



Type 45-3



Type 45-4



Type 45-9

# Self-operated Flow and Differential Pressure Regulators

For installation in the return flow pipe · Type 46-7 and Type 47-5

For installation in the flow pipe · Type 47-1 and Type 47-4



## Application

Flow rate and differential pressure regulation or flow rate and pressure regulation in district heating supply networks and industrial plants

## Special features

- Flow rate regulation, adjustable at the restriction in the valve
- Differential pressure or downstream pressure adjustable at the set point adjuster on the actuator
- Low-maintenance, medium-controlled proportional regulators requiring no auxiliary energy

The largest signal closes the valve. The valve closes when the differential pressure or flow rate rises.

## Versions

Flow and differential pressure regulators with valves (DN 15 to 50) with integrated restriction to adjust the flow rate set point

Flow and differential pressure regulators for installation in the return flow pipe

- **Type 46-7:** adjustable differential pressure set point
- **Type 47-5:** fixed differential pressure set point

Flow and differential pressure regulators for installation in the flow pipe

- **Type 47-1:** adjustable differential pressure or pressure set point
- **Type 47-4:** fixed differential pressure set point

## Technical data

Valve size	DN	15	20	25	32	40	50
K <sub>VS</sub> coefficient		2.5	6.3	8	12.5	16	20
Flanged body		–			12.5	20	25
Differential pressure set point range							
Types 47-4 and 47-5 bar		0.1, 0.2, 0.3, 0.4 or 0.5 fixed					
Types 46-7 and 47-1 bar		0.2 to 0.6, 0.2 to 1 or 0.5 to 2, continuously adjustable					
Flow rate set point for differential pressure at restriction of 0.2 bar		0.01 to 15 m <sup>3</sup> /h					
Max. permissible temperature		Liquids: 150 °C, nitrogen and air: 150 °C <sup>1)</sup>					
Compliance		CE · EAC					
Data sheet		T 3131					

<sup>1)</sup> Diaphragm and seals made of FKM, PN 25 version only

## Materials

Body	Red brass CC491K/CC499K	EN-GJS-400-18-LT/395 <sup>1)</sup>
Seat	Stainless steel 1.4305	
Plug	PN 16	Brass (resistant to dezincification) and plastic with EPDM <sup>2)</sup> soft seal
	PN 25	Brass (resistant to dezincification) with EPDM <sup>2)</sup> soft seal
Operating diaphragm	EPDM <sup>2)</sup> with fabric reinforcement	

<sup>1)</sup> For flanged valve body DN 32 to 50

<sup>2)</sup> FKM in special version for mineral oils



Type 46-7



Type 47-5



Type 46-7 with flanged valve body (DN 32 to 50)

# Pilot-operated Universal Regulators

Pressure, differential pressure, flow rate, temperature or combined regulators, optionally with additional electric actuator

## Type 2334

### Application

Pilot-operated pressure, differential pressure, flow rate, temperature or combined regulators, optionally with additional electric actuator

For heating and cooling plants, suitable for liquids from 5 to 150 °C and non-flammable gases up to 80 °C

### Special features

- Main valve with flanges in DN 65 to 400
- Low-maintenance proportional regulators requiring no auxiliary energy
- Suitable for district heating plants conforming to DIN 4747-1
- Wide control range and high rangeability at low pressure loss
- Pilot operated by the medium, with a maximum of three pilot valves
- High stability and control accuracy even at considerably fluctuating upstream pressures
- Smooth opening and closing of the main valve
- Wide set point range and convenient set point adjustment at the pilot valve
- Numerous control functions and the possibility to combine several functions

### Versions

Type 2423 Valve with integrated restriction or Type 2422 Valve without restriction (DN 65 to 100) with balancing bellows and external Type 2420 Actuator (closing) with integrated diaphragm actuator with internal closing spring (DN 125 to 250)

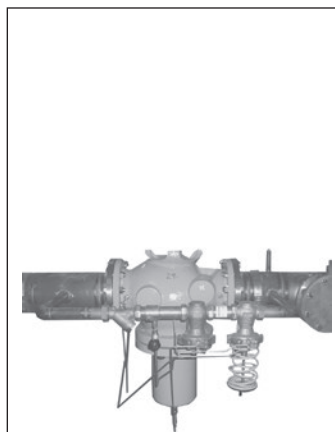
Pilot valve depending on the application

- **Basic version:** main valve (DN 65 to 250) and bypass line with strainer, Venturi nozzle and pilot valve (ready-to-install assembly), bypass line (DN 15) made of stainless steel, strainer and pilot valve depending on the application
- **Version with bypass** · Main valve DN 65 to 400  
Bypass line DN 25 or 40 with strainer, Venturi nozzle and pilot valve (assembly on site)

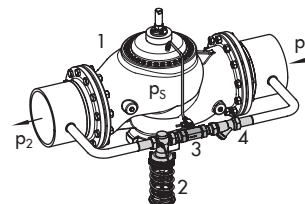
See associated Information Sheet T 3000, Data Sheet T 3210

### Special versions, DN 65 to 250

- Reduced  $K_{VS}$  coefficient
- Version for higher temperatures (steam)
- ANSI and JIS versions
- Flow divider for noise reduction (only valves balanced by a bellows)
- Oil-resistant
- Free of non-ferrous metal
- Pilot valves connected in parallel (instead of in series)
- Balanced by a metal bellows
- Free of graphite for deionized water
- External restriction
- With downstream attenuation plate for noise reduction



Type 2334 with Type 2422 Valve, DN 200 with operating bellows



Type 2334 with bypass

- 1 Main valve
- 2 Pilot valve
- 3 Venturi nozzle
- 4 Strainer
- $p_s$  Control pressure
- $p_1$  Upstream pressure
- $p_2$  Downstream pressure

# Pressure-independent Control Valve (PICV)

Flow regulator · Type 42-36 E



## Application

Self-operated regulators combined with an electric actuator used to transmit the control signal of an electronic controller.

## Sample application

Flow rate and temperature regulation e.g. in district heating systems or extended heating or cooling networks

## Special features

The valve closes when the flow rate rises. In addition, the control signal of an electric controller can be applied to influence the flow rate over the actuator.

- The combined regulators consist of:
  - Valve with flanged body
  - Diaphragm actuator
  - Adapter to adjust the flow rate set point and to attach the electric actuator
- Control equipment tested according to DIN EN 14597 available

## Versions

Valves DN 15 to 250, pressure rating PN 16 to 40, suitable for liquids from 5 to 150 °C, electric actuators with or without fail-safe action to change the flow rate set point depending on the control signal issued by an electric controller

- **Type 42-36 E:** pressure-independent control valve with restriction to adjust the flow rate set point, installation in the flow or return flow pipe

## Technical data

Type	42-36 E
Valve size	DN 15 to 250 (NPS ½ to 10)
Pressure rating	PN 16, 25, 40 (Class 125, 150, 300)
Flow rate set point ranges	
Differential pressure at restriction: 0.2 bar	0.5 to 220 m <sup>3</sup> /h (2.2 to 970 US gal/min), balanced by a diaphragm: max. 260 m <sup>3</sup> /h (1140 US gal/min)
Differential pressure at restriction: 0.5 bar	0.8 to 300 m <sup>3</sup> /h (3.5 to 1300 US gal/min), balanced by a diaphragm: max. 360 m <sup>3</sup> /h (1580 US gal/min)
Perm. medium temperature	Max. 150 °C
Permissible ambient temperature	Max. 50 °C
K <sub>VS</sub> coefficient	4 <sup>1)</sup> to 800
<b>Data sheet</b>	<b>T 3018</b>

<sup>1)</sup> Special restriction for very low flow rates on request



Type 42-36 E  
with Type 5825 Actuator



## Materials

Valve	Type	2423			
Body material	DIN	EN-GJL-250	EN-GJS-400-18-LT	1.0619	1.4408
Pressure rating	PN	16	25	16/25/40	
Seat					
Balanced by a bellows		1.4104, 1.4006			1.4404
Balanced by a diaphragm (max. 150 °C)		Red brass, DN 65 to 100: 1.4006			1.4409
Plug					
Balanced by a bellows		Up to DN 100: 1.4112, 1.4104, 1.4006 DN 125 and larger: 1.4404 with EPDM soft seal			1.4404
Balanced by a diaphragm (max. 150 °C)		Red brass, 1.4104 and 1.4006 (DN 65 to 100)			1.4409 <sup>1)</sup>
Balancing bellows		DN 15 to 100: 1.4571, DN 125 and larger: 1.4404			
Balancing diaphragm		EPDM with fabric reinforcement			
Actuator	Type	2426			
Diaphragm cases		DD11			1.4301
Diaphragm		EPDM with fabric reinforcement			

<sup>1)</sup> DN 65 to 100: 1.4404



Type 42-36 E  
with TROVIS 5724-8 Actuator

# Pressure-independent Control Valves

Flow regulators · Type 2488/58... and Type 2489/58...



## Application

Flow regulation in district heating supply networks and industrial plants, combined with an electric actuator. A further operating parameter (e.g. temperature) can be regulated when combined with a district heating controller and electric actuator.

## Special features

The valve closes when the flow rate rises. In addition, the control signal of an electric controller can be applied to influence the flow rate over the actuator.

- Low-maintenance, medium-controlled flow regulators requiring no auxiliary energy
- Single-seated valve with balanced plug
- Adapter to attach the electric actuator and to adjust the flow rate
- Control equipment tested according to DIN EN 14597 available

## Versions

The combined regulators consist of valve, diaphragm actuator and Type 5824 or Type 5825 Electric Actuator with fail-safe action or optionally Type 5857 or Type 5757 Electric Actuator without fail-safe action for DN 15 to 25.

For indirectly connected systems (with heat transfer medium) for installation in low-pressure pipes

- **Type 2488/58... Pressure-independent Control Valve**  
with Types 5824, 5825 or 5857 Electric Actuator
- **Type 2489/58... Pressure-independent Control Valve**  
with Types 5824, 5825 or 5857 Electric Actuator and additional Type 2430 Control Thermostat for temperature regulation

## Technical data

Valve size	DN	15	20	25	32	40	50
K <sub>vs</sub> coefficient	Body with screwed ends	2.5	6.3	8	12.5	16	20
	Flanged body	–			12.5	20	25
Flow rate set point for differential pressure at restriction of 0.2 bar		0.03 to 15 m <sup>3</sup> /h					
Max. permissible temperature		150 °C					
Connections		Welding ends, threaded ends, flanges					
Compliance		CE · EAC					
Data sheet		T 3135					

## Materials

Body	Red brass CC499K	EN-GJS-400-18-LT <sup>1)</sup>
Seat	Stainless steel 1.4305	
Plug	PN 16	Brass (resistant to dezincification) and plastic with EPDM <sup>2)</sup> soft seal
	PN 25	Brass (resistant to dezincification) with EPDM <sup>2)</sup> soft seal
Operating diaphragm	EPDM <sup>2)</sup> with fabric reinforcement	

<sup>1)</sup> Version in spheroidal graphite iron for flanged valve bodies (DN 32, 40 and 50)

<sup>2)</sup> FKM in special version for mineral oils



Type 2488 with Type 5824 Actuator

# Strainers

With threaded connection · Type 1 N and Type 1 NI

With flanges · Type 2 N and Type 2 NI

## Application

For protecting downstream plants, aggregates and measuring and control devices against impurities. Straining and collecting dirt particles carried along by the medium

## Special features

- Compact design
- Easy removal of the collected dirt particles
- Easy replacement of the strainer insert

## Versions

Y-shaped body with flanges or threaded end connections and wide-meshed strainer insert with an additional fine-meshed internal strainer

Types 1 N, 1 NI		Types 2 N, 2 NI	
Threaded connection		Flanges	
Type 1 N	Standard strainer insert	Type 2 N	Standard strainer insert
Type 1 N	Dual strainer insert	Type 2 NI	Dual strainer insert

## Technical data

Type	1 N		1 NI	2 N				2 NI
Pressure rating	PN 25			PN 10, 16, 25, 40				
Connection	Thread, G...			Flange, DN...				
	½ to 1	1¼ to 2	½ to 2	15 to 25	32 to 65	80 to 150	200 to 250	15 to 250
Mesh size	0.5 mm	0.75 mm	0.25 mm	0.5 mm	0.8 mm	1.25 mm	2 mm	0.25 mm
Data sheets	T 1010			T 1015				

## Materials

Body	Red brass, brass	EN-GJL-250, EN-GJS-400-18-LT, 1.0619, Cast stainless steel 1.4408
Filter	Stainless steel 1.4401	

## Additional accessories for self-operated regulators (see Data Sheets T 3095 and T 2595)

- Compression-type fittings
- Needle valve
- Compensation chamber
- Orifice plate
- Welding neck flange
- Control lines etc.



Type 1 N/1 NI



Type 2 N and Type 2 NI

# Appendix

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# SAMSON AT A GLANCE

## STAFF

- Worldwide 4,300
- Europe 3,300
- Asia 500
- Americas 200
- Frankfurt am Main, Germany 1,800

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- Chemicals and petrochemicals
- Power and energy
- District heating and cooling, building automation
- General industry
- Industrial gases
- Food and beverages
- Metallurgy and mining
- Oil and gas
- Pharmaceuticals and biotechnology
- Marine equipment
- Water and wastewater
- Pulp and paper

## PRODUCTS

- Valves
- Self-operated regulators
- Actuators
- Valve accessories
- Signal converters
- Controllers and automation systems
- Sensors and thermostats
- Digital solutions

## SALES SITES

- More than 50 subsidiaries in over 40 countries
- More than 200 representatives

## PRODUCTION SITES

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Total plot and production area: 150,000 m<sup>2</sup>
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Total plot and production area: 23,400 m<sup>2</sup>
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Total plot and production area: 11,053 m<sup>2</sup>
- SAMSON USA, Baytown, TX, established 1992  
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- SAMSON China, Beijing, established 1998  
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- SAMSON India, Pune district, established 1999  
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- SAMSON SED, Bad Rappenau, Germany  
Total plot and production area: 10,370 m<sup>2</sup>
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- SAMSON VDH PRODUCTS, the Netherlands
- SAMSON VETEC, Speyer, Germany  
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