



# SAMSON PRODUCT RANGE



# Products

Edition April 2023

## Overview

Technical Basics	7
Control Valves	39
Actuators	81
Positioners	88
Valve Accessories	95
Converters	102
Electronic Process Controllers	108
Devices for Cryogenic Applications	110
Electronic Digital Controllers and Sensors	114
Software and Applications	122
Self-operated Temperature Regulators	128
Self-operated Pressure Regulators	137
Self-operated Flow and Differential Pressure Regulators	149
Pilot-operated Universal Regulators	157
Pressure-independent Control Valves	158
Strainers	161
Annex	163



# Contents

<b>Technical Basics</b>	
SAMSON control valves	9
Valve accessories	25
Self-operated regulators	27
<b>Control Valves</b>	
Type 3241 Globe Valve	39
Type 3244 Three-way Valve	41
Type 3510 Micro-flow Valve	
Type 3252 High-pressure Valve	42
Type 3251 Globe Valve	
Type 3256 Angle Valve	43
Type 3253 Three-way Valve	
Type 3254 Globe Valve	44
Type 3281 and Type 3286 Steam-conditioning Valves	45
Components to reduce noise and wear	
Flow dividers · AC trims · Perforated plug	
Type 3381 Silencer	46
Type 3351 On/off Valve	
Type 3353 Angle Seat Valve	
Type 3354 Globe Valve	47
Pneumatic Control Valves for Hygienic and Aseptic Applications	
Type 3347 Hygienic Angle Valve	48
Type 3349 Aseptic Angle Valve	51
Type 3321CT Globe Valve	52
Pneumatic Diaphragm Valves for Aseptic Applications	
SED Steripur Series Diaphragm Valves	53
SED KMA Series Diaphragm Valves	55
SED KMD Series Diaphragm Valves	57
Cryogenic valves	
Type 3248 with bellows seal, top-entry design	59
Type 3246 with long insulating section and circulation inhibitor	60
Type 3598 with circulation inhibitor, top-entry design	61
High-performance control and shut-off butterfly valve	
PFEIFFER Type 14p PSA	62
Type 3331 Butterfly Valve	
High-pressure butterfly valve · LEUSCH Type LTR 43	63
Control butterfly valves · PFEIFFER Types 10a, 10e and 14b/31a	64
PTFE or PFA-lined Control Valves	
Globe valves · PFEIFFER Types 01a, 01b and 06a	
Angle valve · PFEIFFER Type 08a	65
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	66
CERA 1000 Ball Valves	
CERA SYSTEM Types KST, KSV, KAT and KAV	68
CERA SYSTEM Type KGT and KZT	69
CERA 4300 Ball Valves	
CERA SYSTEM Types KBR, KBRG and KBRZ	
CERA SYSTEM Type KFK/KFL	70
CERA 17SSC Sliding Disk Valves	
CERA SYSTEM Type SSC	71
Rotary plug valves · VETEC Type 82.7 and Type 72.3	72
High-pressure Valve Series	
Rotary plug valves · VETEC Type 73.7 and Type 73.3	73
Rotary plug valve · VETEC Type 62.7	74
Type 3310 Segmented Ball Valve	75
Control valves with pneumatic or electric actuator for HVAC/industrial applications	
Type 3321 Globe Valve	
Type 3323 Three-way Valve	76
Type 3531 Globe Valve for Heat Transfer Oil	
Type 3535 Three-way Valve for Heat Transfer Oil	77
Pneumatic and Electric Control Valves for HVAC Systems/Industrial Applications	
Types 3213, 3214, 3222, 3222 N and 3260 Globe Valves	
Type 3260 and Type 3226 Three-way Valve	78
<b>Actuators</b>	
Pneumatic actuators	
Type 3277 and Type 3271	81
Pneumatic actuators for the food and pharmaceutical industries	
Type 3379 Pneumatic Actuator	83
Pneumatic rotary actuators	
Type 3278 and PFEIFFER Type 31a	84
Electric actuators	
Type 5827, Type 5857 and Type 3374	85
Electric actuators with process controllers	
TROVIS 5724-3, TROVIS 5725-3 with fail-safe action	
TROVIS 5757-3, TROVIS 5757-7	
TROVIS 5724-8, TROVIS 5725-8 with fail-safe action	86
<b>Positioners</b>	
Pneumatic and electropneumatic positioners	
Type 3766/3767	88
Electropneumatic positioners for control applications	
TROVIS 3730-1	
Type 3725	
Type 3730-0	89
Smart positioners	
HART®:	
Types 3730-3/3731-3/3730-6,	
TROVIS 3730-3/3793	89
PROFIBUS PA:	
Type 3730-4	89
FOUNDATION™ fieldbus:	
Types 3730-5/3731-5	90

# Contents

EXPERTplus valve diagnostics Type 3770 Ex d/Ex i Field Barrier	92
---	----

Digital positioners for safety-instrumented systems TROVIS SAFE 3730-6/3731-3/3793	93
---	----

Electronic positioners for the food and pharmaceutical industries Type 3724 Valve with Type 3379 Pneumatic Actuator	94
--	----

## Valve Accessories

Types 4746, 4747 and 4744 Limit Switches	95
Types 3776, 3738-20, 3738-50 and 3768 Limit Switches	96
Type 4708 Supply Pressure Regulator	96
SAMSTATION Type 7029 Supply Pressure Regulator	97
Types 3962, 3963, 3967 and 3969 Solenoid Valves	98
Type 3709 Pneumatic Lock-Up Valve	99
Type 3710 Reversing Amplifier	100
Type 3755 Pneumatic Volume Booster	100
Type 3711 Quick Exhaust Valve	101

## Converters

Types 6111, 6116 and Type 6126 i/p Converters	102
Type 6132 and Type 6134 p/i Converters	103
Media Series	
Differential pressure, flow and liquid level meters Media 5 · Media 05	104
Microprocessor-controlled transmitter for differential pressure Media 7	105
Gateway to handle signals from transmitters SAM Connect Gateway	106
Differential pressure and flow meter Orifice flange · Type 5090	107

## Electronic Process Controllers

TROVIS 6493 Compact Controller TROVIS 6495-2 Industrial Controller	108
---	-----

## Devices for Cryogenic Applications

Devices for Cryogenic Service	
Type 2357-1 Pressure Build-up Regulator Type 2357-2 Excess Pressure Valve	110
Type 2357-11 Pressure Build-up Regulator Type 2357-21 Excess Pressure Valve	111
Type 2357-3 Pressure Build-up Regulator	112
Self-operated temperature regulators for cryogenic applications Type 2040 Safety Temperature Monitor (STM)	113

## Electronic Digital Controllers and Sensors

Heating and district heating controllers TROVIS 5573	114
TROVIS 5578/TROVIS I/O	115
SAM LAN Gateway SAM MOBILE Gateway SAM HOME Gateway Modbus to meter bus gateway Converter or repeater CoRe02	117
TROVIS 6600 Automation System TROVIS 6611-2 Control and Automation Unit TROVIS 6620 I/O Module	118
TROVIS 6625 Input Module TROVIS 6616 Web Terminal	119
Temperature sensors Resistors with Pt100 and Pt1000	120
Thermostats Type 5343 Safety Temperature Monitor Type 5344 Temperature Regulator Type 5345 Safety Temperature Limiter Types 5347, 5348 and 5349 Double Thermostats	121

## Software and Applications

TROVIS-VIEW software Valve sizing VDI 3805 records of products	122
Industry-specific application for the smart valve diagnostics SAM VALVE MANAGEMENT	123
Industry-specific application for district heating and cooling SAM DISTRICT ENERGY	124
Industry-specific application for monitoring tank filling levels SAM TANK MANAGEMENT	125
Predictive analytics for the process industry SAM GUARD	126

## Self-operated Temperature Regulators

Types 1/4 and Type 4u Temperature Regulators with Globe Valve Type 9 Temperature Regulator with Three-way Valve	128
Types 2231, 2232 and 2234 Control Thermostats	130
Typetested safety devices Type 2212 Safety Temperature Limiter (STL)	131
Typetested safety devices Type 2213 Safety Temperature Monitor (STM)	132
Type 43-1 to Type 43-7 Temperature Regulators	133
Typetested safety devices Type 2439 Safety Temperature Limiter Type 2403 Safety Temperature Monitor	135
	136

# Contents

<b>Self-operated Pressure Regulators</b>		<b>Pressure-independent Control Valves</b>	
Type 2405 Pressure Reducing Valve		Pressure-independent control valve (PICV)	
Type 2406 Excess Pressure Valve	137	Type 42-36 E Flow Regulator	158
<hr/>		<hr/>	
Type 41-23 Pressure Reducing Valve		Pressure-independent control valves (PICV)	
Type 41-73 Excess Pressure Valve	138	Type 2488 and Type 2489 Flow Regulator	160
<hr/>		<hr/>	
Type 44-0 B and Type 44-1 B Pressure Reducing Valves		<b>Strainers</b>	
Type 44-6 B Excess Pressure Valve	140	Type 1 N/1 NI Strainers with threaded end connections	
<hr/>		Type 2 N/2 NI Strainers with flanged connections	161
Type 2333 Pressure Reducing Valve with pilot valve		<hr/>	
Type 2335 Excess Pressure Valve with pilot valve	142	<b>Annex</b>	
<hr/>		<hr/>	
Type 44-2 Pressure Reducing Valve		Index	164
Type 44-3 and Type 44-9 Safety Shut-off Valves (SSV)		<hr/>	
Type 44-7 Excess Pressure Valve			
Type 44-4 Safety Excess Pressure Valve (SEV)	143		
<hr/>			
Self-operated Pressure Regulators for the Food Processing Industry			
Type 2371-00 and Type 2371-01 Excess Pressure Valves			
Type 2371-10 and Type 2371-11 Pressure Reducing Valves	144		
<hr/>			
Type 2422/2424 Pressure Reducing Valve			
Type 2422/2425 Excess Pressure Valve	145		
<hr/>			
Type 2404-1 Pressure Reducing Valve with pilot valve for small set point ranges (mbar)	147		
<hr/>			
Type 2404-2 Excess Pressure Valve with pilot valve for small set point ranges (mbar)	148		
<hr/>			
<b>Self-operated Flow and Differential Pressure Regulators</b>			
Type 42-10 RS Check Valve (backflow protection)	149		
<hr/>			
Type 42-36 Flow Regulator	150		
<hr/>			
Flow and differential pressure regulators			
Type 42-37 and Type 42-39	152		
<hr/>			
Differential pressure regulators with closing actuator			
Type 42-24 and Type 42-28			
Differential pressure regulator with opening actuator			
Type 42-20 and Type 42-25	154		
<hr/>			
Differential pressure regulators with closing actuator			
Types 45-1, 45-2, 45-3 and 45-4			
Type 45-9 Flow Regulator	155		
<hr/>			
Flow and differential pressure regulators			
Type 46-7 and Type 47-5 · For installation in the return flow pipe			
For installation in the flow pipe · Type 47-1 and Type 47-4	156		
<hr/>			
<b>Pilot-operated Universal Regulators</b>			
Pressure, differential pressure, flow rate, temperature or combined regulators, optionally with additional electric actuator			
Type 2334	157		
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# Technical Basics

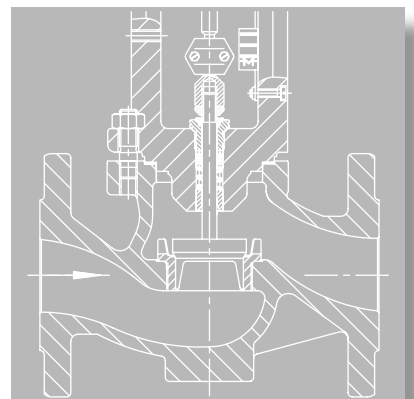
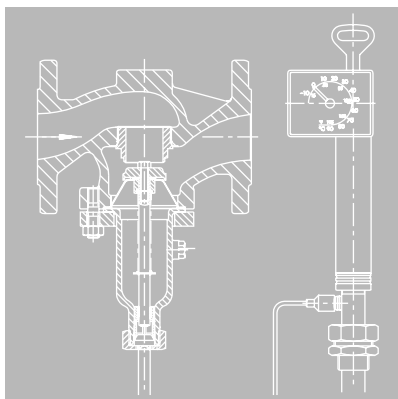
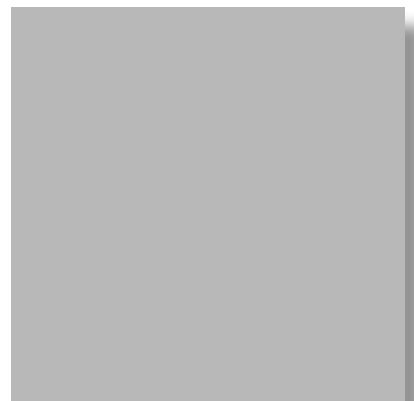
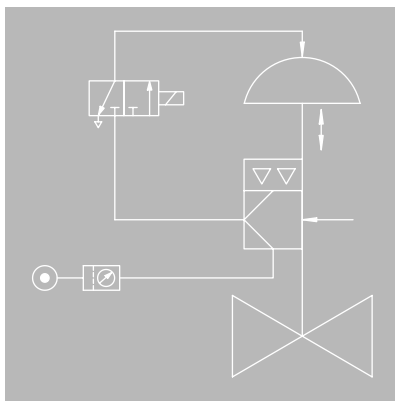
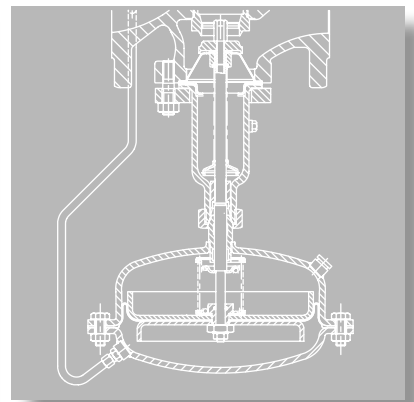
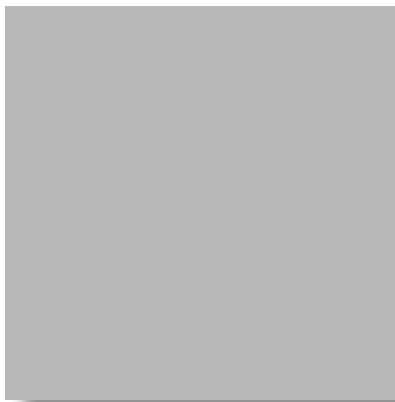
$Q = 30 \text{ m}^3/\text{h}$   
 $p_1 = 10 \text{ bar}$   
 $p_2 = 7 \text{ bar}$   
 $t_1 = 20 \text{ }^\circ\text{C}$

$$K_v = \frac{Q}{\sqrt{\frac{p_1 - p_2}{\rho}}}$$

$$K_v = \frac{30}{\sqrt{\frac{1}{3}}}$$

$$K_v = 17,3$$

Kopftitel		Prozessdaten	
Betriebsfall	1		
Q [m³/h]	30		
p1 [bar(a)]	10		
p2 [bar(a)]	7		
t1 [°C]	20		
Ergeb. Vent.		Vent. Fakt. 1	Vent.
Kv		17,3	
DN erf. [mm]		46,1	





## 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 40 (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

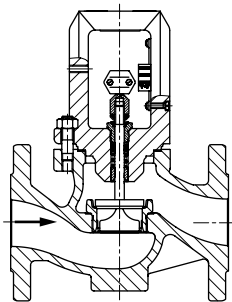
The valve body, valve bonnet and, in some cases, the bottom flange are subject to internal stress caused by the process medium flowing through the valve. Consequently, the valves must be designed to be sufficiently resistant to mechanical and chemical stress.

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

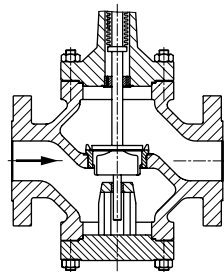
Globe valves allow easy installation in straight pipelines. For pressure ratings up to PN 40 and valve sizes up to DN 300, three-flanged bodies of the Series 240 are mainly used. The plug stem is guided in the valve bonnet and the V-port plug in the screwed-in seat.

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.

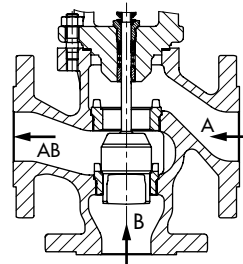


Additional plug stem guide in Type 3254

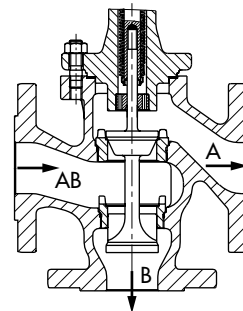
More details on globe valves in Data Sheets ► T 8015 and ► T 8060

#### Three-way valve

Three-way valves are used for mixing or 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



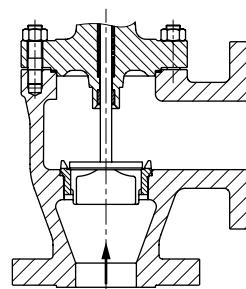
Flow-diverting service with Type 3244 Three-way Valve

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.

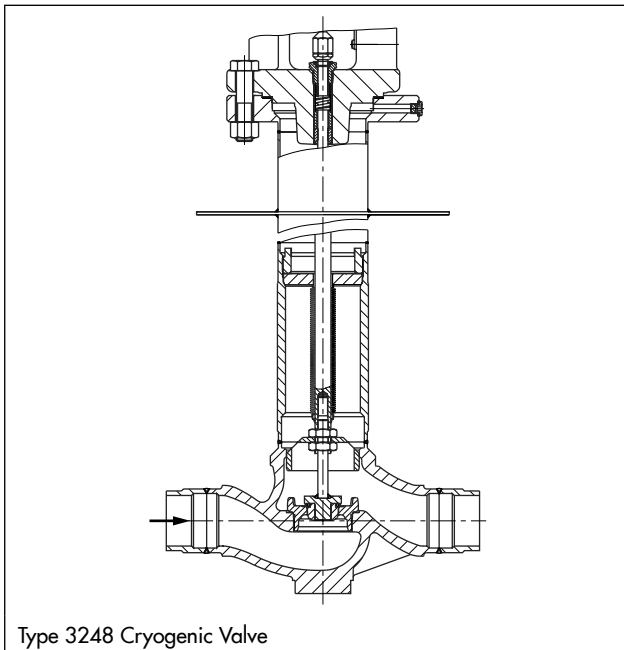


Type 3256 Angle Valve

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.

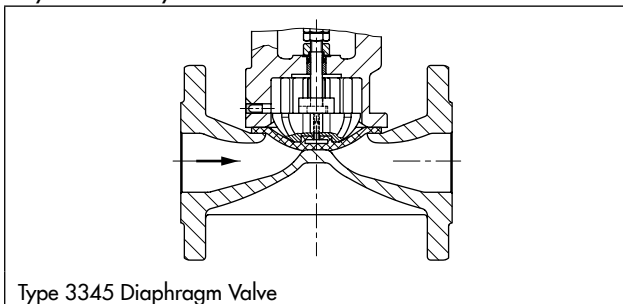


Type 3248 Cryogenic Valve

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 cavities 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.

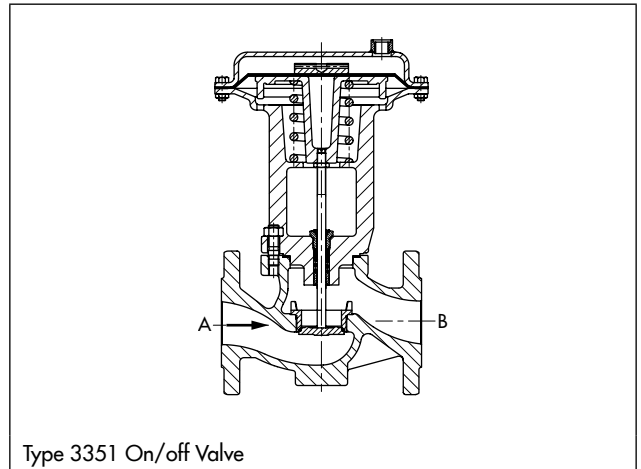


Type 3345 Diaphragm Valve

More details on diaphragm valves in Data Sheet ► T 8031

### On/off valve

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.

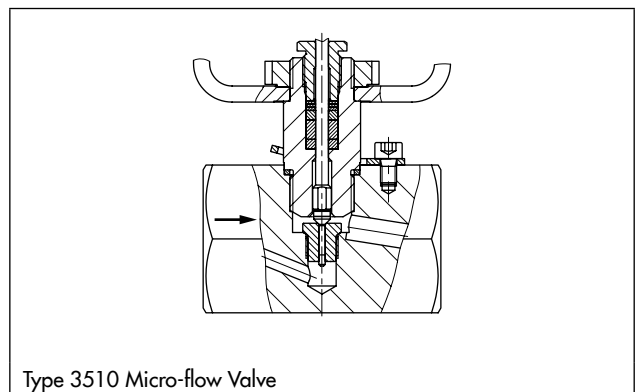


Type 3351 On/off Valve

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.

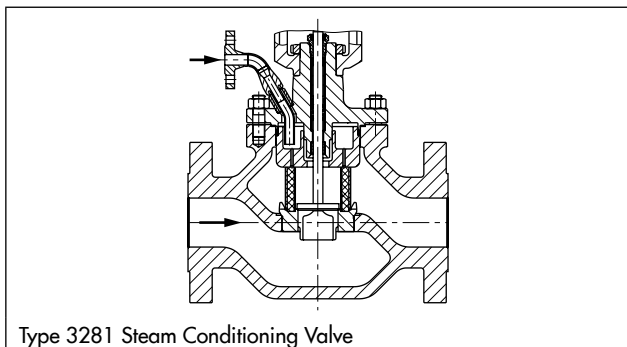


Type 3510 Micro-flow Valve

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.



Type 3281 Steam Conditioning Valve

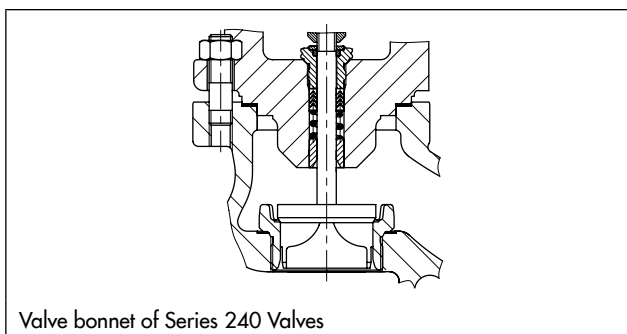
More details on steam-conditioning valves in Data Sheets  
▶ T 8251 and ▶ T 8256

### 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

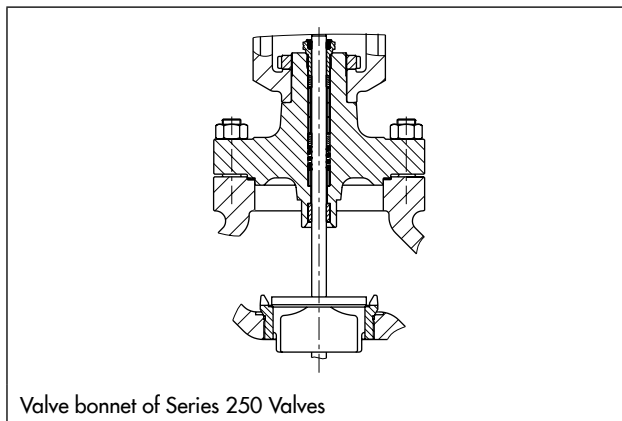
The plug stem is sealed by the packing. The standard packing is used for standard versions, versions with bellows seal or insulating section or when the packing functions as a backup packing.



Valve bonnet of Series 240 Valves

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.



Valve bonnet of Series 250 Valves

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 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 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 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

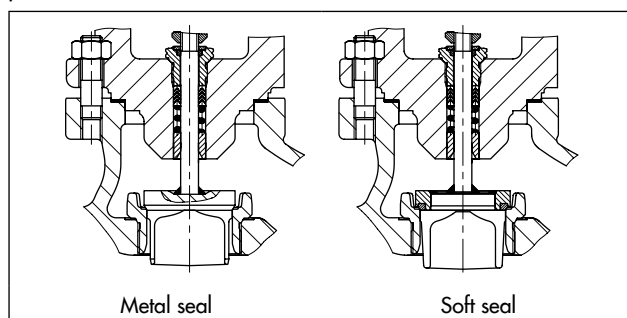
Self-adjusting, spring-loaded packing made of pure PTFE with intermediate FFKM V-rings for valve sizes DN 200 and larger. The ZELETEC (**Z**ero **L**eakage **T**echnology) packing is maintenance-free and is especially designed for valves that are difficult to access and must have a high level of sealing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

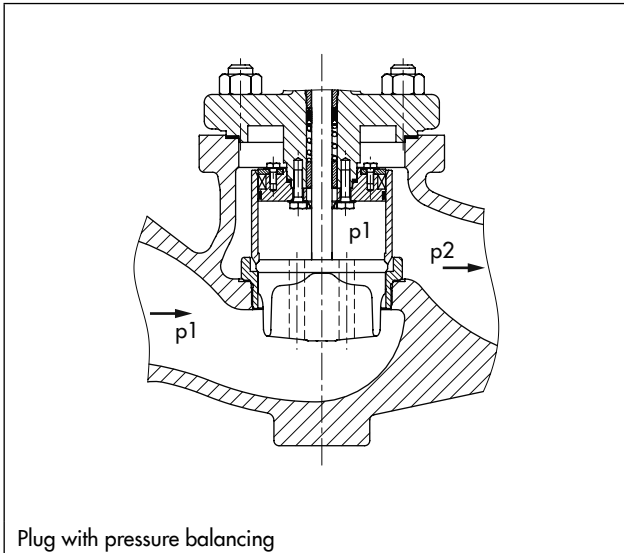
Seat-plug seal	Leakage class IEC 60534-4 ANSI/FCI 70-2	Seat leakage % of $K_{VS}$ ( $C_V$ )
Metal seal	IV	$\leq 0.01$
High-performance metal seal	V	IEC 60534-4, Table 3
Soft seal	VI	$0.3 \cdot \Delta p \cdot f_L^{1)}$
Pressure balancing with PTFE ring	V	IEC 60534-4, Table 3
Pressure balancing with graphite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

<sup>1)</sup> 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. In these cases, we recommend to use a more powerful actuator.



### Carbide or ceramic trims

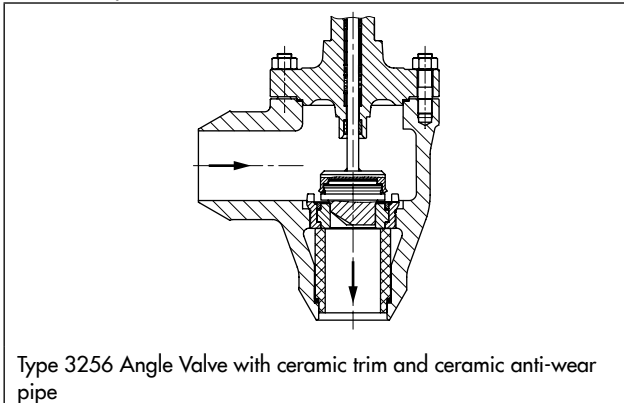
Control valves with extremely resistant carbide or ceramic trims are used when the valve body and trim are subject to considerable erosion and abrasion.

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.



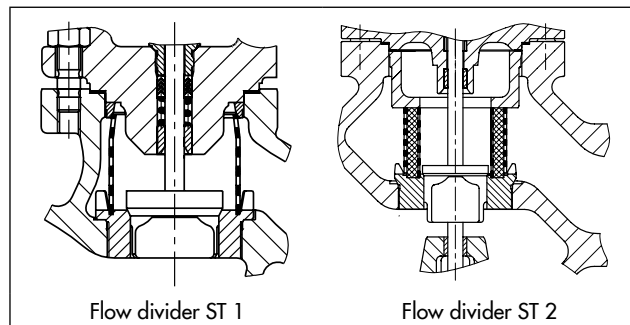
More details on ceramic trims in Data Sheet ▶ T 8071

### 1.1.4 Low-noise operation

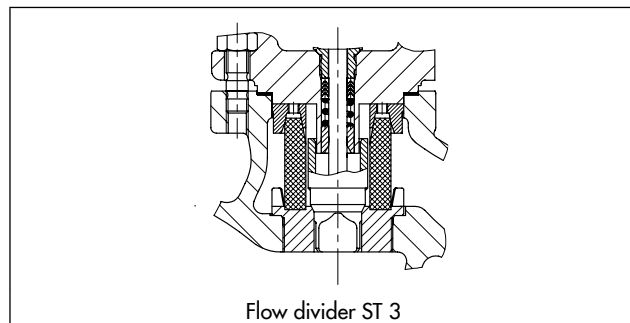
#### Flow divider

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.



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.

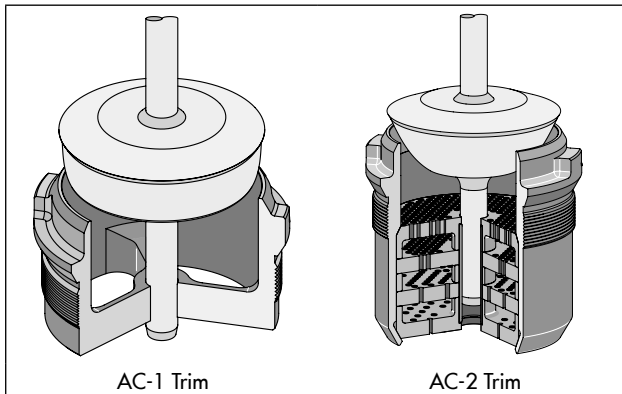
The  $K_{VS} (C_V)$  coefficient of the valve trim is reduced by the flow divider. The  $K_{VS} (C_V)$  coefficients for the flow dividers ST 1, ST 2 and ST 3 are listed in the associated data sheet.

More details on flow dividers in Data Sheet ▶ T 8081

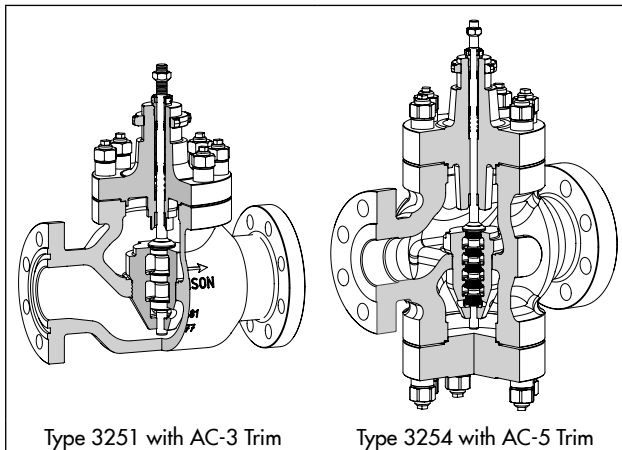


### AC trim

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.



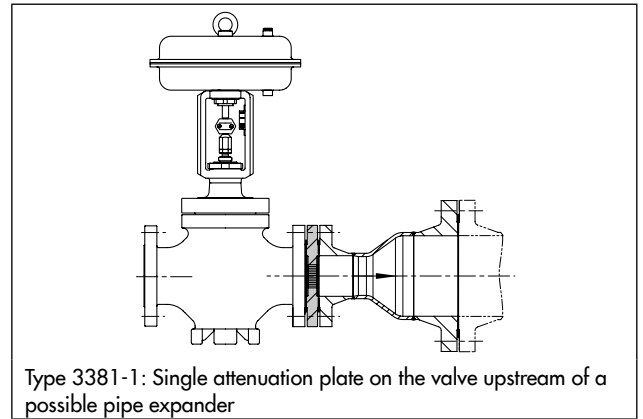
The three-staged AC-3 Trim is used for differential pressures up to 100 bar. Optionally, Stellite® facings or hardened trims are available. For differential pressures over 100 bar, the five-staged AC-5 Trim is available.



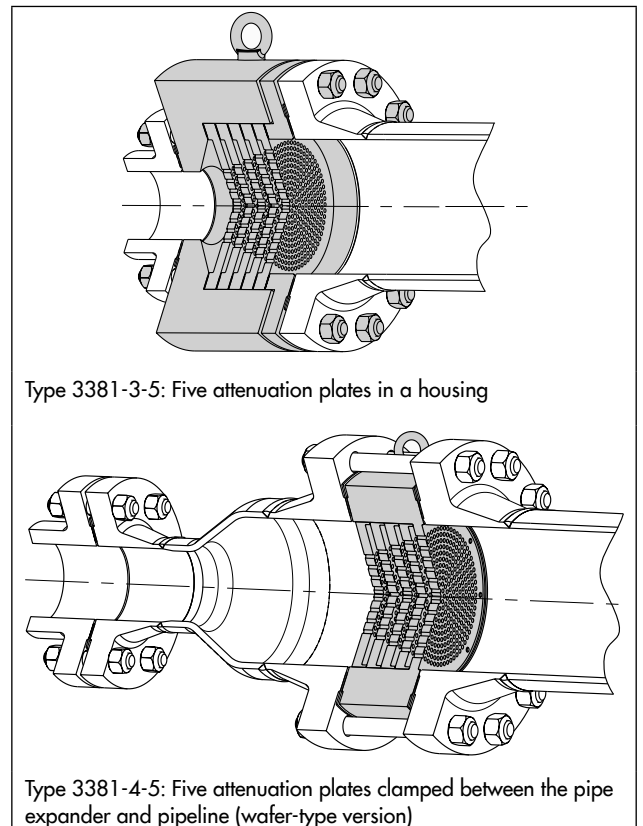
More details on AC trims in Data Sheets ► T 8082 and ► T 8083

### Silencer

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

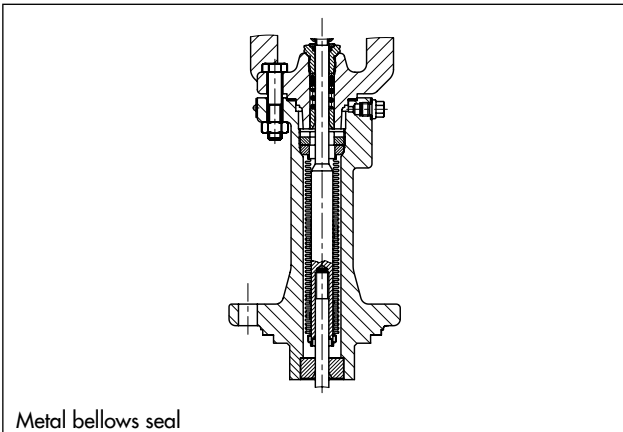
#### Metal bellows seal

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.

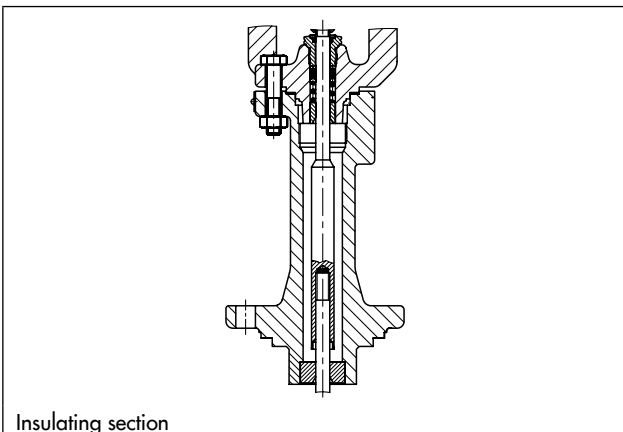
Higher temperatures for Series 250 and 280 on request



Metal bellows seal

#### 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.



Insulating section

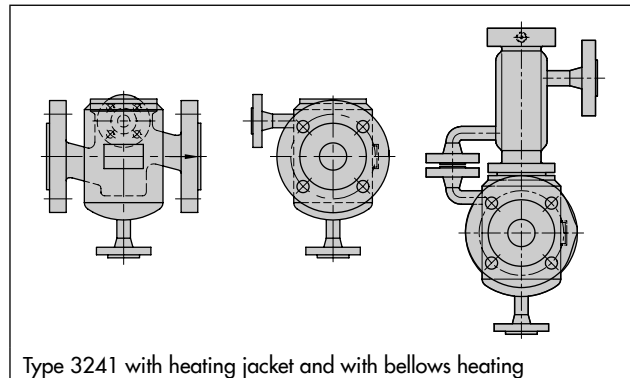
The temperature ranges of the various valves series are:

- 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. 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.



Type 3241 with heating jacket and with bellows heating

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

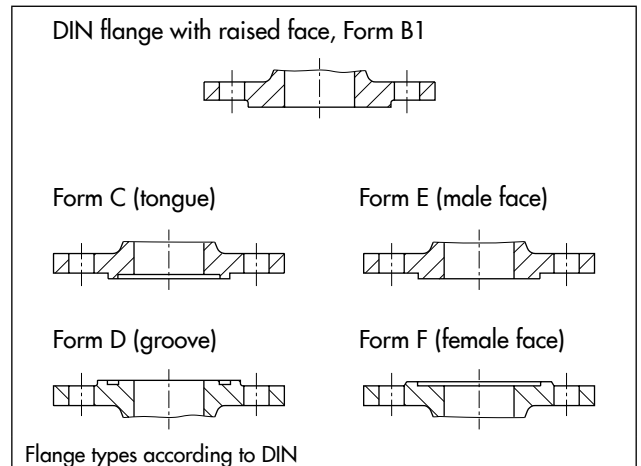
Versions with welding-neck ends are not standardized. Consult SAMSON first concerning their face-to-face dimensions.

### 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.

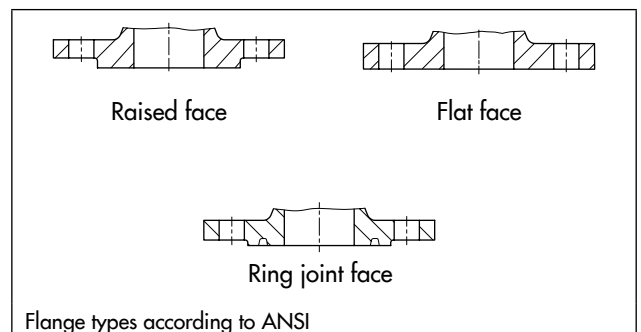


The US standard for cast iron flanges is ASME B16.1, ASME B16.42 for spheroidal graphite iron flanges and ASME B16.5 for steel flanges.

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 moves 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 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.

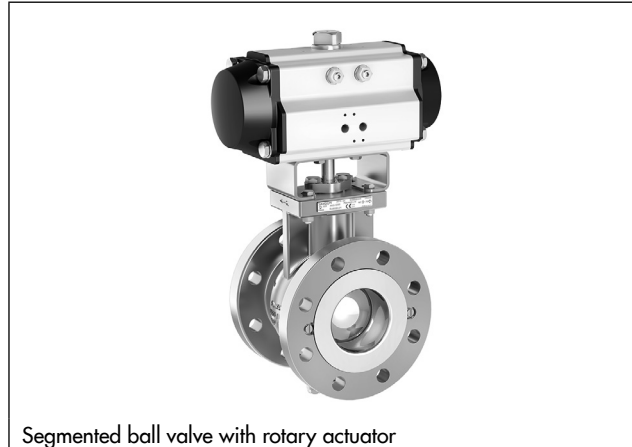
There are two types of ball valves: floating and trunnion-mounted ball valves. The ball of the trunnion-mounted ball valve is mounted on both sides, resulting in less friction torque which means smaller actuators can be used. Additionally, higher torques can be transferred which allows higher differential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

loys 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.



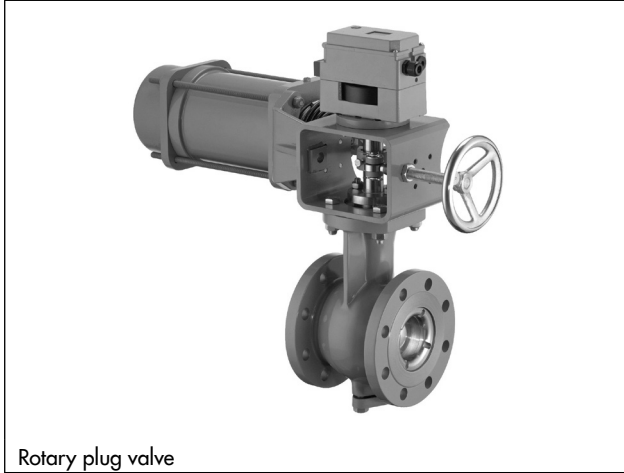
Tank bottom valve

### 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 the 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  $K_{VS}/K_{VR}$ .  $K_{VR}$  is 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.

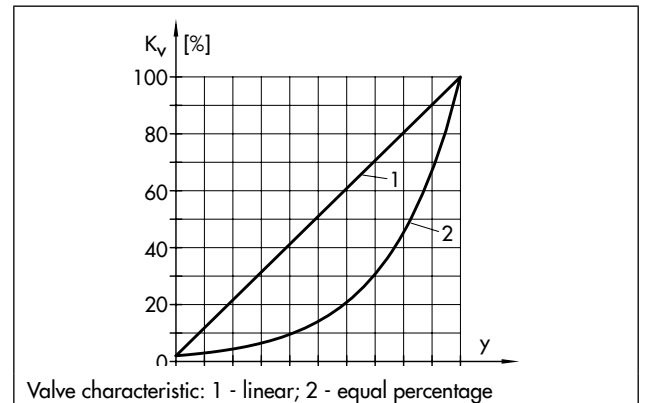
### Inherent characteristic

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 acoustic efficiency  $\eta_G$ .

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 acoustic efficiency  $\eta_F$  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  $x_{Fz} = 0.3$ .

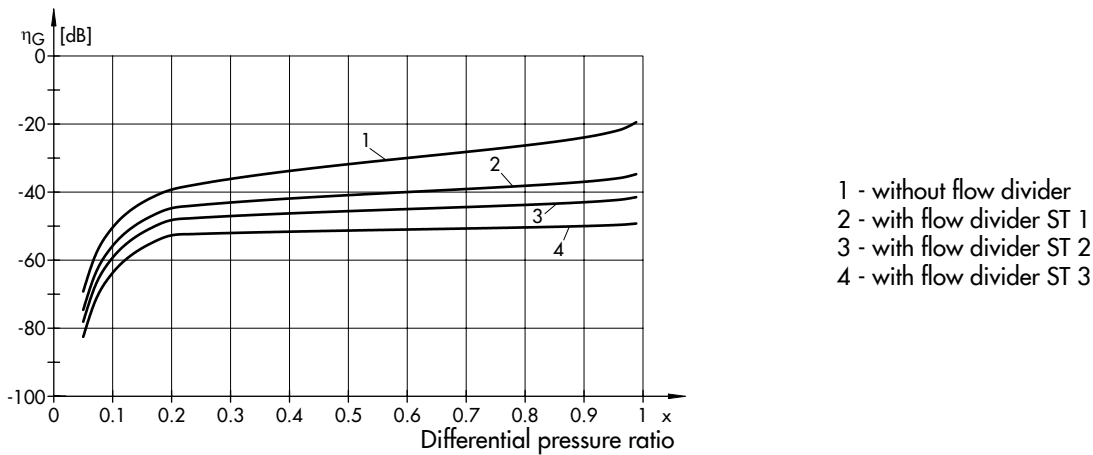


Diagram 1: Noise reduction with gases depending on the differential pressure using flow dividers

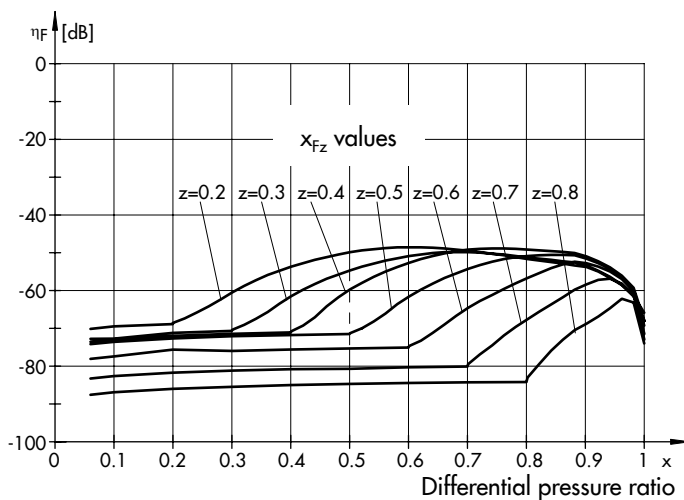


Diagram 2: Noise reduction with liquids depending on the differential pressure using flow dividers

### 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																		
	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. In cases where real operating data are used in the calculation, the following generally applies:  
 $K_{V_{max}} = 0.7 \text{ to } 0.8 \cdot K_{VS}$ .
2. Select the  $K_{VS}$  coefficient and the valve 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 action	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	PN	NPS Class
	8	Pipe material			
	12	Process medium			
	13	State at the valve inlet	Liquid	Vapor	Gas
	15		Min.	Usual	Max. Unit
	16	Flow rate			
	17	Input pressure $p_1$			
	18	Output pressure $p_2$			
	19	Temperature $T_1$			
	20	Input density $\rho_1$ or M			
	21	Vapor pressure $P_v$			
	22	Critical pressure $P_c$			
	23	Kinematic viscosity $\nu$			
	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		dB(A)	
	35	Type ... Valve			
	36	Style			
	38	Pressure rating	PN	Class	
	39	Valve size	DN	NPS	
	40	Type of end connections	Flanges	Welding ends	Welding-neck end DIN/ ANSI
	43	Type of bonnet	Normal	Insulating section	Bellows seal Heating jacket
	45	Body/bonnet material			
	47	Characteristic	Linear	Equal percentage	
	48	Plug/stem material			
	49	Bushing/seat material			
	52	Hard facing	None	Stellite® facing	Completely of Stellite® Hardened
	54	Leakage class	% $K_{vS}$	Class	
	55	Packing material	Standard	Form	
	57	Actuator type	Pneumatic		
	60	Actuator area	cm <sup>2</sup>		
	62	Supply pressure	Min.	Max.	
	63	Bench range			
	64	Fail-safe action	Fail-close	Fail-open	Fail in place
	66	Other actuator types	Electric	Electrohydraulic	Hand-operated
	67	Fail-safe position for three-way valves			
	68	Additional manual override	No	Yes	
	70	Type ... Positioner			
	71	Input signal	Pneumatic	Electric	
	72	Control valve OPEN at	bar	mA	
	73	Control valve CLOSED at	bar	mA	
	76	Air connection, max.	bar		
	78	Explosion protection	Ex i	Ex d	
	80	Type ... Limit Switch			
	81	Limit contacts	Electric	Inductive	Pneumatic
	82	Switching position	Closed	% travel	Open
	83	Switching function	Closing	Opening	
	84	Explosion protection	Ex i	Ex d	

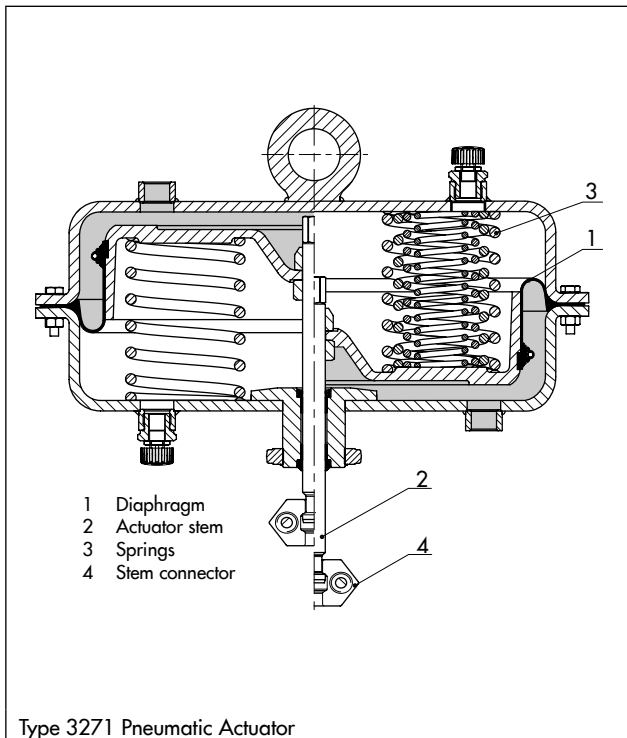
## 1.4 Actuators

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 and electric 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 excellent control properties and low power consumption. A series of modules can 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.

### 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:

- Easy 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.

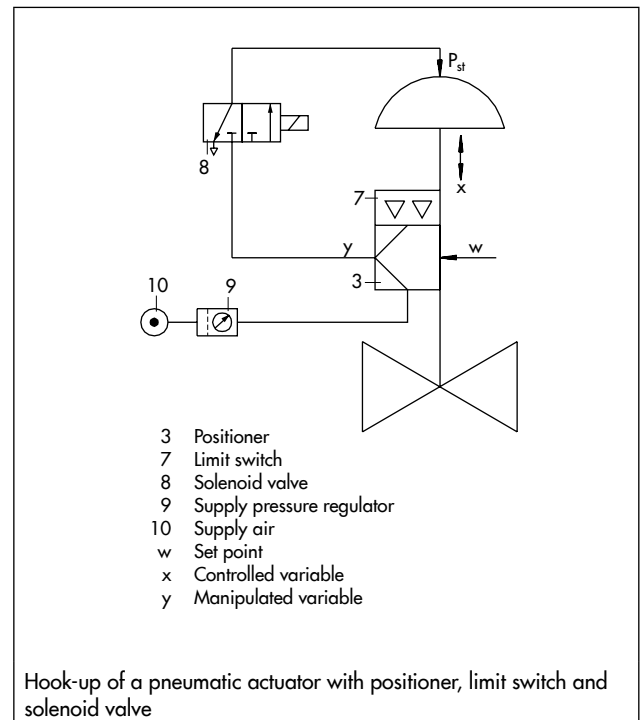
The installed limit contacts are either:

- 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 electropneumatic 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.

Depending on the solenoid valve version, 3/2-way, 5/2-way, 5/3-way or 6/2-way functions can be implemented. 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 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.

## 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 amplifier

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 valve

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

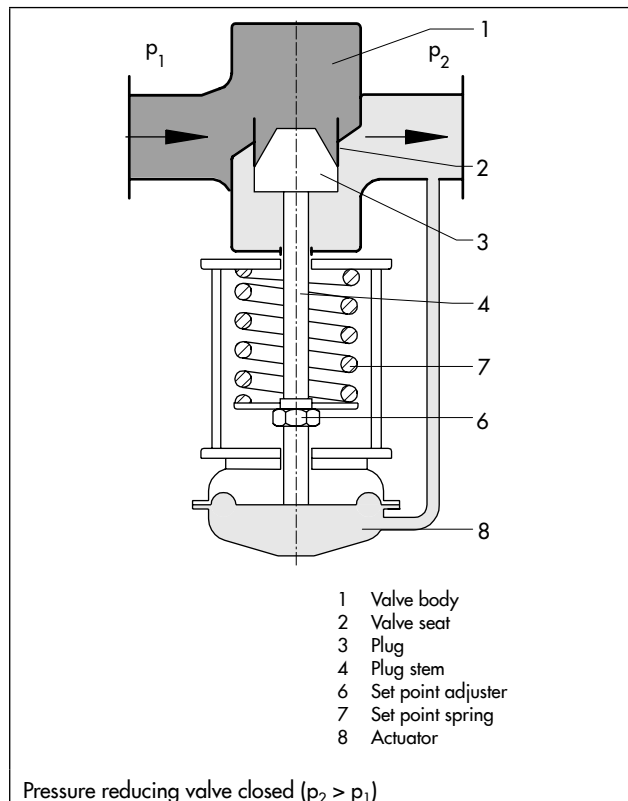
The regulators consist of a valve and an actuator, which either opens or closes the valve when the pressure increases. The regulators are proportional regulators controlled by the process medium. Each deviation from the adjusted set point is assigned a certain valve plug position.

##### 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  $F_m = F_s$ .

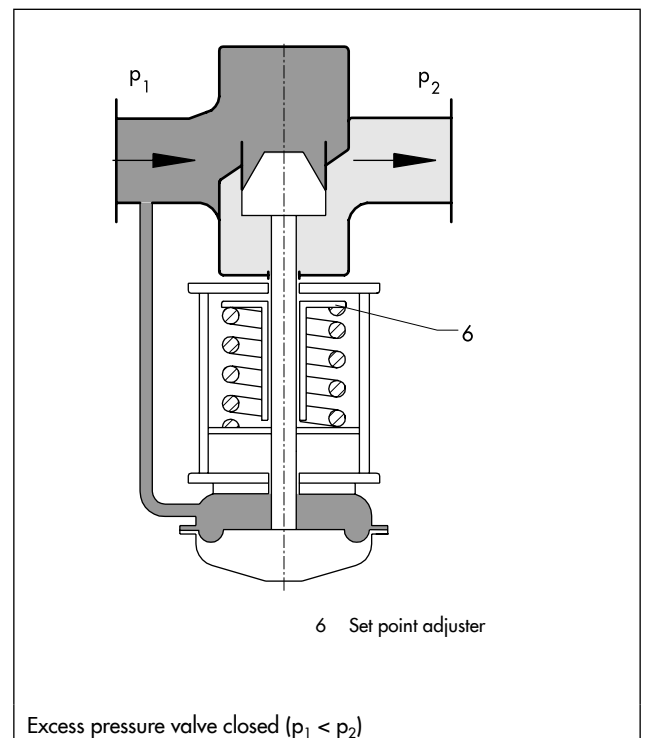
In the version illustrated, the valve closes when the pressure to be maintained constant rises. The regulator, in this case a pressure reducing valve, regulates the pressure  $p_2$  downstream of the valve to the value adjusted at the set point adjuster.



##### 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.

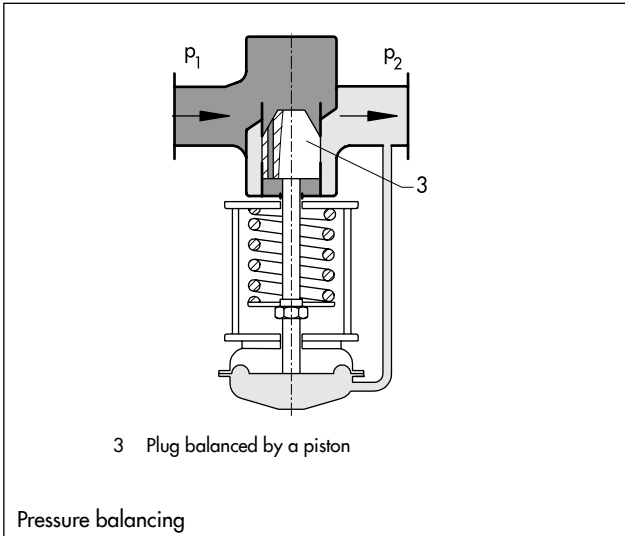
In the version illustrated, the valve opens when the pressure to be maintained constant rises. The regulator, in this case an excess pressure valve, regulates the pressure  $p_1$  upstream of the valve to the value adjusted at the set point adjuster.



### 3.1.1 Details concerning pressure regulators

#### Pressure balancing

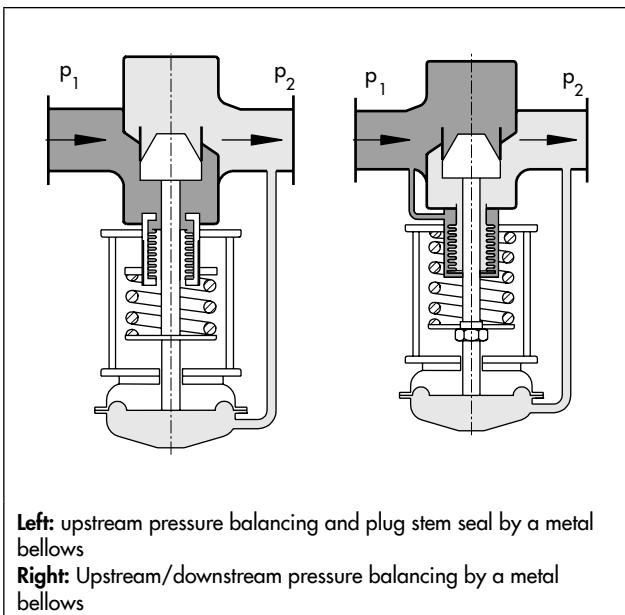
The control accuracy (offset) and stability of the control process depend on the disturbances occurring in the loop (for example, changes in upstream pressure and flow rate). The regulators are designed in such a way that the effect of these disturbances is relatively small. The force acting on the valve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

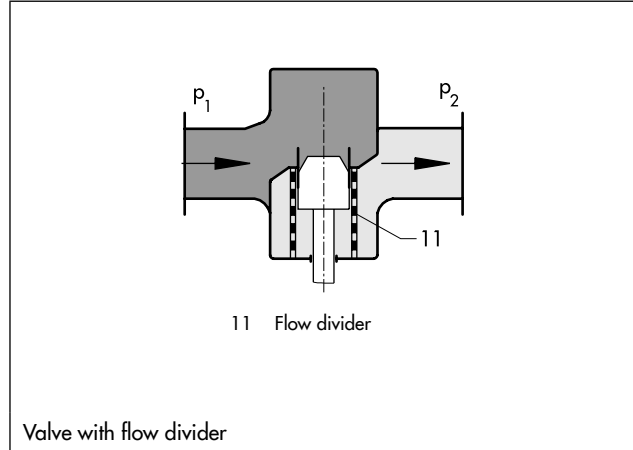
In the regulator (left), the metal bellows balances the upstream pressure and provides an absolutely tight and frictionless plug stem seal.

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



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

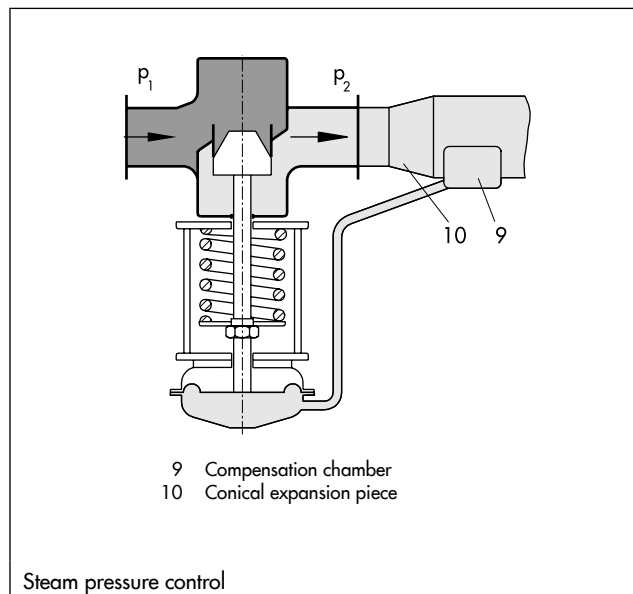
All regulators come with low-noise valve plugs. The valves used in the Type 41-23, Type 2422/2424, Type 41-73 and Type 2422/2425 Regulators can be equipped with a flow divider in special versions. Flow dividers are effective and reliable components used to reduce the noise level or to avoid critical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

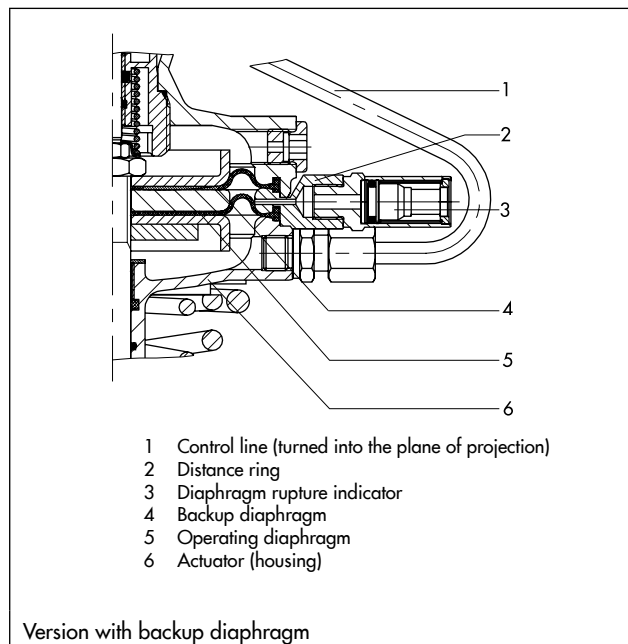
#### Safety shut-off valves (SSV) and safety excess pressure valves (SEV)

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 a certain 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



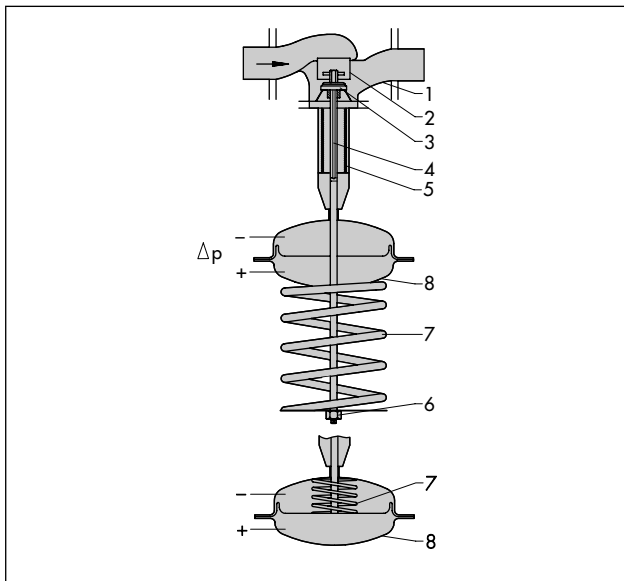
### Legend for the following diagrams

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

### Differential pressure regulators with closing actuator

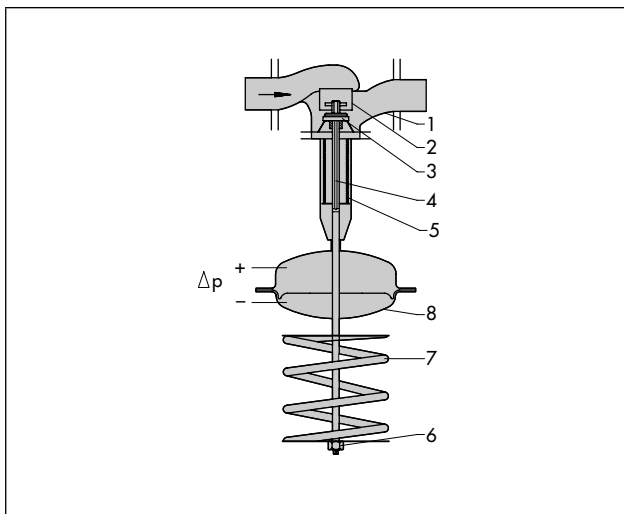
This actuator closes the valve when the adjusted differential pressure set point is exceeded. The top of the diagram shows a closing actuator with an adjustable set point, the bottom an actuator with a fixed set point.

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 regulator with opening actuator

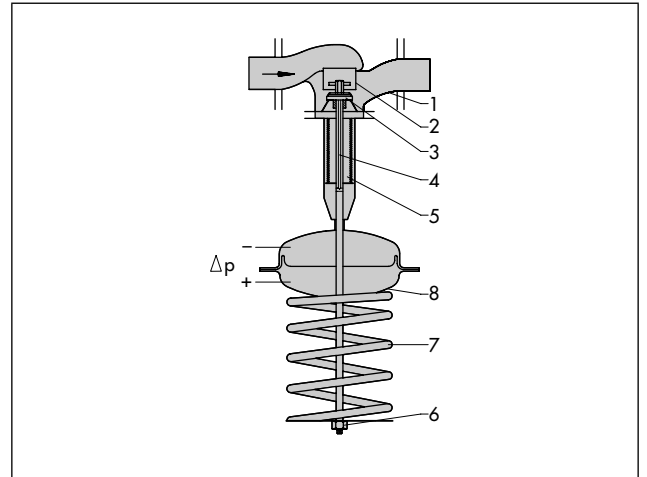
This actuator opens the valve when the differential pressure rises. The valve is closed when relieved of pressure ( $\Delta p = 0$ ).



### Valve 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.

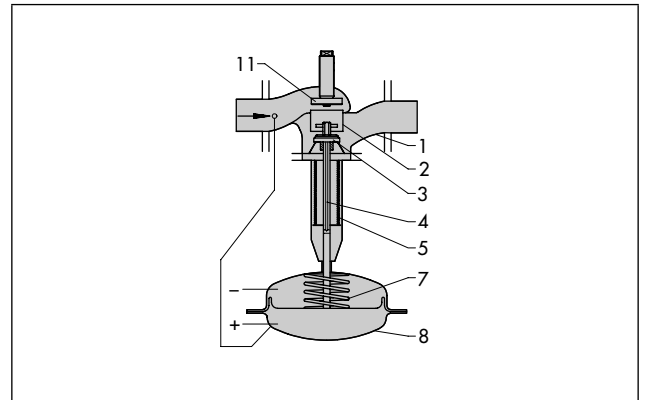
The fully balanced valves in the Series 42 Regulators allow these regulators to be used for valve sizes up to DN 250 and flow rates up to 520 m<sup>3</sup>/h.



### Flow regulators

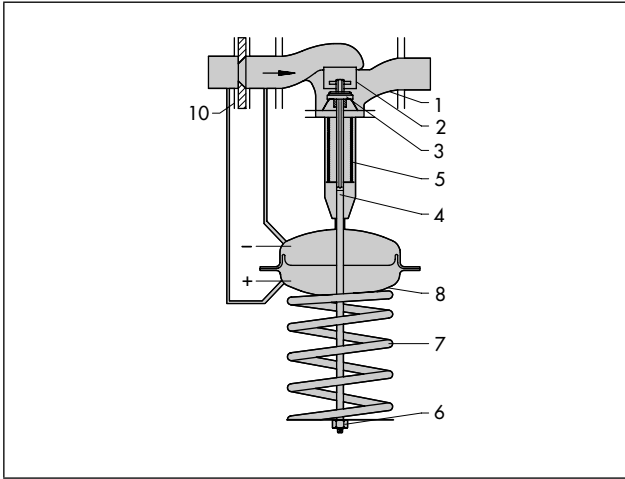
Flow regulators are particularly suitable for district heating supply networks. The measuring system is designed for a fixed differential pressure at the restriction of, for example 0.2 bar.

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:

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

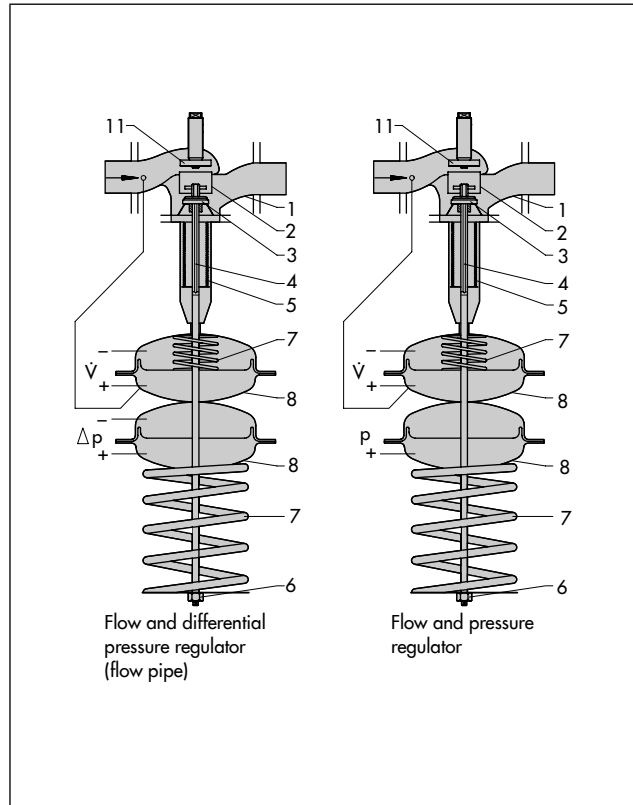
$$\Delta p_{\text{restriction}} = \frac{F_m}{A}$$

- $\dot{V}$  = 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.

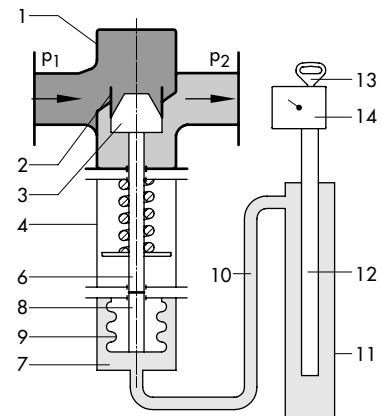
The hydraulic actuator and the valve, which does not contain a packing, ensure high operating reliability of the regulators. Since the regulators operate on the liquid expansion principle, the temperature sensor and the control thermostat can be adapted to different operating conditions. Therefore, the 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 to 2234 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.

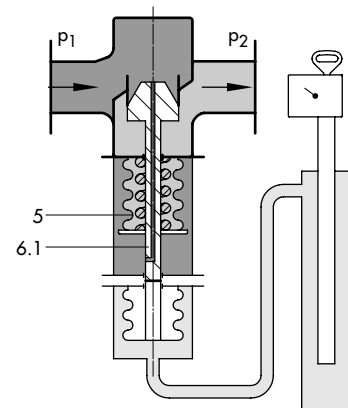
In unbalanced valves (top diagram), the effect on the plug is a force resulting from the cross-sectional seat area and the differential pressure.

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).

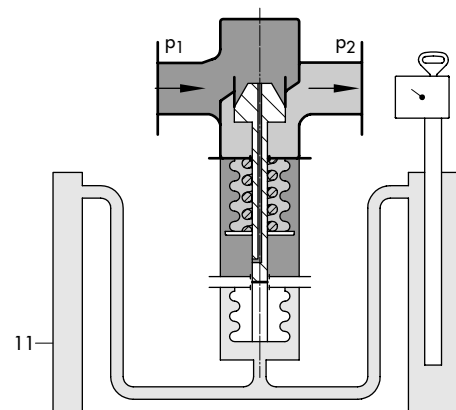
A balancing diaphragm can be used instead of the balancing bellows for non-flammable gases (max. 80 °C/175 °F) and water (max. 150 °C/300 °F) for globe valves in sizes DN 65 to 150 (NPS 2½ to 6). The maximum permissible differential pressure of some valves balanced by a diaphragm is lower than valves balanced by a bellows. However, these valves are more compact and more cost effective.



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.

Principle of operation	Control thermostat	Time constant [s]	
		Without Thermowell	With Thermowell
Liquid expansion	Type 2231	70	120
	Type 2232	65	110
	Type 2234	15	- 1)
	Type 2213	70	120
Adsorption	Type 2212	- 1)	40

1) Not permissible

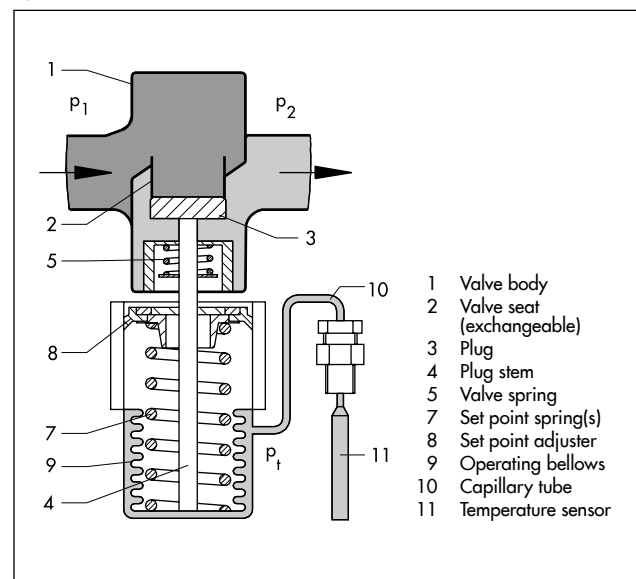
### 3.4 Temperature regulators (Series 43)

#### 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.

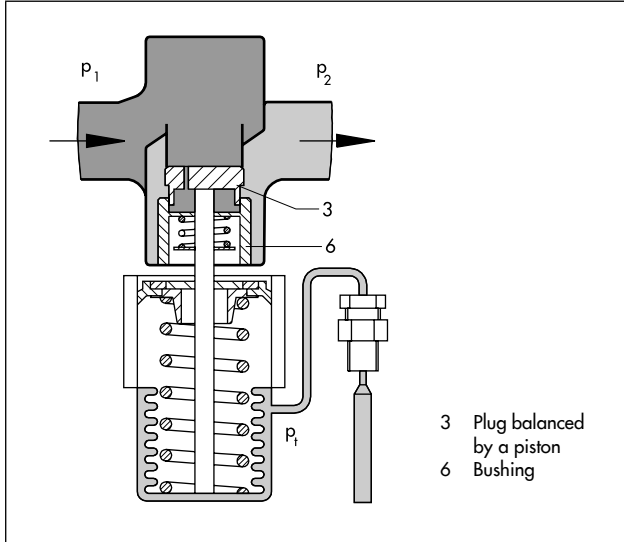
The medium temperature creates the pressure  $p_i$  in the sensor (11) that corresponds to the actual value. This pressure is transferred over the capillary tube (10) to the positioning bellows (9) where the force  $F_i = p_i \times A$  is created at the effective bellows area  $A$ . This force that 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  $F_i = F_s$ .



### Pressure balancing

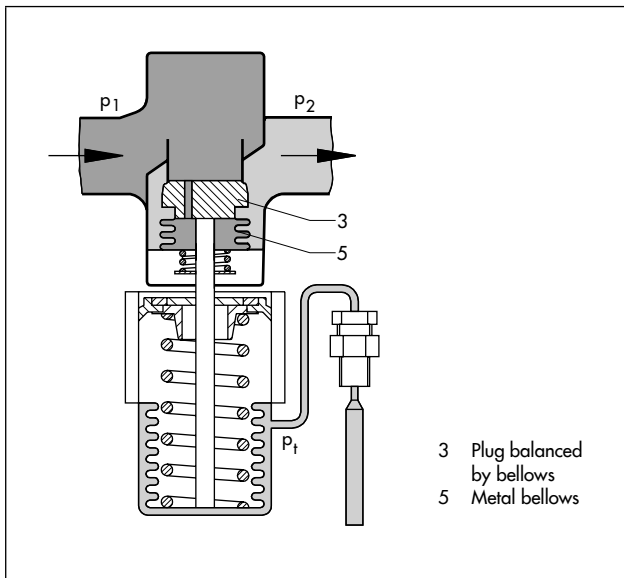
The control accuracy and stability of the control process depend on the disturbances occurring in the loop (for example, changes in upstream pressure and flow rate). The regulators are designed in such a way that the effect of these disturbances is relatively small. The force acting on the valve plug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

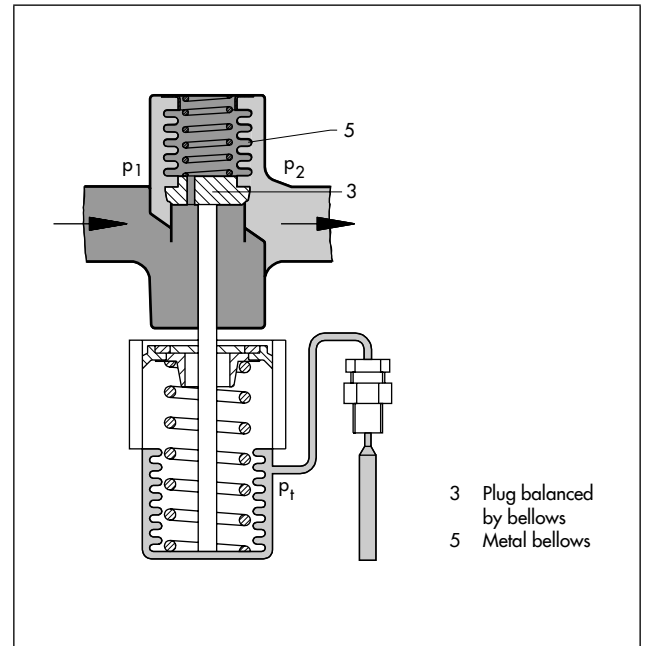
### Regulators for plants to be heated

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



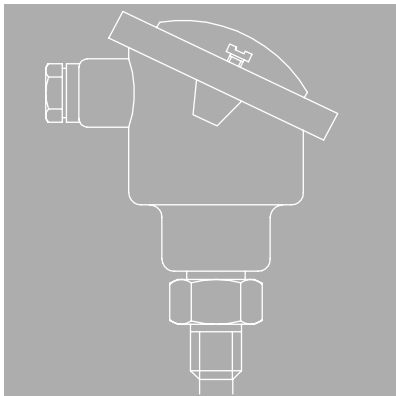
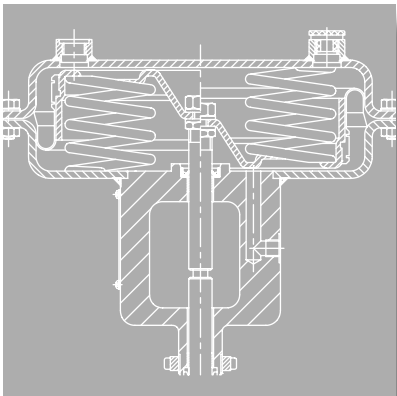
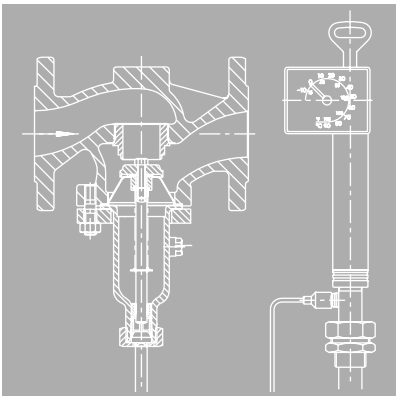
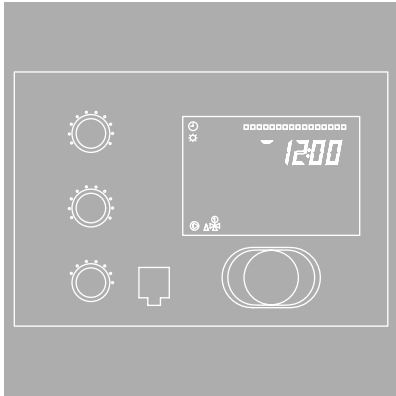
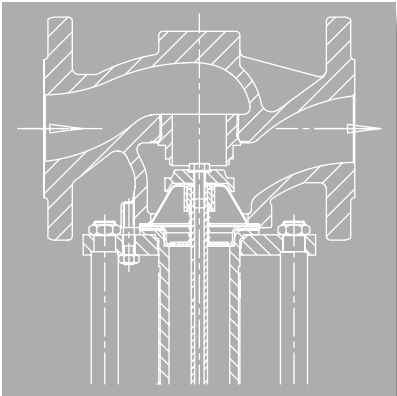
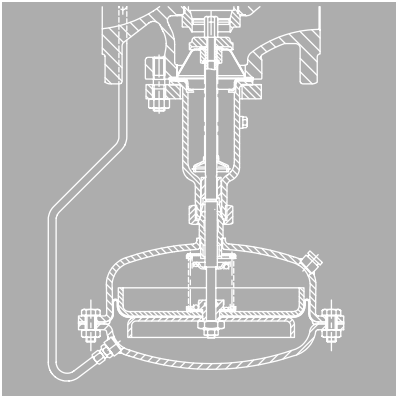
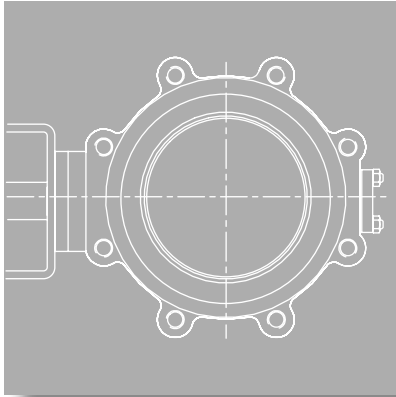
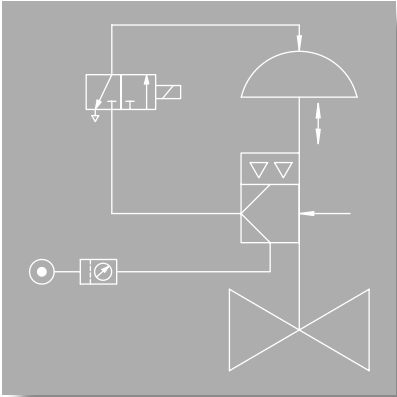
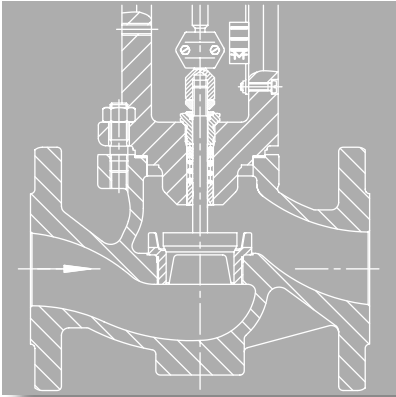
### Regulators for plants to be cooled

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
- Optional with RFID tags with unique identification according to DIN SPEC 91406

### Versions

- **Type 3241-7** · Valve with Type 3277 Pneumatic Actuator (see page 81)
- **Type 3241-1** · Valve with Type 3271 Pneumatic Actuator (see page 81)

**Accessories** · Positioners, limit switches, solenoid valves

### Technical data

Valve size	DN	15 to 300				15 to 80	
	NPS	½ to 12				½ to 3	
Body material	DIN	Cast iron EN-GJL-250	Spheroidal graphite iron EN-GJS-400-18-LT	Cast steel 1.0619	Cast stainless steel 1.4408	Forged steel 1.0460 <sup>1)</sup>	Forged stainless steel 1.4404 <sup>1)</sup>
	ANSI	A126 B	–	A216 WCC	A351 CF8M	A105	A182 F316
Pressure rating	PN	10, 16	16, 25	10 to 40			
	Class	125/250	–	150/300		300	
End connections	DIN	Flanges		Flanges, welding ends according to EN 12627		Flanges	
	ANSI	Flanges FF, NPT thread	–	ANSI B16.25/ flanges RF		Flanges RF	
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)						
Conformity	CE · EAC · UK CA						
Data sheets	DIN/ANSI: T 8015/T 8012 · Actuators: T 8310-1/-2/-3						



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 8020-2

#### 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 3374 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
- Optional with RFID tags with unique identification according to DIN SPEC 91406

### Versions

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

- **Type 3244-7** · Valve with Type 3277 Pneumatic Actuator (see page 81)
- **Type 3244-1** · Valve with Type 3271 Pneumatic Actuator (see page 81)

### 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)		
Conformity				
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 81 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
Standard body material	DIN	1.4404	1.4404
	ANSI	316 L	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, on/off
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 long insulating section	–196 to +450 °C (–325 to +842 °F)	–196 to +450 °C (–325 to +842 °F)
Conformity	CE · EAC · UK CA		
Data sheets		T 8091, T 8091-1	T 8053

**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
- Optional with RFID tags with unique identification according to DIN SPEC 91406

## 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 81)

– **Type 3251-7** or **Type 3256-7**: valve with Type 3277 Pneumatic Actuator (page 81)

## 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 according to DIN EN 1092, welding ends according to EN 12627			
	ANSI	Flanges according to B16.5, welding ends according to 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, on/off			
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)			
Conformity		CE · EAC · UK CA			
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

- Optional with RFID tags with unique identification according to DIN SPEC 91406

## Technical data

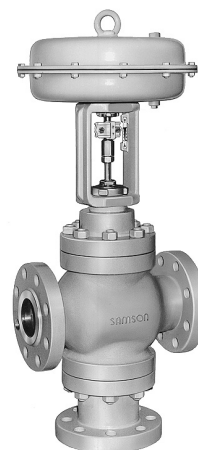
Valve	Type	3253 <sup>1)</sup>	
Valve size		DN 15 to 500 (NPS ½ to 20)	
Body material	DIN	Cast steel 1.0619	Cast stainless steel 1.4408
	ANSI	A216 WCC	A351 CF8M
Pressure rating		PN 10 to 160 <sup>2)</sup> , Class 150 to 900 <sup>2)</sup>	
End connections	DIN	Flanges according to DIN EN 1092, welding ends according to EN 12627	
	ANSI	Flanges according to B16.5, welding ends according to B16.25	
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	
Temperature range		-10 to +220 °C (14 to 428 °F)	
	With high-temp.packing	220 to 350 °C (428 to 662 °F)	
	With insulating section	-196 to +550 °C (-325 to +1022 °F)	
Conformity		CE · EAC	
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 according to DIN EN 1092, welding ends according to EN 12627		
	ANSI	Flanges according to B16.5, welding ends according to 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, on/off		
Rangeability		50:1		
Temperature range		-10 to +220 °C (14 to 428 °F)		
	With high-temp. packing	220 to 350 °C (428 to 662 °F)		
	With insulating section	-196 to +550 °C (-325 to +1022 °F)		
Conformity		CE · EAC		
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	DIN	Flanges according to DIN EN 1092, welding ends according to EN 12627	
	ANSI	Flanges according to B16.5, welding ends according to B16.25	
Seat-plug seal, leakage class acc. 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)	
Conformity	CE · ENEC		
Data sheets	T 8251/T 8252	T 8256/T 8257	



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-3 Trim: multi-stage parabolic plug for DN 15 to 300 and PN 40 to 400 (see T 8083)

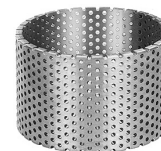
Control valves with perforated plug · Mainly used for valves in steam applications, particularly for operation in the wet steam region, the control of two-phase medium flow, liquid media which vaporize on the outlet side (flashing valves) or emergency relief valves (blow-off valves). The perforated plug 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).

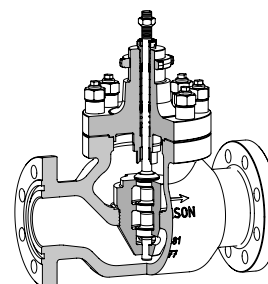
- DN 40 to 800 (NPS 1½ to 32) · PN 10 to 400 (Class 150 to 2500)

## Versions

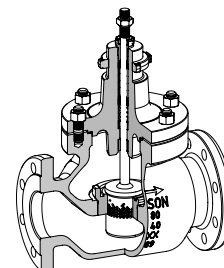
- Sandwich-style version for clamping between flanges with one attenuation plate · Body for two to five attenuation plates attachable using flanges (see Data Sheet T 8084)



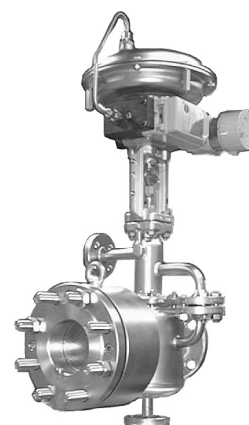
Flow divider ST 1



Type 3251 with AC-3 Trim



Type 3251 with perforated plug



Type 3381, flanged to control valve with heating jacket



# Pneumatic Control Valves for Plant Engineering

On/off valve · Type 3351

Type 3353 Angle Seat Valve

Type 3354 Globe Valve

## Application

On/off valves designed for mechanical and plant engineering. Tight shut-off. Suitable for liquids, gases and steam.

## Versions

Pneumatic control valves in accordance with DIN or ANSI standards

- **Type 3351** · On/off valve with pneumatic actuator
- **Type 3353** · Globe valve made of stainless steel with angle seat body, soft-seated flat plug and pneumatic piston actuator, optionally with limit switch and/or solenoid valve
- **Type 3354** · Globe valve with straight pattern body, soft-seated flat plug and pneumatic piston actuator, optionally with limit switch and/or solenoid valve

## Technical data

Type		3351	3353	3354
Valve size	DN	15 to 100	15 to 50 G ½ to G 2	15 to 80
	NPS	½ to 4	–	–
Body material	Cast iron	•		•
	Spheroidal graphite iron	•		
	Cast steel	•		
	Stainless steel	•	•	
Pressure rating	PN	Up to 40	40	16
	Class	Up to 300		
End connections	Flanges	•		•
	Welding ends		•	
	Female thread		•	
Leakage class		VI		
Characteristic		On/off		
Medium temperature		–10 to +220 °C (14 to 428 °F)	–10 to +180 °C	–10 to +180 °C
Ambient temperature		NBR: –35 to +100 °C (–31 to +212 °F)		
		EPDM: –40 to +150 °C (–40 to +302 °F)	–10 to +60 °C	–10 to +60 °C
		FKM: –25 to +200 °C (–13 to +392 °F)		
Conformity		CE · EAC · UK CA	CE · EAC	EAC
Actuator		Integrated	30/60 cm <sup>2</sup>	30, 60, 120 cm <sup>2</sup>
Data sheets		T 8039	T 8139	T 8140



Type 3351



Type 3353



Type 3354

# Pneumatic Control Valves for Hygienic and Aseptic Applications

## Type 3347 Hygienic Angle Valve

### Application

Pneumatic control valves for the food processing and pharmaceutical industries. Optionally with Type 3271 or Type 3277 Pneumatic Actuators for integral attachment of positioners and accessories or with Type 3372 or Type 3379 Actuators.

### Compliance

The Type 3347 Hygienic Valve complies with the following regulations and standards:

- FDA 21 CFR 177.1550, FDA 21 CFR 177.2600, FDA 21 CFR 177.2415
- NSF H1
- EC 1935/2004
- EU 10/2001
- EC 2023/2006
- Free of animal-derived ingredients (ADI-free)
- EC 999/2001, revision 2015: TSE/BSE free
- Versions complying with EHEDG and 3-A regulations on request

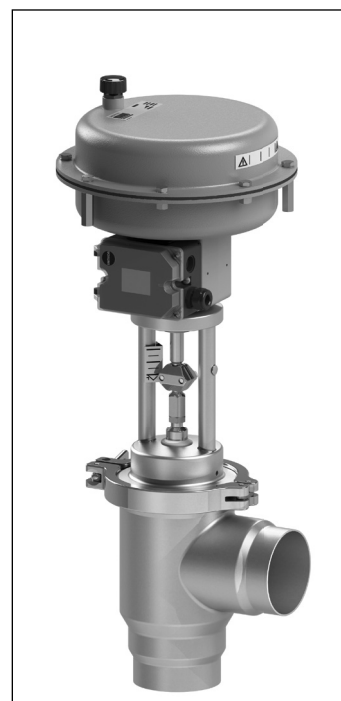
### Versions

Control valves in accordance with DIN or ANSI standards

- **Type 3347** · Hygienic angle valve with Type 3271 or Type 3277 Actuator

### Technical data

Type	3347		
Body version	Cast	Bar stock	
Valve size	DN	25 to 100	15 to 125
	NPS	1 to 4	½ to 5
Body material	1.4404/316L		•
	1.4409/CF3M	•	
	1.4435/316L		•
	Special materials		•
Bonnet	Bolted-on		Up to 63 bar/914 psi
	Clamp	•	Up to 16 bar/230 psi
Maximum pressure	16 bar/230 psi		16 bar/230 psi Option: 63 bar/914 psi
End connections	Flanges	•	•
	Welding ends	•	•
	Thread	•	•
	Clamp	•	•
Leakage class	Up to VI		Up to VI
Characteristic	Equal percentage or linear		Equal percentage or linear
Steam barrier	•		•
Medium temperature range	-10 to 150 °C (14 to 300 °F)		-10 to 150 °C (14 to 300 °F)
Cleaning	CIP	•	•
	SIP	•	•
Conformity	<b>CE · EAC · UK CA</b>		
Actuator	Type 3271/Type 3277		
Data sheet	<b>T 8097</b>		



Type 3347/3277  
with Type 3725 Positioner



Type 3347/3379  
with Type 3724 Positioner

– **Type 3347** · Hygienic angle valve with Type 3372 Actuator and as micro-flow valve

**Technical data**

Type		3347	
Body version		Micro-flow valve <sup>1)</sup>	For Type 3372 Actuator
Valve size	DN	6 to 15	25 to 100
	NPS	¼ to 1	1 to 4
	1.4409/ A351 CF3M		Cast
	1.4435/316L	•	
	Special materials	•	
Bonnet	Bolted-on	•	
	Clamp		•
Maximum pressure		16 bar/230 psi Option: 63 bar/914 psi	16 bar/230 psi
End connections	Flanges	•	
	Welding ends	•	•
	Thread	•	
	Clamp	•	
Leakage class		Up to IV	Up to IV
Characteristic		Equal percentage or linear	Equal percentage or linear
Medium temperature range		-10 to 150 °C (14 to 300 °F)	-10 to 150 °C (14 to 300 °F)
Cleaning	CIP	•	•
	SIP	•	•
Conformity		<b>CE · EAC · UK CA</b>	
Actuator		Type 3271/Type 3277	Type 3372
<b>Data sheets</b>		<b>T 8097</b>	<b>T 8097-1</b>

<sup>1)</sup> K<sub>VS</sub> 0.01 to 0.25 · C<sub>v</sub> 0.012 to 0.30



Type 3347/3372  
with Type 3725 Positioner



Type 3347/3379  
with Type 3724 Positioner

– **Type 3347** · Hygienic angle valve with Type 3379 Actuator

**Technical data**

Type		3347		
Body version		Cast	Bar stock	Micro-flow valve
Valve size	DN	25 to 80 <sup>1)</sup>	15 to 80 <sup>1)</sup>	6 to 15
	NPS	1 to 3 <sup>1)</sup>	½ to 3 <sup>1)</sup>	¼ to ½
Body material	1.4404/316L		•	
	1.4409/CF3M	•		
	1.4435/316L		•	•
	Special materials	•	•	
Bonnet	Bolted-on		Up to 63 bar/914 psi	•
	Clamp	•	Up to 16 bar/230 psi	
Maximum pressure		16 bar/230 psi	16 bar/230 psi Option: 63 bar/914 psi	16 bar/230 psi
End connections	Flanges	•	•	•
	Welding ends	•	•	•
	Thread	•	•	•
	Clamp	•	•	•
Leakage class		Up to VI	Up to VI	Up to IV
Characteristic		Equal percentage or linear	Equal percentage or linear	Equal percentage or linear
Steam barrier		•	•	
Medium temperature range		-10 to 150 °C (14 to 300 °F)	-10 to 150 °C (14 to 300 °F)	-10 to 150 °C (14 to 300 °F)
Cleaning	CIP	•	•	•
	SIP	•	•	•
Conformity		<b>CE · EAC · UK CA</b>		
Actuator		Type 3379		
<b>Data sheet</b>		<b>T 8097</b>		

<sup>1)</sup> Only for version with clamp in DN 65 to 80/NPS 2½ to 3



Compact automated unit:  
Type 3347/3379  
with Type 3724 Positioner

# Pneumatic Control Valves for Hygienic and Aseptic Applications

## Type 3349 Aseptic Angle Valve

### Application

Control valve for aseptic applications in the food and pharmaceutical industries according to DIN or ANSI standards with USP-VI diaphragm

### Compliance

The Type 3349 Aseptic Valve complies with the following regulations and standards:

- FDA 21 CFR 177.1550, FDA 21 CFR 177.2600, FDA 21 CFR 177.2415
- NSF H1
- EC 1935/2004
- EU 10/2011
- USP Class VI-121 °C
- EC 2023/2006
- Free of animal-derived ingredients (ADI-free)
- EC 999/2001, revision 2015: TSE/BSE free
- Versions complying with EHEDG and 3-A regulations on request

### Versions

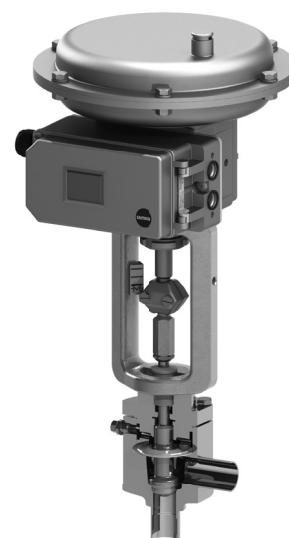
- **Type 3349** · Aseptic angle valve with Type 3271 or Type 3277 Pneumatic Actuator
- **Type 3349** · Aseptic angle valve with Type 3379 Pneumatic Actuator

### Technical data

Type	3349		
Actuator	Type 3271/3277	Type 3379	
Valve size	DN	6 to 100	6 to 50
	NPS	¼ to 4	¼ to 2
Body material	1.4435/316L	•	•
	Special materials	•	•
Bonnet	Bolted-on	•	•
Maximum pressure	10 bar/150 psi	10 bar/150 psi	
End connections	Flanges	•	•
	Welding ends	•	•
	Thread	•	•
	Clamp	•	•
Leakage class	Up to VI	Up to VI	
Characteristic	Equal percentage or linear	Equal percentage or linear	
Sterilization temperature	180 °C (356 °F) up to 30 min	180 °C (356 °F) up to 30 min	
Operating temperature range	-10 to 160 °C (14 to 320 °F)	-10 to 160 °C (14 to 320 °F)	
Cleaning	CIP	•	•
	SIP	•	•
Conformity	CE · EAC · UK CA		
Data sheets	T 8048-21	T 8048-22	



Compact automated unit:  
Type 3349/3379 Angle Valve  
with Type 3724 Positioner



Type 3349/3277  
with Type 3730 Positioner

# Series V2001 Valves · Clean Tech

## Type 3321CT Globe Valve with pneumatic actuator

### Application

Type 3321CT Globe Valve for auxiliary media in the process industry with Type 3379 Pneumatic Actuator and Type 3724 Positioner

### Special features

- Completely made of stainless steel for hygienic, corrosive environments. Especially suitable for auxiliary media (e.g. water and steam) in the food and beverage industry as well as biotech sector
- Skid mounting and compact design facilitate installation
- Gaskets and packings are compliant with food and beverage requirements (EU 1935/2004 and FDA).
- Display, auto tuning and error monitoring

### Versions

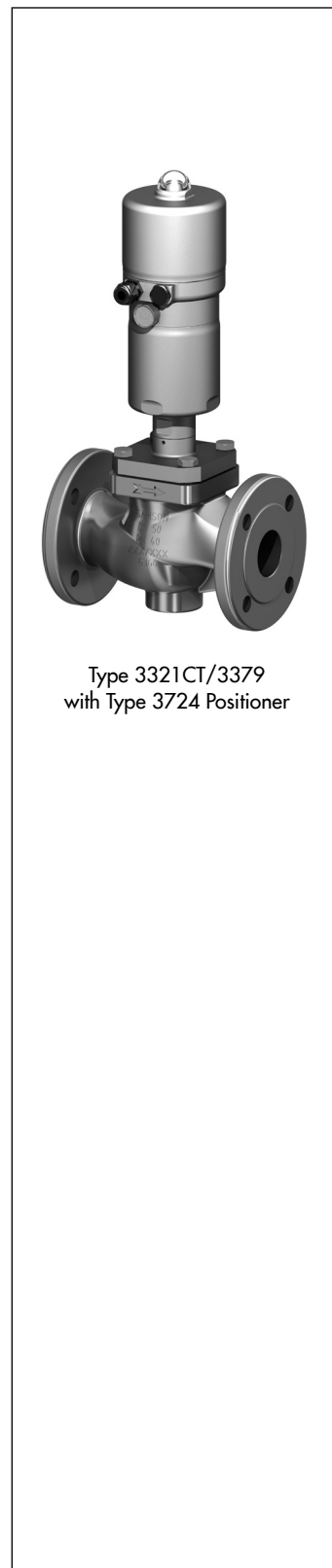
- **Type 3321CT** · Globe valve with Type 3379 Pneumatic Actuator and Type 3724 Positioner

### Technical data

Type	3321CT	
Valve size	DN	15 to 80
	NPS	½ to 3
Pressure rating	PN	PN 16 to 40
	Class	Class 150 and 300
Body material	1.4408/A351 CF8M	
End connections	Flanges: B1 according to EN 1092-1 RF according to ASME B16.5	
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2	Metal seal: IV Soft seal: VI	
Characteristic	Equal percentage	
Medium temperature	–10 to +220 °C (14 to 428 °F)	
Conformity	CE · EAC · UK CA	
Actuator/positioner	Type 3379/Type 3724	
Data sheet	T 8115	

### Further versions

- With reduced  $K_{VS}$  coefficients
- With soft-seated plug for bubble-free shut-off
- As on/off valve with Type 4740 Limit Switch



Type 3321CT/3379  
with Type 3724 Positioner

# Pneumatic Diaphragm Valves for Aseptic Applications

## SED Steripur Series Diaphragm Valves

### Application

Pneumatic diaphragm valves with minimized dead spaces for aseptic applications in the food processing and pharmaceutical industries according to ASME BPE, DIN or ISO standards

### Versions

- **Steripur 217** · Diaphragm valve with stainless steel double-piston actuator
- **Steripur 317, 407, 417** · Diaphragm valve with stainless steel piston actuator

### Technical data

Stainless steel piston actuator		Steripur 217	Steripur 317	Steripur 417	Steripur 407
Valve size	DN	4 to 15	8 to 20	15 to 65	65 to 100
	NPS	¼ to ½	¾ to ¾	¾ to 2½	2½ to 4
Body material		Investment casting or forged steel 1.4435 · A316L <sup>1)</sup>			
Max. operating pressure	EPDM diaphragm	8 bar		10 bar ≤DN 50 <sup>2)</sup>	
	PTFE diaphragm	7 bar		8 bar ≤DN 50 <sup>3)</sup>	
End connections		Welding ends · Clamps · Aseptic flanges · Special versions			
Characteristic		On/off			
Behavior		Quick opening · Self draining			
Diaphragm		MA 8	MA 10	MA 25 to 50	MA 80, 100
Diaphragm material	EPDM	Single-piece			
	PTFE/EPDM	Single-piece		Single-piece, two-piece	Two-piece
Max. medium temperature		160 °C			
Medium temperature range	EPDM, one-piece	–40 to +150 °C			
	PTFE/EPDM, one-piece	–20 to +150 °C (MA 50 and lower)			–
	PTFE/EPDM, two-piece	–	–20 to +160 °C		
Certificates	EPDM Code 28	FDA CFR #21 Section 177.2600 · USP Class VI Test Section #87 + 88, 3-A Sanitary Class II			
	PTFE/EPDM Code 30/44	FDA CFR #21 Section 177.1550 · USP Class VI Test Section #87 + 88, 3-A Sanitary Class I			
Conformity		<b>CE</b>			
Actuator		Stainless steel piston actuator			
Associated documentation		<b>SED catalog</b>			

<sup>1)</sup> Other materials, e.g. 1.4539/AISI 904L, on request

<sup>2)</sup> DN 65 and 80: 7 bar; DN 100: 6 bar

<sup>3)</sup> DN 65 and 80: 6 bar; DN 100: 5 bar



SED Steripur 217 Diaphragm Valve



SED Steripur 317 Diaphragm Valve



SED Steripur 417 Diaphragm Valve



SED Steripur 407 Diaphragm Valve

- **Steripur 206, 397, 907 997** · Diaphragm valve with stainless steel bonnet and hand-wheel

**Technical data**

Stainless steel bonnet and hand-wheel		Steripur 206	Steripur 397	Steripur 907	Steripur 997
Valve size	DN	4 to 15	8 to 20	15 to 65	65 to 100
	NPS	¼ to ½	⅜ to ¾	¾ to 2½	2½ to 4
Body material		Investment casting or forged steel 1.4435 · A316L <sup>1)</sup>			
Max. operating pressure	EPDM diaphragm	10 bar			
	PTFE diaphragm	10 bar		10 bar ≤DN 50 <sup>2)</sup>	
End connections		Welding ends · Clamps · Aseptic flanges · Special versions			
Characteristic		On/off			
Behavior		Self draining			
Diaphragm		MA 8	MA 10	MA 25 to 50	MA 80 to 100
Diaphragm material	EPDM	Single-piece			
	PTFE/EPDM	Single-piece		Single-piece, two-piece	Two-piece
Max. medium temperature		160 °C			
Medium temperature range	EPDM, one-piece	-40 to +150 °C			
	PTFE/EPDM, one-piece	-20 to +150 °C			-
	PTFE/EPDM, two-piece	-	-20 to +160 °C		
Certificates	EPDM Code 28	FDA CFR #21 Section 177.2600 · USP Class VI Test Section #87 + 88, 3-A Sanitary Class II			
	PTFE/EPDM Code 30/44	FDA CFR #21 Section 177.1550 · USP Class VI Test Section #87 + 88, 3-A Sanitary Class I			
Conformity		<b>CE</b>			
Actuator		Stainless steel bonnet and hand-operated actuator			
<b>Associated documentation</b>		<b>SED catalog</b>			

<sup>1)</sup> Other materials, e.g. 1.4539/AISI 904L, on request  
<sup>2)</sup> DN 65 to 100: 8 bar



SED Steripur 206 Diaphragm Valve



SED Steripur 397 Diaphragm Valve



SED Steripur 907 Diaphragm Valve



SED Steripur 997 Diaphragm Valve



# Pneumatic Diaphragm Valves for Aseptic Applications

## SED KMA Series Diaphragm Valves

### Application

Pneumatic diaphragm valves with minimized dead spaces for aseptic applications in the food processing and pharmaceutical industries according to ASME BPE, DIN or ISO standards

### Versions

- **KMA 190, KMA 195, KMA 395** · Diaphragm valve with plastic piston actuator and stainless steel adapter
- **KMA 495** · Diaphragm valve with plastic diaphragm actuator and stainless steel adapter

### Technical data

Plastic actuator with stainless steel adapter		KMA 190	KMA 195	KMA 395	KMA 495
Valve size	DN	4 to 15	8 to 20	15 to 65	15 to 100
	NPS	¼ to ½	⅜ to ¾	¾ to 2½	¾ to 4
Body material		Investment casting or forged steel 1.4435 · A316L <sup>1)</sup>			
Max. operating pressure	EPDM diaphragm	8 bar		10 bar ≤DN 50 <sup>2)</sup>	
	PTFE diaphragm	7 bar		8 bar ≤DN 50 <sup>3)</sup>	
End connections		Welding ends · Clamps · Aseptic flanges · Special versions			
Characteristic		On/off			
Behavior		Quick opening · Self draining			
Diaphragm		MA 8	MA 10	MA 25 to 50	MA 25 to 50, 80, 100
Diaphragm material	EPDM	Single-piece			
	PTFE/EPDM	Single-piece		Single-piece, two-piece	Two-piece
Max. medium temperature		160 °C			
Medium temperature range	EPDM, one-piece	–40 to +150 °C			
	PTFE/EPDM, one-piece	–20 to +150 °C (MA 50 and lower)			–
	PTFE/EPDM, two-piece	–		–20 to +160 °C	
Certificates	EPDM Code 28	FDA CFR #21 Section 177.2600 · USP Class VI Test Section #87 + 88, 3-A Sanitary Class II			
	PTFE/EPDM Code 30/44	FDA CFR #21 Section 177.1550 · USP Class VI Test Section #87 + 88, 3-A Sanitary Class I			
Actuator		Thermoplastic piston actuator with stainless steel adapter			Plastic diaphragm actuator with stainless steel adapter
Conformity		<b>CE</b>			
Associated documentation		<b>SED catalog</b>			

<sup>1)</sup> Other materials, e.g. 1.4539/AISI 904L, on request

<sup>2)</sup> DN 65 and 80: 7 bar; DN 100: 6 bar

<sup>3)</sup> DN 65 and 80: 6 bar; DN 100: 5 bar



SED KMA 190 Diaphragm Valve



SED KMA 195 Diaphragm Valve



SED KMA 395 Diaphragm Valve



SED KMA 495 Diaphragm Valve

- **KMA 205, KMA 295, KMA 905, KMA 995** · Diaphragm valve with stainless steel bonnet and plastic handwheel

**Technical data**

Stainless steel bonnet and plastic handwheel		KMA 205	KMA 295	KMA 905	KMA 995
Valve size	DN	4 to 15	8 to 20	15 to 65	65 to 100
	NPS	¼ to ½	⅜ to ¾	¾ to 2½	2½ to 4
Body material		Investment casting or forged steel 1.4435 · A316L <sup>1)</sup>			
Max. operating pressure	EPDM diaphragm	10 bar			
	PTFE diaphragm	10 bar		10 bar ≤DN 50 <sup>2)</sup>	
End connections		Welding ends · Clamps · Aseptic flanges · Special versions			
Characteristic		On/off			
Behavior		Self draining			
Diaphragm		MA 8	MA 10	MA 25 to 50	MA 80 to 100
Diaphragm material	EPDM	Single-piece			
	PTFE/EPDM	Single-piece		Single-piece, two-piece	Two-piece
Max. medium temperature		160 °C			
Medium temperature range	EPDM, one-piece	-40 to +150 °C			
	PTFE/EPDM, one-piece	-20 to +150 °C			-
	PTFE/EPDM, two-piece	-	-20 to +160 °C		
Certificates	EPDM Code 28	FDA CFR #21 Section 177.2600 · USP Class VI Test Section #87 + 88, 3-A Sanitary Class II			
	PTFE/EPDM Code 30/44	FDA CFR #21 Section 177.1550 · USP Class VI Test Section #87 + 88, 3-A Sanitary Class I			
Conformity		<b>CE</b>			
Actuator		Stainless steel bonnet and thermoplastic hand-operated actuator			
Associated documentation		<b>SED catalog</b>			

<sup>1)</sup> Other materials, e.g. 1.4539/AISI 904L, on request

<sup>2)</sup> DN 65 and 100: 8 bar



SED KMA 205 Diaphragm Valve



SED KMA 295 Diaphragm Valve



SED KMA 905 Diaphragm Valve



SED KMA 995 Diaphragm Valve

# Pneumatic Diaphragm Valves for Aseptic Applications

## SED KMD Series Diaphragm Valves

### Application

Pneumatic diaphragm valves with minimized dead spaces for aseptic applications in the food processing and pharmaceutical industries according to ASME BPE, DIN or ISO standards

### Versions

- **KMD 188** · Diaphragm valve with plastic piston actuator directly mounted onto the valve body
- **KMD 385** · Diaphragm valve with plastic diaphragm actuator directly mounted onto the valve body
- **KMD 402** · Diaphragm valve with plastic piston actuator

### Technical data

Plastic actuator		KMD 188	KMD 402	KMD 385
Valve size	DN	8 to 20	15 to 65	15 to 80
	NPS	3/8 to 3/4	3/4 to 2 1/2	3/4 to 3
Body material		Investment casting or forged steel 1.4435 · A316L <sup>1)</sup>		
Max. operating pressure	EPDM diaphragm	8 bar	10 bar	10 bar <sup>2)</sup>
	PTFE diaphragm	7 bar	8 bar	8 bar <sup>3)</sup>
End connections		Welding ends · Clamps · Aseptic flanges · Special versions		
Characteristic		On/off		
Behavior		Quick opening · Self draining		
Diaphragm		MA 10	MA 25 to 50	MA 15 to 50, 80
Diaphragm material	EPDM	Single-piece		
	PTFE/EPDM	Single-piece	Single-piece, two-piece	
Max. medium temperature		PS version: 80 °C HS version: 150 °C	150 °C	Max. 80 °C
Medium temperature range	EPDM, one-piece	-40 to +150 °C		
	PTFE/EPDM, one-piece	-20 to +150 °C	-	
	PTFE/EPDM, two-piece	-	-20 to +160 °C	
Certificates	EPDM Code 28	FDA CFR #21 Section 177.2600 · USP Class VI Test Section #87 + 88, 3-A Sanitary Class II		
	PTFE/EPDM Code 30/44	FDA CFR #21 Section 177.1550 · USP Class VI Test Section #87 + 88, 3-A Sanitary Class I		
Actuator		Plastic piston actuator directly mounted onto the valve body	Plastic piston actuator directly mounted onto the valve body	Plastic diaphragm actuator directly mounted onto the valve body
Conformity		<b>CE</b>		
Associated documentation		<b>SED catalog</b>		

<sup>1)</sup> Other materials, e.g. 1.4539/AISI 904L, on request

<sup>2)</sup> DN 65 and 80: 7 bar

<sup>3)</sup> DN 65 and 80: 6 bar



SED KMD 188 Diaphragm Valve



SED KMD 402 Diaphragm Valve



SED KMD 385 Diaphragm Valve

– KMD 289, KMD 982, KMD 985 · Diaphragm valve with plastic bonnet and handwheel

**Technical data**

Plastic bonnet and handwheel		KMD 289	KMD 982	KMD 985
Valve size	DN	8 to 20	15 to 65	65 to 100
	NPS	3/8 to 3/4	3/4 to 2 1/2	2 1/2 to 4
Body material		Investment casting or forged steel 1.4435 · A316L <sup>1)</sup>		
Max. operating pressure	EPDM diaphragm	6 bar	10 bar	10 bar
	PTFE diaphragm	6 bar	10 bar	8 bar
End connections		Welding ends · Clamps · Aseptic flanges · Special versions		
Characteristic		On/off		
Behavior		Quick opening · Self draining		
Diaphragm		MA 10	MA 25 to 50	MA 80 to 100
Diaphragm material	EPDM	Single-piece		
	PTFE/EPDM	Single-piece	Single-piece, two-piece	Two-piece
Max. medium temperature		S version: 80 °C HS version: 150 °C	80 °C	80 °C
Medium temperature range	EPDM, one-piece	-40 to +150 °C		
	PTFE/EPDM, one-piece	-20 to +150 °C		-
	PTFE/EPDM, two-piece	-	-20 to +160 °C	
Certificates	EPDM Code 28	FDA CFR #21 Section 177.2600 · USP Class VI Test Section #87 + 88, 3-A Sanitary Class II		
	PTFE/EPDM Code 30/44	FDA CFR #21 Section 177.1550 · USP Class VI Test Section #87 + 88, 3-A Sanitary Class I		
Actuator		Plastic bonnet and hand-operated actuator		
Conformity		<b>CE</b>		
Associated documentation		<b>SED catalog</b>		

<sup>1)</sup> Other materials, e.g. 1.4539/AISI 904L, on request



SED KMD 289 Diaphragm Valve



SED KMD 982 Diaphragm Valve



SED KMD 985 Diaphragm Valve

# Pneumatic Control Valves

## Cryogenic valves

Type 3248 with bellows seal, top-entry design

Type 3246 with long insulating section and circulation inhibitor

Type 3598 with circulation inhibitor, top-entry design

### 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
- Optional with RFID tags with unique identification according to DIN SPEC 91406

### 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 81)

– **Type 3248-1:** cryogenic valve with Type 3271 Pneumatic Actuator (page 81)

### Technical data

Valve size	DN	25 to 150	
	NPS	1 to 6	
Body style		Globe valve	Angle valve
Body material		1.4308 A351 CF8	1.4308 or AlMg4, 5MnF27 A351 CF8
Pressure rating	PN	16 to 100	
	Class	150 to 600	
End connections		Welding ends, welding-neck ends	
Seat-plug seal, leakage class acc. to IEC 60534-4 or ANSI/FCI 70-2		Metal seal: IV Soft seal: VI	
		High-performance metal seal: V	
Characteristic		Equal percentage, linear, on/off	
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)	
Conformity		CE · EAC · UK CA	
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
- Optional with RFID tags with unique identification according to DIN SPEC 91406

**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 81)
- **Type 3246-7:** valve with Type 3277 Pneumatic Actuator (see page 81)

**Technical data**

Body style	Globe valve		Three-way valve
Valve size	DN	15 to 300	15 to 200
	NPS	½ to 12	½ to 8
Pressure rating	PN	16/400	100/160
	Class	150/300	600/900
Body material	1.4308 · A351 CF8		1.4408 · 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 <sub>v</sub>
Characteristic	Equal percentage, linear, on/off		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)
Conformity	CE · EAC		
Data sheets	T 8046-1	T 8046-2	T 8046-3



Type 3246-7, Class 150/300



Type 3246-1, Class 600



Type 3246-7, Class 150/300

## Type 3598 Cryogenic Valve with circulation inhibitor, top-entry design, ANSI version

### Application

Globe valve for cryogenic applications. Easy to service due to top-entry design

### Special features

- Minimized heat leakage thanks to the use of a circulation inhibitor and a cryogenic extension bonnet
- Installation in vacuum-insulated pipelines, air separation plants (cold box) and peripheral plants made possible by a cover plate on the cryogenic extension bonnet
- Valve maintenance possible without removing it from the pipeline
- Top entry through the cryogenic extension bonnet allows easy access to the seat, cage, piston and circulation inhibitor after removal of the actuator
- The  $C_v$  coefficients can be modified in wide ranges by replacing the cage, seat and valve plug

### Versions

Standard version for temperature range from  $-196$  to  $+65$  °C ( $-325$  to  $+149$  °F) · Stem sealed by metal bellows and self-adjusting V-ring packing made of pure PTFE or PTFE/carbon

- **Type 3598-1:** valve with Type 3271 Pneumatic Actuator (see page 81)
- **Type 3598-7:** valve with Type 3277 Pneumatic Actuator (see page 81)

### Technical data

Body style		Globe valve
Valve size	NPS	On request
Pressure rating	Class	On request
Body material		A351 CF8
End connections		Butt weld ends ASME B16.25
Seat-piston seal		Metal seal
		High-performance metal seal
Leakage class according to IEC 60534-4 or ANSI/FCI 70-2		Metal seal: IV High-performance metal seal: V
Characteristic		Equal percentage
Rangeability		60:1
Temperature range		$-196$ to $+65$ °C ( $-325$ to $+149$ °F)
Conformity		CE · EAC
Data sheet		T 8076



Type 3598 (actuator not shown)

# Pneumatic Butterfly Valves

## PFEIFFER Type 14p PSA High-performance Control and Shut-off Butterfly Valve

### Application

Bidirectional high-performance butterfly valve to isolate a single gas from a gas mixture and dry or clean gases.

### Special features

- Valve size DN 80 to 400/NPS 3 to 16
- Pressure ratings PN 10 to 40/Class 150 and 300
- Body in steel (A216 WCB/1.0619) or stainless steel (A351 CF8M/1.4408)
- Lug-type and wafer-type bodies
- Standard face-to-face dimensions according to EN 558 Series 16 and API 609
- PTFE or FKM soft seal
- Operating temperature from  $-20$  to  $+180$  °C ( $-4$  to  $+356$  °F)
- Bidirectional tight shut-off for gases
- Shaft seal according to TA Luft requirements
- Attachment options according to DIN ISO 5211

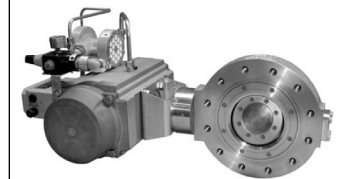
### Technical data

Type		Type 14p
Valve size	DN	80 to 400
	NPS	3 to 16
Pressure rating	PN	10 to 40
	Class	150/300
Body style	Lug-type and wafer-type bodies	
Gasket	Soft seal (PSA version)	
Leakage class	A according to DIN EN 12266-1, P12 test	VI according to DIN EN 1349
Rangeability	50:1	
Overall length	DIN: DIN EN 558, Series 16 ANSI: API Class 150/API Class 300	
Body material	Steel 1.0619 (A216 WCB) Stainless steel 1.4408 (A351 CF8M)	
Conformity	CE	
PFEIFFER data sheet	TB 14p	

**Accessories** · Positioners, limit switches, solenoid valves



Type 14p PSA  
with hand-operated actuator



Type 14p PSA  
with Type 31a Rotary Actuator



# 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 SRP/DAP Pneumatic Actuator or Type 3278 Diaphragm 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

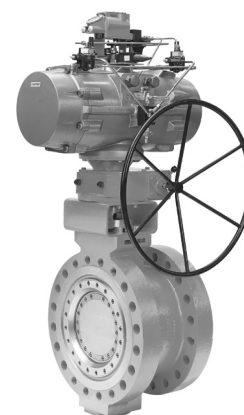
## Technical data

Type		3331	LTR 43
Valve size	DN	100 to 400	80 to 2000
	NPS	4 to 16	3 to 84
Body material	DIN	DN 100: 1.0425, 1.4404 DN 150 and larger: 1.0619, 1.4408	1.4408 1.0619
	ANSI	DN 100: A414 Gr D, 316L NPS 6 and larger: A216 WCC, A351 CF8M	A216 WCC/WCB A351 CF8M
Pressure rating	PN	10 to 40	10 to 320
	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		DN 100 to 150/NPS 4 to 6: ≤1 % DN 200 to 400/NPS 8 to 16: ≤0.5 %	Class VI DIN EN 1349/ ANSI/FCI 70-2
Opening angle		90°, 70°	80° (90°)
Throttling service up to		70°	70°
Rangeability		50:1 with $\phi_{100} = 70^\circ$	> 50:1
Temperature range		-10 to +220 °C (14 to 428 °F) (standard version)	-196 to +700 °C (-320 to +1292 °F)
Actuator	Type	Type SRP/DAP, Type 3278	Type SRP/DAP, on request
Conformity		<b>CE · EAC · UK CA</b>	
Data sheets		<b>T 8227</b>	<b>T LW20010</b>

Accessories · Positioners, limit switches, solenoid valves



Type 3331 with Type SRP/DAP Actuator



Type LTR 43

- **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		PTFE Nickel, Inconel® 1.4571, graphite
Leakage		A according to DIN EN 12266-1 IV to VI, IEC 60534-4		PTFE: A according to DIN EN 12266-1 Metal seal: IV and V, IEC 60534-4
Opening angle		90°		
Temperature range		-40 to +200 °C (-40 to 392 °F)	-35 to +200 °C (-31 to +392 °F)	-196 to +400 °C, -320 to +752 °F
Actuator Type		Type 31a/30a	Type 31a/30a	Type 31a/30a
Conformity		<b>CE</b>		
<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



Type BR 14b/31a

# PTFE or PFA-lined Control Valves

Globe valves · PFEIFFER Types 01a, 01b and 06a

Angle valve · PFEIFFER Type 08a

## 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 01a:** PTFE-lined globe valve
- **PFEIFFER Type 01b:** PFA-lined globe valve
- **PFEIFFER Type 06a:** PTFE-lined micro-flow valve with  $K_{vs}$  coefficients between 0.005 and 2.5
- **PFEIFFER Type 08a:** PTFE-lined angle valve

## Technical data

Type	Type 01a	Type 01b	Type 06a	Type 08a
Body style	Globe valve			Angle valve
Valve size	DN	25 to 200	25 to 100 <sup>1)</sup>	6 to 15
	NPS	1 to 8	1 to 4 <sup>1)</sup>	–
Body material	DIN	EN-GJS-400-18-LT		
	ANSI	A395		–
Lining	PTFE	PFA	PTFE	PTFE
Pressure rating	PN	10/16	10/16	10
	Class	150	150	–
Connection	For flanges according to DIN EN 1092-2, form B			
Leakage class acc. to IEC 60534-4 or ANSI/FCI 70-2	PTFE, A			
Characteristic	Equal percentage, linear			
Rangeability	30:1	50:1	30:1	30:1
Temperatures	–10 to 200 °C (14 to 392 °F)		–10 to 150 °C (14 to 300 °F)	
Conformity	<b>CE</b>			
<b>PFEIFFER data sheets</b>	<b>TB 01a</b>	<b>TB 01b</b>	<b>TB 06a</b>	<b>TB 08a</b>

<sup>1)</sup> DN 15/NPS ½ and DN 150/NPS 6 in preparation

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

**Further versions with hand-operated actuator**



Type 01a



Type 01b



Type 06a

# 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 ball 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 200/½ to 8	15 to 200/½ to 3
Body material	EN-GJS-400-18-LT/A395	EN-GJS-400-18-LT/A395
Lining	White PTFE	PFA
Pressure rating PN/Class	16/150	16/150
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)	
Conformity	<b>CE</b>	
PFEIFFER data sheets	<b>TB 20a</b>	<b>TB 20b</b>

## Application

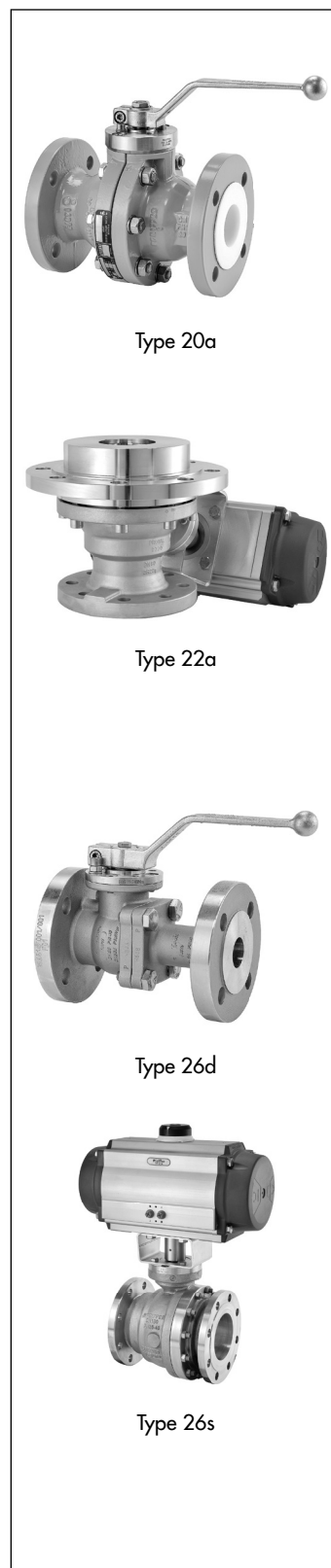
Tight-closing ball valves for process engineering and industrial applications, especially for use with corrosive media

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

## Technical data

Type	Type 22a	Type 26d	Type 26s	
Valve size	DN	50 to 300	15 to 150	15 to 800
	NPS	2 to 12	½ to 4	½ to 32
Body material	DIN	1.4408, 1.4571, 1.4581	1.4408, 1.4571, 1.0619	1.4408, 1.0619
	ANSI	F316 Ti, A351 CF8M	A351 CF8M, A216 WCB	A351 C8M, A216 WCB/WCC
Pressure rating	PN	16 to 40	16 to 40	10 to 40
	Class	150/300	150/300	150/300
Connecting flanges	Acc. to EN 1092	Acc. to EN 1092-1	According to EN 1092	
Ball seal	TFM	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)		-196 to +550 °C (-320 to +1022 °F)	
Conformity	<b>CE</b>			
PFEIFFER data sheets	<b>TB 22a</b>	<b>TB 26d</b>	<b>TB 26s</b>	

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



Type 20a

Type 22a

Type 26d

Type 26s

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

### Application

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

### Special features

- Cavity-free passage
- Maintenance-free design
- Version according to DIN 2430

### Versions

- **PFEIFFER Type 28:** valve designed as a pig launcher or receiver and for batch pigging
- **PFEIFFER Type 29:** multi-way valves for distribution or connection · Version as 3/4, 5/4 or 7/6-way manifolds

### Technical data

Type		Type 28	Type 29
Valve size	DN	50, 80, 100, 125, 150, 200	
Body material		1.4408, 1.4571	
Pressure rating	PN	25/40	
Connection		Flanges	
Ball seal		PTFE	
Conformity		<b>CE</b>	
<b>PFEIFFER data sheets</b>		<b>TB 28a, TB 28ax, TB 28e, TB 28m, TB 28s, TB 28t, TB 28u, TB 28y, TB 28z</b>	<b>TB 29a, TB 29b</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 cavities
- 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	Continuous	Intermittent	Continuous	Continuous
Conformity		<b>CE</b>			
<b>PFEIFFER data sheets</b>		<b>TB 27a</b>	<b>TB 27d</b>		<b>TB 27f</b>

### Further versions

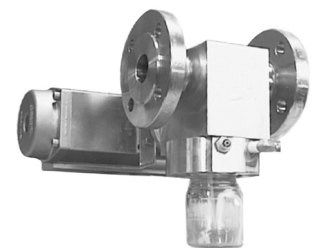
- Dead man's control
- Protective casing
- Control or automation (except for Type 27f)
- Other valve sizes and materials on request



Type 28a



Type 29a



Type 27a

# CERA 1000 Ball Valves

Ceramic-lined ball valves · CERA SYSTEM Types KST, KSV, KAT and KAV

Ceramic-lined ball valves · CERA SYSTEM Types KGT and KZT

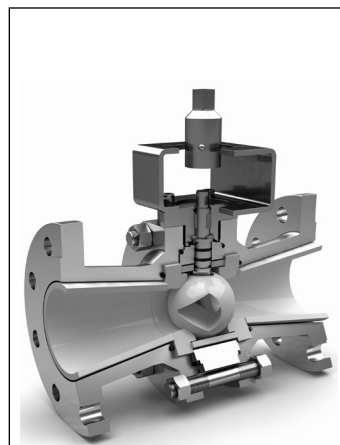
## Application

Shut-off and control valve used in chemical and process engineering to control severely abrasive media and corrosive liquids and gases

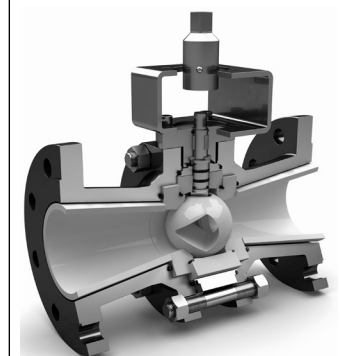
- **CERA SYSTEM Type KST:** Wear protection, floating ceramic ball, fixed seat rings
- **CERA SYSTEM Type KSV:** Wear protection, floating ceramic ball, fixed seat rings, flanges with HALAR®
- **CERA SYSTEM Type KAT:** Wear protection, floating ceramic ball, fixed/spring-loaded seat rings
- **CERA SYSTEM Type KAV:** Wear protection, floating ceramic ball, fixed/spring-loaded seat rings, flanges with HALAR®

## Technical data

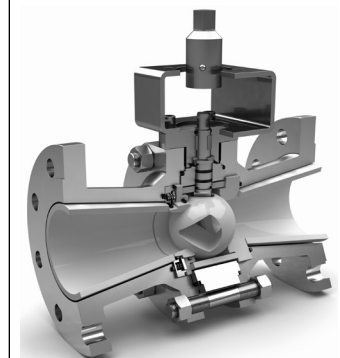
Type		KST	KSV	KAT	KAV
Style/end connections		Flanges	Flanges	Flanges	Flanges
Valve size	DN	15 to 350	15 to 350	15 to 350	15 to 350
	NPS	½ to 14	½ to 14	½ to 14	½ to 14
Pressure rating	PN	10 to 40	10 to 40	10 to 40	10 to 40
Body material (standard)		1.4301/1.4408	1.4301/1.0460	1.4301/1.4408	1.4301/1.0460
Lining (standard)		Al <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>
Ball (standard)		ZrO <sub>2</sub>	ZrO <sub>2</sub>	ZrO <sub>2</sub>	ZrO <sub>2</sub>
Leakage class		IV/V according to IEC 60534-4, A according to DIN EN 12266-1			
Temperature range		-10 to +950 °C (14 to 1742 °F)	-10 to +160 °C (14 to 320 °F)	-10 to +750 °C (14 to 1382 °F)	-10 to +160 °C (14 to 320 °F)
Conformity		<b>CE</b>			
CERA data sheets		<a href="http://www.cerasystem.de">www.cerasystem.de</a>			



Type KST



Type KSV



Type KAT

## Application

Shut-off and control valve used in chemical and process engineering to control abrasive media and corrosive liquids and gases as well as media which tend to cake to dead spaces

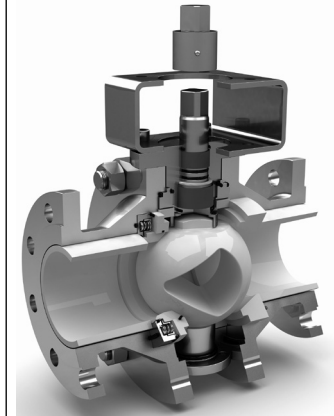
- **CERA SYSTEM Type KGT:** Wear protection, trunnion-mounted ceramic ball, fixed/spring-loaded seat rings
- **CERA SYSTEM Type KZT:** Wear protection, trunnion-mounted ceramic ball, spring-loaded seat rings

## Technical data

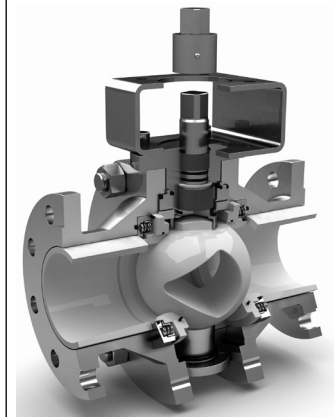
Type		KGT	KZT
Style/end connections		Flanges	Flanges
Valve size	DN	65 to 350	65 to 350
	NPS	2½ to 14	2½ to 14
Pressure rating	PN	10 to 40	10 to 40
Body material (standard)		1.4301	1.4301
Lining (standard)		Al <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>
Ball (standard)		ZrO <sub>2</sub>	ZrO <sub>2</sub>
Leakage class		IV/V according to IEC 60534-4, A according to DIN EN 12266-1	
Temperature range		-10 to +260 °C (14 to 500 °F)	
Conformity		<b>CE</b>	
CERA data sheets		<a href="http://www.cerasystem.de">www.cerasystem.de</a>	

**Accessories** - Positioner, limit switch, solenoid valve

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



Type KGT



Type KZT

# CERA 4300 Ball Valves

Stainless steel ball valves · CERA SYSTEM Types KBR, KBRG and KBRZ

Ball valve · CERA SYSTEM Type KFK/KFL

## Application

Shut-off valves for severely abrasive media, preferably used for the pneumatic transport of bulk solids

- **CERA SYSTEM Type KBR:** Floating ball made of hardened metal, spring-loaded seat rings
- **CERA SYSTEM Type KBRG:** Trunnion-mounted ball made of hardened metal, spring-loaded/fixed seat rings
- **CERA SYSTEM Type KBRZ:** Trunnion-mounted ball made of hardened metal, spring-loaded seat rings

## Technical data

Type		KBR	KBRG	KBRZ
Style/end connections		Flanges	Flanges	Flanges
Valve size	DN	25 to 200	65 to 200	65 to 200
	NPS	1 to 8	2½ to 8	2½ to 8
Pressure rating	PN	10 to 40	10 to 40	10 to 40
Body material (standard)		1.4301	1.4301	1.4301
Seat ring material		1.4462 coated or Al <sub>2</sub> O <sub>3</sub>		
Ball		1.4112/58 HRC	1.4112/58 HRC	1.4112/58 HRC
Leakage class		IV/V according to IEC 60534-4, A according to DIN EN 12266-1		
Temperature range		-10 to +450 °C (14 to 842 °F)	-10 to +180 °C (14 to 365 °F)	-10 to +180 °C (14 to 365 °F)
Conformity		<b>CE</b>		
CERA data sheets		<a href="http://www.cerasystem.de">www.cerasystem.de</a>		

## Application

Shut-off valve for abrasive media (mainly dusts)

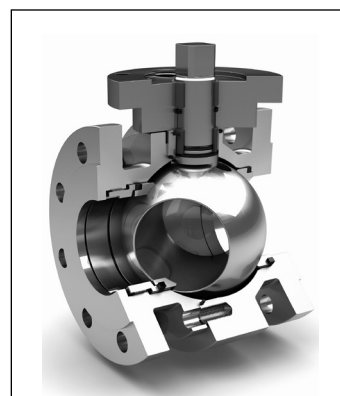
- **CERA SYSTEM Type KFK/KFL:** Floating ball (trunnion-mounted in DN 65 and larger)

## Technical data

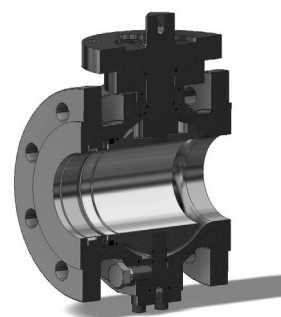
Type		KFK/KFL
Style/end connections		Flanges
Valve size	DN	25 to 150
	NPS	1 to 6
Pressure rating	PN	10 to 40
Body material (standard)		Forged steel, cast steel
Seat ring material		PTFE or PTFE/carbon
Ball		Brass · Steel · Cast iron
Leakage class		IV/V according to IEC 60534-4, A according to DIN EN 12266-1
Temperature range		-10 to +160 °C (14 to 320 °F)
Conformity		<b>CE</b>
CERA data sheets		<a href="http://www.cerasystem.de">www.cerasystem.de</a>

**Accessories** · Positioner, limit switch, solenoid valve

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



Type KBR



Type KBRG



Type KBRZ



Type KFK



# CERA 17SSC Sliding Disk Valves

Sliding disk valve with ceramic lining · CERA SYSTEM Type SSC

## Application

Ceramic-lined and ceramic-sealed sliding disk valve for industrial applications with extreme operating conditions. The valves have a long service life even with a high switching frequency. They can withstand intensive abrasion in the control position in cases where dead spaces in the valve are not permissible.

- **CERA SYSTEM Type SSC:** Three floating ceramic disks that seal each other; the middle disk moves in a linear motion.

## Technical data

Type	SSC	
Style/end connections	Flanges	
Valve size	DN	10 to 65
	NPS	¾ to 2½
Pressure rating	PN	10 to 40
Body material (standard)	1.4301	
Liners (standard)	SSiC	
Disks (standard)	Al <sub>2</sub> O <sub>3</sub>	
Leakage class	I and VI according to IEC 60534-4	
Temperature range	-10 to +450 °C (14 to 842 °F)	
Conformity	CE	
CERA data sheets	<a href="http://www.cerasystem.de">www.cerasystem.de</a>	

**Accessories** · Positioner, limit switch, solenoid valve

**Further versions** with pneumatic, electric or hydraulic actuator



Type SSC

# Pneumatic Control Valves

## Rotary plug valves · VETEC Type 82.7 and Type 72.3

### Application

Double-eccentric control valves for process engineering, industrial applications and refineries; according to DIN or ANSI standards

- Valve size DN 25 to 300/NPS 1 to 12 (Type 82.7 with rotary valve FTF)
- Valve size DN 25 to 500/NPS 1 to 20 (Type 72.3 with globe valve FTF)
- Pressure rating PN 10 to 40/Class 150 to 300

### Special features

- Globe valve with pneumatic, electric or hand-operated actuator
- Valve body optionally made of cast steel, forged steel, cold-resisting and high-alloy steels or special materials
- Metal seal, soft seal, ceramic seal or high-performance metal seal

### Versions

- **Type 82.7/R and Type 72.3/R:** with Type R Actuator with rolling diaphragm
- **Type 82.7/AT and Type 72.3/AT:** with Type AT Pneumatic Piston Actuator

### Technical data

Type		82.7	72.3
Valve size	DN	25 to 300	25 to 500
	NPS	1 to 12	1 to 20
Body material	DIN	1.0619, 1.4408	
	ANSI	A216 WCC, A351 CF8M	
Pressure rating	PN	10 to 40	
	Class	150, 300	
Flange		DIN: Form B1 or Form D according to DIN EN 1092-1 ANSI: RF according to ANSI B16.5	
Overall length		DIN EN 558 Tab. 2	
Leakage class acc. 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	
Temperature range	Metal	-196 to +500 °C (-321 to +932 °F)	
	Soft	-80 to +210 °C (-112 to +410 °F)	
Conformity		CE · EAC	
VETEC data sheets		<a href="https://vetec.samsongroup.com">https://vetec.samsongroup.com</a>	

### Further versions

- With TA Luft packing or double TA Luft packing with optional leak-off connection for toxic media
- With noise-reducing measures for gases and liquids
- With heating jacket, purge connections, insulating section for use with high or low temperatures
- Valves for special applications: Types 82.7 and 72.3 · GAR pneumatic control and quick-acting shut-off valves for gases, type tested according to European Gas Appliance Directive, DIN EN 161 and DVGW (German Technical and Scientific Association for Gas and Water)



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



Type 72.3/AT

# Pneumatic Control Valves

## High-pressure Valve Series

### Rotary plug valves · VETEC Type 73.7 and Type 73.3

#### Application

Double-eccentric control valves for process engineering, industrial applications and refineries; according to DIN or ANSI standards

- Valve sizes DN 25 to 500/NPS 1 to 20
- Pressure ratings PN 63 to 160/Class 600 to 900 (higher pressure rating on request)

#### Special features

- Globe valve with pneumatic, electric or hand-operated actuator
- Valve body optionally made of cast steel, forged steel, cold-resisting and high-alloy steels or special materials
- High-performance metal seal, soft seal or ceramic seal

#### Versions

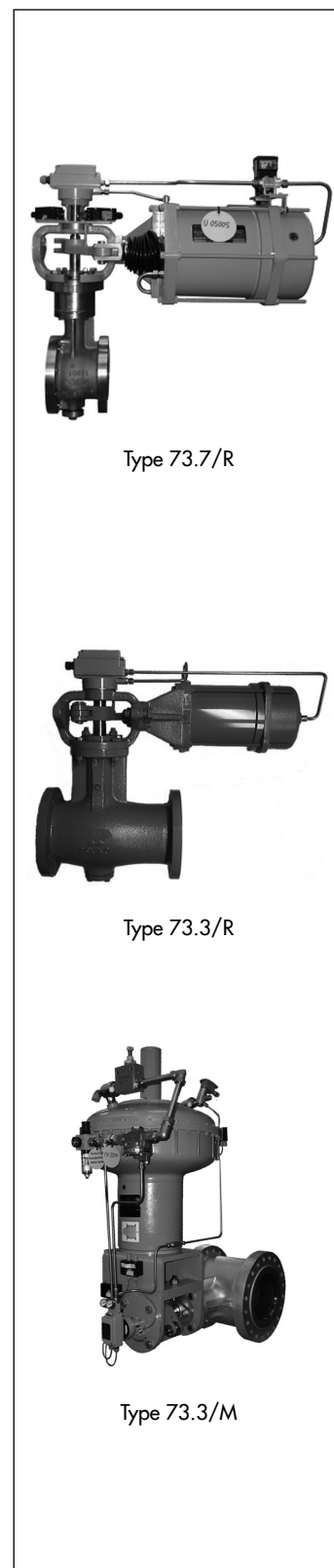
- **Type 73.7/R and Type 73.3/R:** with Type R Actuator with rolling diaphragm
- **Type 73.7/M and Type 73.3/M:** with Type M Pneumatic Diaphragm Actuator
- **Type 73.7/F and Type 73.3/F:** with Avamo Type ASP Pneumatic Scotch Yoke Actuator

#### Technical data

Type		73.7	73.3 (on request)
Valve size	DN	25 to 500	25 to 250
	NPS	1 to 20	1 to 10
Body material	DIN	1.0619, 1.4408	
	ANSI	A216 WCC, A351 CF8M	
Pressure rating	PN	63 to 160	63 to 250
	Class	600, 900	600, 900, 1500
End connections		DIN: flanges Form B2 according to DIN EN 1092 or lens gasket according to DIN 2696 · ANSI: RF or RTJ according to ANSI B16.5	
Overall length		DIN EN 558 Tab. 2	
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	
Temperature range		-196 to +500 °C (-321 to +932 °F)	
Conformity		CE · EAC	
Data sheets		<a href="https://vetec.samsongroup.com">https://vetec.samsongroup.com</a>	

#### Further versions

- With noise-reducing measures for gases and liquids
- With TA Luft packing or double TA Luft packing with optional leak-off connection for toxic media
- With heating jacket, purge connections, insulating section for use with high or low temperatures



# Pneumatic Control Valves

## Rotary plug valve · VETEC Type 62.7

### Application

Double-eccentric control valve designed for mechanical and plant engineering. Suitable for liquids, gases and steam

### Special features

- Optionally with metal or soft seal

### Versions

- **Type 62.7 · Pneumatic control valve:** with AIR TORQUE Type AT Pneumatic Actuator with fail-safe action
- **Type 62.7 · Electric Control Valve:** with PS Automation Type PSQ Electric Actuator for 230 V/24 V

### Technical data

Type	62.7	
Valve size	DN	25 to 200
	NPS	1 to 8
Body material	DIN	1.0619, 1.4408
	ANSI	A216 WCC, A351 CF8M
Pressure rating	PN	10 to 40
	Class	150, 300
Flanges	DIN: Form B1 according to DIN EN 1092 ANSI: RF according to ANSI B16.5	
Overall length	DIN EN 558 Tab. 2	
Leakage class acc. to IEC 60534-4 or ANSI/FCI 70-2	Metal seal: IV Soft seal: VI	
Characteristic (cam disk in positioner)	Equal percentage, linear	
Medium temperature range	-40 to +120 °C (-40 to 248 °F)	
Conformity	CE · EAC	
Data sheets	<a href="https://vetec.samsongroup.com">https://vetec.samsongroup.com</a>	



Type 62.7 with rotary actuator, handwheel and Type 3725 Positioner



Type 62.7 with rotary actuator

# Pneumatic Control Valves

## Segmented ball valve · Type 3310

### Application

Rotary valve for throttling or on/off service in industrial applications with high flow rates

### 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/SRP or DAP:** segmented ball valve with single-acting or double-acting Type SRP/DAP 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	1.0619, 1.4408/A216 WCC, A351 CF8M	
Pressure rating	PN 16 to 40	Class 150/300
End connections	Flanges according to DIN EN 1092-1	Flanges according to ASME B16.5
Leakage class according to ANSI/FCI 70-2	Metal: IV, soft: VI	
Characteristic	Equal percentage, linear	
Rangeability	Equal percentage: $\geq 400:1$ Linear: $\geq 100:1$	
Temperature ranges (standard versions)	1.0619: -10 to +220 °C (14 to +428 °F) 1.4408: -29 to +220 °C (20 to +428 °F)	-29 to +220 °C (-20 to +428 °F)
Conformity	CE · EAC · UK CA	
Actuator	Type SRP/DAP, Type 3278	
Data sheets	T 8222	

### Further versions

- Various valve seat versions: PTFE or PEEK soft seal, ARCAP® or enhanced metal seal
- With double packing, with or without leak monitoring
- With insulating section for a wider temperature range
- With form-fit flanges
- With pneumatic rotary actuator and additional handwheel
- With handwheel
- With heating jacket
- With gaskets and lubricants in compliance with FDA/EC 1935/NSF H1
- With additional seals for protection of the bearing
- Version for oxygen service (GOX) up to 13.8 bar



Type 3310 with Type SRP/DAP Actuator

Cutaway view of Type 3310 Segmented Ball Valve with Type SRP Actuator and Type 3730 Positioner

# 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:**  
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 5827 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, 24 V/50 Hz, optionally with fail-safe action and/or positioner

## 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 <sub>vs</sub> )
Characteristic		Inherent	Linear
Rangeability		Up to 50:1	
Temperature range		-10 to +300 °C (14 to 572 °F)	
Conformity		<b>CE · EAC · UK CA</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 350 cm<sup>2</sup> actuator and Type 3725 Positioner



Type 3323-E1 with Type 5827 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:**  
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 5827 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, 24 V/50 Hz, optionally with fail-safe action and/or positioner

## 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	A216 WCC, A351 CF8M	
Pressure rating	PN	25	
	Class	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 % $K_{vs}$ )
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)	
Conformity		<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 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 an integrated digital controller. The controlled variable is measured by a directly connected Pt1000 sensor and the output signal is transferred to the actuator stem as the positioning force.

## Recommended valve/electric actuator combinations

Actuator type	5827	5857	3374 <sup>1)</sup>
<b>Globe valve in valve size DN</b>			
Type 3213	15 to 50 <sup>2)</sup>	15 to 25	–
Type 3214	15 to 50	–	65 to 250
Type 3222	15 to 50	15 to 25	–
Type 3222 N	–	15	–
Type 3260	–	–	65 to 150
<b>Three-way valve in valve size DN</b>			
Type 3226	15 to 50	15 to 25	–
Type 3260	15 to 80	15 to 25	65 to 150

<sup>1)</sup> Electric globe valves tested according to DIN EN 14597 with Type 5827-A or Type 3374 Actuator (with 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

## Recommended valve/electric actuator with process controller combinations

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

<sup>1)</sup> The TROVIS 5725-3 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 5827 Actuator

Type 3214 with Type 3374 Actuator

Type 3260 with Type 5827 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 80	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
Conformity		CE · EAC	
Data sheets		T 5868, T 5869	

## 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 3/4 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
Conformity		CE · EAC	
Data sheets		T 5866	T 5867

### Further versions

- Type 3222: globe valve with balanced plug



Type 3222/2780-2



Type 3222/5827



Type 3226/5827



Type 3214/5827

**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
Conformity		CE · EAC		
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 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, 350v2, 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>	–
<b>Materials</b>				
Actuator stem		Stainless steel		
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

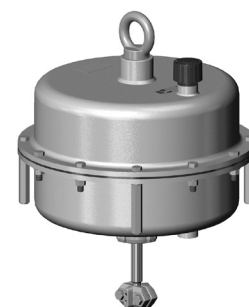


Type 3271 Actuator



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	1400-60	1400-120	1400-250
Max. supply pressure	bar	6	6	6	6
Rated travel	mm	Up to 60 mm	Up to 60 mm	Up to 120 mm	Up to 250
Fail-safe action		Reversible	Reversible	Reversible	Reversible
Temperature range with diaphragm material	NBR	-35 to +90 °C	-35 to +90 °C	-35 to +90 °C	-35 to +90 °C
	EPDM	-	-50 to +120 °C	-	-
	PVMQ	-60 to +90 °C	-	-60 to +90 °C	-60 to +90 °C
<b>Materials</b>					
Actuator stem		Stainless steel			
Actuator stem sealing		NBR	NBR	NBR	NBR
		EPDM	EPDM	PVMQ	PVMQ
Diaphragm cases		Sheet steel, sheet stainless steel	Sheet steel, plastic-coated	Painted cast steel	Spheroidal graphite iron
<b>Data sheets</b>		<b>T 8310-2</b>	<b>T 8310-3</b>	<b>T 8310-2</b>	<b>T 8310-8</b>



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

Type		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			
<b>Materials</b>					
Actuator stem		Stainless steel			
Actuator stem sealing		NBR		NBR	
		PVMQ		PVMQ	
Diaphragm cases		Painted cast steel			
<b>Data sheet</b>		<b>T 8310-2</b>			

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

- 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, Type 3349 Aseptic Valve or Type 3321CT Globe 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** with 63 mm piston diameter and 31 cm<sup>2</sup> actuator area
- **Type 3379** with 90 mm piston diameter and 63 cm<sup>2</sup> actuator area
- **Type 3379** with 150 mm piston diameter and 176 cm<sup>2</sup> actuator area

### Technical data

Type	3379						
Piston diameter	mm	63	90	150			
Actuator area	cm <sup>2</sup>	31	63	176			
Rated travel	mm	15					
Permissible ambient temperature		0 to 60 °C (32 to 140 °F)					
Max. supply pressure	bar	8 <sup>1)</sup>					
<b>Fail-close version</b>							
Number of springs		1	1	2	3	4	6
Control pressure	bar	4	4.5	6	4	4	4.5
Rated travel	bar	2.3 to 3.7	2.5 to 4.0	3.3 to 5.6	1.0 to 2.3	1.4 to 3.0	2.1 to 4.6
Thrust	N	710	1510	2330	1760	2280	3690
<b>Fail-open version</b>							
Number of springs		1	1	2	3	3	
Control pressure	bar	6	4	6	4	6	
Rated travel	bar	2.3 to 3.7	1.0 to 1.9		1.0 to 2.3		
Thrust	N	680	1320	2580	2990	6500	
Documentation		EB 8315					

<sup>1)</sup> Versions with Type 3724 Positioner and with Type 4740 Limit Switch restricted to 7 bar



Type 3379



Type 3379  
with Type 3724 Positioner mounted  
on Type 3347 Valve

# 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	
<b>Materials</b>			
Housing	EN-JS1049	AlMgSi0.5 F25	
Diaphragm/piston	NBR	GD AlSi8Cu3	
Data sheets	<b>T 8321</b>	<b>TB 31a</b>	

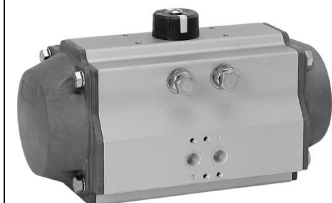
### Accessories

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 · Type 5827, Type 5857 and Type 3374

## Application

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

## Versions

- **Type 5827:** Electric actuator, optionally with fail-safe action
- **Type 5857:** Electric actuator
- **Type 3374:** Electric actuator, optionally with fail-safe action

## Technical data for Types 5827, 5857 and 3374

Type	5827	5857	3374
Rated travel	mm 6, 12, 15	6	15, 30
Max. thrust	N 700	300	5000
Fail-safe action	-/•	-	-/•
Manual override	•	•	•
Supply voltage	230 V, 50 Hz 24 V, 50 Hz	230 V, 50 Hz 24 V, 50 Hz	230 V/50 Hz 24 V/50 Hz
Permissible ambient temperature	0 to 50 °C		5 to 60 °C
<b>Additional electrical equipment</b>			
Positioner	Digital	Digital	Digital
Limit contacts	2	-	2
Resistance transmitters	1	-	2
Conformity	CE · EAC		CE · EAC · UK CA
Data sheets	T 5827	T 5857	T 8331

<sup>1)</sup> With an Allen key after removing the cover

## Further versions

The Type 5827 and Type 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 5827-N



Type 5827-A



Type 5857



Type 3374-11



Type 3374-15

# 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 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 switches
- Temperature measured by Pt1000 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 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 Modbus RTU · 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 Pt1000 Sensor (fast response)
- Sensor pocket (order no. 1400-9249)
- Water flow sensor (1400-9246)

**Accessories for heating and cooling applications**

- Type 5267-3 Contact Sensor (Pt1000)
- Type 5257-71 Room Panel (Pt1000) with potentiometer and mode selector switch
- Type 5227-4 Outdoor Sensor (Pt1000)
- Mounting kit for a Pt1000 cable sensor as contact sensor, order no. 100000722
- 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

# Pneumatic and Electropneumatic Positioners

Positioners · Type 3766/3767

**Ex**  
certified

## Application

Positioners for attachment to pneumatic control valves

## Versions

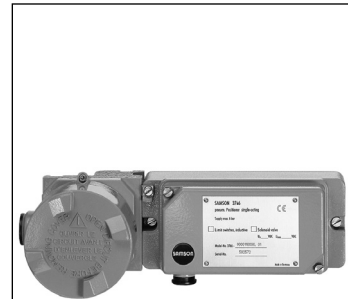
- **Type 3766/3767:** positioners for direct attachment to Type 3277 Actuators as well as for attachment according to IEC 60534 or for attachment to rotary actuators according to VDI/VDE 3845

## Technical data

Type	3766	3767
Principle of operation		
Pneumatic	•	–
Electropneumatic	–	•
Rated travel	mm	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	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
Degree of protection		IP54/IP65/NEMA 4X
Conformity	<b>CE EAC</b>	
<b>Explosion protection</b> (see data sheet for detailed information on national and international certification)		
Intrinsic safety Ex i	•	•
Flameproof enclosure Ex d	• 1)	• 2)
<b>Additional electrical equipment</b>		
Limit contact		2 (inductive)
Solenoid valve		•
<b>Options</b>		
Data sheets	<b>T 8355</b>	

1) Flameproof enclosure in combination with Type 6116 i/p Converter

2) Flameproof enclosure in combination with Type 3770 Field Barrier



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

Ex  
certified

## 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. 90 for technical data)

- **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
- **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 using a rotary pushbutton and 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 feedback. Housing same as Type 3730-x (identical mounting dimensions).

## Electropneumatic positioners with HART® communication (see overview on p. 90 for technical data)

- **Type 3730-3:** 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
- **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 feedback. Housing same as Type 3730-x (identical mounting 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.

## 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)



## 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



### Technical data · Overview of electropneumatic positioners

Positioners	TROVIS 3730-1	TROVIS 3730-3	TROVIS 3793	Type 3725	Type 3730-0	
Rated travel mm	3.5 to 300	3.6 to 300	3.6 to 300	3.75 to 50	5.3 to 200	
Opening angle	24 to 100°	24 to 100°	24 to 170°	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	
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)	
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)	
Characteristic	Adjustable	Adjustable	Adjustable	Adjustable	Linear	
Permissible ambient temperature	–55 to +85 °C	–55 to +85 °C	–55 to +85 °C	–25 to +80 °C	–45 to +80 °C	
Degree of protection	IP66/NEMA 4X	IP66/NEMA 4X	IP66	IP66	IP66/NEMA 4X	
Communication	–	HART®	HART®	–	–	
<b>Explosion protection</b> (see data sheet for detailed information on national and international certification)						
Intrinsic safety Ex i	•	•	•	•	•	
Non-sparking equipment Ex nA	•	•	•	•	•	
Protection by enclosure Ex t	•	•	•	•	•	
Flameproof enclosure Ex d						
<b>Additional electrical equipment</b>						
Limit contact	•	•	•	–	–	
Position transmitter	•	•	•	–	–	
Solenoid valve	–	–	–	–	–	
Forced venting	–	•	•	–	–	
External position sensor	–	•	–	–	–	
Analog input	–	–	–	–	–	
Binary input	–	•	•	–	–	
Binary output	–	•	•	–	–	
Leakage sensor	–	–	–	–	–	
<b>Conformity</b>	CE · EAC · UK CA			CE · EAC		
<b>Data sheets</b>	T 8484-1	T 8484-3	T 8493	T 8394	T 8384-0	

1) Flameproof enclosure in combination with Type 3770 Field Barrier

	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 200	3.6 to 200
	24 to 100°	24 to 100°	24 to 100°	24 to 100°	24 to 100°	24 to 100°
	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 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 6 bar 0 to 90 psi	0 to 6 bar 0 to 90 psi
	Adjustable	Adjustable	Adjustable	Adjustable	Adjustable	Adjustable
	-45 to +80 °C	-45 to +80 °C	-45 to +80 °C	-45 to +80 °C	-40 to +80 °C	-40 to +80 °C
	IP66/NEMA 4X	IP66/NEMA 4X	IP66/NEMA 4X	IP66/NEMA 4X	IP66/NEMA 4X	IP66/NEMA 4X
	HART®	PROFIBUS	FOUNDATION™ fieldbus	HART®	HART®	FOUNDATION™ fieldbus
	•	•	•	•	•	•
	•	•	•	•		
	•	•	•	•	•	•
	• <sup>1)</sup>			• <sup>1)</sup>	•	•
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	<b>CE · EAC</b>	<b>CE · EAC · UK CA</b>		<b>CE · EAC</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.samsongroup.com](http://www.samsongroup.com)) 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	•

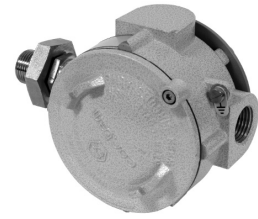
### EXPERTplus valve diagnostics

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

**Ex**  
certified

## 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 3793:** positioner same as TROVIS 3793 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	-40 to +80 °C	-55 to +85 °C
Degree of protection	IP66/NEMA 4X	IP66/NEMA 4X	IP66
Partial stroke testing	✓	✓	✓
<b>Explosion protection</b> (see data sheet for detailed information on national and international certification)			
Intrinsic safety Ex i	•	•	•
Non-sparking equipment Ex nA	•		•
Protection by enclosure Ex t	•	•	•
Flameproof enclosure Ex d	• <sup>1)</sup>	•	
<b>Additional electrical equipment</b>			
Limit contact	•	–	•
Position transmitter	•	•	•
Solenoid valve	•	–	–
Forced venting	•	•	•
External position sensor	•	–	–
Analog input	–	–	•
Binary input	•	•	•
Binary output	–	•	•
Leakage sensor	•	–	–
Conformity	CE · EAC		CE · EAC · UK CA
Data sheets	T 8384-6S	T 8387-3S	T 8493S

<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, Type 3349 Aseptic Valve or Type 3321CT Globe 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 quality according 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
Air consumption, steady state	Independent of supply air, approx. 110 l <sub>n</sub> /h
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	IP65 <sup>1)</sup> , only applies in combination with Type 3379 Pneumatic Actuator
Conformity	<b>CE · EAC</b>
<b>Additional electrical equipment</b>	
Limit contact	Two software limit contacts (min., max.), reverse polarity protection, galvanic isolation
<b>Data sheet</b>	<b>T 8395</b>

<sup>1)</sup> In preparation



Type 3724 (cover removed)



Type 3724 with Type 3379 Actuator



# Valve Accessories

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

Supply pressure regulator · SAMSTATION (Type 4708)

Solenoid valves · Type 3962, Type 3963, Type 3967 and Type 3969

Pneumatic lock-up valve · Type 3709

Reversing amplifier · Type 3710

Pneumatic volume booster · Type 3755

Quick exhaust valve · Type 3711

**Ex**  
certified

## 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

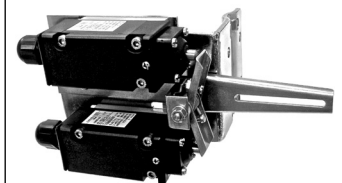
Type	4746			4747		4744	
	-x2	-x3	-x4	-1	-2	-	-2
Rated travel mm	7.5 to 180			7.5 to 200		7.5 to 150	15
Opening angle	–			0 to 100		–	
Permissible ambient temperature	–50 to +100 °C	–40 to +85 °C	–20 to +60 °C	–25 to +80 °C	–40 to +80 °C	–55 to +70 °C	–20 to +75 °C
Conformity	<b>CE · EAC</b>						
<b>Switching element</b>							
Inductive	•			•	•		
Electric		•			•	•	•
Pneumatic			•				
<b>Explosion protection</b> (see data sheet for detailed information on national and international certification)							
Intrinsic safety Ex i	•	•	•	•			
Non-sparking equipment Ex nA	•	•					
Protection by enclosure Ex t				•	•	•	
Flameproof enclosure Ex d					•	•	•
<b>Data sheets</b>	<b>T 8365</b>			<b>T 4747</b>		<b>T 8367</b>	



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. permissible ambient temperature	-45 to +80 °C	-40 to +80 °C		-45 to +80 °C
Optional internal solenoid valve	•	•		•
Conformity	CE · EAC			
<b>Switching element</b>				
Inductive	•			•
Mechanical	•			
Electronic		•	•	
<b>Explosion protection</b> (see data sheet for detailed information on national and international certification)				
Intrinsic safety Ex i	•	•	•	•
Non-sparking equipment Ex nA	•			•
Protection by enclosure Ex t		•	•	
Data sheets	T 3776	T 8390	T 8390-5	T 8356

## 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	Glass-fiber-reinforced polyamide, aluminum or stainless steel body
Max. permissible 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
Conformity	CE · EAC
Data sheet	T 8546



Type 3776



Type 3738-20/-50



Type 3768



Type 4708-53



Type 4708-45

### **SAMSTATION Supply Pressure Regulator (Type 7029)**

Supply pressure regulator to provide pneumatic measuring and control equipment with a constant supply pressure, set point range from 0.5 to 6 bar (8 to 90 psi)

- Low air consumption
- Pneumatic connections G ¼ or ¼-18 NPT
- Installation into the pipeline
- Pressure reading on a pressure gauge (optional)
- Transparent filter housing (optional)
- 5 µm filter (optional)
- Protective cap to cover the set point screw (accessories)

#### **Versions**

- **Type 7029:** with/without pressure gauge, with/without filter receptacle

#### **Technical data**

<b>Type</b>	<b>7029</b>
Supply pressure	1 to 12 bar (15 to 180 psi)
Set point range	0.5 to 6 bar (8 to 90 psi)
Permissible ambient temperature	-20 to +60 °C
Dependency on inlet pressure	<150 mbar/Δp = 1 bar
Reversing error	100 to 400 mbar (depending on set point)
Hysteresis	<100 mbar
Filter cartridge mesh size	20 µm
Connection	G ¼ or ¼-18 NPT
Body/cover material	PA glass fiber reinforced
Conformity	<b>ERC</b>
<b>Data sheet</b>	<b>T 8546-2</b>

## Solenoid valves - Type 3962, Type 3963, Type 3967, Type 3969

Solenoid valves for high operational reliability and short actuating times for controlling pneumatic actuators also in hazardous areas. Mounting using NAMUR interface according to VDI/VDE 3845 or VDI/VDE 3847, NAMUR rib according to IEC 60534 and customized hook-up A variety of device versions to suit individual applications are available due to the various switching functions, flow rates and different connections. The solenoid valves with NAMUR interface according to VDI/VDE 3845 or VDI/VDE 3847 are compatible with the SAMSON's modular design system (see Application Notes AB 11).

### Technical data

Type	3962		3963		
	No explosion protection	With explosion protection	No explosion protection	With explosion protection	
Nominal signal	V DC	24	24/115/230	6/12/24	6/12/24
	V AC	24/115/230	24/115/230	115/230	-
Power consumption <sup>1)</sup>		2.7 to 3.9 W	1.8 to 3 W	6 to 27 mW	
		3.6 to 5.2 VA	5 to 9.5 VA	0.04 to 0.46 VA	
Supply air	1.4 to 10 bar		1.4 to 6 bar		
Output signal	Max. 10 bar		Max. 10 bar		
Service life	Up to 2 x 10 <sup>7</sup> switching cycles				
Max. perm. ambient temperature	-45 to +80 °C		-45 to +80 °C		
Conformity	CE · ENEC · UKCA		CE · ENEC		
<b>Explosion protection</b> (see data sheet for detailed information on national and international certification)					
Intrinsic safety Ex i					•
Non-sparking equipment Ex nA					•
Increased safety Ex e		•			
Flameproof enclosure Ex d		•			
<b>Data sheets</b>	<b>T 3966</b>		<b>T 3963</b>		

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

Type	3967 <sup>2)</sup>		3969 <sup>3)</sup>	
	No explosion protection	With explosion protection	No explosion protection	With explosion protection
Nominal signal	V DC	6/12/24	14...24	
	V AC	-	-	-
Power consumption <sup>1)</sup>	6 to 27 mW		71 mW	
Supply air	1.4 to 10 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	
<b>Explosion protection</b> (see data sheet for detailed information on national and international certification)				
Intrinsic safety Ex i		•		•
Non-sparking equipment Ex nA		•		•
Protection by enclosure Ex t		•		•
Increased safety Ex e				•
Conformity	CE · ENEC			
<b>Data sheets</b>	<b>T 3967</b>		<b>T 3967</b>	

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

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

<sup>3)</sup> No air consumption



Type 3962



Type 3963



Type 3967



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

## 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. All versions are available either in stainless steel or aluminum.

### Versions

- **Type 3709-01:** pneumatic lock-up valve for direct attachment to a positioner
- **Type 3709-02:** pneumatic lock-up valve for installation in the signal pressure line in any position as required
- **Type 3709-04:** pneumatic lock-up valve with booster for installation in the signal pressure line as required with connecting thread
- **Type 3709-05 and Type 3709-06:** pneumatic lock-up valve with booster for attachment to single-acting rotary actuators according to VDI/VDE 3845, input hook-up as required
- **Type 3709-07 and Type 3709-08:** pneumatic lock-up valve with booster for attachment to single-acting rotary actuators according to VDI/VDE 3845, sandwich style

### Technical data

Type	3709-01	3709-02
Attachment	Positioner	Customized hook-up
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	
	–45 to +80 °C	
<b>Data sheet</b>	<b>T 8391</b>	

Type	Pneumatic lock-up valve with booster				
	3709-04	3709-05	3709-06 <sup>1)</sup>	3709-07	3709-08 <sup>1)</sup>
Attachment	Customized hook-up	VDI/VDE 3845 Customized hook-up at input			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	–45 to +80 °C				
<b>Data sheet</b>	<b>T 8391</b>				

<sup>1)</sup> On request



Type 3709-01



Type 3709-04



Type 3709-07

### 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	¼-18 NPT, ISO 228/1-G ¼	
Degree of protection	IP65	
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)
Conformity	<b>CE</b>	
<b>Options</b>		
Pressure gauge Ø 40 mm	0 to 6 bar (0 to 90 psi)	
<b>Data sheet</b>	<b>T 8392</b>	



Type 3710

### 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	IP44	IP66
Service life	≥1 x 10 <sup>7</sup> full strokes	
<b>Data sheet</b>	<b>T 8393</b>	



Type 3755-1



Type 3755-2



Type 3755-2 (stainless steel body)

### Type 3711 Quick Exhaust Valve

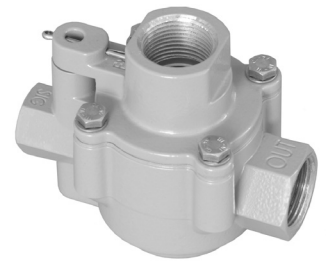
The Type 3711 Quick Exhaust Valve is mounted between the positioner or solenoid valve and the actuator. It is used to vent the actuator more quickly.

- 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	$\leq 25$ l <sub>n</sub> /h
Permissible ambient temperature	-40 to +80 °C
Closing hysteresis of check valve	<0.02 bar
Weight	Approx. 0.5 kg <sup>1)</sup>
Body material	Aluminum, stainless steel
Conformity	CE · EAC
Data sheet	T 8547

<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

**Ex**  
certified

## 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	IP20, IP65	IP54, IP65	IP54, IP65
Conformity	<b>CE · EAC</b>		
<b>Explosion protection</b> (see data sheet for detailed information on national and international certification)			
Intrinsic safety Ex i	•	•	
Non-sparking equipment Ex nA	•		
Flameproof enclosure Ex d		•	
<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	IP20		IP54 IP65
Conformity	<b>CE · EAC</b>		
<b>Data sheets</b>	<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	IP54	
Permissible ambient temperature	-40 to +80 °C	
Characteristic	Reading linear to the differential pressure	
Indicator Ø	160 mm	100 mm
Conformity	CE · EAC · UK CA	CE · EAC
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

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 graphics 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	$\leq \pm 1.6\%$ (including hysteresis)
Sensitivity	$\leq 0.25\%$ or $\leq \pm 0.5\%$ 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	IP67
Permissible ambient temperature	$-20$ to $+70$ °C ( $-40$ to $+70$ °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
Conformity	<b>CE · EAC</b>
Data sheet	<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

# Media Series

## SAM Connect Gateway

For connection to SAM TANK MANAGEMENT



### Application

The modular gateway for the input of signals issued by external transmitters · Connection to the SAM TANK MANAGEMENT web portal

### Special features

- Modular design: easy to install or exchange optional additional functions by inserting option modules (four slots in the device)
- Integrated GSM module for remote data transmission
- Modular power supply unit with standby power supply (SPS)
- 4" backlit graphics display
- Configuration and programming using the TROVIS-VIEW software
- Capacitive keys facilitate operation
- Start-up wizard

### Versions

- **SAM Connect Gateway · Type 5007-2x...** Gateway with 18 to 36 V power supply unit and four slots to hold option modules
  - AI: Analog input and/or
  - AIA: Analog input active

### Technical data

SAM Connect Gateway	
Display	
Display	LCD 128 x 64 (90 x 40 mm)
Storage temperature	-40 to approx. +80 °C
Operating temperature	-40 to +70 °C
Electrical connections	
Cable glands	M16x1.5 (max. 5)
Communication	
Local	SAMSON SSP interface and serial interface adapter, TROVIS-VIEW
Remote data transmission	GSM module
Power supply	
Input voltage	24 to 36 V DC
Output voltage	12 V DC
Rating	24 W
Version	Reverse polarity protection
Perm. ambient temperature <sup>1)</sup>	-40 to +55 °C
Mounting orientation	Upright with display facing sideways
Degree of protection	IP67 according to IEC 60529 (VDE 470 Part 1, 2014-09)
Weight	Approx. 1400 g (with 4 option modules)
Conformity	<b>CE · EAC</b>
Data sheet	<b>T 9511</b>

<sup>1)</sup> See Data Sheet T 9511 for details on permissible temperatures



SAM Connect Gateway

# 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 series, 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)
Conformity	CE · UK CA
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 and plain text display or the TROVIS-VIEW software
- Two control circuits, operated separately or combined
- Fixed set point, follow-up, ratio, cascade, override or mixing control adjustable
- Operation with up to four internal set points and one external set point
- Split-range control
- Output tracking (DDC backup)
- Optional RS-232/USB or RS-485/USB interface boards for SSP and Modbus RTU



TROVIS 6493 Compact Controller

TROVIS 6495-2 Industrial Controller

## Technical data

TROVIS controller		6493	6495-2	
Design	Panel-mounting unit	•	•	
	Front frame W x H (mm)	48x96	96x96	
	Degree of protection (front)	IP65	IP65	
	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	•	•	
	Pt100 resistance thermometer	•	•	
	Pt1000 resistance thermometer	•	•	
	Resistance transmitter	•	•	
	Transmitter supply	•	•	
	Binary inputs	1	4	
	Output	Analog outputs	1	3
0/4 to 20 mA		•	•	
0/2 to 10 V		•	•	
Relays		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	•	•	
Conformity		<b>CE · ENEC</b>		
<b>Data sheet</b>		<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)

# Devices 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 <sub>VS</sub> 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. permissible differential pressure $\Delta p$	Gases: 30 bar · Liquids: 6 bar	
Connections	G 3/4 A conical joint	
Temperature range	-196 to +200 °C <sup>1)</sup>	
Conformity	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 <sub>VS</sub> 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. permissible differential pressure $\Delta p$	3 bar <sup>1)</sup>	
Connections	Inlet: G 3/4 A conical joint Outlet: G 3/4 female thread	
Temperature range	-196 to +200 °C	
Conformity	CE · EAC	
Data sheet	T 2557	

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



Type 2357-1



Type 2357-2



# Devices 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>	
Conformity	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 and Type 2357-21

# Devices 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>
Conformity	CE · EAC
Data sheet	T 2559

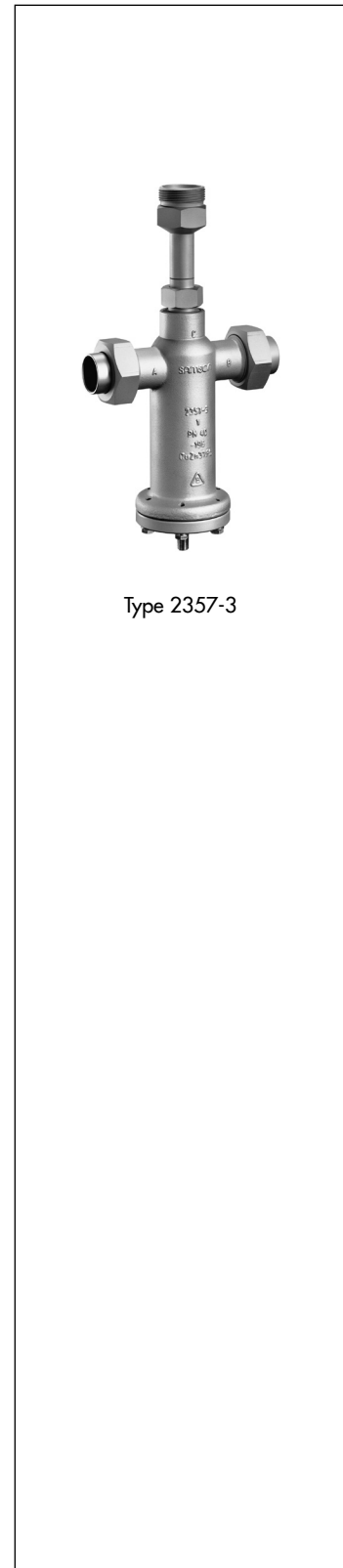
<sup>1)</sup> For oxygen max. 60 °C

### Accessories

Solder 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



# 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, a limit 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
Limit ranges <sup>1)</sup>	-30 to +10 °C -45 to -10 °C
Permissible operating pressure	40 bar
Permissible differential pressure	25 bar
Leakage class according to IEC 60534-4	≤0.05 % of K <sub>VS</sub> with limit range -30 to +10 °C ≤0.1 % of K <sub>VS</sub> with limit range -45 to +10 °C
Hysteresis	2 K
Accuracy	±1 °C
Permissible storage temperature	-60 to +60 °C
Temperature open/closed differential	17 K
Conformity	CE · EAC · UK CA
Data sheet	T 2090

<sup>1)</sup> Temperature limit adjustable within the specified limit range. To adjust the limit properly, the ambient temperature must be at least 25 K above the temperature limit to be adjusted.

## Special version

Limit adjuster with limit marking · Ring markings on the limit adjuster in steps of 10 °C

## Accessories

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



Type 2040

# Electronic Digital Controllers for Heating and District Heating

Heating and district heating controllers

TROVIS 5573 · TROVIS 5578-E · TROVIS I/O

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 individual 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 rail mounting
- Two control circuits (three control circuits with TROVIS 5578-E) for controlling one primary heat exchanger and supplementary heating circuits plus DHW heating or two heating circuits and one DHW circuit or two heating circuits (three heating circuits with TROVIS 5578-E)
- Alternatively, applications including outdoor-temperature-controlled buffer storage tank control (also with solar support) and heating circuits can be implemented.
- **TROVIS 5573-000x:** display with icon readings
  - RS-232 or RS-485 interface for Modbus-RTU communication using optional external module
  - Modbus-TCP/IP communication and connection to SAM DISTRICT ENERGY using optional external gateways
  - Saving of the operating values of the past 7 days at 2-minute intervals in an optional external data logging module.
  - Transfer of controller settings using a memory module or the TROVIS-VIEW software
- **TROVIS 5573-100x:** graphics display with plain-text readings
  - RS-232 or RS-485 interface for Modbus-RTU communication using optional external module
  - Modbus-TCP/IP communication and connection to SAM DISTRICT ENERGY using optional external gateways
  - Alarms and setting changes including time stamp shown in tables on the backlit graphics display
  - Graphical display of operating values of the past 14 days at 1-minute intervals
  - Transfer of controller settings using a memory module or the TROVIS-VIEW software



TROVIS 5573-11

- **TROVIS 5573-110x:** graphics display with plain-text readings
  - M-Bus interface for max. three M-Bus units, RS-232 or RS-485 interface for Modbus-RTU communication using optional external module
  - Modbus-TCP/IP communication and connection to SAM DISTRICT ENERGY using optional external gateways
  - Alarms and setting changes including time stamp shown in tables on the backlit graphics display
  - Graphical display of operating values of the past 14 days at 1-minute intervals
  - Transfer of controller settings using a memory module or the TROVIS-VIEW software
- **TROVIS 5578-E:** graphics display with plain-text readings
  - Buffer tank systems with continuous-flow hot water module possible.
  - Maximum three control loop circuits possible using optional external **TROVIS I/O** expansion module
  - Multi-circuit systems possible by interconnecting controllers by device bus
  - M-Bus interface for maximum 3 M-Bus devices, two galvanically isolated RS-485 interfaces for separate Modbus RTU and device bus communication
  - Ethernet interface for Modbus-TCP/IP communication and connection to SAM DISTRICT ENERGY using an Internet router, alternative access using optional external gateways
  - Alarms and setting changes including time stamp shown in tables on the backlit graphics display
  - Graphical display of operating values of the past 14 days at 1-minute intervals
  - Bluetooth interface to transfer controller settings using the TROVIS 55Pro smart-phone app (iOS/Android)
  - DHW heating with noiseless triacs (230 V AC voltage)





TROVIS 5578-E



TROVIS I/O

**Technical data** (• = installed/yes; o = optional)

TROVIS	5573	5578-E	I/O
Control circuits, max.	2	3	1
Heating, max.	2	3 <sup>1)</sup>	1
DHW, max.	1	1 <sup>2)</sup>	1
<b>Inputs</b>			
Sensors	8	14	4
Binary as an alternative	–	14	4
alternatively 0 to 10 V	–	–	–
alternatively 0/4 to 20 mA	–	–	–
Binary as an addition	2	–	–
additionally 0 to 10 V	1 <sup>4)</sup>	3	–
Usable sensor types	Pt1000, PTC, Ni1000	Pt1000, PTC, Ni1000	Pt1000, PTC, Ni1000
<b>Outputs</b>			
Control signal			
On/off or three-step, max.	2	3	1
Binary	3	5	2
0 to 10 V/PWM	1 <sup>4)</sup> /0	4	2
<b>Interfaces · Partly optional</b>			
Device bus	–	•	•
Meter bus	o	•	–
Modbus slave			
RS-232	o	–	–
RS-485	o	•	–
Ethernet	o	•	–
<b>Data transmission and data logging</b>			
TROVIS-VIEW software module	•	•	–
Data transmission			
With memory module	•	–	–
Direct	• <sup>5)</sup>	• <sup>6)</sup>	–
Data Logging Viewer/ Trend-Viewer	•/• <sup>7)</sup>	•/•	–/–
Supply voltage	85 to 250 V~		85 to 250 V~
Conformity			
<b>Data sheets</b>	<b>T 5573</b>	<b>T 5578</b>	<b>On request</b>

1) With 3 TROVIS I/O: 6

2) With 3 TROVIS I/O: 2

3) V and mA input cannot be used at the same time

4) 0 to 10 V input and output in TROVIS 5573 cannot be used at the same time

5) Using USB converter 3

6) Over Ethernet

7) TROVIS 5573-1xxx only

## 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 reading of controller and meter data
- Manufacturer-specific meter bus files (ZDB) for billing date values or monthly values
- Wall, panel or 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 controllers (TROVIS 5573, 5576, 5578, 5579), electric actuators (Type 3374), electric actuators with process controller (Types 5724-8 and 5725-8) or other generic Modbus devices
- Connection of utility meters (max. three meter bus loads)
- Simultaneous reading of controller and meter data
- Further physical interfaces (2x DI, 1x DO, 1x AI, 1x AO)
- Manufacturer-specific meter bus files (ZDB) for billing date values or monthly values
- Wall, panel or 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 controller (TROVIS 5573), electric actuator (Type 3374), electric actuators with process controller (Types 5724-8 and 5725-8) or other generic Modbus devices
- Simultaneous access to several Modbus TCP masters in LAN
- Connection of utility meters (max. three meter bus loads)
- Further physical interfaces (2x DI, 1x DO, 1x AI, 1x AO)
- Local buffer to temporarily store selected values (capacity for 14 days)
- Manufacturer-specific meter bus files (ZDB) for billing date values or monthly values
- Wall, panel or 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

## Universal bus unit CoRe02 (converter or repeater)

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

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



SAM LAN Gateway



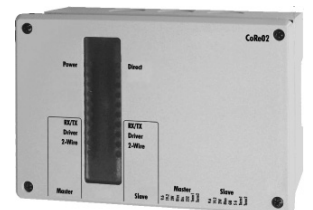
SAM MOBILE Gateway



SAM HOME Gateway



Modbus to meter bus gateway



Universal bus unit CoRe02

# 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

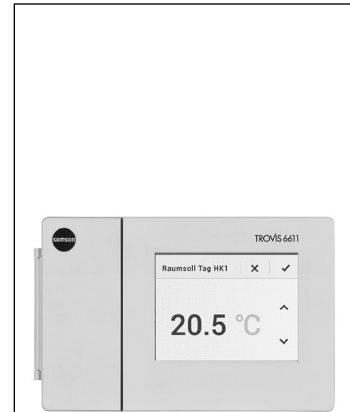
Control and monitoring of autonomous automation stations

## 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
- Color graphics on display
- Simple operation over touch screen (3.5")
- Fast and easy start-up using a USB flash drive
- With user-defined event log (audit trail)
- Additional logging memory extension over USB
- Protocols: Modbus TCP/IP, Modbus RTU, MQTT (client), OPC UA and BACnet IP
- Encrypted protocols and user role administration to achieve 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 and error indication
- **TROVIS 6620 I/O Module**
  - Analog inputs as Pt1000 (two-wire), 0 to 10 V DC, 0 to 2000  $\Omega$ , 0/4 to 20 mA
  - Binary inputs either as NC or NO 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 either as NC or NO 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 6616-1 Web Terminal**

- Display and manage all relevant operating data of a building automation system
- Use in combination with:
  - TROVIS 6610 CPU Module or
  - TROVIS 6611-2 Control and Automation Unit for panel mounting
- Graphics touch screen
- Operation, parameterization, set point changes and access to time schedules of a building automation system
- Android operating system
- 7" widescreen LED-TFT monitor, projected capacitive touch screen, 1024 x 600 pixels
- 1x USB 2.0 A
- Ethernet 10/100 (1x RJ-45)

– **TROVIS 6616-2 Web Terminal**

- Display and manage all relevant operating data of a building automation system
- Use in combination with:
  - TROVIS 6610 CPU Module or
  - TROVIS 6611-2 Control and Automation Unit for panel mounting
- Graphics touch screen
- Operation, parameterization, set point changes and access to time schedules of a building automation system
- Android operating system
- 10" widescreen LED-TFT monitor, projected capacitive touch screen, 1024 x 600 pixels
- 1x USB 2.0 A
- Ethernet 10/100 (1x RJ-45)



TROVIS 6616-1



TROVIS 6616-2

# Temperature Sensors

Resistors with Pt100 · Pt1000

## Application

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

### Types 5204 to 5256 · Temperature sensors with Pt100 resistor

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

### Types 5207 to 5277 · Temperature sensors with Pt1000 resistor

Type	5207-xx	5217	5227-4	5257-x
Screw-in sensor	•			
Duct 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	-50 to +90 °C	-35 to +70 °C
Conformity	<b>CE · ENEC</b>			
Data sheet	T 5220/T5221/T5222			

Type	5267-3	5277-21	5277-31/-51
Immersion sensor		•	•
Contact sensor	•		
Operating temperature range	-50 to +120 °C	-50 to +180 °C	-50 to +180 °C
Conformity	<b>CE · ENEC</b>		
Data sheet	T 5220		

Types 5207-60, 5207-61, 5207-64 and 5207-65 also available as fast-response versions with Pt1000 resistor (see T 5221 and T 5222)



Type 5207-64 (top),  
Type 5207-61 (bottom)

Type 5206/5207

Type 5267-3

# Thermostats

Safety temperature monitor · Type 5343

Temperature regulator · Type 5344

Safety temperature limiter · Type 5345

Double thermostats · Type 5347, Type 5348 and Type 5349



## 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 IP54

### 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:

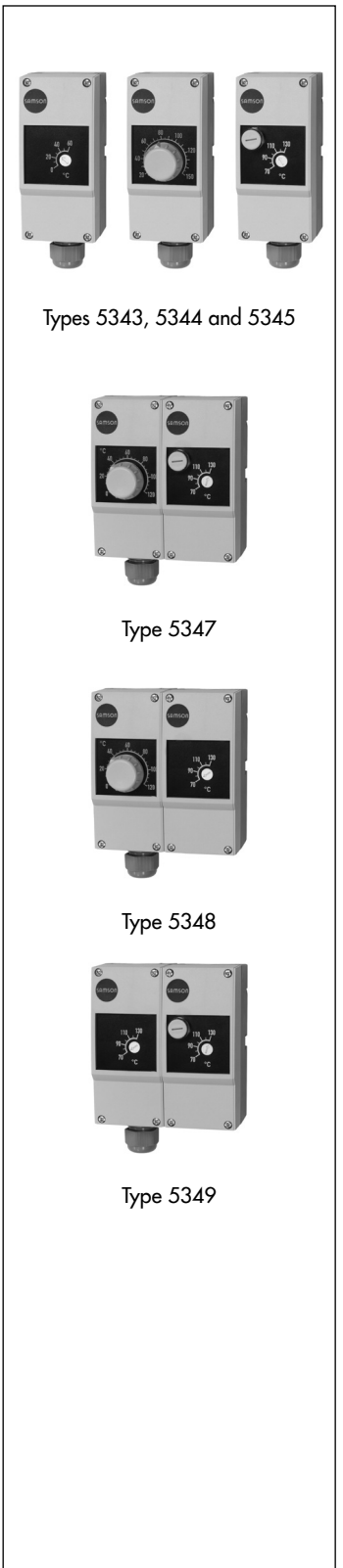
- Safety temperature monitor (STM)
- Temperature regulator (TR)
- Safety temperature limiter (STL)
- Temperature regulator with safety temperature limiter (TR/STL) or
- Temperature regulator with safety temperature monitor (TR/STM)

### Single thermostats

Type	5343	5344	5345
Function	STM	TR	STL
Set point range [°C]	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]	2000		
Max. medium temperature [°C]	85, 125, 155, 120	145, 175	155, 115
Conformity	CE · EAC	CE	CE · EAC
Data sheet	T 5206		

### 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
70 to 130	–	70 to 130	
Sensor length [mm]	2000		
Max. medium temperature [°C]	145 or 115	145 or 125	145
Conformity	CE · EAC		CE
Data sheet	T 5206		



Types 5343, 5344 and 5345

Type 5347

Type 5348

Type 5349

# Software

## TROVIS-VIEW 6661 Software

Valve sizing · Calculation and sizing of valves

VDI 3805 records of products



### 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.

- Easy 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
- Free download from our website at [www.samsongroup.com](http://www.samsongroup.com) > Service & Support > Downloads > TROVIS-VIEW · See Data Sheet T 6661 for further information

### 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.

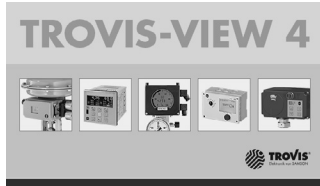
#### New features included in version 4.7 of the SAMSON Valve Sizing:

- 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.


### VDI 3805 records of products

Electronic product catalog to exchange data in building services (mechanical, electrical, plumbing) providing technical and geometrical data for CAD-supported planning, drawing, sizing and bidding. The data can be used in both planning and maintenance.


- Free download from our website at [www.samsongroup.com](http://www.samsongroup.com) > Service & Support > Downloads > VDI 3805



Operating and monitoring using TROVIS-VIEW



Calculation and sizing using valve sizing program



VDI 3805 records of products

# SAM VALVE MANAGEMENT

Industry-specific application · Web-based solution for smart valve diagnostics



## SAM VALVE MANAGEMENT

SAM VALVE MANAGEMENT is a web-based, industry-specific solution for the smart monitoring and management of control valves installed in process plants. The cloud service application provides a complete overview of all valves fitted with smart SAMSON positioners connected to the system, along with clearly structured valve and plant reports including all relevant messages and recommended action. Extended diagnostic functions, such as identification of the valve's working range and clear diagnostic messages, are also part of the SAM VALVE MANAGEMENT concept.

SAM VALVE MANAGEMENT follows a preventive approach, which enables users to plan maintenance work before an actual malfunction occurs to prevent costly unscheduled plant downtime.

### Typical applications:

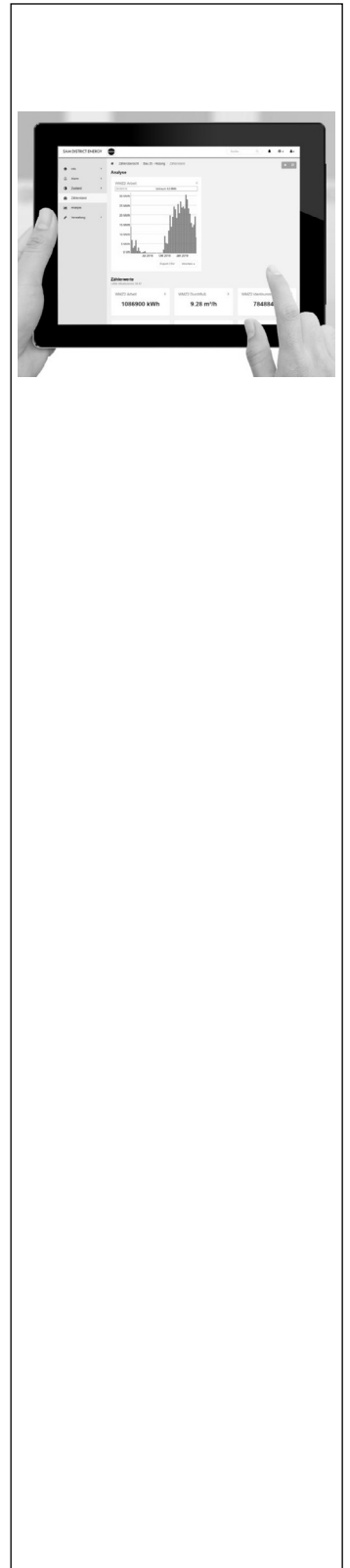
- Monitoring of valves for maintenance and safety purposes
- Detection of wear in valves
- Support in planning necessary maintenance work

### Easy-to-use user management including:

- Complete overview of all SAMSON valves with mapping of existing asset structures
- Dashboards providing an overview of the entire plant and single tags
- Clear recommended action after a maintenance alarm is generated

### Creating added value:

- Optimized costing
  - Optimized profitability and plant availability
  - Prevention of unplanned plant downtime
  - Proactive maintenance planning
- Data management
  - Access to view operating states
  - Built-in file management to save valve-related information
  - Access from anywhere at any time
- Data analysis
  - Automatic and manual analysis of data
  - Efficient monitoring of all relevant diagnostic data
  - Asset- and plant-related reporting
  - Visualization of valve operating modes including histograms and trend graphs
- Predictive maintenance
  - Efficient, proactive maintenance planning
  - Prevention of costly unplanned plant downtime
  - Extended diagnostic functions, such as identification of the valve's working range, clear diagnostic messages with recommended action
  - SAMSON's asset management service provides direct point of contact



# SAM DISTRICT ENERGY

Industry-specific application · Specifically developed for district heating and cooling



## SAM DISTRICT ENERGY

Web-based solution for managing, controlling and optimizing heating and cooling networks with all key data on connected controllers, utility meters and electric actuators

### Typical applications:

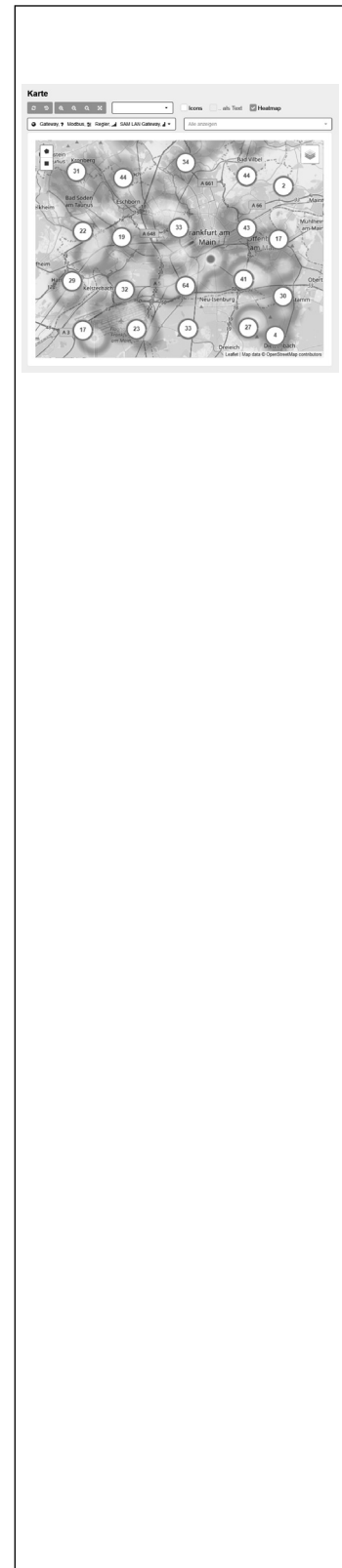
- Wide variety of connection options through the use of various communication protocols in SAM MOBILE Gateways, SAM LAN Gateways and SAM HOME Gateways
- Boiler house automation with various visualization options
- Clear assignment of meter IDs and consumption data to ensure that the heat consumption and billing information are logged correctly for every customer.
- Dynamic detection of a network's point of worst efficiency to achieve the optimal pressure
- Reduction of the network temperature to the absolute minimum required
- Identification of reserves in hydronic networks to extend heat networks
- Interfaces to customers' servers and ERP systems over API REST
- Maximum scalability due to an unlimited number of devices that can be connected
- Secondary use of the portal through rental to major customers

### Easy-to-use user management including:

- Central administration with integrated dynamic authorization concept
- Responsive web design for devices with Internet connection
- Customized user interface including setting up company accounts with company branding
- Map of network route plans with several layers

### Creating added value through the following functions:

- Algorithm-based fault analysis and alarm management
- Automatic system configuration based on a system code number
- Creation of virtual meters or devices as well as user-specific designations of heating circuits
- Smart Detection with a priority rating of plant problems including recommended action and additional information
- Visual network analysis with relative color coding and time-lapse mode for a dynamic detection of a network's point of worst efficiency
- Holistic approach to enhance the protection, redundancy and security of data
- Sensor sharing and cross-traffic to achieve optimized control
- Comprehensive data analysis options including operators as well as bar graphs and charts
- Network pump control based on valve positions or differential pressures



# SAM TANK MANAGEMENT

Industry-specific application · Specifically designed for smart monitoring tank filling levels



## SAM TANK MANAGEMENT

SAM TANK MANAGEMENT is a web-based application specifically developed for monitoring the filling levels of liquids, gases and vapors stored in stationary or truck-mounted pressure vessels. SAM TANK MANAGEMENT is used in combination with SAMSON differential pressure meters from the Media series. Media 5 meters, which have been successful on the market for years, as well as the newly developed Media 7 meters can communicate with the web portal.

### Typical applications:

- Monitoring of maximum filling of stationary or mobile tanks
- Monitoring of pressures
- Automatic generation of filling level reports
- Analysis of vacuum insulation
- Alarm-based monitoring of plant conditions
- Avoidance of unnecessary cost incurred due to empty tanks
- Customized analysis report
- Analysis of tank farm sizing
- Remote parameter setting of Media devices

### Easy-to-use user management including:

- Central tank management and intuitive dashboard
- Responsive web design for devices with Internet connection
- Customized user interface including setting up company accounts with company branding
- Customizable reports

### Creating added value:

- Optimized costing
  - Optimized delivery routes and profitability
  - Avoidance of unnecessary cost incurred due to empty tanks
  - Improved business processes
  - Development of new business models
  - Proactive maintenance planning
- Remote start-up
  - Configuration of Media differential pressure meters over the Internet
  - Active transfer of settings to the device in real time
  - All configuration functions of the differential pressure meters accessible
- Device information at a glance
  - Real-time monitoring of all connected devices, 24/7 availability
  - Immediate notification in the event of device malfunctions by plain-text message with device status information
  - Complete device identification
  - Event logging
  - Write access of documents and master data



# SAM GUARD

Predictive analytics for the process industry



## SAM GUARD

SAM GUARD® is a web-based application specifically developed for predictive monitoring in the process industry. It transforms process time series data into powerful predictive indicators.

SAM GUARD combines advanced AI software and human plant know-how, providing an overall solution. When an imminent failure is detected, analytical process engineers perform an in-depth analysis.

### Typical applications:

- 24/7 real-time monitoring for the entire plant (pressure, flow, torque, level and other sensors)
- Alerting on process deviations and incorrect operating modes
- Predictive alerts for a variety of equipment types, both rotating and static, such as heat exchangers, control valves, boilers, columns, reactors, condensers
- Identification of leakage, blockage, clogged filters, broken sensors, flare events, emissions etc. in any type of equipment and process
- Detection of unexpected issues beyond known alarm-based monitoring, such as DCS
- Visualization of online and historical data
- Advanced analytical tools (functions, conditions, virtual sensors etc.)
- Context for analysis by transparent integration with process diagrams (P&ID)
- Event logging and categorization
- Customized analysis reports by analytical monitoring experts

### Easy-to-use web interface including:

- Central administration with integrated dynamic authorization concept
- Responsive web design for devices with Internet connection
- Customized user interface including setting up company accounts with company branding
- Map of network route plans with several layers
- Online Monitoring Inbox: intuitive tool built according to the guided analysis approach
- Studio for defining and maintaining digital twins and relations between various assets
- Advanced analytical features (functions, conditions etc.)
- Dashboard and reports of closed events
- Platform for monetary evaluation of alerts
- Different user levels from operators to process engineers
- Custom user interface, possibility to set up company branding
- Multi-language support
- ISO 27001 compliant





**Creating added value:**

- Safety, environment, cost, performance and profitability
  - Reduce cost of maintenance thanks to early fault detection and proactive maintenance planning
  - Reduce unplanned downtime and avoid production loss
  - Proactively prevent environmental issues and safety hazards
  - Improve sustainability
- Early alarm notification
  - You have sufficient time to prepare a plan of action long before the discovered issues have a significant impact on your plant.
  - Early detection reduces the cost of repair as the equipment is still recoverable in most cases

# 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, Type 2232 or Type 2234 Control Thermostat, 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 or 2234 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

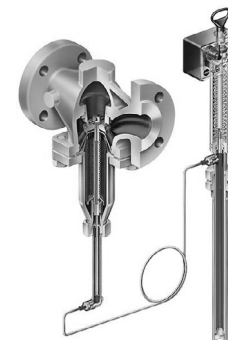
The valve **opens** when the temperature rises.

### – 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	With
Connection	DN	DN 15 to 50	DN 15 to 150
	NPS	½ to 2	½ to 10
Pressure rating	PN	16 to 40	16 to 40
	Class	125 to 300	125 to 300
Max. permissible temperature		350 °C	350 °C <sup>1)</sup>
		660 °F	660 °F <sup>1)</sup>
Conformity		CE · EAC · UK CA	
Data sheets		T 2111 T 2115	T 2121 T 2025
			T 2123

<sup>1)</sup> Version balanced by a diaphragm 150 °C/300 °F

## 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)
Conformity		CE · EAC · UK CA
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

## Type 2231, Type 2232, Type 2234 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 2234:** set points from  $-10$  to  $250$  °C ( $15$  to  $480$  °F), separate set point adjustment, suitable for liquids, air and other gases, installation in air ducts, vessels, pipelines, heating or cooling systems

### Technical data

Type	2231	2232	2234
Set point span	$-10$ to $+90$ , $20$ to $120$ or $50$ to $150$ °C For Types 2232, 2234 also $100$ to $200$ , $150$ to $250$ °C		
	$15$ to $195$ , $70$ to $250$ or $120$ to $300$ °F For Types 2232, 2234 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)		
Conformity	UK PA		UK PA
Data sheets	T 2111/2115, T 2121/2025, T 2123, T 2133/2134		

### Materials

Type	2231	2232	2234
Sensor	Bronze	Bronze	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 2232



Type 2231

# Self-operated Temperature Regulators

Typetested safety devices

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

Safety temperature limiter (STL) · Type 2212



## Application

Safety temperature limiter 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
- 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 or Type 2119 Three-way 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 temperature limit of the selected limit range
Min. permissible temperature of the STL including sensor when the plant is shut down <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
Conformity	CE · EAC · UK CA
Data sheet	T 2046

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

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

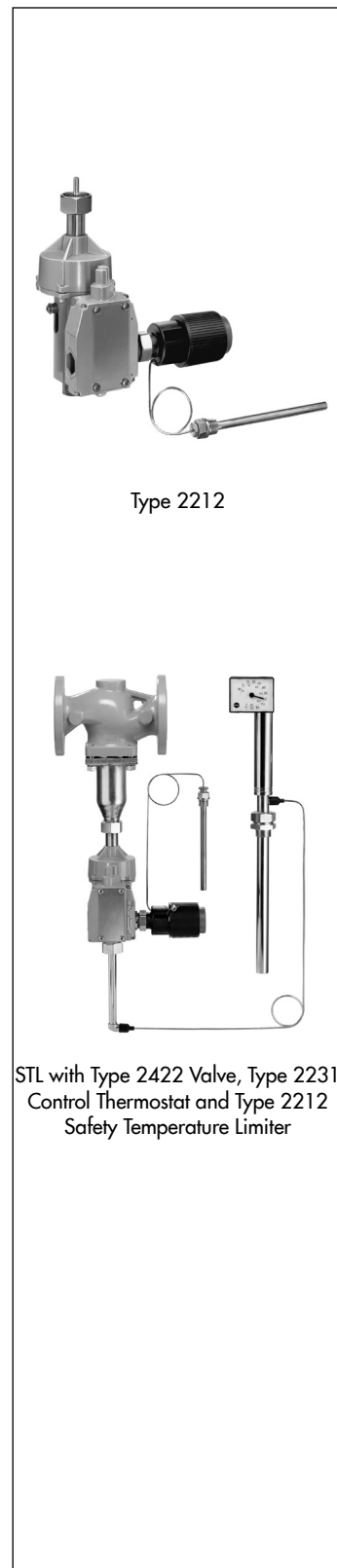
<sup>3)</sup> The STL is locked when the temperature falls below the specified temperature.

## 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)



Type 2212

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 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 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
Conformity	CE · EAC
Data sheet	T 2043

## 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
Conformity	<b>ERC</b>	<b>CE · ERC</b>	<b>ERC</b>
Data sheets	<b>T 2171/T 2175</b>		<b>T 2173/T 2177</b>

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
Conformity	<b>ERC</b>	<b>CE · ERC</b>	<b>CE</b>
Data sheets	<b>T 2172, T 2174</b>		



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 limit
Capillary tube length	2 m
Conformity	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
Conformity	CE
Data sheet	T 2183

## 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 113



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>	
Conformity	CE · EAC	
Data sheets	T 2520	T 2522

<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 · 1.4404 · 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)
Conformity		CE · EAC · UK CA		
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)		
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			

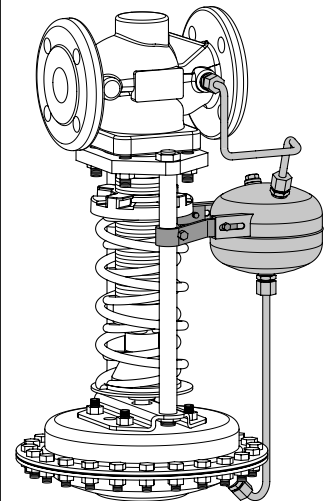
<sup>1)</sup> In corrosion-resistant version (CrNi steel)

## Special versions

- Control line kit for tapping the pressure directly at the valve body (accessories) - See Data Sheet T 2595
- 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 (DN 15 to 100) 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



Control line kit with compensation chamber for Type 41-23 or 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>		
Conformity	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 bellows	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					
Conformity		CE · EAC · UK CA					
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 valve (SEV) · 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 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 44-4 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 <sub>V5</sub> coefficient		1/2.5/4	6.3	8	12.5	16	20
Max. perm. 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 44-4 (SEV)	bar	1 to 4 <sup>1)</sup> /2 to 4.4/2.4 to 6.6/6 to 11					
Conformity		CE · ENEC · UKCA					
Data sheets		T 2623, T 2723, T 2630, T 2632					

<sup>1)</sup> Without type test

## 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<sub>V5</sub> coefficients for DN 15



Types 44-3/-9



Type 44-4 (SEV)

# Self-operated Pressure Regulators for the Food Processing Industry

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

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

## Application

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

## Compliance

The Type 2371 Pressure Regulators comply with the following regulations and standards:

- FDA 21 CFR 177.1550, FDA 21 CFR 177.2600, FDA 21 CFR 177.2415
- NSF H1
- EC 1935/2004
- EU 10/2011
- USP Class VI-121 °C
- EC 2023/2006
- Free of animal-derived ingredients (ADI-free)
- EC 999/2001, revision 2015: TSE/BSE free

## Special features

- Proportional pressure regulators with cavity-free valve bodies made of stainless steel
- Wetted inside surfaces with a precision-lathed or polished finish
- Diaphragms monitored for leakage over a test connection

**Excess pressure valve** with diaphragm to control the inlet pressure to the adjusted set point

- **Type 2371-00** · Excess pressure valve with pneumatic set point adjustment
- **Type 2371-01** · Excess pressure valve with mechanical set point adjustment

**Pressure reducing valve** with diaphragm to control the outlet pressure to the adjusted set point

- **Type 2371-10** · Pressure reducing valve with pneumatic set point adjustment
- **Type 2371-11** · Pressure reducing valve with mechanical set point adjustment

## Technical data

Pressure regulators		Types 2371-00/-01	Types 2371-10/-11
Function		Excess pressure valve	Pressure reducing valve
Valve size	DN	15 to 50	15 to 50 <sup>1)</sup>
	NPS	½ to 2	½ to 2 <sup>1)</sup>
Body material		1.4409, 1.4404/CF3M, 316L	
Maximum pressure		10 bar/150 psi	
Set point ranges	bar	0.3 to 1.2 through 4 to 6	0.4 to 1.2 through 4 to 6
	End connections		
End connections	Flanges	•	•
	Welding ends	•	–
	Thread	•	•
	Clamp	•	•
Leakage, based on K <sub>VS</sub> coefficient		Metal seal: ≤0.05 % Soft seal: ≤0.01 %	
Medium temperature range		0 to 160 °C (32 to 320 °F)	
Max. sterilization temperature		180 °C (356 °F) up to 30 min	
Cleaning	CIP	•	•
	SIP	•	•
Conformity		CE · EAC · UK CA	
Data sheets		T 2642	T 2640

<sup>1)</sup> Type 2371-10 only in DN 32 to 50/NPS 1¼ to 2



Type 2371-00 with pneumatic set point adjustment



Type 2371-01 with mechanical set point adjustment and with stem locking



Type 2371-10



Type 2371-11

# 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

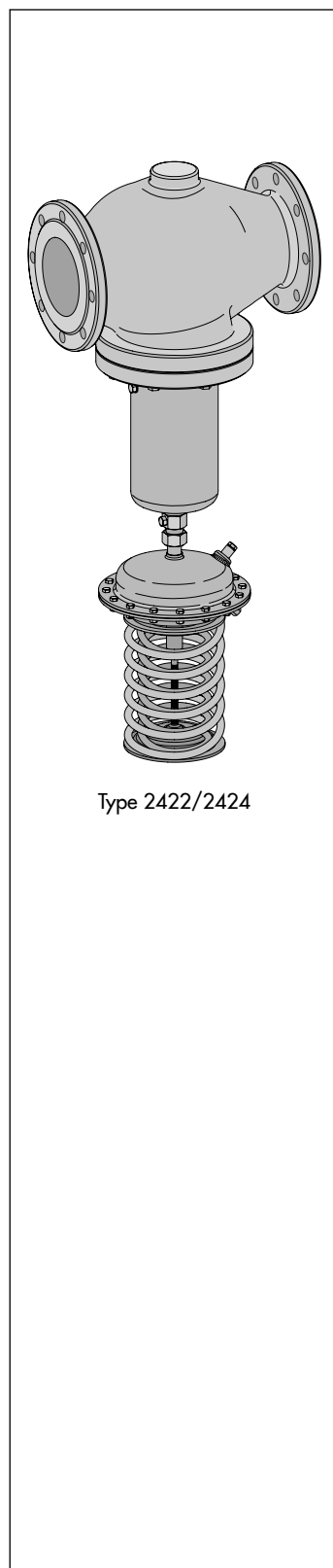
- Low-maintenance, medium-controlled proportional regulators requiring no auxiliary energy
- Wide set point range and convenient set point adjustment using a nut
- Exchangeable set point springs and actuator
- Spring-loaded, single-seated valve with upstream and downstream pressures balanced by a stainless 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
	Valve 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
	Valve 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	
Conformity	CE · ENEC · UKCA	
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	T 2547/T 2548/T 2549/T 2550	



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 <sub>VS</sub> coefficient	8 to 380 (C <sub>v</sub> 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)
Conformity	<b>CE</b>
Data sheet	<b>T 2538</b>

<sup>1)</sup> Higher values on request

### Materials

Body	A126B, A216 WCC, A351 CF8M · 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

<b>Valve size</b>	<b>DN 65 to 150 (NPS 2½ to 6)</b>
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 $\Delta p_{\min}$	12 bar (175 psi)
Conformity	<b>CE</b>
<b>Data sheet</b>	<b>T 2540</b>

<sup>1)</sup> Higher values on request

### Materials

Body	A126B, A216 WCC, A351 CF8M · 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	
Conformity		<b>CE</b>	
Data sheets		T 3009, T 3010	

## 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 (1 540 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
Conformity	CE · EAC
Data sheets	T 3015, T 3016

<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, 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, DN 65 to 100: 1.4104 and 1.4006			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

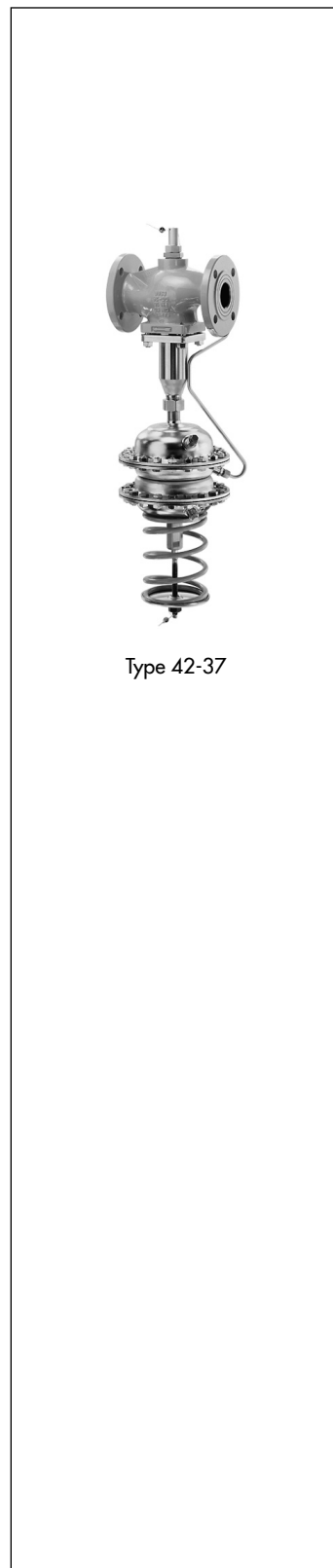
## Technical data

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
Conformity	CE · EAC
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, DN 65 to 100: 1.4104 and 1.4006			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			
<b>Actuator</b>	<b>Type</b>	<b>2427, 2429</b>			
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	0.1, 0.2, 0.3, 0.4 or 0.5 fixed	
	psi	0.75 to 145	3, 4, 6 or 7 fixed	
Conformity	<b>CE · EAC</b>			
Data sheets	<b>T 3003, T 3004, T 3007, T 3008</b>			

## Materials

Valve <sup>1)</sup>	Type	2422				
Valve body	DIN	EN-GJL-250	EN-GJS-400-18-LT	1.0619	1.4404 <sup>2)</sup>	1.4408
	ANSI	A126 B	–	A216 WCC	A351 CF8M	
Pressure rating	PN	16	25	16/25/40		
	Class	125/250	–	125/150/300		
<b>Actuator</b>	<b>Type</b>	<b>2420/2424/2425/2428</b>				
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> 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
$K_{VS}$ 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>						
Conformity	<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
$K_{VS}$ 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. perm. temperature		Liquids: 150 °C, nitrogen and air: 150 °C <sup>1)</sup>					
Conformity <sup>2)</sup>		CE · EAC					
Data sheet		T 3131					

<sup>1)</sup> Diaphragm and seals made of FKM, PN 25 version only

<sup>2)</sup> Type 47-4 only with CE conformity

## 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), DN 125 to 250 with integrated diaphragm actuator with internal closing spring

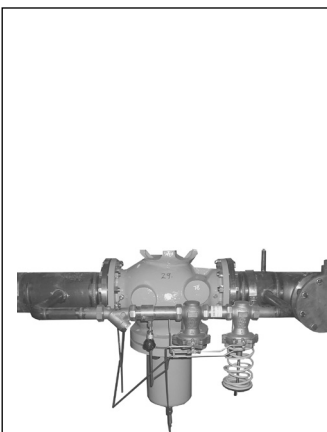
Pilot valve depending on the application

- **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)

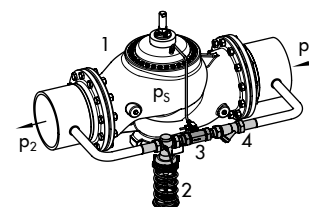
See associated Information Sheet T 3000, Data Sheet T 3210

## 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 Valves (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

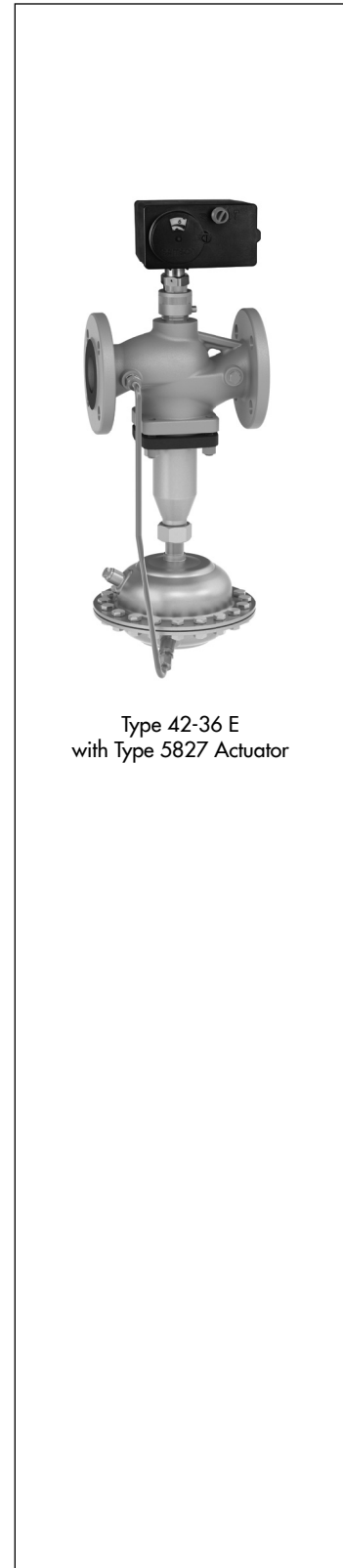
Valves DN 15 to 250, pressure rating PN 16 to 40, suitable for liquids from 5 to 150 °C, electric actuators with or without fail-safe action to change the flow rate set point depending on the control signal issued by an electric controller

- **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
Conformity	CE · EAC
Data sheet	T 3018

<sup>1)</sup> Special restriction for very low flow rates on request



Type 42-36 E  
with Type 5827 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, DN 65 to 100: 1.4104 and 1.4006			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 5727 Actuator

# Pressure-independent Control Valves (PICV)

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 5827 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 5827 or 5857 Electric Actuator
- **Type 2489/58... Pressure-independent Control Valve**  
with Types 5827 or 5857 Electric Actuator and additional Type 2430 Control Thermostat for temperature regulation

## Technical data

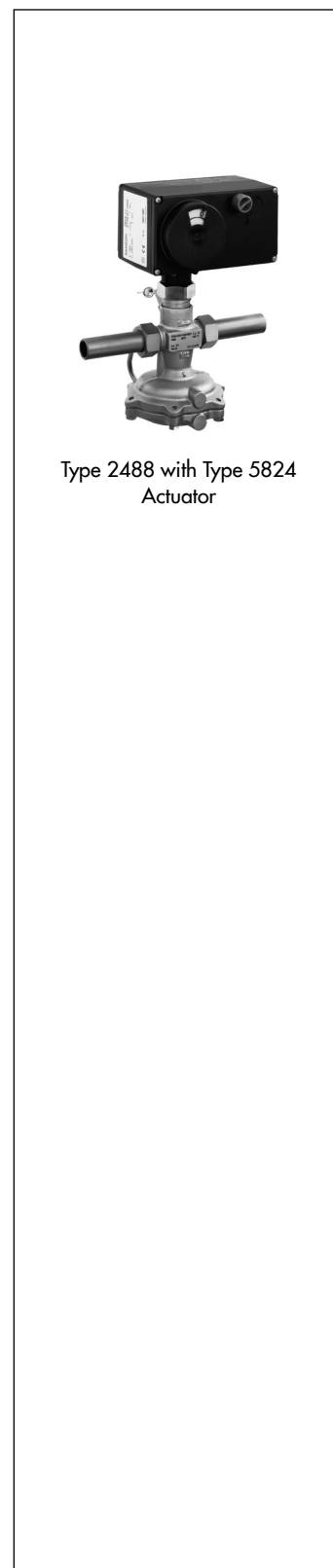
Valve size	DN	15	20	25	32	40	50
K <sub>vs</sub> coefficient	Body with screwed ends	2.5	6.3	8	12.5	16	20
	Flanged body	–			12.5	20	25
Flow rate set point for differential pressure at restriction of 0.2 bar		0.03 to 15 m <sup>3</sup> /h					
Max. permissible temperature		150 °C					
Connections		Welding ends, threaded ends, flanges					
Conformity		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
Conformity	CE			CE · EAC				
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



# Annex

Index

164

# Index

Type	Application/function	Page	Type	Application/function	Page
01a	PTFE-lined globe valve	65	45-1	Differential pressure regulator	155
01b	PFA-lined globe valve	65	45-2	Differential pressure regulator	155
06a	PTFE-lined micro-flow valve	65	45-3	Differential pressure regulator	155
08a	PTFE-lined angle valve	65	45-4	Differential pressure regulator	155
1	Temperature regulator	128	45-9	Differential pressure regulator	155
1 N	Strainer	161	46-7	Flow and differential pressure regulator	156
1 NI	Strainer	161	47-1	Flow and differential pressure regulator	156
2 N	Strainer	161	47-4	Flow and differential pressure regulator	156
2 NI	Strainer	161	47-5	Flow and differential pressure regulator	156
4	Temperature regulator	128	62.7	Rotary plug valve	74
4u	Temperature regulator	128	72.3	Rotary plug valve	72
9	Temperature regulator	128	73.3	Rotary plug valve	73
10a	Lined double-eccentric control butterfly valve	64	73.7	Rotary plug valve	73
10e	Centric control and shut-off butterfly valve	64	82.7	Rotary plug valve	72
14b	Double-eccentric control butterfly valve	64	2040	Safety temperature monitor	113
14b - PSA	High-performance control and shut-off butterfly valve	62	2212	Safety temperature limiter	131
20a	PTFE-lined ball valve	66	2213	Safety temperature limiter	132
20b	PFA-lined ball valve	66	2231	Control thermostat	130
22a	Stainless steel tank bottom valve	66	2232	Control thermostat	130
26d	Stainless steel ball valve	66	2234	Control thermostat	130
26s	Flanged ball valve	66	2333	Pressure reducing valve	142
27x	Sampling valve	67	2334	Pilot-operated universal regulator	157
28	Piggable dosing valve	67	2335	Excess pressure valve	142
29	Piggable dosing valve	67	2357-1	Pressure build-up regulator	110
31a	Pneumatic rotary actuator	84	2357-2	Excess pressure valve	110
42-20	Flow and differential pressure regulators	154	2357-3	Pressure build-up regulator	112
42-24	Flow and differential pressure regulators	154	2357-11	Pressure build-up regulator	111
42-25	Flow and differential pressure regulators	154	2357-21	Excess pressure valve	111
42-28	Flow and differential pressure regulators	154	2371-00	Excess pressure valve	144
42-36	Flow regulator	150	2371-01	Excess pressure valve	144
42-36 E	Pressure-independent control valve (PICV)	158	2371-10	Pressure reducing valve	144
42-37	Flow and differential pressure regulator	152	2371-11	Pressure reducing valve	144
42-39	Flow and differential pressure regulator	152	2403	Safety temperature monitor	136
43-1	Temperature regulator	133	2404-1	Pressure reducing valve with pilot valve	147
43-2	Temperature regulator	133	2404-2	Excess pressure valve with pilot valve	148
43-3	Temperature regulator	133	2405	Pressure reducing valve	137
43-5	Temperature regulator	133	2406	Excess pressure valve	137
43-6	Temperature regulator	133	2422	Pressure reducing valve/excess pressure valve	145
43-7	Temperature regulator	133	2424	Pressure reducing valve	145
44-0 B	Pressure reducing valve	140	2425	Excess pressure valve	145
44-1 B	Pressure reducing valve	140	2439	Safety temperature limiter	135
44-2	Pressure reducing valve	143	2488/58...	Pressure-independent control valve (PICV)	160
44-3	Safety shut-off valve	143	2489/58...	Pressure-independent control valve (PICV)	160
44-4	Safety excess pressure valve	143	3213	Globe valve	79
44-6 B	Excess pressure valve	140	3214	Globe valve	79
44-7	Excess pressure valve	143	3222	Globe valve	79
44-9	Safety shut-off valve	143	3222 N	Globe valve	79
			3226	Three-way valve	80

# Index

Type	Application/function	Page	Type	Application/function	Page
3241	Globe valve	39	3755	Pneumatic volume booster	100
3244	Three-way valve	41	3766	Pneumatic positioner	88
3246	Cryogenic valve	60	3767	Electropneumatic positioner	88
3248	Cryogenic valve	59	3768	Limit switch	96
3251	Globe valve	43	3776	Limit switch	96
3252	High-pressure valve	42	3793	Positioner with HART® communication	90
3253	Three-way valve	44	3962	Solenoid valve	98
3254	Globe valve	44	3963	Solenoid valve	98
3256	Angle valve	43	3967	Solenoid valve	98
3260	Globe/three-way valve	80	3969	Solenoid valve	98
3271	Pneumatic actuator	81	4708	Supply pressure regulator	96
3277	Pneumatic actuator	81	4744	Limit switch	95
3278	Pneumatic rotary actuator	84	4746	Limit switch	95
3281	Steam conditioning valve	45	4747	Limit switch	95
3286	Steam conditioning valve	46	5090	Orifice flange (Media accessories)	107
3310	Segmented ball valve	75	52xx	Temperature sensors	120
3321	Globe valve	76	5343	Safety temperature monitor	121
3321CT	Globe valve	52	5344	Temperature regulator	121
3323	Three-way valve	76	5345	Safety temperature limiter	121
3331	Butterfly valve	63	5347	Double thermostat	121
3347	Hygienic angle valve	48	5348	Double thermostat	121
3349	Aseptic angle valve	51	5349	Double thermostat	121
3351	On/off valve	47	5573	Heating and district heating controller	114
3353	Y-pattern valve	47	5578-E	Heating and district heating controller	115
3354	Globe valve	47	5724-3	Electric actuator with process controller	86
3374	Electric actuator	85	5724-8	Electric actuator with process controller	86
3379	Pneumatic actuator	83	5725-3	Electric actuator with process controller	86
3381	Silencer	46	5725-8	Electric actuator with process controller	86
3510	Micro-flow valve	42	5757-3	Electric actuator with process controller	86
3531	Globe valve	77	5757-7	Electric actuator with process controller	86
3535	Three-way valve	77	5827	Electric actuator	85
3598	Cryogenic valve	61	5857	Electric actuator	85
3709	Pneumatic lock-up valve	99	6111	i/p converter	102
3710	Reversing amplifier	100	6116	i/p converter	102
3711	Quick exhaust valve	101	6126	i/p converter	102
3724	Electropneumatic positioner	94	6132	i/p converter	103
3725	Electropneumatic positioner	90	6134	i/p converter	103
3730-0	Electropneumatic positioner	90	6493	Compact controller	108
3730-3	Positioner with HART® communication	91	6495-2	Industrial controller	108
3730-4	Positioner with PROFIBUS-PA communication	91	6611-2	Control and automation unit	118
3730-5	Positioner with FOUNDATION™ fieldbus communication	91	6616-x	Web terminal	119
3730-6	Positioner with HART® communication	91	6620	I/O module	118
3731-3	Positioner with HART® communication (flameproof)	91	6625	Input module	118
3731-5	Positioner with FOUNDATION™ fieldbus communication (flameproof)	91	6661	TROVIS-VIEW software	122
3738	Electronic limit switch	96	7029	SAMSTATION supply pressure regulator	97
			AC-X	Trim	46
			CoRe02	RS-232-/RS-485 converter or repeater	117
			KAT	Ceramic-lined ball valve	68
			KAV	Ceramic-lined ball valve	68

# Index

Type	Application/function	Page	Type	Application/function	Page
KBR	Stainless steel ball valve	70	SSC	Sliding disk valve	71
KBRG	Stainless steel ball valve	70	ST 1/2/3	Flow divider	46
KBRZ	Stainless steel ball valve	70	Steripur 206	Diaphragm valve	54
KFK	Ball valve	70	Steripur 217	Diaphragm valve	53
KFL	Ball valve	70	Steripur 317	Diaphragm valve	53
KGT	Ceramic-lined ball valve	69	Steripur 397	Diaphragm valve	54
KMA 190	Diaphragm valve	55	Steripur 407	Diaphragm valve	53
KMA 195	Diaphragm valve	55	Steripur 417	Diaphragm valve	53
KMA 205	Diaphragm valve	56	Steripur 907	Diaphragm valve	54
KMA 295	Diaphragm valve	56	Steripur 997	Diaphragm valve	54
KMA 395	Diaphragm valve	55	<b>TROVIS</b>		
KMA 495	Diaphragm valve	55	3730-1	Electropneumatic positioner	90
KMA 905	Diaphragm valve	56	3730-3	Positioner with HART® communication	90
KMA 995	Diaphragm valve	56	3793	Positioner with HART® communication	90
KMD 188	Diaphragm valve	57	5573	Heating and district heating controller	114
KMD 289	Diaphragm valve	58	5578-E	Heating and district heating controller	115
KMD 385	Diaphragm valve	57	5724-3	Electric actuator with process controller	86
KMD 402	Diaphragm valve	57	5724-8	Electric actuator with process controller	86
KMD 982	Diaphragm valve	58	5725-3	Electric actuator with process controller	86
KMD 985	Diaphragm valve	58	5725-8	Electric actuator with process controller	86
KST	Ceramic-lined ball valve	68	5757-3	Electric actuator with process controller	86
KSV	Ceramic-lined ball valve	68	5757-7	Electric actuator with process controller	86
KZT	Ceramic-lined ball valve	69	6493	Compact controller	108
LTR 43	High-pressure butterfly valve	63	6495-2	Compact controller	108
Media 5/05	Differential pressure meter	104	6611-2	Control and automation unit	118
Media 7	Digital transmitter for differential pressure	105	6616-x	Web terminal	119
<b>VDI 3805 records of products</b>			6620	I/O module	118
	Electronic product catalog to exchange data in building services (mechanical, electrical, plumbing).	122	6625	Input module	118
			I/O	Expansion module	115
<b>SAM Connect Gateway</b>			<b>TROVIS SAFE</b>		
	Gateway to handle signals from transmitters	106	3730-6	Digital positioner for safety-instrumented systems	93
<b>SAM DISTRICT ENERGY</b>			3731-3	Digital positioner for safety-instrumented systems	93
	Industry-specific application for district heating and cooling	124	3793	Digital positioner for safety-instrumented systems	93
<b>SAM GUARD</b>			<b>TROVIS-VIEW</b>	Configuration and user interface	122
	Predictive analytics for the process industry	126	<b>Valve sizing</b>		
<b>SAM HOME Gateway</b>				Software for calculating and sizing control valves	122
	Integration of Modbus controllers	117	<b>Modbus to meter bus gateway</b>		
<b>SAM LAN Gateway</b>				Integration of M-Bus meters	117
	Wireless networking	117			
<b>SAM MOBILE Gateway</b>					
	Polling over mobile networks or local area networks	117			
<b>SAM TANK MANAGEMENT</b>					
	Industry-specific application for monitoring tank filling levels	125			
<b>SAM VALVE MANAGEMENT</b>					
	Industry-specific application for the smart valve diagnostics	123			





# SAMSON AT A GLANCE



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- Europe 3,600
- Asia 600
- Americas 200
- Frankfurt am Main, Germany 1,900

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- Food and beverages
- Pharmaceuticals and biotechnology
- Oil and gas
- Liquefied Natural Gas (LNG)
- Marine equipment
- Power and energy
- Industrial gases
- Cryogenic applications
- District energy and building automation
- Metallurgy and mining
- Pulp and paper
- Water technology
- Other industries

## PRODUCTS

- Valves
- Self-operated regulators
- Actuators
- Positioners and valve accessories
- Signal converters
- Controllers and automation systems
- Sensors and thermostats
- Digital solutions

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- More than 50 subsidiaries  
in over 40 countries
- More than 200 representatives

## PRODUCTION SITES

- SAMSON Germany, Frankfurt, established in 1916  
Total plot and production area: 150,000 m<sup>2</sup>
- SAMSON France, Lyon, established in 1962  
Total plot and production area: 23,400 m<sup>2</sup>
- SAMSON Turkey, Istanbul, established in 1984  
Total plot and production area: 11,100 m<sup>2</sup>
- SAMSON USA, Baytown, TX, established in 1992  
Total plot and production area: 20,000 m<sup>2</sup>
- SAMSON China, Beijing, established in 1998  
Total plot and production area: 47,000 m<sup>2</sup>
- SAMSON India, Pune district, established in 1999  
Total plot and production area: 28,000 m<sup>2</sup>
- SAMSON AIR TORQUE, Bergamo, Italy  
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Total plot and production area: 1,100 m<sup>2</sup>
- SAMSON LEUSCH, Neuss, Germany  
Total plot and production area: 18,400 m<sup>2</sup>
- SAMSON PFEIFFER, Kempen, Germany  
Total plot and production area: 20,300 m<sup>2</sup>
- SAMSON RINGO, Zaragoza, Spain  
Total plot and production area: 19,000 m<sup>2</sup>
- SAMSON SED, Bad Rappenau, Germany  
Total plot and production area: 10,400 m<sup>2</sup>
- SAMSON STARLINE, Bergamo, Italy  
Total plot and production area: 27,000 m<sup>2</sup>
- SAMSON VDH PRODUCTS, the Netherlands  
Total plot and production area: 12,000 m<sup>2</sup>
- SAMSON VETEC, Speyer, Germany  
Total plot and production area: 27,100 m<sup>2</sup>

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