ACVATIX HYDRONICS. EVERYTHING UNDER CONTROL

밸브 (Valves)

Acvatix™ is a versatile range of valves and actuators designed for ease of use, superior control accuracy, and energy efficiency.

더 알아보기

SIEMENS

Siemens Smart Infrastructure combines the real and digital worlds across energy systems, buildings and industries, enhancing the way people live and work and significantly improving efficiency and sustainability

Contents

인텔리전트 밸브

EVG.. EVF.. 4

PICV 복합밸브

PN16: VPF43../VPF44.. 34

PN25: VPF53../VPF54.. 34

VPF53.. 54

VPP46.., VPP46..Q, VPI46.., VPI64..Q 67

STA..3.., STP..3.. 83

SSA 100

SAV.. P.. 114

SAX.. P.. 124

SAY.. P.. 134

SQV.. P.. 143

글로브밸브

VVF42.../VXF42... 156

VVF43.../VXF43... 175

VVF53.../VXF53... 191

V..F63.. 209

마그네틱 밸브

MXG461.., MXF461.. 228

MVF461H 244

로터리식밸브

VBF21... 258

VKF42... 266

VAG60.../VBG60... 274

VAI60.../VBI60...L/VBI60...T 292

Refrigerant Valve

MVL661... 308

MVS661..N 328

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ACVATIX™

Intelligent Valve - Control valve with integrated energy data

EVG.. EVF..

Intelligent Valve – control valve with integrated energy data acquisition for ventilation and air conditioning plants as well as precontrol groups. Sensor-guided dynamic flow control.

- Valves with threaded connection EVG4U10E..:
  - DN 15…50
  - Nominal volume flow 1.5…18 m³/h
  - Externally threaded connection per ISO-228
- Flanged valves EVF4U20E..:
  - DN 65…125
  - Nominal volume flow 30…120 m³/h
  - Flange connection per ISO 7005-1
- System integration in building automation and control over BACnet IP
- Supports the direct transfer to Siemens Building Operator
- Ultrasonic flow measurement at measuring accuracy ± 2%
- Temperature measurement with paired immersion temperature sensors

Use

The Intelligent Valve is a 2-port PICV with volume flow, temperature and power measurement for heating, ventilation, and air conditioning plants.

The integration of the valve in the temperature control circuit can be analog (DC 0/2...10 V or 4...20 mA) or digital (BACnet IP). All process data (flow, power, primary flow and return temperature, etc.) can be read out digitally even if analog integrated.

The Intelligent Valve also has local limitation and optimization functions that support energy-efficient plant operation.

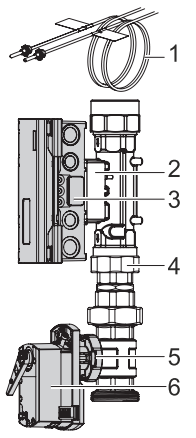
In addition to digital integration in the building automation and control system, integration in the cloud with the Siemens Building Operator app supports the building operator to operate and monitor the system as well as evaluate energy consumption.

Technical design

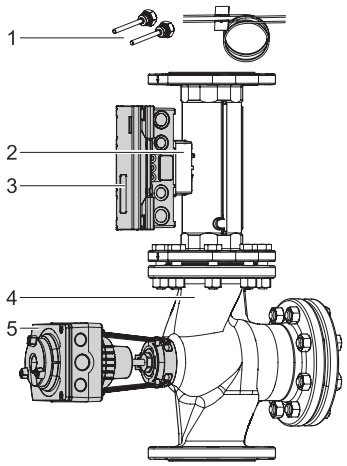
Basic design

The Intelligent Valve combines four main functions:

- Exact, continuous volume flow measurement with an ultrasonic flow sensor
- Precise temperature measurement using paired PT1000 temperature sensors
- Precise volume control using a control valve with an high-resolution actuator
- Dynamic hydraulic balancing, power and energy calculation, data storage and network integration via a central control unit



1	Temperature sensor pair (>DN 50 with protection pockets)	1
2	Ultrasonic flow sensor	2
3	Intelligent Valve controller – Sensor interface – Dynamic flow control – Power and energy measurement – Optimization of heat exchange – Data storage – Network integration	3
4	Flow sensor / valve interface	-
5	Flow control valve	4
6	High-resolution actuator	5



Volume flow is acquired continuously in the ultrasonic flow sensor and provided to the Intelligent Valve controller, where the controller applies it as the actual value for control or limitation by guiding the control valve position until achieving the volume flow actual value for the applicable setpoint.

Control modes

The Intelligent Valve supports three control modes:

- Volume flow control
- Position control
- Output control

Volume flow limitation is active on all four control types!

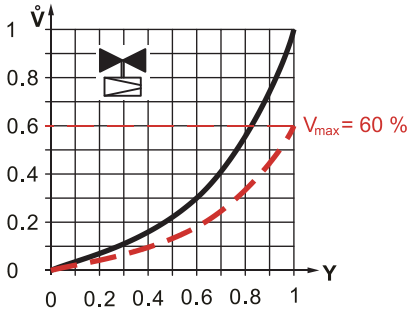
Volume flow control

In the basic configuration, the Intelligent Valve operates as an electronic PICV. This control type is called volume flow control. The positioning signal is proportional to the volume flow to be controlled (setpoint 0% = closed; setpoint 100% = $\dot{V}_{100}$). The setpoint range reflects new limit values (setpoint 0% = $\dot{V}_{min}$, setpoint 100% = $\dot{V}_{max}$), if volume flow limitation ($\dot{V}_{min}$ and/or $\dot{V}_{max}$) is activated. In the volume flow control mode, the flow characteristic curve can be adapted to the transfer behavior of the heat exchanger.

Three characteristic curves are available:

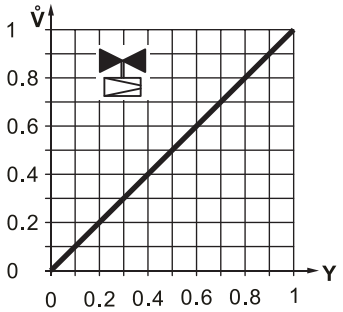
Equal percentage, optimized in the opening range (factory setting)

Recommended for heating and cooling registers, if the transfer characteristic is unknown.



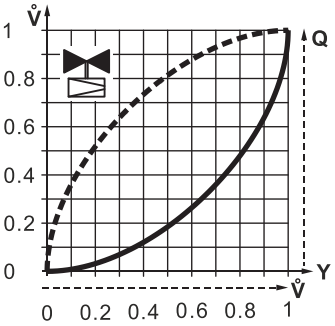
Linear

Recommended for plate heat exchangers water/water or injection circuits in precontrol groups.



Heat exchanger optimized

Recommended for heating and cooling registers, if the transfer characteristic (a-Value) is known.



$\dot{v}$ = Volume flow V / V_{100}
Y = Positioning signal
Q = Heat output

In the event of volume flow limitation, the curve always adapts to the set limitation setpoint (example for equal percentage curve).

Position control

The control valve position is proportional to the setpoint (setpoint 0% = closed; setpoint 100% = H_{100}) – whereby the limitation to the applicable maximum volume flow ($\dot{V}_{100}$ or $\dot{V}_{max}$) remains active. Dynamic volume flow control is inactive in position control mode. The flow characteristic curve for the valves with threaded connection EVG.. is equal percentage with a ngl 2.2; the curve for the flanged valves EVF.. is linear.

Output control

The setpoint for the output for control is interpreted by referencing the output limitation (Y = 0…100% $\dot{Q}_{max}$; 0% = closed; 100% = $\dot{Q}_{max}$), whereby $\dot{Q}_{max}$ is the output limitation in %, relating to the design output of the consumption (heat exchanger/precontrol group).

The design output for the heat exchanger is preset as the design volume flow $\dot{V}_{max}$ and design temperatures $T_{VL,\ design}$ and $T_{RL,\ design}$:
$\dot{Q}_{design} \sim \dot{V}_{max} \cdot (T_{VL,\ design} - T_{RL,\ design})$.

The "Sizing" section provides a table of the output values for water at typical temperature differentials (page 5).

The volume flow maximum limitation ($\dot{V}_{100}$ or $\dot{V}_{max}$) also remains active in the output control mode. In output control, the dynamic volume flow control is inactive, since any undesired change in volume flow automatically results in a change in output, which is not controlled anyway.

The flow characteristic curve is not relevant to output control.

Operating limits

The nominal volume flow and minimum required differential pressure – the Intelligent Valve has, as does any dynamic PICV, a nominal flow $\dot{V}_{100}$ by build design that may not be breached during operation. A minimum differential pressure (Δp_{min}) is calculated from the Intelligent Valve k_{vs} value to achieve the nominal volume flow. In contrast to mechanical PICVs, the electronic volume flow control on the Intelligent Valve remains active below the minimum differential pressure – so that the network is always optimally balanced.

The Intelligent Valve supports different limitation functions:

- Volume flow maximum limitation
- Volume flow minimum limitation
- Output maximum limitation
- Return air temperature min./max. limitation

Volume flow maximum limitation

We recommend activating the volume flow maximum limitation if the design volume flow for the partial plant (heating coil/cooler/precontrol group) controlled by the Intelligent Valve, is lower than the nominal flow of the Intelligent Valve. In volume flow control mode, the set volume flow $\dot{V}_{max}$ – anywhere between 30 and 100% of the nominal volume flow – is interpreted as the 100% setpoint. It serves as just the limitation value in the other control modes.

Volume flow minimum limitation

The volume flow minimum limitation achieves a minimum flow through the controlled partial plant where this appears to be appropriate. The limitation is of course pressure-independent so that there is no over or under supply as the local differential pressure changes.

Output maximum limitation

In contrast to volume flow limitation, the output limitation adapts dynamically to the temperature distribution on the plant. As a consequence, output control is more analogous to a volume flow limitation for critical users.

Return air temperature min./max. limitation

Modern, high-efficiency output generators must have sufficient low/high return temperatures to achieve their output numbers/degree of efficiency. With Intelligent Valve, you can precisely limit the return temperature value as needed by the given plant.

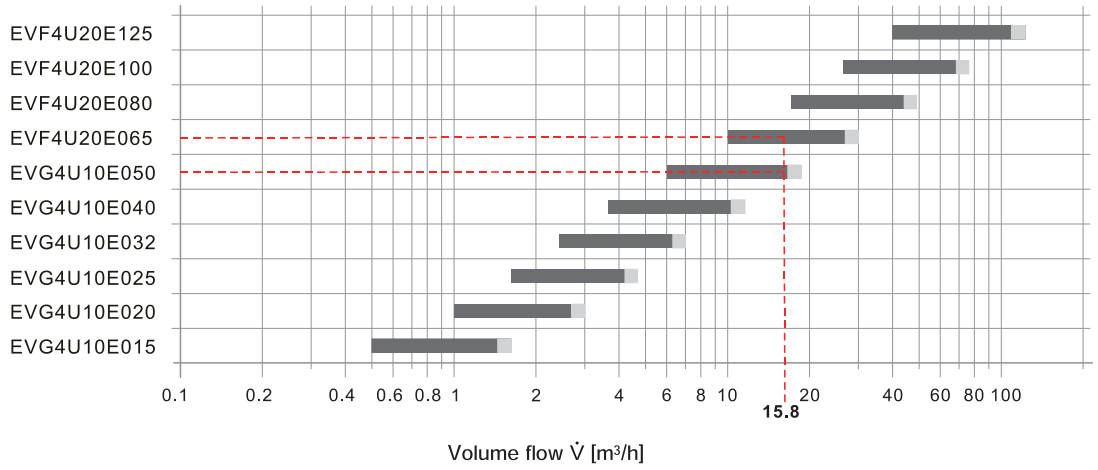
A return temperature maximum limitation is available if the Intelligent Valve is used on a heating application; in a cooling application it has a return temperature minimum limitation at its disposal. The settings are in two steps: Enable the function (1) and set the limitation setpoint (2). The factory setting for maximum limitation is = 40 °C; minimum limitation = 10 °C.

Not all limitations are available to each control mode. The following limitations are available based on control mode:

	Position control	Volume flow control	Output control
Setpoint	External		
Volume flow maximum limitation	Always active		
Volume flow minimum limitation	Selectable		
Output maximum limitation	-		Always active
Return temperature limitation	Selectable		

Sizing

As a pressure-independent solution, it is generally easy to size the Intelligent Valve. If the volume flow is already a known variable, simply select the corresponding valve from the diagram below. The volume flow for control should be between 30 and 90% of the nominal volume flow of the Intelligent Valve.



= Reasonable usable range for presetting flow

= 90...100% of $\dot{V}_{100}$

Example		
Required volume flow $\dot{V}_{max}$	Intelligent Valve selection	
15.8 m³/h	EVG4U10E050: $\dot{V}_{100}$ = 18 m³/h	⇒ $\dot{V}_{max}$ = 88%
	EVF4U20E065: $\dot{V}_{100}$ = 30 m³/h	⇒ $\dot{V}_{max}$ = 53%

Maximum consumer output range at typical temperature differentials:

Type	Order number	DN	$\dot{V}_{100}$ [m³/h]	$\dot{Q}$ [kW] at			
				ΔT 6 K	ΔT 10 K	ΔT 15 K	ΔT 20 K
EVG4U10E015	S55300-M100	15	1.5	10.4	17.4	26.1	34.5
EVG4U10E020	S55300-M101	20	3	20.9	34.8	52	70
EVG4U10E025	S55300-M102	25	4.5	31.3	52	78	104
EVG4U10E032	S55300-M103	32	7	49	81	122	162
EVG4U10E040	S55300-M104	40	11.5	80	133	200	267
EVG4U10E050	S55300-M105	50	18	125	209	313	418
EVF4U20E065	S55300-M106	65	30	209	348	522	696
EVF4U20E080	S55300-M107	80	48	334	557	835	1114
EVF4U20E100	S55300-M108	100	75	522	870	1305	1740
EVF4U20E125	S55300-M109	125	120	835	1392	2088	2784

Engineering example

Calculation basis

1. Determination of heating or cooling demand $\dot{Q}$ [kW]
2. Determination of temperature differential ΔT [K]
3. Calculation of volume flow

$$\dot{V}\left[\frac{m^3}{h}\right] = \frac{Q[kW] \cdot 3600[s]}{4190\frac{kJ}{kgK} \cdot \Delta T[K]}$$

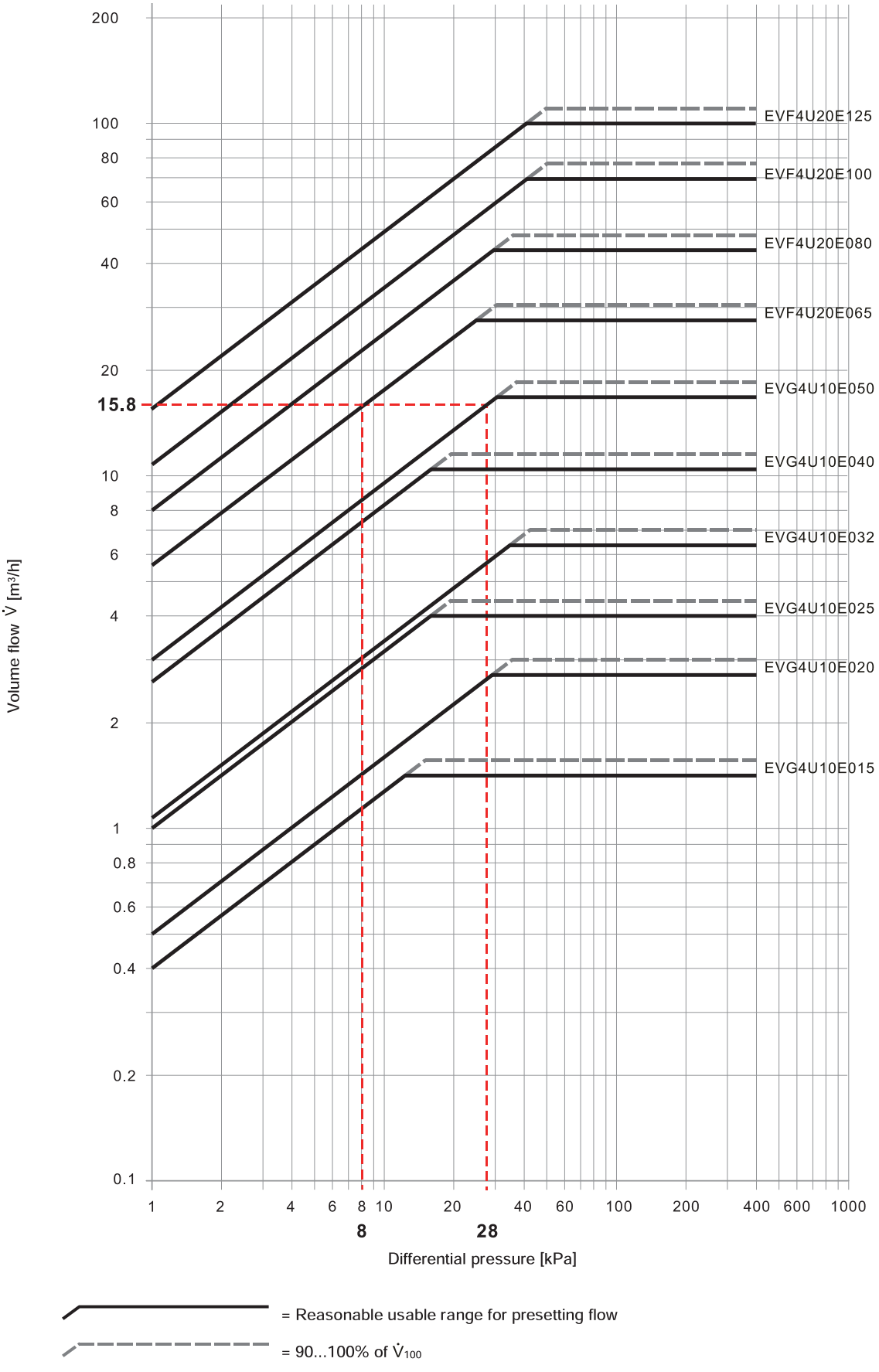
4.
5. Select the suitable Intelligent Valve EV..

Example

1.	Heating/cooling power	$\dot{Q}$ = 110 kW
2.	Temperature spread	ΔT = 6 K
3.	Volume flow $\dot{V}\left[\frac{m^3}{h}\right] = \frac{110\ kW \cdot 3600\ s}{4190\frac{kJ}{kg\ K} \cdot 6\ K} = 15{,}8\ \frac{m^3}{h}$ Note: You can use the valve slider to determine volume flow.	
4.	Select EV.. Select the Intelligent Valve to operate at 90% of the nominal volume flow. This permits setting higher heat or cooling output as needed.	
	Selection:	EVG4U10E050 Δp_{min} = 28 kPa EVF4U20E065 Δp_{min} = 8 kPa
5.	Assess presetting EVG4U10E050: 15.8 / 18 = 88% EVF4U20E065: 15.8 / 30 = 53%	Optimum selection

Sizing diagram

You can rely on the k_{vs} value under Type summary (page 8) to determine the pressure drop at the requested maximum volume flow.



Calculated volume flow $\dot{V}$	Intelligent Valve selection	Differential pressure [kPa]
15.8 m³/h	EVG4U10E050	28
	EVF4U20E065	8

Type summary

Intelligent Valve with threaded connection EVG4U10E..

Type	Order number	DN	$\dot{V}_{100}$ [m³/h]	$\dot{V}_{min}$ [m³/h]	Δp_{max} [kPa]	Δp_s [kPa]	k_{VS} [m³/h]
EVG4U10E015	S55300-M100	15	1.5	0.5	350	1400	4
EVG4U10E020	S55300-M101	20	3	1			5
EVG4U10E025	S55300-M102	25	4.5	1.5			10
EVG4U10E032	S55300-M103	32	7	2.3		1000	11
EVG4U10E040	S55300-M104	40	11.5	3.5		800	26
EVG4U10E050	S55300-M105	50	18	6		600	30

Flanged Intelligent Valve EVF4U20E..

Type	Order number	DN	$\dot{V}_{100}$ [m³/h]	$\dot{V}_{min}$ [m³/h]	Δp_{max} [kPa]	Δp_s [kPa]	p_s [kPa]	k_{VS} [m³/h]
EVF4U20E065	S55300-M106	65	30	10	500	1600	1500	55
EVF4U20E080	S55300-M107	80	48	16			1200	80
EVF4U20E100	S55300-M108	100	75	25			1600	113
EVF4U20E125	S55300-M109	125	120	40				142

DN = Nominal size
$\dot{V}_{100}$ = Volumetric flow through fully open valve
$\dot{V}_{min}$ = Smallest presettable volumetric flow through fully open valve
Δp_{max} = Maximum permissible differential pressure across the valve's control path, valid for the entire actuating range of the motorized valve
Δp_s = Maximum permissible differential pressure at which the motorized valve will close securely against the pressure (close off pressure)
p_s = Permissible operating pressure
k_{VS} = Flow nominal value of cold water (5…30 °C) through fully opened valve at a differential pressure of 100 kPa (1 bar)

Scope of delivery

The Intelligent Valve is supplied as a complete set consisting of:

EVG.. with threaded connection	EVF.. flanged
Intelligent Valve controller	
Actuator	
Flow section (control valve and flow sensor are preinstalled)	Flow sensor
	Control valve
Temperature sensor pair for direct mounting (order protection pockets separately)	Temperature sensor pair including protection pockets

The device is not supplied without fittings, mating flange, and gaskets.

Accessories/ spare parts

Accessories

Type	Order number	Designation	
EZT-M40	S55845-Z231	Protection pockets, brass, for DN 15...50	DN 65...125 include protection pockets!
EZU-WA	S55845-Z234	Wall mount for Intelligent Valve controller	Use at high media temperatures (>90 °C)
ALX15	S55845-Z174	Filter with internal threading, DN 15	Filter
ALX20	S55845-Z175	Filter with internal threading, DN 20	
ALX25	S55845-Z176	Filter with internal threading, DN 25	
ALX32	S55845-Z177	Filter with internal threading, DN 32	
ALX40	S55845-Z178	Filter with internal threading, DN 40	
ALX50	S55845-Z179	Filter with internal threading, DN 50	
QBE3000-D1.6	S55720-S174	Differential pressure sensor for fluids and gas (0…10 V)	0…1.6 bar
QBE3000-D2.5	S55720-S175		0…2.5 bar
QBE3000-D4	S55720-S176		0…4 bar

Spare parts

Type	Order number	Designation
ASE4U10E	S55845-Z205	Intelligent Valve controller for PICV, series EVG4U.. and EVF4U..
AVG4E015VAG	S55845-Z223	Control valve section PN 16 for Intelligent Valve EVG4..1.E015, DN 15 with threaded connection, k_{vs} 4 m³/h
AVG4E020VAG	S55845-Z224	Control valve section PN 16 for Intelligent Valve EVG4..1.E020, DN 20 with threaded connection, k_{vs} 5 m³/h
AVG4E025VAG	S55845-Z225	Control valve section PN 16 for Intelligent Valve EVG4..1.E025, DN 25 with threaded connection, k_{vs} 10 m³/h
AVG4E032VAG	S55845-Z226	Control valve section PN 16 for Intelligent Valve EVG4..1.E032, DN 32 with threaded connection, k_{vs} 11 m³/h
AVG4E040VAG	S55845-Z227	Control valve section PN 16 for Intelligent Valve EVG4..1.E040, DN 40 with threaded connection, k_{vs} 26 m³/h
AVG4E050VAG	S55845-Z228	Control valve section PN 16 for Intelligent Valve EVG4..1.E050, DN 50 with threaded connection, k_{vs} 30 m³/h
AVF4E065	S55845-Z213	Ultrasonic flow sensor for Intelligent Valve DN 65 mounting length 300 mm, flanged DN 65, PN 16
AVF4E080	S55845-Z214	Ultrasonic flow sensor for Intelligent Valve DN 80 mounting length 300 mm, flanged DN 80, PN 16
AVF4E100	S55845-Z215	Ultrasonic flow sensor for Intelligent Valve DN 100 mounting length 360 mm, flanged DN 100, PN 16
AVF4E125	S55845-Z216	Ultrasonic flow sensor for Intelligent Valve DN 125 mounting length 360 mm, flanged DN 100, PN 16
ALF4E065	S55845-Z218	Control valve mounting set PN16 for Intelligent Valve DN 65 (EVF4..2..E065), flanged
ALF4E080	S55845-Z219	Control valve mounting set PN16 for Intelligent Valve DN 80 (EVF4..2..E080), flanged
ALF4E100	S55845-Z220	Control valve mounting set PN16 for Intelligent Valve DN 100 (EVF4..2..E100), flanged
ALF4E125	S55845-Z221	Control valve mounting set PN16 for Intelligent Valve DN 125 (EVF4..2..E125), flanged

Type	Order number	Designation
EZU10-2615	S55845-Z229	Temperature sensor pair Pt1000, DS M10x1, Ø 5.2 x 26 mm, cable length 1.5 m
EZU10-10025	S55845-Z230	Temperature sensor pair Pt1000, PL Ø 6 x 105 mm, cable length 2.5 m
EZT-S100	S55845-Z232	Protection pocket G ½ B'', G ¼ B'', stainless steel, Ø 6.2 x 92.5 mm, for temperature sensors Ø 6 x 105 mm
GLA161.9E/HR	S55499-D444	Rotary actuator for ball valves, AC/DC 24 V, 10 Nm, NSR, modulating 0…10 V Highly accurate positioning signal, only for use with Intelligent Valve EVG4U10E..
SAX61.03/HR	S55150-A142	Valve actuator 800 N, 20 mm stroke, AC/DC 24 V, modulating 0…10 V Highly accurate positioning signal, only for use with Intelligent Valve EVF4U20E.., DN 65 and DN 80
SAV61.00/HR	S55150-A146	Valve actuator1600 N, 40 mm stroke, AC/DC 24 V, modulating 0…10 V Highly accurate positioning signal, only for use with Intelligent Valve EVF4U20E.., DN 100 and DN 125

Product documentation

Title	Content	Document ID
Intelligent Valve - Control valve with integrated energy data acquisition	Data sheet: Product description EVG.., EVF..	A6V11444716
Rotary actuators for ball valves together with the Intelligent Valve Controller	Data sheet: Product description GLA161.9E/HR	A6V11418678
Electromotive actuator in combination with the Intelligent Valve Controller	Data sheet: Product description SAX61.03/HR, SAV61.00/HR	A6V11418660
Actuators SAX.., SAY.., SAV.., SAL.. for valves	Basic document: Comprehensive information on the new generation of SAX.., SAV.. actuators	P4040
EVF.. / EVG..	Mounting Instructions	A6V11449479
GLA161.9E/HR	Mounting Instructions	A6V11418688
AVG4..VAG	Mounting Instructions	A6V11449852
AVF4..	Mounting Instructions	A6V11478285
Readme OSS "Intelligent Valve – 1.1"	OSS document Open source software components, copyright holders, license conditions	A6V11676101

Related documents such as environmental declarations, CE declarations, etc., can be downloaded at the following Internet address:

http://siemens.com/bt/download

Note concept

The safety notices must be observed in order to protect people and property.

The safety notices in this document contain the following elements:

- Symbol for danger
- Signal word
- Nature and origin of the danger
- Consequences if the danger occurs
- Measures or prohibitions for danger avoidance

Symbol for danger

	This is the symbol for danger. It warns of **risks of injury.** Follow all measures identified by this symbol to avoid injury or death.

Additional danger symbols

These symbols indicate general dangers, the type of danger or possible consequences, measures and prohibitions, examples of which are shown in the following table:

 General danger

 Explosive atmosphere

 Voltage/electric shock

 Laser light

 Battery

 Heat

Signal word

The signal word classifies the danger as defined in the following table:

Signal word	Danger level
DANGER	'DANGER' identifies a dangerous situation, which **will result directly in death or serious injury** if you do not avoid this situation.
WARNING	'WARNING' identifies a dangerous situation, which **may result in death or serious injury** if you do not avoid this situation.
CAUTION	'CAUTION' identifies a dangerous situation, which could result in **slight to moderately serious injury** if you do not avoid this situation.
NOTICE	'*NOTICE*' identifies a possibly harmful situation or possible damage to property that may result from non-observance. '*NOTICE*' does not relate to possible bodily injury.

How risk of injury is presented

Information about the risk of injury is shown as follows:

	⚠ WARNING
	Nature and origin of the danger Consequences if the danger occurs • Measures / prohibitions for danger avoidance

How possible damage to property is presented

Information about possible damage to property is shown as follows:

	*NOTICE*
	Nature and origin of the danger Consequences if the danger occurs • Measures / prohibitions for danger avoidance

Safety

	⚠ CAUTION
	National safety regulations Failure to comply with national safety regulations may result in personal injury and property damage. • Observe national provisions and comply with the appropriate safety regulations.

Qualified personnel

	*NOTICE*
	Qualified personnel! Improper installation can invalidate safety precautions not otherwise discernable to an ordinary person. • Technical knowledge of HVAC plants required for installation. • Only qualified personnel may undertake the installation. • Prevent access by ordinary persons, especially children.

All personnel must be persons who can be reasonably expected to work reliably and conscientiously. Persons whose ability to react is impaired, e.g. by drugs, alcohol or medication, are prohibited from working with the devices.

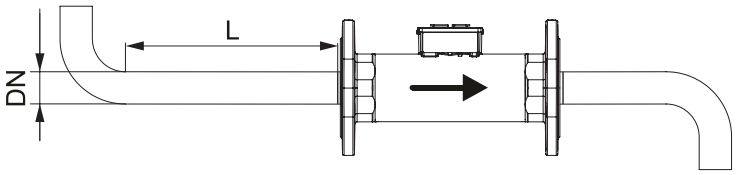
Heating technician

Due to their specialist training, knowledge and experience, as well as knowledge of relevant standards and regulations, the heating technician is able to perform mechanical tasks on HVAC plants and independently recognize possible dangers and avoid them.

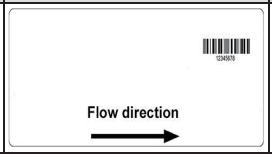
The heating technician is trained specially for the working environment they are operating in, and knows the relevant standards and regulations.

Engineering

An unhindered inlet section of L = 5 x DN must be maintained upstream of the flow sensor to guarantee the indicated measurement and control accuracy.



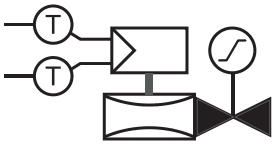
L ≥ 5 x DN

Valve.	Symbol / flow direction EVG.. / EVF..	Flow in control mode		Valve stem	
		Input	Output	SAX.. / SAV..: Retracts	SAX.. / SAV..: Extends
				GLA..: Clockwise rotation	GLA..: Counterclockwise rotation
Intelligent Valve		Variable		Closes	Opens

The indicated flow direction (arrow on the flow sensor and valve body) must be correct; the Intelligent Valve cannot otherwise be operated!

The rule is: First measure, then control – in other words, the flow sensor must always be mounted upstream of the control valve.

The Intelligent Valve should be installed in the return for optimum performance. The components are subject to less wear and tear due to the lower temperatures.

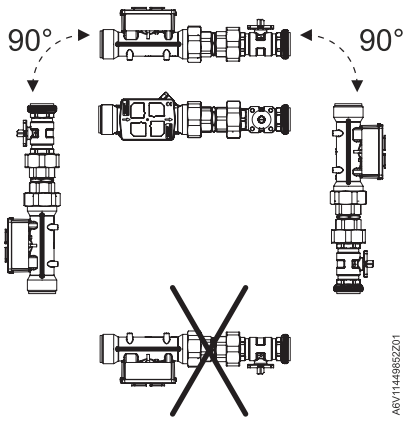
Symbol in catalogs and application descriptions	Symbol in diagrams
	There are no standard symbols for PICVs in the diagrams

We recommend installing a filter or strainer, e.g. ALX.., in the flow to the heat exchanger. This increases the reliability and life cycle of the Intelligent Valve.

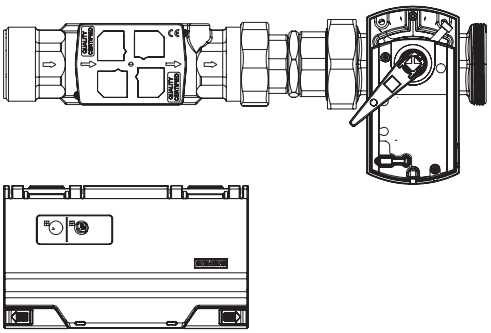
Mounting

The Intelligent Valve is assembled at the mounting location. No adjustments, with the exception of configuring with the ABT Go app (see 'Commissioning', page 16) nor special tools required. Separating mounting instructions are included with the valve and flow sensor.

Mounting positions



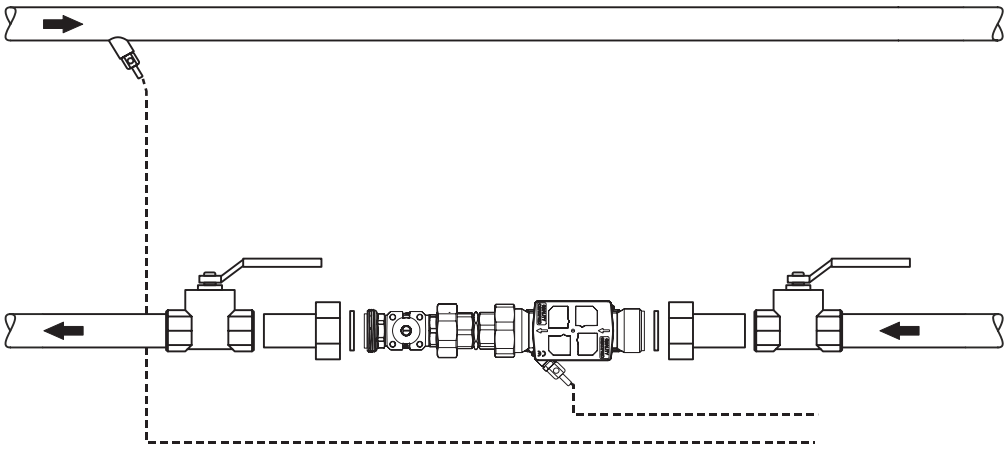
Mount the flow sensor in the return if the media temperatures exceed (>90 °C). If not possible, mount the Intelligent Valve controller remotely from the flow sensor and use the wall-mount plate EZU-WA.



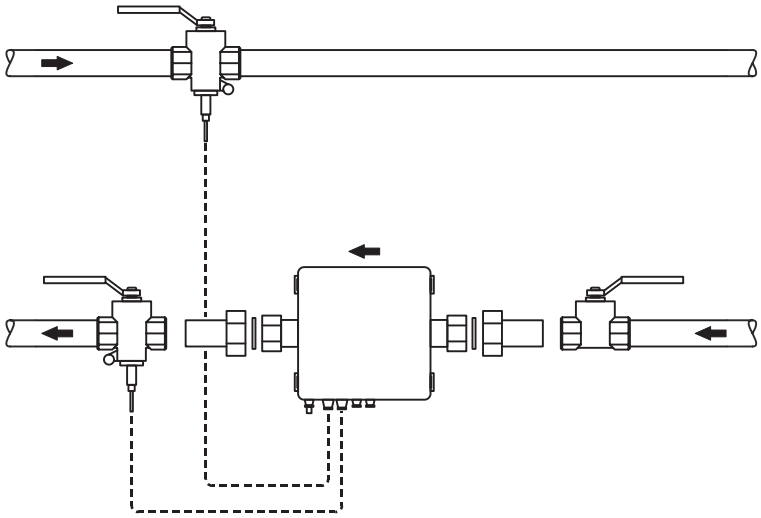
Mount temperature sensors

Valves with threaded connection **EVG4U10E..**

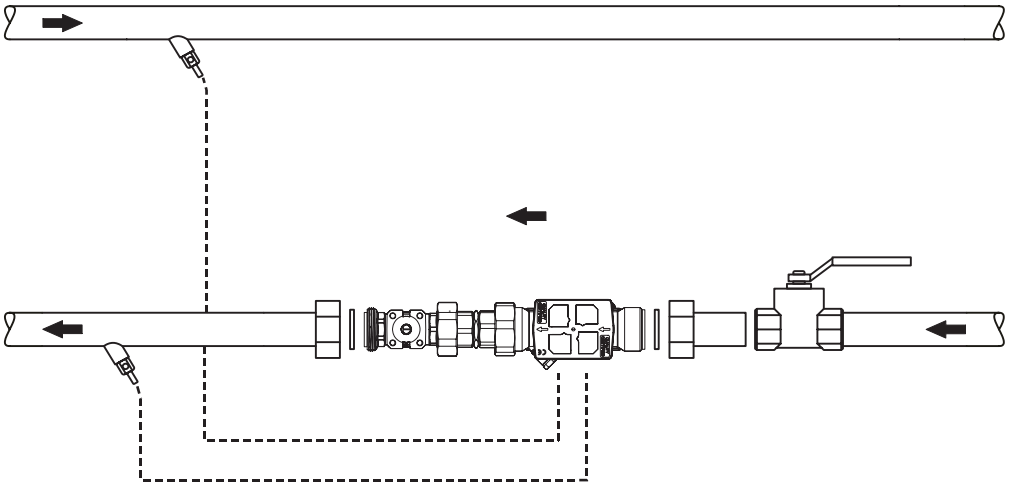
The EVG.. valves with threaded connection are supplied with direct immersion temperature sensors EZU10-2615.
The sensors with the M10x1 threaded connection can be directly immersed in the flow sensor. The second temperature sensor is also directly immersed with the WZT-G10 welding sleeve.



As an alternative, the sensors can be installed directly immerse in off-the-shelf ball valves with integrated measuring points (e.g. Siemens WZT-K.. / Jumo 902442/11) or t-pieces (e.g. Jumo 902442/31).



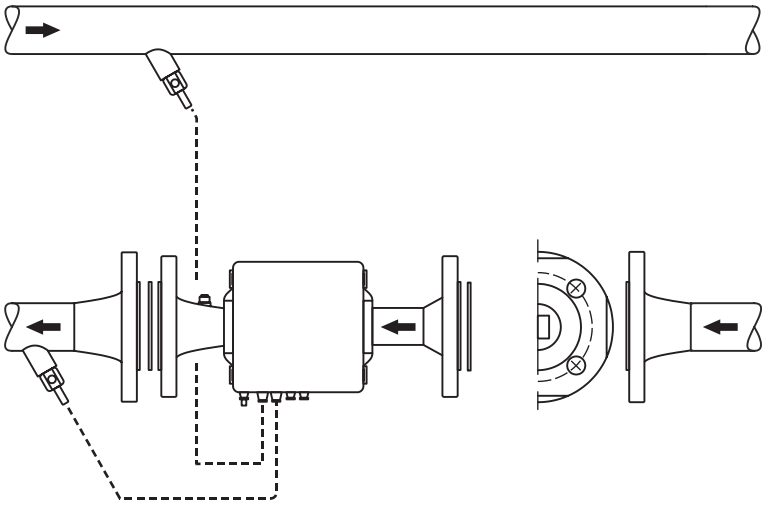
The brass protection pocket EZT-M40 is available for mounting with protection pockets.



Flanged valves **EVF4U20E..**

The EVF.. flanged valves include the temperature sensors EZU10-10025 for installing in the protection pockets EZT-S100.

Welding sleeves must be planned on the construction side (e.g. WZT-G12) – installation example with protection pocket.



Commissioning

The device has only a simple user interface.

Siemens ABT Go app is used to actually commission the device.

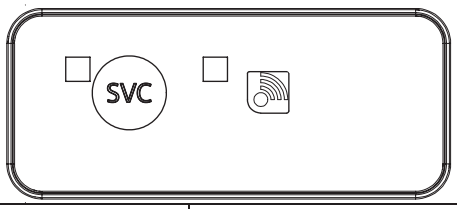
ABT Go App

The Siemens ABT Go app is available in iOS and Android versions in the corresponding app stores and can be used on smartphones and tablets. It connects directly over WLAN. The Intelligent Valve's own WLAN key activates the device's WLAN access point.

The following are the most important setting parameters for commissioning the Intelligent Valve:

Parameter	Value range	Description	Factory setting	Access level
Control mode	Position control Volume flow control Output control	See "Control modes" (page 3)	Air volume control	Measuring and control technician
$\dot{V}_{max}$	30...100%	Maximum volume flow applicable to all control modes. It is used for hydraulic balancing of the consumer. Can be set in the ABT Go app in the units m^3/h, l/h, l/min or l/s.	Active 100%	Installer
$\dot{V}_{Min.}$	2,5...20%	Minimum volume flow applicable to all control modes. Can be set in the ABT Go app in the units m^3/h, l/h, l/min or l/s.	Inactive	Installer
Setpoint source	Terminal BACnet IP local	Selection whether to interpret input X1 as the setpoint, whether it originates from a BACnet network, or whether it is set locally to a fixed value.	Terminal	Measuring and control technician
Setpoint signal	0...10 V 2...10 V 4...20 mA	Signal type pending at input X1	0...10 V	Measuring and control technician
Actual value parameter	Position Volume flow 0…V_{100}	Selection whether the analog signal at output X2 depicts the valve position or volume flow. For volume flow, 0...V_{100} = 0...100% is depicted	Volume flow 0…V_{100}	Measuring and control technician
Actual value signal type	0...10 V 2...10 V 4...20 mA	Signal type pending at output X2	-	Measuring and control technician
Flow characteristics	Linear Equal percentage	The flow characteristic flow can be selected in the volume flow control operating mode.	Equal percentage	Measuring and control technician

User interface on the device

Service LED • Indicates the operating state (see table below)	Communication LED • Indicates the communication state (see table below)
	
Service button • Overrides the setpoint and sets $\dot{V}_{max}$ for 10 minutes (press for 3…6 s) • Start the flow test (press 6...8 s)	WLAN button • Enables the integrated WLAN access point for 10 min

Engineering

Service LED			SVC
Color	Blinking pattern		Description
	On	Off	
Green	0.5 s	0.5 s	Device in configuration mode
	4.75 s	0.25 s	Normal operation
	0.25 s	0.25 s	Stop local forced control
Blue	0.5 s	0.5 s	Local forced control – Flow test
Yellow	0.5 s	0.5 s	Local forced control – Continuous nominal flow
Red	0.5 s	0.5 s	Fault input/output or component: • Flow sensor – Wrong direction of flow – Air in sensor – Sensor connection faulty • Temperature sensor – Damaged cable – Short circuit. • Actuator – Blocked – Faulty connection • Setpoint input terminal – Faulty connection – Invalid signal
	Continuous	-	Fault
-	-	-	Undervoltage / Device starts up

Communication LED			
Color	Blinking pattern		Description
	On	Off	
-	-	-	• No communication • Ethernet cable unplugged • Start-up
Blue	0.5 s	0.5 s	WLAN enabled
	Continuous	-	Data transmission WLAN
Green	0.5 s	0.5 s	TCP/IP communications error – IP address not available
	Continuous	-	TCP/IP data transmission
	Continuous	-	RS485 data transmission

Network integration

The Intelligent Valve can be integrated over TCP/IP in a BACnet IP network. A complete list of supported BACnet data points is included in the document "Intelligent Valve BACnet system integration".

ABT Go app configures the network parameters.

Maintenance

Control valves EVF.. and EVG.. are maintenance free.

Disposal

The device is considered an electronic device for disposal in terms of the European Directive and may not be disposed of as domestic waste.

- Use only designated channels for disposing the devices.
- Comply with all local and currently applicable laws and regulations.

Warranty service

Bestimmungsgemässe Verwendung

⚠ WARNING

Proper use

Improper use can lead to injuries as well as damage to the device or plant.

- Siemens products may only be used fort he applications described in the catalog and in the relevant technical documentation.
- User-related technical data are only guaranteed in connection with the products listed in this document. Siemens rejects any and all warranties in the event that third-party products are used.
- Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without problems.
- The permissible ambient conditions must be complied with. The information in the relevant technical documentation must be observed.

Liability disclaimer

The contents of this document have been checked for consistency with the hardware and firmware described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the information provided in this document is reviewed regularly and necessary corrections are included in subsequent editions. Suggestions for improvement are welcome.

Radio equipment directive

The device is using harmonized frequency in Europe, and is also in compliance with the Radio Equipment Directive (2014/53/EU, formerly 1999/5/EC).

Open Source Software (OSS)

Software License Summary

These devices incorporate open source software (OSS), please refer to the OSS document for the specific controller type and valid version set.

Title: Readme OSS "Intelligent Valve – 1.1"

All open source software components used within the product (including their copyright holders and the license conditions) can be found in the document A6V11676101 at http://siemens.com/bt/download.

Cyber security disclaimer

Siemens provides a portfolio of products, solutions, systems and services that includes security functions that support the secure operation of plants, systems, machines and networks. In the field of Building Technologies, this includes building automation and control, fire safety, security management as well as physical security systems.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art security concept. Siemens' portfolio only forms one element of such a concept.

You are responsible for preventing unauthorized access to your plants, systems, machines and networks which should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place. Additionally, Siemens' guidance on appropriate security measures should be taken into account. For additional information, please contact your Siemens sales representative or visit https://www.siemens.com/global/en/home/company/topic-areas/future-of-manufacturing/industrial-security.html.

Siemens' portfolio undergoes continuous development to make it more secure. Siemens strongly recommends that updates are applied as soon as they are available and that the latest versions are used. Use of versions that are no longer supported, and failure to apply the latest updates may increase your exposure to cyber threats. Siemens strongly recommends to comply with security advisories on the latest security threats, patches and other related measures, published, among others, under https://www.siemens.com/cert/en/cert-security-advisories.htm.

Technical data

Dimensions and weight
See "Dimensions" (page 27)

Power supply		EVG4U10E..	EVF4U20E.. DN 65…80	EVF4U20E.. DN 100…125
Operating voltage		AC 24 V ~ ±20% (19.2…28.8 V ~) DC 24 V ⎓ ±20% (19.2…28.8 V ⎓)		
Frequency		50 Hz / 60 Hz		
Power consumption including connected field devices				
	Operation	5 W	6.25 W	8 W
	Normal position	2.7 W	3.5 W	3.5 W
	Sizing	8.5 VA	14 VA	16 VA
Power consumption ASE4U10E				
	Operation	3.5 W		
	Normal position	2 W		
	Sizing	6 VA (controller without actuator!)		
Internal fuse		Irreversible		
External fusing of supply line		• Fuse slow 6…10 A • Circuit breaker: Max. 13 A, type B, C, D per EN 60898 • Power source with current limitation of max. 10 A		

Interfaces	
Ethernet	Plugs: 2 x RJ45, screened Interface type: 100BASE-TX, IEEE 802.3 compatible Bitrates: 10/100 Mbps, autosensing Protocol: BACnet over UDP/IP
USB (2.0)	Plug: Micro-B Data rate: 1.5 Mbps and 12 Mbps No galvanic isolation to ground
L-bus	Baud rate: 2.4 kBaud Bus power: 10 mA Short-circuit proof Protection against faulty wiring at max. AC 24 V

Function data

Control valve.	EVG4U10E..	EVF4U20E..
Nominal flow	See Type summary (page 8).	
Adjustable flow as [%] of V_{100}	30…100%	
Control accuracy	±6%	
Permissible media	Chilled and hot water	
Medium temperature	1…120 °C	
Operating pressure p_s	1600 kPa	See Type summary (page 8).
Differential pressure Δp_{max} / Δp_s	See Type summary (page 8).	
Valve flow characteristic	Linear or equal percentage, ngl = 3.0 VDI/VDE 2173, optimized in closing range	

Control valve.	EVG4U10E..	EVF4U20E..
Leakage rate	Waterproof per EN 60534-4 L/1, improved class 5	0…0.03% of k_{vs} value
Mounting position	Upright to horizontal	
Valve body	Brass	Cast iron
Blank flange	-	
Valve stem, seat, ball	Brass	Stainless steel
Stem sealing gland	EPDM	

Actuator	EVG4U10E.. GLA161.9E/HR	EVF4U20E.. SAX61.03/HR	EVF4U20E.. SAV61.00/HR
Positioning time (at the specified nominal stroke)	90 s	30 s	120 s
Positioning force	-	800 N	1600 N
Nominal torque	10 Nm	-	
Nominal rotational angle	90°		
Nominal stroke	-	20 mm	40 mm

Flow measurement		EVG4U10E..	EVF4U20E..
Ultrasonic volume flow measurement		Yes	
Measuring accuracy		±2%	
Minimum flow measurement		1% of V_{100}	
Material of measuring pipe			
	DN 15…50	Brass	-
	DN 65	-	Brass
	DN 80		Nodular cast iron EN-GJS-500
	DN 100…125		Brass

Temperature measurement		EVG4U10E..	EVF4U20E..
Measuring accuracy absolute temperature		±0.6 °C at 20 °C ±0.8 °C at 60 °C (PT1000 EN60751, class B)	
Measuring accuracy temperature difference		±0.2 K at ΔT = 20 K	
Resolution		0.085 °C	
Permissible operating pressure for direct immersion sensor		PN 16	-
Housing for direct immersion sensor DS M10x1; Ø 5.2 x 26 mm, cable length 1.5 m		Stainless steel	-
Protection pocket G ½ B", Ø 6.2 x 92.5 mm, for temperature sensors Ø 6 x 105 mm			
	Permissible operational pressure	PN 25	
	Material	Brass	Stainless steel

Inputs

The inputs are protected against incorrect wiring AC/DC 24 V.

Positioning signal input, analog (input X1)			
Type	Range (over range)	Resolution	Input resistance (R_{in})
AI 0…10 V	0…10 V (-1…11 V)	1 mV	100 kΩ
AI 2…10 V	2…10 V (1…11 V)	1 mV	100 kΩ
AI 4…20 mA	4…20 mA (0…20 mA)	2.3 µA	<460 Ω
Open connection: Negative voltage -3.1 V (line failure detection)			

Positioning signal input, analog (input X1)		
Type	Range (over range)	Resolution
AI (LG-)Ni1000	-40…150 °C (-45…160 °C) -40…302 °F (-49…320 °F)	55 mK 0.099 °F
AI PT1K 385 (EU)		85 mK 0.153 °F
AI Ni1000 DIN		45 mK 0.081 °F
AI NTC10K	-35…110 °C (-40…115 °C) -31…230 °F (-40…239 °F)	20 mK (25 °C) 0.036 °F (77 °F)
AI NTC100K	-35…120 °C (-40…125 °C) -31…248 °F (-40…257 °F)	20 mK (25 °C) 0.036 °F (77 °F)

Position feedback, analog (Input U)			
Type	Range (over range)	Resolution	Input resistance (R_{in})
AI 0…10 V	0…10 V (-1…11 V)	1 mV	100 kΩ
Open connection: Negative voltage -3.1 V (line failure detection)			

Temperature measurement for power measurement, analog (Inputs B7, B26)		
Type	Range (over range)	Resolution
AI PT1K 385 (EU)	-40…150 °C (-45…160 °C) -40…302 °F (-49…320 °F)	85 mK 0.153 °F

Temperature and voltage measurement, analog (Input X3)			CURRENTLY NOT IN USE
Type	Range (over range)	Resolution	
AI PT1K 385 (EU)	-40…150 °C (-45…160 °C) -40…302 °F (-49…320 °F)	85 mK 0.153 °F	
AI (LG-)Ni1000		55 mK 0.099 °F	
AI Ni1000 DIN		45 mK 0.081 °F	
AI NTC10K	-35…110 °C (-40…115 °C) -31…230 °F (-40…239 °F)	20 mK (25 °C) 0.036 °F (77 °F)	
AI NTC100K	-35…120 °C (-40…125 °C) -31…248 °F (-40…257 °F)	20 mK (25 °C) 0.036 °F (77 °F)	
AI 0…10 V	0…10 V (-1…11 V)	1 mV	100 kΩ
AI 0…10 V standard	0…100% (-10…110%)	1 mV	
Open connection: Negative voltage -1.5 V, 8 µA (line failure detection)			

Flow measurement, digital (Input DU)
Use only the flow sensors specified in the data sheet.

Outputs

The outputs are protected against short circuiting and incorrect wiring AC/DC 24 V.

Position feedback, analog (output X2)			
Type	**Range (over range)**	**Resolution**	**Output current / output impedance**
AO 0-10 V	0...10 V (0...10.5 V)	11 mV	Max. 1 mA
AI 4…20 mA	4…20 mA (4…20 mA)	22 µA	<650 Ω

Signal output, analog (Output Y)			
Type	**Range (over range)**	**Resolution**	**Output current**
AO 0-10 V	0...10 V (0...10.5 V)	11 mV	Max. 1 mA

Switching outputs relay (Outputs Q13, Q14)	CURRENTLY NOT IN USE
Type	Relay
Switching voltage	AC 24 V / DC 30 V
Permissible load current	100 mA

Supply for field devices (outputs V~)	
Output voltage	AC / DC 24 V
Permissible load current	10 A
Protection against overload	None

Conformity

Protection class	
Housing protective class from vertical to horizontal (see 'Mounting', page 14)	IP 54 as per EN 60529
Insulation class	As per EN 60730
AC / DC 24 V	III

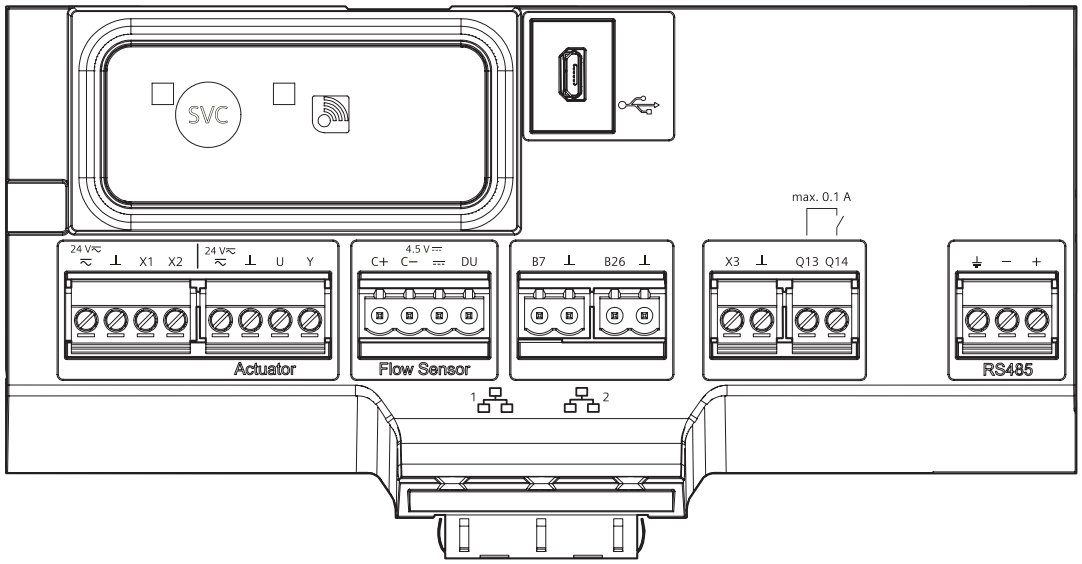
Ambient conditions		
Operation		as per EN 60721-3-3
	Climatic conditions	Class 3K5
	Mounting location	Indoors (weather-protected)
	Temperature (general)	-5...< 55 °C
	Humidity (non-condensing)	5...95% r.h.
Transport		as per EN 60721-3-2
	Climatic conditions	Class 2K3
	Temperature	-25...70 °C
	Humidity	< 95% r.h.
Storage		Per IEC 60721-3-1
	Climatic conditions	Class 1K5
	Temperature	-5...55 °C
	Humidity	5...95% r.h.
Max. media temperature when mounted on valve		120 °C

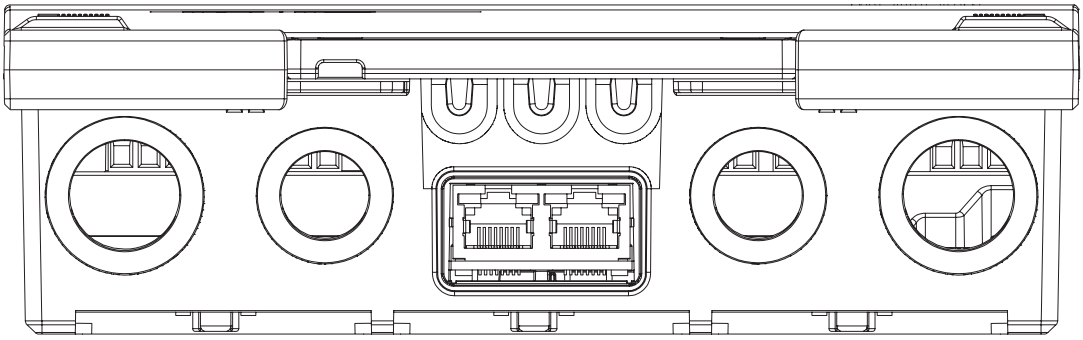
Directives and standards		
Product standards		EN 60730-x
Electromagnetic compatibility (field of use)		For residential, commercial, and industrial environments
EU conformity (CE)		
	EVG.. / EVF..	A6V11692721 [1]
	ASE4U10E	A6V11664685 [1]
	AVG4E..VAG / AVF4E..	A6V11692707 [1]
	GLA161.9E/HR	A6V101082021 [1]
	SAV61.00/HR	A6V10455624 [1]
	SAX61.03/HR	A6V10321559 [1]
	EZU10-..	A6V11692688 [1]
RCM Conformity		
	EVG.. / EVF..	A6V11694334 [1]
	ASE4U10E	A6V11692702 [1]
	AVG4E..VAG / AVF4E..	A6V11692730 [1]
	GLA161.9E/HR	A6V101082027 [1]
	SAV61.00/HR	A6V10455626 [1]
	SAX61.03/HR	A6V10402431 [1]
EAC compliance		Eurasian compliance for all EVG../EVF..

Environmental compatibility		
The product environmental declarations listed below contain data on environmentally compatible product design and assessments (RoHS compliance, material composition, packaging, environmental benefit, and disposal).		
	ASE4U10E	A6V11684717 [1]
	AVG4E..VAG	A6V11654066 [1]
	AVF4E..	A6V11654064 [1]
	ALF4E..	A6V11654081 [1]
	EZU10-..	A6V11684742 [1]
	GLA161.9E/HR	A6V101033533 [1]
	SAV61.00/HR	A6V10450170 [1]
	SAX61.03/HR	A6V10691442 [1]
	VVF42..KC	A6V10824366 [1]
	EZT..	A6V11684744 [1]
	EZU-WA	A6V11654200 [1]

[1] Documents can be downloaded at http://www.siemens.com/bt/download.

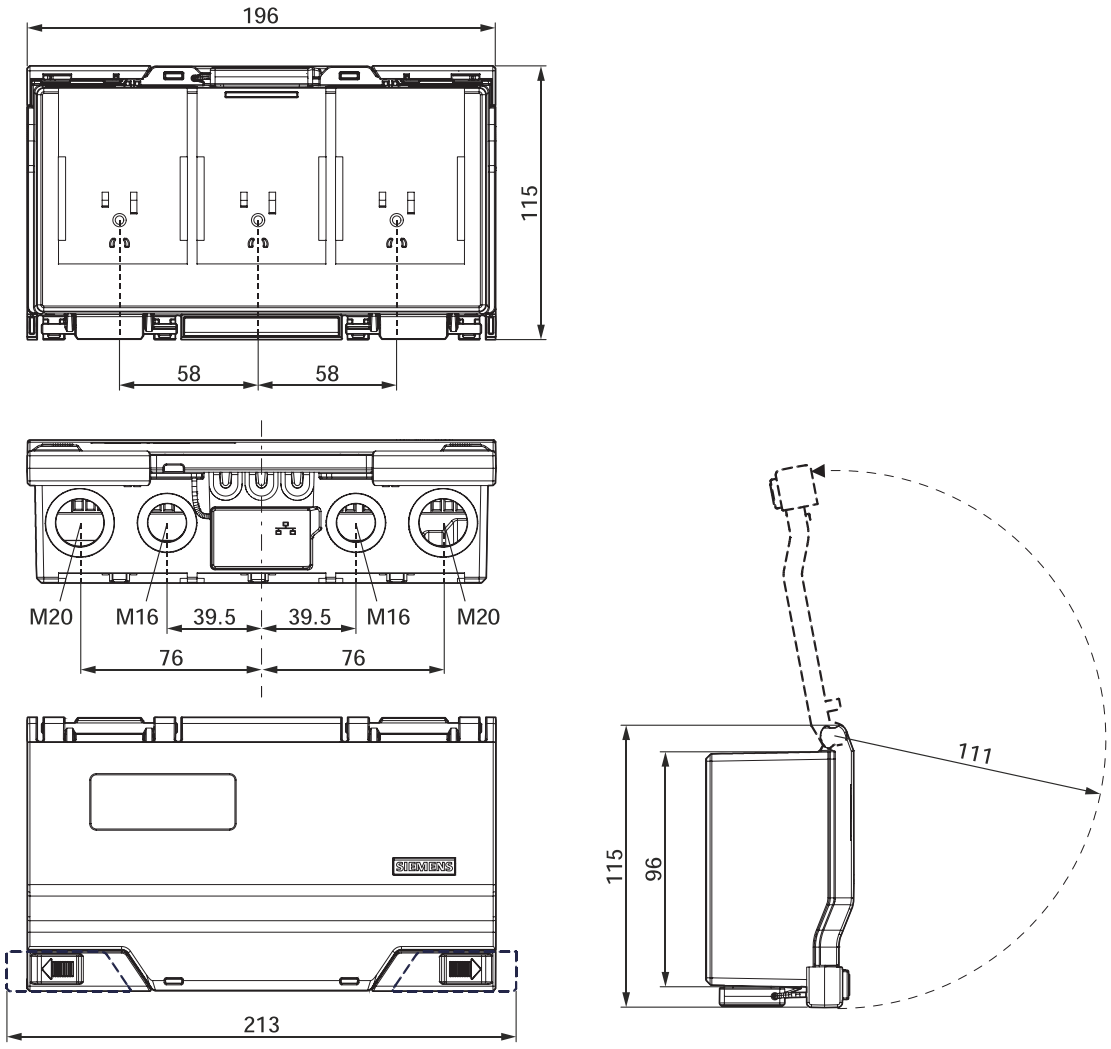
Connection terminals





Connecting thread	Description	Terminal
1, 2 Ethernet	2 x RJ45 interface for 2-port Ethernet switch	
	Power SELV/PELV AC/DC 24 V	V~
	System zero	⊥
	Setpoint input Intelligent Valve: DC 0/2…10 V; 4…20 mA	X1
	Actual value output for Intelligent Valve: DC 0/2…10 V; 4…20 mA	X2
USB	USB interface	
Actuator	Field supply AC 24 V for actuator	V~
	System zero	⊥
	Position feedback actuator DC 0…10 V	U
	Positioning signal actuator DC 0…10 V	Y
Flow sensor	L-bus potential	C+
	L-bus neutral (Galvanically insulated)	C-
	Power flow sensor (DC 4.5 V)	⎓
	Pulse input	DU
Analog inputs	Passive temperature input	B7
	System zero	⊥
	Passive temperature input	B26
	System zero	⊥
	Currently not in use	X3
		⊥
	Currently not in use	Q13
		Q14
RS 485	Currently not in use	
		-
		+
Service	Service button	SVC
Display	Operation LED	
Com/ WLAN	WLAN button	
Display	Communication LED	

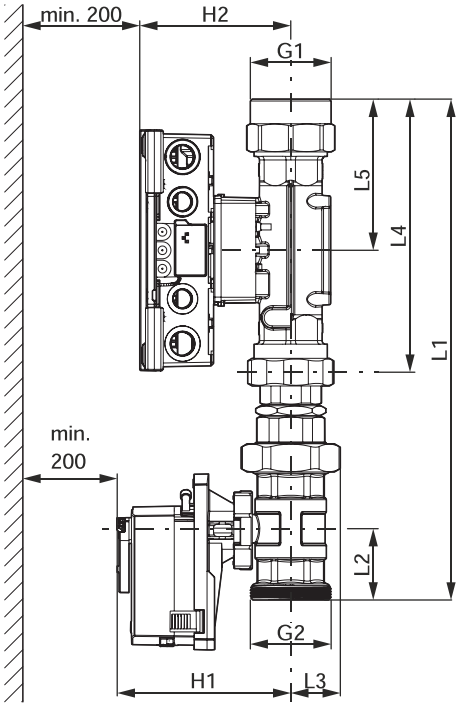
Intelligent Valve controller, ASE4U10E

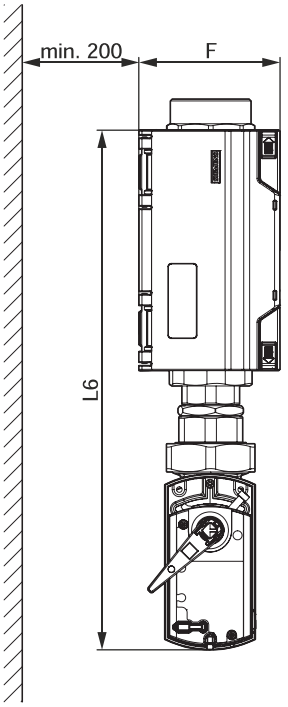


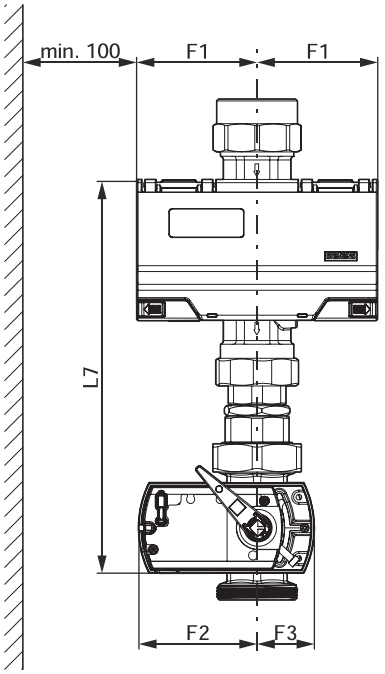
Dimensions in mm

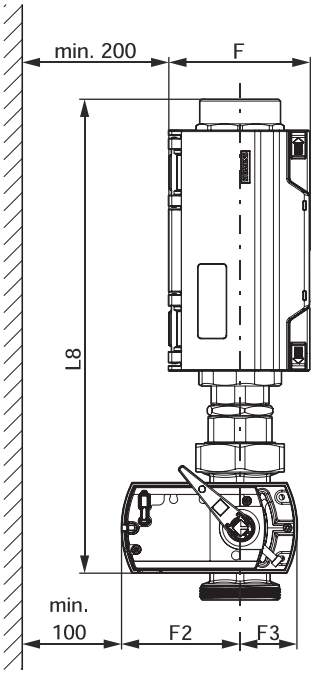
kg
0,5

With threaded connection, EVG4U10E..









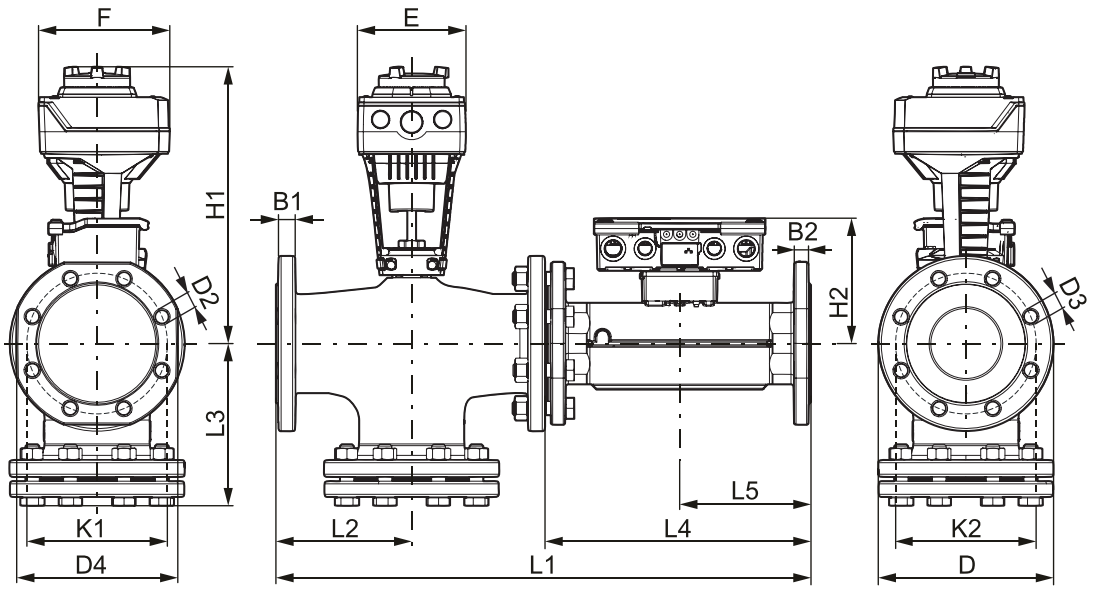
Valve type	F	F1	F2	F3	G1	G2	H1	H2	L1	L2	L3	L4	L5	L6	L7	L8	kg
EVG4U10E015	115	98	98	46	G 1 B		130	110	232	43.5	21.5	115	60	382	- [1]	321	2.9
EVG4U10E020					G 1¼ B		130	112	274	45	28.5	130	65	360		300	3
EVG4U10E025					G 1½ B		132.5	116	302		29	150	75	377		317	3.7
EVG4U10E032					G 2 B		136		250	50	35	145	77.5	380		320	4
EVG4U10E040					G 2¼ B		142	123	408	58	40.5	223	123	423	324	-	6.6
EVG4U10E050					G 2¾ B		155		356	62.5	49			367	367		7.6

[1] Arrangement not possible

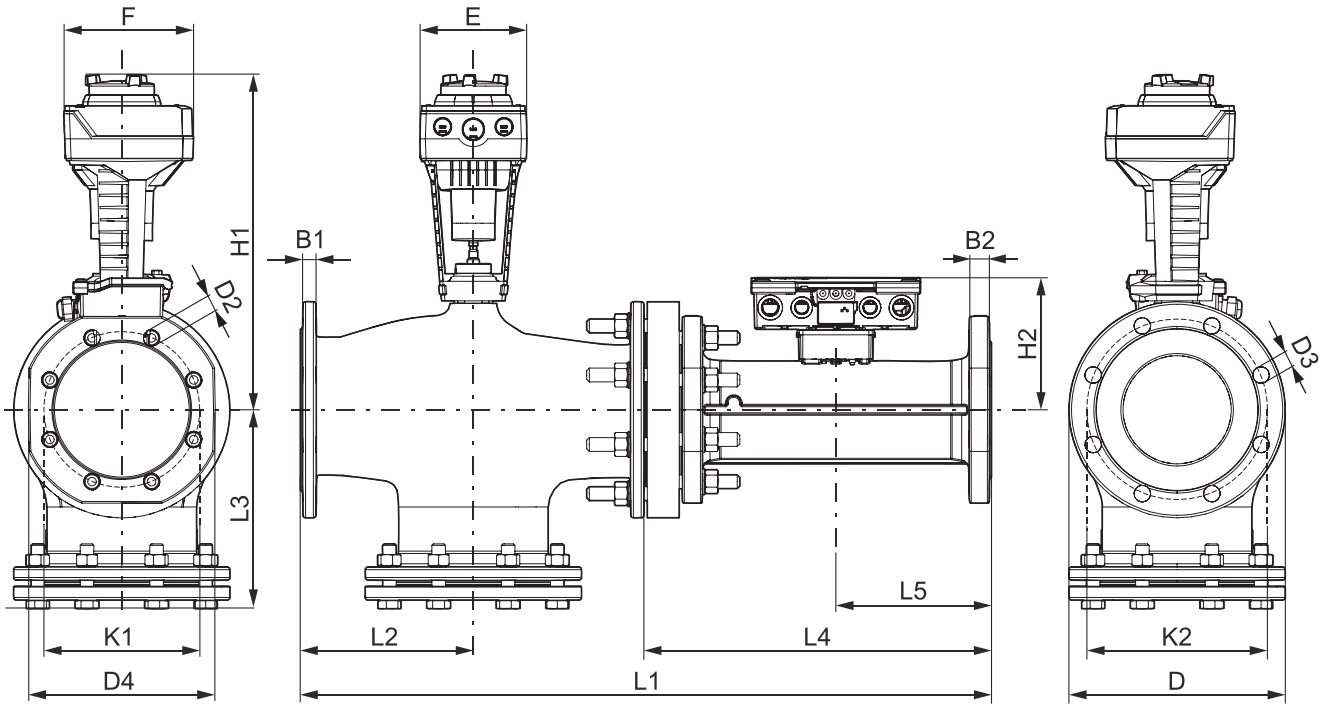
Dimensions in mm

Flanged, EVF4U20E..

DN 65...100



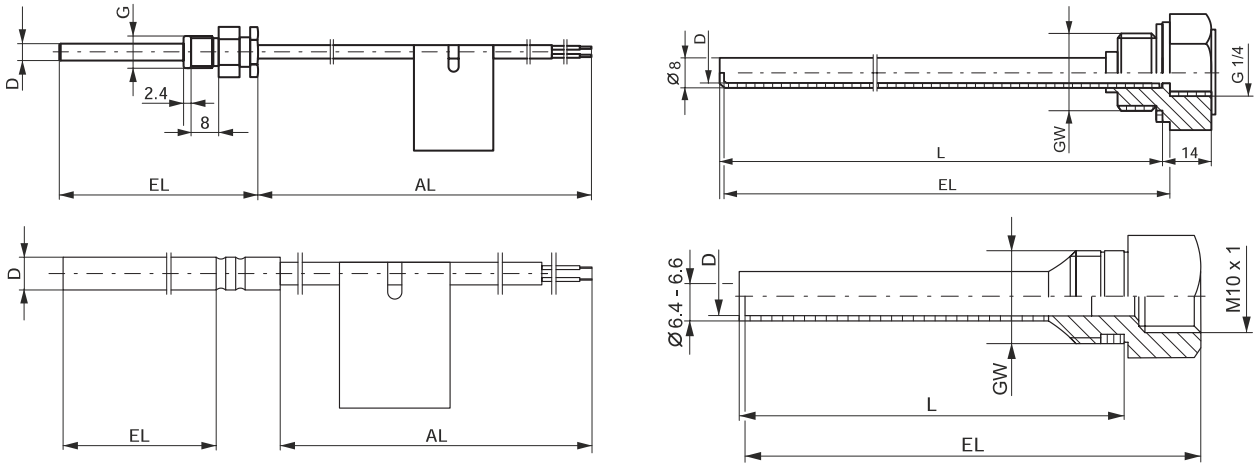
DN 125



Valve type	B1	B2	D	D2	D3	D4	E	F	H1	H2	K1	K2	L1	L2	L3	L4	L5	kg
EVF4U20E065	17	19	184	18 (4x)	19 (4x)	170	124	150	316	136	145	145	591	145	174	300	150	28.2
EVF4U20E080	19	18	200	19 (8x)	19 (8x)	185				143	160	160	611	155	186			41.1
EVF4U20E100	20	23	220	19 (8x)		216			375	154	180	180	711	175	206	360	180	56.9
EVF4U20E125	15		250						388			210	800	200	228			69.6

Dimensions in mm

Temperature sensors EZU.., protection pockets EZT..



Temperature sensors				
Type	D	EL	G	AL
EZU10-2615	5.2	26.5	M10 x 1	1500
EZU10-10025	6	92.5	-	2500

Protection pockets				
Type	D	EL	L	GW
EZT-M40	5.4	40	-	-
EZT-S100	6.2	100	92,5	G ½

Dimensions in mm

Revision numbers

Type	Valid from rev. no.	Type	Valid from rev. no.
EVG4U10E015 S55300-M100	..A	EVF4U20E065 S55300-M106	..A
EVG4U10E020 S55300-M101	..A	EVF4U20E080 S55300-M107	..A
EVG4U10E025 S55300-M102	..A	EVF4U20E100 S55300-M108	..A
EVG4U10E032 S55300-M103	..A	EVF4U20E125 S55300-M109	..A
EVG4U10E040 S55300-M104	..A		
EVG4U10E050 S55300-M105	..A		

SIEMENS

VPF44../VPF54..

VPF43../VPF53..

ACVATIX™

PICV PN16/PN25 with flanged connections

PN16: VPF43../VPF44..
PN25: VPF53../VPF54..

Pressure Independent Control Valves (PICV)

- With integrated pressure differential controller
- Valve body made of gray cast iron GJL-250 (PN16) and nodular cast iron GJL-400 (PN25)
- Available in the range from DN50 to 200
- Volumetric flow 15 to 280 m^3/h nominal, with presetting
- Equipped with pressure test points P/T
- Can be equipped with SAX..P.., SAV..P.. or SQV..P.. electromotoric actuators

Use

- For use in heating, ventilation and air conditioning systems, district heating, as a control valve
- For closed circuits

Type summary

	Product number	Stock number	DN	H_{100} [mm]	V_{min} [m^3/h]	V_{100} [m^3/h]	ΔP_{min} [kPa]
Standard flow rate	VPF44.50F15	S55266-V174	50	20	3.7	14.3	on page 9
	VPF54.50F15	S55266-V152					
	VPF44.65F25	S55266-V176	65		4.5	24.4	
	VPF54.65F25	S55266-V154					
	VPF44.80F35	S55266-V178	80		6.8	35.7	
	VPF54.80F35	S55266-V156					
	VPF44.100F70	S55266-V142	100	40	12.2	69.6	
	VPF54.100F70	S55266-V158					
	VPF43.125F110	S55266-V108	125		18.5	110	
	VPF53.125F110	S55266-V120					
	VPF43.150F160	S55266-V110	150	43	25.6	148	
	VPF53.150F160	S55266-V122					
	VPF43.200F210	S55266-V148	200		95	210	
	VPF53.200F210	S55266-V150					
High flow rate	VPF44.50F25	S55266-V175	50	20	5.7	24.6	on page 10
	VPF54.50F25	S55266-V153					
	VPF44.65F35	S55266-V177	65		6.4	37.7	
	VPF54.65F35	S55266-V155					
	VPF44.80F45	S55266-V179	80		8.5	49.9	
	VPF54.80F45	S55266-V157					
	VPF44.100F90	S55266-V143	100	40	14.8	90.9	
	VPF54.100F90	S55266-V159					
	VPF43.125F135	S55266-V109	125		23	135	
	VPF53.125F135	S55266-V121					
	VPF43.150F200	S55266-V111	150	43	32	195	
	VPF53.150F200	S55266-V123					
	VPF43.200F280	S55266-V149	200		130	280	
	VPF53.200F280	S55266-V151					

Note:

DN = nominal size

H_{100} = nominal stroke

V_{100} = volumetric flow through fully open valve (H_{100})

V_{min} = smallest pre-settable volumetric flow through fully open valve (H_{100})

ΔP_{min} = minimum differential pressure required across the valve's control path, so that the differential pressure regulator works reliably

Ordering

PICV valve, actuator must be ordered separately.

When ordering please specify the quantity, product name and type code.

Example:

Product number	Stock number	Designation
VPF44.65F25	S55266-V176	PICV PN16 with flanged connections

Delivery

- PICVs, actuators and accessories are packed and supplied separately.
- The valves are supplied without counter-flanges and without flange gaskets.

Equipment combinations

Valves				Actuators					
				SAX..P..		SQV..P..		SAV..P..	
		DN	H_{100} [mm]	Δp_{max} [kPa]	Δp_s [kPa]	Δp_{max} [kPa]	Δp_s [kPa]	Δp_{max} [kPa]	Δp_s [kPa]
Standard flow rate	VPF44.50F15 VPF54.50F15	50	20	600	700	600	700	-	-
	VPF44.65F25 VPF54.65F25	65							
	VPF44.80F35 VPF54.80F35	80							
	VPF44.100F70 VPF54.100F70	100	40	-				600	700
	VPF43.125F110 VPF53.125F110	125			-		600		600
	VPF43.150F160 VPF53.150F160	150	43						
	VPF43.200F210 VPF53.200F210	200							
High flow rate	VPF44.50F25 VPF54.50F25	50	20	600	700	600	700	-	-
	VPF44.65F35 VPF54.65F35	65							
	VPF44.80F45 VPF54.80F45	80							
	VPF44.100F90 VPF54.100F90	100	40	-				600	700
	VPF43.125F135 VPF53.125F135	125			-		600		600
	VPF43.150F200 VPF53.150F200	150	43						
	VPF43.200F280 VPF53.200F280	200							

Note:

H_{100} = nominal stroke

Δp_{max} = maximum permissible differential pressure across valve's control path, valid for the entire actuating range of the motorized valve

Δp_s = maximum permissible differential pressure at which the motorized valve will close securely against the pressure (close off pressure)

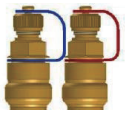
Actuator overview

Type	Stock number	Stroke	Positioning force	Operating voltage	Positioning signal	Spring return time	Spring return direction	Positioning time	LED	Manual adjuster	Extra functions
SAX31P03	S55150-A118	20 mm	500 N	AC 230 V	3-position	-	-	30 s	-	Push and fix	1)
SAX61P03	S55150-A114			AC/DC 24 V	DC 0…10 V DC 4…20 mA 0…1000 Ω	-	-	30 s	√		2), 3)
SAX81P03	S55150-A116				3-position	-	-	-	-		1)
SQV91P30	S55150-A130	20 mm 40 mm	1100 N	AC/DC 24 V AC 230 V[4]	3-position DC 0…10 V DC 4…20 mA	30 s	Pull to open or push to close[5]	< 120 s[5]	√	Turn and fix	1), 6)
SQV91P40	S55150-A131										
SAV31P00	S55150-A121	40 mm	1100 N	AC 230 V	3-position	-	-	120 s	-	Push and fix	1)
SAV61P00	S55150-A119	-	-	AC/DC 24 V	DC 0…10 V DC 4…20 mA 0…1000 Ω	-	-		√	-	2), 3)
SAV81P00	S55150-A120				3-position		-		-		1)
SAX61P03/MO	S55150-A143	20 mm	500 N	AC/DC 24 V	Modbus RTU	-	-	30 s	√	Push and fix	2), 3)
SAV61P00/MO [7]	S55150-A144	40 mm	1100 N	AC/DC 24 V	Modbus RTU	-	-	120 s	√	Push and fix	6)
SAX61P03/MO [8]	S55150-A143	20 mm	500 N	AC/DC 24 V	Modbus RTU	-	-	30 s	√	Push and fix	3) 6)

1) Optional accessories: Auxiliary switch, potentiometer
2) Position feedback, forced control, change of flow characteristic
3) Optional accessories: Auxiliary switch, sequence control, acting direction
4) Voltage adapter required, order separately
5) Selectable
6) Position feedback, forced control
7) UL certified
8) UL certified and CE conform

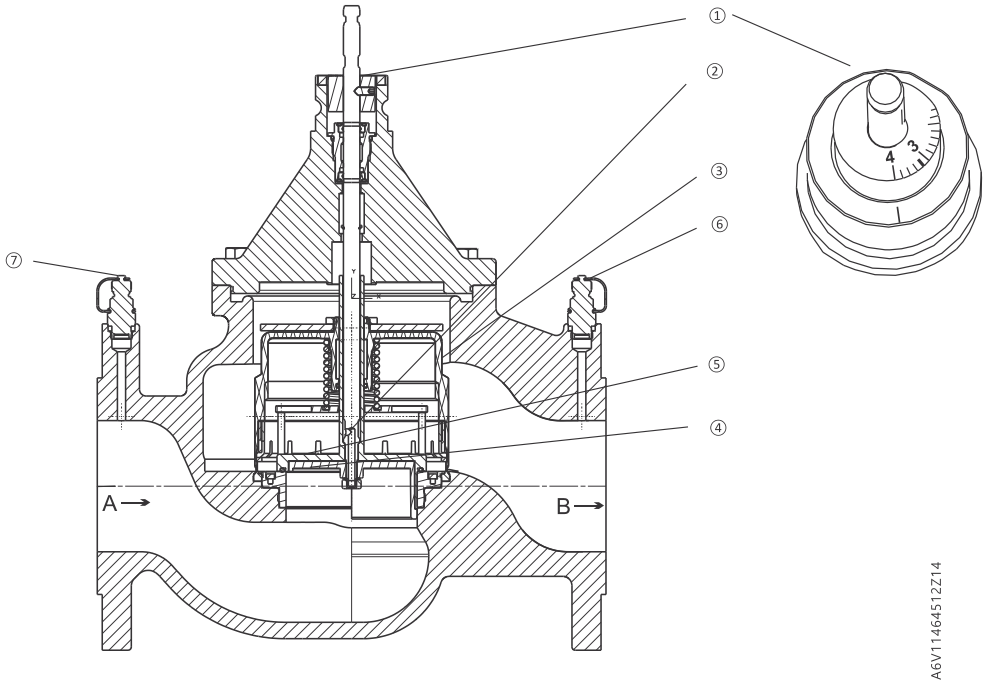
Accessories

Product numbers	Order number	Designation	
ALE10	ALE10		Electronic manometer excluding measuring lines and measuring tips. Measuring range 0 .. 700 kPa. A differential pressure of more than 1000 kPa will destroy the pressure sensor. For measuring the differential pressure between P_1, and P_2 /P_3 of the PICVs (refer to diagram under "Functional principle"). Functions of the manometer: ● Start/stop ● Automatic zero position ● Backlit display ● Display: Out → outside the measuring range ● Holding function
ALE11	ALE11		Measuring lines and straight measuring tips for use with Siemens PICVs. Equipped with G ⅛" connection with 2 x 40 mm needles.

Product numbers	Order number	Designation	
ALP45	ALP45		Spare nipples P/T port (set of 2). Set contains 1 piece each with a red and blue ribbon. Port: External threads G 1/8 " to ISO 228 Connection to valve body: G 1/4 " to ISO 228, including O-ring Length: 40 mm
ALP46 (only for p_1, p_3)	S55264-V115		Blanking plugs for P/T ports Connection to valve body: G ¼" to ISO 228, inclusive O-ring
ALP47 (only for p_1, p_3)	S55264-V116		Drain ball valve inclusive O-ring Port: External threads G ½" to ISO 228 Connection to valve body: G ¼" to ISO 228, inclusive O-ring Length: 48 mm
ALP48 (only for p_1, p_3)	S55264-V117		Combined P/T port and drain ball valve with blue ribbon Port: External threads G ⅛" to ISO 228 Connection to valve body: G ¼" to ISO 228, inclusive O-ring Length: 80 mm
ALP49	S55264-V118		Long P/T ports (set of 2 pieces) Set contains 1 piece each with a red and blue ribbon. Port: External threads G ⅛" to ISO 228 Connection to valve body: G ¼" to ISO 228, inclusive O-ring Length: 120 mm

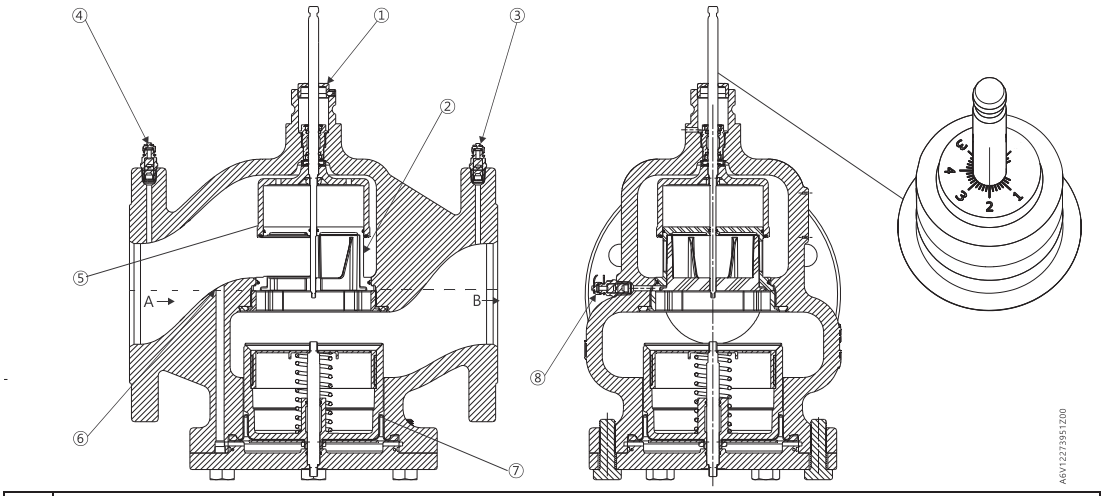
Technical design

VPF43../VPF53..



1	Ring with dial for presetting
2	Aperture for the differential pressure controller is linked with outlet port B
3	Differential pressure controller
4	Plug with variable presetting opening
5	Control valve
6	Pressure test point (P/T) at outlet port B, blue ribbon, p_3
7	Pressure test point (P/T) at inlet port A, red ribbon, p_1
A	Inlet port A
B	Outlet port B

VPF44../VPF54..



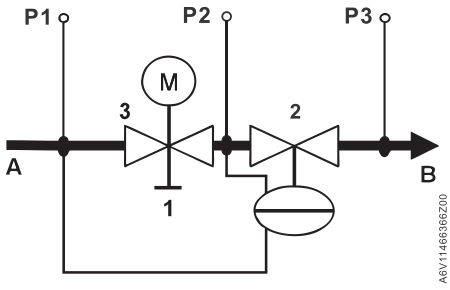
1	Ring with dial for presetting
2	Seat with variable presetting opening
3	Pressure test point (P/T) at outlet, blue ribbon, p_3
4	Pressure test point (P/T) at inlet port A, red ribbon, p_1
5	Control valve
6	Aperture for the differential pressure regulator is linked with inlet port A
7	Differential pressure controller - DPR
8	Pressure test point (P/T) at outlet of control valve, blue ribbon, p_2
A	Inlet port A
B	Outlet port B

Functional principle

The PICVs VPF43../VPF44../VPF53../VPF54.. combine three functions:

- a control valve for controlling the volumetric flow
- an adjustable mechanism with a dial for a presettable maximum volumetric flow
- a DPR for balancing pressure fluctuations in the hydraulic system respectively across the control valve

The mechanical series-connected differential pressure controller keeps the differential pressure ($p_1 – p_2$) constant across the control valve and thus the volumetric flow too. The desired maximum volumetric flow V_{100} can be preset with the adjusting mechanism. The controller (not shown) and the actuator regulate the volumetric flow and consequently the desired temperature in buildings, rooms or zones.



A	Inlet medium (inlet port A)
B	Outlet medium (outlet port B)
1	Ring with dial for presetting
2	Differential pressure controller (DPR)
3	Control valve with mounted actuator

p_1	P/T port with red ribbon, pressure test point at inlet port A of PICV
p_2	P/T port with blue ribbon, pressure at outlet port of control valve (3)
p_3	P/T port with blue ribbon, pressure test point at outlet port B of PICV

Medium flow

The medium entering the PICV (inlet port A) first passes through the control valve (3) with a linear characteristic and a stroke of 20 mm (DN 50…80) respectively 40 mm (DN 100…50) and 43mm (DN 200). The actuator (not shown here) opens or closes accurately the control valve. Then, the medium flows through the variable presetting opening which is connected to the ring with dial (1) for presetting the desired maximum volumetric flow V_{100}.

Before leaving the PICV (outlet port B), the medium passes through a built-in mechanical differential pressure controller. This differential pressure controller is the heart of the PICV and ensures that the selected volumetric flow is maintained across the whole working range and independent of the inlet pressure p_1.

Pressure test points

The PICV VPF43../VPF53.. are equipped with two pressure test points (p_1, p_3) for measuring and monitoring the differential pressure across the valve during commissioning or operation. The PICV VPF44../VPF54.. are equipped with three pressure test points (p_1, p_3, p_2) for measuring and monitoring the differential pressure across the control valve and PICV during commissioning or for analysis during operation. For that purpose, the electronic manometer ALE10 can be used.

Manual control

Only possible with mounted actuator.

Advantages

The advantages of PICVs are that:

- Once the flow limiter (presetting) is set to the desired nominal flow, the hydraulic circuit is self-balanced, even when changes to the system are made, such as additions.
- For any heat or cold demand the PICV with mounted actuator can be set to the desired volumetric flow and will be relatively constant regardless of pressure fluctuations in the system.

Constant flow regardless of pressure changes in the system reduces hydraulic interdependence between hydraulic groups and leads to a more stable control.

Sizing

Engineering Example

$$\dot{V} = \frac{Q[kW] \cdot 1000}{1.163 \cdot \Delta T[K]} \left[\frac{l}{h}\right]$$

Basis of design

1. Determine heat/cold demand Q [kW]
2. Determine temperature spread ΔT [K]
3. Calculate volumetric flow
4. Select suitable PICV VPF43../VPF44../VPF53../VPF54..
5. Determine dial setting using volumetric flow/dial presetting tables, see below.

Example

1. Heat demand Q = 150 kW
2. Temperature spread ΔT = 6 K
3. Volumetric flow

$$\dot{V} = \frac{150\,kW \cdot 1000}{1.163 \cdot 6\ K} = 21'654\ l/h = 21.6 m^3/h$$

   Hint: You can also determine the volumetric flow using the valve slide rule.
4. PN class: PN16
5. Select PICV VPF44., PN16
   Ideally, PICVs should be selected such that they operate at about 80 % of their maximum flow, enabling them to deliver spare capacity, if required.
   Selections:
   VPF44.65F25 Δp_{min} = 25 kPa
   VPF44.65F35 Δp_{min} = 40.5 kPa
6. Determine dial setting using volumetric flow/dial presetting tables:
   VPF44.65F25 Volumetric flow 21.6 m^3/h

Dial setting 3.7
VPF44.65F35 Volumetric flow 21.6 m^3/h
Dial setting 2.5

Volumetric flow/ dial presetting

Tables to determine the dial setting for a desired volumetric flow.
Δp_{min} [kPa] based on volumetric flow; interpolate missing values.

	Presetting range linear to VDI/VDE 2173
	Presetting range not permitted

Low flow rate

VPF44.50F15/VPF54.50F15																				15 m^3/h nominal
$\dot{V}$ [m^3/h]				3.7	4.2	4.9	5.6	6.3	7.0	7.7	8.4	9.2	10.0	11.0	11.9	12.6	13.2	13.5	13.8	14.1	14.3
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δp_{min} [kPa]				13	14	15	16	16	17	18	18	19	20	21	21	22	23	23	24	25	25

VPF44.65F25/VPF54.65F25																				25 m^3/h nominal
$\dot{V}$ [m^3/h]				4.5	5.3	6.2	7.1	7.9	8.7	9.9	11.1	12.5	13.8	15.3	16.7	17.9	19.1	20.4	21.6	23.0	24.4
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δp_{min} [kPa]				28	29	29	29	29	30	30	30	30	31	31	31	31	32	32	32	32	32

VPF44.80F35/VPF54.80F35																				35 m^3/h nominal
$\dot{V}$ [m^3/h]				6.8	8.4	9.6	10.7	12.2	13.7	15.5	17.3	19.4	21.4	23.3	25.1	27.2	29.3	31.2	33.2	34.5	35.7
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δp_{min} [kPa]				18	19	19	19	19	20	20	20	20	21	21	21	21	22	22	22	22	22

VPF44.100F70/VPF54.100F70																				68 m^3/h nominal
$\dot{V}$ [m^3/h]				12.2	14.8	17.3	19.8	22.5	25.2	29.1	33.0	37.1	41.2	46.2	51.1	56.3	61.5	64.3	67.2	68.4	69.6
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δp_{min} [kPa]				18	19	20	21	22	23	24	25	26	26	27	28	29	30	31	32	33	33

VPF43.125F110/VPF53.125F110																				110 m^3/h nominal
$\dot{V}$ [m^3/h]				18.5	23	28	33	37	42	46	51	55	60	65	69	74	80	85	92	99	110
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δp_{min} [kPa]				16	16	16	16.4	16.8	17.2	17.6	18	18.5	19.2	19.8	20.3	21	23.3	25.3	28	30.7	35

VPF43.150F160/VPF53.150F160																				160 m^3/h nominal
$\dot{V}$ [m^3/h]				25.6	31	38	44	51	57	63	72	76	82	89	96	104	111	120	128	137	148
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δp_{min} [kPa]				21	21	21	21.2	21.4	21.6	21.7	22	23	24.5	26.3	28	30	30.8	31.8	32.7	33.8	35

VPF43.200F210/VPF53.200F210																				210 m^3/h nominal
$\dot{V}$ [m^3/h]						95	100	105	112	118	124	132	140	149	157	165	173	182	192	200	210
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δp_{min} [kPa]						11	12	12	14	15	16	17	19	21	22	24	26	27	29	30	32

High flow rate

VPF44.50F25/VPF54.50F25 — **25 m³/h nominal**

$\dot{V}$ [m³/h]				5.7	6.9	7.8	8.8	9.9	11.1	12.3	13.5	15.0	16.5	18.1	19.7	21.0	22.2	22.9	23.5	24.0	24.6
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δp_{min} [kPa]				30	32	33	35	36	38	39	41	42	44	45	47	48	50	51	53	54	55

VPF44.65F35/VPF54.65F35 — **35 m³/h nominal**

$\dot{V}$ [m³/h]				6.4	7.8	8.8	10.1	11.2	12.3	14.2	16.1	18.1	20.2	22.4	24.6	26.5	28.5	30.6	32.7	35.2	37.7
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δp_{min} [kPa]				30	32	33	34	35	36	38	39	40	41	42	43	45	46	47	48	49	50

VPF44.80F45/VPF54.80F45 — **45 m³/h nominal**

$\dot{V}$ [m³/h]				8.5	10.5	12.2	13.9	16.0	18.0	20.2	22.4	24.7	27.0	30.2	33.4	36.5	39.6	42.5	45.4	47.2	49.0
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δp_{min} [kPa]				22	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

VPF44.100F90/VPF54.100F90 — **90 m³/h nominal**

$\dot{V}$ [m³/h]				14.8	18.2	21.3	24.4	27.6	30.8	35.4	39.9	43.7	47.4	55.7	64.0	70.8	77.5	82.3	87.1	89.0	90.9
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δp_{min} [kPa]				20	22	23	25	26	28	29	31	32	34	35	37	38	40	41	43	44	45

VPF43.125F135/VPF53.125F135 — **135 m³/h nominal**

$\dot{V}$ [m³/h]				23	29	36	42	48	53	59	64	70	76	81	87	93	100	107	114	122	135
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δp_{min} [kPa]				27.0	27.0	27.0	27.4	27.9	28.2	28.6	29.0	29.8	30.7	31.3	32.2	33.0	36.3	39.7	43.0	46.8	53

VPF43.150F200/VPF53.150F200 — **200 m³/h nominal**

$\dot{V}$ [m³/h]				32	40	48	57	64	72	80	88	96	104	112	121	131	141	152	165	178	195
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δp_{min} [kPa]				33.0	33.0	33.0	33.2	33.4	33.6	33.8	34.0	36.2	38.5	40.7	43.2	46.0	49.0	52.2	56.1	60.0	65

VPF43.200F280/VPF53.200F280 — **280 m³/h nominal**

$\dot{V}$ [m³/h]						130	137	145	153	162	170	180	189	199	209	220	232	243	256	267	280
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δp_{min} [kPa]						31	32	33	35	38	41	45	49	53	57	61	65	69	73	75	78

Product documentation

Topic	Title	Document ID
Mounting and installation	VPF43../VPF44../ VPF53../VPF54.. Mounting instructions	A6V12190279
Product environmental compatibility	VPF44../VPF54.. The product environmental declaration A5W00159028A contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).	A5W00159028A
	VPF43../VPF53.. The product environmental declaration CE1E4315en contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).	CE1E4315en
EU Conformity (CE)	VPF44../ VPF54..	A5W00099503A
	VPF43../ VPF53..	CE1T4315xx

Related documents such as environmental declarations, CE declarations, etc., can be downloaded at the following Internet address:

http://siemens.com/bt/download

Notes

Security

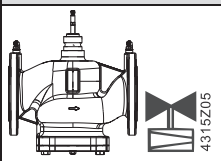
⚠ CAUTION

National safety regulations

Failure to comply with national safety regulations may result in personal injury and property damage.

- Observe national provisions and comply with the appropriate safety regulations.

Engineering

Valve	Symbols / Direction of flow VPF44..	Flow in control mode	Valve stem	
			retracts	extends
PICV		variable	Valve closes	Valve opens

⚠ WARNING

The direction of flow indicated (arrow on the valve body) is mandatory!

- The valves should preferably be mounted in the return pipe where temperatures are lower (for heating circuits), and where the sealing gland is less affected by strain.
- Valve's factory default position (without actuator) = CLOSED.

Symbol

Symbol used in catalogs and application descriptions	Symbol used in diagrams
	There are no standard symbols for PICVs in diagrams

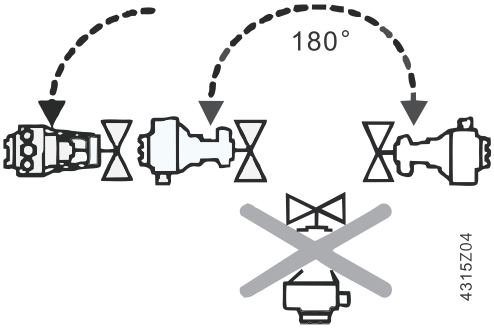
Recommendation

- A strainer or dirt trap should be fitted upstream of the valve to enhance reliability and service life.
- Remove dirt, welding beads etc. from valves and pipes.
- Do not insulate the actuator bracket, as air circulation must be ensured!
- If flow measurement section is used (VPF44../VPF54.. only), make sure the flow measuring device is installed in a low turbulence area. In general, use the 5 × DN / 10 × DN rule, whenever possible and maintain a 10D distance from the pump.

Mounting

- PICV and actuator can easily be assembled on site. Neither special tools nor adjustments, besides flow rate presetting are required.
- The valve is supplied with Mounting Instructions A6V11464512.

Orientation



Direction flow

Pay attention to the valve's flow direction symbol during mounting.

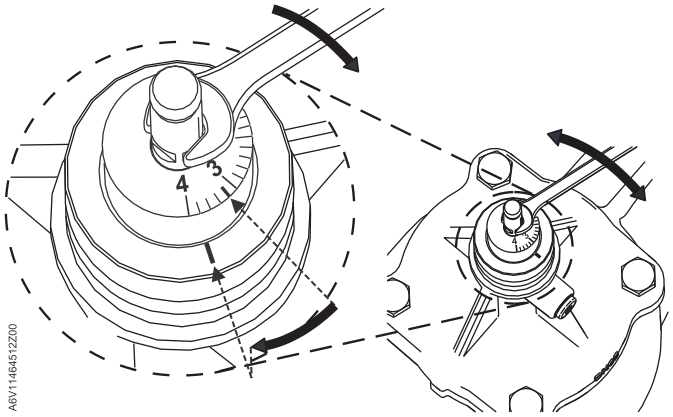
Installation

Presetting

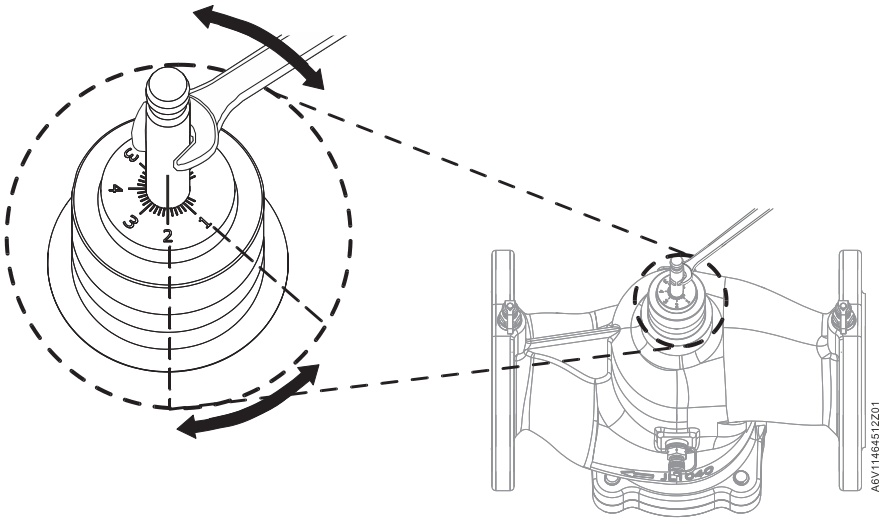
It is recommended to mount the actuator before the presetting is made.

1. Mount actuator and fix valve neck coupling
2. Mount valve stem coupling and tighten slightly
3. Make presetting according to table under “Volumetric flow / dia presetting”. Do **NOT** adjust presetting to a dial reading lower than “0.6”.
4. Tighten stem coupling

VPF43../ VPF53.. (8 mm, $\dot{V}$ [m³/h])

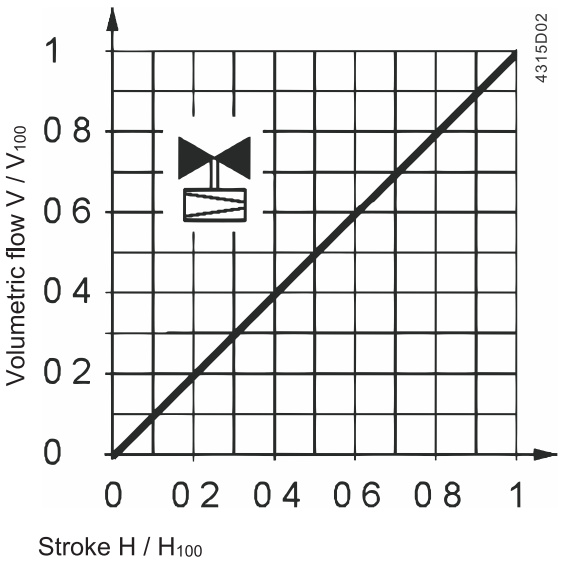


VPF44.../VPF54.. (8 mm, $\dot{V}$ [m³/h])

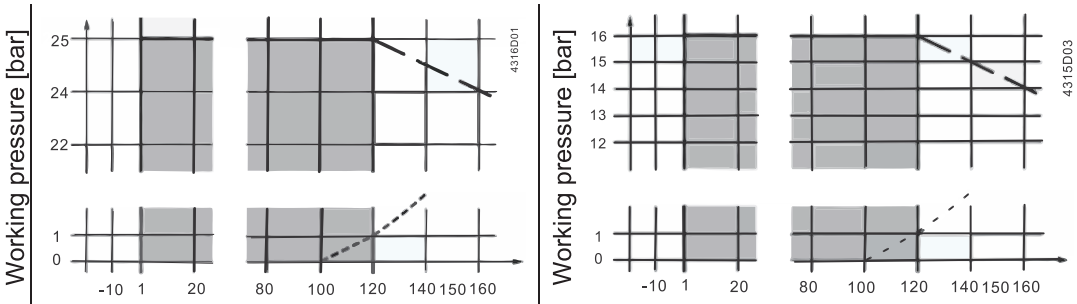


VPF44../VPF54.. has a symmetric pre-setting scale for easy commissioning. Identical pre-settings positions give identical flow rate.

Valve characteristic



Working pressure and medium temperature



Working pressure and medium temperature staged as per ISO 7005.

	⚠ WARNING
	Current local legislation must be observed.

Commissioning

	NOTICE
	• Consequences The valves must be commissioned with the actuator correctly fitted. Strong pressure impacts can damage closed PICVs. • The valves must be open when flushing or pressure testing the system. Strong pressure impacts can damage closed PICVs. • Differential pressure P_{max} across the valve's control path is not allowed to exceed 600 kPa. • Valve's factory default position (without actuator) = CLOSED.

Maintenance

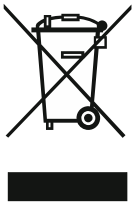
All VPF… PICVs are maintenance-free. Maintenance for VPF44../VPF54.. allows easy exchange of the differential pressure controller (DPR).

	⚠ WARNING
	When performing service work on the valve or actuator: • Switch off the pump and disconnect power supply. • Close the shut-off valves in the piping network. • Fully reduce pressure in the piping network and allow the pipes to cool down completely. • Remove the electrical connections only if necessary.

Sealing gland

The stem sealing gland cannot be exchanged. In case of leakage the whole valve must be replaced.

Disposal



The valve is considered an electronic device for disposal in accordance with the European Guidelines and may not be disposed of as domestic garbage.

- Dispose of the valve through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Warranty

Technical data on specific applications are valid only together with Siemens products listed under "Equipment combinations". Siemens rejects any and all warranties in the event that third-party products are used.

Technical data

Functional data			
PN class	PN16/ PN25 as per EN 1333		
Permissible operating pressure	1600 kPa (16 bar)/2500kPa (25 bar) as per ISO 7628 / EN 1333		
Valve characteristic	Linear as per VDI / VDE 2173		
Leakage rate	Class IV (0…0.01 % of volumetric flow V_{100}) to EN 1349		
Operating direction	Normally open (push to close/pull to open)		
Permissible media	Low temperature hot water, medium temperature hot water, chilled water, wagter with anti-freeze Recommendation: water treatment to VDI 2035		
Medium temperature	PN16	DN 50-150: 1...120 °C DN 200: 1...110 °C	
	PN25	DN 50–125: 1…120 °C DN 150, 200: 1…110 °C	
Rangeability	1: 100		
Average flow accuracy	± 10 %	from ΔP_{min} up to 70 kPa from ΔP_{min} up to 105 kPa from ΔP_{min} up 600 kPa	(DN 50…80) (DN 100…50) (DN 200)
	± 5 %	from 70…600 kPa from 105…600 kPa	(DN 50…80) (DN 100…150)
Nominal stroke	DN 50, 65, 80: 20 mm DN 100, 125: 40 mm DN 150, 200: 43 mm		
Low-noise operation	To operate the valve at a low noise level, a differential pressure of 150kPa should not be exceeded.		

*tested in clean water conditions, represents the maximum deviation from the average measured flow

Materials	
Valve body	DN 50…80, DN125 (PN16:): Gray cast iron GJL-250 DN 50…80, DN100, 150, 200 (PN25): Nodular cast iron GJS-400-15
Stem, spring	Stainless steel
Trim	Brass (DZR)
Regulator	Stainless steel
Seals	EPDM

Norms and standards		
VPF43../VPF53.. EU Conformity (CE)		CE1T4315xx[1)]
VPF44../VPF54.. EU Conformity (CE)		A5W00099503A
EAC conformity		VPF43../VPF44../VPF53../VPF54.. Eurasia conformity
Pressure Equipment Directive		PED 2014/68/EU
Pressure accessories		Scope: Article 1, section 1 Definitions: Article 2, section 5
Fluid group 2 (for VPF43../VPF53..)	DN 150 [3)] (PN 25) DN 200 [3)] (PN 16, PN 25)	Without CE-marking as per article 4, section 3 (sound engineering practice) [1)]
	DN 125 (PN 16, PN 25) DN 150 (PN 16)	Category I, module A, with CE-marking as per article 14, section 2
Fluid group 2 (for VPF44../VPF54..)	DN 50 (PN 16)	Without CE-marking as per article 4, section 3 (sound engineering practice) [1)]
	DN 65…100 (PN 16) DN 50…100 (PN 25)	Category I, module A, with CE-marking as per article 14, section 2
Environmental conformity		The product environmental declaration CE1E4315en [2)] (for VPF43../ VPF53..), A5W00090351A [2)] (for VPF44../ VPF54..)

	contain data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).

1). Valves where PS x DN < 1000, do not require special testing and cannot carry the CE label.
2).The documents can be downloaded from http://siemens.com/bt/download.
3). Warm water temperature not greater than 110°C, do not require special testing and cannot carry the CE label.

General ambient conditions			
	Operation EN 60721-3-3	Transport EN 60721-3-2	Storage EN 60721-3-1
Environmental conditions	Class 3K5	Class 2K3	Class 1K3
Temperature	1…55 °C	-30...65 °C	-15...50 °C
Humidity	5...95 % r. h.	< 95 % r. h.	5...95 % r. h.

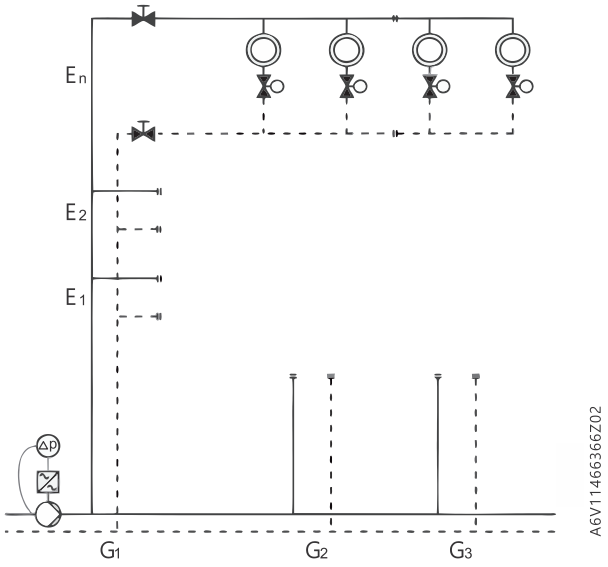
Dimensions/weight	
Dimensions	Refer to Dimensions [on page 18]
Weight	Refer to Dimensions [on page 18]
Flange connections	ISO 7005-2
Pressure test points (P / T points)	G ¼ inch (connection) 2 mm x 40 mm (measuring tips)

Application examples

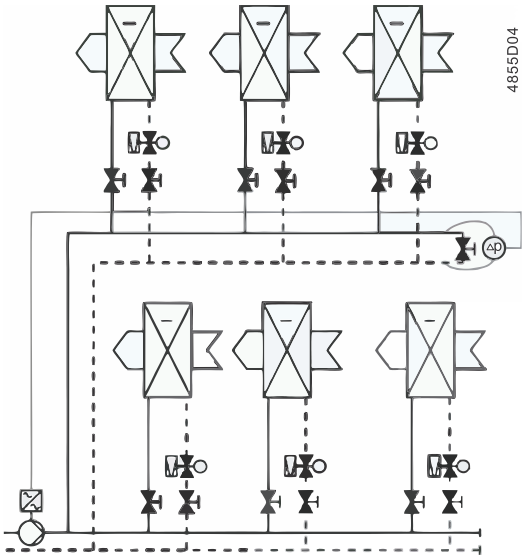
PICVs in HVAC systems combined with variable speed pumps provide even higher energy efficiency. When sizing the pump, it must be made certain that the most critical branch or consumer in the system – usually the remotest from the pump – gets enough pressure (pump head). Thus, it is recommended to use a variable speed pump in constant-pressure mode with end-point feedback, to maintain a minimum differential pressure across the critical valve.

Residential buildings

Residential buildings with for example self-contained flat heating systems:

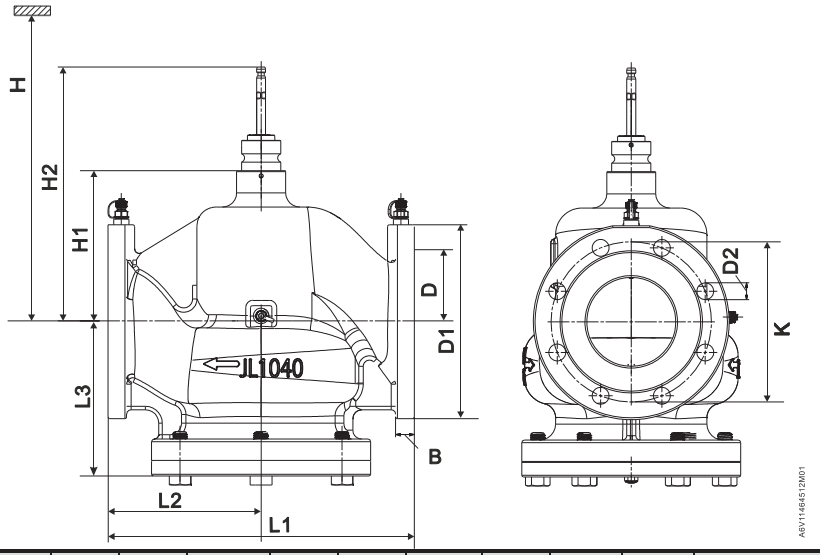


E = Floor
G = Group or zone
Non-residential buildings
Commercial buildings with for example Fan Coil Units or heat exchangers for heating or cooling



Dimensions

Dimensions in mm: VPF44../VPF54..



Product number	DN	B	⌀ D	⌀ D1	⌀ D2	L1	L2	L3	⌀ K	H1	H2	H			Weight
												SAX..P	SQV..P	SAV..P	
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	kg
VPF44..	50	17	165	99	19 (4x)	230	115	115	125	102.5	199	545	492	-	15
	65	17	185	118	19 (4x)	290	145	122	145	104	200.5	546	493	-	19
	80	19	200	132	19 (8x)	310	155	139	160	104.5	201	547	494	-	28
	100	21	220	156	19 (8x)	350	175	174.5	180	169	285.5	-	557	637	46
VPF54..	50	16	165	99	19 (4x)	230	115	115	125	102.5	199	545	492	-	16
	65	16	185	118	19 (8x)	290	145	122	145	104	200.5	546	493	-	20
	80	19	200	132	19 (8x)	310	155	139	160	104.5	201	547	494	-	30
	100	21	235	156	19 (8x)	350	175	174.5	190	169	285.5	-	557	637	50

Note:

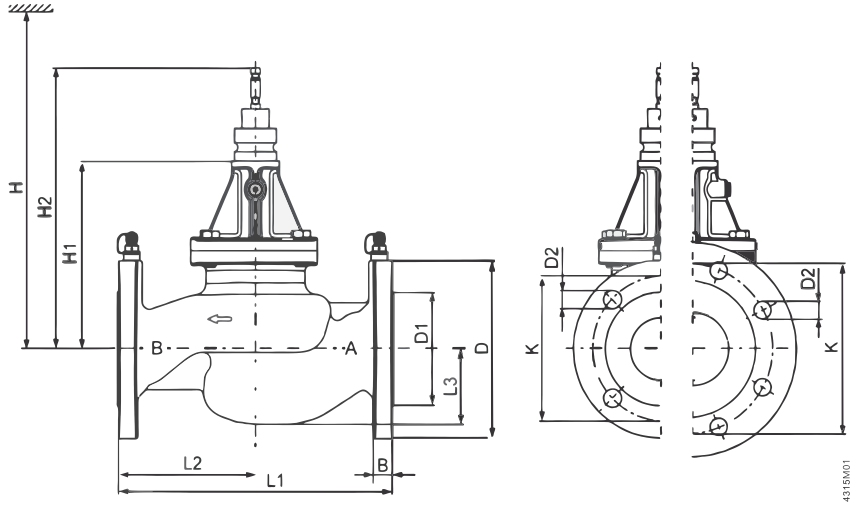
DN = Nominal size

H = Total actuator height plus minimum distance to the wall or the ceiling for mounting, connection, operation, maintenance etc.

H_1 = Dimension from the pipe center to install the actuator (upper edge).

H_2 = Valve in the OPEN position means that the valve stem is fully extended.

Dimensions in mm: VPF43../VPF53..



Product number	DN	B	⌀ D	⌀ D1	⌀ D2	L1	L2	L3	⌀ K	H1	H2	H			Weight
												SAX..P	SAV..P	SQV..P	
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	kg
VPF43..	125	25	270	184	19 (8x)	400	192	133	210	357	474	820	750	77	125
	150	26	285	211	23 (8x)	480	230	156	240	401	521	870	790	111	150
	200	28	380	266	23 (12x)	600	300	300	295	401	521	870	790	175	200
VPF53..	125	25	270	186	27 (8x)	400	192	134	220	357	474	820	750	77	125
	150	26	285	211	27 (8x)	480	230	156	250	401	521	870	790	111	150
	200	28	380	274	28 (12x)	600	300	300	310	401	521	870	790	175	200

Revision number overview

Product number	Valid from rev. no.	Product number	Valid from rev. no
VPF44.50F15	..B	VPF44.50F25	..B
VPF44.65F25	..B	VPF44.65F35	..B
VPF44.80F35	..B	VPF44.80F45	..B
VPF44.100F70	..A	VPF44.100F90	..A
VPF43.125F110	..A	VPF43.125F135	..A
VPF43.150F160	..A	VPF43.150F200	..A
VPF43.200F210	..A	VPF43.200F280	..A
VPF54.50F15	..A	VPF54.50F25	..A
VPF54.65F25	..A	VPF54.65F35	..A
VPF54.80F35	..A	VPF54.80F45	..A
VPF54.100F70	..A	VPF54.100F90	..A
VPF53.125F110	..A	VPF53.125F135	..A
VPF53.150F160	..A	VPF53.150F200	..A
VPF43.200F210	..A	VPF43.200F280	..A

Documentation form

Installed location	Valve type	Actuator type	Valve size	Planned Presetting	Required Δp_{min} [kPa]	Verified Δp_{min} [kPa]	Flow[1) 2)] (m^3/h)

[1)] Valid for VPF43../VPF44../VPF53../VPF54..: Flow = If measured Δp_{min} (p_1-p_3) > Required Δp_{min} (p_1-p_3), then flow is as per presetting in datasheet, otherwise check system pressure.

[2)] Valid for VPF44../VPF54.. only: Please refer to k_{vs}-table (provided separately).

ACVATIX™

PICVs PN 25 with flanged connections VPF53..

Pressure Independent Combi Valves

- **With integrated pressure differential controller**
- **Valve body made of nodular cast iron GJS-400-15**
- **DN 50 - 200**
- **Volumetric flow 15 to 280 m^3/h nominal, with presetting**
- **Equipped with pressure test points P/T**
- **Can be equipped with SAX..P.., SAV..P.. or SQV..P.. electromotoric actuators**

Use

- For use in heating, ventilating and air conditioning systems, district heating, as a control valve.
- For closed circuits.

Type summary

	Product number	Stock number	DN	H_{100} [mm]	V_{min} [m^3/h]	V_{100} [m^3/h]	Δp_{min} [kPa]
Standard flow rate	**VPF53.50F16** [1)]	**S55266-V112**	50	20	2.3	15	See page 6 + 7
	VPF53.65F24 [1)]	**S55266-V114**	65		4.4	25	
	VPF53.80F35 [1)]	**S55266-V116**	80		5.3	34	
	VPF53. 100F70 [1)]	**S55266-V118**	100	40	12.1	68	
	VPF53. 125F110	**S55266-V120**	125		18.5	110	
	VPF53. 150F160	**S55266-V122**	150	43	25.6	148	
	VPF53. 200F210	**S55266-V150**	200		95	210	
High flow rate	**VPF53.50F25** [1)]	**S55266-V113**	50	20	4.3	25	See page 6 + 7
	VPF53.65F35 [1)]	**S55266-V115**	65		6	35	
	VPF53.80F45 [1)]	**S55266-V117**	80		7	43	
	VPF53. 100F90 [1)]	**S55266-V119**	100	40	14.8	90	
	VPF53. 125F135	**S55266-V121**	125		23	135	
	VPF53. 150F200	**S55266-V123**	150	43	32	195	
	VPF53. 200F280	**S55266-V151**	200		130	280	

[1)] = While stocks last

DN = nominal size

H_{100} = nominal stroke

V_{100} = volumetric flow through fully open valve (H_{100})

V_{min} = smallest presettable volumetric flow through fully open valve (H_{100})

Δp_{min} = minimum differential pressure required across the valve's control path, so that the difference pressure regulator works reliably

Ordering

Example:

Product number	*Stock number*	*Designation*
VPF53.65F24	S55266-V114	PICV PN 25 with flanged connections

Delivery — PICVs, actuators and accessories are packed and supplied separately.
The valves are supplied without counter-flanges and without flange gaskets.

Revision numbers — See page 13

Equipment combinations

Valves				Actuators					
				SAX..P..		SQV..P..		SAV..P..	
		DN	H_{100} [mm]	Δp_{max} [kPa]	Δp_s [kPa]	Δp_{max} [kPa]	Δp_s [kPa]	Δp_{max} [kPa]	Δp_s [kPa]
Standard flow rate	**VPF53.50F16**	50	20	600	600	600	600	-	-
	VPF53.65F24	65							
	VPF53.80F35	80							
	VPF53. 100F70	100	40	-	-			600	600
	VPF53. 125F110	125							
	VPF53. 150F160	150	43						
	VPF53. 200F210	200							
High flow rate	**VPF53.50F25**	50	20	600	600	600	600	-	-
	VPF53.65F35	65							
	VPF53.80F45	80							
	VPF53. 100F90	100	40	-	-			600	600
	VPF53. 125F135	125							
	VPF53. 150F200	150	43						
	VPF53. 200F280	200							

H_{100} = nominal stroke

Δp_{max} = maximum permissible differential pressure across the valve's control path, valid for the entire actuating range of the motorized valve

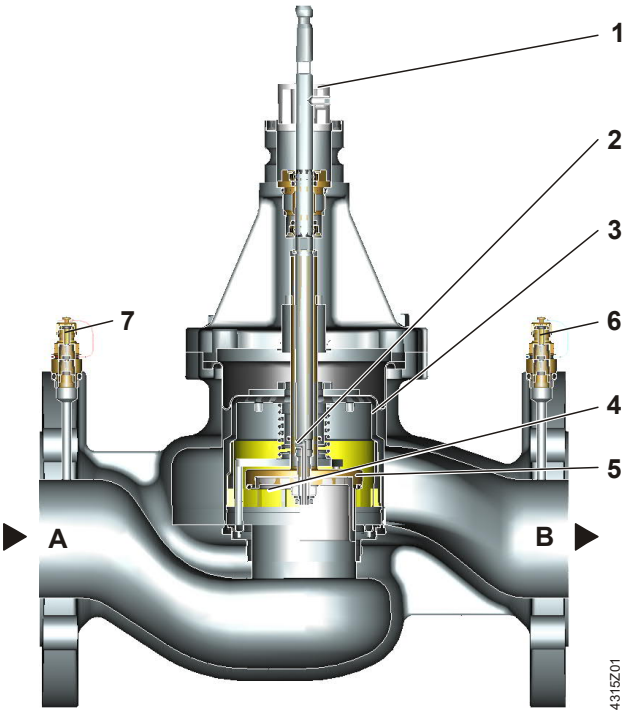
Δp_s = maximum permissible differential pressure at which the motorized PICV will close securely against the pressure (close off pressure

Actuator overview

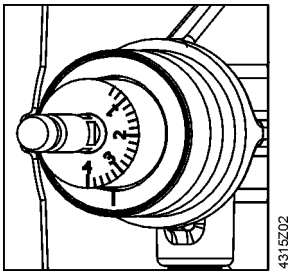
Type	Stock no.	Stroke	Pos. force	Operating voltage	Positioning signal	Spring return time	Spring return direction	Pos. time	LED	Manual adjuster	Extra functions
SAX31P03	S55150-A118	20 mm	500 N	AC 230 V	3-position	-	-	30 s	-	Push and fix	1)
SAX61P03	S55150-A114			AC/DC 24 V	DC 0…10 V DC 4…20 mA 0…1000 Ω				✓		2), 3)
SAX81P03	S55150-A116				3-position	-	-	30 s	-	Push and fix	1)
SQV91P30	S55150-A130	20 mm 40 mm	1100 N	AC/DC 24 V AC 230 V 4)	3-position DC 0…10 V DC 4…20 mA	30 s	Pull to open or push to close 5)	< 120 s 5)	✓	Turn and fix	1), 6)
SQV91P40	S55150-A131										
SAV31P00	**S55150-A121**	40 mm	1100 N	AC 230 V	3-position	-	-	120 s	-	Push and fix	1)
SAV61P00	**S55150-A119**			AC/DC 24 V	DC 0…10 V DC 4…20 mA 0…1000 Ω		-		✓		2), 3)
SAV81P00	**S55150-A120**				3-position		-		-		1)

1) Optional accessories: Auxiliary switch, potentiometer
2) Position feedback, forced control, change of flow characteristic
3) Optional accessories: Auxiliary switch, sequence control, acting direction
4) Voltage adapter required, order separately
5) Selectable
6) Position feedback

Technical / mechanical design



1 Ring with dial for presetting



2 Aperture for the differential pressure controller is linked with outlet port B

3 Differential pressure controller

4 Plug with variable presetting opening

5 Control valve

6 Pressure test point (P/T) at outlet port B, blue ribbon, P-

7 Pressure test point (P/T) at inlet port A, red ribbon, P+

A Inlet port A

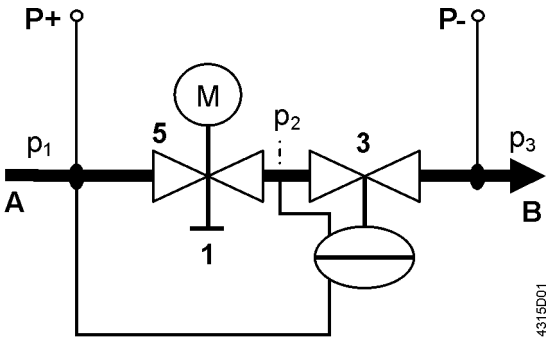
B Outlet port B

Functional principle

The PICVs VPF53.. combine three functions:

- a control valve (5) for controlling the volumetric flow,
- an adjusting mechanism (1, 4) with a dial for a presettable maximum volumetric flow,
- a differential pressure controller (3) for balancing pressure fluctuations in the hydraulic system respectively across the control valve.

The mechanical series-connected differential pressure controller keeps the differential pressure ($p_1 – p_2$) constant across the control valve and thus the set volumetric flow too. The desired maximum volumetric flow can be preset with the adjusting mechanism. The controller (not shown) and the actuator regulate the volumetric flow and consequently the desired temperature in buildings, rooms or zones.



A Inlet medium (inlet port A)

B Outlet medium (outlet port B)

1 Ring with dial for presetting

3 Differential pressure controller

5 Control valve with mounted actuator

P- = P/T port, pressure test point with blue ribbon (6)

P+ = P/T port, pressure test point with red ribbon (7)

p_1 = pressure at inlet port A of PICV

p_2 = pressure at outlet port of control valve (5)

p_3 = pressure at outlet port B of PICV

Medium flow

The medium entering the PICV (inlet port A) first passes through the control valve (5) with a linear characteristic and a stroke of 20 mm (DN 50…80) respectively 40 mm (DN 100…150). The actuator (not shown here) opens and accurately positions the control valve. Then, the medium flows through the variable presetting opening (4) which is connected to the ring with dial (1) for presetting the desired maximum volumetric flow.
Before leaving the PICV (outlet port B), the medium passes through a built-in mechanical differential pressure controller (3). This differential pressure controller is the heart of the PICV and ensures that the selected volumetric flow is maintained across the whole working range and independent of the inlet pressure p_1.

Pressure test points

The PICV VPF53.. is equipped with two pressure test points (P+, P-) for measuring and monitoring the differential pressure across the valve during commissioning. For that purpose, the electronic manometer ALE10 can be used.

Manual control

Manual control is only possible with mounted actuator.

Advantages

The advantages of PICVs are that:

- once the flow limiter is set to design flow, the hydraulic circuit self balances, even when changes to the system are made, such as additions.
- for any heat demand the PICV with mounted actuator can be set to the desired volumetric flow and will be relatively constant regardless of pressure fluctuations in the system.

Constant flow regardless of pressure changes in the system reduces hydraulic interdependence and leads to a more stable control.

Accessories

Product no.	Stock no.		Beschreibung
ALE10	**ALE10**		Electronic manometer **excluding** measuring lines and measuring tips. For measuring the differential pressure between P+ and P- of the PICVs (refer to diagram under "Functional principle" on page 4). Measuring range 0 ... 700 kPa. A differential pressure of more than 1000 kPa will destroy the pressure sensor. Functions of the manometer: • Start/stop • Automatic zero position • Backlit display • Display: Out → outside the measuring range • Holding function
ALE11	**ALE11**		Measuring lines and straight measuring tips for use with Siemens PICVs. Equipped with G ⅛" connection with 2 x 40 mm needles.
ALP46	**S55264-V115**		Blanking plugs for P/T ports Connection to valve body: G ¼" to ISO 228, inclusive O-ring
ALP47	**S55264-V116**		Drain ball valve inclusive O-ring Port: External threads G ½" to ISO 228 Connection to valve body: G ¼" to ISO 228, inclusive O-ring Length: 48 mm
ALP48	**S55264-V117**		Combined P/T port and drain ball valve with blue ribbon Port: External threads G ⅛" to ISO 228 Connection to valve body: G ¼" to ISO 228, inclusive O-ring Length: 80 mm
LP49	**S55264-V118**		Long P/T ports (set of 2 pieces) Set contains 1 piece each with a red and blue ribbon. Port: External threads G ⅛" to ISO 228 Connection to valve body: G ¼" to ISO 228, inclusive O-ring Length: 120 mm

Engineering example

Basis of design

1. Determine heat demand Q [kW]
2. Determine temperature spread ΔT [K]
3. Calculate volumetric flow

$$V = \frac{Q\,[kW] \cdot 1000}{1.163 \cdot \Delta T\,[K]} \left[\frac{l}{h}\right]$$

4. Select suitable PICV VPF53..
5. Determine dial setting using volumetric flow/dial presetting tables, see below.

Example

1. Heat demand Q = 150 kW
2. Temperature spread ΔT = 6 K
3. Volumetric flow

$$V = \frac{150\,kW \cdot 1000}{1.163 \cdot 6\ K} = 21'654\ l/h = 21.6 m^3/h$$

Hint: You can also determine the volumetric flow using the valve slide rule.

4. Select PICV VPF53..
   Ideally, PICVs should be selected such that they operate at about 80% of their maximum flow, enabling them to deliver spare capacity, if required.
   Selection: VPF53.65F24 Δp_{min} = 25 kPa
   VPF53.65F35 Δp_{min} = 55 kPa
5. Determine dial setting using volumetric flow/dial presetting tables:

VPF53.65F24	Volumetric flow	21.6 m³/h
	Dial setting	3.6
VPF53.65F35	Volumetric flow	21.6 m³/h
	Dial setting	2.7

Volumetric flow/dial presetting

Tables to determine the dial setting for a desired volumetric flow.

Dp min [kPa] based on volumetric flow; interpolate missing values.

Note

The presetting tables below indicate the expected nominal volumetric flow. During commissioning, check whether the current presetting corresponds to the planned design. Further adjustment of the presetting may be required to achieve the needed volumetric flow.

	Presetting range linear to VDI/VDE 2173
	Presetting range linear
	Presetting range not permitted
	Nominal flow

Standard flow rate

VPF53.50F16 — **16 m³/h nominal**

V̇ [m³/h]				2.5	3.2	3.8	4.5	5.3	6	6.8	7.5	8.3	9	9.8	10.5	11.3	12	12.8	13.5	14.3	**15**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4
Δpmin [kPa]				6.5	6.5	6.5	6.8	7.1	7.4	7.7	8.0	8.8	9.6	10.4	11.2	12.0	13.5	15.2	16.8	18.5	20

VPF53.65F24 — **24 m³/h nominal**

V̇ [m³/h]				4.4	5.6	6.6	7.7	8.6	9.6	10.5	11.5	12.5	13.5	14.7	15.8	17.1	18.5	19.9	21.5	23.2	**25**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4
Δpmin [kPa]				15.0	15.0	15.0	15.7	16.2	16.8	17.4	18.0	18.4	18.7	19.1	19.5	20.0	20.9	21.8	22.8	23.9	25

VPF53.80F35 — **35 m³/h nominal**

V̇ [m³/h]				5.3	6.9	8.3	9.6	10.9	12.2	13.5	14.8	16.2	17.6	19.1	20.7	22.4	24.3	26.4	28.7	31.2	**34**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4
Δpmin [kPa]				16.0	16.0	16.0	16.4	16.8	17.2	17.6	18.0	18.4	18.7	19.1	19.6	20.0	20.8	21.7	22.7	23.8	25

VPF53.100F70 **70 m³/h nominal**

V̇ [m³/h]				12.1	15	18	21	23	25	28	30	32	35	38	40	43	47	51	56	62	**68**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4
Δpmin [kPa]				19.0	19.0	20.0	20.5	20.8	21.2	21.7	22.0	22.5	23.2	23.8	24.3	25.0	26.6	28.2	30.2	32.6	35

VPF53.125F110 **110 m³/h nominal**

V̇ [m³/h]				18.5	23	28	33	37	42	46	51	55	60	65	69	74	80	85	92	99	**110**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3,8	4
Δpmin [kPa]				16.0	16.0	16.0	16.4	16.8	17.2	17.6	18.0	18.5	19.2	19.8	20.3	21.0	23.3	25.3	28.0	30.7	35

VPF53.150F160 **160 m³/h nominal**

V̇ [m³/h]				25.6	31	38	44	51	57	63	72	76	82	89	96	104	111	120	128	137	**148**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4
Δpmin [kPa]				21.0	21.0	21.0	21.2	21.4	21.6	21.7	22.0	23.0	24.5	26.3	28.0	30.0	30.8	31.8	32.7	33.8	35

VPF53.200F210 **210 m³/h nominal**

V̇ [m³/h]						95	100	105	112	118	124	132	140	149	157	165	173	182	192	200	**210**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4
Δpmin [kPa]						11	12	12	14	15	16	17	19	21	22	24	26	27	29	30	32

High flow rate

VPF53.50F25 **25 m³/h nominal**

V̇ [m³/h]				4.3	5.2	6.2	7.2	8.1	9	10	11	12.1	13.2	14.3	15.4	16.5	18.2	19.9	21.6	23.3	**25**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4
Δpmin [kPa]				19.0	19.0	19.0	19.4	19.8	20.2	20.6	21.0	22.8	24.6	26.4	28.2	30.0	34.0	38.0	42.0	46.0	50

VPF53.65F35 **35 m³/h nominal**

V̇ [m³/h]				6.0	7.6	9.1	10.5	11.9	13.3	14.7	16.0	17.5	19.0	20.6	22.3	24.1	26.0	28.0	30.2	32.5	**35**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4
Δpmin [kPa]				30.0	30.0	30.0	30.4	30.8	31.2	31.6	32.0	32.6	33.1	33.7	34.3	35.0	38.5	42.2	46.2	50.4	55

VPF53.80F45 **45 m³/h nominal**

V̇ [m³/h]				7	9	11	12.8	14.5	16.2	18	19.6	21.4	23.2	25.1	27.1	29.3	31.6	34.1	36.8	39.8	**43**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4
Δpmin [kPa]				23.0	23.0	23.0	23.4	23.8	24.2	24.6	25.0	25.9	26.9	27.8	28.9	30.0	33.4	37.0	40.9	45.3	50

VPF53.100F90 **90 m³/h nominal**

V̇ [m³/h]				14.8	19	22	26	29	32	35	38	42	44	48	52	56	61	66	73	81	**90**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4
Δpmin [kPa]				29.0	29.0	30.0	31.3	32.2	33.1	34.1	35.0	37.2	38.3	40.6	42.8	45.0	49.4	53.8	60.0	67.1	75

VPF53.125F135 **135 m³/h nominal**

V̇ [m³/h]				23	29	36	42	48	53	59	64	70	76	81	87	93	100	107	114	122	**135**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4
Δpmin [kPa]				27.0	27.0	27.0	27.4	27.9	28.2	28.6	29.0	29.8	30.7	31.3	32.2	33.0	36.3	39.7	43.0	46.8	53

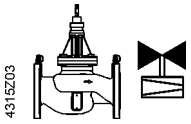
VPF53.150F200 **200 m³/h nominal**

V̇ [m³/h]				32	40	48	57	64	72	80	88	96	104	112	121	131	141	152	165	178	**195**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4
Δpmin [kPa]				33.0	33.0	33.0	33.2	33.4	33.6	33.8	34.0	36.2	38.5	40.7	43.2	46.0	49.0	52.2	56.1	60.0	65

VPF53.200F280 **280 m³/h nominal**

V̇ [m³/h]						130	137	145	153	162	170	180	189	199	209	220	232	243	256	267	**280**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4
Δpmin [kPa]						31	32	33	35	38	41	45	49	53	57	61	65	69	73	75	78

Engineering notes

Valve	Symbols / Direction of flow VPF53..	Flow in control mode	Valve stem	
			retracts	extends
PICV		variable	closes	opens

⚠ **The direction of flow indicated (arrow on the valve body) is mandatory!**
The valves should preferably be mounted in the return pipe where temperatures are lower and where the sealing gland is less affected by strain.

Symbol

Symbol used in catalogs and application descriptions	Symbol used in diagrams
	There are no standard symbols for PICVs in diagrams.

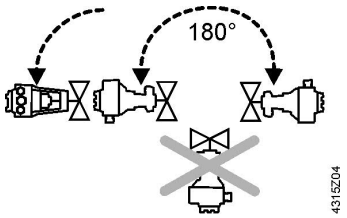
Recommendation

A strainer or dirt trap should be fitted upstream of the valve to enhance reliability and service life.
Remove dirt, welding beads etc. from valves and pipes.
Do not insulate the actuator bracket, as air circulation must be ensured.

Mounting notes

PICV and actuator can be easily assembled on site. Neither special tools nor adjustments, besides the presetting, are required. Prior to mounting the actuator, the required volumetric flow must be set. The valve is supplied with Mounting Instructions 74 319 0711 0.

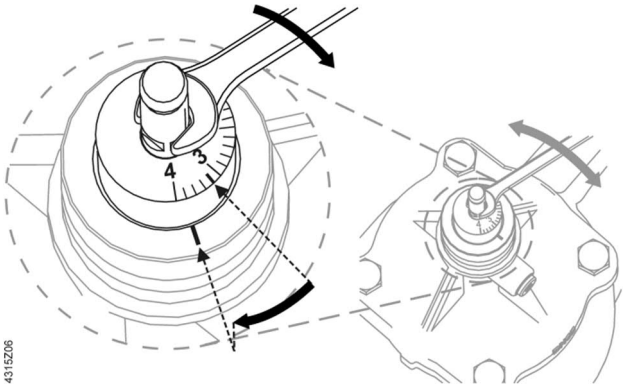
Mounting positions



Presetting

It is recommended to mount the actuator before the presetting is made.

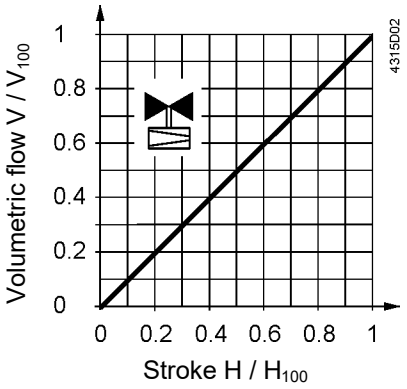
1. Mount actuator and fix valve neck coupling
2. Mount valve stem coupling and tighten slightly
3. Make presetting according to table under "Volumetric flow/dial presetting" on page 6. Do NOT adjust presetting to a dial reading lower than “0.6”.
4. Tighten stem coupling



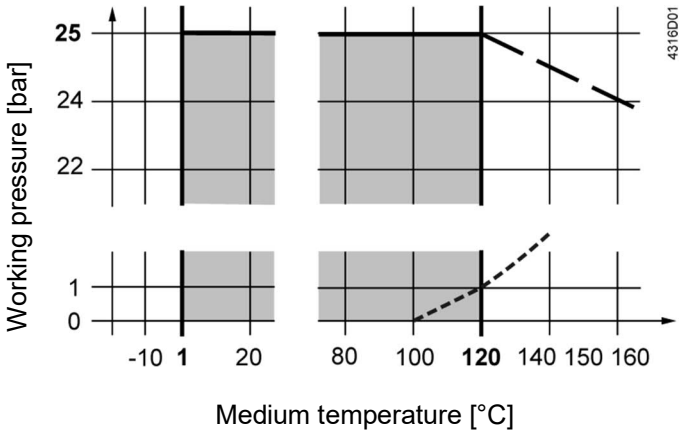
8 mm

Using an open-end wrench and turn the stem with dial to the desired presetting position.

Valve characteristic



Working pressure and medium temperature
Fluids



--- Curve for saturated steam; steam forms below this line

Note: for DN 150: max. medium temperature is 110°C.

Working pressure and medium temperature staged as per ISO 7005

⚠ Current local legislation must be observed.

Commissioning notes

⚠ **The valves must be commissioned with the actuator correctly fitted. Strong pressure impacts can damage closed PICVs.**

⚠ **The PICVs have to be open when flushing or pressure testing the system. Strong pressure impacts can damage closed PICVs.**

⚠ **Differential pressure Δp_{max} across the valve's control path is not allowed to exceed 600 kPa.**

Manual control

Only possible with mounted actuator.

Maintenance notes

The VPF53.. PICVs are maintenance-free.

⚠ When performing service work on the valve or actuator:

- Switch off the pump and disconnect power supply.
- Close the shut-off valves in the piping network.
- Fully reduce pressure in the piping network and allow the pipes to cool down completely.

Remove the electrical connections only if necessary.

Sealing gland

The stem sealing gland cannot be exchanged. In case of leakage the whole valve must be replaced.

Disposal

Do not dispose of the device as household waste.

- Special handling of individual components may be mandated by law or make ecological sense.
- Observe all local and currently applicable laws and regulations.

Warranty

Application-related technical data are guaranteed only when the valves are used in connection with the Siemens actuators listed under "Equipment combinations" on page 3.
Siemens warranty is void, if used with non-Siemens actuators.

Technical data

Functional data	PN class		PN 25 as per EN 1333
	Permissible operating pressure		2500 kPa (25 bar) as per ISO 7628 / EN 1333
	Volumetric flow deviation		< ±10% within differential pressure range
	Valve characteristic		Linear as per VDI/VDE 2173
	Leakage rate		Class IV (0…0.01% of volumetric flow V_{100}) to EN 1349
	Operating direction		Normally open (push to close)
	Permissible media		Low temperature hot water, medium temperature hot water, chilled water, water with antifreeze Recommendation: Water treatment to VDI 2035
	Medium temperature	DN 50 – 125	1…120 °C
		DN 150, 200	1…110 °C
	Rangeability		1:100
	Nominal stroke	DN 50, 65, 80	20 mm
		DN 100, 125	40 mm
		DN 150, 200	43 mm
	Low-noise operation		To operate the valve at a low noise level, a differential pressure of 150 kPa should not be exceeded.
Standards, directives and approvals	EU Conformity (CE)		CE1T4315xx [1]
	EAC conformity		Eurasia conformity
	Pressure Equipment Directive		PED 2014/68/EU
	Pressure Accessories		Scope: Article 1, section 1 Definitions: Article 2, section 5
	Fluid group 2	DN 50, 150, 200 [3]	Without CE-marking as per article 4, section 3 (sound engineering practice) [2]
		DN 65…125	Category I, module A, with CE-marking as per article 14, section 2
	Environmental compatibility		The product environmental declaration CE1E4315en [1] contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).

[1] The documents can be downloaded from http://siemens.com/bt/download.

[2] Valves where PS x DN < 1000, do not require special testing and cannot carry the CE label.

[3] Warm water temperature not greater than 110°C, do not require special testing and cannot carry the CE label.

Materials	Valve body	Nodular cast iron GJS-400
	Stem, spring	Stainless steel
	Trim	Brass (DZR)
	Regulator	Stainless steel
	Seals	EPDM
Dimensions / weight	Dimensions	Refer to "Dimensions" on page 13
	Flange connections	To ISO 7005-2
	Pressure test points (P/T-ports)	G ¼ inch (connection)
		2 mm x 40 mm (measuring tips)
	Weight	Refer to "Dimensions" on page 13

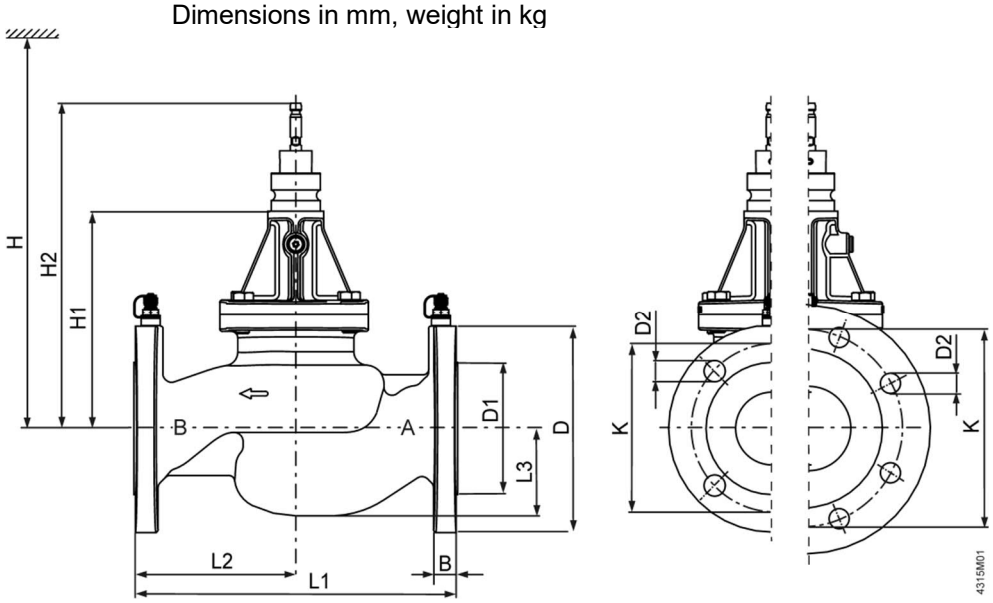
General ambient conditions	**Operation** EN 60721-3-3	**Transport** EN 60721-3-2	**Storage** EN 60721-3-1
Environmental conditions	Class 3K5	Class 2K3	Class 1K3
Temperature	0…55 °C	-30...65 °C	-15...50 °C
Humidity	5...95 % r.h.	< 95 % r.h.	5...95 % r.h.

Application examples

It is recommended to use PICVs in plants with variable speed pumps. When sizing the pump, it must be made certain that the most critical branch or consumer in the system – usually the remotest from the pump – gets enough pressure (pump head).

Dimensions

Dimensions in mm, weight in kg



DN50 DN65 / DN80

Product number	DN	B	Ø D	Ø D1	Ø D2	L1	L2	L3	Ø K	H1	H2	H		kg
												SAX..P[1)] SAV..P[1)]	SQV..P	
VPF53..	50	16	165	99	19 (4x)	230	115	65	125	187.5	284	630	577	14
	65	17	185	118	19 (8x)	290	145	80	145	195	271,5	637	584	19
	80	17	200	132	19 (8x)	310	155	93	160	216.5	313	659	606	27
	100	20	235	156	23 (8x)	350	162	111	190	332	449	800	720	50
	125	25	270	186	27 (8x)	400	192	134	220	357	474	820	750	77
	150	26	285	211	27 (8x)	480	230	156	250	401	521	870	790	111
	200	28	380	274	28 (12x)	600	300	300	310	401	521	870	790	175

DN = Nominal size
H = Total actuator height plus minimum distance to the wall or the ceiling for mounting, connection, operation, maintenance etc.
H1 = Dimension from the pipe center to install the actuator (upper edge)
H2 = Valve in the « OPEN » position means that the valve stem is fully extended.
1) SAX..P for DN50- 80; SAV..P for DN100- 200

Revision Numbers

Product number	Valid from rev. no.	Product number	Valid from rev. no.
VPF53.50F16	**..A**	**VPF53.50F25**	**..A**
VPF53.65F24	**..A**	**VPF53.65F35**	**..A**
VPF53.80F35	**..A**	**VPF53.80F45**	**..A**
VPF53.100F70	**..A**	**VPF53.100F90**	**..A**
VPF53.125F110	**..A**	**VPF53.125F135**	**..A**
VPF53.150F160	**..A**	**VPF53.150F200**	**..A**
VPF53.200F210	**..A**	**VPF53.200F280**	**..A**

VPP46..

VPI46..

VPP46..Q, with pressure test points P/T

VPI46..Q, with pressure test points P/T

ACVATIX™

Combi valves, PN 25

VPP46..
VPP46..Q
VPI46..
VPI46..Q

for rooms, zones, ventilation and air-conditioning systems

- **With integrated differential pressure controller**
- **DN 10…DN 32: Valve body made of dezincification resistant hot-pressed brass (DZR)**
- **DN 40…DN 50: Housing made of spheroidal graphite iron**
- **Volumetric flow 30... 11500 l/h,**
- **Differential pressure range 15…600 kPa**
- **Internally threaded Rp conforming to ISO 7-1**
- **Externally threaded G conforming to ISO 228-1**
- **Version with pressure test points for Δp measurement (optional)**
- **Can be equipped with electro thermal or electromotive actuators**
  - **SSA.. (3-position or DC 0…10 V)**
  - **STA..3../STP..3.. (2-position or PDM)**
  - **SUA21/3, SUA21/3P, SUE21P (2-position SPST)**
  - **STA63../STP63.. (DC 0…10 V)**
  - **SAY..1P03 (3-position or DC 0…10 V)**

Use

- In ventilation and air conditioning plants for control on the water side and automatic hydraulic balancing of terminal units, such as fan coils, induction units, and in heat exchangers for heating or cooling
- In heating zones like self-contained heating systems, apartments, individual rooms, etc.
- For closed circuits

Type summary

Product no.	Stock	DN	H_{100}	Connections		Test points	$\dot{v}_{min}$	$\dot{v}_{100}$	SUA21/3[2] SUA21/3P	SUE21P	STA..3.. / STP..3..[3]	SSA..
									Δp_{max}[1]	Δp_{max}[1]	Δp_{max}[1]	Δp_{max}[1]
			[mm]	[inch]			[l/h]	[l/h]	[kPa]	[kPa]	[kPa]	[kPa]
VPP46.10L0.2	S55264-V101	10	2.5	G ½	externally threaded	-	30	200	600	-	600	600
VPP46.10L0.4	S55264-V131		4.5				65	333	-	-		-
			5					370		600	-	600
VPP46.15L0.2	S55264-V102	15	2.5	G ¾			30	200	600	-	600	
VPP46.15L0.6	S55264-V103						100	575				
VPP46.20F1.4	S55264-V104	20	4.5	G 1			200	1190	-	-		-
			5				220	1330		600	-	600
VPP46.25F1.8	S55264-V121	25	4.5	G 1¼			238	1530	-	-	600	-
			5				260	1670		600	-	-
			5.5				280	1800		-	-	600
VPP46.32F4	S55264-V122	32	4.5	G 1½			468	3400	-	-	600	-
			5				510	3700		600	-	-
			5.5				550	4001		-	-	600
VPP46.10L0.2Q	S55264-V105	10	2.5	G ½		with pressure test points P/T	30	200	600	-	600	
VPP46.10L0.4Q	S55264-V132		4.5				65	333	-	-		-
			5					370		600	-	600
VPP46.15L0.2Q	S55264-V106	15	2.5	G ¾			30	200	600	-	600	
VPP46.15L0.6Q	S55264-V107						100	575				
VPP46.20F1.4Q	S55264-V108	20	4.5	G 1			200	1190	-	-		-
			5				220	1330		600	-	600
VPP46.25F1.8Q	S55264-V123	25	4.5	G 1¼			238	1530	-	-	600	-
			5				260	1670		600	-	-
			5.5				280	1800		-	-	600
VPP46.32F4Q	S55264-V124	32	4.5	G 1½			468	3400	-	-	600	-
			5				510	3700		600	-	-
			5.5				550	4001		-	-	600
VPI46.15L0.2	S55264-V109	15	2.5	Rp ½	internally threaded	-	30	200	600	-	600	600
VPI46.15L0.6	S55264-V110						100	575				
VPI46.20F1.4	S55264-V111	20	4.5	Rp ¾			200	1190	-	-		-
			5				220	1330		600	-	600
VPI46.25F1.8	S55264-V125	25	4.5	Rp 1			238	1530	-	-	600	-
			5				260	1670		600	-	-
			5.5				280	1800		-	-	600
VPI46.32F4	S55264-V126	32	4.5	Rp 1¼			468	3400	-	-	600	-
			5				510	3700		600	-	-
			5.5				550	4001		-	-	
VPI46.15L0.2Q	S55264-V112	15	2.5	Rp ½		with pressure test points P/T	30	200	600	-	600	600
VPI46.15L0.6Q	S55264-V113						100	575				
VPI46.20F1.4Q	S55264-V114	20	4.5	Rp ¾			200	1190	-	-		-
			5				220	1330		600	-	600
VPI46.25F1.8Q	S55264-V127	25	4.5	Rp 1			238	1530	-	-	600	-
			5				260	1670		600	-	-
			5.5				280	1800		-	-	600
VPI46.32F4Q	S55264-V128	32	4.5	Rp 1¼			468	3400	-	-	600	-
			5				510	3700		600	-	-
			5.5				550	4001		-	-	600

[1] Δp_{min} value refer to page 9

[2] Only with mounting AL60 accessory, the SUA21/3 can drive the VPI46.. or VPP46..valve

[3] STP..3.. may only be used together with

- VPP46.10L0.2
- VPP46.10L0.2Q
- VPI46.15L0.2
- VPI46.15L0.2Q
- VPP46.15L0.2
- VPP46.15L0.2Q
- VPI46.15L0.6
- VPI46.15L0.6Q
- VPP46.15L0.6
- VPP46.15L0.6Q

Product no.	Stock no.	DN	H_{100}	Connections		Test points	$\dot{v}_{min}$	$\dot{v}_{100}$	SAY..P	
									Δp_{min}	Δp_{max}
			[mm]	[Inch]			[l/h]	[l/h]	[kPa]	[kPa]
VPI46.40F9.5Q	S55264-V129	40	15	Rp 1½	internally threaded	with pressure test points P/T	1370	9500	25	600
VPI46.50F12Q	S55264-V130	50		Rp 2			1400	11500	36	

DN = nominal size

H_{100} = nominal stroke

$\dot{v}_{100}$ = volumetric flow through fully open valve (H_{100})

$\dot{v}_{min}$ = smallest pre-settable volumetric flow through fully open valve (H_{100})

Δp_{max} = maximum permissible differential pressure across the valves control path, valid for the entire actuating range of the motorized valve

Δp_{min} = minimum differential pressure required across the valve's control path, so that the difference pressure regulator works reliably

Fittings

Product no.	Stock no.	Description
ALG..2	**ALG..2**	Set of 2 fittings with threaded connections for 2-port valves, consisting of 2 union nuts, 2 discs and 2 flat seals
ALG..2B	**S55846-Z1..**	Brass fittings, for media temperatures up to 100 °C

Ordering

Example

Product no.	Stock no.	Designation
VPP46.15L0.2	S55264-V102	Combi valve, PN 25, externally threaded
SSA331	S55180-A105	Actuator

Delivery PICV valves, actuators and accessories are packed and supplied separately.

Revision numbers See page 18

Equipment combinations DN 15…32

Actuators	Mounting set	Operating voltage	Positioning signal	Positioning force	Actuators (no power)[1]	Spring return	Stroke	Connecting cable	Data sheet
SSA131	-	AC 24 V	3-position	100 N	-	-	1.2 mm 6.5 mm	1.5 m	A6V11858276
SSA331		AC 230 V							
SSA161.05		AC/DC 24 V	DC 0...10 V						
SSA151.05HF			DC 4...20 mA						A6V11858278
SSA161.05HF			DC 0...10 V						
SSA161E.05HF									
STA23..		AC 230 V	2- position		NC	✓	2.5 mm max. 4.5 mm	see data sheet	N4884
STA73..		AC/DC 24V	2-position, PDM						
STA63..		AC 24 V	DC 0…10 V						
STP23.. [2]		AC 230 V	2-position		NO				
STP73.. [2]		AC/DC 24V	2-position, PDM						
STP63.. [2]		AC 24 V	DC 0...10 V						
SUA21/3	AL60	AC230V	3-wire on/off (SPST[1])	170N		-	2.5 mm	0.8 m	A6V10446174
SUA21/3P	-	AC230V		100N					A6V11780780
SUE21P		AC230V					5mm		A6V11780777

[1] NC = Normal Closed = VPP46../VPI46.. powerless closed

NO = Normal Open = VPP46../VPI46.. powerless open

The valve is fully opened without an actuator

[2] STP..3.. may only be used together with

- VPP46.10L0.2
- VPP46.10L0.2Q
- VPI46.15L0.2
- VPI46.15L0.2Q
- VPP46.15L0.2
- VPP46.15L0.2Q
- VPI46.15L0.6
- VPI46.15L0.6Q
- VPP46.15L0.6
- VPP46.15L0.6Q

Equipment combinations DN 40…50

Type	Article no.	Stroke	Pos. force	Operating voltage	Positioning signal	Spring return	Spring return direction	Pos. time	LED	Manual adjustment	Auxiliary functions
SAY31P03	**S55150-A132**	15 mm	200 N	AC 230 V	3-position	-	-	30 s	-	Press and fix in place	[1]
SAY61P03	**S55150-A133**			AC/DC 24 V	DC 0…10 V DC 4…20 mA 0…1000 Ω				✓		[2], [3]
SAY81P03	**S55150-A134**				3-position				-		[1]

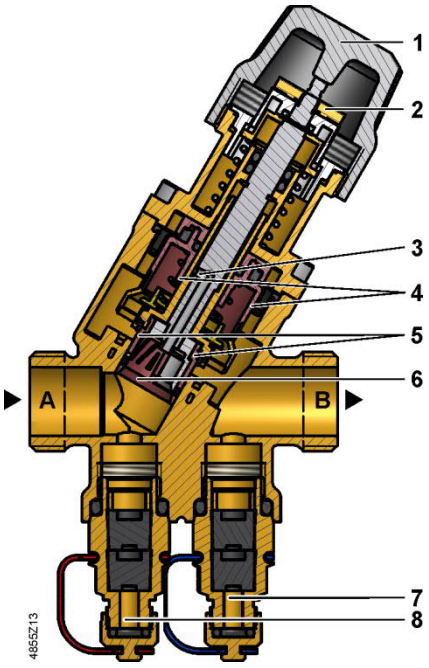
[1] Optional accessories: Auxiliary switch ASC10.51
[2] Positioning feedback, forced control, characteristic curve changeover
[3] Optional accessories: Auxiliary switch ASC10.51, sequence control, control action changeover AZX61.1

Fittings

Combi valves		Set of fittings		
Externally threaded		**Malleable cast iron**	**Brass**	
Product no.	Stock no.	Type / Stock no.	Product no.	Stock no.
VPP46.10L0.2	S55264-V101	-	ALG132 [1]	BPZ:ALG132
VPP46.10L0.4	S55264-V131	-	ALG132 [1]	BPZ:ALG132
VPP46.15L0.2	S55264-V102	-	ALG142 [1]	BPZ:ALG142
VPP46.15L0.6	S55264-V103	-	ALG142 [1]	BPZ:ALG142
VPP46.20F1.4	S55264-V104	ALG152	ALG152B [2]	S55846-Z100
VPP46.25F1.8	S55264-V121	ALG202	ALG202B[2]	S55846-Z102
VPP46.32F4	S55264-V122	ALG252	ALG252B[2]	S55846-Z104
VPP46.10L0.2Q	S55264-V105	-	ALG132 [1]	BPZ:ALG132
VPP46.10L0.4Q	S55264-V132	-	ALG132 [1]	BPZ:ALG132
VPP46.15L0.2Q	S55264-V106	-	ALG142 [1]	BPZ:ALG142
VPP46.15L0.6Q	S55264-V107	-	ALG142 [1]	BPZ:ALG142
VPP46.20F1.4Q	S55264-V108	ALG152	ALG152B [2]	S55846-Z100
VPP46.25F1.8Q	S55264-V123	ALG202	ALG202B[2]	S55846-Z102
VPP46.32F4Q	S55264-V124	ALG252	ALG252B[2]	S55846-Z104

[1] Connecting thread pipe side: Internally threaded
[2] Usable up to maximum medium temperature of 100 °C

Technical / mechanical design

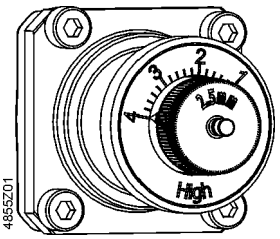


1 Manual control knob
2 Ring with dial for presetting
3 Aperture for differential pressure controller is linked with outlet port B
4 Differential pressure controller
5 Plug for presetting opening
6 Flow control valve
7 Pressure test point, blue ribbon, P-
8 Pressure test point, red ribbon, P+
A Inlet port A
B Outlet port B

Combi valves VP..46..Q (shown here) are additionally equipped with pressure test points P/T.

Functional principle

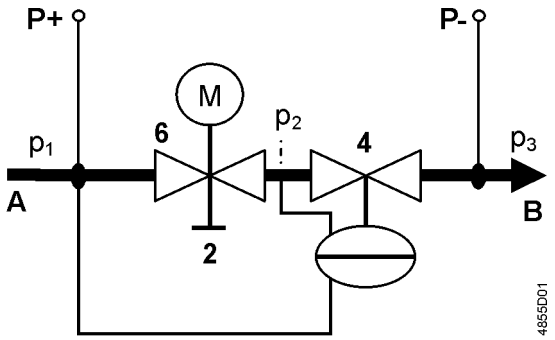
The medium entering the valve (inlet port A) passes through the variable presetting opening (5) which is connected to the ring with the dial (2) for presetting the desired maximum volumetric flow. Then, the medium flows through the flow control valve (6) with a linear characteristic and a stroke of 2.5 mm (DN 10…15) respectively 5 mm (DN 20).



Ring with dial for presetting (2)

The actuator (not shown here) opens and accurately positions the control valve (6). Before leaving the Combi valve, the medium passes through a built-in mechanical differential pressure controller (4). This differential pressure controller is the heart of the Combi valve and ensures that the selected volumetric flow is maintained across the whole working range and independent of the inlet pressure p_1.

The Combi valves VP..46..Q are additionally equipped with two pressure test points (P+, P-), which allow measurement of the differential pressure across the Combi valve. For that purpose, the electronic manometer ALE10 can be used.



A Inlet medium (inlet port)

B Outlet medium (outlet port)

2 Ring with dial for presetting

4 Differential pressure controller maintains the pressure $p_1 - p_2$ constant across the flow control valve (6) and the presetting (2)

6 Control valve with mounted actuator

P- = P/T port, pressure test point with blue ribbon (7)

P+ = P/T port, pressure test point with red ribbon (8)

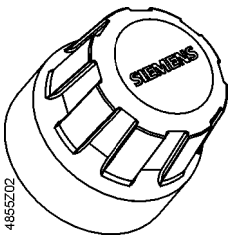
p_1 = pressure at inlet of Combi valve

p_2 = pressure at outlet of flow control valve

p_3 = pressure at outlet of Combi valve

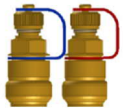
Manual control
DN 10…32

The manual control knob (1) is ready fitted to protect valve stem and pre-set mechanism and facilitates manual control of the Combi valve during commissioning.



Factory setting:
The valve is open. To close the valve, turn the manual knob clockwise.
The valve must be open to purge the system.

Accessories

Product no.	Stock no.		Description
ALE10	**ALE10**		Electronic manometer **excluding** measuring lines and measuring tips. Measuring range 0-700 kPa. A differential pressure of more than 1000 kPa will destroy the pressure sensor. For measuring the differential pressure between P+ and P- of the Combi valves (refer to diagram under "Functional principle" on page 3). Functions of the manometer: • Start/stop • Automatic zero position • Backlit display • Display: Out → outside the measuring range • Holding function
ALE11	**ALE11**		Measuring lines and straight measuring tips for use with Siemens Combi valves. Equipped with G ⅛" connection with 2 x 40 mm needles.
ALP45	**ALP45**		Spare nipples P/T port (set of 2) Set contains 1 piece each with a red and blue ribbon. Port: External threads G ⅛" to ISO 228 Connection to valve body: G ¼" to ISO 228, inclusive O-ring Length: 40 mm
ALP46	**S55264-V115**		Blanking plug for P/T ports Connection to valve body: G ¼" to ISO 228, inclusive O-ring
ALP47	**S55264-V116**		Drain ball valve inclusive O-ring Port: External threads G ½" to ISO 228 Connection to valve body: G ¼" to ISO 228, inclusive O-ring Length: 48 mm
ALP48	**S55264-V117**		Combined P/T port and drain ball valve with red ribbon Port: External threads G ⅛" to ISO 228 Connection to valve body: G ¼" to ISO 228, inclusive O-ring Length: 80 mm
ALP49	**S55264-V118**		Long P/T ports (set of 2 pieces) Set contains 1 piece each with a red and blue ribbon. Port: External threads G ⅛" to ISO 228 Connection to valve body: G ¼" to ISO 228, inclusive O-ring Length: 120 mm
ALP50	**S55264-V119**		Spare black valve protection cap

Engineering example

Basis of calculation

1. Determine energy demand Q [kW]
2. Determine temperature differential ΔT [K]
3. Calculate volumetric flow

$$\dot{v} = \frac{Q[kW] \cdot 1000}{1{,}163 \cdot \Delta T[K]} \left[\frac{l}{h}\right]$$

4. Select suitable Combi valve
   - pipe connections (internally or externally threaded)
   - with or without P/T ports
5. Determine dial setting using volumetric flow/dial presetting table, see the following page

Example

1. Given is a heat exchanger with Q = 1.9 kW
2. Temperature differential (supply - return) ΔT = 6 K
3. Volumetric flow

$$\dot{v} = \frac{1{,}9 kW \cdot 1000}{1{,}163 \cdot 6\ K} = 272{,}28\ l/h$$

   Hint: You can also determine the volumetric flow using the valve slide rule.
4. The valve shall have connections with external threads to ISO 228-1 and size DN 15.
5. Combi valve selection:
   Ideally, Combi valves should be selected such that they operate at about 80% of their maximum flow, enabling them to deliver spare capacity, if required.
   VPP46.15L0.6 (externally threaded connections, no pressure test points P/T, nominal volumetric flow 600 l/h)
6. Determine dial setting using volumetric flow/dial presetting table below:
   Volumetric flow 270 l/h
   Dial setting 1.8

Volumetric flow/dial presetting

Tables to determine the dial setting for a desired volumetric flow.

Dp min [kPa] based on volumetric flow; interpolate missing values.

Note **The presetting tables indicate the expected nominal volumetric flow. During commissioning, check whether current pre-settings correspond to the planned design. Further adjustment of the pre-settings may be required to achieve the needed volumetric flow.**

Presetting range linear to VDI/VDE 2173
Presetting range linear
Presetting range not permitted

VPP46.10L0.2, VPP46.10L0.2Q, VPP46.15L0.2, VPP46.15L0.2Q, VPI46.15L0.2, VPI46.15L0.2Q — **200 l/h nominal**

V̇ [l/h]				30	35	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
Dial	Min.	0.2	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δpmin [kPa]				14.3	14.3	14.3	14.5	14.6	14.6	14.7	14.8	14.9	15	15.1	15.2	15.3	15.4	15.5	15.5	15.6	15.7	15.8

VPP46.10L0.4, VPP46.10L0.4Q with STA.. — **330 l/h nominal**

V̇ [l/h]					59	75	91	107	123	140	161	172	188	203	220	236	252	268	284	301	317	333
Dial	Min.	0.2	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δpmin [kPa]					14.6	14.7	14.8	15	15.1	15.3	15.5	15.6	15.7	15.8	16	16.1	16.2	16.4	16.5	16.6	16.8	16.9

VPP46.10L0.4, VPP46.10L0.4Q — **370 l/h nominal**

V̇ [l/h]					65	83	101	119	137	155	179	191	209	226	244	262	280	298	316	334	352	370
Dial	Min.	0.2	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δpmin [kPa]					14.6	14.8	14.9	15.1	15.3	15.4	15.6	15.7	15.9	16	16.2	16.3	16.5	16.6	16.7	16.9	17	17.2

VPP46.15L0.6, VPP46.15L0.6Q, VPI46.15L0.6, VPI46.15L0.6Q — **600 l/h nominal**

V̇ [l/h]				100	115	130	160	180	210	240	270	300	320	350	380	410	440	460	490	520	550	575
Dial	Min.	0,2	0,4	0,5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δpmin [kPa]				14.9	15.2	15.5	15.6	15.9	16.1	16.4	16.6	16.8	17	17.2	17.5	17.6	17.8	18	18.2	18.4	18.6	18.9

VPP46.20F1.4, VPP46.20F1.4 Q with STA.., VPI46.20F1.4, VPI46.20F1.4Q with STA.. — **1200 l/h nominal**

V̇ [l/h]					200	260	310	380	430	490	550	610	660	730	780	840	900	960	1010	1070	1130	1190
Dial	Min.	0.2	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δpmin [kPa]					16	16.5	17	17.5	17.9	18.4	18.8	19.2	19.5	19.9	20.2	20.4	20.7	20.9	21.1	21.3	21.4	21.6

VPP46.20F1.4, VPP46.20F1.4Q, VPI46.20F1.4, VPI46.20F1.4Q — **1400 l/h nominal**

V̇ [l/h]					220	290	350	420	480	550	610	680	740	810	870	940	1000	1070	1130	1200	1260	1330
Dial	Min.	0.2	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δpmin [kPa]					16	16.5	17	17.5	17.9	18.4	18.8	19.2	19.5	19.9	20.2	20.4	20.7	20.9	21.1	21.3	21.4	21.6

VPP46.25F1.8, VPP46.25F1.8Q, VPI46.25F1.8, VPI46.25F1.8Q with STA.. — **1530 l/h nominal**

V̇ [l/h]					238	303	366	427	488	550	614	680	749	822	898	978	1063	1150	1241	1335	1432	1530
Dial	Min.	0.2	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δpmin [kPa]					15.3	15.8	16.1	16.4	16.7	17	17.5	18	18.7	19.7	20.9	22.3	24.2	26.4	28.9	32.0	35.4	39.4

VPP46.25F1.8, VPP46.25F1.8Q, VPI46.25F1.8, VPI46.25F1.8Q — **1800 l/h nominal**

V̇ [l/h]					280	356	430	502	574	647	722	800	881	967	1057	1151	1250	1353	1460	1571	1685	1800
Dial	Min.	0.2	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δpmin [kPa]					15.3	15.8	16.1	16.4	16.7	17	17.5	18	18.7	19.7	20.9	22.3	24.2	26.4	28.9	32.0	35.4	39.4

VPP46.32F4, VPP46.32F4Q, VPI46.32F4, VPI46.32F4Q with STA.. — **3400 l/h nominal**

V̇ [l/h]					468	680	770	940	1120	1290	1460	1640	1810	1980	2150	2330	2500	2670	2850	3020	3190	3400
Dial	Min.	0.2	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δpmin [kPa]					17.9	18	18.1	18.2	18.3	18.5	18.7	18.9	19.2	19.6	20.1	20.7	21.4	22.3	23.4	24.6	26	28

VPP46.32F4, VPP46.32F4Q, VPI46.32F4, VPI46.32F4Q — **4000 l/h nominal**

V̇ [l/h]					550	800	910	1110	1320	1520	1720	1930	2130	2330	2530	2740	2940	3140	3350	3550	3750	4001
Dial	Min.	0.2	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δpmin [kPa]					17.9	18	18.1	18.2	18.3	18.5	18.7	18.9	19.2	19.6	20.1	20.7	21.4	22.3	23.4	24.6	26	28

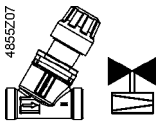
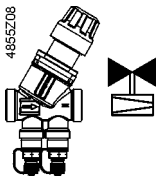
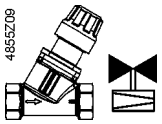
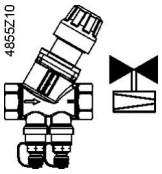
VPI46.40F9.5Q — **9500 l/h nominal**

V̇ [l/h]					1370	1600	1950	2250	2650	3000	3400	3800	4250	4750	5250	5800	6350	6950	7550	8200	8800	9500
Dial	Min.	0.2	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δpmin [kPa]					10	10	10	10	10	10	10	11	11	12	13	15	16	18	20	22	24	25

VPI46.50F12Q — **11500 l/h nominal**

V̇ [l/h]					1400	1650	2000	2350	2700	3150	3550	4050	4600	5150	5800	6500	7300	8150	9000	9800	10600	11500
Dial	Min.	0.2	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.
Δpmin [kPa]					10	10	11	11	11	12	12	13	14	15	17	19	21	24	27	30	33	36

Engineering notes

Valve	Symbols / Direction of flow		Flow in control mode	Valve stem	
	VP..46..	VP..46..Q		retracts	extends
Combi valve VPP46..			variable	closes	opens
Combi valve VPI46..			variable	closes	opens

⚠ **The direction of flow indicated (arrow on the valve body) is mandatory!**

The valves should preferably be mounted in the return pipe where temperatures are lower and where the sealing gland is less affected by strain.

Symbols

Symbol used in catalogs and application descriptions	Symbol used in diagrams
	There are no standard symbols for Combi valves in diagrams.

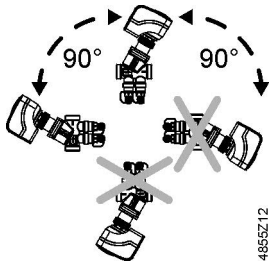
Recommendation

A strainer or dirt trap should be fitted upstream of the valve to enhance reliability.
Remove dirt, welding beads etc. from valves and pipes.
Do not insulate the actuator bracket, as air circulation must be ensured!

Mounting notes

Combi valve and actuator can be straightforwardly assembled on site. Special tools or adjustments are not required.
Prior to mounting the actuator, the required volumetric flow must be set.
The valve is supplied complete with Mounting Instructions (74 319 0649 0 b).

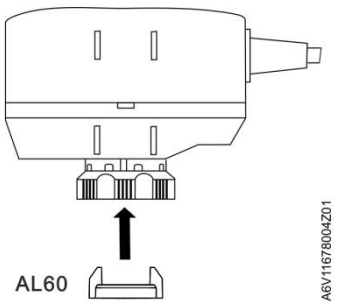
Mounting positions



Thermal actuators STA.., STP.. may be installed in any position.
Actuators SSA.., SAY.. must be installed horizontally up to 90° and not hanging.

AL60 supporting ring

The AL60 supporting ring must be put into position before mounting the actuator SUA21/3 onto the valve.

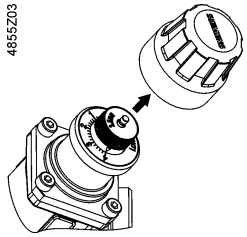


Installation notes

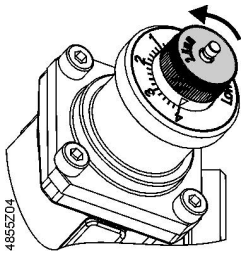
Prior to mounting the actuator, the presetting is to be made as follows:

Presetting DN 10…32:

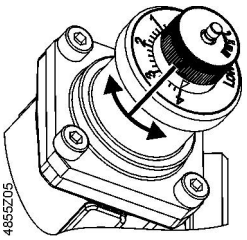
1. Remove control knob from Combi valve.



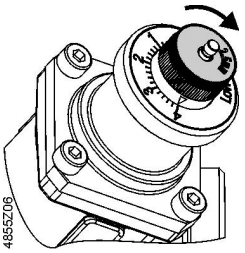
2. Loosen knurled nut.



3. Adjust the desired dial setting with the white knob.

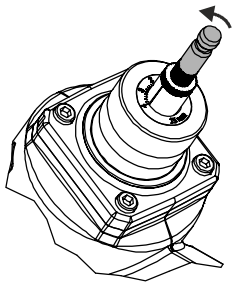


4. Retighten knurled nut by hand.

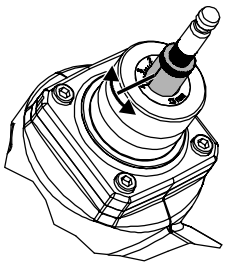


Presetting DN 40…50:

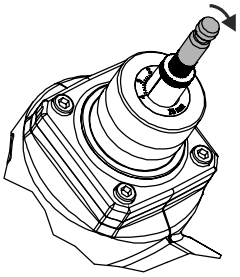
1. Loosen spindle head



2. Adjust the desired dial setting with the white knob.

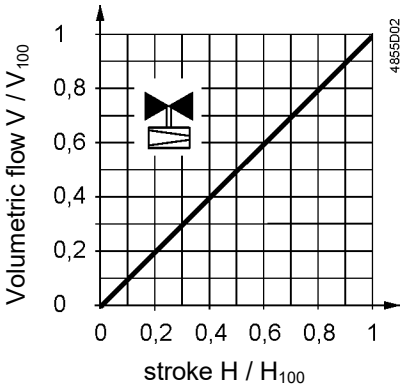


3. Retighten spindle head - by hand only



Valve characteristic

VP..46.., VP..46..Q



Commissioning notes

⚠ **The valves must be commissioned with the manual control knob or actuator correctly fitted. Strong pressure impacts can damage closed Combi valves.**

⚠ **The Combi valves have to be open when flushing or pressure testing the system. Flush only in correct flow direction. Strong pressure impacts can damage closed Combi valves.**

⚠ **Differential pressure Δp_{max} across the valve's control path is not allowed to exceed 600 kPa.**

Manual control

When turning the manual control knob in counter-clockwise direction or manually operating the actuator, the valve opens. The actuator closes the valve. The valves are supplied fully open. The manual knob is not designed for permanent manual operation.

Maintenance notes

The V..P46.. PICV valves are maintenance-free without cartridge.
Valve plug, stem, presetting, diaphragm etc. may not be disassembled
When performing service work on the valve and / or actuator:

- Switch off the pump and disconnect power supply.
- Close the shut-off valves in the piping network.
- Fully reduce pressure in the piping network and allow the pipes to cool down completely.

Remove the electrical connections only if necessary.

Sealing gland

The stem sealing gland cannot be exchanged. Should leakage occur, the whole valve must be replaced.

Disposal

Do not dispose of the device as household waste.

⚠ **Warning**
Due to the tensioned spring return, valve disassembly may result in flying parts causing possible injury.

Only authorized staff may disassemble valves with tensioned spring return!

Disposal

- Special handling of individual components may be mandated by law or make ecological sense.
- Observe all local and currently applicable laws and regulations.

Warranty

Application-related technical data are guaranteed only when the valves are used in connection with the Siemens actuators listed under "Equipment combinations" on page 3. When used with actuators of other manufacture, any warranty by Siemens becomes void.

Technical data

Functional data

PN class	PN 25 as per EN 1333
Permissible operating pressure	2.500 kPa (25 bar) as per ISO 7628 / EN 1333
Max. differential pressure	600 kPa
Min. differential pressure	See tables volumetric flow/dial presetting

Valve characteristic	Linear as per VDI/VDE 2173
Leakage rate in general	Class IV (0…0.01% of volumetric flow V_{100}) to EN 1349
DN 25…32 with STA..3..	Class III (0…0,1% of volumetric flow V_{100}) per EN 1349
Average flow accuracy	+/-10% from ΔPmin - to 2.5 x ΔPmin +/- 5% from 2.5 x ΔPmin – to 600kPa

	Permissible media		Low-temperature hot water, chilled water, water with antifreeze Recommendation: Water treatment to VDI 2035
	Medium temperature:		
	Valve with actuator		1...120 °C 1…110°C with SUA21/3[3], SUA21/3P, SUE21P
	Permissible ambient temperature		1…50 °C
	Nominal stroke	DN 10L0.2 DN 15L0.2 DN 15L0.6	2.5 mm
		DN 10L0.4 / DN 20	5 mm
		DN 25…32	5.5 mm
		DN 40…50	15 mm
Materials	Valve body, port, seat, sealing gland and test points		Dezincification resistant hot-pressed brass (DZR), CW602N
	Valve body DN 40…50		Nodular cast iron
	Stem, spring		Stainless steel
	Presetting element		PTFE, PPO, POM C and ABS
	Regulator		PPS
	Seals		EPDM 281 (O-ring)
Dimensions / weight	Dimensions		Refer to "Dimensions" on page 14
	Threaded connections	VPP46..	G to ISO 228-1 (externally threaded)
		VPI46..	Rp to ISO 7-1 (internally threaded)
	Actuator connection	DN 10…32	M30 x 1.5 mm
		DN 40…50	Siemens large stroke connector
	Pressure test points (P/T-ports)		G ¼" (connection valve body)
			2 mm x 40 mm (needles)
	Weight		Refer to "Dimensions" on page 14
Standards, directives and approvals	Pressure Equipment Directive Pressure-carrying accessories		PED 2014/68/EU Scope: Article 1, section 1 Definitions: Article 2, section 5
	Fluid group 2	DN 10…40	Without CE-marking as per article 4, section 3 (sound engineering practice) [1]
		DN 50	Category I, Modul A, with CE-marking as per article 14, section 2
	EU conformity (CE)	DN 50	A5W00022837, CE1T4855xx [2]
	EAC conformity		Eurasia conformity
Environmental compatibility	The product environmental declaration CE1E4855en [2] contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).		

[1] Valves where PS x DN < 1000, do not require special testing and cannot carry the CE label.

[2] Documents are available at http://www.siemens.com/bt/download

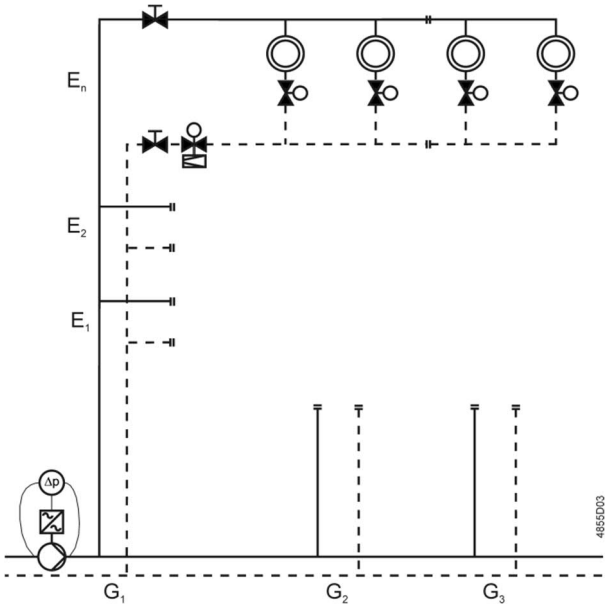
[3] Only with mounting AL60 accessory, the SUA21/3 can drive the VPI46.. or VPP46..valve

Application examples

Combi valves in HVAC systems combined with variable speed pumps provide even higher energy efficiency. When sizing the pump, it must be made certain that the most critical branch or consumer in the system – usually the remotest from the pump – gets enough pressure (pump head). Thus, it is recommended to use a variable speed pump in constant-pressure mode with end-point feedback, to maintain a minimum differential pressure across the critical valve.

Residential buildings

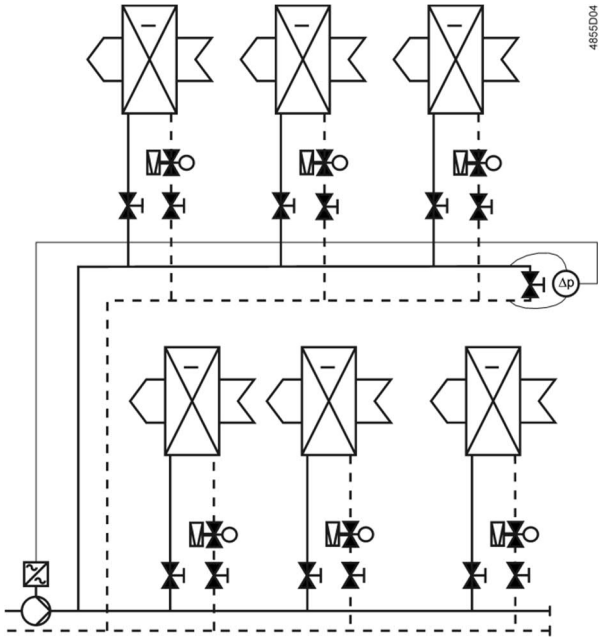
Residential buildings with for example self-contained flat heating systems:



E = Floor
G = Group or zone

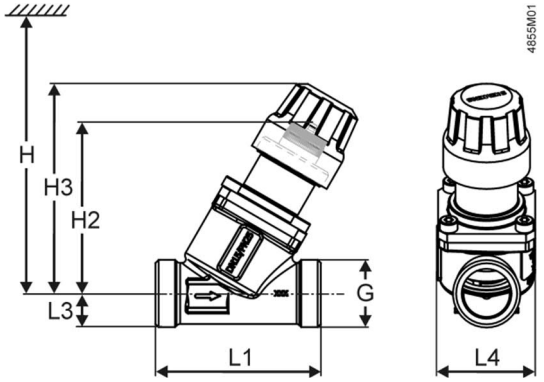
Non-residential buildings

Commercial buildings with for example Fan Coil Units or heat exchangers for heating or cooling:

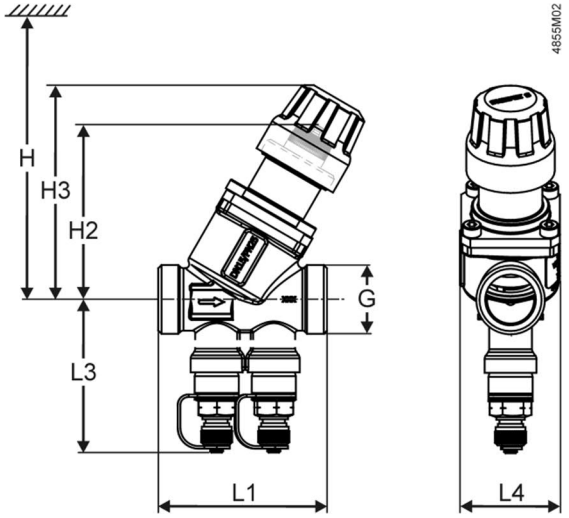


Dimensions

VPP46..

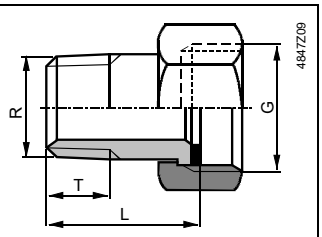
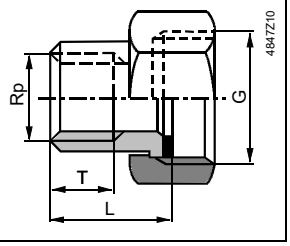


VPP46..Q



Valves	DN	G	L1	L3	L4	H2	H3	H [1]		Weight
								SSA..	STA..3.. STP..3..	
		[inch]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
VPP46.10L0.2	10	½	65	10.5	38	68.5	83.5	170	160	0.314
VPP46.10L0.4										
VPP46.15L0.2	15	¾		13.2		67.3	82.2			0.333
VPP46.15L0.6										
VPP46.20F1.4	20	1	70	13.6		67.5	82.5			0.371
VPP46.25F1.8	25	1¼	78	22		70	85			0.497
VPP46.32F4	32	1½	104	26	63	85	100	185	175	1.22
VPP46.10L0.2Q	10	½	65	54.8	38	68.5	83.5	170	160	0.402
VPP46.10L0.4Q										0.302
VPP46.15L0.2Q	15	¾		55.5		67.3	82.2			0.422
VPP46.15L0.6Q										
VPP46.20F1.4Q	20	1	70	57.3		67.5	82.5			0.459
VPP46.25F1.8Q	25	1¼	78	59		70	85			0.59
VPP46.32F4Q	32	1½	104	68	63	85	100	185	175	1.317

[1] Total height including actuator

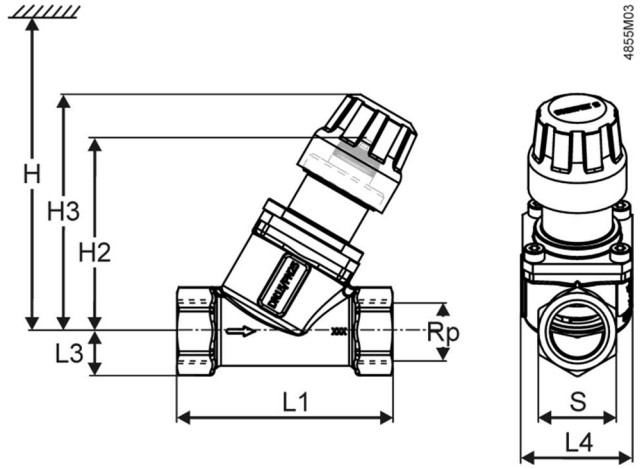
Sets of threaded fittings with flat seal ALG…2: set of 2 threaded fittings	ALG132 ALG142	pipe side with external R threads	
	ALG152 ALG152B ALG202 ALG202B ALG252 ALG252B	pipe side with internal Rp threads	

Type ALG..		for valve type	DN	G	R	Rp	L	T
Malleable cast iron	Brass [1]			[Inch]	[Inch]	[Inch]	[mm]	[mm]
	ALG132	VPP46.10..	10	G ½	R ⅜		≈ 24	≈ 9
	ALG142	VPP46.15..	15	G ¾	R ½		≈ 29.5	≈ 12
ALG152	**ALG152B**	VPP46.20..	20	G 1		Rp ½	≈ 23	≈ 13
ALG202	**ALG202B**	VPP46.25..	25	G 1¼		Rp ¾		
ALG252	**ALG252B**	VPP46.32..	32	G 1½		Rp 1		

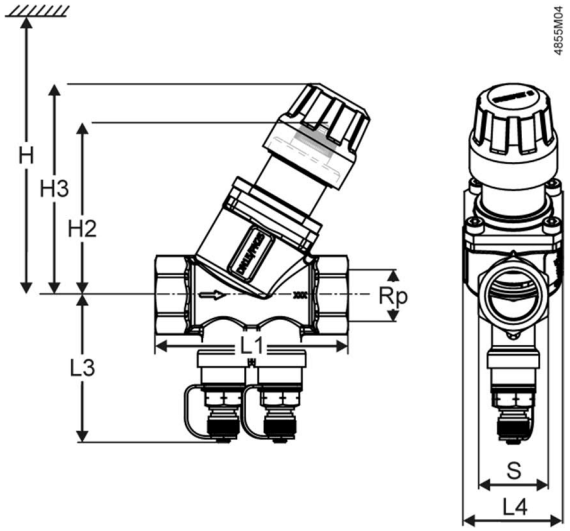
[1] Maximum medium temperature 100 °C

- On valve side: cylindrical thread to ISO 228-1, on pipe side: with cylindrical thread to ISO 7-1

VPI46..



VPI46..Q



Valves	DN	Rp	S	L1	L3	L4	H2	H3	H [1]			Weight
									SSA..	STA..3.. STP..3..	SAY..	
		[inch]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
VPI46.15L0.2	15	½	27	75	15.2	38	67.3	82.4	170	160	-	0.377
VPI46.15L0.6												
VPI46.20F1.4	20	¾	32	79	17.9		67.5	82.5				0.418
VPI46.25F1.8	25	1	39	83	22		70	85				0.533
VPI46.32F4	32	1¼	46	104	26	63	85	100	185	175		1.219
VPI46.15L0.2Q	15	½	27	75	60.2	38	67.3	82.4	170	160		0.477
VPI46.15L0.6Q												
VPI46.20F1.4Q	20	¾	32	79	62.9		67.5	82.5				0.506
VPI46.25F1.8Q	25	1	39	83	59		70	85				0.625
VPI46.32F4Q	32	1¼	46	104	68	63	85	100	185	175		1.316
VPI46.40F9.5Q	40	1½	56	138	71	90	161	-	-	-	500	3.253
VPI46.50F12Q	50	2	70		77							3.683

[1] Total height including actuator

Revision Numbers

Product number	Valid from rev. no.	Product number	Valid from rev. no.
VPP46.10L0.2	..A	VPP46.10L0.2Q	..A
VPP46.10L0.4	..B	VPP46.10L0.4Q	..B
VPP46.15L0.2	..A	VPP46.15L0.2Q	..A
VPP46.15L0.6	..A	VPP46.15L0.6Q	..A
VPP46.20F1.4	..A	VPP46.20F1.4Q	..A
VPP46.25F1.8	..A	VPP46.25F1.8Q	..A
VPP46.32F4	..A	VPP46.32F4Q	..A
VPI46.15L0.2	..A	VPI46.15L0.2Q	..A
VPI46.15L0.6	..A	VPI46.15L0.6Q	..A
VPI46.20F1.4	..A	VPI46.20F1.4Q	..A
VPI46.25F1.8	..A	VPI46.25F1.8Q	..A
VPI46.32F4	..A	VPI46.32F4Q	..A
		VPI46.40F9.5Q	..A
		VPI46.50F12Q	..A

SIEMENS

4884

STA..3..

STP..3..

ACVATIX™

Electrothermal actuators

STA..3.. STP..3..

for radiators, small and Combi valves

- **Operating voltage AC/DC 24 V, 2-point positioning signal or PDM/TPI (pulse-duration modulation/ Time Proportional Integral)**
- **Operating voltage AC 230 V, 2-point positioning signal**
- **Operating voltage AC 24 V, Positioning signal DC 0…10 V**
- **Positioning force 100 N, (Variants for FHD with 90 N)**
- **Standard version with connecting cable (2 m / 1 m / 0.8 m)**
- **Actuators without connecting cable used together with:**
  - Connecting cable for up to 15 meters, halogen-free available to 10 meters
  - Connecting cable with LED operating indication
  - Connecting cable with auxiliary switch or DC 0…10 V module
- **Variants supporting synchronous operation of multiple actuators switched in parallel**
- **270° visible position indication**
- **Mounting using a sliding sleeve lock (bayonet)**
- **Adaptor for mounting on third-party valves**
- **Dismantling protection (optional)**
- **Automatic adaption of close – dimension**
- **IP54**
- **Robust, maintenance-free, noise-free**

Use

- Used in interior rooms
- For Siemens valves:
  - Radiator valves VDN.., VEN.. and VUN..
  - Small valves VD1..CLC, V..P47..
  - Zone valves V..I46..
  - Combi valves VPP46.., VPI46..
  - MiniCombiValves (MCV) VPD.. and VPE..
- For third-party valves
  - Direct assembly: Heimeier, Cazzaniga, Oventrop M30 x 1.5, Honeywell-Braukmann and MNG
  - Mounting using an adapter: See "Type summary" on page 3.
- For additional valves, see "Equipment combinations" on page 6

Fast selection

The product range STA..3.. / STP..3.. covers the widest range of equipment combinations and applications. The cable in a standard length is included with actuators using connecting cables. Actuators without connecting cables can be used in combination with the appropriate cables, see Accessories / *Connecting cable*, page 4. See page 5 for additional accessories.

Examples

The following examples simplify fast selection of actuators appropriate to the application (including accessories).

Starting point	*Procedure for quick selection*
Example 1 • Valves used: VVP47.. • Connecting cable length: Approx. 0.6 m • Operating voltage: AC 230 V	1. See "Equipment combinations" on page 6. Correct actuator (group): STP.. 2. See "Type summary" on page 3, Table "Actuators with connecting cable": Actuator **STP23** (with 1 m connecting cable)
Example 2 • Valves used: VDN.. • Connecting cable length: ca. 5 m • Operating voltage: AC 24 V • Color Black	1. See "Equipment combinations" on page 6 Actuator (group): STA.. 2. No proper device can be found in the "Type summary" on page 3, Table "Actuators with connecting cable". 3. Select an actuator **without connecting cable** due to the desired color and length of the connecting cable: **STA73B/00** 4. Select the appropriate connecting cable from the table "Accessories / *Connecting cable*", page 4: **ASY23L50B**

Type summary

Actuators with connecting cable

Type	*Item No.*	*Position de-energized* [1]	*Operating voltage*	*Positioning signal*	*Positioning time*	*Connecting cable*	*Weight*
STA73	S55174-A100	NC	AC/DC 24 V	2-position, PDM/TPI [2]	270 s	1 m	181 g
STA23	S55174-A101	NC	AC 230 V	2-position [4]	210 s	1 m	181 g
STP73	S55174-A102	NO	AC/DC 24 V	2-position, PDM/TPI [2]	270 s	1 m	177 g
STP23	S55174-A103	NO	AC 230 V	2-position [4]	210 s	1 m	177 g
STA63	S55174-A104	NC	AC 24 V	DC 0…10 V	270 s [5]	2 m	205 g
STP63	S55174-A105	NO	AC 24 V	DC 0…10 V	270 s [5]	2 m	201 g
STA73HD [3]	S55174-A106	NC	AC/DC 24 V	2-position	270 s	0.8 m	174 g
STA23HD [3]	S55174-A107	NC	AC 230 V	2-position	210 s	0.8 m	174 g

[1] NC = Normally Closed = (valve) powerless closed, with regart to radiator valves, VPP46../VPI46.. and VVI46../VXI46.
NO = Normally Open = (valve) powerless open , with regart to radiator valves, VPP46../VPI46.. and VVI46../VXI46.
(valve) powerless closed with regard to the small valves V..P47.. .

[2] Pulse Duration Modulation/Time Proportional Integral together with Desigo room controllers and other Siemens controllers according to their data sheet. Not suitable for parallel run

[3] For floor heating distributors, 90 N

[4] Pulse Duration Modulation (PDM)/Time Proportional Integral (TPI) possible with Siemens Thermostats where explicitly stated in the thermostats data sheet. Not suitable for parallel run in connection with PDM/TPI.

[5] Min. runtime ca. 40 s/mm in control mode (after heating-up time)

Actuators without connecting cables

(see "Accessories" for proper cables)

Type	*Item No.*	*Position de-energized.* [1]	*Operating voltage*	*Pos.signal / pos.time* [2]			*Cable group*	*Weight*
				2-position	*PDM/TPI*	*DC 0…10 V*		
Version in white RAL 9016								
STA73/00 [5]	S55174-A109	NC	AC/DC 24 V	270 s		270 s [6]	1, 2, 7, 9	133 g
STA23/00	S55174-A110	NC	AC 230 V	210 s	–	–	1, 7	133 g
STP73/00 [5]	S55174-A111	NO	AC/DC 24 V	270 s		270 s [6]	1, 3, 8, 9	129 g
STP23/00	S55174-A112	NO	AC 230 V	210 s	–	–	1, 8	129 g
STA73PR/00 [3]	S55174-A115	NC	AC/DC 24 V	270 s		–	1, 7, 9	133 g
STP73PR/00 [3]	S55174-A116	NO	AC/DC 24 V	270 s		–	1, 8, 9	129 g
STA73 MP/00 [4]	S55174-A113	NC	AC/DC 24 V	270 s		270 s [6]	1, 7, 9	133 g
STA23 MP/00 [4]	S55174-A114	NC	AC 230 V	210 s	–	–	1, 7	133 g
Version in black RAL 9005								
STA73B/00	S55174-A117	NC	AC/DC 24 V	270 s		270 s [6]	4	133 g
STA23B/00	S55174-A118	NC	AC 230 V	210	–	–	4	133 g

[1] NC = Normally Closed = (valve) powerless closed, with regart to radiator valves, VPP46../VPI46.. and VVI46../VXI46.
NO = Normally Open = (valve) powerless open , with regart to radiator valves, VPP46../VPI46.. and VVI46../VXI46.
(valve) powerless closed with regard to the small valves V..P47.. .

[2] At an ambient temperature of 20 °C.

[3] Suitable for parallel operation even in connection with PDM/TPI (Pulse Duration Modulation/Time Proportional Integral) or on/off control

[4] Packaging unit: 50 pieces (OEM)

[5] In connection with an ASY6AL.. resp. ASY6PL.. DC 0…10 V connection cable/module, the operating voltage is limited to AC 24 V only.

[6] Min. runtime ca. 40 s/mm in control mode (after heating-up time)

Accessories

Connecting cable/connecting cable with function module

Type	Item No.	Cable group	Length [m]	Weight [g]	Assembled with	Cable coating	Positioning signal	Operating voltage		Color
								STA23.. STP23..	STA73.. STP73..	
ASY23L08	S55174-A121	1	0,8	42	–	PVC	2-position	AC 230 V	AC/DC 24 V	White
ASY23L20	S55174-A123		2	81						
ASY23L50	S55174-A126		5	223						
ASY23L100	S55174-A129		10	435						
ASY23L150	S55174-A130		15	646						
ASY23L30B	S55174-A131	4	3	139						Black
ASY23L50B	S55174-A132		5	223						
ASY23L20HF	S55174-A134	1	2	100		Halogen-free				White
ASY23L50HF	S55174-A135		5	218						
ASY23L100HF	S55174-A136		10	466						
ASY6AL20	S55174-A137	2	2	72	Function module DC 0…10 V	PVC	DC 0…10 V	–	AC 24 V	
ASY6PL20	S55174-A140	3	2	72						
ASY6AL20HF	S55174-A147	2	2	61		Halogen-free				
ASY6PL20HF	S55174-A150	3	2	61						
ASA23U10	S55174-A153	7	1	75	Auxiliary switch for STA..	PVC	2-position	AC 230 V	AC/DC 24 V	
ASP23U10	S55174-A155	8	1	75	Auxiliary switch for STP..					
ASY23L20LD	S55174-A157	9	2	70	LED			-		

Adapter

Type	*Item NO.*	*For third-party valves*	*Description*
AV53	AV53	Danfoss RA-N	Metal
AV63	S55174-A165	Giacomini M30x1.5	Plastic
AV59	AV59	Vaillant	Metal
AV64	S55174-A166	Pettinaroli M28x1,5	Plastic
AL100	AL100	Siemens 2W..-, 3W..- and 4W..- valves	Metal
AV301	S55174-A159	Valves with M30 x 1.5	Higher bayonet adapter, 5 mm[1)]
AV302	S55174-A160	Valves with M28 x 1,5 - Comap - Markaryd - Herz	Higher bayonet adapter, 5 mm[1)]
AV303	S55174-A161	Valves with M30 x 1 - TA	Higher sliding sleeve adapter (bayonet), 5 mm [1)]
AV304	S55174-A167	Various (5 pieces)	Adapter set for installers
AV305	S55174-A169	Valves with M30 x 1.5	Alternate bayonet adapter set (10 pieces)[2)]
AV306	S55174-A171	Valves with M28x1.5 - preset able radiator valves by Markaryd	Higher sliding sleeve adapter (bayonet), 5 mm (10 pieces)[2)]

[1)] The insert is with or without a 5 mm extension depending on assembly.

[2)] Only 10 pack available

Protection against dismantling

Type	*Item no.*	*Description*
AL431	S55174-A168	Tamper-proof fitting to prevent dismantling of the actuator

Ordering

When ordering, specify the quantity, product name, and type code.

Example 1
1 actuator STA23 with 1 m connecting cable and
1 adapter AV301

Example 2
1 actuator STP73/00 without connecting cable,
1 connecting cable ASY23L20LD, 2 m length with LED operating indication, operating voltage AC/DC 24 V, white
1 adapter AV301

Delivery
Actuators, valves and accessories are supplied in separate packages.

Equipment combinations

Siemens valve type	*Actuator*	*Valve type*	*k_{vs} [m^3/h]*	*$\dot{V}$ [l/h]*	*PN class*	*Data sheet valve*
VDN.., VEN.., VUN..	STA..	Radiator valves	0.09…1.41	–	PN 10	N2105, N2106
VPD.., VPE..	STA..	MCV MiniCombiValves	–	25…483		N2185
VD1..CLC..	STA..	Small valves	0.25…2.6	–		N2103
VVI46.., VXI46..	STA..	Zone valves	2…5	–	PN 16	N4842
V..P47..	STP..	Small valves	0.25…4	–		N4847
VPP46.., VPI46.. (DN10..DN15) (DN10-DN32)	STP.. STA..	Combi valves	– 30…575 30…3400	30…575	PN 25	N4855

Third-party valves, connection M30 x 1.5, without adapter

Radiator valves

- Heimeier
- Watts (Cazzaniga)
- Oventrop M30 x 1.5 (as of 2001)
- Honeywell-Braukmann
- MGN

Valves from additional manufacturers upon request

Additional radiator valves with adapters AV.. see "Accessories/Adapter" page 5

k_{vs} = Nominal flow value for cold water (5…30 °C) through a fully opened valve (H_{100}), at a differential pressure of 100 kPa (1 bar)

$\dot{V}$ = Volumetric flow at 0.5 mm stroke

Technical notes

NO, NC valves

NO valves	• Valve is opened without actuator (Normally Open) • The valve stem is fully extended • Typical examples: Radiator valves (VDN.., VEN.., VUN..), small valves (VD1..CLC), zone valves (V..I46) and Combi valves (VP..).
NC valves	• Valve is closed without actuator (Normally closed) • The valve stem is fully extended • Example: Small valve V..P47..

Most third-party valves are NO valves.

Valve and actuator combination

NO function	• STA.. actuator stem is extended when de-energized. • NC valve required.
NC function	• STA.. actuator stem is extended when de-energized. • NO valve required.

Note
NO function
(Normally Open)

The valve is closed in a de-energized state for most valve applications featuring thermal actuators

Actuators with the opposite control action, are used when the reverse function is required: The valve is open in a de-energized state.

The following table displays the appropriate combinations.

Note
Response at de-energized actuator

Valve	*Type*	*De-energized actuator*	
		STA..	STP..
Radiator valves	VDN.., VEN.., VUN..	Closed	Open [1) 2)]
Small valves	V..P47..	A ↔ AB open [1) 2)]	A ↔ AB closed
	VD1..CLC	Closed	Open [1) 2)]
Zone valves	V..I46..	AB ↔ A closed	AB ↔ A open [1) 2)]
Combi valves	VPD.., VPE.. VPP46.., VPI46..,	Closed	Open [1) 2)]

[1)] Controller must support NO valve actuator combinations.

[2)] Combination not recommended as it makes no sense in terms of energy outside of demand period.

Technical and mechanical design

Actuator operation

The electrothermal actuators STA.. and STP.. are noise-free and maintenance-free. When the control signal is applied to the actuator, the temperature of the heating element rises, which causes the solid expansion medium to expand. It transfers its stroke directly to the installed valve.
The valve starts to open after preheating for approx. 1.5 min if the heating element is switched on in a cold state (room temperature), and achieves the maximum stroke after another approx. 2 min (230 V) or 3 min (24 V). At power-off, the expansion element cools down and the valve will be closed by the spring.
This has the following effect for the actuator types below:

STA73.., STA23.. (NC)
2-position, PDM/TPI

The actuator stem retracts and the radiator valve is opened by the own spring. The actuator stem extends when de-energized and the radiator valve is closed.

STP73.., STP23.. (NO)
2-position, PDM/TPI

The actuator stem extends and the small valve, V..P47.., is opened. The actuator stem retracts when de-energized and the small valve is closed by the own spring.

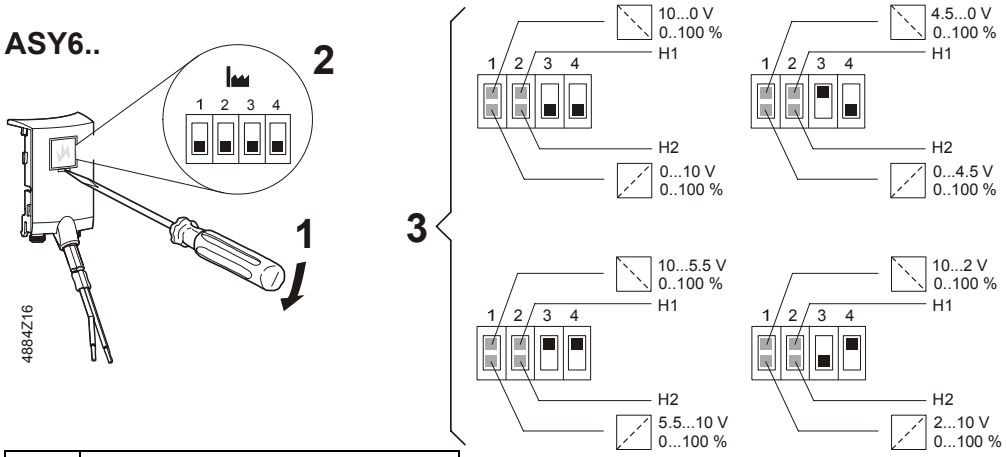
STA63..
STA73/00 with
DC 0…10 V module

The actuator stem retracts and the radiator valve is opened by the spring. The position of the stem is proportional to the DC 0…10 V positioning signal. The actuator stem extends when de-energized and the radiator valve is closed. The actuator deploys to the 50% stroke position if the positioning signal is lost when applying operating voltage.
DC 0…10 V actuators support various operation modes, see also under DIP-Switch settings

STP63..
STP73/00 with
DC 0…10 V module

The actuator stem extends and the small valve, V..P47.., is opened. The position of the stem is proportional to the DC 0…10 V positioning signal. The actuator stem retracts when de-energized and the small valve is closed by the own spring. The actuator deploys to the 50% stroke position if the positioning signal is lost when applying operating voltage.
DC 0…10 V actuators support various operation modes, see also under DIP-Switch settings

STP63../STP63..
DIP-switch settings

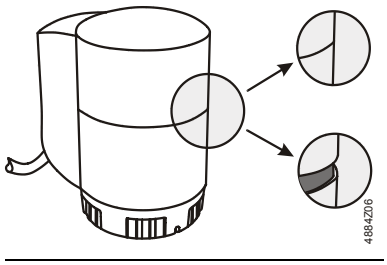


H1	3 mm stroke
H2	4.5 mm stroke

Position indication on the actuator

The movement and actual position of the actuator is indicated by the gray interior part.

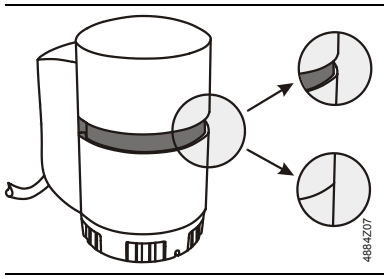
STA..



De-energized actuator
- The actuator's stem is extended
- The [1]valve is closed.

Actuator > 3 minutes with power
- The valve stem is retracted.
- The [1]valve is opened.

STP..



De-energized actuator
- The actuator's stem is retracted.
- The [2]valve is closed.

Actuator > 3 minutes with power
- The actuator's stem is extended
- The [2]valve is opened.

[1] With regard to radiator valves, VPP46../VPI46.. and VVI46../VXI46 .

[2] With regard to V..P47..

Automatic adaption of close - dimension

Locking the sliding sleeve, bayonet-ring, triggers the mechanical adaption of the close- dimension. This affects a pre-tensioning for NC types (STA..) on the valve stem resulting in a sealed valve. For NO types (STP..), the actuator stem will be positioned above the valve spindle without pre-tension.

Adaption of close-dimension for STA.. actuators (NC)

Lies in the range between 8.5…13.5 mm [1]

Adaption of close - dimension for STP.. Actuators (NO)

Lies in the range between 12.5…17.5 mm [1]

[1] when used with the supplied standard sliding sleeve

Adaption of close-dimension with higher sliding sleeve (bayonet-nut) AV301, AV302 und AV303, bayonet-nut, AV.. (accessories)

A higher sliding sleeve, bayonet nut, is used in the following cases:

a. If the diameter of the actuator's sliding sleeve, bayonet-ring (42,5 mm) prevents assembly (e.g. angle valves, valves with measurement ports) and

b. To adapt to the desired thread size for third-party manufacturers (M28 x 1.5 or M30 x 1)

It must be used with insert A (black) if a higher sliding sleeve adapter (bayonet) is used to maintain the close-dimension range.

Options

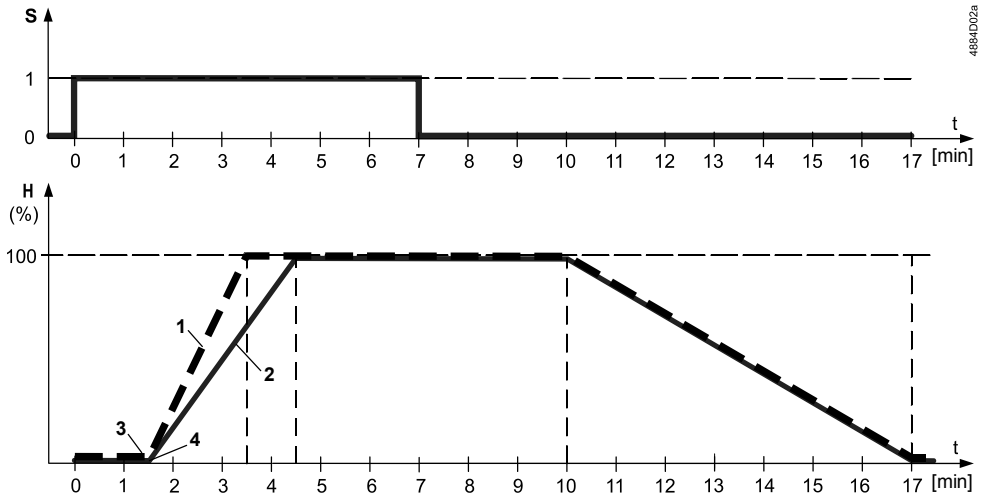
- To achieve the close-dimension range, reduced by 5 mm, the sliding sleeve adapter must be used together with insert B (white).
- To achieve the close-dimension range, increased by 5 mm, the sliding sleeve adapter must be used without insert A or B.

Expansion to the close-dimension is required to adapt to third-party valves that do not operate within the standard close dimension range.

Close-dimension range with the different adapters:

	Standard bayonet-nut	Higher bayonet adapter AV301 → M30 x 1,5 AV302 → M28 x 1,5 AV303 → M30 x 1		
	No insert	Insert-A (black)	Insert-B (white)	No insert
STA..	8.5 … 13.5	8.5 … 13.5	3.5 … 8.5	13.5 … 18.5
STP..	12.5 … 17.5	12.5 … 17.5	7.5 … 12.5	17.5 … 22.5

Positioning times, Opening/closing



S Positioning signal
H Stroke in %
1 Actuator ST..2.. (AC 230 V)
2 Actuator ST..7.. (AC 24 V)
3/4 Warm start
– Values at 25° C (ambient temperature)
– The positioning time depends on the voltage and the ambient temperature

⚠ Warning

Some controllers drive the valve actuators with PDM/TPI signals. This increases the response time. For optimal control, the ambient temperature of the actuator must be < 40°C.

Pulse-duration modulation/Time Proportional Integral

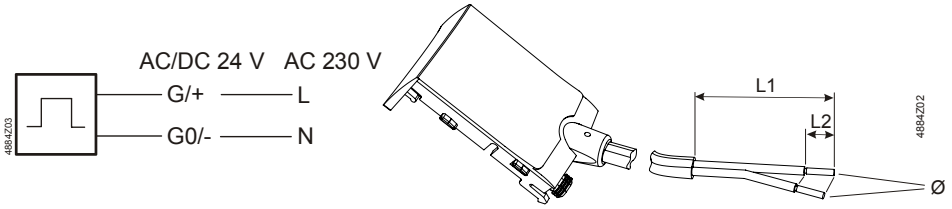
Accessories

Separate connecting cable

The actuators STA../00 and STP../00 are supplied without a connecting cable. They can be assembled as per the table "Accessories/connecting cables" on page 4. The product also includes halogen-free cable (Lengths 2 / 5 / 10 m).

ASY23L..

Standard connecting cable for all STA.. and STP.. Actuators for open/close positioning signal AC 24 V or AC 230 V with PVC coating. Lengths 0.8 / 2 / 3 / 5 / 10 / 15 m.



G/+ L brown
G0/- N blue

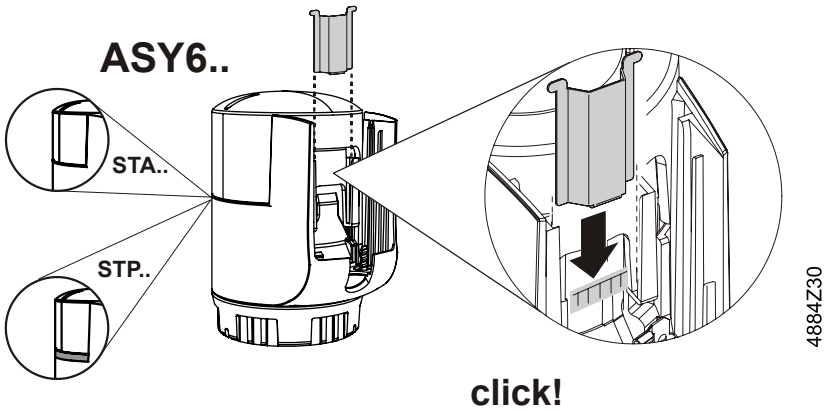
L1 ca. 50 mm
L2 ca. 6 mm
Cross section ≤ 2 m 0,5 mm^2 , > 2 m 0,75 mm^2

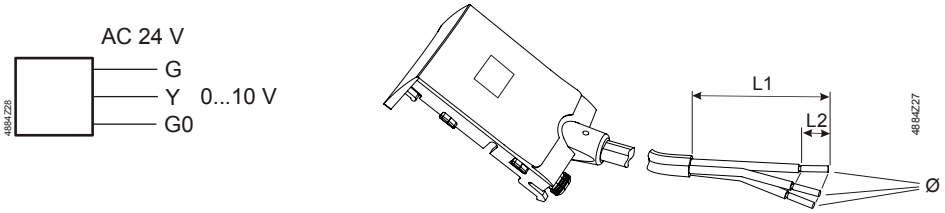
ASY6AL..

The connecting cables are available in various lengths and coating quality with DC 0…10 V control module and AC 24 V voltage supply, can be combined with STA73/00 thermal actuators. To this end, the metal bridge supplied with the cable must be inserted in the actuator.

ASY6PL..

The connecting cables are available in various lengths and coating quality with DC 0…10 V control module and AC 24 V voltage supply, can be combined with STP73/00 thermal actuators. To this end, the metal bridge supplied with the cable must be inserted in the actuator.

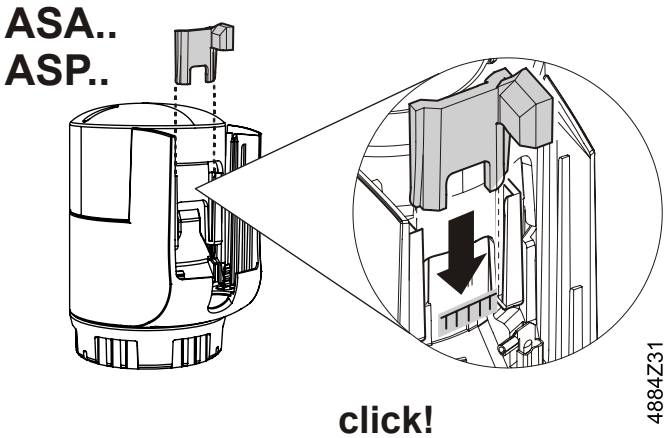




G	braun	L1	ca. 50 mm
Y	rot	L2	ca. 6 mm
G0	blau	Cross section ≤ 2 m	0,5 mm^2

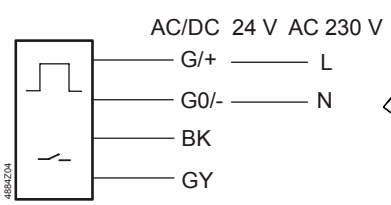
ASA23U10 with aux. switch for **STA../00**
ASP23U10 with aux. switch for **STP../00**

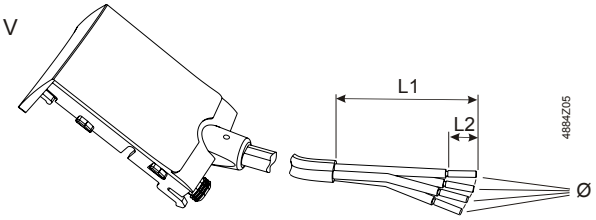
Connecting cable with PVC coating and integrated auxiliary switch for all STA../00, STP../00 actuators for open/close positioning signal AC 24 V or AC 230 V. Length 1 m. To this end, the plastic bridge supplied with the cable must be inserted in the actuator.



Switch power:

AC	*DC*
3 A resistive	4…30 V / 100 mA
2 A inductive	48 V / 1 A





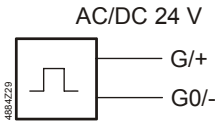
G/+ brown
G0/- blue
BK black
GY gray

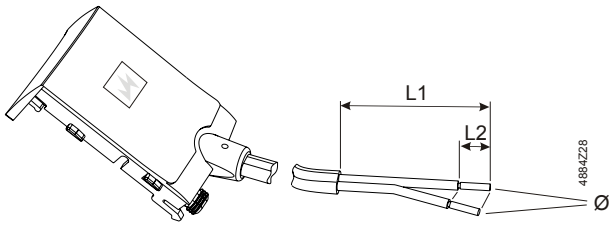
L1 ca. 50 mm
L2 ca. 6 mm
Cross section 0.5 mm^2

Switch-point: Between 1.5 and 2.3 mm stroke

ASY23L20LD
with LED indicator

The same as AS..23U but for AC/DC 24 V only. The green LED is lit synchronously with the open/close control. It visually indicates control and provides support during commissioning and service. Length 2 m.





G/+ brown
G0/- blue

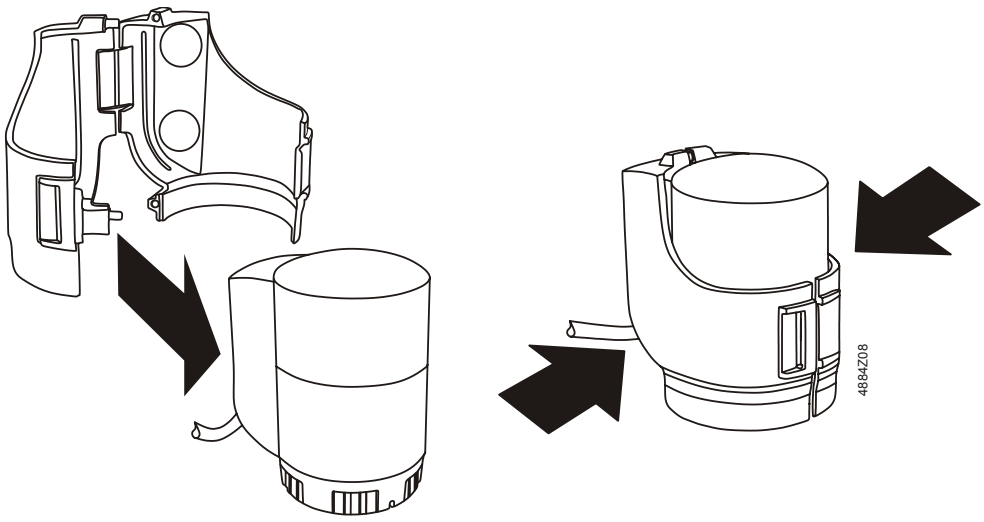
1 LED
L1 ca. 50 mm
L2 ca. 6 mm
Cross section 0.5 mm^2

Adapter AV.. for third-party valves

Adapters are available for mounting the STA.. and STP.. actuators on valves from other manufacturers (see "Accessories/Adapters" on page 5).

Tamper-proof fitting AL431

Tamper-proof fittings can be used to prevent unauthorized intervention on the actuators.



Mounting and installation notes

Mounting on valve

Mounting instructions are included in the packaging.

Actuators STA.. or STP.. are supplied as separate units. They can be assembled with just a few movements prior to commissioning:

- Remove the protective cover from the valve body
- Insert the sliding sleeve, bayonet-nut, on the valve and manually tighten
- Put actuator in position and manually tighten (clockwise) the bayonet-ring until a second click
- STA../00, STP../00: Plug in the connecting cable
- Connect to operating voltage only after mounting

Hints for the dismounting:

- Interrupt the power supply and disconnect the connection cable
- Wait for 6 min. until the actuator is cooled down
- Turn the sliding sleeve, bayonet-ring, counter clockwise to the end-position

At dismounting the actuator will be set automatically to the original position (factory setting).

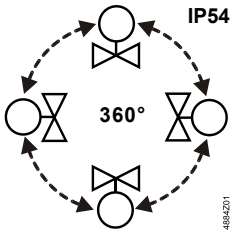
Seldom may happen that the actuator will be released from the valve together with the valve whereby the bayonet-nut stuck in the actuator. In order to re-use the actuator, the actuator's stem has to be re-set to the original position (factory setting). For this purpose, turn the actuator up-side-down and push back the stem with simultaneous counter clock wise turning of the sliding sleeve, bayonet-ring, until latching.

⚠ Warning

Do not use pipe wrenches, spanners or similar!

Mounting positions

Actuators may be installed in all positions (IP54 standard guaranteed).



Notes on electrical installation

- Comply with all local regulations when installing.
- Connect the connecting cable downward and away from the bottom.
- Provide for a means to isolate from mains power/connecting voltage, e.g. by connecting an automatic circuit breaker or switch fuse upstream of the control unit.

Maintenance

The actuator is maintenance-free.

Repair

Disconnect the connecting cable from the operating voltage prior to replacing.
Opening the actuator can cause irreparable damage. It may also result in injury from the installed, strong spring.
The actuator cannot be repaired; the entire unit must be replaced.

Disposal

- The device is considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.
  - Dispose of the device through channels provided for this purpose.
  - Comply with all local and currently applicable laws and regulations.

Warranty

The technical data relating to specific applications are valid only in conjunction with the valves listed under "Equipment combinations" in this data sheet on page "6".

When using STA.. and STP.. actuators, users are responsible for ensuring the proper functioning of actuators when used together with third-party valves; any guarantees on the part of Siemens Building Technologies expire accordingly.

Technical data

		STA73.. / STA73../00 STA73HD STP73.. / STP73../00	STA23.., STA23../00 STA23HD STP23.., STP23../00	STA63.. STP63..
Power supply	Operating voltage Frequency	AC/DC 24 V ± 20 % [1] 50 / 60 Hz	AC 230 V ± 15 % 50 / 60 Hz	AC 24 V ± 20 % 50 / 60 Hz
	Power consumption at 50 Hz Operation At power-up	 2.5 W 6 VA	 2.5 W 58 VA	 2.5 W 6 VA
	Switch-on current (transient)	250 mA	250 mA	250 mA
	Primary fuse	External		
Signal input	Positioning signal	2-position, PDM/TPI [2] DC 0…10 V [3]	2-position	DC 0…10 V (Power consumption 0.06 mA)
	Parallel operation of multiple actuators	For PDM/TPI [2] ST..3PR/00	May be limited by the controller's output power	
Operating data	Positioning time at 20 °C, 50 Hz	270 s	210 s	270 s [6]
	Positioning force	100 N, STA..HD 90 N		
	Nominal stroke	Max. 4.5 mm		4.5 mm (adjustable 3 mm[4])
	Permissible temperature of medium in the connected valve	1…110 °C		
	Actuator stem for "de-energized actuator“	STA.. extended STP.. retracted		
	Radiator valves (e.g. VD..)	See "Equipment combinations" on page 6.		
	Small valves (V..P47..)			
	Zone valves (V..I46..)			
	Maintenance	No maintenance required		
Electrical connection	Cable length	See page 3, "Type summary“ or page 4, "Connecting cables“ and page 5, "Adapter“		2 m
	Cross section [5]	Strands 2 x 0.5 mm²	Strands 2 x 0,75 mm²	Strands 3 x 0.5 mm²
Mounting	Attached to the valve	Bayonet-nut/-ring M30 x 1.5; – see also under adapters		
	Mounting position	Any, 360°		
Colors	Cover	White, RAL 9016; STA..B/00 black, RAL 9005		
	Lower part	STA.. light gray, RAL 7035, STP.. Traffic gray, RAL 7042 STA..B/00 black, RAL 9005		
	Connecting cables	See "Connecting cables“ on page 4 and page 5, "Adapter“		
Norms and directives for actuators and connecting cables	Electromagnetic compatibility (Application)	For residential, commercial and industrial environments		
	Product standard	EN60730-x and EN60335-x		
	EU Conformity (CE) STA.. STP..	 8000072738 [7] A5W00004469 [7]		
	Protection class as per	EN 60730 Class III	EN 60730 Class II	EN 60730 Class III
	Degree of pollution	As per EN 60730 class II		
	Housing type	IP54 as per EN 60529		
	Environmental compatibility	The product environmental declaration CE1E4884en [7] contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).		
Dimensions Weight	Dimensions	See "Dimensions“ on page 17		
	Actuator weight	See table "Type summary" actuators with and without connecting cable on page 3.		
	Weight of connecting cable ASY..	See table Accessories page 4		-
Materials **STA.., STP..**	Cover and lower part	Polycarbonate		
Conn. cables	ASY.., ASP..	PVC		
	ASY..HF	Halogen-free as per VDE 0207-24		

1) Permitted for safety extra-low voltage only (SELV, PELV)
2) PDM = Pulse-duration modulation / TPI = Time Proportional Integral
3) It is recommended to use a variable cycle time to increase life time.
STA73/00, STA73 MP/00 and STA73B/00, with connecting cable ASY6AL..
STP73/00 with connecting cable ASY6PL..
4) Can be set using the DIP switch under the cover on the connecting cable. See Mounting instructions M4884
5) Separate cable, see page 4
6) Min. runtime ca. 40 s/mm in control mode (after heating-up time)
7) The documents can be downloaded from http://siemens.com/bt/download

General ambient conditions

	Operation EN 60721-3-3	Transportation EN 60721-3-2	Storage EN 60721-3-1
Temperature	5…50 °C	–20…60 °C	5…50 °C
Temperature for quasi-continuous control	5…40 °C	–	–
Humidity	< 85 % r.h.	< 95 % r.h.	5…100 % r.h.

Connecting cables

Connecting cables w/o 0…10 V module

	ASY23..	ASY23..B	ASY23..HF	ASY23L20LD	ASA23U10	ASP23U10
Length [m]	0.8 / 2 / 3 / 5 / 10 / 15	3 / 5	2 / 5 / 10	2	1	1
Cross section [mm^{2}]	≤ 2 m: 0.50 > 2 m: 0.75	0.75	0.75	0.50	0.50	0.50
Operating voltage [V]	24 / 230 [1]	24 / 230 [1]	24 / 230 [1]	24	24 / 230 [1]	24 / 230 [1]
Housing color	White, RAL 9016	Black, RAL 9005	White, RAL 9016	White, RAL 9016	White, RAL 9016	White, RAL 9016
Coating	PVC	PVC	Halogen-free	PVC	PVC	PVC
Auxiliary switch	–	–	–	–	x	x
Switch-point auxiliary switch	–	–	–	–	1.5 ... 2.3 mm stroke	1.5 ... 2.3 mm stroke
Indicator	–	–	–	LED	–	–
Weight	See Table on page 4					

[1] AC 230 V with STA23../STP23.., AC/DC 24 V with STA73../STP73..

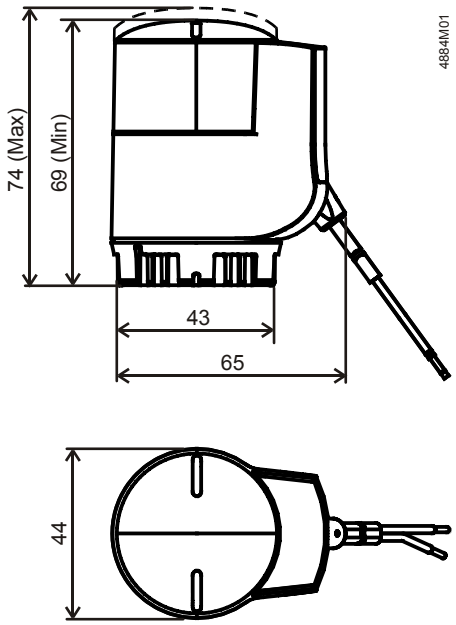
Connecting cables with 0…10 V module

	ASY6AL..		ASY6PL..	
	ASY6AL20	ASY6AL20HF	ASY6PL20	ASY6PL20HF
Length [m]	2	2	2	2
Cross section [mm^{2}]	0.22	0.22	0.22	0.22
Operating voltage [V AC]	24	24	24	24
Color	White, RAL 9016	White, RAL 9016	White, RAL 9016	White, RAL 9016
Coating	PVC	Halogen-free	PVC	Halogen-free
Signal	0…10 V	0…10 V	0…10 V	0…10 V
Interior resistance Ri	100 kΩ	100 kΩ	100 kΩ	100 kΩ
Weight	See Table on page 4			

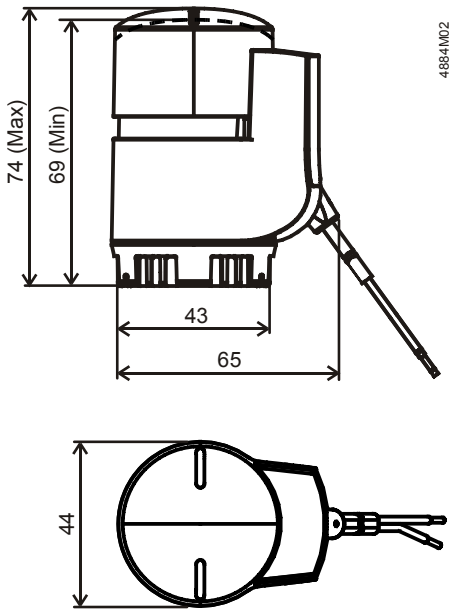
Dimensions

Dimensions in mm

STA..



STP..



SIEMENS

Electromotoric actuator

SSA151.05HF
SSA161.05HF
SSA161E.05HF

For pressure independent combi valves (PICV), radiator valves, MiniCombi valves (MCV) and small globe valves

- LCD backlit display
- Keylock function
- Display either room temperature or setpoint
- Comfort and Protection (Off) operating modes
- Automatic or manual heating/cooling changeover
- Automatic or manual 3-speed fan control
- Fan and heating/cooling changeover symbol display (enable / disable)
- Fan and heating/cooling changeover functions (enable / disable)
- Selectable fan operation in deadzone
- Timer with delay Off function: preset or user selection from 1 to 23 hours
- Minimum and maximum setpoint limitation
- Return to previous operating mode, Protection or Comfort upon power down
- Internal sensor calibration
- Adjustable commissioning and control parameters
- Fit into 86x86 conduit boxes
- Three standard color variants are available: reference color codes are SILVER (Cool Grey 4C), GOLD (Gold 453C), BLACK (Pantone Black 7C)
- Customization is available

Use

- For radiator valves, VDN.., VEN.., VUN..
- For Siemens PICV (pressure independent combi valves) VPP46.. and VPI46..
- For MiniCombi valves VPD.., VPE..
- For small valves VD1..CLC
- For radiator valves (M30 × 1.5) from other manufacturers without adapter
- Typically in radiator, chilled ceiling, VAV and fan coil unit applications
- Max.10 units of SSA161.05HF/SSA161E.05HF are able to operate in parallel, provided the controller output suffices.

!	**NOTICE**
	SSA161E.05HF is only compatible with VPD.., VPE.., VPP46.. and VPI46…

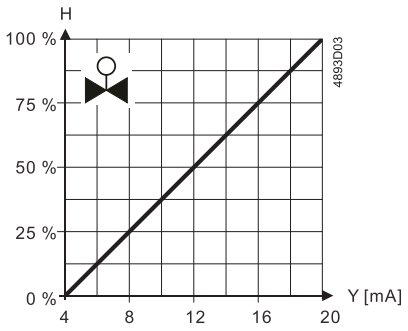
Technical design

When the actuator is driven by DC 0…10 V control voltage or a DC 4…20 mA signal, it produces a stroke, which is transmitted to the valve stem.

The description of operation in this document applies to valve versions that are fully open when valve stem is extended / no actuator is mounted (Normally Open (NO) valve).

Control signal with input impedance 4-20 mA 150Ω (for SSA151.05HF)

- The valve opens / closes in proportion to the control signal at Y.
- At 4 mA, actuator stem extended, the valve is fully closed.
- When no power is supplied, the actuator maintains its current position.
- This actuator provides a 4…20 mA position feedback signal proportional to the stroke of the actuator stem.

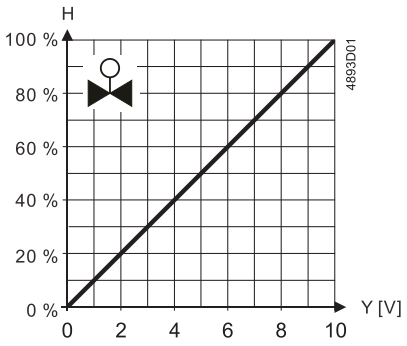


Y = Control signal Y [mA]

H = Percentage of calibrated valve stroke

DC 0...10 V control signal (for SSA161.05HF)

- The valve opens / closes in proportion to the control signal at Y.
- At DC 0 V, actuator stem extended, the valve is fully closed.
- When no power is supplied, the actuator maintains its current position.
- This actuator provides a DC 0…10 V position feedback signal proportional to the stroke of the actuator stem.



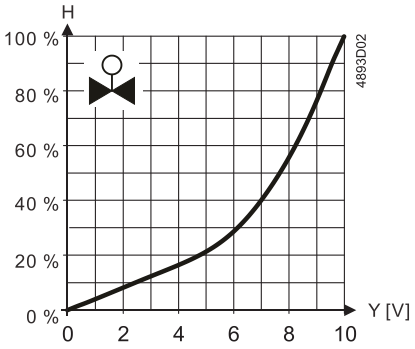
Y = Control signal Y [V]

H = Percentage of calibrated valve stroke

DC 0...10 V control signal (for SSA161E.05HF)

Combi valves VPI46../VPP46.. in combination with SSA161E.05HF have equal-percentage characteristics.

- The valve opens / closes in equal percentage ratio to the control signal at Y.
- At DC 0 V, actuator stem extended, the valve is fully closed.
- When no power is supplied, the actuator maintains its current position.
- This actuator provides a DC 0…10V position feedback signal proportional to the stroke of the actuator stem.



Y = Control signal Y [V]

H = Percentage of calibrated valve stroke

LED indication

Color	Pattern	Flashing interval	Description
Green	Flashing	0.1 s	Self-calibration
		0.5 s	Actuator stem is moving.
	Constant	-	Actuator stem reaches a set position. The LED turns off after it is constantly on for five seconds.
Green/red	Flashing	0.5 s	Manual operation
Red	Constant	-	Error*

* Hint: calibration or power reset required.

Type summary

Type	Stock number	Operating voltage	Running speed	Running time 2.5 mm	Control signal	Actuator characteristic	Cable length
SSA151.05HF	S55180-A110	AC/DC 24 V	10 s/mm	25 s	DC 4…20 mA	Linear	1.5 m
SSA161.05HF	S55180-A108	AC/DC 24 V	10 s/mm	25 s	DC 0...10 V	Linear	1.5 m
SSA161E.05HF	S55180-A109	AC/DC 24 V	10 s/mm	25 s	DC 0...10 V	Equal percentage	1.5 m

Ordering

When ordering, specify both type and quantity.
Example:

Type	Stock number	Designation	Quantity
SSA161.05HF	S55180-A108	Electromotoric actuator	2

Delivery

Valves and actuators are supplied in separate packages. For easier valve assembly, the position of the actuator stem (spindle) is fully retracted.

Equipment combinations

Valves

Combinable valves for SSA151.05HF and SSA161.05HF

Type reference	Valve type	K_{vs} [m^3/h]	$\dot{V}$ [l/h]	PN class	Data sheet
VDN.., VEN.., VUN..	Radiator valves	0.09…1.41	-	PN 10	N2105, N2106
VPD.., VPE..	MCV radiator valves	-	25…483*		N2185
VD1..CLC	Small valves	0.25…2.60	-		N2103
VPP46.., VPI46..	PICV valves DN10..DN32	-	30…4001	PN 25	N4855

K_{vs}: Nominal flow rate of cold water (5…30 °C) through the fully open valve (H100) by a differential pressure of 100 kPa (1 bar).

Radiator valves (M30 × 1.5) from other manufacturers, without adapter:

• *Heimeier*	• *Crane D981..*	• *TA-Type TBV-C*
• *Oventrop M30 × 1.5 (from 2001)*	• *MNG*	• *Junkers*
• *Honeywell-Braukmann*	• *Cazzaniga*	• *Beulco (new)*

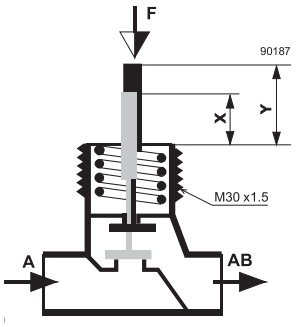
* Nominal volume flow at 0.5 mm stroke.

Combinable valves for SSA161E.05HF

Type reference	Valve type	K_{vs} [m^3/h]	$\dot{V}$ [l/h]	PN class	Data sheet
VPP46.., VPI46..	PICV valves DN10..DN32	-	30…4001	PN 25	N4855
Kvs: Nominal flow rate of cold water (5…30 °C) through the fully open valve (H100) by a differential pressure of 100 kPa (1 bar).					

Note: To ensure trouble-free operation of third-party valves with the SSA.. actuator, the valves must satisfy the following requirements:

- Threaded connections with coupling nut M30 × 1.5.
- Nominal force F ≤ 100 N
- Dimension X ≥ 8.3 mm
- Dimension Y ≤ 14.8 mm



Controllers

Type	SSA151.05HF	SSA161.05HF	SSA161E.05HF
	AC/DC 24 V	AC/DC 24 V	AC/DC 24 V
	DC 4...20 mA	DC 0...10 V	DC 0...10 V
DXR2	-	DXR2..09..	-
RXB..	-	RXB39.1..	-
Synco 700 Synco 200	-	RMU7...0B-1, RMS705B-1, RMH760B-1, RMK770-1, RLU220, RLU222, RLU232, RLU236	-

Combinable room thermostats for SSA161.05HF and SSA161E.05HF

Type	Detail
RDG..	RDG160KN, RDG160T, RDG405KN
RDU..	RDU340
RCU..	RCU50..

	NOTICE
!	SSA151.05HF cannot be used in combination with the above thermostats as its control signal of DC 4...20 mA is not supported by these thermostats.

Product documentation

Topic	Title	Document ID:
Mounting and installation	Mounting instructions[1)]	A6V11858272
Standards and directives	CE declarations	A5W00106106A
	RCM conformity	A5W00106107A
Environmental compatibility	Environmental declarations	A5W00109220A

[1)] The mounting instructions is enclosed in product packaging.
Related documents such as environmental declarations, CE declarations etc., can be downloaded from http://siemens.com/bt/download.

Notes

Engineering

The actuators must be electrically connected in accordance with local regulations (see "Connection diagrams [▷ 13]").

⚠ CAUTION

National safety regulations

Failure to comply with national safety regulations may result in personal injury and property damage.

- Observe national provisions and comply with the appropriate safety regulations.

Observe permissible temperatures (see "Technical data [▷ 11]"). The connecting cable of the actuator may come into contact with the hot valve body, provided the temperature of the valve body does not exceed 80 °C.

Mounting

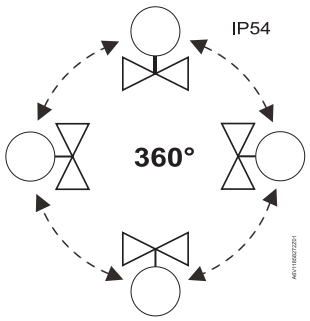
⚠ WARNING

- Do not use pipe wrenches, spanners or similar tools.
- Before mounting, fit the actuator in a position where the actuator stem is fully retracted (see “Manual operation [▷ 8]”).
- Avoid lateral pressure or (cable) tension on the mounted actuator!

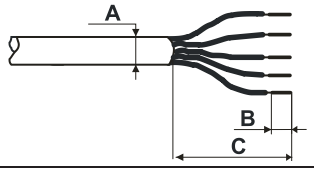
Valve and actuator are easy to assemble on site before commissioning:

- Remove protective cover from the valve body.
- Position the actuator and tighten the union nut manually.
- See Mounting instructions enclosed with the product package for graphical instructions.

Orientation



Installation

	A [mm]	B [mm]	C [mm]
	5.5	4.2	50
	Crimp ferrule on stripped wire of connecting cable.		

- Observe all admissible temperatures (see “Technical data [▸ 11]”).
- Do not twist the cable.
- Magnets can damage the actuator.
- Provide a means for isolation from the power supply, e.g., connecting a circuit breaker or switch fuse upstream of the control unit.

⚠ CAUTION

National safety regulations

Failure to comply with national safety regulations may result in personal injury and property damage.

- Observe national provisions and comply with the appropriate safety regulations.

⚠ CAUTION

Phase cut and pulse-duration-modulated (PDM) signals are not suitable. Regulations and requirements to ensure the safety of people and property must be observed at all times!

Commissioning

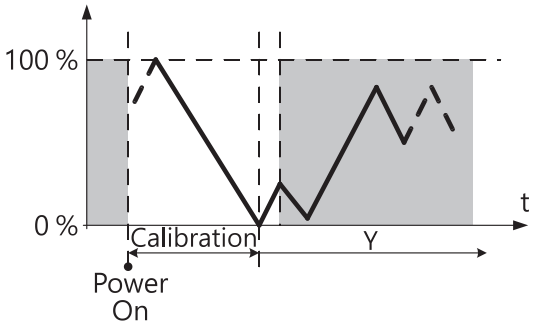
When commissioning, check both wiring and functioning of the actuator.

- Actuator stem extends — Valve closes
- Actuator stem retracts — Valve opens

	NOTICE
	The actuator must be commissioned only with a correctly mounted valve in place!

Self-calibration

When operating voltage is applied, the actuator self-calibrates (fully retracted → fully extended → setpoint).



	⚠ CAUTION
	Never intervene manually during self-calibration.

	NOTICE
	• Correct calibration is only possible with valve stroke > 1.2 mm. Valve stroke < 1.2 mm results calibration failure. • If calibration fails, the actuator performs another calibration automatically after 10 seconds. • After three failed calibration attempts, the actuator stem remains in the extended position and the valves are closed.

Manual operation

A 3-mm hexagonal socket wrench can be used to move the actuator to any position.

To move the actuator stem manually

a) Open the cover using a proper screwdriver. Note that IP54 protection does not apply if the cover is open.

b) Press and hold down button (a) illustrated below for at least three seconds.

⇨ The actuator ignores any control signal from the controller.

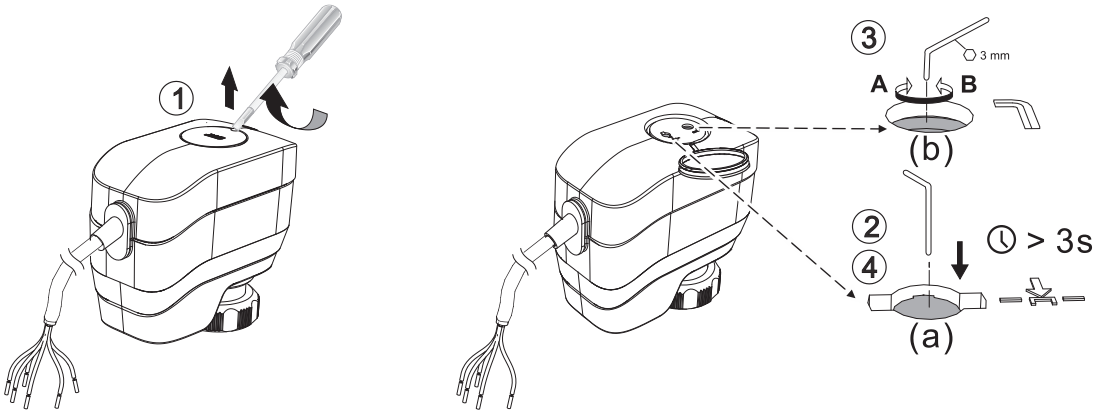
c) Adjust the position of the actuator stem by rotating hexagon socket (b) illustrated below clockwise or anti-clockwise.

⇨ The actuator stem moves down if you rotate clockwise; it moves up if you rotate anti-clockwise. The manually set position is retained.

d) Press and hold down button (a) illustrated below again for at least three seconds.

⇨ The actuator runs a self-calibration automatically. Control signal sent from the controller takes effect.

e) Close the cover to ensure IP54 protection.



	⚠ WARNING
	If operating voltage is switched on, press button (a) before and after adjusting the position of the actuator stem. If you switched off operating voltage and control signal, you can adjust the position directly without pressing button (a).

Maintenance

The actuators require no maintenance.

	⚠ WARNING
	Operating voltage must be switched off during any maintenance!

	NOTICE
	When carrying out service work on the plant, note the following: ● Switch off operating voltage. ● If necessary, disconnect electrical connections from the terminals. ● The actuator must be commissioned only with a correctly mounted valve in place!

Repair

The actuators cannot be repaired; the complete unit must be replaced.

Disposal

	The device is considered an electronic device for disposal in accordance with the European Guidelines and may not be disposed of as domestic garbage. ● Dispose of the device through channels provided for this purpose. ● Comply with all local and currently applicable laws and regulations.

Warranty

Technical data on specific applications are valid only together with Siemens products listed under "Equipment combinations". Siemens rejects any and all warranties in the event that third-party products are used.

Open Source Software (OSS)

Software license overview

These devices use Open Source Software (OSS). All Open Source Software components used in the product (to include copyrights and licensing agreement) are available at http://siemens.com/bt/download.

Firmware version	OSS document		Device
	Document ID	Title	
1.8.0	A6V12067557	Readme OSS "MRA Modulating – 1.1"	SSA161.05HF SSA151.05HF SSA161E.05HF

Technical data

Power supply		
Operating voltage	AC 24 V (± 15 %) or DC 24 V (± 20 %)	
Frequency	50/60 Hz	
Power consumption	Running	2.5 VA
	Holding	2 VA
Primary fuse or breaker rating	External, 2 A quick blow	

Signal input	SSA151.05HF	SSA161.05HF/SSA161E.05HF
Control signal	4…20 mA	DC 0...10 V
Input impedance	150 Ohm	100 kOhm
Parallel operation (number of actuators)	1	Max. 10[1)]

[1)] Provided that the controller output is sufficient.

Signal output	SSA151.05HF	SSA161.05HF/SSA161E.05HF
Feedback signal	4…20 mA	DC 0...10 V
Max. output current	-	1 mA
Max. output voltage	24 V	-
Resolution	1:100	1:100

Operating data	
Position with de-energized contact Y	See "Technical design [▶ 2]"
Running speed	<10 s/mm
Positioning force	100 N
Stroke	1.2…6.5 mm
Permissible temperature of medium in the connected valve	1...110 °C (1...90 °C for MCV-radiator valves)

Electrical connection (connecting cable integral)	
Cable length (integral)	1.5 m, according to VDE 0207
Cross section of prewired connection cables	0.34 mm^2 (5 ×)
Permissible length for signal lines	20 m

Mounting	
Fixing on valve	Plastic coupling nut M30 × 1.5
Orientation	360°

Standards	
EU conformity (CE)	A5W00106106A
RCM conformity	A5W00106107A
Housing protection degree	IP 54
Protection class according to EN 60730	III
Environmental compatibility	The product environmental declaration (A5W00109220A) contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).

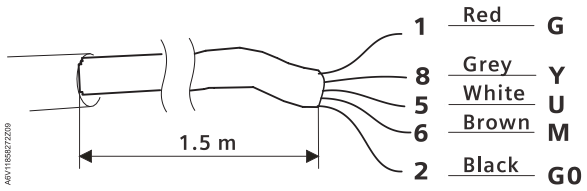
Housing color	
Cover/base	RAL 9003, signal white
Coupling nut	RAL 7035, light gray

General ambient conditions			
	Operation EN 60721-3-3	**Transport EN 60721-3-2**	**Storage EN 60721-3-1**
Environmental conditions	Class 3K3	Class 2K3	Class 1K3
Temperature	1...50 ℃	-25...70 ℃	-5...50 ℃
Humidity	5...85 % r.h.	<95 % r.h.	5...95 % r.h.

Material	
Cover/base	PC + ABS

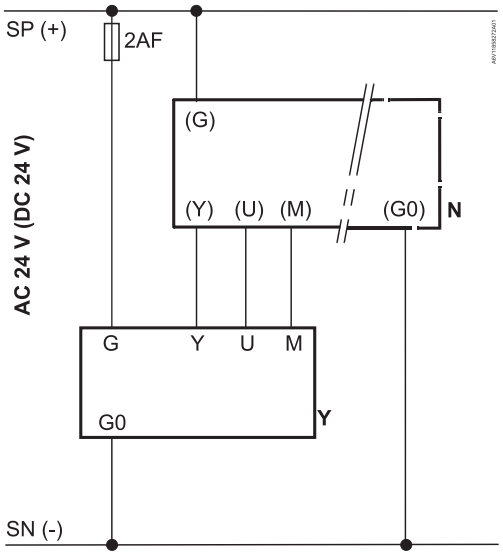
Weight	
Weight for all variants	224 g

Connection terminals



Code	No.	Color	Abbreviation	Meaning	
				SSA151.05HF	**SSA161.05HF/ SSA161E.05HF**
G	1	Red	RD	System potential AC 24 V (+ DC 24 V)	System potential AC 24 V (+ DC 24 V)
Y	8	Grey	GY	Control signal DC 4...20 mA, < 3 V	Control signal DC 0...10 V, < 0.1 mA
U	5	White	WH	Feedback signal	Feedback signal
M	6	Brown	BR	Measurement reference	Measurement reference
G0	2	Black	BK	System neutral (- DC 24 V)	System neutral (- DC 24 V)

Connection diagrams



N = Controller

Y = Actuator

SP, G = System potential AC 24 V

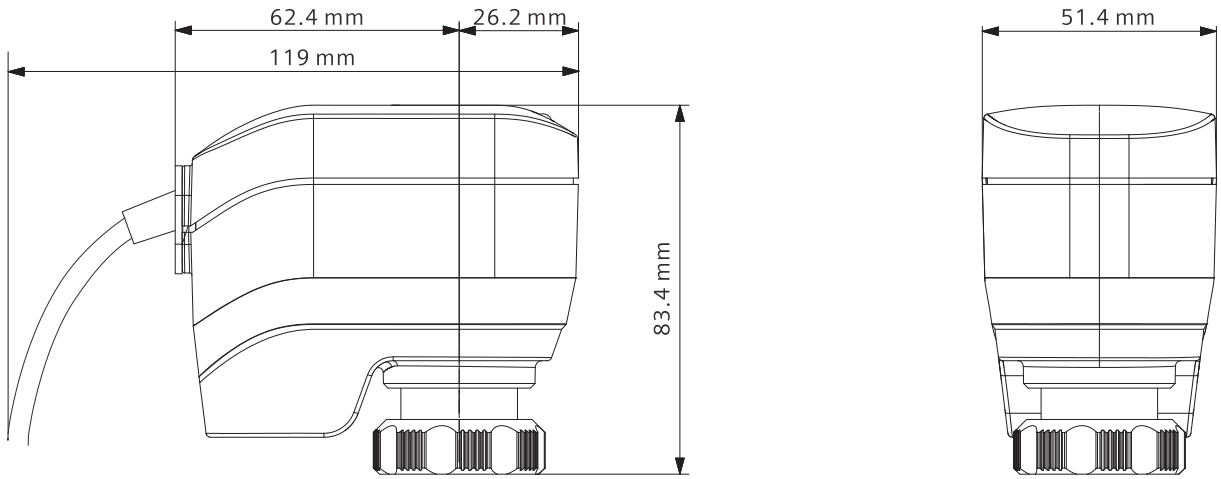
SN, G0 = System neutral

Y = Control signal

U = Feedback signal

M = Measurement reference

Dimensions



Revision numbers

Type	Valid from rev. no.
SSA151.05HF	..A
SSA161.05HF	..A
SSA161E.05HF	..A

ACVATIX™

Electromotoric actuators for valves SAV..P..

with a 40 mm stroke

- **SAV31P00 Operating voltage AC 230 V, 3-position control signal**
- **SAV61P00 Operating voltage AC/DC 24 V, control signal DC 0…10 V, 4…20 mA**
- **SAV81P00 Operating voltage AC/DC 24 V, 3-position control signal**
- **SAV61P00 Position feedback, override control, choice of flow characteristic**
- **For direct mounting on valves; no adjustments required**
- **Manual adjuster, position indicator and status indication per LED**
- **Optional functions with auxiliary switches, potentiometer, function module, stem heating element**

Use

Electromotoric actuators for the operation of Siemens combi valves of types VPF43.. and VPF53.. with 40 mm stroke as control and safety shut-off valves in ventilation, air conditioning, district heating and refrigerating systems.

Type summary

Product no.	Stock no.	Stroke	Pos. force	Operating voltage	Positioning signal	Spr. ret. time	Pos. time	LED	Manual adjuster	Extra functions
SAV31P00	S55150-A121	40 mm	1100 N	AC 230 V	3-position	-	120 s	-	Press and fix	[1]
SAV61P00	S55150-A119			AC/DC 24 V	DC 0…10 V DC 4…20 mA 0…1000 Ω			✓		[2] [3]
SAV81P00	S55150-A120				3-position			-		[1]

[1] Optional accessories: auxiliary switch, potentiometer
[2] Position feedback, forced control, change of characteristic
[3] Optional accessories: auxiliary switch, sequence control, selection of acting direction

Electrical accessories

Product no.	Auxiliary switch ASC10.51	Potentiometer ASZ7.5/.. [1]	Function module AZX61.1
Stock no.	S55845-Z103	S55845-Z104 (ASZ7.5/135) S55845-Z105 (ASZ7.5/200) S55845-Z106 (ASZ7.5/1000)	S55845-Z107
	Max. 2		
SAV31P..	Max. 2	Max. 1	
SAV61P..	Max. 2	-	Max. 1 AZX61.1
SAV81P..		Max. 1	

[1] Available with 135 Ω, 200 Ω or 1000 Ω

Mechanical Accessory

Weather shield ASK39.1

Ordering

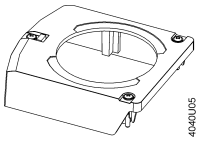
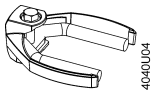
Example

Product no.	Stock no.	Description	Quantity
SAV81P00	S55150-A120	Actuator	1
ASZ7.5/1000	S55845-Z106	Potentiometer	1

Delivery

Actuators, valves and accessories are supplied in individual packs.

Spare parts

Product number / Stock number	Housing cover	Screw (valve stem coupling)
8000060843	 4040U05	 4040U22
		U-bracket  4040U04

Combinations

VPF43..	Type	Stock no.	DN	H_{100} [mm]	$\dot{V}_{min}$ [m^3/h]	$\dot{V}_{100}$ [m^3/h]	Δp_{min} [kPa]	Data sheet
Standard flow	**VPF43. 100F70**	**S55266-V106**	100	40	14	70	35	N4315
	VPF43. 125F110	**S55266-V108**	125		22	110		
	VPF43. 150F160	**S55266-V110**	150	43	32	160		
High flow	**VPF43. 100F90**	**S55266-V107**	100	40	18	90	70	
	VPF43. 125F135	**S55266-V109**	125		27	135		
	VPF43. 150F200	**S55266-V111**	150	43	40	200		

VPF53..	Type	Stock no.	DN	H_{100} [mm]	$\dot{V}_{min}$ [m^3/h]	$\dot{V}_{100}$ [m^3/h]	Δp_{min} [kPa]	Data sheet
Standard flow	**VPF53. 100F70**	**S55266-V118**	100	40	14	70	35	N4316
	VPF53. 125F110	**S55266-V120**	125		22	110		
	VPF53. 150F160	**S55266-V122**	150	43	32	160		
High flow	**VPF53. 100F90**	**S55266-V119**	100	40	18	90	70	
	VPF53. 125F135	**S55266-V121**	125		27	135		
	VPF53. 150F200	**S55266-V123**	150	43	40	200		

Product documentation

Detailed Informations about the New Generation actuators can be found in the Basic documentation for actuators (P4040).

Notes

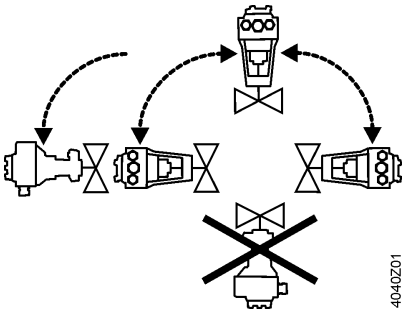
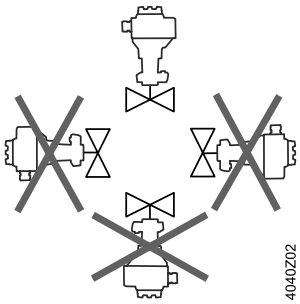
Engineering
SAV31P00 / SAV81P00

3-position actuators must have their own specific controller, refer to "Connection Diagrams" (page 9).

SAV61P00

Up to 10 actuators can drive in parallel on a controller output with a rating of 1 mA. Modulating actuators have an input impedance of 100 kΩ.

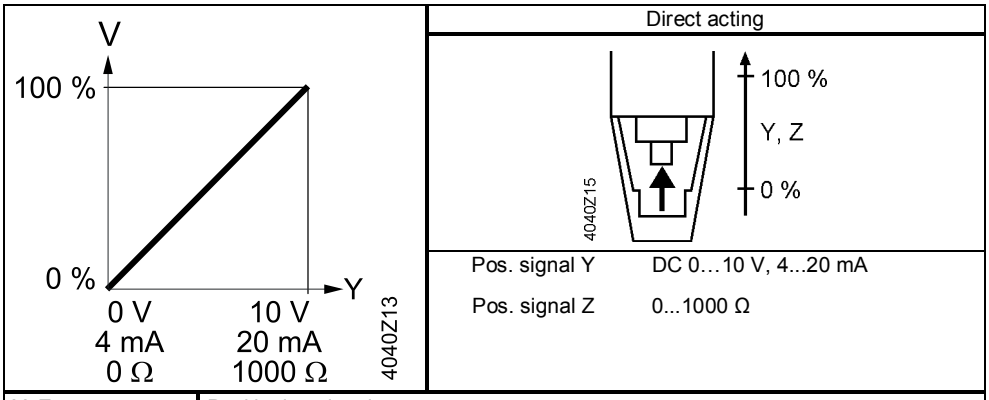
Mounting
Mounting positions

Indoor use	Outdoor use [1]
	

[1] Only in connection with weather shield ASK39.1

Acting direction

With valves whose stem is retracted in the fully closed position, "direct acting" means that the valve is fully closed (0 %) when positioning signal Y = 0 V and Z = 0 Ω respectively.



Y, Z	Positioning signal
V	Volumetric flow
———	Acting direction: direct

Maintenance

The actuators are maintenance-free.

Warranty

The engineering data specified in chapter "Combinations" (page 3) are only guaranteed in connection with the Siemens valves listed.

Note

When using the actuators in connection with valves of other manufacture, correct functioning must be ensured by the user, and Siemens will assume no responsibility.

Disposal

The device is considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the device through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Technical Data

		SAV..P..
Power supply	Operating voltage	
	SAV31..	AC 230 V ±15%
	SAV61..	AC 24 V ± 20% / DC 24 V + 20% / -15% (SELV)
	SAV81..	AC 24 V ±20% / DC 24 V + 20 % / -15% (SELV)
	Frequency	45…65Hz
	External supply line protection (EU)	• Fuse slow 6…10 A • Circuit breaker max. 13 A, Characteristic B, C, D according to EN 60898 • Power source with current limitation of max. 10 A
	Power consumption at 50 Hz	
	SAV31P00 Stem retracts / extends	6.5 VA, 4 W
	SAV61P00 Stem retracts / extends	9.5 VA, 4.5 W
	SAV81P00 Stem retracts / extends	7 VA, 4.5 W
Function data	Positioning times (with the specified nominal stroke) The positioning time can vary, depending on the type of valve -> refer chapter "Type summary" (page 2)	
	SAV31P00, SAV61P00, SAV81P00	120 s
	Positioning force	1100 N
	Nominal stroke	40 mm (43 mm on VPF..150)
	Permissible medium temperature (valve fitted)	1…120 °C
Signal inputs	Positioning signal ”Y” SAV31P00, SAV81P00	3-position
	SAV31P.. Voltage	AC 230 V ±15%
	SAV81P.. Voltage	AC 24 V ± 20 % / DC 24 V + 20 % / -15%
	SAV61P00 (DC 0...10 V) Current draw	≤ 0.1 mA
	Input impedance	≥ 100 kΩ
	SAV61P00 (DC 4...20 mA) Current draw	DC 4...20 mA ± 1%
	Input impedance	≤ 500 Ω
Parallel operation	SAV61P03	≤ 10 (depending on controler output)
Forced control	Positioning signal ”Z” SAV61P00	R = 0…1000 Ω, G, G0
	R = 0…1000 Ω	Stroke proportional to R
	Z connected to G	Max. stroke 100% [1]
	Z connected to G0	Min. stroke 0% [1]
	Voltage	Max. AC 24 V ± 20% Max. DC 24 V + 20% / -15%
	Current draw	≤ 0.1 mA
Position feedback	Position feedback U SAV61P00	DC 0...10 V
	Load impedance	> 10 kΩ res.
	Load	Max. 1 mA
Connecting cable	Wire cross-sectional areas	0.75…1.5 mm², AWG 20…16 [2]
	Cable entries SAV..P..	EU: 2 entries ∅ 20.5 mm (for M20) 1 entry ∅ 25.5 mm (for M25)
Degree of protection	Housing from vertical to horizontal	IP54 as per EN 60529 [3]
	Insulation class	As per EN 60730
	Actuators SAV31P00 AC 230 V	II
	Actuators SAV61P00 AC / DC 24 V	III
	Actuators SAV81P00 AC / DC 24 V	III
Environmental conditions	Operation	IEC 60721-3-3
	Climatic conditions	Class 3K5
	Mounting location	Indoors (weather-protected)
	Temperature General	5…55 °C
	Humidity (noncondensing)	5…95% r.h.
	Transport	IEC 60721-3-2
	Climatic conditions	Class 2K3
	Temperature	-25…70 °C
	Humidity	<95% r.h.
	Storage	IEC 60721-3-1
	Climatic conditions	Class 1K3
	Temperature	-5…55 °C
	Humidity	5…95% r.h.
	Max. media temperatur when mounted on valve	120 °C

[1] Observe acting direction of DIL switches
[2] AWG = American wire gauge
[3] Also with weather shield ASK39.1

		SAV..P..
Directives and Standards	Product standard	EN 60730-x
	Electromagnetic compatibility (Application)	For residential, commercial and industrial environments
	EU Conformity (CE)	CE1T4503xx [1]
	RCM Conformity AC 230 V	CE1T4503_C1 [1]

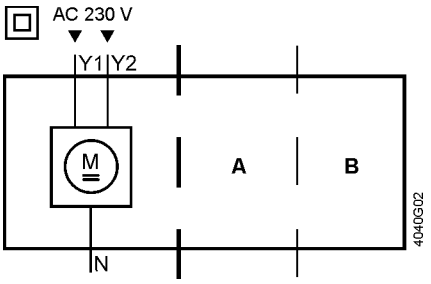
	EAC Conformity		Eurasia Conformity for all SAV..
	UL, cUL	AC 230 V	-
		AC/DC 24 V	UL 873 http://ul.com/database
Environmental compatibility			The product environmental declaration 71 7331 0522 A [1] contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).
Dimensions			See "Dimensions" (page 10)
Accessories [2]	Potentiometer ASZ7.5/135		0…135 Ω ± 5%
		Voltage	DC 10 V
		Current rating	<4 mA
	Potentiometer ASZ7.5/200		0…200 Ω ± 5%
		Voltage	DC 10 V
		Current rating	<4 mA
	Potentiometer ASZ7.5/1000		0…1000 Ω ± 5%
		Voltage	DC 10 V
		Current rating	<4 mA
	Auxiliary switch ASC10.51	Switching capacity	AC 24…230 V, 6 (2) A, floating
	External supply line protection		See section power supply
	US Installation, UL & cUL		AC 24 V class 2, 5 A general purpose

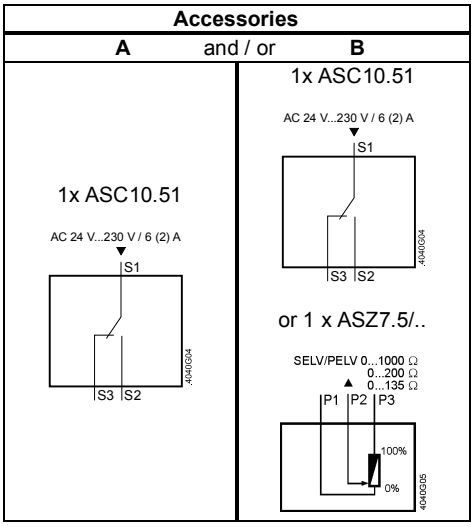
[1] The documents can be downloaded from http://siemens.com/bt/download.

[2] UL recognized component

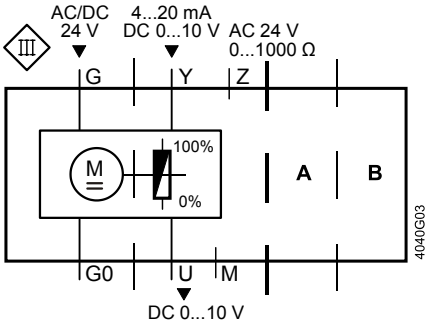
Internal Diagrams

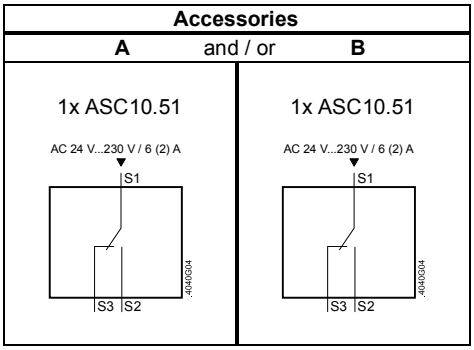
SAV31P00



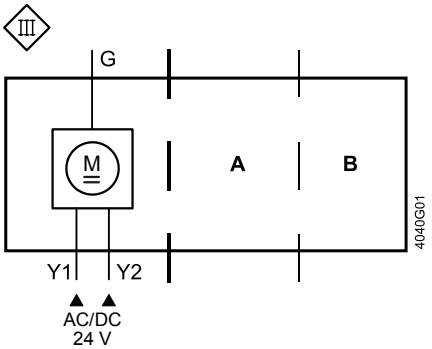


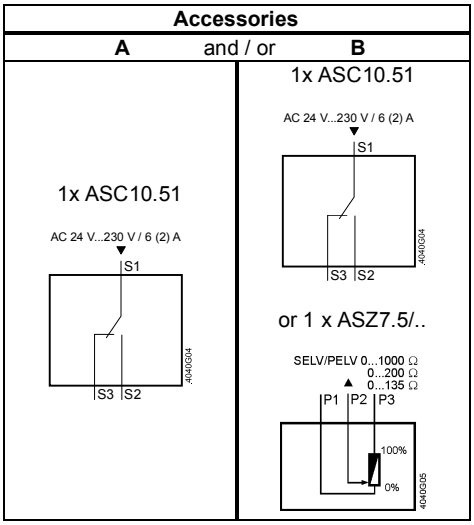
SAV61P00





SAV81P00

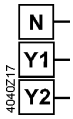




Connection terminals

SAV31P00

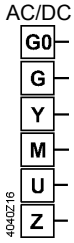
AC 230 V, 3-position



- N — Sytem neutral (SN)
- Y1 — Positioning signal (actuator's stem retracts)
- Y2 — Positioning signal (actuator's stem extends)

SAV61P00

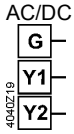
AC/DC 24 V, DC 0…10 V / 4…20 mA / 0…1000 Ω



- G0 — Sytem neutral (SN)
- G — Sytem potential (SP)
- Y — Positioning signal for DC 0…10 V / 4…20 mA
- M — Measuring neutral
- U — Position feedback DC 0...10 V
- Z — Positioning signal forced control

SAV81P00

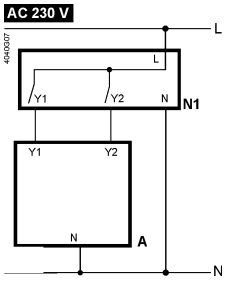
AC/DC 24 V, 3-position



- G — Sytem potential (SP)
- Y1 — Positioning signal (actuator's stem retracts)
- Y2 — Positioning signal (actuator's stem extends)

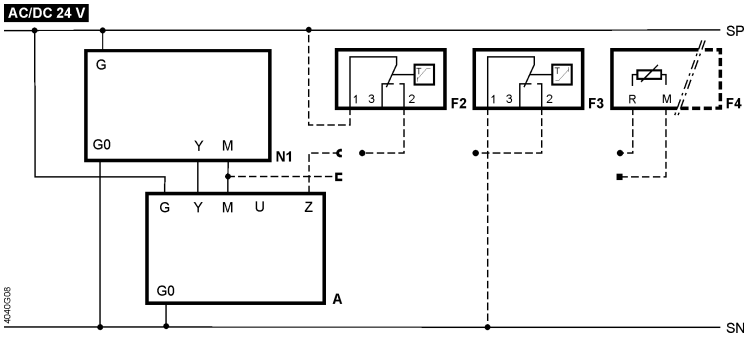
Connection Diagrams

SAV31P00



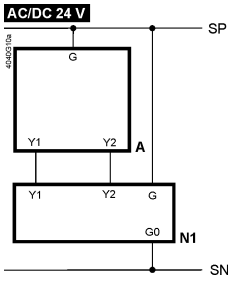
A	Actuator
L	Phase
N	Neutral
N1	Controller
Y1, Y2	Positioning signals

SAV61P00



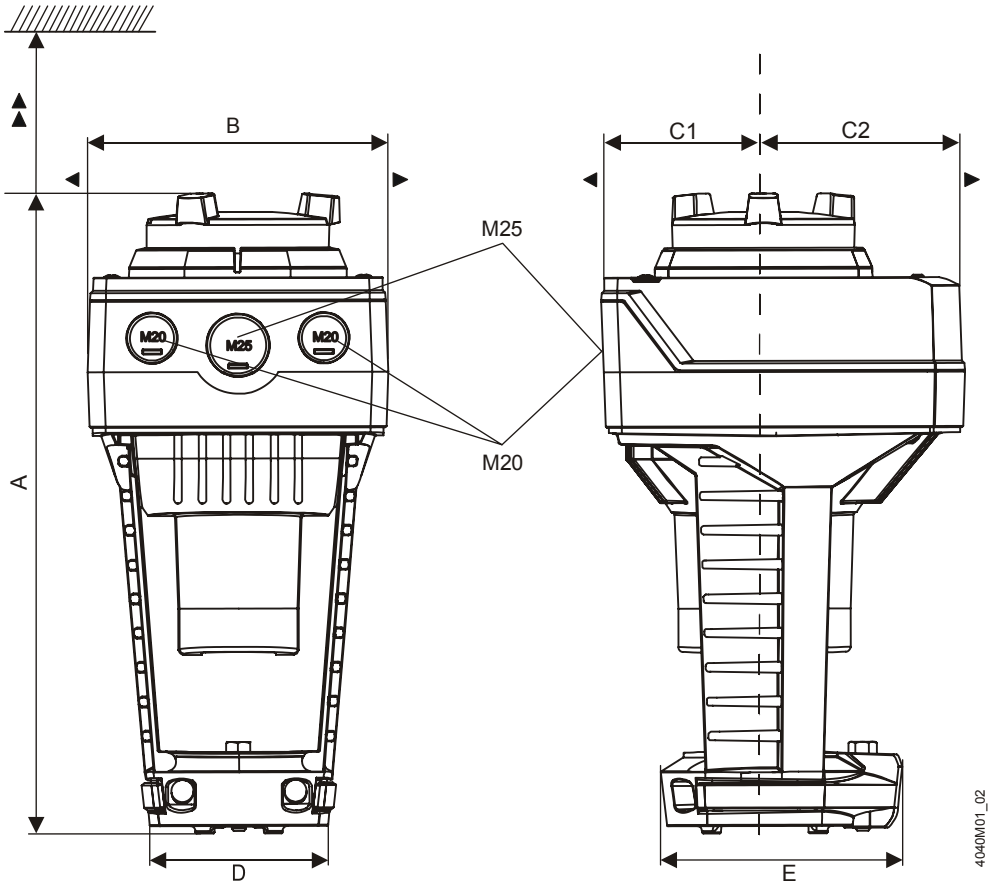
A	Actuator
F2	Frost protection thermostat; terminals: 1 – 2 frost hazard / sensor is interrupted (thermostat closes with frost) 1 – 3 normal operation
F3	Temperature detector
F4	Frost protection monitor with 0…1000 Ω signal output, does NOT support QAF21.. or QAF61..
M	Measuring neutral
N1	Controller
SN	System neutral
SP	System potential AC/DC 24 V
U	Position feedback
Y	Position signal
Z	Positioning signal forced control

SAV81P00



A	Actuator
N1	controller
SN	System neutral
SP	System potential AC/DC 24 V
Y1, Y2	Positioning signals

Dimensions



Type	A	B	C	C1	C2	D	E	►	►►	kg
SAV..P..	265	124	150	68	82	80	100	100	200	1.920
With ASK39.1	+25	154	300	200	100	-	-	-	-	2.150

Dimensions in mm

Revision numbers

Product no.	Valid from rev. no.
SAV31P00	..B
SAV61P00	..B
SAV81P00	..B

ACVATIX™

Electromotoric actuators for valves SAX..P..

with a 20 mm stroke

- **SAX31P03 Operating voltage AC 230 V, 3-position control signal**
- **SAX61P03 Operating voltage AC/DC 24 V, control signal DC 0…10 V, 4…20 mA**
- **SAX81P03 Operating voltage AC/DC 24 V, 3-position control signal**
- **SAX61P03 Position feedback, override control, choice of flow characteristic**
- **For direct mounting on valves; no adjustments required**
- **Manual adjuster, position indicator and status indication per LED**
- **Optional functions with auxiliary switches, potentiometer, function module, stem heating element**

Use

Electromotoric actuators for the operation of Siemens combi valves of types VPF43.. and VPF53.. with 20 mm stroke as control and safety shut-off valves in ventilation, air conditioning, district heating and refrigerating systems.

Type summary

Product no.	Stock no.	Stroke	Pos. force	Operating voltage	Positioning signal	Spr. ret. time	Pos. time	LED	Manual adjuster	Extra functions
SAX31P03	S55150-A118	20 mm	500 N	AC 230 V	3-position	-	30 s	-	Push and fix	[1]
SAX61P03	S55150-A114			AC/DC 24 V	DC 0…10 V DC 4…20 mA 0…1000 Ω			✓		[2], [3]
SAX81P03	S55150-A116				3-position			-		[1]

[1] Optional accessories: auxiliary switch, potentiometer
[2] Position feedback, forced control, change of characteristic
[3] Optional accessories: auxiliary switch, sequence control, selection of acting direction

Electrical accessories

Product no.	Auxiliary switch ASC10.51	Potentiometer ASZ7.5	Function module AZX61.1
Stock no.	S55845-Z103	S55845-Z106	S55845-Z107
	Max. 2		
SAX31P..	Max. 2	Max. 1	
SAX61P..	Max. 2	-	Max. 1 AZX61.1
SAX81P..		Max. 1	

Note: ASZ7.5

For the combination SIMATIC S5/S7 and position feedback message, we recommend actuators with DC 0…9.8 V feedback signals.

The signal peaks that occur in the potentiometer ASZ7.5 may result in error messages on Siemens SIMATIC.
This is not the case when combined with Siemens HVAC controllers.
The reason is that SIMATIC has a higher resolution and faster response time.

Mechanical Accessory

Weather shield ASK39.1

Ordering

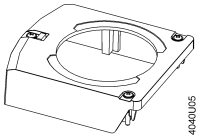
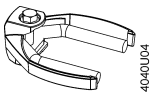
Example

Product no.	Stock no.	Description	Quantity
SAX81P03	S55150-A116	Actuator	1
ASZ7.5	S55845-Z106	Potentiometer	1

Delivery

Actuators, valves and accessories are supplied in individual packs.

Spare parts

Product number / Stock number	Housing cover	Screw (valve stem coupling)
8000060843		
		U-bracket 

Combinations

VPF43..	Type	Stock no.	DN	H_{100} [mm]	$\dot{V}_{min}$ [m^3/h]	$\dot{V}_{100}$ [m^3/h]	Δp_{min} [kPa]	Data sheet
Standard flow	**VPF43.50F16**	**S55266-V100**	50	20	2.3	15	35	N4315
	VPF43.65F24	**S55266-V102**	65		4.4	25		
	VPF43.80F35	**S55266-V104**	80		5.3	34		
High flow	**VPF43.50F25**	**S55266-V101**	50	20	4.3	25	70	
	VPF43.65F35	**S55266-V103**	65		6	35		
	VPF43.80F45	**S55266-V105**	80		7	43		

VPF53..				H_{100}	$\dot{V}_{min}$	$\dot{V}_{100}$	Δp_{min}	
	Type	Stock no.	DN	[mm]	[m^3/h]	[m^3/h]	[kPa]	Data sheet
Standard flow	**VPF53.50F16**	**S55266-V112**	50	20	2.3	15	35	N4316
	VPF53.65F24	**S55266-V114**	65		4.4	25		
	VPF53.80F35	**S55266-V116**	80		5.3	34		
High flow	**VPF53.50F25**	**S55266-V113**	50	20	4.3	25	70	
	VPF53.65F35	**S55266-V115**	65		6	35		
	VPF53.80F45	**S55266-V117**	80		7	43		

Product documentation

Detailed Informations about the New Generation actuators can be found in the Basic documentation for actuators (P4040).

Notes

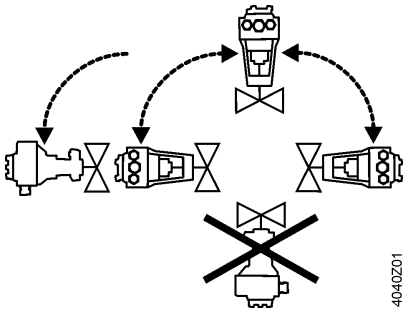
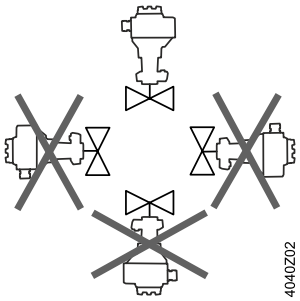
Engineering
SAX31P03 and SAX81P03

3-position actuators must have their own specific controller, refer to "Connection Diagrams" (page 9).

SAX61P03

Up to 10 actuators can drive in parallel on a controller output with a rating of 1 mA. Modulating actuators have an input impedance of 100 kΩ.

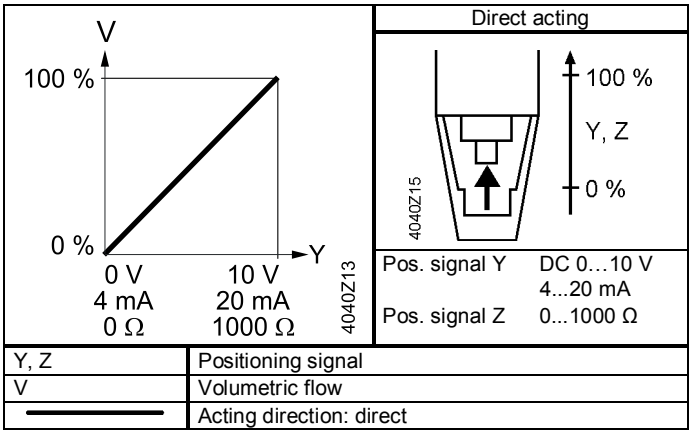
Mounting
Mounting positions

Indoor use	Outdoor use [1]
	

[1] Only in connection with weather shield ASK39.1

Acting direction

With valves whose stem is retracted in the fully closed position, "direct acting" means that the valve is fully closed (100 %) when positioning signal Y = 0 V and Z = 0 Ω respectively.



Y, Z	Positioning signal
V	Volumetric flow
———	Acting direction: direct

Maintenance

The actuators are maintenance-free.

Disposal

The device is considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the device through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Warranty

The engineering data specified in chapter "Combinations" (page 3) are only guaranteed in connection with the Siemens valves listed.

Note

When using the actuators in connection with valves of other manufacture, correct functioning must be ensured by the user, and Siemens will assume no responsibility.

Technical Data

		SAX..P
Power supply	Operating voltage SAX31.. SAX61.. SAX81..	 AC 230 V ±15% AC 24 V ± 20% / DC 24 V + 20% / -15% (SELV) AC 24 V ±20% / DC 24 V + 20 % / -15% (SELV)
	Frequency	45…65Hz
	External supply line protection (EU)	• Fuse slow 6…10 A • Circuit breaker max. 13 A, Characteristic B, C, D according to EN 60898 • Power source with current limitation of max. 10 A
	Power consumption at 50 Hz SAX31P03 Stem retracts / extends SAX61P03 Stem retracts / extends SAX81P03 Stem retracts / extends	 6 VA / 3.5 W 8 VA / 3.75 W 5 VA / 3.75 W
Function data	Positioning times (with the specified nominal stroke) The positioning time can vary, depending on the type of valve -> refer chapter "Type summary" (page 2) SAX31P03, SAX61P03, SAX81P03 Positioning force Nominal stroke Permissible medium temperature (valve fitted)	 30 s 500 N 20 mm 1…130 °C
Signal inputs	Positioning signal "Y" SAX31P03, SAX81P03 SAX31P.. Voltage SAX81P.. Voltage SAX61P03 (DC 0...10 V) Current draw Input impedance SAX61P03 (DC 4...20 mA) Current draw Input impedance	3-position AC 230 V ±15% AC 24 V ± 20 % / DC 24 V + 20 % / -15% ≤ 0.1 mA ≥ 100 kΩ DC 4...20 mA ± 1% ≤ 500 Ω
Parallel operation	SAX61P03	≤ 10 (depending on controler output)
Forced control	Positioning signal "Z" SAX61P03 R = 0…1000 Ω Z connected to G Z connected to G0 Voltage Current draw	R = 0…1000 Ω, G, G0 Stroke proportional to R Max. stroke 100% [1] Min. stroke 0% [1] Max. AC 24 V ± 20% Max. DC 24 V + 20% / -15% ≤ 0.1 mA
Position feedback	Position feedback U SAX61P03 Load impedance Load	DC 0...10 V > 10 kΩ res. Max. 1 mA
Connecting cable	Wire cross-sectional areas	0.75…1.5 mm^2, AWG 20…16 [2]
	Cable entries SAX..P..	EU: 2 entries ∅ 20.5 mm (for M20) 1 entry ∅ 25.5 mm (for M25)
Degree of protection	Housing from vertical to horizontal	IP54 as per EN 60529 [3]
	Insulation class Actuators SAX31P03Y AC 230 V Actuators SAX61P03Y AC / DC 24 V Actuators SAX81P03Y AC / DC 24 V	As per EN 60730 II III III
Environmental conditions	Operation Climatic conditions Mounting location Temperature General Humidity (noncondensing)	IEC 60721-3-3 Class 3K5 Indoors (weather-protected) 5…<55 °C 5…95% r.h.
	Transport Climatic conditions Temperature Humidity	IEC 60721-3-2 Class 2K3 -25…70 °C <95% r.h.
	Storage Climatic conditions Temperature Humidity	IEC 60721-3-1 Class 1K3 -5…55 °C 5…95% r.h.
	Max. media temperatur when mounted on valve	130 °C

[1] Observe acting direction of DIL switches
[2] AWG = American wire gauge
[3] Also with weather shield ASK39.1

		SAX..P
Norms and Directives	Product standard	EN 60730-x
	Electromagnetic compatibility (Application)	For residential, commercial and industrial environments
	EU Conformity (CE)	CE1T4501X1 [1]
	RCM Conformity	CE1T4515X4 [1]

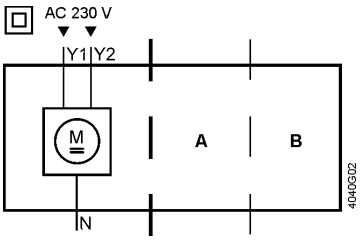
	EAC Conformity		Eurasia Conformity for all SAX..P..
	UL, cUL	AC 230 V AC/DC 24 V	- UL 873 http://ul.com/database
Environmental compatibility			The product environmental declaration 7173310559Ben [1] contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).
Dimensions			See "Dimensions" (page 10)
Accessories [2]	Potentiometer ASZ7.5		0…1000 Ω ± 5% Voltage DC 10 V Current rating <4 mA
	Auxiliary switch ASC10.51 External supply line protection US Installation, UL & cUL	Switching capacity	AC 24…230 V, 6 (2) A, floating See section power supply AC24 V class 2, 5 A general purpose

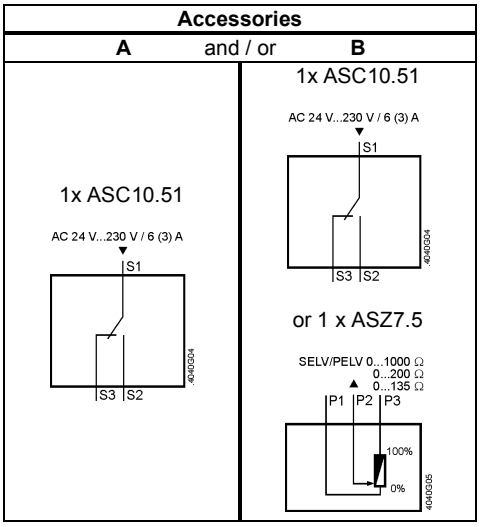
[1] The documents can be downloaded from http://siemens.com/bt/download.

[2] UL recognized component

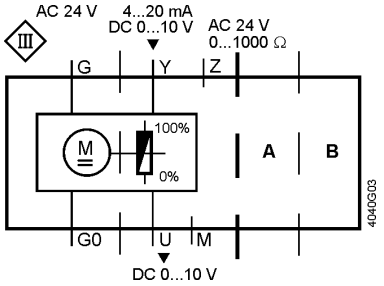
Internal Diagrams

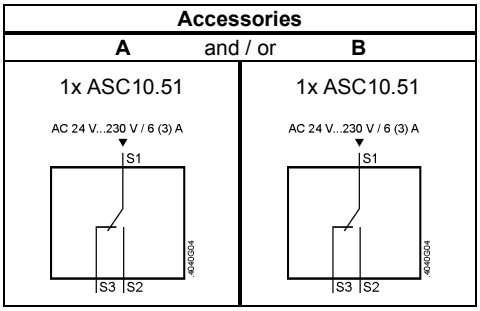
SAX31P03



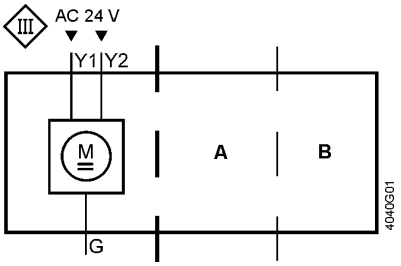


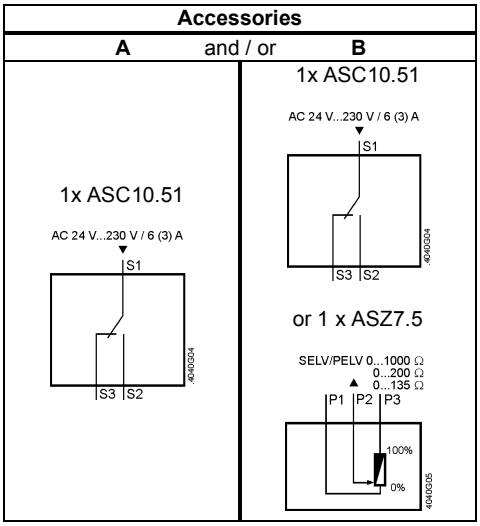
SAX61P03





SAX81P03

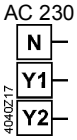




Connection terminals

SAX31P03

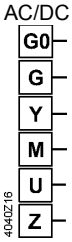
AC 230 V, 3-position



- N — Sytem neutral (SN)
- Y1 — Positioning signal (actuator's stem retracts)
- Y2 — Positioning signal (actuator's stem extends)

SAX61P03

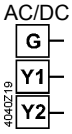
AC/DC 24 V, DC 0…10 V / 4…20 mA / 0…1000 Ω



- G0 — Sytem neutral (SN)
- G — Sytem potential (SP)
- Y — Positioning signal for DC 0…10 V / 4…20 mA
- M — Measuring neutral
- U — Position feedback DC 0...10 V
- Z — Positioning signal forced control

SAX81P03

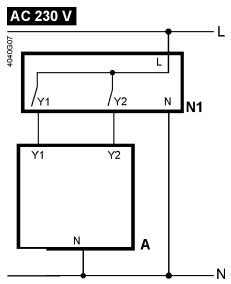
AC/DC 24 V, 3-position



- G — Sytem potential (SP)
- Y1 — Positioning signal (actuator's stem retracts)
- Y2 — Positioning signal (actuator's stem extends)

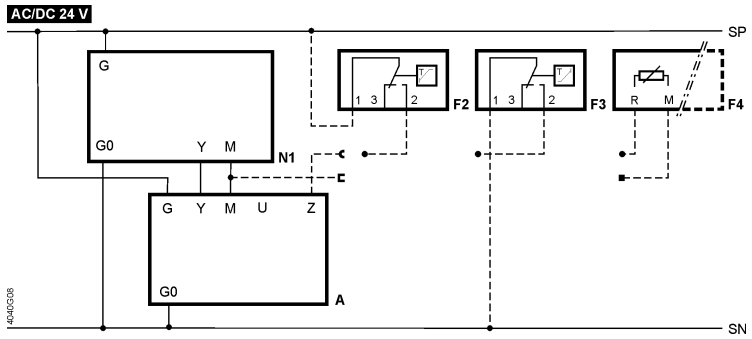
Connection Diagrams

SAX31P03



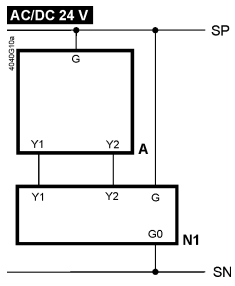
A	Actuator
L	Phase
N	Neutral
N1	Controller
Y1, Y2	Positioning signals

SAX61P03



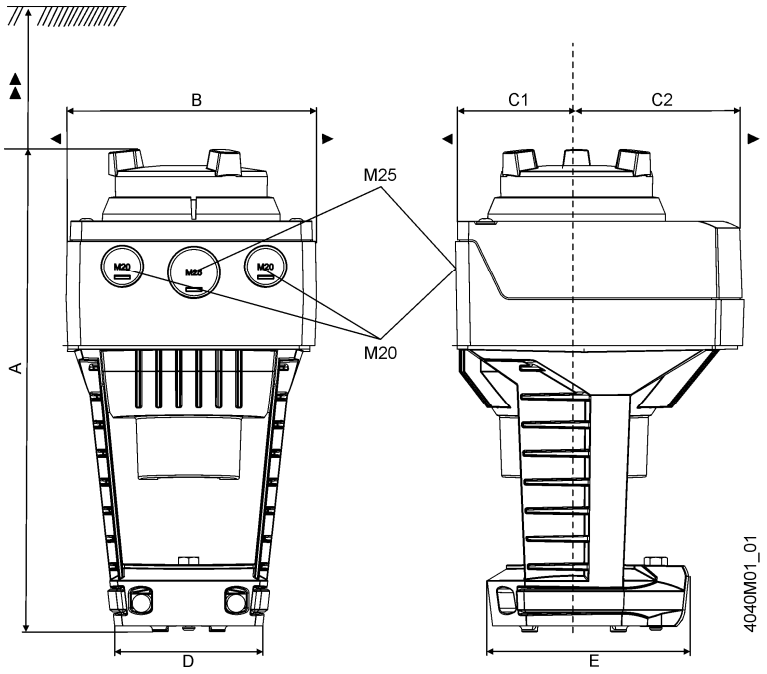
A	Actuator
F2	Frost protection thermostat; terminals: 1 – 2 frost hazard / sensor is interrupted (thermostat closes with frost) 1 – 3 normal operation
F3	Temperature detector
F4	Frost protection monitor with 0…1000 Ω signal output, does NOT support QAF21.. or QAF61..
M	Measuring neutral
N1	Controller
SN	System neutral
SP	System potential AC/DC 24 V
U	Position feedback
Y	Position signal
Z	Positioning signal forced control

SAX81P03



A	Actuator
N1	controller
SN	System neutral
SP	System potential AC/DC 24 V
Y1, Y2	Positioning signals

Dimensions



Type	A	B	C	C1	C2	D	E	►	►►	kg
SAX..P..	242	124	150	68	82	80	100	100	200	1.780
With ASK39.1	+25	154	300	200	100	-	-	-	-	2.010

Dimensions in mm

Revision numbers

Product no.	Valid from rev. no.
SAX31P03	..H
SAX61P03	..H
SAX81P03	..H

SIEMENS

A6V10628469

ACVATIX™

Electromotoric actuators for valves

SAY..P..

with a 15 mm stroke

- **SAY31P03 Operating voltage AC 230 V, 3-position control signal**
- **SAY61P03 Operating voltage AC/DC 24 V, control signal DC 0…10 V, 4…20 mA**
- **SAY81P03 Operating voltage AC/DC 24 V, 3-position control signal**
- **SAY61P03 Position feedback, override control, choice of flow characteristic**
- **For direct mounting on valves; no adjustments required**
- **Manual adjuster, position indicator and status indication per LED**
- **Optional functions with auxiliary switches, function module**

Use

Electromotoric actuators for the operation of Siemens combi valves of type VPI46.40F9.5Q and VPI46.50F12Q with 15 mm stroke as control valves in ventilation, air conditioning, and district heating systems.

Type summary

Product no.	Stock no.	Stroke	Pos. force	Operating voltage	Positioning signal	Spr. ret. time	Pos. time	LED	Manual adjuster	Extra functions
SAY31P03	S55150-A132	15 mm	200 N	AC 230 V	3-position	-	30 s	-	Push and fix	[1]
SAY61P03	S55150-A133			AC/DC 24 V	DC 0…10 V DC 4…20 mA 0…1000 Ω			✓		[2], [3]
SAY81P03	S55150-A134				3-position			-		[1]

[1] Optional accessories: Auxiliary switch ASC10.51
[2] Positioning feedback, forced control, characteristic curve changeover
[3] Optional accessories: Auxiliary switch ASC10.51, sequence control, control action changeover AZX61.1

Electrical accessories

Product no.	Auxiliary switch ASC10.51	Function module AZX61.1
Stock no.	S55845-Z103	S55845-Z107
SAY31P..	Max. 2	Max. 1 AZX61.1
SAY61P..		
SAY81P..		

Mechanical Accessory

Weather shield ASK39.1

Ordering

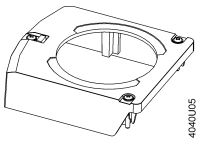
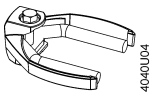
Example

Product no.	Stock no.	Description	Quantity
SAY81P03	S55150-A134	Actuator	1
ASC10.51	S55845-Z103	Auxiliary switch	1

Delivery

Actuators, valves and accessories are supplied in individual packs.

Spare parts

Product number / Stock number	Housing cover	Screw (valve stem coupling)
8000060843		
		U-bracket 

Combinations

Type	Stock no.	DN	H_{100} [mm]	$\dot{V}_{min}$ [l/h]	$\dot{V}_{100}$ [l/h]	Δp_{min} [kPa]	Data sheet
VPI46.40F9.5Q	**S55264-V129**	40	15	1370	9500	25	N4855
VPI46.50F12Q	**S55264-V130**	50		1400	11500	36	

Product documentation

Detailed Informations about the New Generation actuators can be found in the Basic documentation for actuators (P4040).

Notes

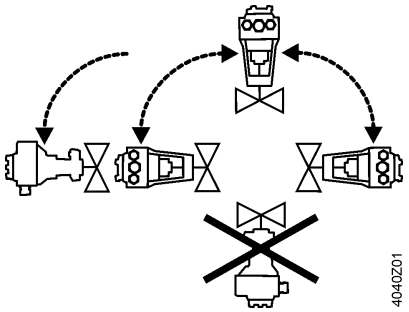
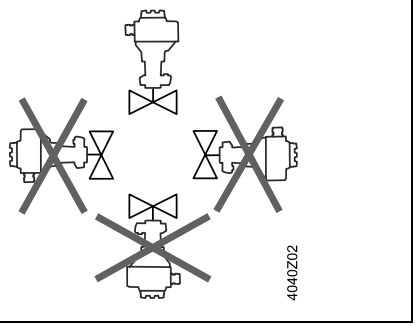
Engineering
SAY31P03 and SAY81P03

3-position actuators must have their own specific controller, refer to "Connection Diagrams" (page 8).

SAY61P03

Up to 10 actuators can drive in parallel on a controller output with a rating of 1 mA. Modulating actuators have an input impedance of 100 kΩ.

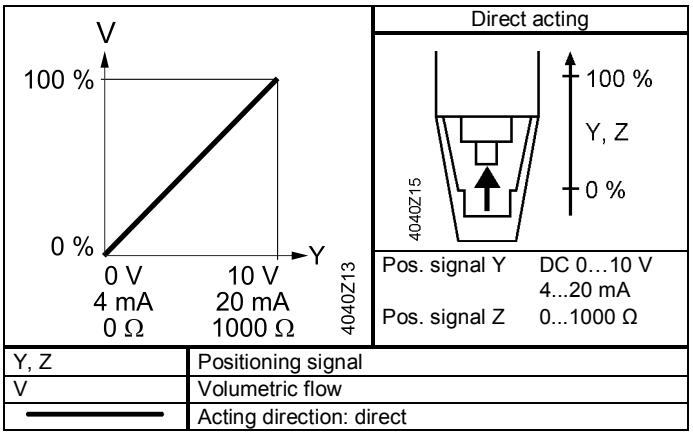
Mounting
Mounting positions

Indoor use	Outdoor use [1]
	

[1] Only in connection with weather shield ASK39.1

Acting direction

With valves whose stem is retracted in the fully closed position, "direct acting" means that the valve is fully closed (100 %) when positioning signal Y = 0 V and Z = 0 Ω respectively.



Y, Z	Positioning signal
V	Volumetric flow
———	Acting direction: direct

Maintenance

The actuators are maintenance-free.

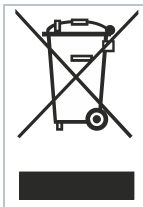
Warranty

The engineering data specified in chapter "Combinations" (page 3) are only guaranteed in connection with the Siemens valves listed.

Note

When using the actuators in connection with valves of other manufacture, correct functioning must be ensured by the user, and Siemens will assume no responsibility.

Disposal



The device is considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the device through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Technical Data

		SAY..P
Power supply	Operating voltage SAY31P03 SAY61P03 SAY81P03	 AC 230 V ±15% AC 24 V ± 20% / DC 24 V + 20% / -15%(SELV) AC 24 V ±20% / DC 24 V + 20 % / -15%(SELV)
	Frequency	45…65Hz
	External supply line protection (EU)	• Fuse slow 6…10 A • Circuit breaker max. 13 A, Characteristic B, C, D according to EN 60898 • Power source with current limitation of max. 10 A
	Power consumption at 50 Hz SAY31P03 Stem retracts / extends SAY61P03 Stem retracts / extends SAY81P03 Stem retracts / extends	 6 VA / 3.5 W 8 VA / 3.75 W 5 VA / 3.75 W
Function data	Positioning times (with the specified nominal stroke) The positioning time can vary, depending on the type of valve -> refer chapter "Type summary" (page 2) SAY31P03, SAY61P03, SAY81P03 Positioning force Nominal stroke Permissible medium temperature (valve fitted)	 30 s 200 N 15 mm 1…120 °C
Signal inputs	Positioning signal ”Y” SAY31P03, SAY81P03 SAY31P.. Voltage SAY81P.. Voltage SAY61P03 (DC 0...10 V) Current draw Input impedance SAY61P03 (DC 4...20 mA) Current draw Input impedance	3-position AC 230 V ±15% AC 24 V ± 20 % / DC 24 V + 20 % / -15% ≤ 0.1 mA ≥ 100 kΩ DC 4...20 mA ± 1% ≤ 500 Ω
Parallel operation	SAY61P03	≤ 10 (depending on controler output)
Forced control	Positioning signal ”Z” SAY61P03 R = 0…1000 Ω Z connected to G Z connected to G0 Voltage Current draw	R = 0…1000 Ω, G, G0 Stroke proportional to R Max. stroke 100% [1] Min. stroke 0% [1] Max. AC 24 V ± 20% Max. DC 24 V + 20% / -15% ≤ 0.1 mA
Position feedback	Position feedback U SAY61P03 Load impedance Load	DC 0...10 V > 10 kΩ res. Max. 1 mA
Connecting cable	Wire cross-sectional areas	0.75…1.5 mm^2, AWG 20…16 [2]
	Cable entries SAY..P..	EU: 2 entries ∅ 20.5 mm (for M20) 1 entry ∅ 25.5 mm (for M25)

[1] Observe acting direction of DIL switches

[2] AWG = American wire gauge

Degree of protection	Protection degree of housing from vertical to horizontal	IP54 as per EN 60529 [1]
	Protection class Actuators SAY31P03Y AC 230 V Actuators SAY61P03Y AC / DC 24 V Actuators SAY81P03Y AC / DC 24 V	As per EN 60730-1 II III III
Environmental conditions	Operation Climatic conditions Mounting location Temperature General Humidity (noncondensing)	IEC 60721-3-3 Class 3K5 Indoors (weather-protected) 5…55 °C 5…95% r.h.
	Transport Climatic conditions Temperature Humidity	IEC 60721-3-2 Class 2K3 -25…70 °C <95% r.h.
	Storage Climatic conditions Temperature Humidity	IEC 60721-3-1 Class 1K3 -15…55 °C 5…95% r.h.
	Max. media temperatur when mounted on valve	120 °C
Directives and Standards	Product standard Electromagnetic compatibility (Application) EU Conformity (CE) RCM Conformity AC 230 V	EN 60730-x For residential, commercial and industrial environments A5W00000333 [2] A5W00000334 [2]
	EAC Conformity	Eurasia Conformity for all SAY..P..
	UL, cUL AC 230 V AC / DC 24 V	- UL 873 http://ul.com/database
Environmental compatibility		The product environmental declaration 7173310559Ben [2] contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).
Dimensions		See "Dimensions" (page 9)
Accessories [3]	Auxiliary switch ASC10.51 Switching capacity External supply line protection US installation, UL & cUL	AC 24…230 V, 6 (2) A, floating See section power supply AC 24 V class 2, 5 A general purpose

[1] Also with weather shield ASK39.1

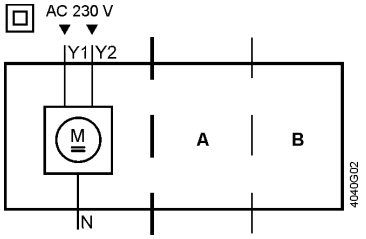
[2] The documents can be downloaded from http://siemens.com/bt/download.

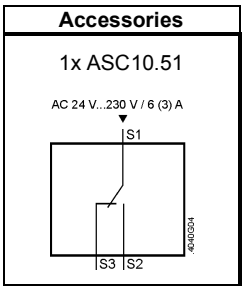
[3] UL recognized component

Connection Diagrams

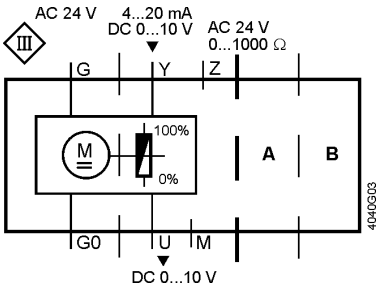
Internal Diagrams

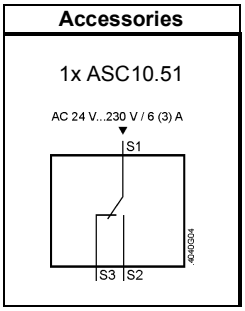
SAY31P03



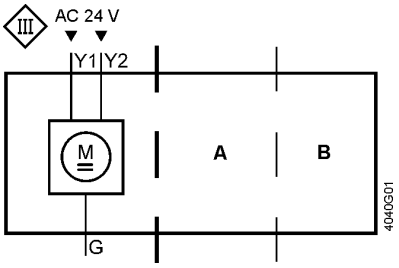


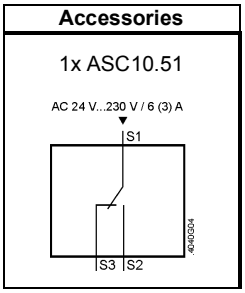
SAY61P03





SAY81P03

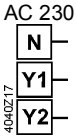




Connection terminals

SAY31P03

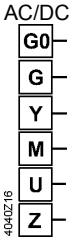
AC 230 V, 3-position



- N — Sytem neutral (SN)
- Y1 — Positioning signal (actuator's stem retracts)
- Y2 — Positioning signal (actuator's stem extends)

SAY61P03

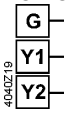
AC/DC 24 V, DC 0…10 V / 4…20 mA / 0…1000 Ω



- G0 — Sytem neutral (SN)
- G — Sytem potential (SP)
- Y — Positioning signal for DC 0…10 V / 4…20 mA
- M — Measuring neutral
- U — Position feedback DC 0...10 V
- Z — Positioning signal forced control

SAY81P03

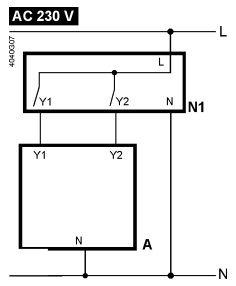
AC/DC 24 V, 3-position



- G — Sytem potential (SP)
- Y1 — Positioning signal (actuator's stem retracts)
- Y2 — Positioning signal (actuator's stem extends)

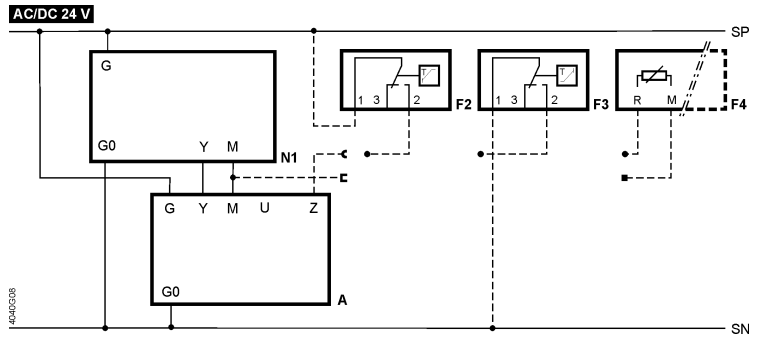
Connection Diagrams

SAY31P03



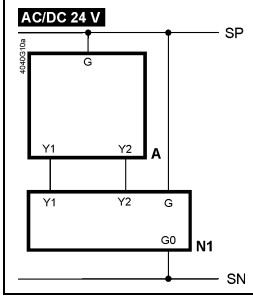
A	Actuator
L	Phase
N	Neutral
N1	Controller
Y1, Y2	Positioning signals

SAY61P03



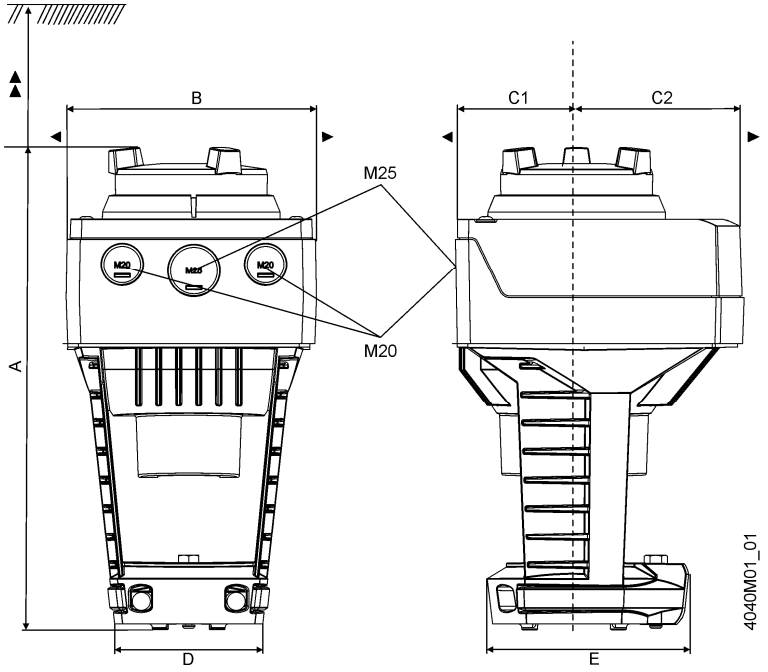
A	Actuator
F2	Frost protection thermostat; terminals: 1 – 2 frost hazard / sensor is interrupted (thermostat closes with frost) 1 – 3 normal operation
F3	Temperature detector
F4	Frost protection monitor with 0…1000 Ω signal output, does NOT support QAF21.. or QAF61..
M	Measuring neutral
N1	Controller
SN	System neutral
SP	System potential AC/DC 24 V
U	Position feedback
Y	Position signal
Z	Positioning signal forced control

SAY81P03



A	Actuator
N1	controller
SN	System neutral
SP	System potential AC/DC 24 V
Y1, Y2	Positioning signals

Dimensions



Type	A	B	C	C1	C2	D	E	►	►►	kg
SAY..P..	242	124	150	68	82	80	100	100	200	1.780
With ASK39.1	+25	154	300	200	100	-	-	-	-	2.010

Dimensions in mm

Revision numbers

Product no.	Valid from rev. no.
SAY31P03	..A
SAY61P03	..A
SAY81P03	..A

ACVATIX™

Electromotive actuators for combi valves SQV..P..

For combi valves VPF43.. and VPF53..

- **SQV91.. Operating voltage AC/DC 24 V,**
  Positioning signal 3-position, DC 0-10 V, DC 4-20 mA
- **Position feedback and selection of flow characteristic**
- **Manual adjuster, position and status indication (LED)**
- **Selectable positioning times 40-240 seconds**
- **Fail-safe function (combi valve open/closed)**
- **Selection of acting direction**
- **Optional functional extension: Auxiliary switch, potentiometer, and AC 230 V module**
- **Direct mounting on combi valves**
- **UL approved**

Use

Electromotive actuators to operate Siemens combi valves for type series VPF43.. and VPF53.. with 20/40/43 mm stroke, as control valves for ventilation, air conditioning, district heating and refrigeration plants.

Type summary

Type	Stock No.	Stroke	Pos. force	Operating voltage	Positioning signal	Spring return time	Pos. time [2]		Fail-safe function
							20mm	40mm	
SQV91P30	S55150-A130	20/40/43 mm	1100 N	AC/DC 24 V AC 230 V [1]	3-position DC 0…10 V DC 4…20 mA	30 sec	40 sec 60 sec	80 s 120 s	Stem retracts
SQV91P40	S55150-A131						90 sec 120 sec	180 s 240 s	Stem extends

[1] AC 230 V requires accessory ASP1.1.
[2] The positioning time can be selected using the DIL switch, see page 7.

Electrical accessories

Type	Auxiliary switch pair ASC10.42	Potentiometer ASZ7.6/1000	AC 230 V module ASP1.1
Stock number	S55845-Z137	S55845-Z136	S55845-Z138
	Max. 2		
SQV91P30	Max. 1		Max. 1
SQV91P40	Max. 1		Max. 1

Spare parts, rev. number

No spare parts available.
Revision numbers, see page 13.

Ordering

Example

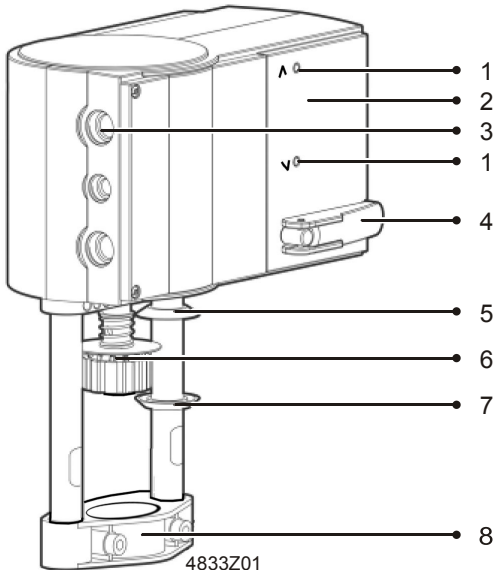
Type	Stock number	Designation	Quantity
SQV91P40	S55150-A131	Actuator	1
ASZ7.6/1000	S55845-Z136	Potentiometer	1

Delivery

Actuator, combi valve, and accessories are individually packed for delivery.

Equipment combination

Valve type		DN	PN class	Flow V_{100} [m^3/h]	Data sheet
 **Combi valves**					
VPF43..	Flange	50	16	2,3…25	N4315
		65		4,4…35	
		80		5,3…43	
		100		12,1…90	
		125		18,5…135	
		150		25,6…195	
VPF53..	Flange	50	25	2,3…25	N4316
		65		4,4…35	
		80		5,3…43	
		100		12,1…90	
		125		18,5…135	
		150		25,6…195	



1 Status and acting direction indication (LED)
2 Housing cover
3 Entry points for cable glands
4 Manual adjuster
5 Indication of upper end position
6 Valve stem coupling
7 Indication of lower end position
8 Valve neck coupling

The actuator can be operated as a 3-position or modulating actuator in two acting directions depending on the type of connection. It is suitable for both combi valves VPF.. with 20 mm stroke as well as for valves with a 40 mm and 43 mm stroke. The stroke is calibrated automatically during initialization.
The actuator includes a position feedback.
The actuator travels to the end position in the event of power loss, see "Fail-safe function", page 5. Up to 45 seconds pass until the actuator is available again following a restart or start after the fail-safe function is triggered.
The positioning time (40 to 240 seconds) and the flow characteristic (lin/log) can be set via the DIL switches.

Auto mode

The manual adjuster is disengaged.

Manual mode

The manual adjuster allows for manually setting the position. The motor is switched off when the manual adjuster is engaged. The fail-safe function (spring return) is reactivated after the manual adjuster is disengaged, and the actuator travels again to the set position without calibration.
The actuator remains in this position without active operating voltage for as long as the manual adjustor is engaged.

Initialization, automatic coupling, calibration

The actuator independently calibrates itself for each type of connection. Initialization occurs as soon as operating voltage is supplied for the first time and the waiting period ends. The actuator travels to the lower stop of the combi valve, thus enabling automatic coupling with the valve stem. It then travels to the upper stop, records and stores it. Recalibration can be manually triggered any time, see "Recalibration", page 5.

3-position control signal

The combi valve can travel to any position by supplying voltage to terminal G1 or G2 as well as L1[1)] or L2[1)].

- Voltage on G2, L2: Actuator stem retracts, combi valve opens.
- Voltage on G1, L1: Actuator stem extends, combi valve closes.
- No voltage on G1 and G2: or L1 and L2: Actuator stem stays at the applicable position.

[1)] When using the AC 230 V module ASP1.1.

Changeover of acting direction

The acting direction of the stroke direction can be reversed by exchanging connections G1 and G2 or L1 and L2.

Direct acting: Positioning signal OPEN on G2, L2. Positioning signal CLOSED on G1, L1.

Reverse acting: Positioning signal OPEN on G1, L1. Positioning signal CLOSED on G2, L2.

Notes

- Do not use connection Yu (DC 0-10 V) and Yi (DC 4-20 mA).
- Positioning times can be selected, see "Positioning times“, page 7".
- Valve characteristic curves "lin" or "log" cannot be selected.
- Position feedback U is activated after initialization/calibration.

Electronic motor shutdown is triggered in the end positions (valve stop or upon reaching maximum stroke) or by overload (no end switch).

Positioning signals Yu and Yi
DC 0-10 V (Yu)
DC4-20 mA (Yi)

The combi valve can be driven to any position by connecting a continuous positioning signal Yu or Yi. The acting direction can be reserved (direct/reverse acting) by connecting operating voltage to G1 or G2:

Direct acting

Operating voltage AC/DC 24 V on G1 or AC 230 V on L1

- Pos. signal to Yu, Yi increasing: Actuator stem retracts, combi valve opens.
- Pos. signal to Yu, Yi decreasing: Actuator stem extends, valve closes.
- Pos. signal to Yu, Yi continuous: Actuator stem remains in the respective pos.

Reverse acting

Operating voltage AC/DC 24 V on G2 or AC 230 V on L2

- Pos. signal to Yu, Yi increasing: Actuator stem extends, combi valve closes.
- Pos. signal to Yu, Yi decreasing: Actuator stem retracts, combi valve opens.
- Pos. signal to Yu, Yi continuous: Actuator stem remains in the respective pos.

Acting direction
Direct acting
Reverse acting

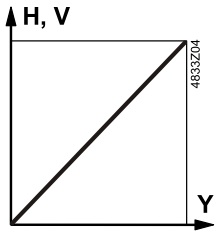
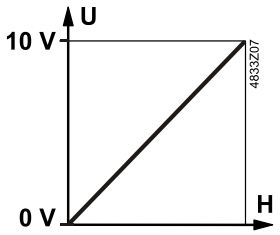
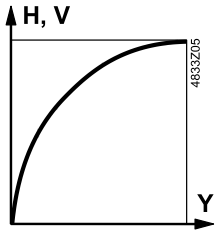
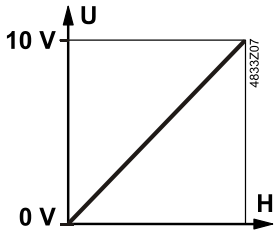
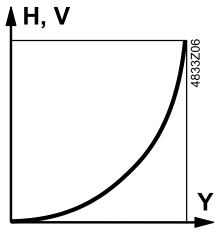
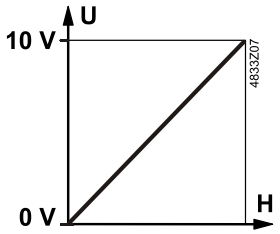
Position signal	Operating voltage	Actuator stem	Combi valve
Yu, Yi increasing	G1 to AC/DC 24 V L1 to AC 230 V	Retracts	Opens
Yu, Yi increasing	G2 to AC/DC 24 V L2 to AC 230 V	Extends	Closes

Notes

- The input with the higher value has priority when a positioning signal is available at both Yu and Yi.
- When using the AC 230 V module ASP1.1, the SQV..P can also be operated with a DC 0…10 V or DC 4…20 mA positioning signal.
- The actuator travels to the applicable end position depending on the selected acting direction if Yu or Yi are interrupted:
  Operating voltage to G1 or L1 — Actuator stem extends.
  Operating voltage to G2 or L2 — Actuator stem retracts.
- Positioning times can be selected, see "Positioning times“, page 7".
- Valve characteristic curves "lin" or "log" can be selected.
- Position feedback U is activated after initialization/calibration.
- Parallel operation with up to 5 actuators possible, see "Technical data", page 10.

Position feedback U

Position feedback U (DC 0…10 V) is always proportional to stroke H for the actuator. It is also active when using the AC 230 V module ASP1.1.

DIL switch	Flow characteristics	Position feedback U
lin = linear [1)]		
log = equal percentage, n_{gl} = 3 (logarithmic normal)		
log = equal percentage, n_{gl} = 3 (exponential normal)		

[1)] Factory setting

Fail-safe function

The actuator travels to the applicable end position (the stem retracts or extends depending on the model) using the preloaded spring if operating voltage to terminal G or 21 is lost or shut down. In this case, the actuator's control function is locked for 45 seconds (both LEDs are green) to reach the end position at any rate. There is no recalibration. The reset positioning speed ensures that no pressure surges occur in the piping.

End position

SQV91P30	Actuator stem retracted	Combi valve opened (V = 100%).
SQV91P40	Actuator stem extended	Combi valve closed (V = 0%).

Recalibration

Recalibration can be manually triggered any time.

1. Operating voltage is supplied.
2. Engage and disengage the manual adjuster twice within 4 seconds.
3. Both LEDs flash green.
4. Recalibration is successful when both LEDs are lit green.
5. Return to normal control function.

Notes

- Position feedback U is inactive or corresponds to value "0".
- The shortest possible runtime is initialized.
- Recalibration is valid only after the entire process is completed.
- Additional engaging the manual adjuster interrupts the process.

Blockade detection

The valve actuator indicates detected blockage by setting the feedback signal to 0 V after ca. 90 seconds. The actuator, however, tries to overcome the blockage during this period. Normal control function is reactivated if the blockage is overcome and position feedback U is once again available.

Response at the end positions

Blockade detection is always operational. In other words, the actuator demonstrates the following response at end positions H_{100} and H_0 not only during initialization and calibration, but also during normal control operation:

1. The actuator travels to the end position; the LED is lit in the direction of travel.
2. It detects the end position; both LEDs are lit green.
3. It then briefly travels in the opposite direction; the LED is lit in the direction of travel.
4. It then returns to the end position; LED is lit in the direction of travel
5. It detects the end position; both LEDs are lit green.

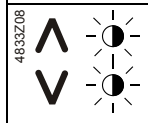
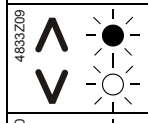
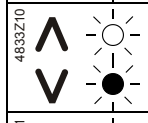
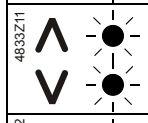
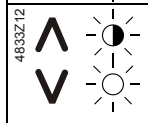
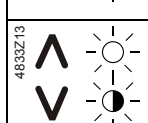
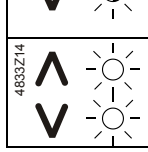
This response is repeated with time intervals between travels increasing exponentially. The intervals are:

25 seconds
1 min 40 seconds
6 min 40 seconds
26 min
1 h 46 min 40 seconds
7 h 6 min 40 seconds
1 day 4 h 26 min 40 seconds

for the previous interval.

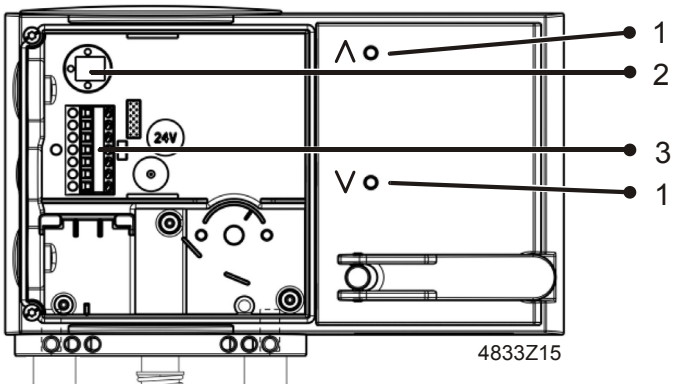
Status and acting direction indication (LED)

The status and acting direction indication consists of two green, lit LEDs.

Indication		Function
	▪ LED flashes green ▪ LED flashes green	▪ Initialization. ▪ Manual mode. ▪ Delay after operating voltage is supplied, or the fail-safe function is triggered.
	▪ Steady green ▪ --	Actuator stem retracts.
	▪ -- ▪ Steady green	Actuator stem extends.
	▪ Steady green ▪ Steady green	End position reached.
	▪ LED flashes green ▪ --	Blockage or foreign object detected during retraction.
	▪ -- ▪ LED flashes green	Blockage or foreign object detected during extension.
	▪ -- ▪ --	No operating voltage

Frost protection thermostat.

The actuators can be operated using a frost protection thermostat or temperature detector, see "Connection diagrams", page 11.



1 Status and acting direction indication (LED)
2 DIL switch
3 Connection terminals

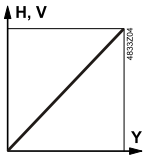
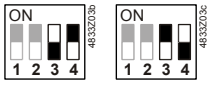
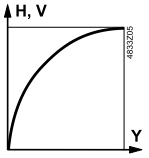
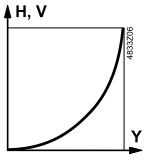
DIL switch
Positioning times

DIL switch	Speed	Positioning time [1] 20 mm	40 mm
	2 sec/mm	40 sec [2]	80 sec [2]
	3 sec/mm	60 sec	120 sec
	4,5 sec/mm	90 sec	180 sec
	6 sec/mm	120 sec	240 sec

[1] Tolerance: ± 1 sec
[2] Factory setting

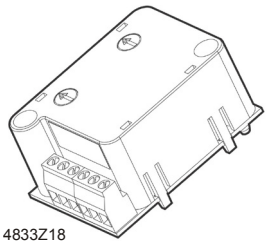
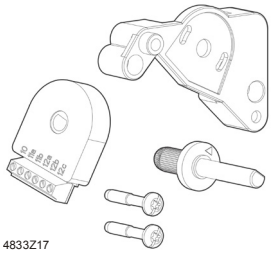
DIL switch
Flow characteristics

The flow characteristics can be used only for connections with constant positioning signals DC 0…10 V and DC 4…20 mA.

DIL switch	Flow characteristics	
	lin = linear [1]	
	log = equal percentage, n_{gl} = 3 (logarithmic normal)	
	log = equal percentage, n_{gl} = 3 (exponential normal)	

[1] Factory setting

Accessories

Type Stock no.	**ASC10.42** S55845-Z137	**ASZ7.6/1000** S55845-Z136	**ASP1.1** S55845-Z138
	Auxiliary switch pair	Potentiometer	AC 230 V module
	 4833Z18	 4833Z17	 4833Z16
	Switching points can be continuously adjusted between 0 and 100%	0…1000 Ω	AC 230 V to AC 24 V converter
Installation	Max. 1		Max. 1
	Max. 2		

See section "Technical data" (page 10) for more information.

Notes

Engineering

Install electrical connections in accordance with local regulations on electric installations as well as internal or connecting diagrams as of page 10.

Observe safety regulations and restrictions designed to ensure the safety of people and property at all times!

- An internal controller controls the actuator for 3-position or DC 4…20 mA positioning signal connection types, see "Connection diagrams", page 11.
- For DC 0…10 V connections (input impedance R_i = 100 kΩ), up to 5 actuators can be controlled in parallel by a controller with a rating of 1 mA.
- The switching points must be entered on the plant diagram when using the double auxiliary switch ASC10.42.
- Do not insulate the actuator console and valve stem, as air circulation must be ensured.

⚠
⚠

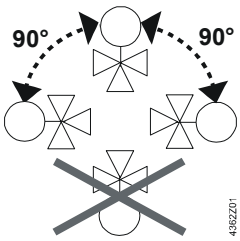
- **Non-observance of the above may result in accidents and fires!**
- **Do not touch the hot parts without prior protective measures to avoid burns!**
- For permitted temperatures, see "Technical data", page 10.

Mounting

Mounting instructions 74 319 0821 0 on mounting combi valves are included in the actuator's packaging. Mounting instructions for accessories are located in the respective packaging.

Accessories		**Mounting instructions**	
ASC10.42	S55845-Z137	M4833.1	74 319 0860 0
ASZ7.6/1000	S55845-Z136	M4833.2	74 319 0861 0
ASP1.1	S55845-Z138	M4833.3	74 319 0862 0

Mounting positions



Commissioning

- Check the wiring and carry out a functional check as part of commissioning.
- Make or check the settings as per the plant diagram for auxiliary switches and potentiometers.

Maintenance

The actuators are maintenance-free.

Recommendation

- Regularly check functioning (trial) of actuators with safety functions.

When servicing the actuating device:

- Switch off both pump and operating voltage.
- Close the main shutoff valve in the piping.
- Release pressure in the pipes and allow them to cool down completely.
- Disconnect electrical connections from the terminals as needed.
- The actuator must be properly installed prior to recommissioning the valve.

Recommendation

Trigger stroke calibration after servicing.

Repair

⚠

- There are no spare parts available; the entire actuator must be replaced.
- **Removing the spring on the actuator is prohibited due to the high risk of injury.**

Disposal

The device is considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the device through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Warranty

The engineering data specified in section "Equipment combination" (page 2) are only guaranteed in connection with the Siemens valves listed.

Note

When using the actuators together with third-party valves, correct functioning must be ensured by the user, and Siemens will assume no responsibility.

Technical data

		SQV..P..
Power supply	Operating voltage With ASP1.1 AC 230 V module	AC 24 V ± 20% DC 24 V ± 15% AC 230 V ± 15%
	Frequency	50…60 Hz
	Fusing ac. DIN 57100 part 430 (supply lines)	6 A…10 A slow
	Power consumption With ASP1.1 AC 230 V module	20 VA / 7,5 W 22 VA
Function data	Positioning times 20 mm 40 mm	40 1) / 60 / 90 / 180 sec 80 1) / 120 / 180 / 240 sec
		The positioning time depends on the DIL switch setting, "Positioning times" (page 7)
	Positioning force	1100 N
	Nominal stroke	20 mm / 40 mm / 43 mm
	Permissible medium temperature (valve fitted)	1…120 °C
Signal inputs	Position signal Terminal G1, G2 Voltage	3-position AC 24 V ± 20% DC 24 V ± 15% AC 230 V ± 15%
	Terminal Yu Voltage Input impedance	DC 0…10 V ≥100 kΩ
	Terminal Yi Power Input impedance	DC 4…20 mA 50 Ω
Fail-safe function [2]	Terminal G / 21 SQV91P30	Loss of operating voltage Actuator stem retracted, combi valve fully open (100%).
	SQV91P40	Loss of operating voltage Actuator stem extended, combi valve fully closed (0%).
	Spring return time 20 mm 40 mm	15 sec [3] 30 sec [3]
Position feedback	Position feedback U Load impedance Load	DC 0...10 V >2.5 kΩ res. Max. 4 mA
Connecting cable	Wire cross-sectional areas	0.75…1.5 mm^2, AWG 20…16 [4]
	Cable entry	2 entry points M20 x 1. 1 entry points M16 x 1.5
Degree of protection	Housing from vertical to horizontal	IP 66 as per EN 60529
	Insulation class AC / DC 24 V With ASP1.1 AC 230 V module	As per EN 60730 III II
Environmental conditions	Operation	IEC 60721-3-3
	Climatic conditions Mounting location Temperature General Humidity (non-condensing)	Class 3K5 Indoors (weather-protected) 0…55 °C <95% r.h.
	Transport Climatic conditions Temperature Humidity	IEC 60721-3-2 Class 2K3 -30…70 °C <95% r.h.
	Storage Climatic conditions Temperature Humidity	IEC 60721-3-1 Class 1K3 -30…65 °C 5…95% r.h.
	Max. media temperature when mounted on combi valve	130 °C
Norms and directives	Electromagnetic compatibility (Application)	For residential, commercial and industrial environments
	Product standard	EN60730-x
	EU Conformity (CE)	CE1T4833xx01 [5]
	RCM Conformity	CE1T4833xx02 [5]
	UL conformity AC / DC 24 V AC 230 V	UL 873 -
Environmental compatibility		The product environmental declaration CE1E4833en [5] contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).

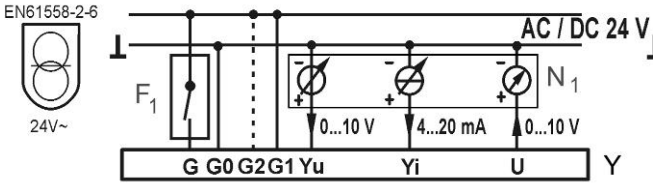
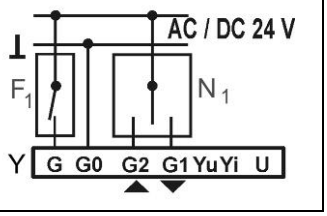
		SQV..P..
Dimensions		See "Dimensions" (page 13)
Accessories	Potentiometer ASZ7.6/1000	0…1000 Ω ± 20%
	Voltage	AC / DC 24 V
	Load	< 1 W
	Double auxiliary switch ASC10.42 Switching capacity	AC/DC 12…AC 230 V, 6 A resistive, 2 A inductive
	AC 230 V module ASP1.1	
	Voltage	AC 230 V ± 5%
	Power consumption	22 VA

[1] Factory setting
[2] Control function is locked for 45 seconds.
[3] At +23 °C ambient temperature and 1100 N nominal load
[4] AWG = American wire gauge.
[5] The documents can be downloaded from http://siemens.com/bt/download

Connection diagrams

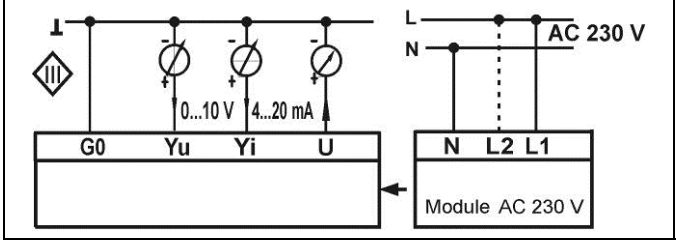
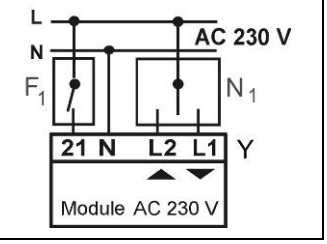
Connection diagrams

AC / DC 24 V

DC 0…10 V, DC 4…20 mA	3-position
	

Y1 actuator
N1 controller
F1 frost protection thermostat

AC 230 V

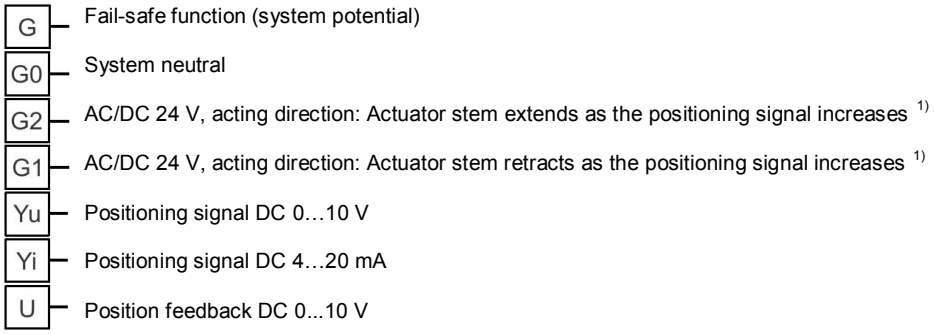
DC 0…10 V, DC 4…20 mA	3-position
	

Y1 actuator
N1 controller
F1 frost protection thermostat

Connection terminals

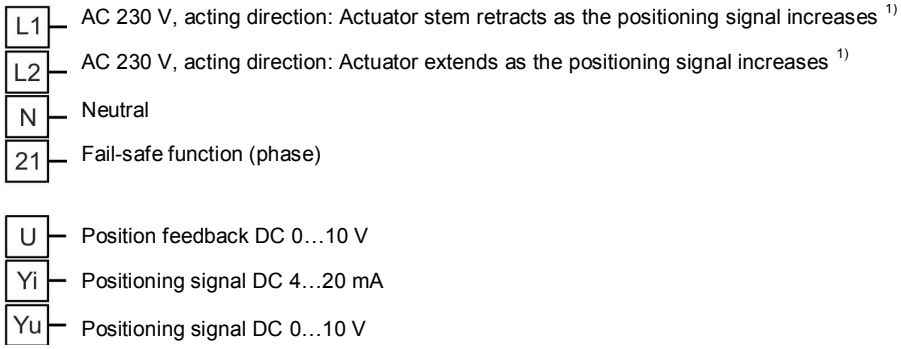
DC 0…10 V
DC 4…20 mA

AC / DC 24 V



with AC 230 V module ASP1.1

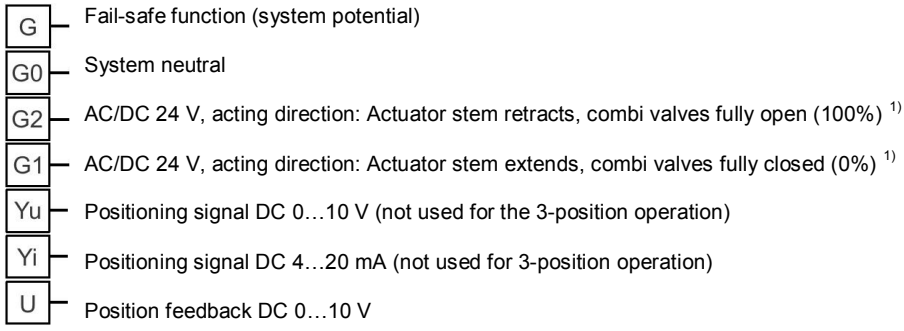
AC 230 V



1) Connect either G1 or G; or L1 or L2. Refer to the description at "Positioning signals Yu and Yi", page 4 for additional details.

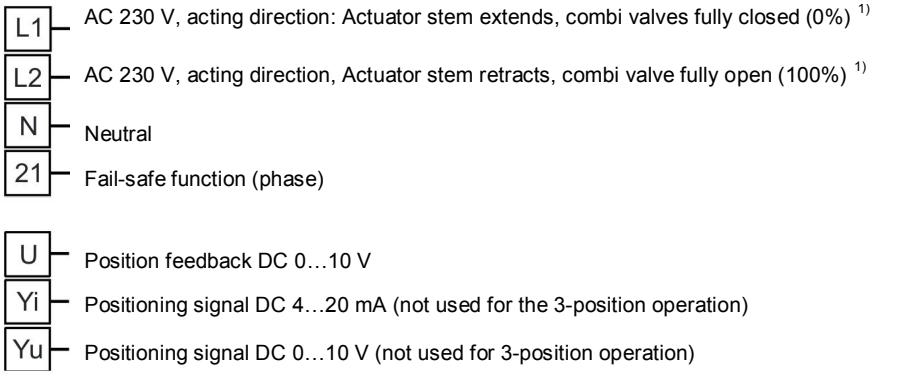
3-position

AC / DC 24 V



With AC 230 V module ASP1.1

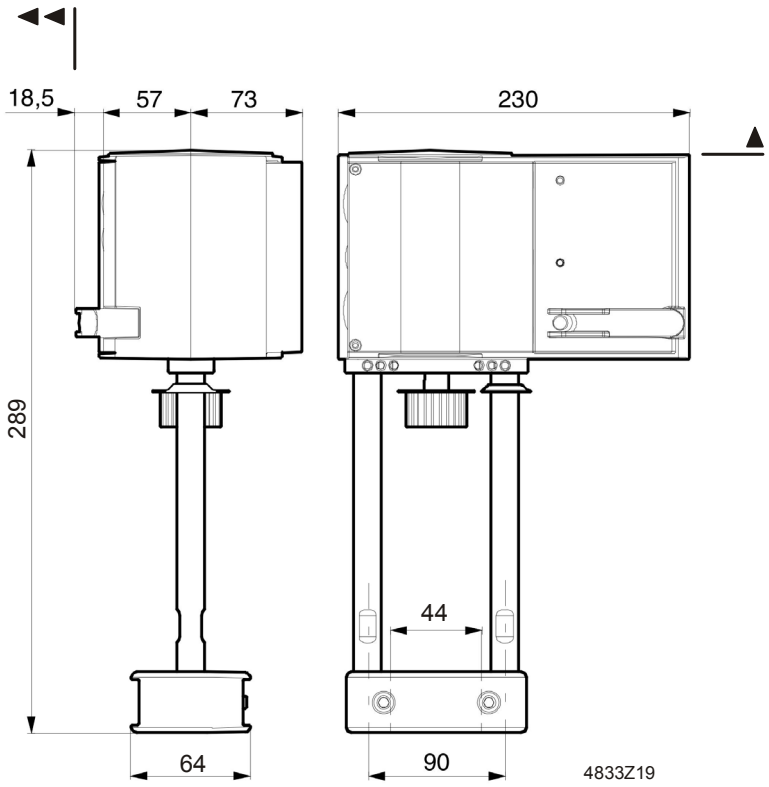
AC 230 V



1) Refer to the description at "3-position control signal", page 3 for additional details.

Dimensions

All dimensions in mm



► > 100 mm ►► >200 mm	Minimum mounting distance to wall or ceiling, for mounting, connection, operation, maintenance etc.

Revision numbers

Type	Revision number	Type	Revision number
SQV91P30	A	SQV91P40	A

SIEMENS

VVF42..
VVF42..K

VXF42..

ACVATIX™

2- and 3-port valves with flanged connections, PN 16

VVF42..
VVF42..K
VXF42..

From the large-stroke valve line

- Control valves for medium temperatures from -10…150 °C
- Valve body of grey cast iron EN-GJL-250
- DN 15…150
- k_{vs} 1.6…400 m^3/h
- Flange type 21, Flange design B
- VVF42..K with pressure compensation to handle high differential pressure
- Equipable with electro-motoric actuators SAX.., SAV.. or electro-hydraulic actuators SKD.., SKB.., SKC..

Use

In boiler, district heating and refrigeration plants, cooling towers, heating groups, in ventilation and air-handling units as control or shutoff valves.

For use in closed hydraulic circuits (observe cavitation).

Type summary

Valves					Actuators		SAX.. [1]		SKD..		SKB..		SAV.. [1]		SKC..	
					Stroke		20 mm						40 mm			
PN 16					Positioning force		800 N		1000 N		2800 N		1600 N		2800 N	
					Data sheet		N4501		N4561		N4564		N4503		N4566	
⋈	Stock no.	DN	k_{vs} [m³/h]	S_v	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}
					[kPa]											
VVF42.15-1.6	S55204-V100	15	1.6	> 50	1600	400	1600	400	1600	400	-	-	-	-		
VVF42.15-2.5	S55204-V101	15	2.5													
VVF42.15-4	S55204-V102	15	4													
VVF42.20-6.3	S55204-V103	20	6.3													
VVF42.25-6.3	S55204-V104	25	6.3													
VVF42.25-10	S55204-V105	25	10													
VVF42.32-16	S55204-V106	32	16	> 100	900		1200									
VVF42.40-16	S55204-V107	40	16		550		750						1250	400		
VVF42.40-25	S55204-V108	40	25													
VVF42.50-31.5	S55204-V109	50	31.5		350	300	450		1200				750			
VVF42.50-40	S55204-V110	50	40													
VVF42.65-50	S55204-V111	65	50		200	150	250	200	700				450			
VVF42.65-63	S55204-V112	65	63													
VVF42.80-80	S55204-V113	80	80		125	75	175	125	450				250	225		
VVF42.80-100	S55204-V114	80	100													
VVF42.100-125	S55204-V115	100	125		-	-	-	-	-	-			160	125	300	250
VVF42.100-160	S55204-V116	100	160													
VVF42.125-200	S55204-V117	125	200										125	90	190	160
VVF42.125-250	S55204-V118	125	250													
VVF42.150-315	S55204-V119	150	315										80	60	125	100
VVF42.150-400	S55204-V120	150	400													

Valves	Actuators				SAX.. [1]		SKD..		SKB..		SAV.. [1]		SKC..	
	Stroke				20 mm						40 mm			
PN 16	Positioning force				800 N		1000 N		2800 N		1600 N		2800 N	
	Data sheet				N4501		N4561		N4564		N4503		N4566	
	Stock no.	DN	k_{vs} [m^3/h]	S_v	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}
					[kPa]									
-5…150 °C														
VVF42.50-40K	S55204-V121	50	40	> 100	1600	400	1600	400	1600	400	-	-	-	-
VVF42.65-63K	S55204-V122	65	63											
VVF42.80-100K	S55204-V123	80	100											
VVF42.100-160K	S55204-V124	100	160		-	-	-	-	-	-	1600	400	1600	400
VVF42.125-250K	S55204-V125	125	250											
VVF42.150-360K	S55204-V126	150	360								1400			

[1] Permissible medium temperature (coupled valve) -25...130 °C - up to 150 °C in horizontal mounting position.

Valves	Actuators				SAX.. [1]		SKD..		SKB..		SAV.. [1]		SKC..	
	Stroke				20 mm						40 mm			
PN 16	Positioning force				800 N		1000 N		2800 N		1600 N		2800 N	
	Data sheet				N4501		N4561		N4564		N4503		N4566	
	Stock no.	DN	k_{vs} [m^3/h]	S_v	Δp_{max} [kPa]									
-10…150 °C					A⇒AB B	AB⇒A B	A⇒AB B	AB⇒A B	A⇒AB B	AB⇒A B	A⇒AB B	AB⇒A B	A⇒AB B	AB⇒A B
VXF42.15-1.6	S55204-V127	15	1.6	> 50	400	100	400	100	400	100	-	-	-	-
VXF42.15-2.5	S55204-V128	15	2.5											
VXF42.15-4	S55204-V129	15	4											
VXF42.20-6.3	S55204-V130	20	6.3											
VXF42.25-6.3	S55204-V131	25	6.3											
VXF42.25-10	S55204-V132	25	10											
VXF42.32-16	S55204-V133	32	16	> 100										
VXF42.40-16	S55204-V134	40	16								400	100		
VXF42.40-25	S55204-V135	40	25											
VXF42.50-31.5	S55204-V136	50	31.5		300									
VXF42.50-40	S55204-V137	50	40											
VXF42.65-50	S55204-V138	65	50		150	50	200	80						
VXF42.65-63	S55204-V139	65	63											
VXF42.80-80	S55204-V140	80	80		75		125	50			225	50		
VXF42.80-100	S55204-V141	80	100											

Valves		Actuators			SAX.. [1]	SKD..	SKB..	SAV.. [1]	SKC..
		Stroke			20 mm			40 mm	
PN 16		Positioning force			800 N	1000 N	2800 N	1600 N	2800 N
		Data sheet			N4501	N4561	N4564	N4503	N4566
	Stock no.	DN	k_{vs} [m³/h]	S_v	Δp_{max} [kPa]				
-10…150 °C					A⇨AB B	AB⇨A B	A⇨AB B	AB⇨A B	A⇨AB B	AB⇨A B	A⇨AB B	AB⇨A B	A⇨AB B	AB⇨A B
VXF42.100-125	S55204-V142	100	125		-	-	-	-	-	-	125		250	50
VXF42.100-160	S55204-V143	100	160											
VXF42.125-200	S55204-V144	125	200								90		160	
VXF42.125-250	S55204-V145	125	250											
VXF42.150-315	S55204-V146	150	315								60		100	
VXF42.150-400	S55204-V147	150	400											

[1] Permissible medium temperature (coupled valve) -25...130 °C - up to 150 °C in horizontal mounting position

DN = Nominal size

k_{vs} = Flow nominal value of cold water (5...30 °C) through the fully opened valve (H_{100}) bat a differential pressure of 100 kPa (1 bar)

S_v = Rangeability

Δp_s = Maximum permissible differential pressure at which the motorized valve still closes securely against the pressure

Δp_{max} = Maximum permissible differential pressure across the valve's throughport for the entire positioning range of the motorized valve

Ordering (example)

Type	Stock no.	Description
VXF42.65-63	S55204-V139	3-port valve with flange, PN 16
SKD32.50	SKD32.50	Electro-hydraulic actuator

Delivery

Valves, actuators, and accessories are packaged and delivered separately.

Note

Counter-flanges, bolts, and gaskets must be provided on site.

Equipment combinations

Type	Stock no.	Stroke	Positioning force	Operating voltage	Positioning signal	Spring return time	Positioning time	LED	Manual adjuster	Auxiliary functions
SAX31.00	S55150-A105	20 mm	800 N	AC 230 V	3-position	-	120 s	-	Press and fix	[1]
SAX31.03	S55150-A106						30 s			
SAX61.03 **SAX61.03U**	S55150-A100 S55150-A100-A100			AC 24 V DC 24 V	0…10 V 4…20 mA 0…1000 Ω			x		[2], [3]
SAX81.00	S55150-A102				3-position	-	120 s	-		[1]
SAX81.03 **SAX81.03U**	S55150-A103 S55150-A103-A100						30 s			
SKD32.21	SKD32.21	20 mm	1000 N	AC 230 V	3-position	8 s	Opening: 30 s Closing: 10 s	-	Turn, position is maintained	[1]
SKD32.50	SKD32.50					-	120 s			
SKD32.51	SKD32.51					8 s				
SKD60	SKD60			AC 24 V	0…10 V 4…20 mA 0…1000 Ω	-	Opening: 30 s Closing: 15 s	x		[2]
SKD62 **SKD62U**	SKD62 SKD62U					15 s				
SKD62UA	SKD62UA									[4]
SKD82.50 **SKD82.50U**	SKD82.50 SKD82.50U				3-position	-	120 s	-		[1]
SKD82.51 **SKD82.51U**	SKD82.51 SKD82.51U					8 s				
SKB32.50	SKB32.50	20 mm	2800 N	AC 230 V	3-position	-	120 s	-	Turn, position is maintained	[1]
SKB32.51	SKB32.51					10 s				
SKB60	SKB60			AC 24 V	0…10 V 4…20 mA 0…1000 Ω	-	Opening: 120 s Closing: 10 s	x		[2]
SKB62 **SKB62U**	SKB62 SKB62U					10 s				
SKB62UA	SKB62UA									[4]
SKB82.50 **SKB82.50U**	SKB82.50 SKB82.50U				3-position	-	120 s	-		[1]
SKB82.51U **SKB82.51**	SKB82.51 SKB82.51U					10 s				
SAV31.00	S55150-A112	40 mm	1600 N	AC 230 V	3-position	-	120 s	-	Press and fix	[1], [5]
SAV61.00 **SAV61.00U**	S55150-A110 S55150-A110-A100			AC 24 V DC 24 V	0…10 V 4…20 mA 0…1000 Ω			x		[1], [2], [5], [6]
SAV81.00 **SAV81.00U**	S55150-A111 S55150-A111-A100				3-position			-		[1], [5]

Type	Stock no.	Stroke	Position-ing force	Operating voltage	Positioning signal	Spring return time	Positioning time	LED	Manual adjuster	Auxiliary functions
SKC32.60	SKC32.60	40 mm	2800 N	AC 230 V	3-position	-	120 s	-	Turn, position is maintain-ed	[1]
SKC32.61	SKC32.61					18 s				
SKC60	SKC60			AC 24 V	0…10 V 4…20 mA 0…1000 Ω	-	Opening: 120 s Closing: 20 s	x		[2]
SKC62 **SKC62U**	SKC62 SKC62U					20 s				
SKC62UA	SKC62UA									[4]
SKC82.60 **SKC82.60U**	SKC82.60 SKC82.60U				3-position	-	120 s	-		[1]
SKC82.61 **SKC82.61U**	SKC82.61 SKC82.61U					18 s				

[1] Auxiliary switch, potentiometer

[2] Position feedback, forced control, selection of valve characteristic

[3] Optional: sequence control, selection of acting direction

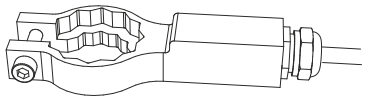
[4] Plus sequence control, stroke limitation, selection of acting direction

[5] Stem heating element (optional)

[6] Function module (optional)

Accessories / Spare parts

Accessories

Type	Stock no.	Description	Notes	Example
ASZ6.6	S55845-Z108	Stem heating element	Required for medium temperatures < 0 °C	

Spare parts

Stem sealing gland				
Type	**DN**	**Stock no.**	**Notes**	**Image**
VVF42.. VXF42..	DN 15…80	4 284 8806 0	Series A	 4 284 8806 0
	DN 100…150	4 284 8806 0	Series A, B and C until October 2015	
	DN 100…150	4 679 5629 0	Series D as of October 2015	
VVF42..K	DN 50…80	4 284 8806 0	Series A, B	 4 679 5629 0
	DN 100...150	4 284 8806 0	Series A	
	DN 100...150	4 679 5629 0	Series B	

Product documentation

Title	Content	Document ID
Mounting instructions valves VVF.. VXF..	Mounting instructions	M4030 74 319 0749 0
Valves VVF..,VXF..,VVG41.., VXG41.., VVI41.., VXI41..	Basic documentation: Contains background information and general technical basics for valves	P4030

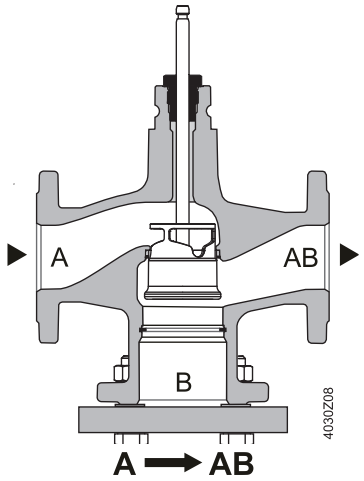
Technical and mechanical design

The illustrations below show the basic design of the valves. Constructional features, such as the shape of plugs, may differ.

2-port valves

Fluids

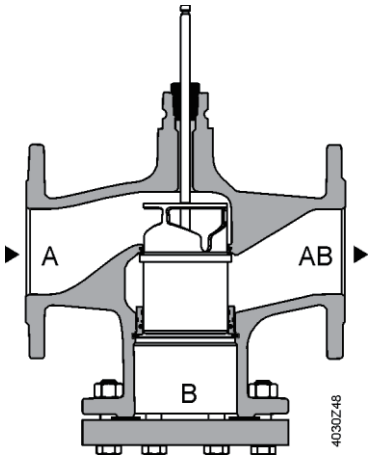
Closing against pressure



For use with all actuators

2-port valves pressure compensated

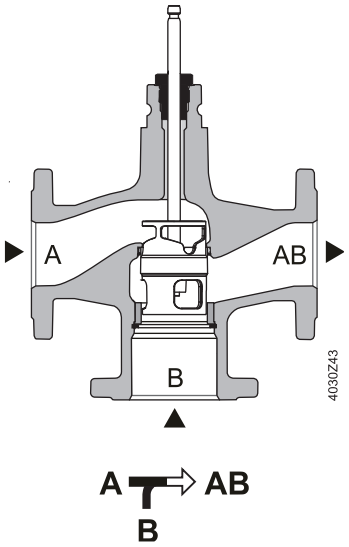
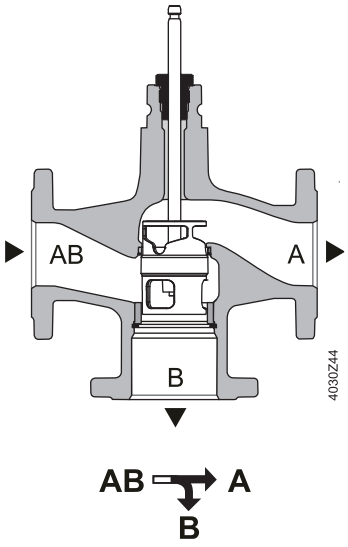
The VVF42..K valves use a pressure compensated plug. This enables the same type of actuators to be used for the control of volumetric flow at higher differential pressures.

Fluids
Closing against pressure
 For use with all actuators

Note

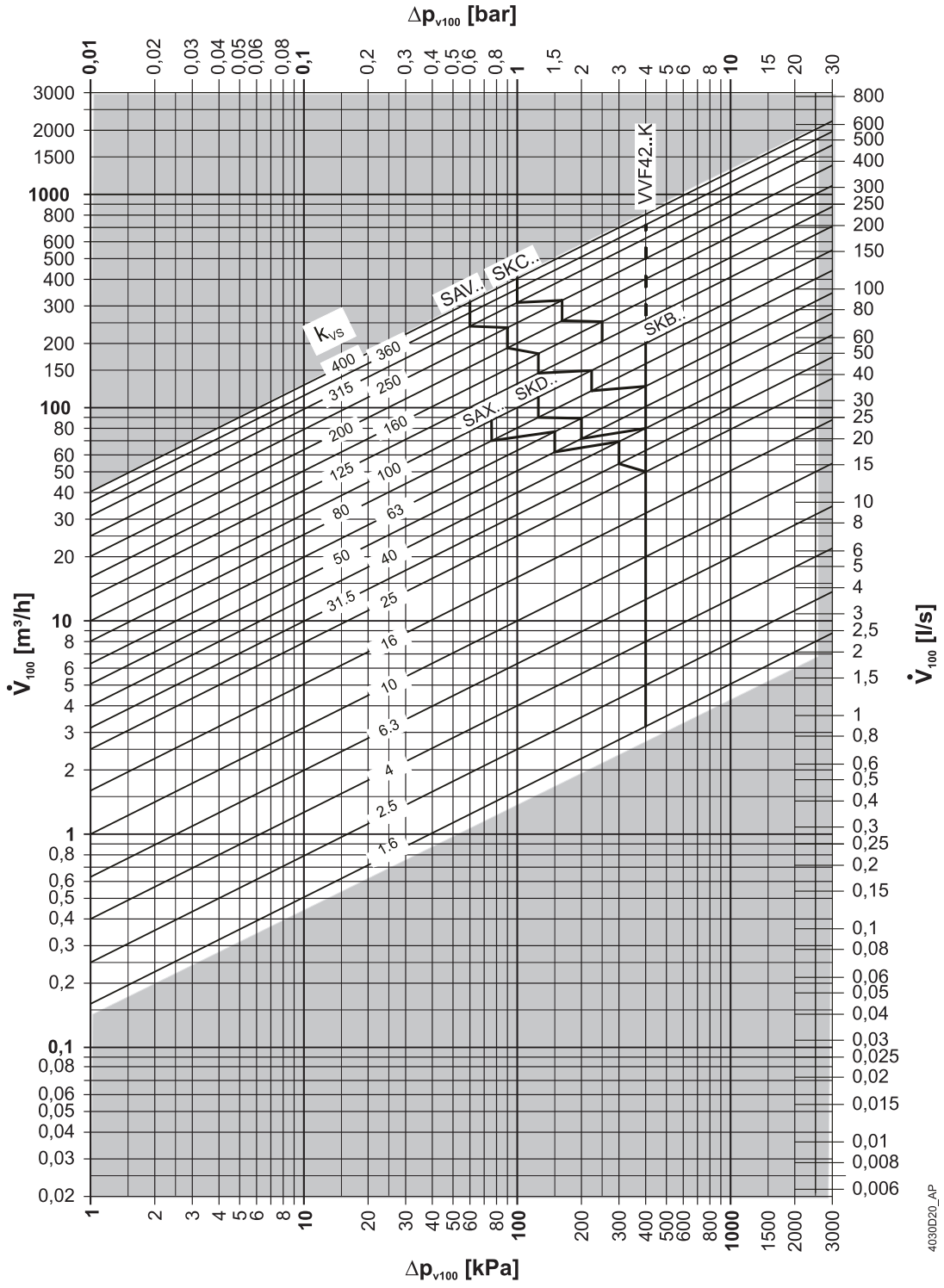
2-port valves do not become 3-port valves by removing the blank flange!

3-port valves

Fluids	
Mixing valve (preferred use)	Diverting valve
	

Sizing

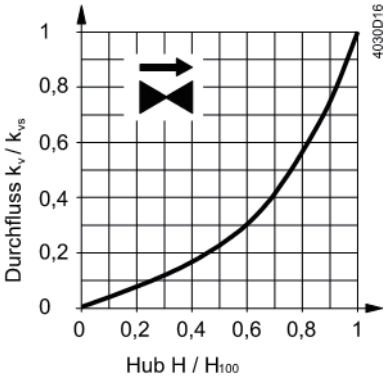
Flow chart



Δpmax values apply for the mixing function. Δpmax values for diverting function, see "Type summary", page 2 [▶ 2].

Valve characteristics

2 port valves

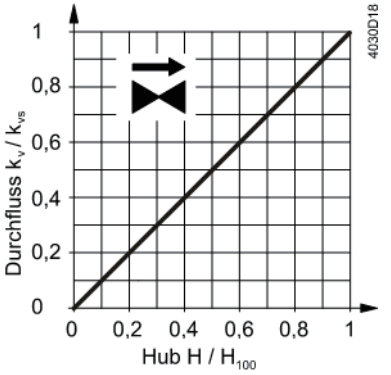


0…30 %: Linear

30…100 %: Equal percentage
n_{gl} = 3 to VDI / VDE 2173

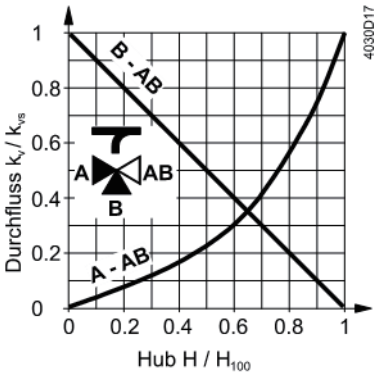
For high k_{vs} values the valve characteristic is optimized for maximum volumetric flow k_{V100}.

For product lines:
VVF42.125 250
VVF42.125 250K
VVF42.150 400
VVF42.150 360K



0…100 %: Linear

3 port valves



Throughport A-AB

0...30 %: Linear

30...100 %: Equal percentage
n_{gl} = 3 to VDI / VDE 2173

For high k_{vs} values the valve characteristic is optimized for maximum volumetric flow k_{V100}.

Bypass B-AB

0...100 %: Linear

Tor AB = constant flow

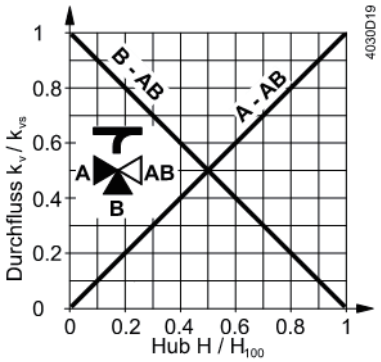
Tor A = variable flow

Tor B = bypass (variable flow)

Mixing: Flow from port a and port B to port AB

Diverting: Flow from port AB to port A and port B

For product lines:
VXF42.125-250
VXF42.150-400



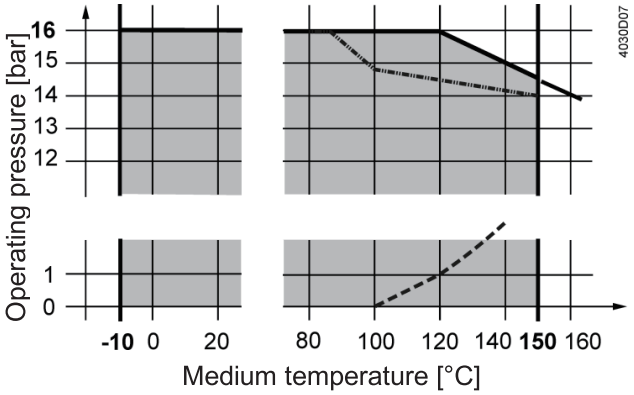
Throughport A-AB

0...100%: Linear

Bypass B-AB

0...100%: Linear

Operating pressure and medium temperature Fluids, PN16
with V..F42..



Curve for saturated steam; steam forms below this line

Operating pressure according to EN 1092-1, valid for 2-port valves with blank flange

Operating pressure and operating temperatures according to ISO 7005, EN 1092, and EN 12284

Notes

All relevant local directives must be observed.

Medium compatibility and temperature ranges

Medium	Temperature range		Type			Notes
	T_{min} [°C]	T_{max} [°C]	VVF42..	VVF42..K	VXF42..	
Cold water	1	25	x	x	x	-
Low-temp. hot water	1	130	x	x	x	-
High temp. hot water [1]	130	150	x	x	x	-
	150	180	-	-	-	-
Water with antifreeze	-5	150	x	x	x	For medium temperatures below 0 °C, the stem heating ASZ6.6 has to be installed.
	-10	150	x	-[3]	x	
	-20	150	-	-	-	
Cooling water [2]	1	25	-	-	-	-
Brines	-5	150	x	x	x	For medium temperatures below 0 °C, the stem heating ASZ6.6 has to be installed.
	-10	150	x	-[3]	x	
	-20	150	-	-	-	

Medium	Temperature range		Type			Notes
	T_{min} [°C]	T_{max} [°C]	VVF42..	VVF42..K	VXF42..	
Super-clean water (demineralized and deionized)	1	150	-	-	-	
Demineralized water according to VDI2035 / SWKI_BT102-01	1	150	x	x	x	

1) Differentiation due to saturated steam curve

2) Open circuits

3) VVF42..K valves cannot be used with media below -5 °C due to the compensation sealing material.

Fields of use

Fields of use		Type		
		VVF42..	VVF42..K	VXF42..
Generation	Boiler plants	x	x	x
	District heating plants	x	x	-
	Refrigeration plants	x	x	x
Distribution	Heating groups	x	x	x
	Ventilation and air-handling units	x	x	x

Notes

Engineering

Mounting location

Preferably mount the valves at the return, as the temperature is lower there and the strain on the stem sealing gland is lower.

Dirt trap

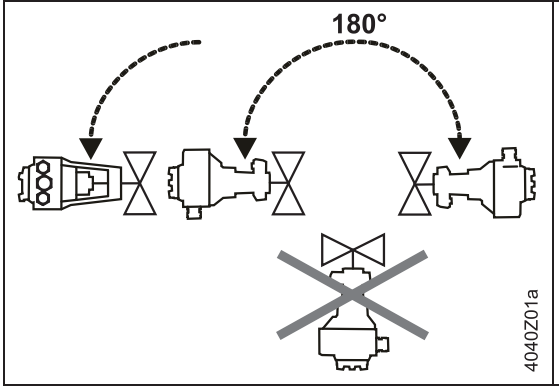
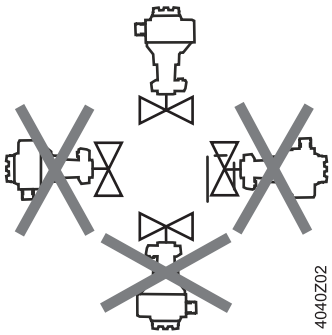
Mount a dirt filter or dirt trap before the valve to ensure the proper functioning and long service life of the valve. Remove dirt, welding beads, etc. from the valves and pipes.

Cavitation

Cavitation can be avoided by limiting the pressure differential across the valve depending on the medium temperature and prepressure.

Mounting

Mounting position

Indoors	Outdoors
	

Mounting positions apply to both 2- and 3-port valves.

Commissioning

The valve may be put into operation only if actuator and valve are correctly assembled.

Note

Ensure that the actuator stem and valve stem are rigidly connected in all positions.

Function check

Valve	Throughport A->AB	Bypass B->AB
Valve stem extends	Closes	Opens
Valve stem retracts	Opens	Closes

Maintenance

The valves are equipped with maintenance-free, continuously lubricated stem sealing glands. See Accessories / Spare parts [▶ 6] for replacement stem sealing glands.

⚠CAUTION	
!	**When servicing valves or actuators:** • Deactivate the pump and turn off the power supply. • Close the shutoff valves. • Fully reduce the pressure in the piping system and allow pipes to completely cool down. If necessary, disconnect the electrical wires.

Disposal

Do not dispose of the valve as part of domestic waste.

- Special treatment for individual components may be required by law or make ecological sense.
- Comply with all local and currently applicable laws and regulations.

Warranty

Application-related technical data are guaranteed only when the valves are used in connection with the Siemens actuators listed under "Type summary" and "Equipment combinations". When used with actuators of other manufacture, any warranty by Siemens becomes void.

Technical data

Functional data			
PN class			PN 16
Connection			Flange
Operating pressures			See section "Operating pressure and medium temperature", page 11
Valve characteristic [1]			See section "Valve characteristics", page 10
Leakage rate	Throughport		0…0.02% of k_{vs} value
	Bypass		0.5…2% of k_{vs} value (k_{vs} ≥6.3) 0.5…3% of k_{vs} value (k_{vs} 1.6; 2.5; 4)
Permissible media			See table "Medium compatibility and temperature ranges", page 11
Medium temperatures			-10…150 °C
	VVF42..K		-5…150 °C
Rangeability	To DN 25		> 50
	From DN 32		>100
Nominal stroke	To DN 80		20 mm
	From DN 100		40 mm

Materials			
Valve body			EN-GJL-250
Blank flange	VVF..		S235JRG2
Valve stem			Stainless steel
Seat			Machined
Plug	VVF.., VXF..		Brass / bronze
	VVF..K..:	DN65, DN80	Brass / bronze
		DN50, DN100…150	Stainless steel
Stem sealing gland			Brass EPDM O-rings PTFE sleeve silicone-free grease
Compensation sealing			Stainless steel FEPM (silicone-free)

Standards, directives and approvals		
Pressure Equipment Directive		PED 2014/68/EU
Pressure-carrying accessories		Scope: Article 1, section 1 Definition: Article 2, section 5
Fluid group 2:		PN 16
	≤ DN 50	Without CE certification as per article 4, section 3 (sound engineering practice) [2]
	DN 65…125	Category I, Module A, with CE-marking as per article 14, section 2

Standards, directives and approvals		
	DN 150	Category II, Module A2, with CE-marking as per article 14, section 2 notified body number 0036
EU conformity (CE)	DN 65…150	A5W00006523 [3]
PN class		ISO 7268
Operating pressure		ISO 7005, DIN EN 12284
Flanges		ISO 7005
Length of flanged valves		DIN EN 558-1, line 1
Valve characteristic		VDI 2173
Leakage rate		Throughport, bypass according to EN 60534-4 / EN 1349
Water treatment		VDI 2035

Environmental conditions		
Storage		IEC 60721-3-1
	Class	1K3
	Temperature	-15…55 °C
	Rel. humidity	5…95 % r.h.
Transport		IEC 60721-3-2
	Class	2K3, 2M2
	Temperature	-30…65 °C
	Rel. humidity	< 95 % r.h.
Operation		IEC 60721-3-3
	Class	3K5, 3Z11
	Temperature	-15…+5 °C
	Rel. humidity	5…95 % r.h.

Environmental compatibility
The product environmental declarations CE1E4403en01 [3], CE1E4403en02 [3] und CE1E4403en03 [3] contain data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).

Dimensions / Weight
See "Dimensions", [▶ 17]

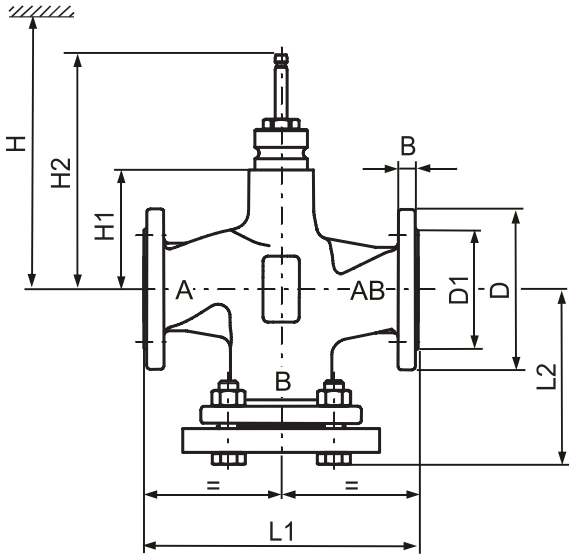
1) For certain valve lines and high k_{vs} values, the valve characteristic is optimized for maximum volumetric flow k_{V100}.

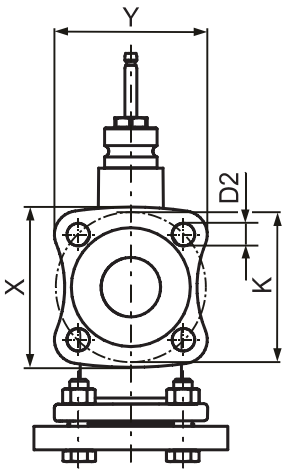
2) Valves where PS x DN < 1000 do not require special testing and cannot carry the CE label.

3) The documents can be downloaded from http://www.siemens.com/bt/download.

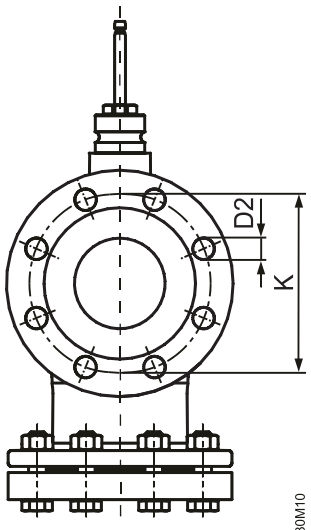
Dimensions

VVF42..
VVF42..K





DN 15..DN 65

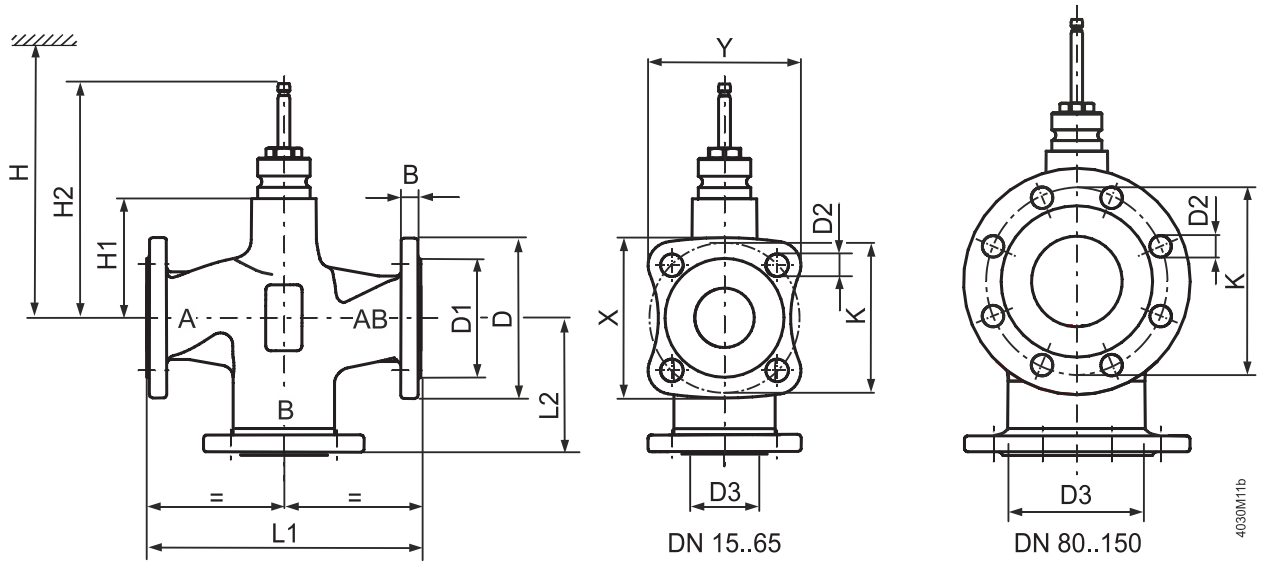


DN 80..DN 150

4030M10

Type	DN	kg	B	Ø D	Ø D1	Ø D2	L1	L2	X	Y	Ø K	H1	H2	H				
														SAX..	SKD..	SKB..	SAV..	SKC..
VVF42..	15	3.7	14	95	46	14 (4x)	130	86	79	76	65	37	133,5	479	537	612	-	-
	20	4.7	16	105	56	14 (4x)	150	97	86.6	83	75	37	133.5	479	537	612	-	-
	25	5.4	15	115	65	14 (4x)	160	106.5	94.4	90.1	85	37	133.5	479	537	612	-	-
	32	8.4	17	140	76	19 (4x)	180	119	115.6	110.7	100	37	133.5	479	537	612	-	-
	40	9.3	16	150	84	19 (4x)	200	126	123.2	117.8	110	37	133.5	479	537	612	502	-
	50	12.2	16	165	99	19 (4x)	230	144	135.2	128.4	125	50	146.5	492	550	625	525	-
	65	17	17	185	118	19 (4x)	290	174	150	142.5	145	75	171.5	517	575	650	540	-
	80	25	17	200	132	19 (8x)	310	186	-	-	160	75	171.5	517	575	650	540	-
	100	35.9	17	220	156	19 (8x)	350	205	-	-	180	110	226.5	-	-	-	575	685
	125	52.5	17	250	184	19 (8x)	400	233	-	-	210	123	239.5	-	-	-	588	698
	150	74.9	17	284	211	23 (8x)	480	275.5	-	-	240	150.5	267	-	-	-	616	726
VVF42..K	50	12	16	165	99	19 (4x)	230	144	135.2	128.4	125	50	146.5	492	550	625	-	-
	65	17.7	17	185	118	19 (4x)	290	174	150	142.5	145	75	171.5	517	575	650	-	-
	80	26.8	17	200	132	19 (8x)	310	186	-	-	160	75	171.5	517	575	650	-	-
	100	35.3	17	220	156	19 (8x)	350	206	-	-	180	110	226.5	-	-	-	575	685
	125	51.6	17	250	184	19 (8x)	400	233	-	-	210	123 - 159	239.5 - 275.5	-	-	-	588 - 624	698 - 734
	150	74.8	17	284	211	23 (8x)	480	275.5	-	-	240	150.5 - 186.5	267 - 303	-	-	-	616 - 652	726 - 762

VXF42..



Type	DN	kg	B	Ø D	Ø D1	Ø D2	Ø D3 [1]	L1	L2	X	Y	Ø K	H1	H2	H				
															SAX..	SKD..	SKB..	SAV..	SKC..
VXF42..	15	2.6	14	95	46	14 (4x)	23	130	65	79	76	65	37	133.5	479	537	612	-	-
	20	3.3	16	105	56	14 (4x)	29	150	75	86.6	83	75	37	133.5	479	537	612	-	-
	25	3.8	15	115	65	14 (4x)	36	160	80	94.4	90.1	85	37	133.5	479	537	612	-	-
	32	5.7	17	140	76	19 (4x)	46	180	90	115.6	110.7	100	37	133.5	479	537	612	-	-
	40	6.3	16	150	84	19 (4x)	56	200	100	123.2	117.8	110	37	133.5	479	537	612	502	-
	50	8.7	16	165	99	19 (4x)	69	230	115	135.2	128.4	125	50	146.5	492	550	625	525	-
	65	12.9	17	185	118	19 (4x)	85	290	150	150	142.5	145	75	171.5	517	575	650	540	-
	80	19.2	17	200	132	19 (8x)	102	310	155	-	-	160	75	171.5	517	575	650	540	-
	100	29	17	220	156	19 (8x)	124	350	175	-	-	180	110	226.5	-	-	-	575	685
	125	43.2	17	250	184	19 (8x)	149	400	200	-	-	210	123 - 159	239.5 - 275.5	-	-	-	588 - 624	698 - 734
	150	62.1	17	284	211	23 (8x)	174	480	240	-	-	240	150.5 - 186.5	267 - 303	-	-	-	616 - 652	726 - 762

[1] Interior opening of the bypass port

Revision numbers

Type	Valid from rev. no.	Type	Valid from rev. no.
VVF42.15-1.6	..A	**VXF42.15-1.6**	..A
VVF42.15-2,5	..A	**VXF42.15-2.5**	..A
VVF42.15-4	..A	**VXF42.15-4**	..A
VVF42.20-6.3	..A	**VXF42.20-6.3**	..A
VVF42.25-6.3	..A	**VXF42.25-6.3**	..A
VVF42.25-10	..A	**VXF42.25-10**	..A
VVF42.32-16	..A	**VXF42.32-16**	..A
VVF42.40-16	..A	**VXF42.40-16**	..A
VVF42.40-25	..A	**VXF42.40-25**	..A
VVF42.50-31.5	..A	**VXF42.50-31.5**	..A
VVF42.50-40	..A	**VXF42.50-40**	..A
VVF42.65-50	..A	**VXF42.65-50**	..A
VVF42.65-63	..A	**VXF42.65-63**	..A
VVF42.80-80	..A	**VXF42.80-80**	..A
VVF42.80-100	..A	**VXF42.80-100**	..A
VVF42.100-125	..D	**VXF42.100-125**	..D
VVF42.100-160	..D	**VXF42.100-160**	..D
VVF42.125-200	..D	**VXF42.125-200**	..D
VVF42.125-250	..D	**VXF42.125-250**	..D
VVF42.150-300	..D	**VXF42.150-300**	..D
VVF42.150-400	..D	**VXF42.150-400**	..D
VVF42.50-40K	..B		
VVF42.65-63K	..A		
VVF42.80-100K	..A		
VVF42.100-160K	..B		
VVF42.125-250K	..B		
VVF42.150-360K	..B		

VVF43..
VVF43..K

VXF43..

ACVATIX™

2- and 3-port valves with flanged connections, PN 16

VVF43..
VXF43..

From the large-stroke valve line

- **High-performance valves for medium temperatures from -20…220 °C**
- **Valve body of nodular cast iron EN-GJS-400-18-LT or higher**
- **DN 65…250**
- **k_{vs} 50…630 m^3/h**
- **Flange type 21, flange design B**
- **VVF43..K with pressure compensation to handle high differential pressure**
- **Equipable with electro-motoric actuators SAV.. or electro-hydraulic actuators SKC..**

Use

In boiler, district heating and refrigeration plants, cooling towers, heating groups, and in air handling units as control or shutoff valves.
For use in closed or open hydraulic circuits (observe cavitation).

Type summary

	Valves PN 16	Actuators				SAV.. [3]		SKC..	
		Stroke				40 mm			
		Positioning force				1600 N		2800 N	
		Data sheet				N4503		N4566	
		Stock number	DN	k_{vs} [m^3/h]	S_V	Δp_s [kPa]	Δp_{max} [kPa]	Δp_s [kPa]	Δp_{max} [kPa]
Fluids Preferred flow direction A – AB with fluids for low noise operation and high kvs-values with all actuator types	**VVF43.65-50**	S55206-V100	65	50	> 100	450	400	700	650
	VVF43.65-63	S55206-V101	65	63					
	VVF43.80-80	S55206-V102	80	80		250	225	450	400
	VVF43.80-100	S55206-V103	80	100					
	VVF43.100-125	S55206-V104	100	125		160	125	300	250
	VVF43.100-160	S55206-V105	100	160					
	VVF43.125-200	S55206-V106	125	200		125	90	175	160
	VVF43.125-250	S55206-V107	125	250					
	VVF43.150-315	S55206-V108	150	315		80	60	125	100
	VVF43.150-400	S55206-V109	150	400					
Steam [1] Exclusive flow direction AB – A for steam. Also useful for maximum close-off pressure Δp_S and maximum differential pressure in operation (Δp_{max}) with fluids. Use with electro-hydraulic actuators only	**VVF43.65-50**	S55206-V100	65	50	> 100	-	-	1600	800
	VVF43.65-63	S55206-V101	65	63					
	VVF43.80-80	S55206-V102	80	80					750
	VVF43.80-100	S55206-V103	80	100					
	VVF43.100-125	S55206-V104	100	125					500
	VVF43.100-160 [2]	S55206-V105	100	150					
	VVF43.125-200	S55206-V106	125	200					300
	VVF43.125-250 [2]	S55206-V107	125	220					
	VVF43.150-315 [2]	S55206-V108	150	280					200
	VVF43.150-400 [2]	S55206-V109	150	360					
Fluids and Steam Compensated valves above DN 65 are optimized for a single flow direction for fluids and steam DN 65..150: AB – A DN 200/250: A – AB	**VVF43.65-63K**	S55206-V110	65	63	> 100	-	-	1600	800
	VVF43.80-100K	S55206-V111	80	100					
	VVF43.100-150K	S55206-V120	100	150					
	VVF43.125-220K	S55206-V121	125	220					
	VVF43.150-315K	S55206-V122	150	315					
	VVF43.200-450K	S55206-V123	200	450	>50			1200	
	VVF43.250-630K	S55206-V124	250	630				1000	

			DN	k_{vs} [m^3/h]	S_V	Δp_{max} [kPa] A⇨AB	Δp_{max} [kPa] AB⇨A	Δp_{max} [kPa] A⇨AB	Δp_{max} [kPa] AB⇨A
		Stock number							
Fluids	**VXF43.65-50**	S55206-V125	65	50	> 100	400	100	650	200
	VXF43.65-63	S55206-V115	65	63					
	VXF43.80-80	S55206-V126	80	80		225	50	400	
	VXF43.80-100	S55206-V116	80	100					
	VXF43.100-125	S55206-V127	100	125		125		250	150
	VXF43.100-160	S55206-V117	100	160					
	VXF43.125-200	S55206-V128	125	200		90		160	100
	VXF43.125-250	S55206-V118	125	250					
	VXF43.150-315	S55206-V129	150	315		60		100	70
	VXF43.150-400	S55206-V119	150	400					

[1] Operate with opposite flow direction with steam
[2] Reduced k_{vs} value
[3] Usable up to a max. medium temperature of 130 °C

DN = Nominal size
k_{vs} = Flow nominal value of cold water (5...30 °C) through the fully opened valve (H_{100}) at a differential pressure of 100 kPa (1 bar)
S_v = Rangeability
Δp_s = Maximum permissible differential pressure at which the motorized valve still closes securely against the pressure
Δp_{max} = Maximum permissible differential pressure across the valve's throughport for the entire positioning range of the motorized valve

Note

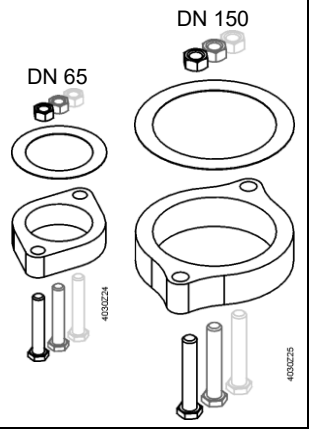
When using a stem heating element with a medium temperature of below –5 °C, the stem sealing gland must be replaced. In this case, the sealing gland must be ordered separately.

DN	Stock number
DN 65…150	4 679 5629 0

Spare parts, Rev.-Nr. See page 16

Accessories

Product number	Stock number	Description	Note	Example
ASZ6.6	S55845-Z108	Stem heating element	Required for medium temperatures < 0 °C	
-	4 679 5629 0	Stem sealing gland	When using valves of the V..F43.. lines DN 65…150 with a stem heating element and a medium temperature below -5 °C, the stem sealing gland must be replaced. With the gland 467956290 the valve can be used with water, water with antifreeze and brines between -20 °C and 150 °C.	

Adapter-type	Stock number	Bolts included	Description	VXF41..	Example
ALF41B65	S55845-Z114	4x M16x90mm	Adapter for replacing 3-port valves VXF41.. by VXF43.. • Due to different dimensions of the bypass flange • Every valve to be replaced requires an adapter • Adapter is supplied with the required number and size of bolts and nuts as well as two suitable flat sealings Replace 3-port valves VXF41.., DN 15…50 by 3-port valves VXF53.. (data sheet N4405).	DN 65	
ALF41B80	S55845-Z115	8x M16x110mm		DN 80	
ALF41B100	S55845-Z116	8x M16x110mm		DN 100	
ALF41B125	S55845-Z117	8x M16x110mm		DN 125	
ALF41B150	S55845-Z118	8x M20x110mm		DN 150	

Equipment combinations

Product number	Description	Stroke	Positioning force	Operating voltage	Positioning signal	Spring return time	Positioning time	LED	Manual adjuster	Auxiliary functions
SAV31.00	S55150-A112	40 mm	1600 N	AC 230 V	3-position	-	120 s	-	Press and fix	[1], [2], [5]
SAV61.00 **SAV61.00U**	S55150-A110 S55150-A110-A100			AC/DC 24 V	DC 0...10 V DC 4...24 mA 0...1000 Ω			✓		[1], [3], [5], [6]
SAV81.00 **SAV81.00U**	S55150-A111 S55150-A111-A100				3-position			-		[1], [2], [5]
SKC32.60	SKC32.60	40 mm	2800 N	AC 230 V	3-position	-	120 s	-	Turn, Position is maintained	[1], [2], [5]
SKC32.61	SKC32.61					18 s				
SKC60	SKC60			AC 24 V	0…10 V 4…20 mA 0…1000 Ω	-	Opening: 120 s Closing: 20 s	✓		[1], [3], [5]
SKC62 **SKC62U**	SKC62 SKC62U					20 s				
SKC62UA	SKC62UA									[1], [4], [5]
SKC82.60 **SKC82.60U**	SKC82.60 SKC82.60U				3-position	-	120 s	-		[1], [2], [5]
SKC82.61 **SKC82.61U**	SKC82.61 SKC82.61U					18 s				

[1] Auxiliary switch (optional)
[2] Potentiometer (optional)
[3] Position feedback, forced control, selection of valve characteristic
[4] Direction of operation, stroke limit control, sequence control, signal addition (optional)
[5] Stem heating element (optional)
[6] Function module (optional)

Ordering

Example

Product number	Stock number	Description
VXF43.65-63	S55206-V115	3-port valve with flange, PN 16
SKC32.60	SKC32.60	Electro-hydraulic actuator

Delivery — Valves, actuators and accessories are packed and delivered as separate items.

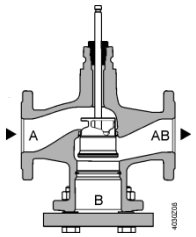
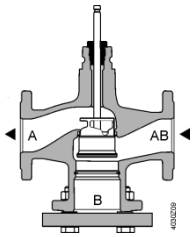
Note — Counter-flanges, bolts and gaskets must be provided on site.

Product documentation

• Mounting Instructions	M4030 74 319 0749 0	DN 65…150
	A6V10774961 A5W90000815	DN 200, DN 250
• Basic documentation	P4030	Contains background information and technical basic knowledge of valves

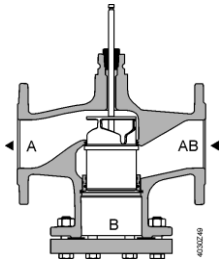
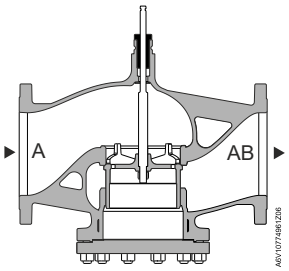
The illustrations below show the basic design of the valves. Constructional features, such as the shape of plugs, may differ.

2-port valves

Fluids	Steam (Fluids possible)
Closing against the pressure	Closing with the pressure
	
A → AB For use with all actuators	**A ← AB** Use with electro-hydraulic actuators only

2-port valves pressure compensated

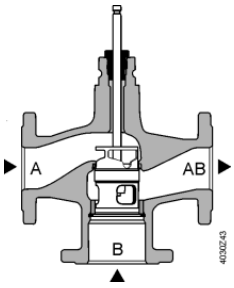
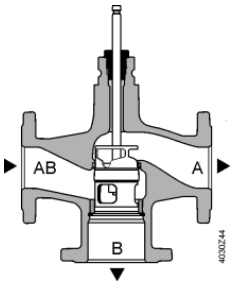
The VVF43..K valves use a pressure-compensated plug. This enables the same type of actuators to be used for the control of volumetric flow at higher differential pressures.

DN 65…150 Fluids and Steam	DN 200, DN 250 Fluids and Steam
Closing with the pressure	Closing against the pressure
	
A ← AB Use with electro-hydraulic actuators only	**A → AB** Use with electro-hydraulic actuators only

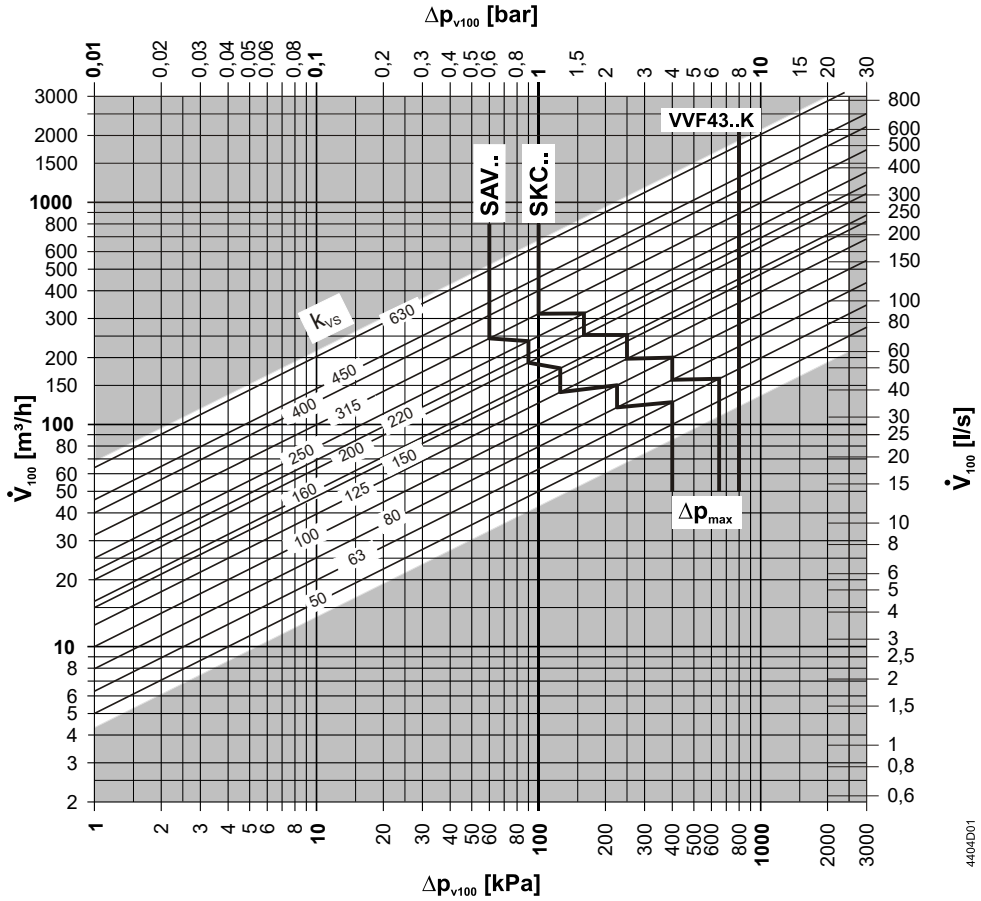
Note

2-port valves do not become 3-port valves by removing the blank flange!

3-port valves

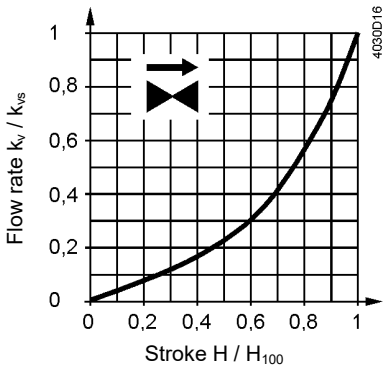
Fluids	
Mixing valve (preferred use)	Diverting valve
	
A → AB **B**	**AB → A** **B**

Flow chart



Δp$_{max}$ values apply for the mixing function. Δp$_{max}$ values for the diverting function see table „Type summary“, page 2

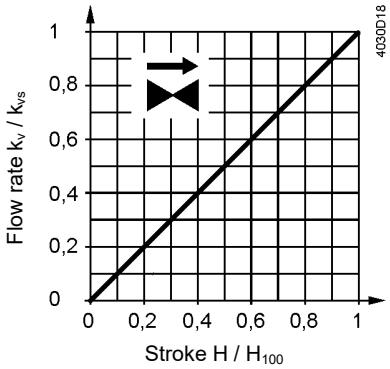
Valve characteristics
2-port valves



0…30 %: Linear
30…100 %: Equal percentage
n_{gl} = 3 to VDI / VDE 2173

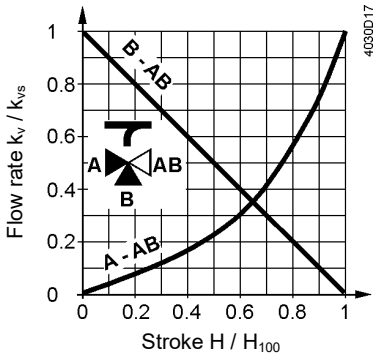
For high k_{VS} values the valve characteristic is optimized for maximum volumetric flow k_{V100}.

For product lines:
VVF43.125-200
VVF43.125-250
VVF43.125-220K
VVF43.150-315
VVF43.150-400
VVF43.150-315K
VVF43.200-450K
VVF43.250-630K



0…100 %: Linear

3-port valves



Throughport A-AB
0...30 %: Linear
30...100 %: Equal percentage
n_{gl} = 3 to VDI / VDE 2173

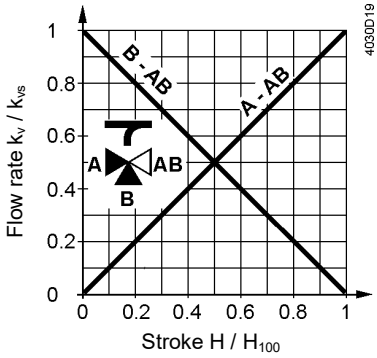
For high k_{VS} values the valve characteristic is optimized for maximum volumetric flow k_{V100}.

Bypass B-AB
0...100 %: Linear

Port AB = constant flow
Port A = variable flow
Port B = bypass (variable flow)

Mixing: Flow from port A and port B to port AB
Diverting: Flow from port AB to port A and port B

For product lines:
VXF43.125-250
VXF43.150-400

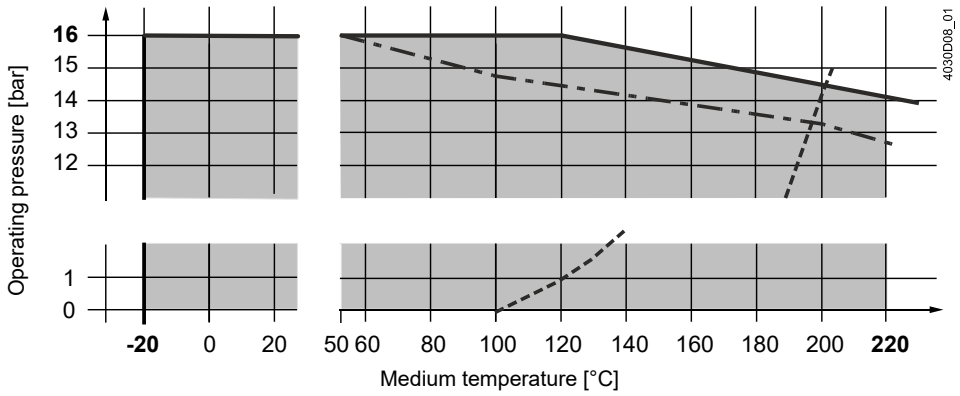


Throughport A-AB
0...100 %: Linear

Bypass B-AB
0...100 %: Linear

Operating pressure and medium temperature

Fluids
with V..F43..



--- Curve for saturated steam; steam forms below this line

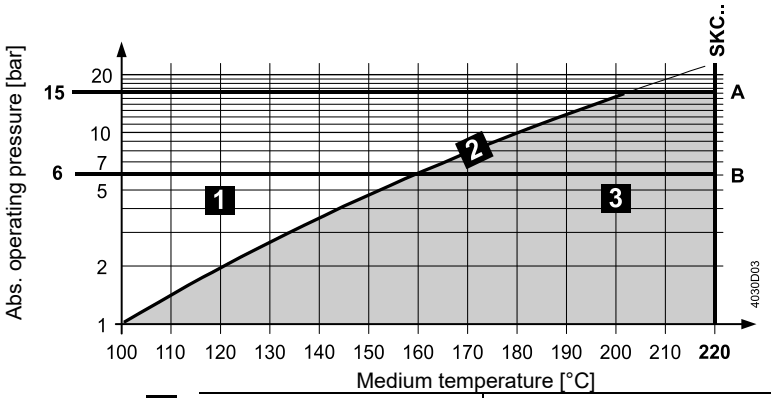
—·· Operating pressure according to EN 1092-1, valid for 2-port valves with blank flange

Operating pressure and operating temperatures according to ISO 7005, EN 1092 and EN 12284

Notes

All relevant local directives must be observed

Saturated steam
Superheated steam
with VVF43..



1	Water	-
2	Wet steam	To be avoided
3	Saturated steam Superheated steam	Permissible operating range
A	Subcritical pressure ratio	
B	Supercritical pressure ratio	

Medium compatibility and temperature ranges

Medium	Temperature range T_{min} [°C]	Temperature range T_{max} [°C]	Valve VVF43..	Valve VVF43..K	Valve VXF43..	Note
Cold water	1	25	■	■	■	-
Low-temperature hot water	1	130	■	■	■	-
High-temperature hot water [1]	130	150	■	■	■	-
	150	180	■	■	■	-
Water with antifreeze	-5	150	■	■	■	V..F43: With a medium temperature of below –5 °C, the stem sealing gland must be replaced by DN 65…150: 467956290
	-10	150	■	-[3]	■	
	-20	150	■	-[3]	■	
Cooling water [2]	1	25	■	■	■	-
Brines	-5	150	■	■	■	V..F43: With a medium temperature of below –5 °C, the stem sealing gland must be replaced by DN 65…150: 467956290
	-10	150	■	-[3]	■	
	-20	150	■	-[3]	■	
Saturated steam	100	150	■	■	-	-
	150	200	■	■	-	-
Superheated steam	120	150	■	■	-	-
	150	220	■	■	-	-
Heat transfer oils	20	220	■	■	■	On the basis of mineral oil
Super-clean water (demineralized and deionized water)	1	150	-	-	-	

[1] Differentiation due to saturated steam curve
[2] Open circuits
[3] VVF43..K can't be used with media below -5 °C due to the compensation sealing material

Fields of use

Fields of use		valves VVF43..	valves VXF43..
Generation	Boiler plants	■	■
	District heating plants	■	-
	Refrigeration plants	■	■
	Cooling towers [1]	■	■
Distribution	Heating groups	■	■
	Air handling units	■	■

[1] Open circuits

Engineering notes

Mounting location

Preferably mount the valves at the return, as the temperature is lower there and the strain on the stem sealing gland is lower.

Dirt trap

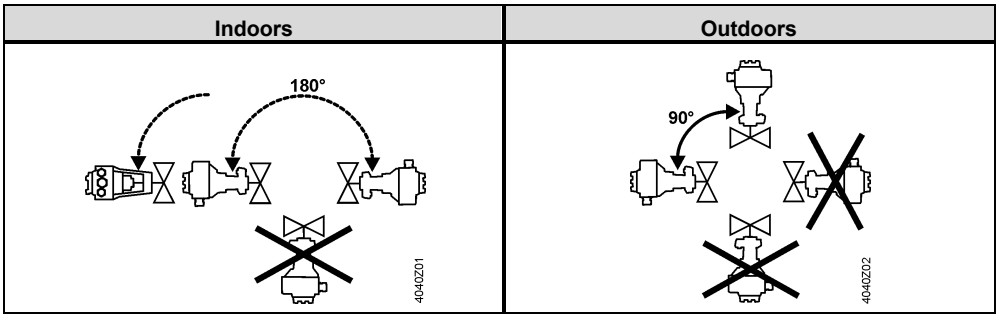
Mount a dirt filter or dirt trap before the valve to ensure proper functioning, and a long service life of the valve. Remove dirt, welding beads, etc. from the valves and pipes.

Cavitation

Cavitation can be avoided by limiting the pressure differential across the valve depending on the medium temperature and the prepressure.

Mounting notes

Mounting position



Mounting positions apply to both 2- and 3-port valves.

Commissioning notes

⚠ **The valve may be put into operation only if actuator and valve are correctly assembled.**

Note

Ensure that actuator stem and valve stem are rigidly connected in all positions.

Function check

Valve	Throughport A→AB or AB→A	Bypass B→AB
Valve stem extends	Closes	Opens
Valve stem retracts	Opens	Closes

Maintenance notes

The valves are maintenance-free.

⚠ When servicing valves or actuators:

- Deactivate the pump and turn off the power supply
- Close the shutoff valves
- Fully reduce the pressure in the piping system and allow pipes to completely cool down

If necessary, disconnect the electrical wires.

Disposal

Do not dispose of the device as unsorted municipal waste.

- Special handling of individual components may be mandated by law or make ecological sense.
- Observe all local and currently applicable laws and regulations.

Warranty

Application-related technical data are guaranteed only when the valves are used in connection with the Siemens actuators listed under ”Equipment combinations”, page 3.
When used with actuators of other manufacture, any warranty by Siemens becomes void.

Technical Data

Functional data	PN class		PN 16
	Connection		Flange
	Operating pressure		See Section "Operating pressure and medium temperature", page 8
	Valve characteristics [1]		See section "Valve characteristics", page 7
	Leakage rate	Throughport	DN 65…150: 0…0.01 % of k_{vs} value (Class IV) DN 200, DN 250: 0…0.02 % of k_{vs} value
		Bypass	0.5…2% of k_{vs} value with SKC.. 0.05% of k_{vs} value with SAV..
	Permissible media		See table "Medium compatibility and temperature ranges", page 9
	Medium temperature		-20…220 °C [2] VVF43..K: -5…220 °C
	Rangeability		DN 65…150: >100 DN 200, DN 250: >50
	Nominal stroke		40 mm
Materials	Valve body		DN 65…150: EN-GJS-400-18-LT DN 200, DN 250: ASTM A216WCB (GP240GH)
	Blank flange		DN 65…150: P265GH DN 200, DN 250: CK25
	Valve stem, seat, plug		Stainless steel
	Stem sealing gland		Stainless steel DN 65…150: FEPM (silicone-free) DN 200, DN 250: PTFE (not silicone-free)
	Compensation sealing		Stainless steel DN 65…150: FEPM (silicone-free) DN 200, DN 250: PTFE+carbon (not silicone-free)
	Adapter ALF41B..		Steel S235JRG2
Norms and standards	Pressure Equipment Directive		PED 2014/68/EU
	Pressure Accessories		Scope: Article 1, section 1 Definition: Article 2, section 5
	Fluid group 2:		
		DN 65…125	Category I, Module A, with CE-marking as per article 14, section 2
		DN 150	Category II, Module A2, with CE-marking, as per article 14, section 2 notified body number 0036
		DN 200, DN 250	Category II, Module A2, with CE-marking, as per article 14, section 2 notified body number 0035
	EU Conformity (CE):		
		DN 65…150	A5W00006523 [3]
		DN 200, DN 250	A5W90001026 [3]
	PN class		ISO 7268
	Operating pressure		ISO 7005, DIN EN 12284
	Flanges		ISO 7005
	Length of flanged valves		DIN EN 558-1, line 1
	Valve characteristic		VDI 2173
	Leakage rate		Throughport, bypass according to EN 60534-4 / EN 1349
	Water treatment		VDI 2035

Environmental conditions	Storage: IEC 60721-3-1	Class	1K3
		Temperature	-15…55 °C
		Rel. humidity	5…95% r.h.
	Transport: IEC 60721-3-2	Class	2K3, 2M2
		Temperature	-30…65 °C
		Rel. humidity	< 95% r.h.
	Operation: IEC 60721-3-3	Class	3K5, 3Z11
		Temperature	-15…55 °C
		Rel. humidity	5…95% r.h.
Environmental compatibility	The product environmental declaration CE1E4404en01 [3], CE1E4404en02 [3] and A5W90001031 [3] contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).		
Dimensions / Weight	Dimensions	See “Dimensions“, page 13 + 14	
	Weight	See “Dimensions“, page 13 + 14	

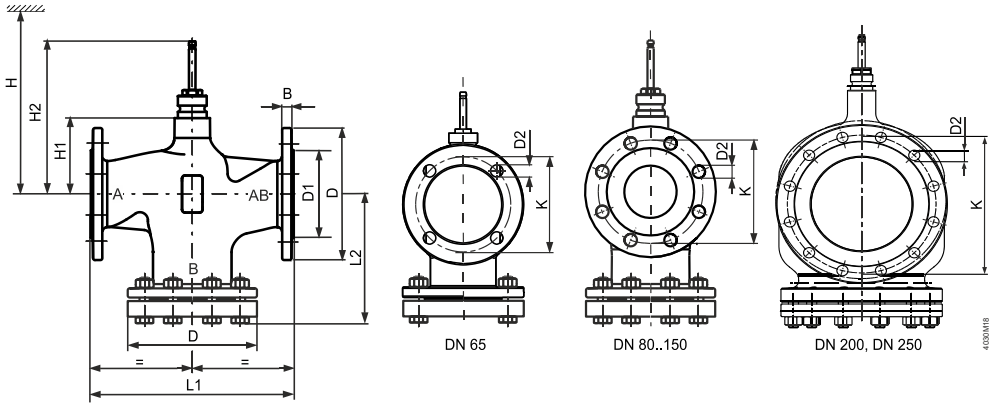
[1] For certain valve lines and high k_{vs} values, the valve characteristic is optimized for maximum volumetric flow k_{V100}

[2] For medium temperatures < -5 °C, the stem sealing gland must be replaced. The sealing gland must be ordered separately (Stock number: 4 679 5629 0).

[3] The documents can be downloaded from http://www.siemens.com/bt/download.

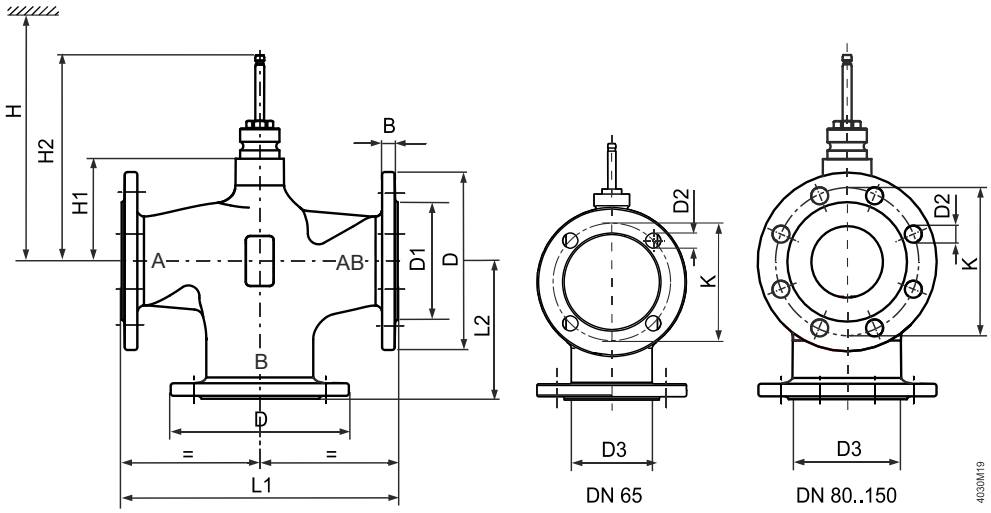
Dimensions

VVF43..



Product number	DN	kg	B	Ø D	Ø D1	Ø D2	L1	L2	Ø K	H1	H2	H	
												SAV..	SKC..
VVF43..	65	21.5	17	185	118	19 (4x)	290	178	145	115	231.5	580	690
	80	27.5	17	200	132	19 (8x)	310	190	160	115	231.5	580	690
	100	33.8	17	220	156	19 (8x)	350	206	180	146	262.5	611	721
	125	45.8	17	250	184	19 (8x)	400	233	210	159	275.5	624	734
	150	67.9	17	284	211	23 (8x)	480	275.5	240	186.5	303	652	762
VVF43..K	65	21.5	17	185	118	19 (4x)	290	178	145	115	231.5	-	690
	80	27.6	17	200	132	19 (8x)	310	190	160	115	231.5	-	690
	100	34.1	17	220	156	19 (8x)	350	206	180	146	262.5	-	721
	125	46.7	17	250	184	19 (8x)	400	233	210	159	275.5	-	734
	150	68.7	17	284	211	23 (8x)	480	275.5	240	186.5	303	-	762
	200	130	30	340	266	22 (12x)	600	265	295	243	359.5	-	818
	250	196	32	405	319	26 (12x)	730	290	355	275	391.5	-	850

VXF43..



Product number	DN	kg	B	Ø D	Ø D1	Ø D2	Ø D3 [1]	L1	L2	Ø K	H1	H2	H	
													SAV..	SKC..
VXF43..	65	16.5	17	185	118	19 (4x)	86	290	145	145	115	231.5	580	690
	80	20.7	17	200	132	19 (8x)	100	310	155	160	115	231.5	580	690
	100	26.9	17	220	156	19 (8x)	123	350	175	180	146	262.5	611	721
	125	36.4	17	250	184	19 (8x)	149	400	200	210	159	275.5	624	734
	150	54.9	17	284	211	23 (8x)	174	480	240	240	186.5	303	652	762

[1] Interior opening of the bypass port

Spare parts

Stem sealing gland

Product number	DN	Stock number	Comments
VVF43.. VXF43.. VVF43..K	DN 65…150 Series A, B and C	74 284 0061 0	Standard version with FEPM-O-ring for medium temperatures between -5 °C and 220 °C
VVF43.. VXF43.. VVF43..K	DN 65…150 As from series D	S55846-Z114	Standard version with FEPM-O-ring for medium temperatures between -5 °C and 220 °C.
VVF43.. K	DN 200, DN 250	4 679 5630 0	Standard version with PTFE sleeve for medium temperatures between -5 °C and 220 °C.
VVF43.., VXF43.., VVF43..K	DN 65…150 As from series D	4 679 5629 0	When operating with medium temperatures below -5 °C . With the gland 467956290 the valve can be used with water, water with antifreeze and brines between -20 °C and 150 °C. 
VXF43..	DN 65…150 series A, B and C	74 284 0061 0	Standard version with PTFE sleeve for medium temperatures between -5 °C and 220 °C.
VXF43..	DN 65…150 As from series D	S55846-Z114	Standard version with PTFE sleeve for medium temperatures between -5 °C and 220 °C.
VVF43.. VVF43..K	DN 200, DN 250	4 679 5630 0	Standard version with PTFE sleeve for medium temperatures between -5 °C and 220 °C.

Revision numbers

Product number	Valid from rev. no.	Product number	Valid from rev. no.
VVF43.65-50	..D	**VXF43.65-50**	..D
VVF43.65-63	..D	**VXF43.65-63**	..D
VVF43.80-80	..D	**VXF43.80-80**	..D
VVF43.80-100	..D	**VXF43.80-100**	..D
VVF43.100-125	..D	**VXF43.100-125**	..D
VVF43.100-160	..D	**VXF43.100-160**	..D
VVF43.125-200	..D	**VXF43.125-200**	..D
VVF43.125-250	..D	**VXF43.125-250**	..D
VVF43.150-315	..D	**VXF43.150-315**	..D
VVF43.150-400	..D	**VXF43.150-400**	..D
VVF43.65-63K	..D		
VVF43.80-100K	..D		
VVF43.100-150K	..D		
VVF43.125-220K	..D		
VVF43.150-315K	..D		
VVF43.200-450K	..A		
VVF43.250-630K	..A		

SIEMENS

VVF53..
VVF53..K

VXF53..

ACVATIX™

2- and 3-port valves with flanged connections, PN 25

VVF53..
VXF53..

From the large-stroke valve line

- **High-performance valves for medium temperatures from -20…220 °C**
- **Valve body of nodular cast iron EN-GJS-400-18-LT or higher**
- **DN 15…250**
- **k_{vs} 0.16…630 m^3/h**
- **Flange type 21, flange design B**
- **VVF53..K with pressure compensation to handle high differential pressure**
- **Equipable with electro-motoric actuators SAX.., SAV.. or electro-hydraulic actuators SKD.., SKB.., SKC..**

Use

In boiler, district heating and refrigeration plants, cooling towers, heating groups, and in air handling units as control or shutoff valves.
For use in closed or open hydraulic circuits (observe cavitation).

Type summary

	Valves	Actuators				SAX.. [3]		SKD.. [2]		SKB..		SAV [3]		SKC..	
		Stroke				20 mm						40 mm			
	PN 25 PN 16 [1]	Positioning force				800 N		1000 N		2800 N		1600 N		2800 N	
		Data sheet				N4501		N4561		N4664		N4503		N4566	
		Stock no.	DN	k_{vs} [m^3/h]	S_V	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}
						[kPa]									
Fluids Preferred flow direction A-AB with fluids for low noise operation and high kvs-values with all actuator types	**VVF53.15-0.16**	S55208-V100	15	0.16	> 50	2500	1200	2500	1200	2500	1200	-	-	-	-
	VVF53.15-0.2	S55208-V101	15	0.2											
	VVF53.15-0.25	S55208-V102	15	0.25											
	VVF53.15-0.32	S55208-V103	15	0.32											
	VVF53.15-0.4	S55208-V104	15	0.4											
	VVF53.15-0.5	S55208-V105	15	0.5											
	VVF53.15-0.63	S55208-V106	15	0.63											
	VVF53.15-0.8	S55208-V107	15	0.8											
	VVF53.15-1	S55208-V108	15	1											
	VVF53.15-1.25	S55208-V109	15	1.25											
	VVF53.15-1.6	S55208-V110	15	1.6	> 100										
	VVF53.15-2	S55208-V111	15	2											
	VVF53.15-2.5	S55208-V112	15	2.5											
	VVF53.15-3.2	S55208-V113	15	3.2											
	VVF53.15-4	S55208-V114	15	4											
	VVF53.20-6.3	S55208-V116	20	6.3											
	VVF53.25-5	S55208-V117	25	5		1600		2100							
	VVF53.25-6.3	S55208-V118	25	6.3											
	VVF53.25-8	S55208-V119	25	8											
	VVF53.25-10	S55208-V120	25	10											
	VVF53.32-16	S55208-V122	32	16		900	750	1200	1100						
	VVF53.40-12.5	S55208-V123	40	12.5		550	500	750	650	2000		1250	1150		
	VVF53.40-16	S55208-V124	40	16											
	VVF53.40-20	S55208-V125	40	20											
	VVF53.40-25	S55208-V126	40	25											
	VVF53.50-31.5	S55208-V127	50	31.5		350	300	450	400	1200	1150	750	700		
	VVF53.50-40	S55208-V128	50	40											
	VVF53.65-63	S55208-V129	65	63		-	-	-	-	-	-	450	400	700	650
	VVF53.80-100	S55208-V130	80	100								250	225	450	400
	VVF53.100-160	S55208-V131	100	160								160	125	300	250
	VVF53.125-250	S55208-V132	125	250								125	90	175	160
	VVF53.150-400	S55208-V133	150	400								80	60	125	100
Fluids and Steam Compensated valves are optimized for a single flow direction for fluids and steam. DN 50..150: AB-A DN 200/250: A-AB	**VVF53.50-40K**	S55208-V134	50	40	> 100	-	-	2500	1250	2500	1250	-	-	-	-
	VVF53.65-63K	S55208-V135	65	63				-	-	-	-			2500	1250
	VVF53.80-100K	S55208-V136	80	100											
	VVF53.100-150K	S55208-V158	100	150											
	VVF53.125-220K	S55208-V159	125	220											
	VVF53.150-315K	S55208-V160	150	315											
	VVF53.200-450K	S55208-V161	200	450	> 50									1200	800
	VVF53.250-630K	S55208-V162	250	630										1000	800

[1] DN 15…50: Flange dimensions for PN 16 and PN 25
DN 65…250: Flange dimensions only for PN 25

[2] Usable up to a max. medium temperature of 150 °C

[3] Usable up to a max. medium temperature of 130 °C

DN = Nominal size
k_{vs} = Flow nominal value of cold water (5...30 °C) through the fully opened valve (H_{100}) at a differential pressure of 100 kPa (1 bar)
S_v = Rangeability
Δp_s = Maximum permissible differential pressure at which the motorized valve still closes securely against the pressure
Δp_{max} = Maximum permissible differential pressure across the valve's throughport for the entire positioning range of the motorized valve

	Valves				Actuators	SAX.. [5]		SKD.. [2]		SKB..		SAV.. [5]		SKC..	
					Stroke	20 mm						40 mm			
	PN 25 PN 16 [1]				Positioning force	800 N		1000 N		2800 N		1600 N		2800 N	
					Data sheet	N4501		N4561		N4664		N4503		N4566	
		Stock no.	DN	k_{vs} [m^3/h]	S_V	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}
						[kPa]									
Steam [3] Exclusive flow direction AB-A for steam. Also useful for maximum close-off pressure Δp_S and maximum differential pressure in operation (Δp_{max}) with fluids. Use with electro-hydraulic actuators only	**VVF53.15-0.16**	S55208-V100	15	0.16		-	-	2500	1200	2500	1200	-	-	-	-
	VVF53.15-0.2	S55208-V101	15	0.2											
	VVF53.15-0.25	S55208-V102	15	0.25											
	VVF53.15-0.32	S55208-V103	15	0.32											
	VVF53.15-0.4	S55208-V104	15	0.4											
	VVF53.15-0.5	S55208-V105	15	0.5	> 50										
	VVF53.15-0.63	S55208-V106	15	0.63											
	VVF53.15-0.8	S55208-V107	15	0.8											
	VVF53.15-1	S55208-V108	15	1											
	VVF53.15-1.25	S55208-V109	15	1.25											
	VVF53.15-1.6	S55208-V110	15	1.6											
	VVF53.15-2	S55208-V111	15	2											
	VVF53.15-2.5	S55208-V112	15	2.5											
	VVF53.15-3.2	S55208-V113	15	3.2											
	VVF53.15-4 [4]	S55208-V114	15	3.6											
	VVF53.20-6.3 [4]	S55208-V116	20	5											
	VVF53.25-5	S55208-V117	25	5											
	VVF53.25-6.3	S55208-V118	25	6.3											
	VVF53.25-8	S55208-V119	25	8											
	VVF53.25-10 [4]	S55208-V120	25	8											
	VVF53.32-16 [4]	S55208-V122	32	15											
	VVF53.40-12.5	S55208-V123	40	12.5	> 100				1000						
	VVF53.40-16	S55208-V124	40	16											
	VVF53.40-20	S55208-V125	40	20											
	VVF53.40-25 [4]	S55208-V126	40	23											
	VVF53.50-31.5	S55208-V127	50	31.5					600						
	VVF53.50-40	S55208-V128	50	40											
	VVF53.65-63	S55208-V129	65	63				-	-	-	-				1000
	VVF53.80-100	S55208-V130	80	100											750
	VVF53.100-160 [4]	S55208-V131	100	150										2500	500
	VVF53.125-250 [4]	S55208-V132	125	220											300
	VVF53.150-400 [4]	S55208-V133	150	360											200
		Stock no.	DN	k_{vs} [m^3/h]	S_V	Δp_{max} [kPa]									
						A⇒AB B	AB⇒A B	A⇒AB B	AB⇒A B	A⇒AB B	AB⇒A B	A⇒AB B	AB⇒A B	A⇒AB B	AB⇒A B
Fluids	**VXF53.15-1.6**	S55208-V140	15	1.6		1200	200	1200	200	1200	200	-	-	-	-
	VXF53.15-2.5	S55208-V141	15	2.5											
	VXF53.15-4	S55208-V142	15	4											
	VXF53.20-6.3	S55208-V144	20	6.3											
	VXF53.25-6.3	S55208-V145	25	6.3											
	VXF53.25-10	S55208-V146	25	10											
	VXF53.32-16	S55208-V148	32	16		750		1100							
	VXF53.40-16	S55208-V149	40	16	> 100	500		650				1150	200		
	VXF53.40-25	S55208-V150	40	25											
	VXF53.50-40	S55208-V152	50	40		300	100	400		1150		700			
	VXF53.65-63	S55208-V153	65	63		-	-	-	-	-	-	400	100	650	200
	VXF53.80-100	S55208-V154	80	100								225	50	400	200
	VXF53.100-160	S55208-V155	100	160								125		250	150
	VXF53.125-250	S55208-V156	125	250								90		160	100
	VXF53.150-400	S55208-V157	150	400								60		100	70

[1] DN 15…50: Flange dimensions for PN 16 and PN 25
DN 65…150: Flange dimensions only for PN 25
[2] Usable up to a max. medium temperature of 150 °C
[3] Operate with opposite flow direction with steam
[4] Reduced k_{vs} value
[5] Usable up to a max. medium temperature of 130 °C

Note

When using a stem heating element with a medium temperature of below –5 °C, the stem sealing gland must be replaced. In this case, the sealing gland must be ordered separately.

DN	Stock number
DN 15…50	4 284 8806 0
DN 65…150	4 679 5629 0

Spare parts, Rev.-No. See page 18

Accessories

Product number	Stock number	Description	Note	
ASZ6.6	S55845-Z108	Stem heating element	Required for medium temperatures < 0 °C	
-	4 284 8806 0	Stem sealing gland	When using valves of the V..F53.. lines DN 15…50 with a stem heating element and a medium temperature below -5 °C, the stem sealing gland must be replaced. With the gland 428488060 the valve can be used with water, water with antifreeze and brines between -20 °C and 150 °C.	
-	4 679 5629 0	Stem sealing gland	When using valves of the V..F53.. lines DN 65…150 with a stem heating element and a medium temperature below -5 °C, the stem sealing gland must be replaced. With the gland 467956290 the valve can be used with water, water with antifreeze and brines between -20 °C and 150 °C.	

Adapter type	Stock number	Bolts included	Description	VXF41..	
ALF41B15	S55845-Z110	4x M12x90mm	Adapter for replacing 3-port valves VXF41.. by VXF53.. • Due to different dimensions of the bypass flange • Every valve to be replaced requires an adapter • Adapter is supplied with the required number and size of bolts and nuts as well as two suitable flat sealings Replace 3-port valves VXF41.., DN 65…150 by 3-port valvesVXF43.. (data sheet N4404).	DN 15	DN 15 
ALF41B25	S55845-Z111	4x M12x90mm		DN 25	
ALF41B40	S55845-Z112	4x M16x90mm		DN 40	
ALF41B50	S55845-Z113	4x M16x90mm		DN 50	

Equipment combinations

Product number	Description	Stroke	Positioning force	Operating voltage	Positioning signal	Spring return time	Positioning time	LED	Manual adjuster	Auxiliary functions
SAX31.00	S55150-A105	20 mm	800 N	AC 230 V	3-position	-	120 s	-	Push and fix	[1], [2],
SAX31.03	S55150-A106						30 s			[3], [4]
SAX61.03 **SAX61.03U**	S55150-A100 S55150-A100-A100			AC/DC 24 V	0…10 V 4…20 mA 0…1000 Ω					
SAX81.00	S55150-A102				3-position	-	120 s	-	Push and fix	[1], [2],
SAX81.03 **SAX81.03U**	S55150-A103 S55150-A103-A100						30 s			
SKD32.21	SKD32.21	20 mm	1000 N	AC 230 V	3-position	8 s	Opening: 30 s Closing: 10 s	-	Turn, Position is maintained	[1], [2],
SKD32.50	SKD32.50					-	120 s			
SKD32.51	SKD32.51					8 s				
SKD60	SKD60			AC 24 V	0…10 V 4…20 mA 0…1000 Ω	-	Opening: 30 s Closing: 15 s	✓		[3]
SKD62 **SKD62U**	SKD62 SKD62U					15 s				
SKD62UA	SKD62UA									[5]
SKD82.50 **SKD82.50U**	SKD82.50 SKD82.50U				3-position	-	120 s	-		[1], [2],
SKD82.51 **SKD82.51U**	SKD82.51 SKD82.51U					8 s				
SKB32.50	SKB32.50	20 mm	2800 N	AC 230 V	3-position	-	120 s	-	Turn, Position is maintained	[1], [2],
SKB32.51	SKB32.51					10 s				
SKB60	SKB60			AC 24 V	0…10 V 4…20 mA 0…1000 Ω	-	Opening: 120 s Closing:10 s	✓		[3]
SKB62 **SKB62U**	SKB62 SKB62U					10 s				
SKB62UA	SKB62UA									[5]
SKB82.50 **SKB82.50U**	SKB82.50 SKB82.50U				3-position	-	120 s	-		[1], [2],
SKB82.51 **SKB82.51U**	SKB82.51 SKB82.51U					10 s				
SAV31.00	S55150-A112	40 mm	1600 N	AC 230 V	3-position	-	120 s	-	Push and fix	[1], [2], [6]
SAV61.00 **SAV61.00U**	S55150-A110 S55150-A110-A100			AC/DC 24 V	DC 0...10 V DC 4...24 mA 0...1000 Ω			✓		[1], [3], [6], [7]
SAV81.00 **SAV81.00U**	S55150-A111 S55150-A111-A100				3-position			-		[1], [2], [6]
SKC32.60	SKC32.60	40 mm	2800 N	AC 230 V	3-position	-	120 s	-	Turn, Position is maintained	[1], [2],
SKC32.61	SKC32.61					18 s				
SKC60	SKC60			AC 24 V	0…10 V 4…20 mA 0…1000 Ω	-	Opening: 120 s Closing: 20 s	✓		[3]
SKC62 **SKC62U**	SKC62 SKC62U					20 s				
SKC62UA	SKC62UA									[5]
SKC82.60 **SKC82.60U**	SKC82.60 SKC82.60U				3-position	-	120 s	-		[1], [2],
SKC82.61 **SKC82.61U**	SKC82.61 SKC82.61U					18 s				

[1] Auxiliary switch (optional)
[2] Potentiometer (optional)
[3] Position feedback, forced control, selection of valve characteristic
[4] Optional: Sequence control, selection of acting direction
[5] Plus sequence control, stroke limitation, and selection of acting direction
[6] Stem heating element (optional)
[7] Function module (optional)

Ordering

Example

Product number	Stock number	Description
VXF53.25-6.3	S55208-V145	3-port valve with flange, PN 25
SAX31.03	S55150-A106	Electro-hydraulic actuator

Delivery — Valves, actuators and accessories are packed and delivered as separate items.

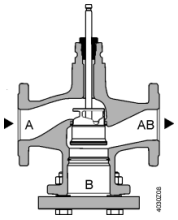
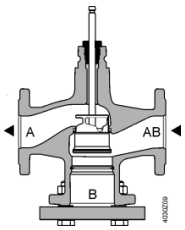
Note — Counter-flanges, bolts and gaskets must be provided on site.

Product documentation

• Mounting Instructions	M4030 74 319 0749 0	DN 15…150
	A6V10774961 A5W90000815	DN 200, DN 250
• Basic documentation	P4030	Contains background information and technical basic knowledge of valves

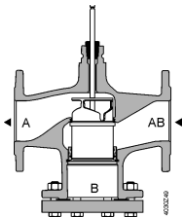
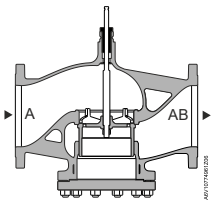
2-port valves

The illustrations below show the basic design of the valves. Constructional features, such as the shape of plugs, may differ.

Fluids	Steam (Fluids possible)
Closing against the pressure	Closing with the pressure
	
A → AB For use with all actuators	**A ← AB** Use with electro-hydraulic actuators only

2-port valves pressure compensated

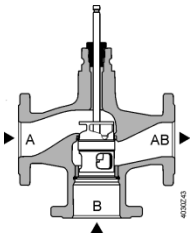
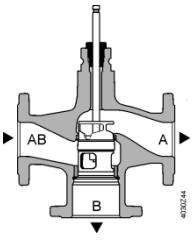
The VVF53..K valves use a pressure-compensated plug. This enables the same type of actuators to be used for the control of volumetric flow at higher differential pressures.

DN 65…150 Fluids and Steam	DN 200, DN 250 Fluids and Steam
Closing with the pressure	Closing against the pressure
	
A ← AB Use with electro-hydraulic actuators only	**A → AB** Use with electro-hydraulic actuators only

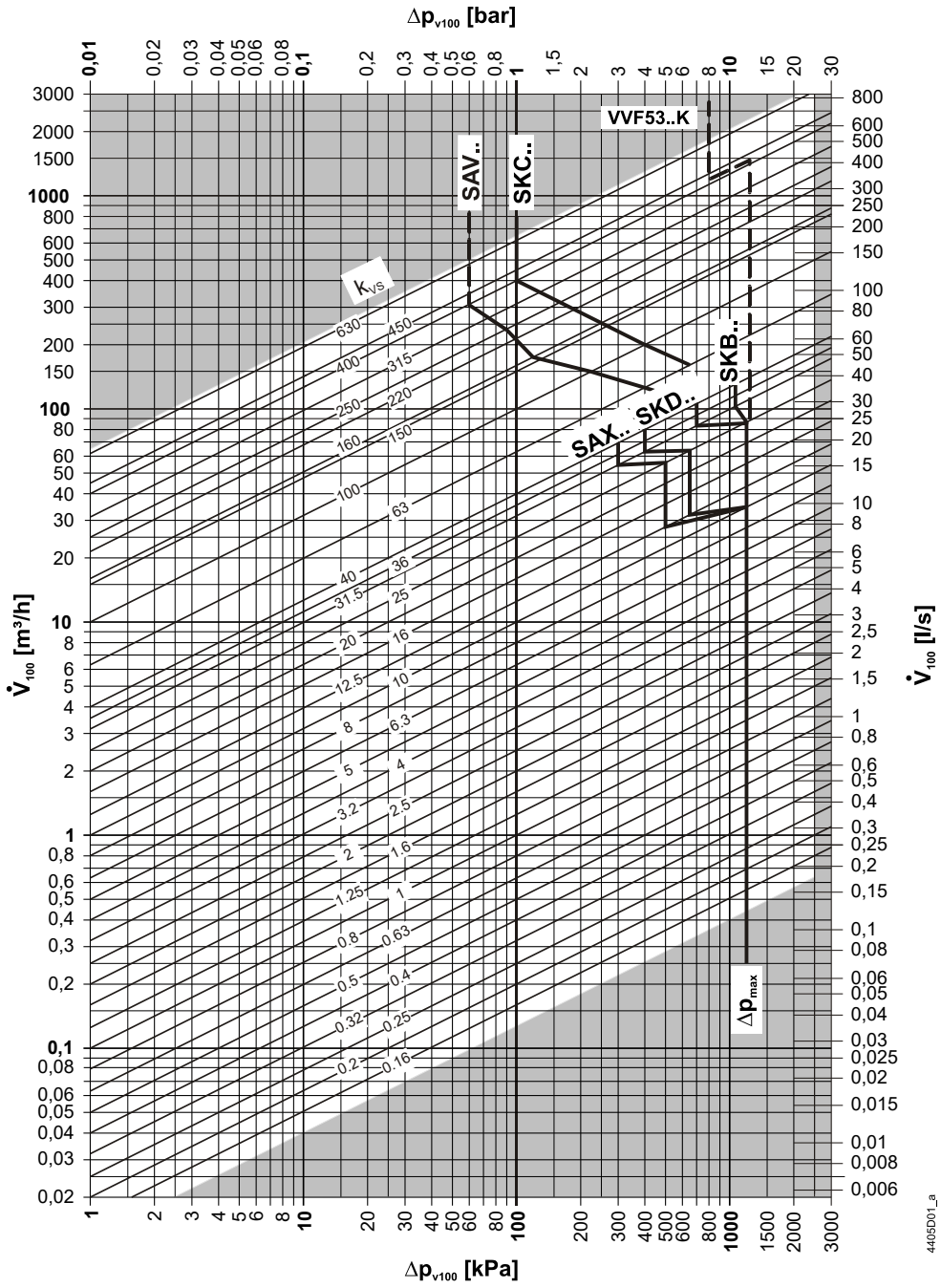
Note

2-port valves do not become 3-port valves by removing the blank flange!

3-port valves

Fluids	
Mixing valve (preferred use)	Diverting valve
	
A → AB **B**	**AB → A** **B**

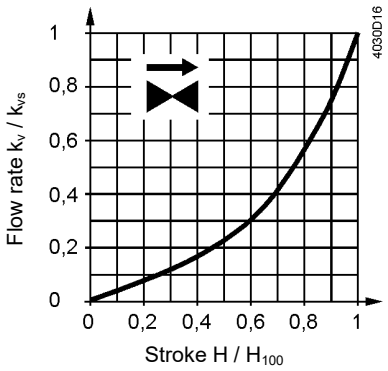
Flow chart



Δp_{max} values apply for the mixing function. Δp_{max} values for the diverting function see table “Type summary”, page 2

Δp_{max} values for k_{vs} value 16, DN 32, see table "Type summary", page 2

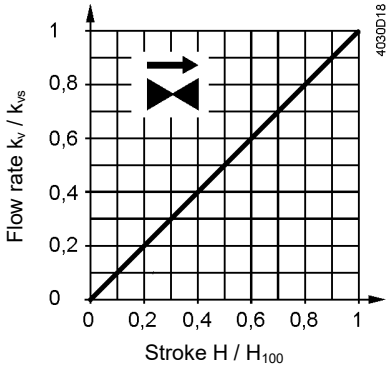
Valve characteristics
2-port valves



0…30 %: Linear
30…100 %: Equal percentage
n_{gl} = 3 to VDI / VDE 2173

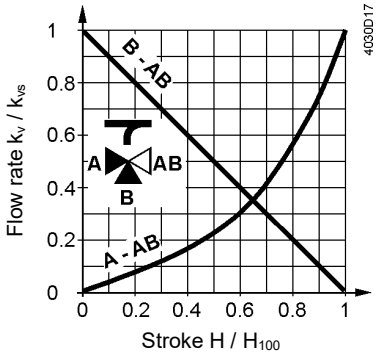
For high k_{vs} values the valve characteristic is optimized for maximum volumetric flow k_{V100}.

For product lines:
VVF53.125-200
VVF53.125-250
VVF53.125-220K
VVF53.150-315
VVF53.150-400
VVF53.150-315K
VVF53.200-450K
VVF53.250-630K



0…100 %: Linear

3-port valves



Throughport A-AB
0...30 %: Linear
30...100 %: Equal percentage
n_{gl} = 3 to VDI / VDE 2173

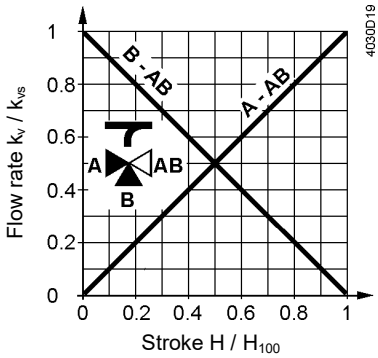
For high k_{vs} values the valve characteristic is optimized for maximum volumetric flow k_{V100}.

Bypass B-AB
0...100 %: Linear

Port AB = constant volumetric flow
Port A = variable volumetric flow
Port B = Bypass (variable volumetric flow)

Mixing: Volumetric flow from port A and port B to port AB
Diverting: Volumetric flow from port AB to port A and port B

For product lines:
VXF53.125-250
VXF53.150-400

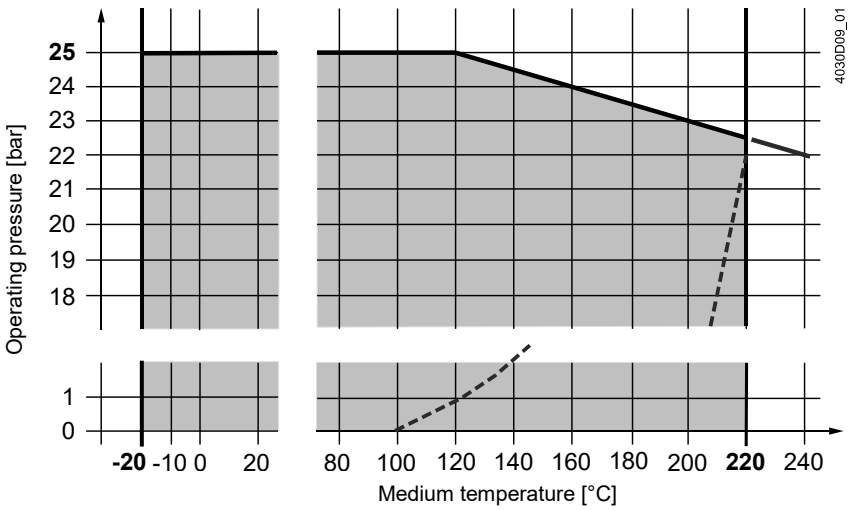


Throughport A-AB
0...100 %: Linear

Bypass B-AB
0...100 %: Linear

Operating pressure and medium temperature

Fluids
with V..F53..



--- Curve for saturated steam; steam forms below this line

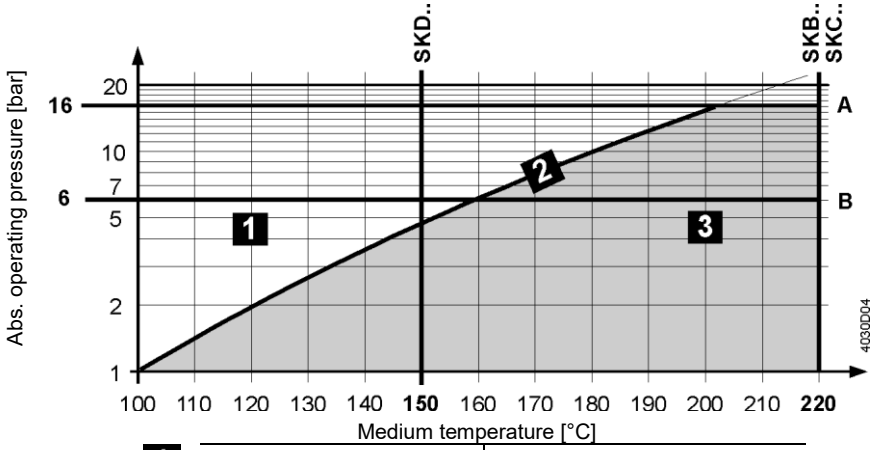
—·· Operating pressure according to EN 1092, valid for 2-port valves with blank flange

Operating pressure and operating temperatures according to ISO 7005, EN 1092 and EN 12284

Notes

All relevant local directives must be observed

Saturated steam
Superheated steam
with VVF53..



1	Water	-
2	Wet steam	To be avoided
3	Saturated steam Superheated steam	Permissible operating range
A	Subcritical pressure ratio	
B	Supercritical pressure ratio	

Medium compatibility and temperature ranges

Medium	Temperature range		Valve			Note
	T_{min} [°C]	T_{max} [°C]	VVF53..	VVF53..K	VXF53..	
Cold water	1	25	■	■	■	-
Low-temperature hot water	1	130	■	■	■	-
High-temperature hot water [1]	130	150	■	■	■	-
	150	180	■	■	■	-
	180	220	■	■	■	
Water with antifreeze	-5	150	■	■	■	V..F53: With a medium temperature of below -5 °C, the stem sealing gland must be replaced by DN 15…50: 428488060 DN 65…150: 467956290
	-10	150	■	-[3]	■	
	-20	150	■	-[3]	■	
Cooling water [2]	1	25	■	■	■	-
Brines	-5	150	■	■	■	V..F53: With a medium temperature of below -5 °C, the stem sealing gland must be replaced by DN 15…50: 428488060 DN 65…150: 467956290
	-10	150	■	-[3]	■	
	-20	150	■	-[3]	■	
Saturated steam	100	150	■	■	-	-
	100	220	■	■	-	-
Superheated steam	120	150	■	■	-	-
	120	220	■	■	-	-
Heat transfer oils	20	220	■	■	■	On the basis of mineral oil
Super-clean water (demineralized and deionized)	1	150	-	-	-	

[1] Differentiation due to saturated steam curve
[2] Open circuits
[3] VVF53..K can't be used with media below -5 °C due to the compensation sealing material

Fields of use

Fields of use		Valve	
		VVF53..	VXF53..
Generation	Boiler plants	■	■
	District heating plants	■	-
	Refrigeration plants	■	■
	Cooling towers [1]	■	■
Distribution	Heating groups	■	■
	Air handling units	■	■

[1] Open circuits

Engineering notes

Mounting location

Preferably mount the valves at the return, as the temperature is lower there and the strain on the stem sealing gland is lower.

Dirt trap

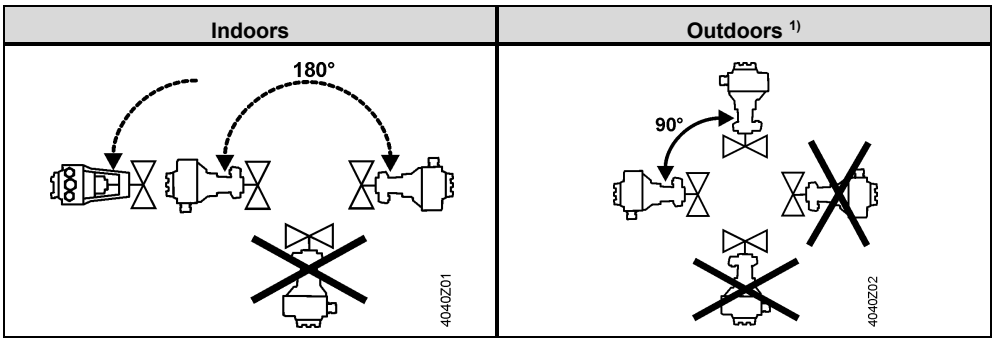
Mount a dirt filter or dirt trap before the valve to ensure proper functioning, and a long service life of the valve.
Remove dirt, welding beads, etc. from the valves and pipes.

Cavitation

Cavitation can be avoided by limiting the pressure differential across the valve depending on the medium temperature and the prepressure.

Mounting notes

Mounting position



1) Only in combination with weather shield ASK39.1 and actuators SAX..

Mounting positions apply to both 2- and 3-port valves.

Commissioning notes

⚠ **The valve may be put into operation only if actuator and valve are correctly assembled.**

Note

Ensure that actuator stem and valve stem are rigidly connected in all positions.

Function check

Valve	Throughport A→AB or AB→A	Bypass B→AB
Valve stem extends	Closes	Opens
Valve stem retracts	Opens	Closes

Maintenance notes

The valves are maintenance-free.

⚠ When servicing valves or actuators:

- Deactivate the pump and turn off the power supply
- Close the shutoff valves
- Fully reduce the pressure in the piping system and allow pipes to completely cool down

If necessary, disconnect the electrical wires.

Disposal

Do not dispose of the device as unsorted municipal waste.

- Special handling of individual components may be mandated by law or make ecological sense.
- Observe all local and currently applicable laws and regulations.

Warranty

Application-related technical data are guaranteed only when the valves are used in connection with the Siemens actuators listed under "Equipment combinations", page 3.
When used with actuators of other manufacture, any warranty by Siemens becomes void.

Technical Data

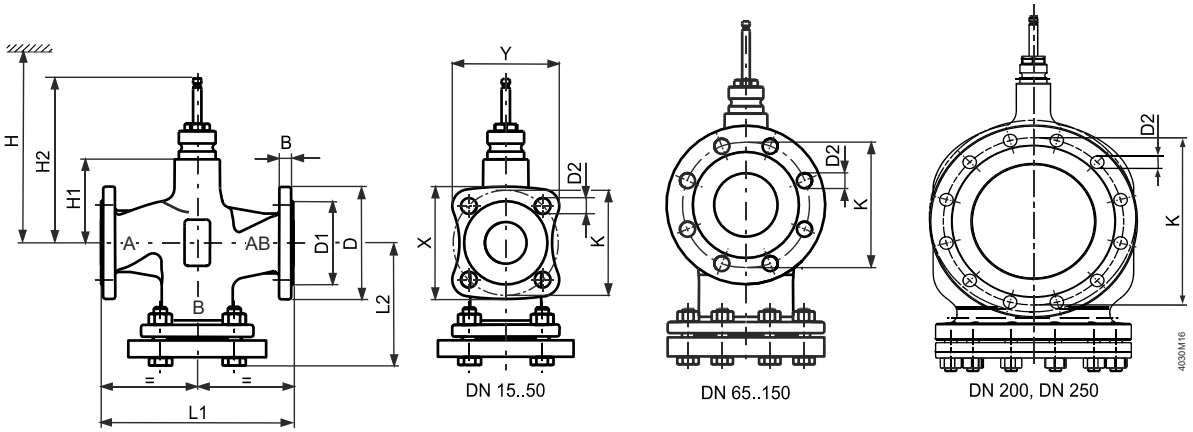
Functional data	PN class		PN 25
	Connection		Flange
	Operating pressure		See Section "Operating pressure and medium temperature" page 10
	Valve characteristics [1]		See section "Valve characteristics", page 9
	Leakage rate	Throughport	DN 15…150: 0…0.01 % of k_{vs} value (Class IV) DN 200, DN 250: 0…0.02 % of k_{vs} value
	Bypass	Bypass	0.5…2 % of k_{vs} value with SKD.., SKB.., SKC.. 0…0.05 % of k_{vs} value with SAX.., SAV..
	Permissible media		See table "Medium compatibility and temperature ranges", page 11
	Medium temperature		-20…220 °C [2] VVF53..K: -5…220 ° C
	Rangeability		DN 15, k_{vs} ≤ 1.25 m³/h: >50 DN 15...150: >100 DN 200, DN 250: >50
	Nominal stroke		Up to DN 50: 20 mm From DN 65: 40 mm
Materials	Valve body		DN 15…150: EN-GJS-400-18-LT DN 200, DN 250: ASTM A216WCB(GP240GH)
	Blank flange	VVF..	DN 15…150: P265GH DN 200, DN 250: CK25
	Valve stem, seat, plug		Stainless steel
	Stem sealing gland		Stainless steel DN 15…150: FEPM (silicone-free) DN 200, DN 250: PTFE (not silicone-free)
	Compensation sealing		Stainless steel DN 50…150: FEPM (silicone-free) DN 200, DN 250: PTFE+carbon (not silicone-free)
	Adapter ALF41B..		Steel S235JRG2
Norms and directives	Pressure Equipment Directive Pressure Accessories		PED 2014/68/EU Scope: Article 1, section 1 Definition: Article 2, section 5
	Fluid group 2:		
		≤ DN 40	without CE-marking, as per article 4, section 3 (sound engineering practice) [3]
		DN 50…100	Category I, Module A, with CE-marking, as per article 14, section 2
		DN 125…150	Category II, Module A2, with CE-marking, as per article 14, section 2 notified body number 0036
		DN 200, DN 250	Category II, Module A2, with CE-marking, as per article 14, section 2 notified body number 0035
	EU Conformity (CE)		
		DN 50…150	A5W00006523 [4]
		DN 200, DN 250	A5W90001026 [4]
	PN class		ISO 7268
	Operating pressure		ISO 7005, DIN EN 12284
	Flanges		ISO 7005
	Length of flanged valves		DIN EN 558-1, line 1

	Valve characteristic	VDI 2173	
	Leakage rate	Throughport, Bypass according to EN 60534-4 / EN 1349	
	Water treatment	VDI 2035	
Environmental conditions			
	Storage: IEC 60721-3-1	Class	1K3
		Temperature	-15…55 °C
		Rel. humidity	5…95 % r.h.
	Transport: IEC 60721-3-2	Class	2K3, 2M2
		Temperature	-30…65 °C
		Rel. humidity	< 95 % r.H.
	Operation: IEC 60721-3-3	Class	3K5, 3Z11
		Temperature	-15…55 °C
		Rel. humidity	5…95 % r.h.
Environmental compatibility	The product environmental declaration CE1E4405en01 [4], CE1E4405en02 [4], CE1E4404en02 [4] and A5W90001031 [4] contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).		
Dimensions / Weight	Dimensions	See „Dimensions“, page 15 + 16	
	Weight	See „Dimensions“, page 15 + 16	

1) For certain valve lines and high k_{vs} values, the valve characteristic is optimized for maximum volumetric flow k_{V100}
2) With SAX.. and SAV..: Usable up to a max. medium temperature of 130 °C
With SKD..: Usable up to a max. medium temperature of 150 °C
For medium temperatures < -5 °C, the stem sealing gland must be replaced, please see page 4.
3) Valves where PS x DN < 1000, do not require special testing and cannot carry the CE label.
4) The documents can be downloaded from http://www.siemens.com/bt/download

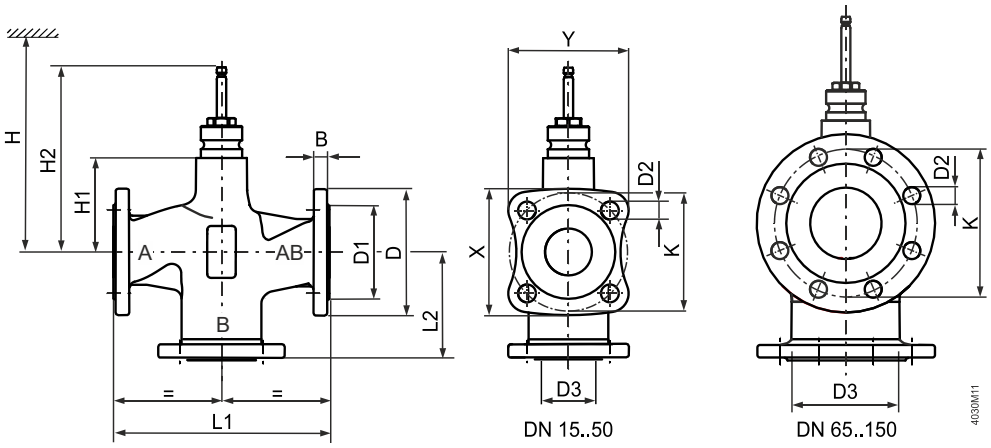
Dimensions

VVF53..



Product number	DN	kg	B	Ø D	Ø D1	Ø D2	L1	L2	X	Y	Ø K	H1	H2	H				
														SAX..	SKD..	SKB..	SAV..	SKC..
VVF53..	15	4.2	14	95	46	14 (4x)	130	87.5	79	76	65	63	159.5	505	563	638	-	-
	20	5.3	16	105	56	14 (4x)	150	99.5	86.6	83	75	63	144.4	505	563	638	-	-
	25	6.1	15	115	65	14 (4x)	160	104.5	94.4	90.1	85	63	159.5	505	563	638	-	-
	32	8.7	17	140	76	19 (4x)	180	119	115.6	110.7	100	60	156.5	502	560	635	-	-
	40	10.1	16	150	84	19 (4x)	200	129	123.2	117.8	110	60	156.5	502	560	635	525	-
	50	13.6	16	165	99	19 (4x)	230	146	135.2	128.4	125	100	196.5	542	600	675	565	-
	65	22	17	185	118	19 (8x)	290	178	-	-	145	115	231.5	-	-	-	580	690
	80	27.4	17	200	132	19 (8x)	310	190	-	-	160	115	231.5	-	-	-	580	690
	100	38.2	17	235	156	23 (8x)	350	212.5	-	-	190	146	262.5	-	-	-	611	721
	125	53.1	17	270	184	28 (8x)	400	242	-	-	220	159	275.5	-	-	-	624	734
	150	73.4	17	297	211	28 (8x)	480	284	-	-	250	186.5	303	-	-	-	652	762
VVF53..K	50	13.6	16	165	99	19 (4x)	230	146	135.2	128.4	125	100	196.5	-	600	675	-	-
	65	22	17	185	118	19 (8x)	290	178	-	-	145	115	231.5	-	-	-	-	690
	80	27.6	17	200	132	19 (8x)	310	190	-	-	160	115	231.5	-	-	-	-	690
	100	38.6	17	235	156	23 (8x)	350	212.5	-	-	190	146	262.5	-	-	-	-	721
	125	53.8	17	270	184	28 (8x)	400	242	-	-	220	159	275.5	-	-	-	-	734
	150	75	17	297	211	28 (8x)	480	284	-	-	250	186.5	303	-	-	-	-	762
	200	133	30	360	274	26 (12X)	600	265	-	-	310	243	359.5	-	-	-	-	818
	250	200	32	425	330	30 (12X)	730	290	-	-	370	275	391.5	-	-	-	-	850

VXF53..



Product number	DN	kg	B	Ø D	Ø D1	Ø D2	Ø D3 [1]	L1	L2	X	Y	Ø K	H1	H2	H				
															SAX..	SKD..	SKB..	SAV..	SKC..
VXF53..	15	3.2	14	95	46	14 (4x)	25	130	65	79	76	65	63	159.5	505	563	638	-	-
	20	4.0	16	105	56	14 (4x)	35	150	75	86.6	83	75	63	159.5	505	563	638	-	-
	25	4.6	15	115	65	14 (4x)	38	160	80	94.4	90.1	85	63	159.5	505	563	638	-	-
	32	6.1	17	140	76	19 (4x)	46	180	90	115.6	110.7	100	60	156.5	502	560	635	-	-
	40	7.2	16	150	84	19 (4x)	57	200	100	123.2	117.8	110	60	156.5	502	560	635	525	-
	50	9.7	16	165	99	19 (4x)	69	230	115	135.2	128.4	125	100	196.5	542	600	675	565	-
	65	16.3	17	185	118	19 (8x)	86	290	145	-	-	145	115	231.5	-	-	-	580	690
	80	20.6	17	200	132	19 (8x)	100	310	155	-	-	160	115	231.5	-	-	-	580	690
	100	28.1	17	235	156	23 (8x)	123	350	175	-	-	190	146	262.5	-	-	-	611	721
	125	38.5	17	270	184	28 (8x)	149	400	200	-	-	220	159	275.5	-	-	-	624	734
	150	54.9	17	297	211	28 (8x)	174	480	240	-	-	250	186.5	303	-	-	-	652	762

[1] Interior opening of the bypass port

Spare parts

Stem sealing gland

Product number	DN	Stock number	Comments
VVF53.. VXF53.. VVF53..K	DN 15…50 and DN 65…150 Series A, B and C	74 284 0061 0	Standard version with FEPM-O-ring for medium temperatures between -5 °C and 220 °C.
VVF53.. VXF53.. VVF53..K	DN 65…150 As from series D	S55846-Z114	Standard version with FEPM-O-ring for medium temperatures between -5 °C and 220 °C.
VVF53.. K	DN 200, DN 250	4 679 5630 0	Standard version with PTFE sleeve for medium temperatures between -5 °C and 220 °C
VVF53.. VXF53..	DN 15…50	4 284 8806 0	When operating with medium temperatures below -5 °C. With the gland 428488060 the valve can be used with water, water with antifreeze and brines between -20 °C and 150 °C. 
VVF53.., VXF53..	DN 65…150	4 679 5629 0	When operating with medium temperatures below -5 °C . With the gland 467956290 the valve can be used with water, water with antifreeze and brines between -20 °C and 150 °C. 
VVF53..	DN 65…150	4 679 5629 0	When operating with medium temperatures below -5 °C . With the gland 467956290 the valve can be used with water, water with antifreeze and brines between -20 °C and 150 °C. 
VXF53..	DN 15…50	4 284 8806 0	When operating with medium temperatures below -5 °C . With the gland 467956290 the valve can be used with water, water with antifreeze and brines between -20 °C and 150 °C.. 
VVF53.. VVF53..K	DN 15…150 and DN65… 150 series A, B and C	74 284 0061 0	Standard version with FEPM-O-ring for medium temperatures between -5 °C and 220 °C.
VVF53.. VVF53..K	DN 65…150 As from series D	S55846-Z114	Standard version with FEPM-O-ring for medium temperatures between -5 °C and 220 °C.
VVF53..K	DN 200, DN 250	4 679 5630 0	Standard version with FEPM-O-ring for medium temperatures between -5 °C and 220 °C.

Revision numbers

Product number	Valid from rev. no.	Product number	Valid from rev. no.	Product number	Valid from rev. no.
VVF53.15-0.16	..A	**VVF53.50-40K**	..D	**VXF53.15-1.6**	..A
VVF53.15-0.2	..A	**VVF53.65-63K**	..D	**VXF53.15-2.5**	..A
VVF53.15-0.25	..A	**VVF53.80-100K**	..D	**VXF53.15-4**	..A
VVF53.15-0.32	..A	**VVF53.100-150K**	..D	**VXF53.20-6.3**	..A
VVF53.15-0.4	..A	**VVF53.125-220K**	..D	**VXF53.25-6.3**	..A
VVF53.15-0.5	..A	**VVF53.150-315K**	..D	**VXF53.25-10**	..A
VVF53.15-0.63	..A	**VVF53.200-450K**	..A	**VXF53.32-16**	..A
VVF53.15-0.8	..A	**VVF53.250-630K**	..A	**VXF53.40-16**	..A
VVF53.15-1	..A			**VXF53.40-25**	..A
VVF53.15-1.25	..A			**VXF53.50-40**	..B
VVF53.15-1.6	..A			**VXF53.65-63**	..D
VVF53.15-2	..A			**VXF53.80-100**	..D
VVF53.15-2.5	..A			**VXF53.100-160**	..D
VVF53.15-3.2	..A			**VXF53.125-250**	..D
VVF53.15-4	..A			**VXF53.150-400**	..D
VVF53.20-6.3	..A				
VVF53.25-5	..A				
VVF53.25-6.3	..A				
VVF53.25-8	..A				
VVF53.25-10	..A				
VVF53.32-16	..A				
VVF53.40-12.5	..A				
VVF53.40-16	..A				
VVF53.40-20	..A				
VVF53.40-25	..A				
VVF53.50-31.5	..B				
VVF53.50-40	..B				
VVF53.65-63	..D				
VVF53.80-100	..D				
VVF53.100-160	..D				
VVF53.125-250	..D				
VVF53.150-400	..D				

SIEMENS

VVF63..
VVF63..K

VXF63..

ACVATIX™

2- and 3-port valves with flanged connections, PN 40 V..F63..

From the large-stroke valve line

- High-performance valves for medium temperatures of -25…220 °C
- Valve body of cast steel GP240GH
- DN 15…150
- k_{vs} 0.2…315 m^3/h
- Flange type 21, flange design B
- Equipable with electro-hydraulic actuators SKD.., SKB.., SKC..

Use

In boiler, district heating and refrigeration plants, cooling towers, heating groups, and in air handling units as control or shutoff valves.

For use in closed or open hydraulic circuits (observe cavitation).

Type summary

	Valves	Actuators				SKD.. [1]		SKB..		SKC..	
		Stroke				20 mm				40 mm	
	PN 40	Positioning force				1000 N		2800 N		2800 N	
		Data sheet				N4561		N4664		N4566	
	⋈	Stock no.	DN	k_{vs}	S_v	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}
				[m³/h]		[kPa]					
Liquids Preferred flow direction A-AB with liquids for low noise operation and high k_{vs} values with all actuator types	**VVF63.15-0.2** [2]	S55210-V100	15	0.2	> 50	4000	2000	4000	2000	-	-
	VVF63.15-0.32 [2]	S55210-V101	15	0.32							
	VVF63.15-0.5 [2]	S55210-V102	15	0.5							
	VVF63.15-0.8 [2] [3]	S55210-V103	15	0.8							
	VVF63.15-1.25 [2] [3]	S55210-V104	15	1.25							
	VVF63.15-2 [2] [3]	S55210-V105	15	2							
	VVF63.15-3.2 [2] [3]	S55210-V106	15	3.2							
	VVF63.20-6.3	S55210-V107	20	6.3		3500					
	VVF63.25-5 [2] [3]	S55210-V108	25	5		2100					
	VVF63.25-8 [2] [3]	S55210-V109	25	8							
	VVF63.32-16	S55210-V110	32	16		1200	1100	3200			
	VVF63.40-12.5 [2]	S55210-V111	40	12.5		750	650	2000	1800		
	VVF63.40-20 [2]	S55210-V112	40	20							
	VVF63.50-31.5 [2]	S55210-V113	50	31.5	> 100	450	400	1200	1150		
	VVF63.65-50 [2]	S55210-V114	65	50		-	-	-	-	700	650
	VVF63.80-80 [2]	S55210-V115	80	80						450	400
	VVF63.100-125 [2]	S55210-V116	100	125						300	250
	VVF63.125-200 [2]	S55210-V117	125	200						175	160
	VVF63.150-315 [2]	S55210-V118	150	315						125	100
Liquids and Steam Compensated valves are optimized for a single flow direction for liquids and steam. DN 50..150: AB-A	**VVF63.50-40K**	VVF63.50-40K	50	36	> 100	4000	1500	4000	2000	-	-
	VVF63.65-63K	VVF63.65-63K	65	63		-	-	-	-	4000	2000
	VVF63.80-100K	VVF63.80-100K	80	100							
	VVF63.100-150K	VVF63.100-150K	100	150							
	VVF63.125-220K	VVF63.125-220K	125	220	> 50						
	VVF63.150-315K	VVF63.150-315K	150	315							

[1] Usable up to a max. medium temperature of 150 °C

[2] Valves with supplemental designation ..**F** (e.g. VVF63.25-10**F**) - with special flange can be ordered exclusively for France.

[3] Valves with supplemental designation ..**L** (e.g. VVF63.25-10**L**) - with parabolic plug can be ordered for special applications (low noise).

DN = Nominal size

k_{vs} = Flow nominal value of cold water (5…30 °C) through the fully opened valve (H_{100}) at a differential pressure of 100 kPa (1 bar)

S_v = Rangeability k_{vs} / k_{vr}

Δp_s = Maximum permissible differential pressure at which the motorized valve still closes securely against the pressure

Δp_{max} = Maximum permissible differential pressure across the valve's throughport for the entire positioning range of the motorized valve

	Valves		**Actuators**			**SKD.. [1]**		**SKB..**		**SKC..**	
			Hub			**20 mm**				**40 mm**	
	PN 40		**Positioning force**			**1000 N**		**2800 N**		**2800 N**	
			Data sheet			**N4561**		**N4664**		**N4566**	
	⋈	**Stock no.**	**DN**	**k_{vs}**	**S_v**	**Δp_s**	**Δp_{max}**	**Δp_s**	**Δp_{max}**	**Δp_s**	**Δp_{max}**
				[m³/h]		**[kPa]**					
Steam [2] Exclusive flow direction AB-A for steam. Also useful for maximum close-off pressure Δp_s and maximum differential pressure in operation (Δp_{max}) with liquids.	**VVF63.15-0.2** [2]	S55210-V100	15	0.2	> 50	4000	2000	4000	2000	-	-
	VVF63.15-0.32	S55210-V101	15	0.32							
	VVF63.15-0.5	S55210-V102	15	0.5							
	VVF63.15-0.8	S55210-V103	15	0.8							
	VVF63.15-1.25	S55210-V104	15	1.25							
	VVF63.15-2	S55210-V105	15	2							
	VVF63.15-3.2	S55210-V106	15	3.2							
	VVF63.20-6.3 [3]	S55210-V107	20	5							
	VVF63.25-5	S55210-V108	25	5							
	VVF63.25-8	S55210-V109	25	8							
	VVF63.32-16	S55210-V110	32	15			1500				
	VVF63.40-12.5	S55210-V111	40	12.5			1000				
	VVF63.40-20	S55210-V112	40	20							
	VVF63.50-31.5	S55210-V113	50	31.5			600		1900		
	VVF63.65-50	S55210-V114	65	50		-	-	-	-	4000	1000
	VVF63.80-80	S55210-V115	80	80							750
	VVF63.100-125	S55210-V116	100	125							500
	VVF63.125-200	S55210-V117	125	200							300
	VVF63.150-315 [3]	S55210-V118	150	280							200

	Valves	Actuators				SKD.. [1]		SKB..		SKC..	
		Stroke				20 mm				40 mm	
	PN 40	Positioning force				1000 N		2800 N		2800 N	
		Data sheet				N4561		N4664		N4566	
		Stock no.	DN	k_{vs} [m³/h]	S_v	Δp_{max} [kPa]					
						A⇨AB B	AB⇨A B	A⇨AB B	AB⇨A B	A⇨AB B	AB⇨A B
Liquids	**VXF63.15-1.6**	S55210-V131	15	1.6	> 100	2000	200	2000	200	-	-
	VXF63.15-2.5	S55210-V132	15	2.5							
	VXF63.15-4	S55210-V133	15	4							
	VXF63.20-6.3	S55210-V134	20	6.3							
	VXF63.25-6.3	S55210-V135	25	6.3							
	VXF63.25-10	S55210-V136	25	10							
	VXF63.32-16	S55210-V137	32	16		1100					
	VXF63.40-16	S55210-V138	40	16		650					
	VXF63.40-25	S55210-V139	40	25							
	VXF63.50-31.5	S55210-V140	50	31.5		400		1150			
	VXF63.65-50	S55210-V141	65	50		-	-	-	-	650	200
	VXF63.80-80	S55210-V142	80	80						400	200
	VXF63.100-125	S55210-V143	100	125						250	150
	VXF63.125-200	S55210-V144	125	200						160	100
	VXF63.150-315	S55210-V145	150	315						100	70

1) Usable up to a max. medium temperature of 150 °C

2) Operate with opposite flow direction with steam

3) Reduced k_{vs} value

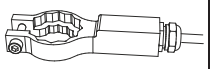
Note

When using a steam heating element with a medium temperature below -5 °C, the stem sealing gland must be replaced. In this case, the sealing gland must be ordered separately.

DN	Stock no.
DN 15…50	4 284 8806 0
DN 65…150	4 679 5629 0

Accessories / Spare parts

Accessories

Type	Stock no.	Description	Note	
ASZ6.6	S55845-Z108	Steam heating element	Required for medium temperatures < 0 °C	
-	4 284 8806 0	Steam sealing gland	When using valves of the V..F63.. lines DN 15...50 with a stem heating element and a medium temperature below -5 °C, the stem sealing gland must be replaced. With the gland 428488060, the valve can be used with water, water with anti-freeze and brines between -25 °C and 150 °C.	
-	4 679 5629 0	Steam sealing gland	When using valves of the V..F63.. lines DN 65…150 with a stem heating element and a medium temperature below -5 °C , the stem sealing gland must be replaced. With the gland 467956290, the valve can be used with water, water with anti-freeze and brines between -25 °C and 150 °C.	

Spare parts

Type	DN	Stock no.	Notes	
VVF63.. VXF63.. VVF63..K	DN 15…50	74 284 0061 0	Standard version with FEPM O-ring for medium temperatures between -5 °C and 220 °C.	
VVF63.. VXF63.. VVF63..K	DN 65…150	S55846-Z114	Standard version with FEPM O-ring for medium temperatures between -5 °C and 220 °C.	
VVF63.. VXF63..	DN 15…50	4 284 8806 0	When operating with medium temperatures below -5 °C. With the gland 428488060, the valve can be used with water, water with anti-freeze and brines between -25 °C and 150 °C.	
VVF63.. VXF63..	DN 65…150	4 679 5629 0	When operating with medium temperatures below -5 °C. With the gland 467956290, the valve can be used with water, water with anti-freeze and brines between -25 °C and 150 °C.	

Equipment combinations

Type	Stock no.	Stroke	Positioning force	Operating voltage	Positioning signal	Spring return time	Positioning time	LED	Manual adjuster	Auxiliary functions
SKD32.21	SKD32.21	20 mm	1000 N	AC 230 V	3-position	8 s	Opening: 30 s Closing: 10 s	-	Turn, position is maintained	[1], [2],
SKD32.50	SKD32.50					-	120 s			
SKD32.51	SKD32.51					8 s				
SKD60	SKD60			AC 24 V	0…10 V 4…20 mA 0…1000 Ω	-	Opening: 30 s Closing: 10 s	x		[3]
SKD62 **SKD62U**	SKD62 SKD62U					15 s				
SKD62UA	SKD62UA									[4]

Type	Stock no.	Stroke	Positioning force	Operating voltage	Positioning signal	Spring return time	Positioning time	LED	Manual adjuster	Auxiliary functions
SKD82.50 **SKD82.50U**	SKD82.50 SKD82.50U				3-position	-	120 s	-		[1], [2]
SKD82.51 **SKD82.51U**	SKD82.51 SKD82.51U					8 s				
SKB32.50	SKB32.50	20 mm	2800 N	AC 230 V	3-position	-	120 s	-	Turn, position is maintained	[1], [2]
SKB32.51	SKB32.51					10 s				
SKB60	SKB60			AC 24 V	0…10 V 4…20 mA 0…1000 Ω	-	Opening: 120 s Closing:10 s	x		[3]
SKB62 **SKB62U**	SKB62 SKB62U					10 s				
SKB62UA	SKB62UA									[4]
SKB82.50 **SKB82.50U**	SKB82.50 SKB82.50U				3-position	-	120 s	-		[1], [2]
SKB82.51 **SKB82.51U**	SKB82.51 SKB82.51U					10 s				
SKC32.60	SKC32.60	40 mm	2800 N	AC 230 V	3-position	-	120 s	-	Turn, position is maintained	[1], [2]
SKC32.61	SKC32.61					18 s				
SKC60	SKC60			AC 24 V	0…10 V 4…20 mA 0…1000 Ω	-	Opening: 120 s Closing: 20 s	x		[3]
SKC62 **SKC62U**	SKC62 SKC62U					20 s				
SKC62UA	SKC62UA									[4]
SKC82.60 **SKC82.60U**	SKC82.60 SKC82.60U				3-position	-	120 s	-		[1], [2]
SKC82.61 **SKC82.61U**	SKC82.61 SKC82.61U					18 s				

[1] Auxiliary switch (optional)

[2] Potentiometer (optional)

[3] Position feedback, forced control, selection of valve characteristic

[4] Plus sequence control, stroke limitation, selection of acting direction

Ordering (Example)

Type	Stock no.	Description
VXF63.32-16	S55210-V137	3-port valve with flange, PN 40, DN32

Delivery

Valves, actuators, and accessories are packed and delivered separately.

Note

Counter-flanges, bolts, and gaskets must be provided on site.

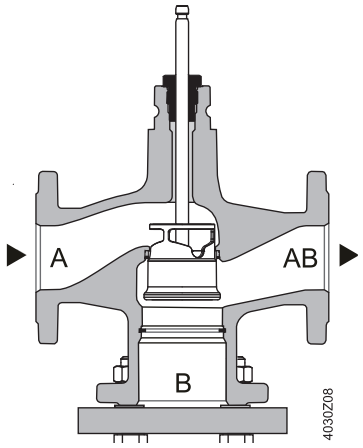
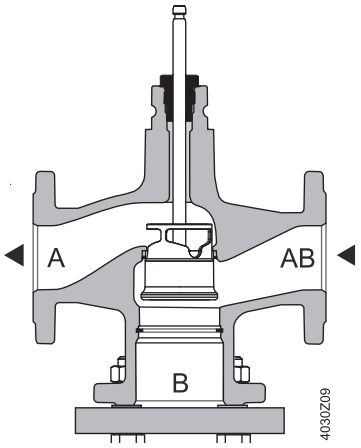
Product documentation

Title	Content	Document ID
Mounting instructions Valves VVF.. VXF..	Mounting instructions: DN 15…150	M4030 74 319 0749 0
Valves VVF..,VXF..,VVG41.., VXG41.., VVI41.., VXI41..	Basic documentation: Contains background information and general technical basics of valves	P4030

Technical design

The illustrations below show the basic design of the valves. Constructional features, such as the shape of plugs, may differ.

2-port valves

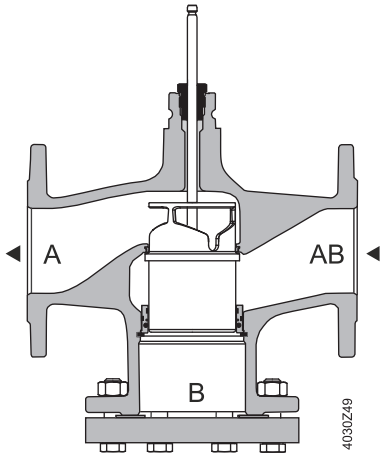
Liquids	Steam (Liquids possible)
Closing against the pressure	Closing with the pressure
 A ⟶ AB	 A ⟵ AB

2-port valves **pressure-compensated**

The VVF63..K valves use a pressure-compensated plug. This enables the same type of actuators to be used for the control of volumetric flow at higher differential pressures.

DN 50…150 Liquids and steam

Closing with the pressure



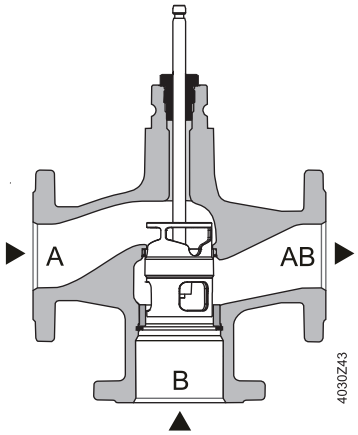
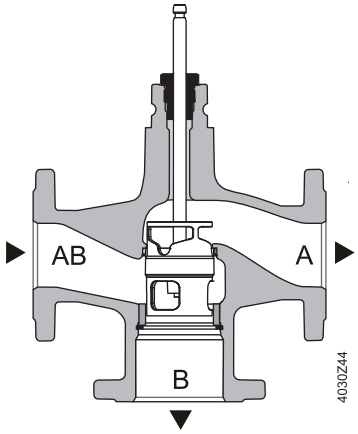
A ⟵ AB

Note

2-port valves do not become 3-port valves by removing the blank flange!

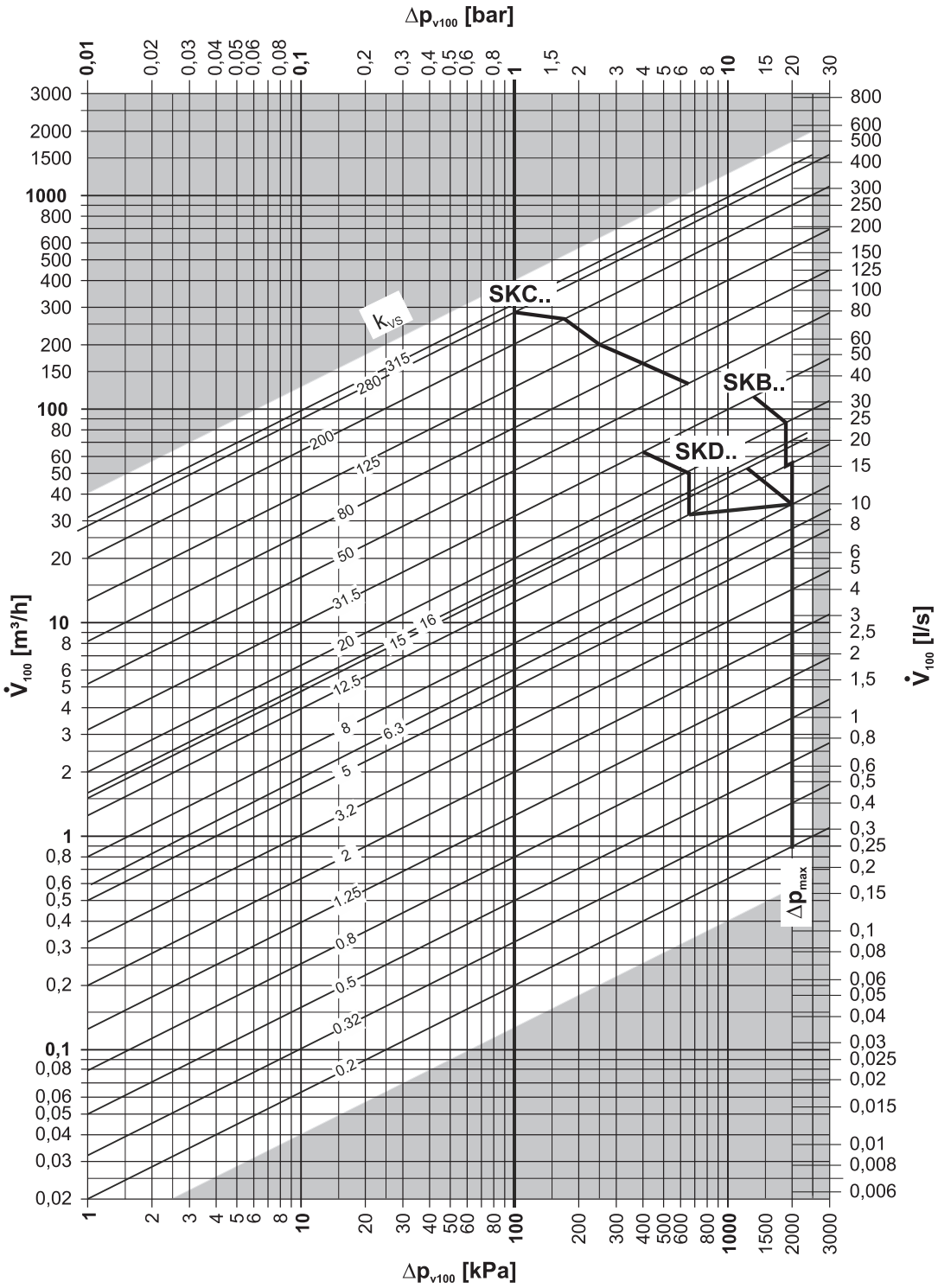
3-port valves

Liquids

Mixing valve (preferred use)	Diverting valve
	

Sizing

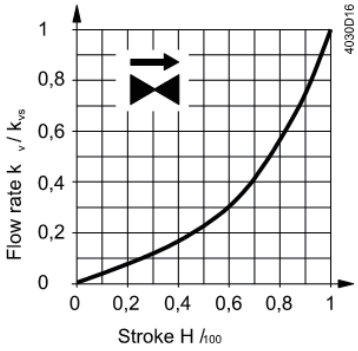
Flow chart



Δp_{max} values apply for the mixing function; Δp_{max} for the diverting function. See Type summary [▶ 2].

Valve characteristics

2 port valves

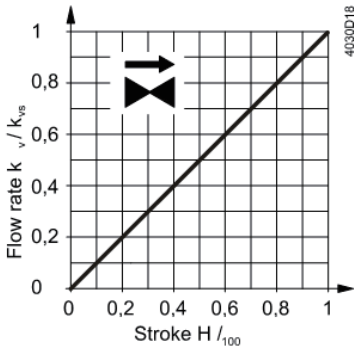


0…30 %: Linear

30…100 %: Equal percentage
n_{gl} = 3 to VDI / VDE 2173

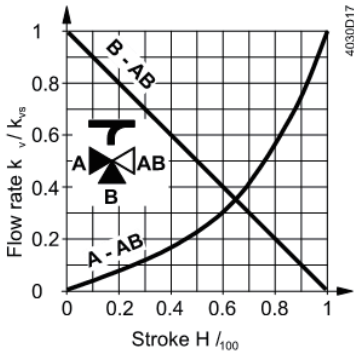
For high k_{vs} values, the valve characteristic is optimized for maximum volumetric flow k_{V100}.

For product lines:
VVF63.125 220K
VVF63.150 315K



0…100 %: Linear

3 port valves



Throughport A-AB

0...30 %: Linear

30...100 %: Equal percentage
n_{gl} = 3 to VDI / VDE 2173

For high k_{vs} values, the valve characteristic is optimized for maximum volumetric k_{v100}.

Bypass B-AB

0...100 %: Linear

Port AB = constant volumetric flow

Port A = variable volumetric flow

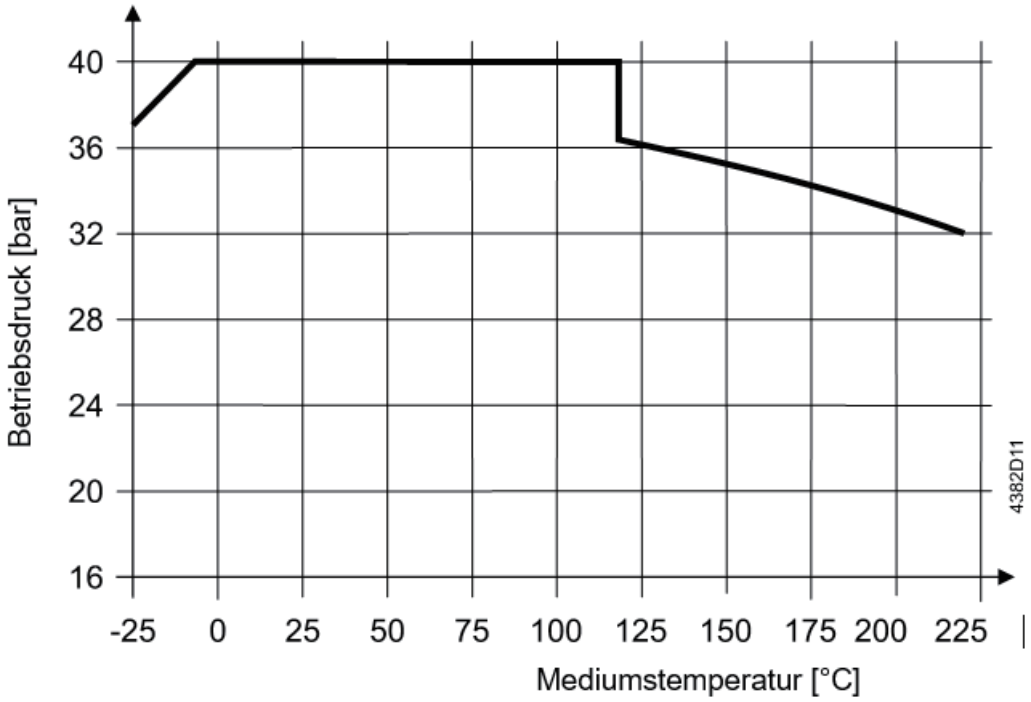
Port B = Bypass (variable volumetric flow)

Mixing: Volumetric flow from port A and port B to port AB

Diverting: Volumetric flow from port AB to port A and port B

Operating pressure and medium temperature

Liquids
with V..F63..

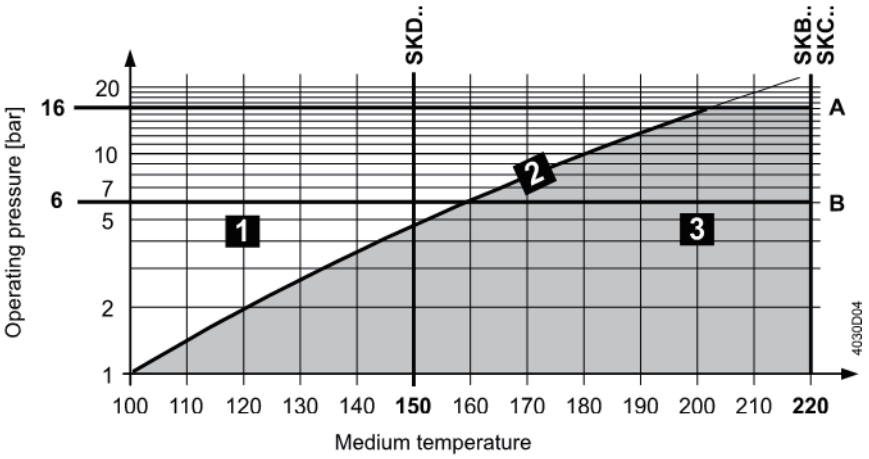


Operating pressure and operating temperatures according to ISO 7005, EN 1092, DIN 4747 and EN 12284

Note:

All relevant local directives must be observed

Saturated steam
Superheated steam
with V..F63..



1	Water	-
2	Wet steam	To be avoided
3	Saturated steam Superheated steam	Permissible operating range
A	Subcritical pressure ratio	
B	Supercritical pressure ratio	

Medium compatibility and temperature ranges

	Temperature range		VVF63..	VXF63..	VVF63..K	
	T_{min} [°C]	T_{max} [°C]				
Cold water	1	25	x	x	x	-
Low-temperature hot water	1	130	x	x	x	-
High-temperature hot water	130	150	x	x	x	-
	150	180	x	x	x	-
	180	220	x	x	x	-
Water with anti-freeze	-25	130	x	x	-[1)]	V..F63: For medium temperatures below -5 °C, the steam sealing gland must be replaced (DN15..50: 4 284 8806 0) (DN65..150: 4 679 5629 0).
	-10	130	x	x	-[1)]	
	-5	130	x	x	x	
	130	150	x	x	x	
Cooling water	1	25	x	x	x	Open circuits
Brines	-25	130	x	x	-[1)]	V..F63: For medium temperatures below -5 °C, the steam sealing gland must be replaced (DN15..50: 4 284 8806 0) (DN65..150: 4 679 5629 0).
	-10	130	x	x	-[1)]	
	-5	130	x	x	x	
	130	150	x	x	x	
Saturated steam	100	150	x	-	x	Min. dryness at inlet: 0.98
	150	200	x	-	x	
	200	220	x	-	x	
Superheated steam	120	150	x	-	x	-
	150	220	x	-	x	-
Heat transfer oils	20	220	x	x	x	On the basis of mineral oil, thermal oil
Super-clean water (demineralized and deionized water)	1	150	-	-	-	-
Demineralized water according to VDI2035 / SWKI_BT102-01	1	130	x	x	x	

[1)] VVF63..K valves cannot be used with media below -5 °C due to the compensation sealing material.

Fields of use

Fields of use		Type	
		VVF63..	VXF63..
Generation	Boiler plants	x	x
	District heating plants	x	-
	Refrigeration plants	x	x
	Cooling towers [2]	x	x
Distribution	Heating groups	x	x
	Air handling units	x	x

[2] Open circuits

Notes

Engineering

Mounting location

Preferably mount the valves at the return, as the temperature is lower there and the stain on the steam sealing gland is lower.

Dirt trap

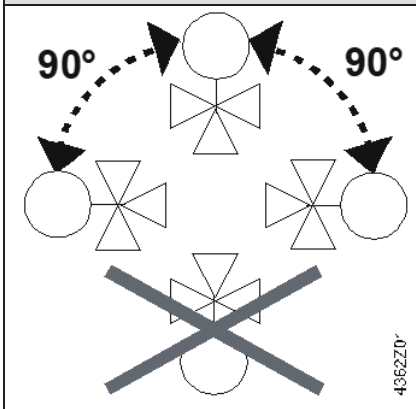
Mount a dirt filter or dirt trap before the valve to ensure proper functioning, and a long service life of the valves.
Remove dirt, welding beads, etc. from the valves and pipes.

Cavitation

Cavitation can be avoided by limiting the pressure differential across the valve depending on the medium temperature and the prepressure.

Mounting

Mounting position



Mounting positions apply to both 2- and 3-port valves.

Commissioning

The valve may be put into operation only if actuator and valve are correctly assembled.

Note

Ensure that the actuator stem and valve stem are rigidly connected in all positions.

Function check

Valve	Throughport A->AB or AB->A	Bypass B->AB
Valve stem extends	Closes	Opens
Valve steam retracts	Opens	Closes

Maintenance

The valves are maintenance-free.

⚠ CAUTION

When servicing valves or actuators:

- Deactivate the pump and turn off the power supply
- Close the shutoff valves
- Fully reduce the pressure in the piping system and allow the pipes to completely cool down

If necessary, disconnect the electrical wires.

Disposal

Do not dispose of the valve as part of domestic waste.

- Special treatment for individual components may be required by law or make ecological sense.
- Comply with all local and currently applicable laws and regulations.

Warranty

Application-related technical data are guaranteed only when the valves are used in combination with the Siemens actuators listed under "Type summary" and "Equipment combinations". When used with actuators of third-party manufacturers, any warranty by Siemens becomes void.

Technical data

Functional data			
PN class			PN 40
Connection			Flange
Operating pressures			See "Operating pressure", see page 11
Valve characteristic [1]			See "Valve characteristics", page 10
Leakage rate	Throughport	DN 15…150	0…0.01 % of k_{vs} value (Class IV)
	Bypass		0.5…2 % of k_{vs} value with SKD.., SKB.., SKC..
Permissible media			See "Medium compatibility and temperature ranges", page 12 Heat transfer oils
Medium temperature			-25…220 °C [2]
		VVF63..K	-5…220 °C
Rangeability		DN15 k_{vs} 0.2...1.25	>50
		DN15 k_{vs} 2 ... DN150	>100
Nominal stroke		Up to DN 50	20 mm
		From DN 65	40 mm

Materials		
Valve body		Cast steel GP240GH
Blank flange	VVF..	P265GH
Valve stem, seat, plug		Stainless steel
Steam sealing gland		Stainless steel
	DN 15…150	FEPM (silicone free)
Compensation sealing		Stainless steel
	DN 15…150	FEPM (silicone free)

Standards and directives		
Pressure Equipment Directive Pressure accessories		PED 2014/68/EU Scope: Article 1, section 1 Definition: Article 2, section 5
Liquid group 2	DN 15…40	Without CE-marking, as per article 4, section 3 (sound engineering practice) [3]
	DN 50…80	Category I, Module A, with CE-marking, as per article 14, section 2
	DN 100…150	Category II, Module A2, with CE-marking, as per article 14, section 2
		Notified body number 0036
EU conformity (CE)	DN 50…150	A5W00006523 [4]
PN class		ISO 7268

Standards and directives		
Operating pressure		ISO 7005, EN1092, DIN 4747, EN 12284
Flanges		ISO 7005
Length of flanged valves		DIN EN 558-1, line 1
Valve characteristic		VDI 2173
Leakage rate	Throughport, Bypass	according to EN 60534-4 / EN 1349
Water treatment		VDI 2035

Environmental conditions		
Storage		IEC 60721-3-1
	Class	1K3
	Temperature	-15…55 °C
	Rel. humidity	5…95 % r.h.
Transportation		IEC 60721-3-2
	Class	2K3, 2M2
	Temperature	-30…65 °C
	Rel. humidity	< 95 % r.h.
Operation		IEC 60721-3-3
	Class	3K5, 3Z11
	Temperature	-15…55 °C
	Rel. humidity	5…95 % r.h.

Environmental compatibility
The product environmental declarations A5W00049179 [4], A5W00049180 [4] und A5W00049181 [4] contain data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).

Dimensions / Weight	
Dimensions	See Dimensions [► 17]
Weight	

1) For certain valve lines and high k_{vs} values, the valve characteristic is optimized for maximum volumetric flow k_{V100}.

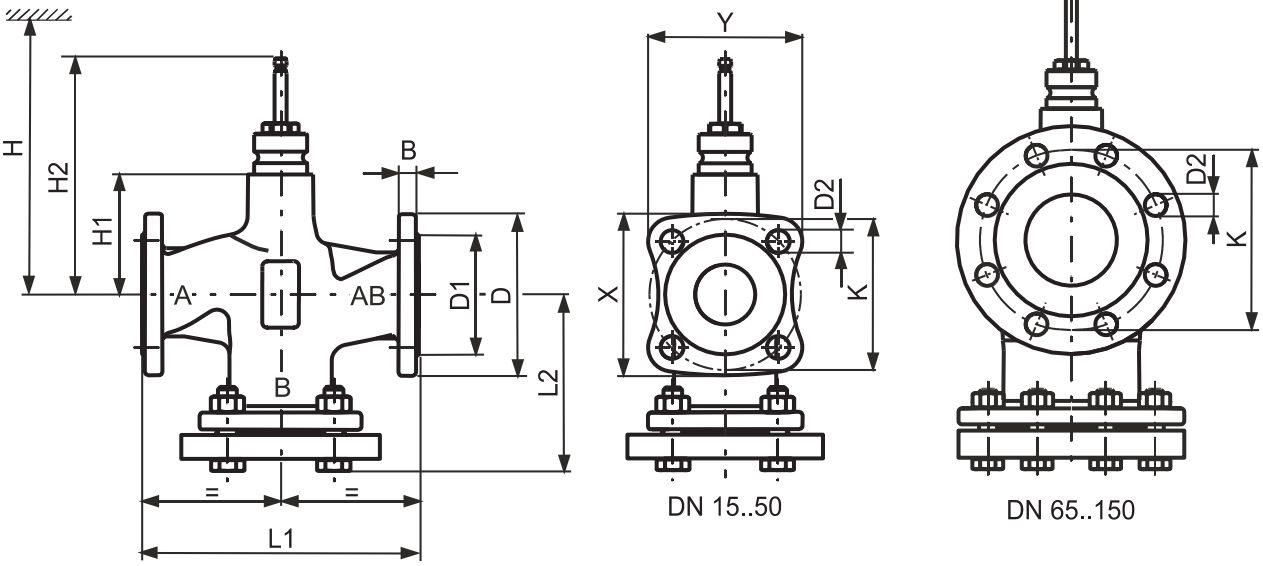
2) With SKD..: Usable up to a max. medium temperature of 150 °C
For medium temperatures < -5 °C, the stem sealing gland must be replaced, see page 4 [► 5]

3) Valves where PS x DN < 1000 do not require special testing and cannot carry the CE-marking

4) The documents can be downloaded from http://www.siemens.com/bt/download

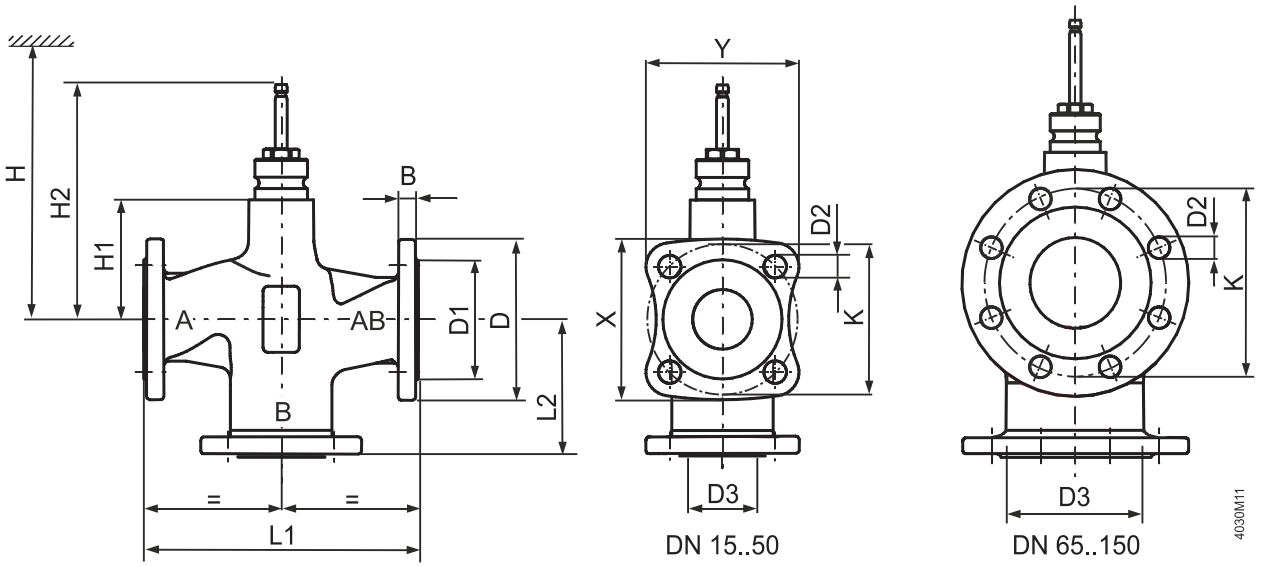
Dimensions

VVF63..



Type	DN	kg	B	Ø D	Ø D1	Ø D2	L1	L2	X	Y	Ø K	H1	H2	H		
														SKD	SKB	SKC
VVF63..	15	5.3	14	95	46	14 (4x)	130	87.5	79	76	65	63	159.5	563	638	-
	20	6.5	16	105	56	14 (4x)	150	99.5	86.6	83	75	63	144.4	563	638	-
	25	7.5	15	115	65	14 (4x)	160	104.5	94.4	90.1	85	63	159.5	563	638	-
	32	10.6	17	140	76	19 (4x)	180	119	115.6	110.7	100	60	156.5	560	635	-
	40	12.3	16	150	84	19 (4x)	200	129	123.2	117.8	110	60	156.5	560	635	-
	50	13.4	16	165	99	19 (4x)	230	146	135.2	128.4	125	100	196.5	600	675	-
	65	29.1	17	185	118	19 (8x)	290	178	-	-	145	115	231.5	-		690
	80	36.9	17	200	132	19 (8x)	310	190	-	-	160	115	231.5	-	-	690
	100	49.8	17	235	156	23 (8x)	350	212.5	-	-	190	146	262.5	-	-	721
	125	73.0	17	270	184	28 (8x)	400	242	-	-	220	159	275.5	-	-	734
	150	102.4	17	297	211	28 (8x)	480	284	-	-	250	186.5	303	-	-	762
VVF63..K	50	17.4	16	165	99	19 (4x)	230	146	135.2	128,4	125	100	196.5	600	675	-
	65	29.2	17	185	118	19 (8x)	290	178	-	-	145	115	231.5	-	-	690
	80	37.1	17	200	132	19 (8x)	310	190	-	-	160	115	231.5	-	-	690
	100	50.2	17	235	156	23 (8x)	350	212.5	-	-	190	146	262.5	-	-	721
	125	73.7	17	270	184	28 (8x)	400	242	-	-	220	159	275.5	-	-	734
	150	103.9	17	297	211	28 (8x)	480	284	-	-	250	186.5	303	-	-	762

VXF63..



Type	DN	kg	B	Ø D	Ø D1	Ø D2	L1	L2	X	Y	Ø K	H1	H2	H		
														SKD	SKB	SKC
VXF63..	15	4.3	14	95	46	14 (4x)	130	65	79	76	65	63	159.5	563	638	-
	20	5.2	16	105	56	14 (4x)	150	75	86.6	83	75	63	159.5	563	638	-
	25	6.0	15	115	65	14 (4x)	160	80	94.4	90.1	85	63	159.5	563	638	-
	32	8.0	17	140	76	19 (4x)	180	90	115.6	110.7	100	60	156.5	560	635	-
	40	9.4	16	150	84	19 (4x)	200	100	123.2	117.8	110	60	156.5	560	635	-
	50	13.5	16	165	99	19 (4x)	230	115	135.2	128.4	125	100	196.5	600	675	-
	65	23.5	17	185	118	19 (8x)	290	145	-	-	145	115	231.5	-		690
	80	30.1	17	200	132	19 (8x)	310	155	-	-	160	115	231.5	-	-	690
	100	39.8	17	235	156	23 (8x)	350	175	-	-	190	146	262.5	-	-	721
	125	58.4	17	270	184	28 (8x)	400	200	-	-	220	159	275.5	-	-	734
	150	84.0	17	297	211	28 (8x)	480	240	-	-	250	186.5	303	-	-	762

[1] Bypass port clear inner width

Revision numbers

Type	Valid from rev. no.	Type	Valid from rev. no.	Type	Valid from rev. no.
VVF63.15-0.2	…B	**VVF63.50-40K**	…B	**VXF63.15-1.6**	…B
VVF63.15-0.32	…B	**VVF63.65-63K**	…B	**VXF63.15-2.5**	…B
VVF63.15-0.5	…B	**VVF63.80-100K**	…B	**VXF63.15-4**	…B
VVF63.15-0.8	…B	**VVF63.100-150K**	…B	**VXF63.20-6.3**	…B
VVF63.15-1.25	…B	**VVF63.125-220K**	…B	**VXF63.25-6.3**	…B
VVF63.15-2	…B	**VVF63.150-315K**	…B	**VXF63.25-10**	…B
VVF63.15-3.2	…B			**VXF63.32-16**	…B
VVF63.20-6.3	…B			**VXF63.40-16**	…B
VVF63.25-5	…B			**VXF63.40-25**	…B
VVF63.25-8	…B			**VXF63.50-31.5**	…B
VVF63.32-16	…B			**VXF63.65-50**	…B
VVF63.40-12.5	…B			**VXF63.80-80**	…B
VVF63.40-20	…B			**VXF63.100-125**	…B
VVF63.50-31.5	…B			**VXF63.125-200**	…B
VVF63.65-50	…B			**VXF63.150-315**	…B
VVF63.80-80	…B				
VVF63.100-125	…B				
VVF63.125-200	…B				
VVF63.150-315	…B				

MXG461..
MXG461..P

MXF461..
MXF461..P

ACVATIX™

Modulating control valves with magnetic actuators, PN 16

MXG461..
MXG461..P
MXF461..
MXF461..P

for chilled and low-temperature hot water systems or
for systems with media containing mineral oils (MX..461..P)

- **Fast positioning time (<2 s), high-resolution stroke (1 : 1000), high rangeability**
- **Equal-percentage or linear valve characteristic (user-selected)**
- **Operating voltage AC / DC 24 V**
- **Switch-selected control signal DC 0/2...10 V or DC 4...20 mA**
- **DC 0…20 V phase cut control signal with SEZ91.6 external interface**
- **Indication of operating state, position feedback and manual control**
- **Wear-free inductive stroke measurement**
- **Fail-safe feature: A → AB closed when de-energized**
- **Low friction, robust, no maintenance required**

Use

The control valves are mixing or throughport valves with the ready fitted magnetic actuator for position control and position feedback. The short positioning time, high resolution and high rangeability make these valves ideal for modulating

- control of chilled and low-temperature hot water systems
- control or dosing control of fluids containing mineral oil (SAE05...SAE50), mineral-oil-based diesel fuels, heat transfer oils

in closed circuits.

Application examples MX..461..P

- Temperature control in mixing circuits for motor oil circulation
- Temperature control in mixing circuits for screw-compressors (compressed air)
- Temperature control of fuel circuits in mixing circuits for petrol and diesel oil
- High pressure control for the calibration of components for electronic injection components
- Control of cutting-oil emulsion for industrial grinding machines

Type summary

Type reference		DN	k_{VS}	Δp_{max}	Δp_S	Operating voltage	Positioning		Spring return
MX..461..	MX..461..P [1]		[m^3/h]	[kPa]	[kPa]		signal	time	
MX..461.15-0.6	MX..461.15-0.6P	15	0.6	300	300	AC / DC 24 V	DC 0...10 V or DC 2…10 V or DC 4...20 mA	<2 s	✓
MX..461.15-1.5	MX..461.15-1.5P		1.5						
MX..461.15-3.0	MX..461.15-3.0P		3.0						
MX..461.20-5.0	MX..461.20-5.0P	20	5.0						
MX..461.25-8.0	MX..461.25-8.0P	25	8.0						
MX..461.32-12	MX..461.32-12P	32	12						
MX..461.40-20	MX..461.40-20P	40	20						
MX..461.50-30	MX..461.50-30P	50	30						
MXF461.65-50	MXF461.65-50P	65	50						
M3P80FY	M3P80FYP	80	80	see datasheet N4454					
M3P100FY	M3P100FYP	100	130						

[1] for media containing mineral oils

.. = F for flanged valves
G for threaded valves

Δp_{max} = max. permissible differential pressure across the valve's control path, valid for the entire actuating range of the motorized valve

Δp_S = max. permissible differential pressure (close off pressure) at which the motorized valve will close securely against the pressure (used as throughport valve)

k_{VS} = nominal flow rate of cold water (5 to 30 °C) through the fully opened valve (H_{100}) at a differential pressure of 100 kPa (1 bar)

High performance range

Type	DN	Type suffix	Description	Examples	Datasheet
MXG461..U	15…50	U	Set of 3 NPT threaded fittings enclosed	MXG461.15-3.0**U**	N4455
MXF461..U	65	U	Flanges to ASME/ANSI B16.1 Class125	MXF461.65-50**U**	N4455

Accessories

Type	Description
ALG..3 (.. = DN)	Set of 3 threaded fittings for 3-port valves, consisting of 3 union nuts, 3 discs and 3 flat seals
Z155/.. (.. = DN)	Blank flange set with blank flange, seal, screws, spring washers and nuts
SEZ91.6	External interface for DC 0…20 V phase cut control signal, refer to data sheet N5143

Order

When ordering, please give quantity, product name and type reference.

Product number	*Stock number*	*Description*
MXG461.25-8.0	MXG461.25-8.0	Threaded valve with magnetic actuator
ALG253	ALG253	Set of threaded union fittings
MXF461.20-5.0	MXF461.20-5.0	Flanged valve with magnetic actuator
Z155/20F	Z155/20F	Set of blank flanges

Delivery	Valve body and magnetic actuator form one assembly and cannot be separated. The threaded fitting sets and blank flanges are packed and supplied separately.
Replacement electronics module ASE1, ASE2	Should the valve electronics prove faulty, the electronics module must be replaced by the ASE1 (DN 15…32) or ASE2 (DN 40…65) replacement electronics module. Mounting Instructions no. 35678 are included.
Rev. no.	See overview, page 16.

Technical and mechanical design

For a detailed description of operation, refer to data sheet CA1N4028E.

Control operation

The electronics module converts the positioning signal to a phase-cut power signal which generates a magnetic field in the coil. This causes the armature to change its position in accordance with the interacting forces (magnetic field, counterspring, hydraulics). The armature responds rapidly to any change in signal, transferring the corresponding movement directly to the valve plug, enabling fast changes in load to be corrected quickly and accurately.
The valve's position is measured continuously (inductive). The internal positioning controller balances any disturbance in the system rapidly and delivers the position feedback signal. The valve stroke is proportional to the positioning signal.

Spring return facility

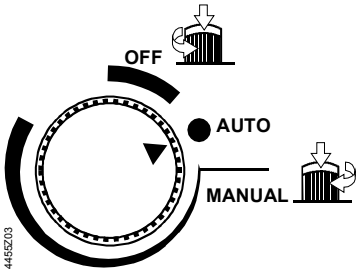
If the positioning signal is interrupted, or in the event of a power failure, the valve's return spring will automatically close control path A → AB.

Control

The magnetic actuator can be driven by a Siemens controller or a controller of other manufacture that deliver a DC 0/2...10 V or DC 4... 20 mA output signal.
To achieve optimum control performance, it is recommended to use a 4-wire connection.

Manual control

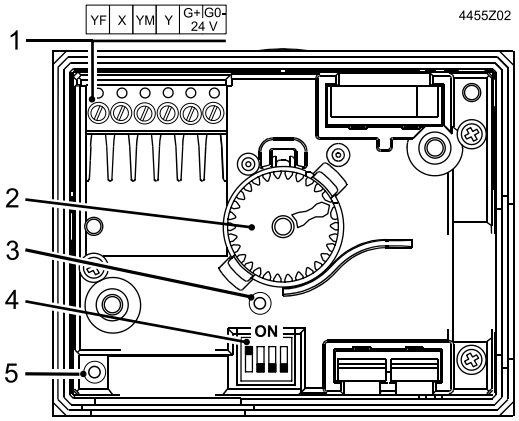
MANUAL
The valve control path (ports A → AB) can be opened manually to between 80 and 90 % of the full stroke (depending on DN) by pressing the hand wheel inwards and turning it clockwise (MANUAL setting). This disables the control signal from the controller, the green LED is flashing.



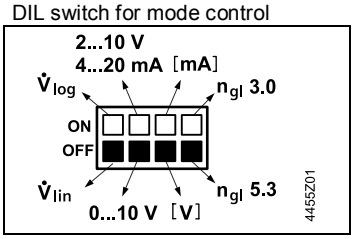
OFF
To disable automatic control of the valve, press the hand wheel inwards and turn it anti-clockwise (to the OFF position). The valve will close, the green LED is flashing.

AUTO
For automatic control, the hand wheel must be set to the AUTO position (the hand wheel will spring out), the green LED is lit.

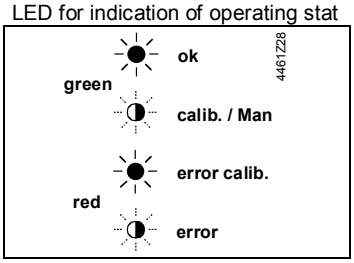
Operator controls and indicators in the electronics housing



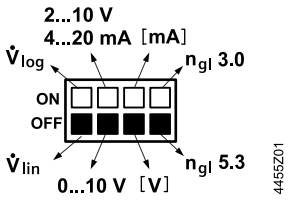
1 Connection terminals
2 Hand wheel
3 Opening for autocalibration
4 DIL switch for mode control

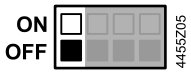


5 LED for indication of operating stat



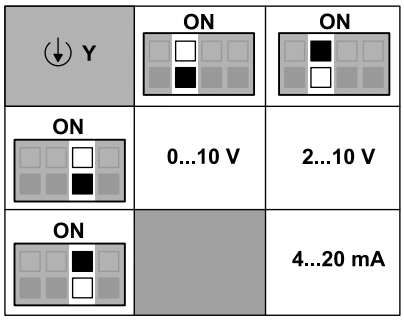
Configuration DIL switches



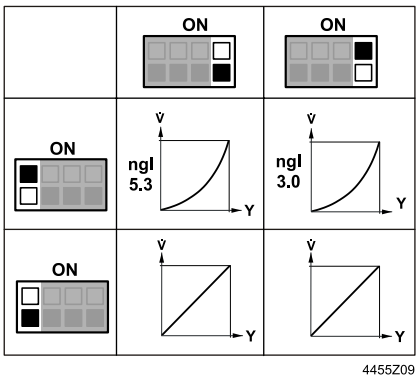
Switch	Function	ON / OFF	Description
	Valve characteristic	ON	$\dot{V}_{log}$ (equal percentage)
		OFF	**$\dot{V}_{lin}$ (linear) [1)]**
	Positioning signal Y	ON	DC 2...10 V, DC 4...20 mA
		OFF	**DC 0...10 V [1)]**
	[V] or [mA]	ON	[mA]
		OFF	**[V] [1)]**
	Valve characteristics	**ON**	**ngl 3.0**
		OFF	**ngl 5.3 [1)]**

1) Factory setting

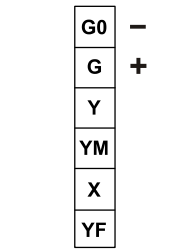
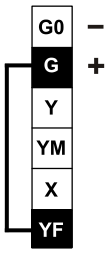
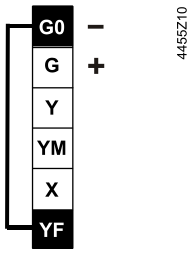
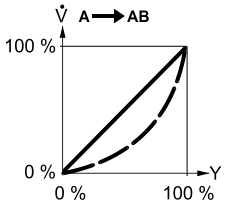
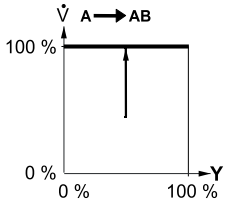
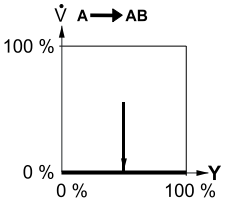
Assignment positioning signal Y: Voltage or current



Selection of valve characteristic (Positioning signal against volumetric flow): Equal-percentage or linear



Forced control input YF

	YF – Function		
	no function	fully open	closed
Connections			
Transfer			
Function	• YF not connected • valve will follow the Y-signal	• YF connected to G • valve will fully open control path A → AB	• YF connected to G0 • valve will close control path A → AB

Signal priority

1. Hand wheel position MANUAL (open) or OFF (close)
2. Forced control signal YF
3. Signal input Y

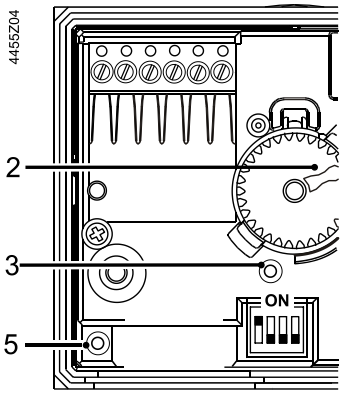
Calibration

The MX..461.. and MX..461..P magnetic valves are factory-calibrated at 0 % and 100 % stroke.

When commissioning the valves, however, (especially under extreme conditions of use) there may still be some leakage via control path A → AB with a 0 % stroke control signal (DC 0 V, DC 2 V or DC 4 mA). In this case, the valve can be recalibrated simply and quickly:

1. Hand wheel [2] in AUTO-position
2. Use a pointed implement (ø 2 mm) to operate the button in the opening [3] once
3. While recalibration is in progress, the LED [5] is flashing green for approximately 10 seconds. The valve will be briefly closed and fully opened.

If the electronics module is replaced, the valve's electronics must be recalibrated. For that, the hand wheel must be set to AUTO.



Indication of operating state

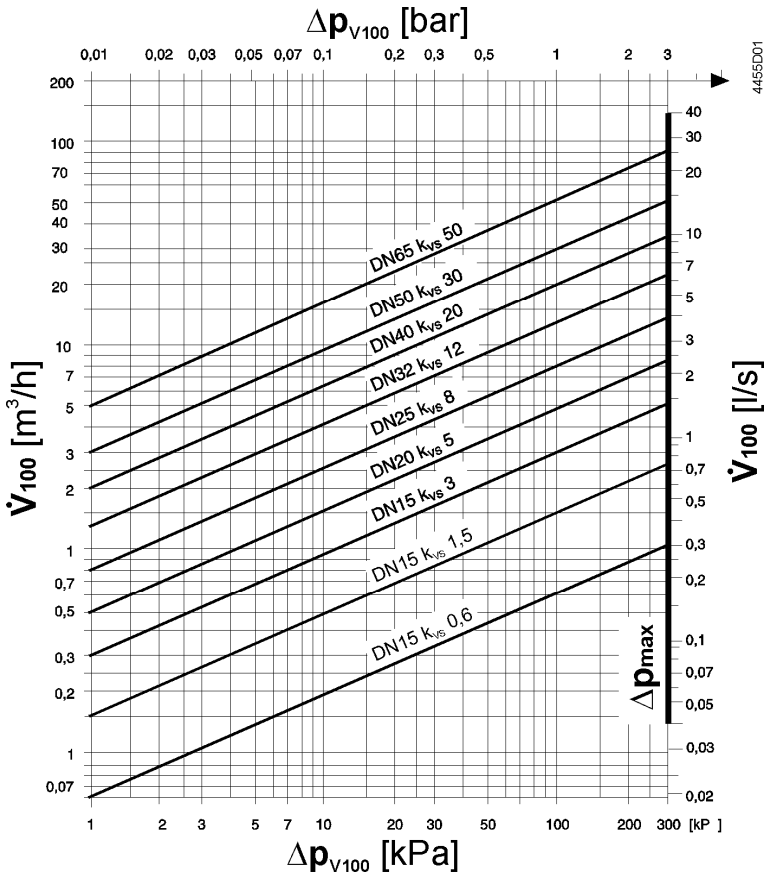
The two-color LED display indicating operating status can be viewed by opening the cover of the electronics module.

LED	Indication	Function	Remarks, troubleshooting
Green	Lit	Control mode	Automatic operation; everything o.k.
	Flashing	Calibration	Wait until calibration is finished (green or red LED will be lit)
		In manual control	Hand wheel in MANUAL or OFF position
Red	Lit	Calibration error	Recalibrate (operate button in opening 1x)
		Internal error	Replace electronics module
	Flashing	Mains fault	Check mains network (outside the frequency or voltage range) or valve blocked
Both	Dark	No power supply	Check mains network, check wiring
		Electronics faulty	Replace electronics module

As a general rule, the LED can assume only the states shown above (continuously red or green, flashing red or green, or off).

Sizing

Flow chart



Δp_{V100} = differential pressure across the fully open valve and the valve's control path A → AB by a volume flow $\dot{V}_{100}$

$\dot{V}_{100}$ = volume flow through the fully open valve (H_{100})

Δp_{max} = max. permissible differential pressure across the valve's control path for the entire actuating range of the motorized valve

100 kPa = 1 bar ≈ 10 mWC

1 m^3/h = 0.278 l/s water at 20 °C

Note for media other than water

When sizing valves for media other than water, note that the medium properties

- specific heat
- density
- kinematic viscosity

differ from water. All variables depend on temperature. The design temperature is the lowest medium temperature in the valve.

Note on viscosity

Viscosity may change considerably on temperature changes depending on the medium. Plant functionality may be impaired if the medium temperature does not guarantee viscosity values compatible with troublefree valve functioning.

Kinematic viscosity ≤10 mm^2/s

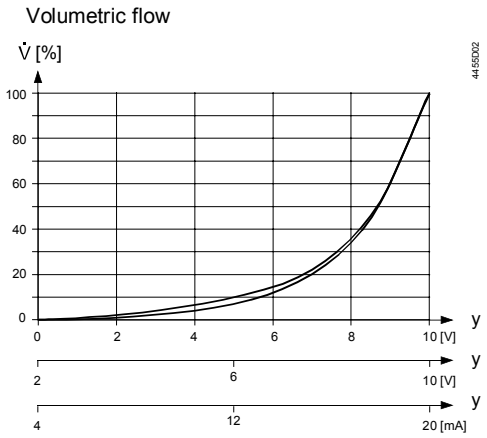
Kinematic viscosity υ [mm^2/s] in HVAC plants always is lower than 10 mm^2/s, i.e. its influence on volume flow is negligible.

>10 mm^2/s

For details please contact your local Siemens branch office.

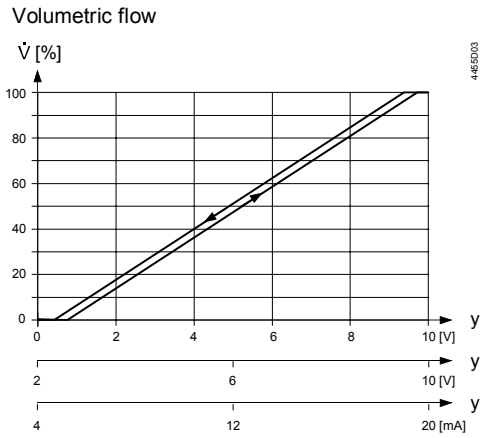
Valve characteristic

Equal percentage



Positioning signals

Linear



Positioning signals

Connection type [1)]

The 4-wire connection should always be given preference!

4-wire connection

Type reference	S_{NA} [VA]	P_{MED} [W]	S_{TR} [VA]	P_{TR} [W]	I_F [A]	Cross-sectional area [mm^2] 1.5 | 2.5 | 4.0 **max. cable length L** [m]		
MX..461.15-0.6	29	5	≥50	≥30	3.15	70	110	170
MX..461.15-1.5								
MX..461.15-3.0								
MX..461.20-5.0								
MX..461.25-8.0								
MX..461.32-12								
MX..461.40-20	44	6	≥75	≥50	4	40	70	110
MX..461.50-30								
MXF461.65-50	46					30	50	80

S_{NA} = Nominal apparent power
P_{med} = Typical power consumption in the application (Valve characteristic: equal percentage)
S_{TR} = Minimal apparent transformer power
P_{TR} = Minimum DC supply power
I_F = Minimal required slow fuse
L = Max. cable length; with 4-wire connections, the max. permissible length of the separate 1.5 mm^2 copper positioning signal cable is 200 m

[1)] All information at AC 24 V or DC 24V

Engineering notes

Conduct electric connections in accordance with local regulations on electric installations as well as the internal or connection diagrams.

Attention ⚠ **Observe safety regulations and restrictions designed to ensure the safety of people and property at all times!**

⚠ **Fit a strainer upstream of the valve to increase reliability.**

⚠ **Do not touch hot surfaces.**

⚠ **Avoiding flow noise**
To reduce flow noise, abrupt reductions in pipe diameters, tight pipe bends, sharp edges or reductions in the vicinity of valves should be avoided. A settling path should be provided.
Recommendation:

- L ≥ 10 x DN, at least 0.4 m

Also, the flow must be free from cavitation

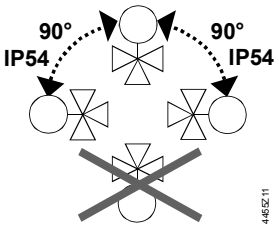
Mounting notes

Mounting and operating instructions are printed on the actuator and on the electronics module.

Caution ⚠ **The valve may only be used as a mixing or throughport valve, not as a diverting valve. Observe the direction of flow!**

⚠ **A strainer should be fitted upstream of the valve. This increases reliability.**

Orientation



Degree of protection valid only with M20 cable gland supplied by the installer.

Access for installation

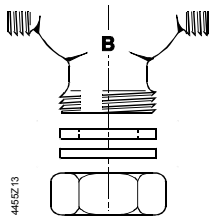
It is essential to maintain the specified minimum clearance above and to the side of the actuator and/or electronics module! (refer to "Dimensions", page 14)
DN 15…32 = 100 mm
DN 40…65 = 150 mm

Use as straight-through valves

Only three-way MX..461.. valves are supplied. They may be used as straight-through valves by closing off port "B".

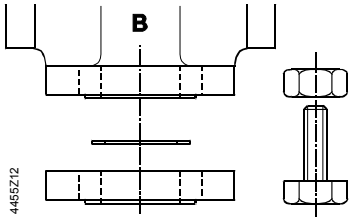
MXG461.. threaded valves in straight-through applications

Port "B" can be sealed with the accessories supplied (cover, gasket) and the union nut of the ALG..3 coupling.



MXF461.. flanged valves in straight-through applications

Port "B" can be sealed with part Z155/.. which must be ordered as a separate item.
The part comes complete with blank flange, seal, screws, spring washers and nuts.
DN 15…32 blank flange (Z155/15F..Z155/32F)
DN 40…65 blank flange (Z155/40..Z155/65)



Installation notes

- The MXG..461.. valves are flat-faced allowing sealing with the gaskets provided with the ALG..3 set of 3 threaded fittings.
- Do not use hemp for sealing the valve body threads.
- The actuator may not be lagged.

For notes on electrical installation, see "Connection diagram".

Maintenance notes

The valves and actuators are maintenance-free.

The low friction and robust design make regular servicing unnecessary and ensure a long service life.
The valve stem is sealed from external influences by a maintenance-free gland.

If the red LED is lit, the electronics must be recalibrated or replaced.

Repair

If the valve electronics prove faulty, the electronics module must be replaced by the ASE1 (DN 15…32) or ASE2 (DN 40…65) replacement electronics module.
Mounting instructions no. 35678 are included.

Caution ⚠ **Always disconnect power before fitting or removing the electronics module.**

After replacing the electronics module, calibration must be triggered in order to optimally match the electronics to the valve (refer to "Calibration", page 5).

Caution ⚠ **Under operating conditions within the limits defined by the application data, the actuator will become hot, but this does not represent a burn risk. Always maintain the minimum clearance specified, refer to "Dimensions", page 14.**

Disposal

The valve is considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the valve through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Warranty

Observe all application-specific technical data.
If specified limits are not observed, Siemens will not assume any responsibility.

Technical data

Functional actuator data

Power supply	Operating voltage	AC / DC 24 V ±20 % (SELV, PELV) or AC / DC 24 V ±20 % class 2 (US)
	Frequency	45...65 Hz
	Typical power consumption P_{med}	Refer to table " Connection type ", page 7
	Standby	<2 W (valve closed)
	Rated apparent power S_{NA}	Refer to table " Connection type ", page 7
	Minimal required fuse I_F	Refer to table " Connection type page 7
	External supply line protection (EU)	• Fuse slow 6…10 A • Circuit breaker max. 13 A, Characteristic B, C, D according to EN 60898 • Power source with current limitation of max. 10 A
Input	Positioning signal Y	DC 0/2...10 V or DC 4...20 mA
	Impedance DC 0/2...10 V	≥100 kΩ
	DC 4...20 mA	100 Ω
	Forced control YF	
	Impedance	22 kΩ
	Close valve (YF connected to G0)	<AC 1 V
	Open valve (YF connected to G)	>AC 6 V
	No function (YF not wired)	Positioning signal Y active
Output	Position feedback signal X	DC 0...10 V; load resistance >500 Ω
	Max. load	2 mA // 100 pF
	Stroke measurement	Inductive
	Nonlinearity	±3 % of end value
Positioning	Positioning time	<2 s
Electrical connection	Cable entry	2 x ∅ 20.5 mm (for M20)
	Connection terminals	Screw terminals 1.5…4 mm^2
	Maximum cable length	Refer to "Connection type", page 7
Functional valve data	PN class	PN 16 to EN 1333
	Permissible operating pressure	1 MPa (10 bar)
	Differential pressure Δp_{max} / Δp_S	Refer to table "Type summary", page 2
	Leakage rate at Δp = 0.1 MPa (1 bar)	A → AB max. 0.02 % k_{VS} B → AB <0.2 % k_{VS} depending on operating conditions
	Valve characteristic [1)]	linear or equal percentage, n_{gl} = 3.0 and 5.3 VDI / VDE 2173, optimized near the closing point
	Permissible media MX..461..	Chilled and low-temperature hot water, water with anti-freeze; Recommendation: water treatment to VDI 2035
	MX..461..P	Mineral oils SAE05 ... SAE50, mineral-oil-based diesel fuels, heat transfer oils
	Medium temperature	1...130 °C
	Stroke resolution ΔH / H_{100}	1 : 1000 (H = stroke)
	Hysteresis	typically 3 %
	Position when deenergized	A → AB closed
	Mounting position	Upright to horizontal
	Mode of operation	Modulating
	Manual operation	Possible, max. 90 %

Materials	Valve body		Cast iron EN-GJL-250
	Plug		CrNi steel (X12CrNiS18 8)
	Seat		Brass (CuZn39Pb3)
	Valve stem seal	MX..461..	EPDM (O-ring)
		MX..461..P	Fluororubber – FPM product (Viton)
	Bellows		Tombac (CuSn6), bronze (CuSn9), CrNi steel
Dimensions / weight	Dimensions		Refer to "Dimensions", page 14
	Weight		Refer to "Dimensions", page 14
Standards, directives and approvals	Product standard	EN 60730-x	Automatic electrical controls for household and similar use
	Electromagnetic compatibility (Applications)		For use in residential, commerce, light-industrial and industrial environments
	EU Conformity (CE)		CA1T4455xx *)
	EAC conformity		Eurasia conformity for all MX.461..
	RCM Conformity		CA1T4455en_C1 *)
	UL, cUL	AC / DC 24 V	UL 873 http://ul.com/database
	Pressure Equipment Directive		PED 2014/68/EU
	Pressure accessories		Scope: Article 1, section 1 Definitions: Article 2, section 5
	Fluid group 2:	DN 15…50	• without CE-marking as per article 4, section 3 (sound engineering practice) 3)
		DN 65	• Category I, module A, with CE-marking as per article 14, section 2
Degree of protection	Protection class		Class III according to EN 60730-1
	Pollution degree		Class 2 according to EN 60730
	Protection degree of housing Upright to horizontal		IP54 according to EN 60529 (with M20 cable gland)
	Vibration 2)		IEC 60068-2-6 (1 g acceleration, 1...100 Hz, 10 min)
Environmental compatibility			The product environmental declarations contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal)
	MXF461..		
		DN 15…25	CA2E4455.1en *)
		DN 32…50	CA2E4455.2en *)
		DN 65	CA2E4455.3en *)
	MXG461		
		DN 15…25	CA2E4455.4en *)
		DN 32…50	CA2E4455.5en *)

*) The documents can be downloaded from http://siemens.com/bt/download.

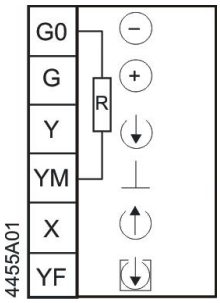
1) Can be selected via DIL switch

2) In case of strong vibrations, use high-flex stranded wires for safety reasons.

3) Valves where PS x DN < 1000, do not require special testing and cannot carry the CE label.

General environmental conditions		Operation EN 60721-3-3	Transport EN 60721-3-2	Storage EN 60721-3-1
MX..461.., MX..461..P	Climatic conditions	Class 3K5	Class 2K3	Class 1K3
	Temperature	-5...45 °C	-25...70 °C	-5...45 °C
	Humidity	5...95 % r.h.	5...95 % r.h.	5...95 % r.h.
	Mechanical conditions	EN 60721-3-6		
		Class 6M2		
		EN 60721-3-3	EN 60721-2	EN 60721-2
MX..461..P	Mechanically active substances		Class 2M2	Class 2M2
	Biological requirements	Class 3B2		
	Chemically active substances	Class 3C1		
	Mechanically active substances	Class 3M2		

Connection terminals



AC 24 / DC 24 V operating voltage	System neutral
	System potential
Positioning signal	DC 0...10 V / 2...10 V / 4...20 mA
	Measuring neutral (= G0)
Position feedback signal	DC 0...10 V
Force control input	

R = Inner resistance between G0 and YM, approx 10 kΩ

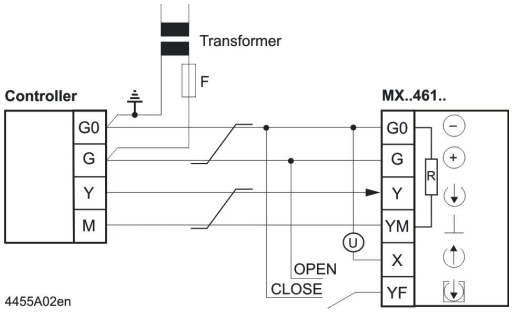
Connection diagrams

Caution ⚠ If controller and valve receive their power from separate sources, only one transformer may be earthed on the secondary side.

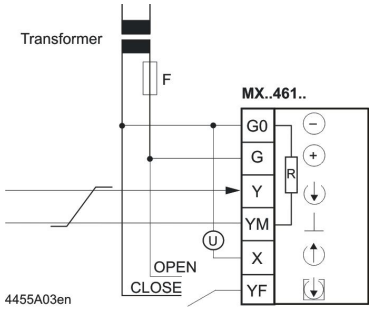
Caution ⚠ In case of DC power supply, a 4-wire connection is mandatory!

Terminal assignment for controller with 4-wire connection (to be preferred!)

Common transformer

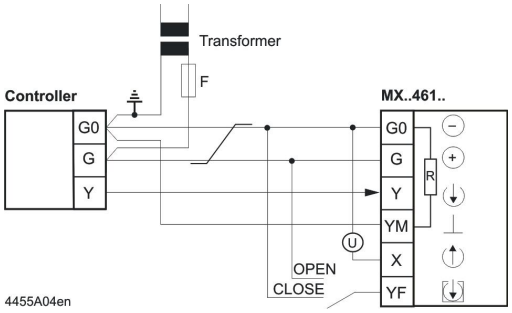


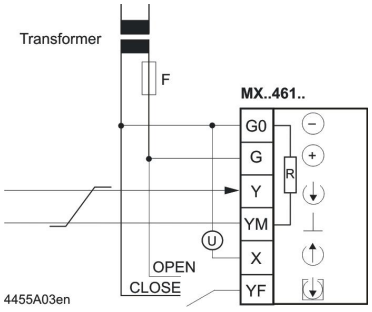
Separate transformer



Terminal assignment for controller with 3-wire connection

Common transformer





Ⓤ Indication of valve position (only if required). DC 0 ...10 V → 0...100 % volumetric flow V_{100}

Twisted pairs. If the lines for AC 24 V power supply and the DC 0...10 V (DC 2...10 V, DC 4... 20 mA) positioning signal are routed separately, the AC 24 V line need not be twisted.

Warning **Piping must be connected to potential earth!**

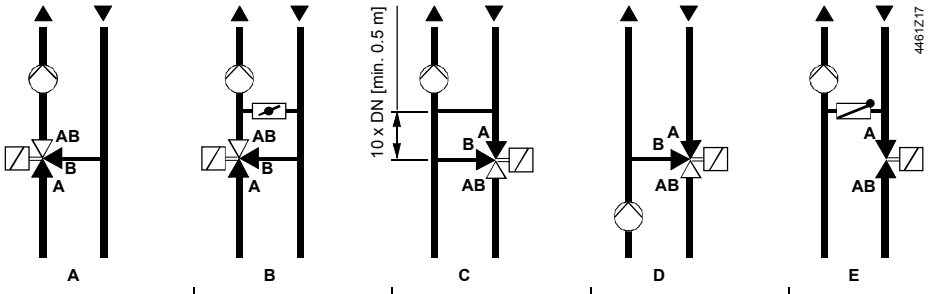
DIL switch Factory setting: Valve characteristics equal-percentage, positioning signal DC 0...10 V. Details see "Configuration DIL switches", page 4.

CalibrationCalibration See "Calibration", page 5.

Application examples

Hydraulic circuits The examples shown below are basic diagrams with no installation-specific details.

Caution ⚠ **The valve may only be used as a mixing or through-port valve, not as a diverting valve. Observe the direction of flow!**

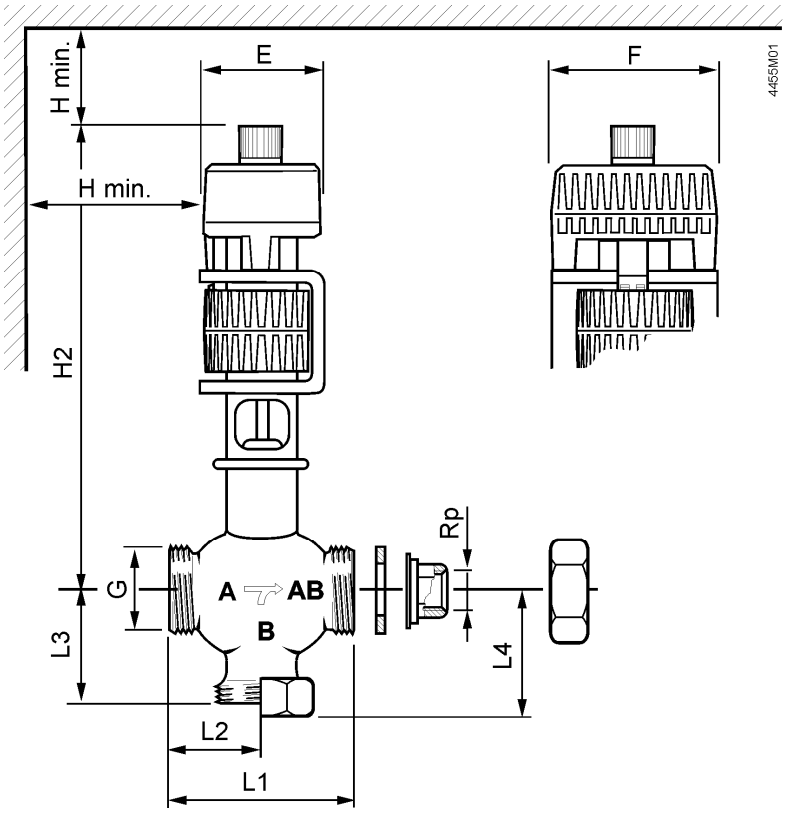


Mixing circuit	Mixing circuit with bypass (underfloor heating system)	Injection circuit	Diverting circuit	Injection circuit with throughport valve

Dimensions

Dimensions in mm

MXG461..
threaded valves



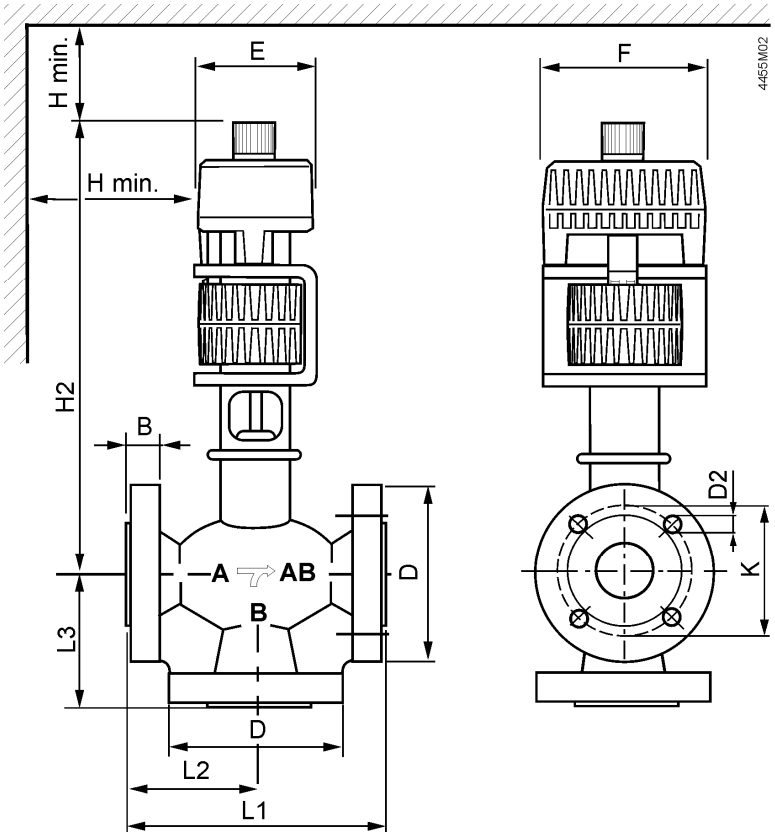
Type reference	DN	Rp [inch]	G [inch]	L1	L2	L3	L4	H2	H min.	E	F	Weight [kg]
MXG461.15-0.6	15	Rp ½	G1B	80	40	42.5	51	240	100	80	100	3.8
MXG461.15-1.5												
MXG461.15-3.0												
MXG461.20-5.0	20	Rp ¾	G 1¼B	95	47.5	52.5	61	260				4.2
MXG461.25-8.0	25	Rp 1	G 1½B	110	55	56.5	65	270				4.7
MXG461.32-12	32	Rp 1¼	G 2B	125	62.5	67.5	76	285				5.6
MXG461.40-20	40	Rp 1½	G 2¼B	140	70	80.5	94	320	150			9.3
MXG461.50-30	50	Rp 2	G 2¾B	170	85	93.5	109	340				11.9

Remarks:

- L4: When used as a throughport valve
- Internally threaded Rp... to ISO 7-1
- Externally threaded G...B to ISO 228-1
- Fittings to ISO 49 / DIN 2950

Also valid for MXG461..P, MXG461..U

MXF461..
flanged valves



Type	DN	B	D ∅	D2 ∅	K	L1	L2	L3	H2	H min.	E	F	Weight [kg]
MXF461.15-0.6[1)]	15	14	95	4x14	65	130	65	65	250	100	80	100	5.8
MXF461.15-1.5[1)]													
MXF461.15-3.0[1)]													
MXF461.20-5.0[1)]	20	16	105		75	150	75	75	260				7.0
MXF461.25-8.0[1)]	25		115		85	160	80	80	272				8.0
MXF461.32-12[1)]	32	18	140	4x18	100	180	90	90	285				11.0
MXF461.40-20[1)]	40		150		110	200	100	100	322	150			15.4
MXF461.50-30[1)]	50	22	165		125	230	115	105	340				19.8
MXF461.65-50[1)]	65		185		145	290	145	125	392				28.6
MXF461.65-50U	65	22	177.8	4x19.05	139.7	290	145	125	392	150	80	100	28.6

[1)] Also valid for MXF461..P

Remarks

- Counter-flanges must be supplied by the installer!
- Flange dimensions to ISO 7005-2

Revision numbers

Type reference	Valid from manufact. date	Type reference	Valid from manufact. date	Type reference	Valid from manufact. date
MXG461.15-0.6	02/15 [1)]	**MXG461.15-0.6P**	02/15 [1)]	**MXG461.15-0.6U**	02/15 [1)]
MXG461.15-1.5	02/15 [1)]	**MXG461.15-1.5P**	02/15 [1)]	**MXG461.15-1.5U**	02/15 [1)]
MXG461.15-3.0	02/15 [1)]	**MXG461.15-3.0P**	02/15 [1)]	**MXG461.15-3.0U**	02/15 [1)]
MXG461.20-5.0	02/15 [1)]	**MXG461.20-5.0P**	02/15 [1)]	**MXG461.20-5.0U**	02/15 [1)]
MXG461.25-8.0	02/15 [1)]	**MXG461.25-8.0P**	02/15 [1)]	**MXG461.25-8.0U**	02/15 [1)]
MXG461.32-12	02/15 [1)]	**MXG461.32-12P**	02/15 [1)]	**MXG461.32-12U**	02/15 [1)]
MXG461.40-20	02/15 [1)]	**MXG461.40-20P**	02/15 [1)]	**MXG461.40-20U**	02/15 [1)]
MXG461.50-30	02/15 [1)]	**MXG461.50-30P**	02/15 [1)]	**MXG461.50-30U**	02/15 [1)]
MXF461.15-0.6	02/15 [1)]	**MXF461.15-0.6P**	02/15 [1)]		
MXF461.15-1.5	02/15 [1)]	**MXF461.15-1.5P**	02/15 [1)]		
MXF461.15-3.0	02/15 [1)]	**MXF461.15-3.0P**	02/15 [1)]		
MXF461.20-5.0	02/15 [1)]	**MXF461.20-5.0P**	02/15 [1)]		
MXF461.25-8.0	02/15 [1)]	**MXF461.25-8.0P**	02/15 [1)]		
MXF461.32-12	02/15 [1)]	**MXF461.32-12P**	02/15 [1)]		
MXF461.40-20	02/15 [1)]	**MXF461.40-20P**	02/15 [1)]		
MXF461.50-30	02/15 [1)]	**MXF461.50-30P**	02/15 [1)]		
MXF461.65-50	02/15 [1)]	**MXF461.65-50P**	02/15 [1)]	**MXF461.65-50U**	02/15 [1)]

[1)] MM/YY = Month, Year of manufacturing

SIEMENS

4361

Modulating control valves with magnetic actuator, PN 16

MVF461H..

for hot water, high temperature hot water and steam

- **Short positioning time (<2 s), high resolution (1 : 1000)**
- **Selectable valve characteristic: Equal-percentage or linear**
- **High rangeability**
- **Selectable standard interface DC 0/2...10 V or DC 0/4...20 mA**
- **Phase-cut signal input for Staefa controllers**
- **Position control and position feedback signal**
- **Wear-free inductive stroke measurement**
- **Spring return facility: A → AB closed when deenergized**
- **Low friction, robust and maintenance-free**

Use

The MVF461H..valve types are through-port control valves with fitted magnetic actuator. The actuator is equipped with connecting electronics for positioning control and position feedback. When deenergized, the valve is closed.

The short positioning time, high resolution and high rangeability make these valves ideal for proportional control of district heating stations and heating plant using HTHW and steam. For closed circuits only.

Type summary

Type reference	DN	k_{VS} [m^3/h]	Δp_{max} [kPa]	Δp_S [kPa]	Operating voltage	Positioning signal	Positioning time	Spring return
MVF461H15-0.6	15	0.6	1000	1000	AC / DC 24 V	DC 0...10 V or DC 2…10 V or DC 0…20 mA or DC 4...20 mA	< 2 s	✓
MVF461H15-1.5		1.5						
MVF461H15-3		3						
MVF461H20-5	20	5						
MVF461H25-8	25	8						
MVF461H32-12	32	12						
MVF461H40-20	40	20						
MVF461H50-30	50	30						

Δp_{max} = max. permissible differential pressure across the valve's control path, valid for the entire actuating range of the motorized valve

Δp_S = max. permissible differential pressure (close off pressure) at which the motorized valve will close securely against the pressure (used as through-port valve)

k_{VS} = nominal flow rate of cold water (5 to 30 °C) through the fully opened valve (H_{100}) at a differential pressure of 100 kPa (1 bar)

Ordering

When ordering, please give quantity, product name and type reference.

Type reference	*Stock number*	*Description*
MVF461H15-0.6	MVF461H15-0.6	Flanged valve with magnetic actuator

Valve body and magnetic actuator form one assembly and cannot be separated.

Replacement electronics module
ASE12

Should the valve electronics prove faulty, the electronics module must be replaced by the ASE12 replacement electronics module.
Mounting Instructions 74 319 0404 0 are included.

Rev. no.

Overview table, see page 14.

Technical and mechanical design

For a detailed description of operation, refer to Data Sheet CA1N4028E.

Control operation

The electronics module converts the positioning signal to a phase-cut power signal which generates a magnetic field in the coil. This causes the armature to change its position in accordance with the interacting forces (magnetic field, counterspring, hydraulics, etc.). The armature responds rapidly to any change in signal, transferring the corresponding movement directly to the valve plug, enabling fast changes in load to be corrected quickly and accurately.

The valve's position is measured continuously. Any disturbance in the system is rapidly corrected by the internal positioning controller, which ensures that the positioning signal and the valve stroke are exactly proportional, and also delivers the position feedback signal.

Control

The magnetic actuator can be driven by a Siemens controller or a controller of other manufacture that deliver a DC 0/2...10 V or DC 0/4...20 mA output signal.
To achieve optimum control performance, it is recommended to use a 4-wire connection for the valve. **In case of DC power supply, a 4-wire connection is mandatory!**
The controller's signal ground terminal M must be connected to the valve's terminal M. Terminals M and GO have the same potential and are internally interconnected in the valve's electronics.

Spring return facility

If the positioning signal is interrupted, or in the event of a power failure, the valve's return spring will automatically close control path A → AB.

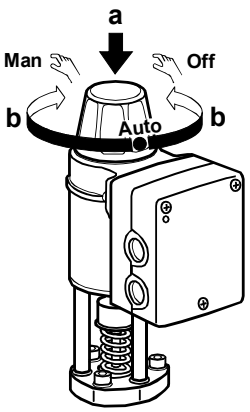
Manual control

By pressing (**a**) and turning (**b**) the hand wheel

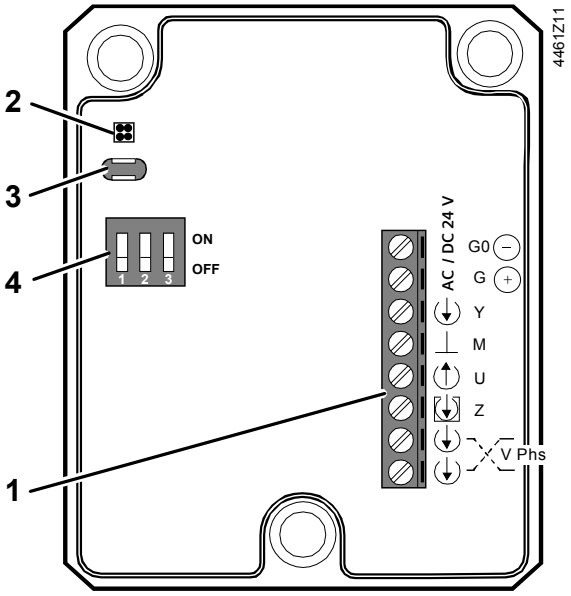
- in clockwise (CW) direction, control path A → AB can be mechanically opened to between 80 and 90 %
- in counterclockwise (CCW) direction, the actuator will be switched off and the valve closed

As soon as the hand wheel is pressed and turned, neither the forced control signal Z nor the input signal Y or the phase-cut signal acts on the actuator. The green LED will flash.

For automatic control, the hand wheel must be set to the Auto position. The green LED will be lit.

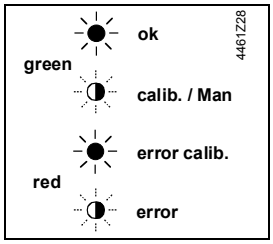


Operator controls and indicators in the electronics housing



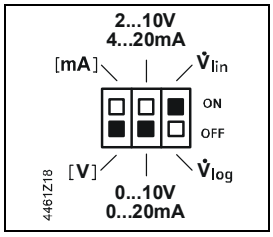
1 Connection terminals

2 LED for indication of operating state

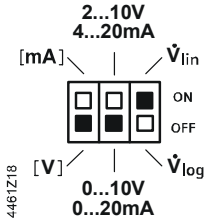


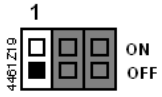
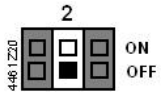
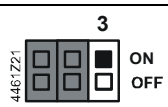
3 Slot for autocalibration

4 DIL switch for mode control



Configuration DIL switches

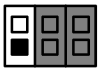
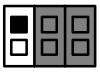


Switch	Function	ON / OFF	Description
	Positioning signal Y	ON	[mA]
		OFF	**[V]** [1]
	Positioning range Y and U	ON	2...10 V, 4...20 mA
		OFF	**0...10 V** , 0...20 mA [1]
	Valve characteristic	**ON**	$\dot{V}_{lin}$ **(linear)** [1]
		OFF	$\dot{V}_{log}$ (equal-percentage)

[1] **Factory settings**

Selection positioning signal and range Y

Voltage and current

Y		
	**0...10 V**	**2...10 V**
	**0...20 mA**	**4...20 mA**

Selection positioning range Y and U:
0...10 V / 0…20 mA or
2...10 V / 4...20 mA

U	ON OFF	ON OFF
Ri > 500 Ω	0...10 V	2...10 V
Ri < 500 Ω	0...20 mA	4...20 mA

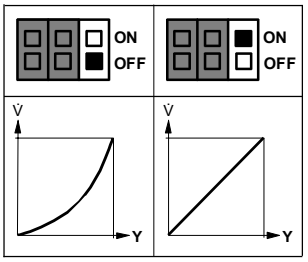
4461Z23

Output signal U (position feedback signal) is dependent on the load resistance Ri.

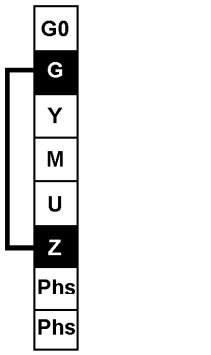
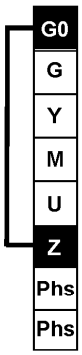
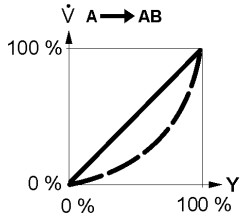
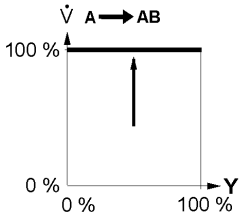
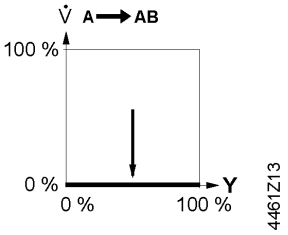
Ri > 500 Ω, → voltage signal

Ri < 500 Ω, → current signal

Selection valve characteristics
Equal-percentage or linear



Forced control input Z

	Z - function		
	no function	fully open	closed
Connections			
Transfer			
Function	• Z is not connected • The valve will follow the Y-signal or phase-cut signal	• Z connected to G • The valve will fully open via control path A → AB	• Z connected to G0 • The valve will close via control path A → AB

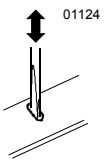
Signal priority

1. Hand wheel position Man (open) or Off
2. Forced control signal Z
3. Phase-cut signal Phs
4. Signal input Y

Calibration

If the electronics module is replaced or the actuator turned through 180 °, the valve's electronics must be recalibrated. For that, the hand wheel must be set to Auto.

The printed circuit board has a slot (position 3, preceding page). Calibration is made by bridging the contacts located behind the slot using a screwdriver. The valve will then travel across the full stroke to store the end positions.



While calibration is in progress, the green LED will flash for about 10 seconds (also refer to «Indication of operating state»).

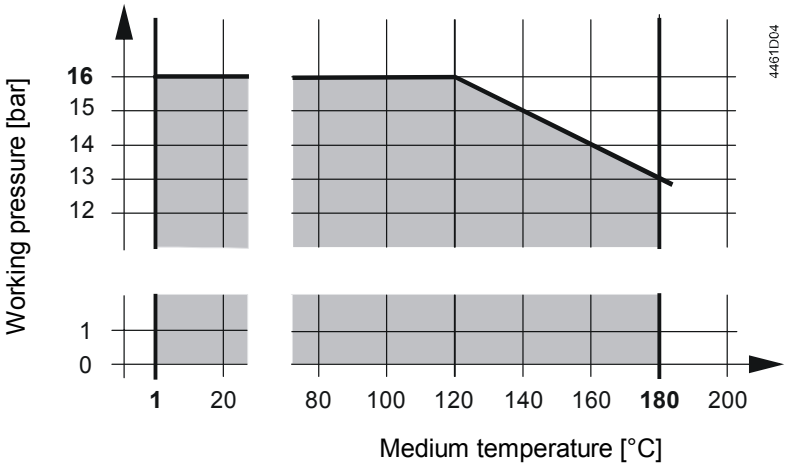
Indication of operating state

LED	Indication	Function	Remarks, troubleshooting
Green	Lit ☀	Control mode	Normal operation; everything o.k.
	Flashing ◐	Calibration	Wait until calibration is finished (green or red LED will be lit)
		In manual control	Hand wheel in Man or Off position
Red	Lit ☀	Calibration error Internal error	Recalibrate (bridge contacts behind the calibration slot) Replace electronics module
	Flashing ◐	Mains fault	Check mains network (outside the frequency or voltage range)
		DC Supply - / +	DC supply + / - connection rectify
Both	Dark ○	No power supply Electronics faulty	Check mains network, check wiring Replace electronics module

Dimension

Working pressure and medium temperature

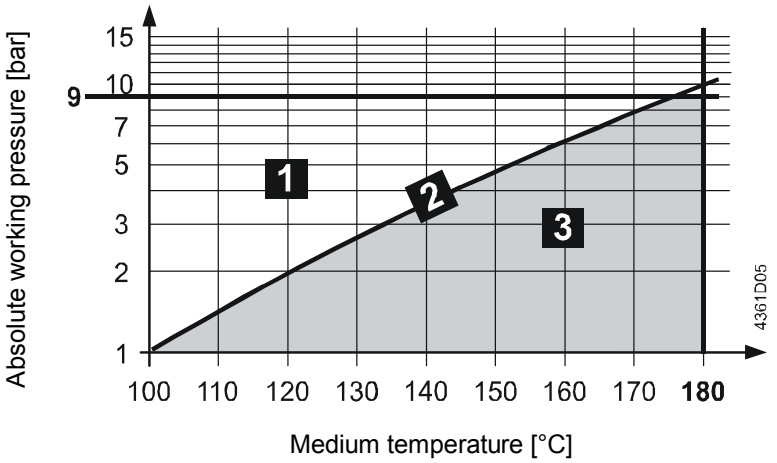
Fluids



⚠ Current local legislation must be observed.

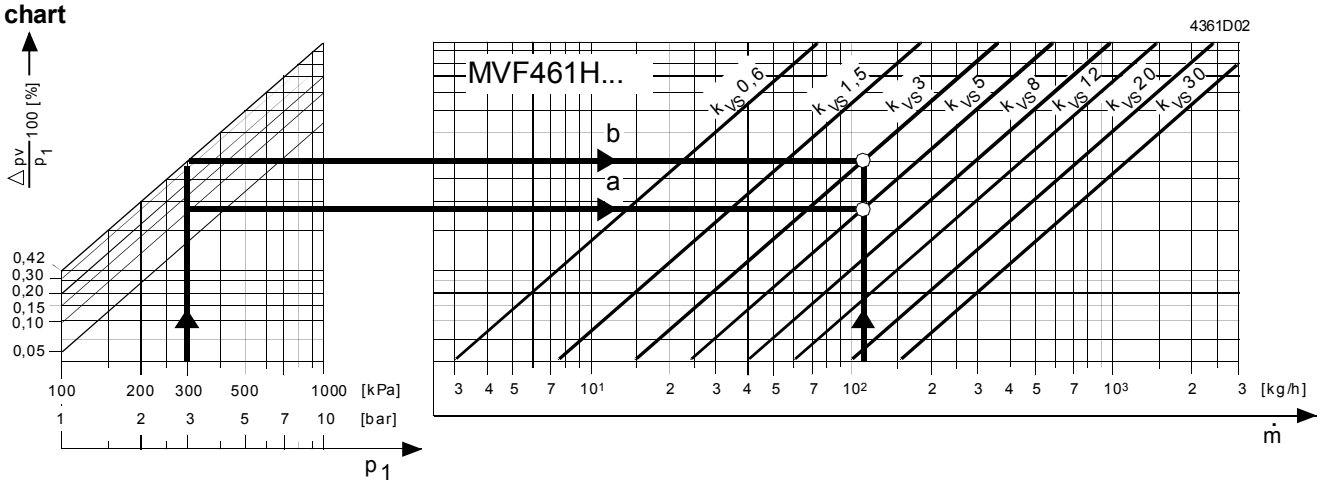
Saturated steam

Superheated steam



1	Water	-
2	wet steam	avoid
3	saturated steam	permissible range of use
	superheated steam	

Saturated steam flow chart



Recommendation

For saturated steam and superheated steam the differential pressure Δp_{max} across the valve should be close to the critical pressure ratio.

$$\text{Pressure ratio} = \frac{p_1 - p_3}{p_1} \cdot 100\%$$

p_1 = absolute pressure before valve in kPa
p_3 = absolute pressure after valve in kPa

Calculation of the k_{vs} value for steam

Subcritical range

$$\frac{p_1 - p_3}{p_1} \cdot 100\% < 42\%$$

Pressure ratio < 42% subcritical

$$k_{VS} = 4.2 \cdot \frac{\dot{m}}{\sqrt{p_3 \cdot (p_1 - p_3)}} \cdot k$$

Supercritical range

$$\frac{p_1 - p_3}{P_1} \cdot 100\% \geq 42\%$$

Pressure ratio ≥ 42% supercritical (not recommended)

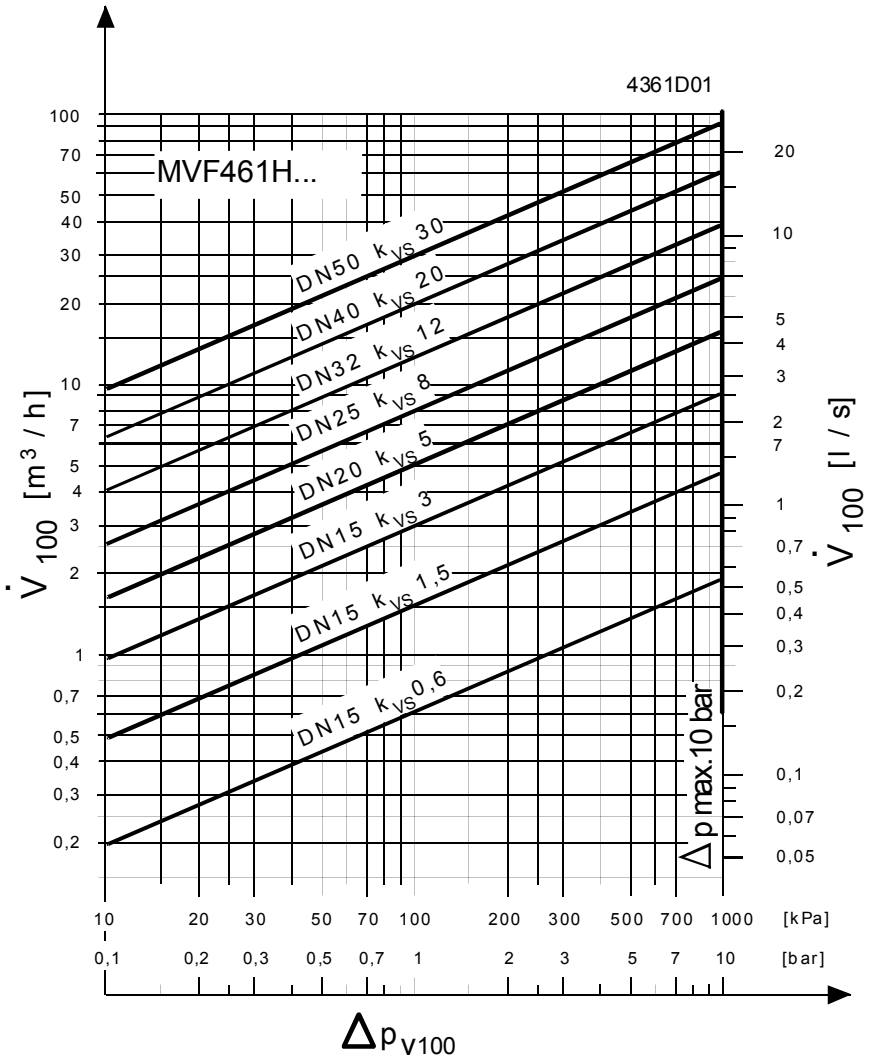
$$k_{VS} = 8.4 \cdot \frac{\dot{m}}{p_1} \cdot k$$

$\dot{m}$ = steam quantity in kg/h
k = factor for superheating of steam = 1 + 0.0013 · ΔT (k = 1 for saturated steam)
ΔT = temperature differential in K between saturated steam and superheated steam

Example

given	saturated steam 133.54 °C p_1 = 300 kPa (3 bar) $\dot{m}$ = 110 kg/h pressure ratio = 12 %	saturated steam 133.54 °C p_1 = 300 kPa (3 bar) $\dot{m}$ = 110 kg/h pressure ratio ≥ 42 % (supercritical permitted)
required	k_{vs}, valve type	k_{vs}, valve type
procedure	$p_3 = p_1 - \frac{12 \cdot p_1}{100}$ $p_3 = 300 - \frac{12 \cdot 300}{100} = 264$ kPa (2.64 bar) $k_{VS} = 4.2 \cdot \frac{110}{\sqrt{264 \cdot (300 - 264)}} \cdot 1 = 4.74$ m³/h	$k_{VS} = 8{,}4 \cdot \frac{110}{300} \cdot 1 = 3{,}08$ m³/h
selected	k_{vs} = 5 m³/h ⇨ MVF461H20-5	k_{vs} = 3 m³/h ⇨ MVF461H15-3

Water flow chart



Δp_{V100} = differential pressure across the fully open valve and the valve's control path A → AB by a volume flow $\dot{V}_{100}$

$\dot{V}_{100}$ = volume flow through the fully open valve (H_{100})

Δp_{max} = max. permissible differential pressure across the valve's control path for the entire actuating range of the motorized valve

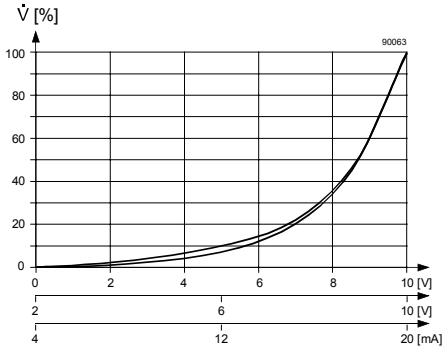
100 kPa = 1 bar ≈ 10 mWC

1 m^3/h = 0,278 l/s water at 20 °C

Valve characteristic

Equal-percentage

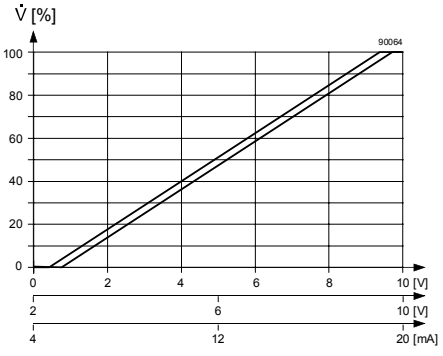
Volumetric flow



Positioning signals

Linear

Volumetric flow



Positioning signals

Connection type [1)]

The 4-wire connection should always be given preference!

4-wire connection

Type reference	S_{NA} [VA]	P_{MED} [W]	S_{TR} [VA]	P_{TR} [W]	I_F [A]	Wire cross-section [mm²] 1,5 | 2,5 | 4,0 **max. cable length L** [m]		
MVF461H15-0.6	33	15	≥50	≥50	3.15	60	100	160
MVF461H15-1.5								
MVF461H15-3								
MVF461H20-5								
MVF461H25-8								
MVF461H32-12	43	20	≥75	≥70	4	40	70	120
MVF461H40-20	65	26	≥100		6.3	30	50	80
MVF461H50-30								

S_{NA} = nominal apparent power
P_{med} = typical power consumption in the application
S_{TR} = Minimum apparent transformer power
P_{TR} = Minimum DC supply power
I_F = Minimal required slow fuse
L = max. cable length; with 4-wire connections, the max. permissible length of the separate 1.5 mm² copper positioning signal wire is 200 m

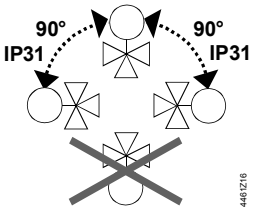
[1)] All information at AC 24 V or DC 24V

Mounting notes

The valve is supplied complete with Mounting Instructions 74 319 0378 0.

Caution ⚠ **The valve may only be used in flow direction (A → AB).**
Observe the direction of flow!

Mounting position



Installation notes

- The actuator may not be lagged

For electrical installation, refer to «Connection diagrams».

Maintenance notes

The low friction and robust, maintenance-free design makes regular servicing unnecessary and ensure a long service life.
The valve stem is sealed from external influences by a maintenance-free gland.

If the red LED is lit, the electronics must be recalibrated or replaced.

Repair

Should the valve electronics prove faulty, the ASE12 electronics module must be replaced (refer to Mounting Instructions 74 319 0404 0).

Caution ⚠ **Always disconnect power before fitting or removing the electronics module.**

After replacing the electronics module, calibration must be triggered in order to optimally match the electronics to the valve (refer to «Calibration»).

Disposal

The device is considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the device through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Warranty

Application-specific technical data must be observed.
If specified limits are not observed, Siemens will not assume any responsibility.

Technical data

Functional data of actuator

Power supply	For use with low-voltage only (SELV, PELV)		
AC 24 V	Operating voltage		AC 24 V ±20% (SELV) or AC 24 V class 2 (US)
	Frequency		45...65 Hz
	Typical power consumption	P_{med}	refer to «Connection type», page 8
		Standby	< 1 W (valve fully closed)
	Rated apparent power S_{NA}		refer to «Connection type», page 8
	Required fuse I_F		slow, «Connection type», page 8
	External supply line protection		Fuse slow max. 10 A or Circuit breaker max. 13 A Characteristic B, C, D according to EN 60898 or Power source with current limitation of max. 10 A
DC 24 V	Operating voltage		DC 20...30 V
Signal inputs	Control signal Y		DC 0/2...10 V
		or	DC 0/4...20 mA
		or phase cut signal	DC 0...20 V Phs
	Impedance	DC 0/2...10 V	100 kΩ // 5nF (load < 0.1 mA)
		DC 0/4...20 mA	240 Ω // 5nF
	Forced control Z		
	Impedance		22 kΩ
	Closing the valve (Z connected to G0)		< AC 1 V; < DC 0.8 V
	Opening the valve (Z connected to G)		> AC 6 V; > DC 5 V
	No function (Z not wired up)		phase-cut or control signal Y active
Signal outputs	Position feedback signal	voltage	DC 0/2...10 V; load resistance > 500 Ω
		current	DC 0/4...20 mA; load resistance ≤ 500 Ω
	Stroke measurement		inductive
	Nonlinearity		± 3 % of end value
Positioning time	Positioning time		< 2 s
Electrical connections	Cable entries		2 x ∅ 20,5 mm (for M20)
	Connection terminals		screw terminals for 4 mm^2 wires
	Min. wire cross-section		0.75 mm^2
	Max. cable length		refer to «Connection type», page 8

Functional data of valve	Pressure class		PN16 to EN 1333
	Permissible operating pressure [1]		within the permissible "medium temperature" range according to the diagram on page 5 Water up to 120 °C: 1.6 MPa (16 bar) Water above 120 °C: 1.3 MPa (13 bar) Saturated steam: 0.9 MPa (9 bar)
	Differential pressure Δp_{max} / Δp_s		1 MPa (10 bar)
	Leakage rate at Δp = 0.1 MPa (1 bar)		A → AB max. 0.05 % k_{VS}
	Valve characteristic [2]		equal percentage, n_{gl} = 3 to VDI / VDE 2173 or linear, optimized near the closing point
	Permissible media	Water	chilled water, low temperature hot water, high temperature hot water, water with anti-freeze; recommendation: water treatment to VDE 2035
		Steam	Saturated steam, superheated steam dryness at inlet minimum 0.98
	Medium temperature		>1...180 °C
	Stroke resolution ΔH / H_{100}		1 : 1000 (H = stoke)
	Position when actuator is deenergized		A → AB closed
	Mounting position		upright to horizontal
	Control mode		modulating
Materials	Valve body		modular cast iron EN-GJS-400-18-LT
	Covering flange		modular cast iron EN-GJS-400-18-LT
	Seat / plug		CrNi-steel
	Valve stem seal		EPDM (O-ring)
Weight and dimensions	Dimensions		refer to «Dimensions»
	Weight		refer to «Dimensions»
Norms and directives	Electromagnetic compatibility (Application)		For residential, commercial and light-industrial environments
	Product standard		EN60730-x
	EU Conformity (CE)		CA2T4361.1 [3]
	RCM Conformity		A5W00004454 [3]
	EAC Conformity		Eurasia Conformity for all MVF..
	Housing protection Upright to horizontal		IP31 to EN 60529
	Vibration [4]		EN 60068-2-6 (1 g acceleration, 1...100 Hz, 10 min)
	UL certification (US) CSA certification		UL 873, http://ul.com/database C22.2 No. 24, http://csagroup.org
	Environmental compatibility		The product environmental declaration CE1E4361en [3] contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).
	Pressure Equipment Directive		PED 2014/68/EU
	Pressure accessories		Scope: Article 1, section 1 Definitions: Article 2, section 5
	Fluid group 2:	DN 15…50	without CE-marking as per article 4, section 3 (sound engineering practice) [5]

[1] Tested at 1.5 x PN (24 bar), similar to EN 12266-1

[2] Can be selected via DIL switch

[3] The documents can be downloaded from http://siemens.com/bt/download.

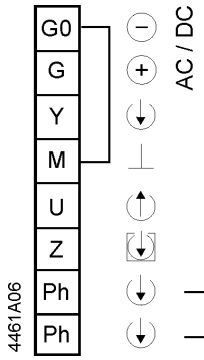
[4] In case of strong vibrations, use high-flex stranded wires for safety reasons.

[5] Valves where PS x DN < 1000, do not require special testing and cannot carry the CE label.

General environmental conditions

	Operation EN 60721-3-3	Transport EN 60721-3-2	Storage EN 60721-3-1
Climatic conditions	Class 3K5	Class 2K3	Class 1K3
Temperature	-5...+45 °C	-25...+70 °C	-5...+45 °C
Humidity	5...95 % r.h.	5...95 % r.h.	5...95 % r.h.
Mechanical conditions	EN 60721-3-6 Class 3M2		

Connection terminals



- System neutral AC 24 V, DC 20…30 V
- System potential AC 24 V, DC 20…30 V
- Control signal DC 0/2…10 V, DC 0/4…20 mA
- Measuring neutral (= G0)
- Position feedback signal DC 0/2…10 V, DC 0/4…20 mA
- Forced- control input Z
- Phase-cut signal DC 0...20 V Phs, interchangeable, galvanically isolated
- Phase-cut signal DC 0...20 V Phs, interchangeable, galvanically isolated

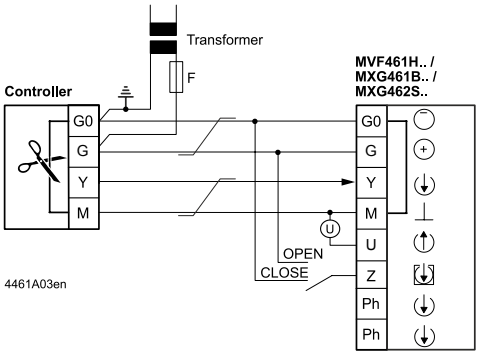
Connection diagrams

Warning ⚠ **If controller and valve receive their power from separate sources, only one transformer may be earthed on the secondary side.**

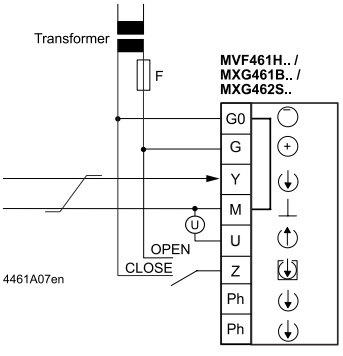
Caution ⚠ **In case of DC power supply, a 4-wire connection is mandatory!**

Terminal assignment for controller with 4-wire connection (to be preferred!).
DC 0...10 V
DC 2...10 V
DC 0...20 mA
DC 4...20 mA

Common Transformer

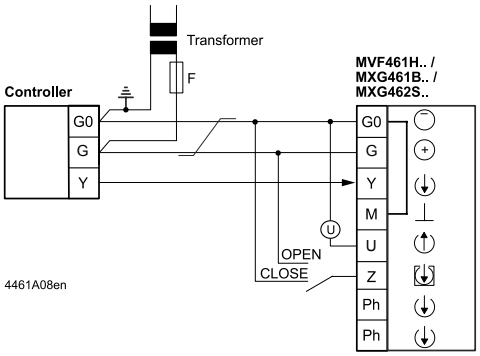


Separate Transformer

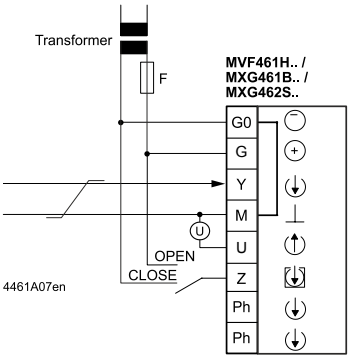


Terminal assignment for controller with 3-wire connection
DC 0...10 V
DC 2...10 V
DC 0...20 mA
DC 4...20 mA

Common Transformer



Separate Transformer



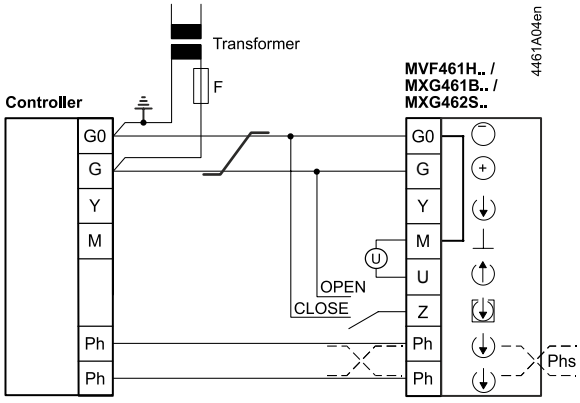
Ⓤ Indication of valve position (only if required). DC 0 ...10 V → 0...100 % volumetric flow V_{100}

Twisted pairs. If the lines for AC 24 V power supply and the DC 0...10 V (DC 2...10 V, DC 4... 20 mA) positioning signal are routed separately, the AC 24 V line need not be twisted.

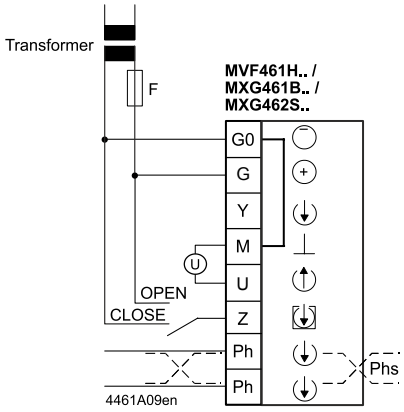
Warning ⚠ **Piping must be connected to potential earth!**

Controllers with phase-cut DC 0...20 V Phs

Common Transformer

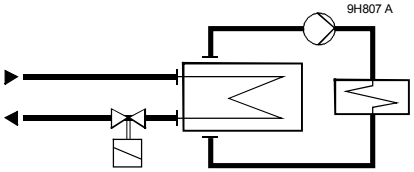


Separate Transformer

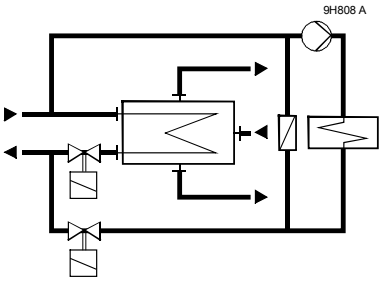


Application examples

The examples shown below are basic diagrams with no installation-specific details.



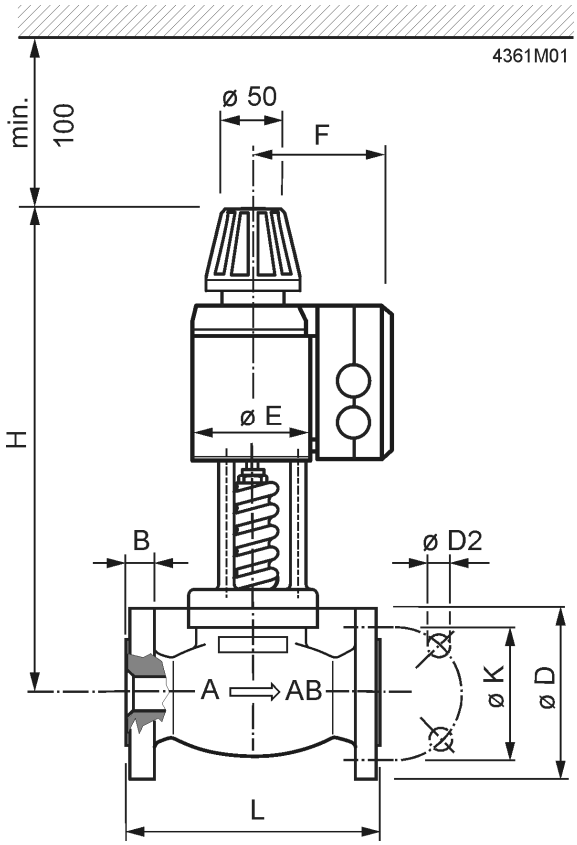
District heating (supply heating) system, indirect connection.



District heating (supply heating) system, directly connected to water-heating system

Caution ⚠ **The valve may only be used in flow direction (A → AB). The direction of flow must be observed!**

Dimensions



Flange dimensions to DIN2533, PN16

Type reference	DN	L [mm]	ø D [mm]	ø D2 [mm]	B [mm]	ø K [mm]	H [mm]	ø E [mm]	F [mm]	Weight [kg]
MVF461H15-0.6	15	130	95	4x14	14	65	340	80	115	8,3
MVF461H15-1.5	15	130	95	4x14	14	65	340	80	115	8,3
MVF461H15-3	15	130	95	4x14	14	65	340	80	115	8,3
MVF461H20-5	20	150	105	4x14	16	75	339	80	115	8,9
MVF461H25-8	25	160	115	4x14	16	85	346	80	115	10,0
MVF461H32-12	32	180	140	4x18	18	100	384	100	125	15,7
MVF461H40-20	40	200	150	4x18	18	110	401	100	125	17,8
MVF461H50-30	50	230	165	4x18	20	125	449	125	138	27,2

Weight incl. packaging

Revision numbers

Type reference	Valid from rev. No.
MVF461H15-0.6	..C
MVF461H15-1.5	..C
MVF461H15-3	..C
MVF461H20-5	..B
MVF461H25-8	..B
MVF461H32-12	..B
MVF461H40-20	..C
MVF461H50-30	..B

Series 02: DN40 and DN50

Series 01: DN 65...150

Three-port slipper valves PN6 VBF21..

Three-port slipper valves, PN6, flanged

- **Grey cast iron EN-GJL-250**
- **DN 40...150**
- **k_{vs} 25...820 m^3/h**
- **Angle of rotation 90°**
- **Flange fittings to ISO 7005**
- **Manual adjuster for DN40 and DN50 slipper valves**
- **Can be fitted with type SQK.. or SAL..T10 electromotoric actuators**
- **No maintenance required**

Use

For use in closed-circuit heating systems and mixing applications.

Type summary

Type	DN	k_{vs} [m^3/h]	SQK.. [2] Δp_{max} [kPa]	SAL..T10
VBF21.40 [1]	40	25	30	30
VBF21.50 [1]	50	40		
VBF21.65	65	63		
VBF21.80	80	100		
VBF21.100	100	160		
VBF21.125	125	550		
VBF21.150	150	820		

DN = Nominal size

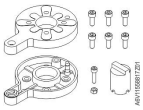
k_{vs} = Nominal flow rate of cold water (5…30 °C) through the fully open slipper valve by a differential pressure of 100 kPa (1 bar)

Δp_{max} = Maximum permissible differential pressure across the slipper valve's control path, valid for the entire actuating range of the motorized slipper valve

[1] Series with manual adjuster

[2] from 2019: only while stock lasts

Accessories

Type	Description
ASK31N 	The ASK31N mounting kit consists of two mounting set parts, screws, adapter including fixing screw and adapter. For VBF21.., DN65…150 Series 01. Mounting instructions are enclosed with the kit.
ASK32 [2] 	The ASK32 mounting kit consists of a console and screw(s). For VBF21.., DN40…50 Series 02. Mounting instructions are enclosed with the kit.
ASK32N 	The ASK32N mounting kit consists of two mounting set parts, screws and adapter including fixing screw. For VBF21.., DN40…50 Series 01. Mounting instructions are enclosed with the kit.

[2] from 2019: only while stock lasts

Ordering

The slipper valve, actuator and mounting kit, if required, must be ordered separately. When ordering, please specify the quantity, product name and type code.

Example:

1 3-port slipper valve type VBF21.65
1 actuator type SAL31.00T10 and
1 mounting kit, type ASK31N

Delivery

The slipper valve, actuator and mounting kit are packed separately.

Spare parts

See overview, section „Spare parts“, page 7

Equipment combinations

Type	Actuators SQK34.. [1], SQK84.. [1]	SQK33.. [1]	SAL..T10
VBF21.40	direct mounting	ASK32 [1]	ASK32N
VBF21.50			
VBF21.65			ASK31N
VBF21.80			
VBF21.100			
VBF21.125			
VBF21.150			

[1] from 2019: only while stock lasts

Actuator overview

Type	Actuator type	Operating voltage	Positioning signal	Positioning time for 90°	Torque	Data sheet
SQK33.00 [1) 2)]	Electro-motoric	AC 230 V	3-position	125 s	5 Nm	N4506
SQK34.00 [1) 3) 5)]				135 s		N4508
SAL31.00T10 [4)]				120 s	10 Nm	N4502
SAL31.03T10 [4)]				30 s		
SAL61.00T10 [4)]		AC / DC24 V	DC 0..10 V	120 s		
SAL61.03T10 [4)]				30 s		
SAL81.00T10 [4)]			3-position	120 s		
SAL81.03T10 [4)]				30 s		
SQK84.00 [1) 3) 5)]		AC 24 V		135 s	5 Nm	N4508

1) ab 2019: nur solange Vorrat

SQK33.00	ASC9.5
SQK34.00	ASC9.7
SQK84.00	

2) Can be fitted with 1 auxiliary switch, type ASC9.5
3) Can be fitted with 1 auxiliary switch, type ASC9.7
4) Can be fitted with 1 auxiliary switch, type ASC10.51 or 2 auxiliary switches, type ASC10.51 or 1 potentiometer ASZ7.5/.. and 1 auxiliary switch, type ASC10.51
5) For direct mounting on slipper valve types VBF21.40 and VBF21.50 (without mounting kit)

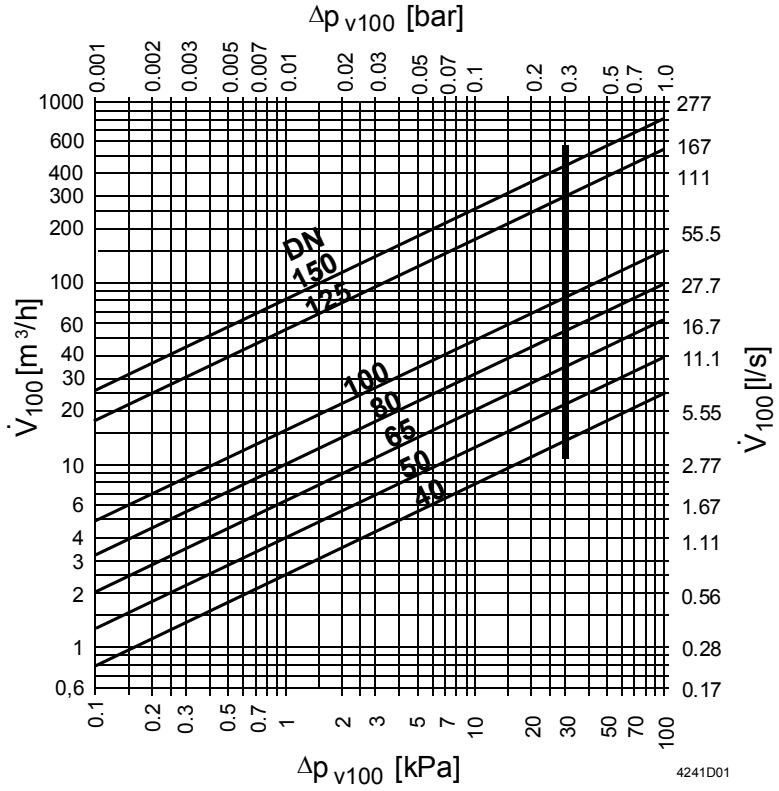
Technical design / mechanical design

Application

Boiler flow from the right or left. The manual adjuster (DN 40 and DN 50), scale plate and valve slipper can be re-positioned to suit the application

Sizing

Flow diagram



Δp_{max} = Maximum permissible differential pressure across the slipper valve's control path, valid for the entire actuating range of the motorized slipper valve

Δp_{v100} = Differential pressure across the fully open slipper valve by a volume flow V_{100}

$\dot{V}_{100}$ = Volumetric flow through the fully open slipper valve

100 kPa = 1 bar ≈ 10 mWC

1 m^3/h = 0.278 l/s water at 20 °C

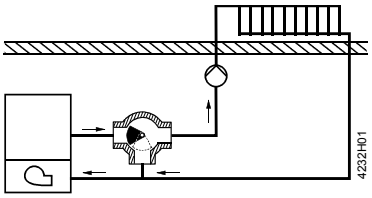
Notes

Engineering

Use the VBF21.. in mixing applications.
In systems where oxygen can enter the hydraulic system, there is an increased risk of corrosion which can cause the valve slipper to seize.

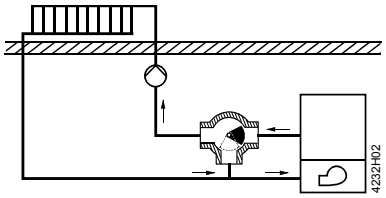
Mounting variants

Boiler flow from left



Factory setting

Boiler flow from right



Re-position the valve slipper, scale plate and manual adjuster (DN 40 and DN 50), as described in the mounting instructions.

Mounting

The slipper valves are easy to assemble directly on site.
The slipper valve, actuator and mounting kit (with mounting instruction) are packed separately.
Mounting instructions for O-Ring replacement: M4241

Accessory	Mounting instruction	
ASK31N	M4502.1	74 319 0739 0
ASK32 [1)]	M4290.2	4 319 5597 0
ASK32N	A6V11558817	A5W00057302

1) ab 2019: nur solange Vorrat

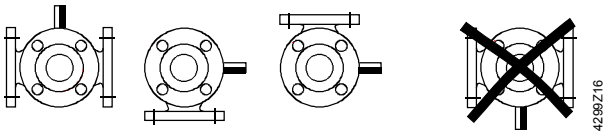
DN 40 and DN 50

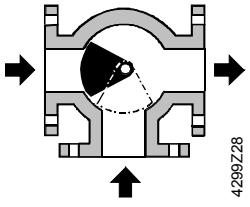
Two special screws are provided in the housing cover to fix the ASK32 mounting kit and the scale plate for position indication. The ASK32N kit contain all the components required for assembly.

DN 65...150

The ASK31N kit contain all the components required for assembly.

Orientation





Factory setting
Slipper positioned for "boiler flow from left".

- Anti-clockwise rotation: opening
- Clockwise rotation: closing.

Manual adjuster for DN40 / DN50 with scale plate, position indicator and yellow color marking for position of slipper
Position indicator at "0" = boiler flow path fully closed.

Commissioning

When commissioning the slipper valve, ensure that the position and rotation of the valve slipper are appropriate for the system concerned (see "Engineering").

The position of the valve slipper is indicated as follows:

- DN 40 and DN 50 slipper valves: by the manual adjuster and scale plate and by the yellow color marking on the pin in the slipper valve shaft
- DN 65…150 slipper valves: by a red plastic marker (part of the mounting kit) which is fitted to the slipper valve shaft.

Maintenance

⚠ Warning

Before performing any service work on the slipper valve, actuator or mounting kit:

- switch OFF the pump and power supply
- close the main shut-off valve in the pipework
- release pressure in the pipes and allow them to cool down completely.
- If necessary, disconnect electrical connections from terminals.

The slipper valve can be commissioned with the manual adjuster fitted, or with a correctly fitted actuator.

Disposal

Do not dispose of the device as household waste.

- Special handling of individual components may be mandated by law or make ecological sense.
- Observe all local and currently applicable laws and regulations.

Warranty

The technical data given for these applications is valid only in conjunction with the Siemens actuators as detailed under «Equipment combinations».
All terms of the warranty will be invalidated by the use of actuators from other manufacturers.

Technical data

Functional data	PN class		PN 6 to ISO 7268
	Working pressure		max. 600 kPa (6 bar) to ISO 7005 within the permissible medium temperature range
	Flow characteristic	through-port	linear
		bypass	linear
	Leakage rate	DN 40…100	0 ... 0,1 % of k_{vs} -value
		DN 125…150	0 ... 0,5 % of k_{vs} – value
	Permissible media		low temperature hot water, water with anti-freeze; Recommendation: water treatment to VDI 2035
	Medium temperature		1…120 °C
	Angle of rotation		90°
Standards, directives and approvals	Pressure Equipment Directive Pressure-carrying accessories		PED 2014/68/EU Scope: Article 1, section 1 Definitions: Article 2, section 5
	Fluid group 2	DN 40…125	Without CE certification as per article 4, section 3 (sound engineering practice) [1]
		DN 150	Category I, Modul A, with CE-marking as per article 14, section 2
	EU conformity (CE)	DN 150	A5W00006521 [2]
	EAC Conformity		Eurasia Conformity
Environmental compatibility	The product environmental declarations CE1E4241en [2] contains data on Environmentally compatible product design and assessments (RoHS compliance, Materials composition, packaging, environmental benefit, disposal).		
Materials	Slipper valve body		Grey cast iron EN-GJL-250
	Shaft		stainless steel
	Slipper	DN 40…100	brass
		DN 125…150	bronze
	O-rings		EPDM
	Manual adjuster		Plastic
	Scale plate for position indication		Aluminum
Dimensions / weight	see «Dimensions»		
	Flange connections		to ISO 7005

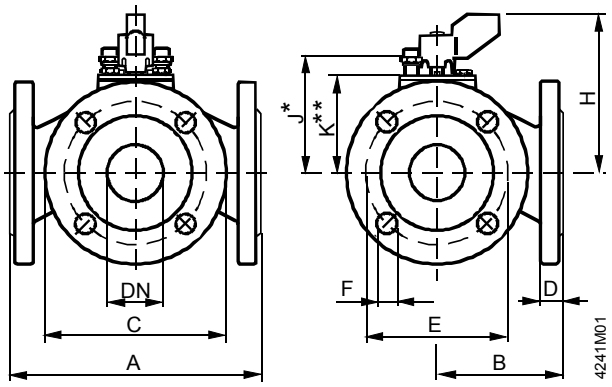
[1] Valves where PS x DN < 1000, do not require special testing and cannot carry the CE label.

[2] The documents can be downloaded from http://siemens.com/bt/download

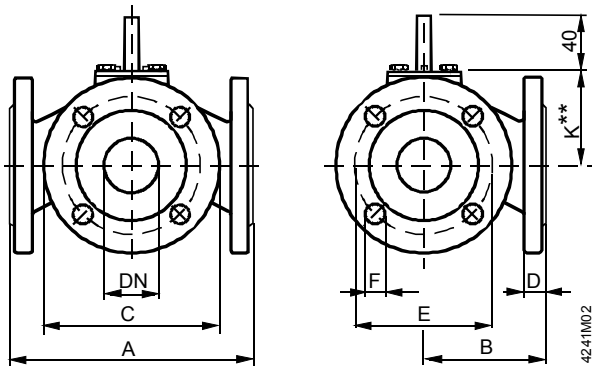
Dimensions

All dimensions in mm

VBF21.40 / VBF21.50
(with manual adjuster)



VBF21.65 .. VBF21.150
(without manual adjuster)



Type	DN	A	B	C	D	E	F	H	J *	K **			Weight
										ASK32	ASK31N	ASK32N	[kg]
VBF21.40	40	180	90	130	16	100	14 (4x)	96	68	56		56	6.0
VBF21.50	50	180	90	140	16	110	14 (4x)	103	75	63		63	6.5
VBF21.65	65	200	100	160	16	130	14 (4x)				43		9.5
VBF21.80	80	230	115	190	18	150	19 (4x)				52		14.5
VBF21.100	100	260	130	210	18	170	19 (4x)				68		18.3
VBF21.125	125	320	160	240	20	200	19 (8x)				129		36.0
VBF21.150	150	350	175	265	20	225	19 (8x)				144		45.3

DN = Nominal size
J* = Installation height for actuators SQK34.00 or SQK84 (without mounting kit)
K** = Installation height for type SQK33.00 actuators with mounting kit ASK32, and SAL..T10 with mounting kit ASK31N or ASK32N

Overall height of slipper valve and actuator

= Installation height of three-port slipper valve
\+ Installation height of mounting kit (if needed)
\+ Installation height of actuator
\+ Minimum clearance (> 200 mm) from ceiling or wall for mounting, connection, operation, service etc.

Spare parts

Order numbers for spare parts

3-port slipper valve	manual adjuster 
VBF21.40	7467601750
VBF21.50	
VBF21.65	
VBF21.80	
VBF21.100	
VBF21.125	
VBF21.150	

ACVATIX™

Butterfly valves PN 16 VKF42..

- **Nodular cast iron valve body**
- **DN 50...600**
- **k_{vs} 70...37,000 m^3/h**
- **For fitting with PN 16 counter-flanges to ISO 7005**
- **Tight-closing in accordance with ISO 5208, leakage rate A**
- **No maintenance required**
- **Can be equipped with SQL321B.., SQL361B.., SQL351B.. electromotoric actuators, or GEB..1E, GBB..1E,GIB..1E damper actuator**

Use

This device is used as motorized or shut-off valves in heating, ventilation and air conditioning systems applications.

- In open and closed circuits
- For 2-position (SPDT) or 3-position controls
- For DC 0…10 V control signals (by SQL361B.. actuator) and 4..20mA control signals (by SQL351B.. actuator)
- For chiller and cooling tower sequencing circuits
- To open or close the flow to a heat exchanger or to complete plant sections

Type summary

Product No.	Stock Number	DN	k_{vs} [m^3/h]	Top Flange EN ISO 5211	Flow velocity of medium [1] Water [m/s]
VKF42.50	S55237-V100	50	70	F07	4.5
VKF42.65	S55237-V101	65	155		
VKF42.80	S55237-V102	80	250		
VKF42.100	S55237-V103	100	510		
VKF42.125	S55237-V104	125	820		
VKF42.150	S55237-V105	150	1350		
VKF42.200	S55237-V106	200	3100		
VKF42.250	S55237-V107	250	4550	F10	
VKF42.300	S55237-V108	300	7500		
VKF42.350	S55237-V109	350	10250	F12	
VKF42.400	S55237-V110	400	14100		
VKF42.450	S55237-V111	450	18500	F14	
VKF42.500	S55237-V112	500	24000		
VKF42.600	S55237-V113	600	37000	F16	

[1] Recommended maximum velocity of flow and the butterfly valve fully open

k_{vs} Nominal flow rate of cold water (5…30 °C) through the fully open butterfly valve by a differential pressure of 100 kPa (1 bar)

Ordering

Butterfly valve, actuator must be ordered separately.
When ordering, please specify the quantity, product name and product number.

Example

Product No.	Stock No.	Product Name	Quantity
VKF42.50	S55237-V100	Butterfly valve	1

Delivery

Butterfly valve and actuator are packed separately.

Rev. No.

Please see chapter “Rev. No” on page 8.

Equipment combinations

	Electromotoric Actuators						
	SQL321B25 SQL361B25 SQL351B25	SQL321B50 SQL361B50 SQL351B50	SQL321B150 SQL361B150 SQL351B150	SQL321B270 SQL361B270 SQL351B270	SQL321B570 SQL361B570 SQL351B570	SQL321B1400 SQL361B1400 SQL351B1400	SQL321B2650 SQL361B2650 SQL351B2650
Butterfly Valve	Δp_s [kPa]						
VKF42.50	700						
VKF42.65	700						
VKF42.80	700						
VKF42.100		700					
VKF42.125		700					
VKF42.150		700					
VKF42.200			700				
VKF42.250				700			
VKF42.300				700			
VKF42.350					700		
VKF42.400					700		
VKF42.450						700	
VKF42.500						700	
VKF42.600							700

Δp_s Maximum permissible differential pressure at which the motorized butterfly valve will close securely against the pressure (close off pressure).

Product No.	Mounting kit	Actuators			
		GEB..1E	GBB...1E [1)]	GIB..1E	2*GIB...1E
		Δp_s [kPa]			
VKF42.50	ASK77.9	700			
VKF42.65		700			
VKF42.80		700			
VKF42.80	ASK77.10		700		
VKF42.100				700	
VKF42.125	ASK77.11				700
VKF42.150					700

1) GBB.. phase out at end of Y2020.

Δp_s Maximum permissible differential pressure at which the motorized butterfly valve will close securely against the pressure (close off pressure).

Actuator overview

Product No.	Operating Voltage	Positioning Signal	Position Feedback Signal	Positioning Time for 90° at 50 Hz [s]	Nominal Torque [Nm]	Flange Connection EN ISO 5211	Datasheet
SQL321B25	AC 220 V 1 phase	2-position (SPDT)	-	11	25	F07	N4520
SQL361B25		DC 0…10 V	DC 0…10 V	11	25	F07	
SQL351B25		4..20mA	4..20mA	11	25	F07	
SQL321B50		2-position (SPDT)	-	19	50	F07	
SQL361B50		DC 0…10 V	DC 0…10 V	19	50	F07	
SQL351B50		4..20mA	4..20mA	19	50	F07	
SQL321B150		2-position (SPDT)	-	39	150	F07	
SQL361B150		DC 0…10 V	DC 0…10 V	39	150	F07	
SQL351B150		4..20mA	4..20mA	39	150	F07	
SQL321B270		2-position (SPDT)	-	39	270	F10	
SQL361B270		DC 0…10 V	DC 0…10 V	39	270	F10	
SQL351B270		4..20mA	4..20mA	39	270	F10	
SQL321B570		2-position (SPDT)	-	47	570	F12 / F10	
SQL361B570		DC 0…10 V	DC 0…10 V	47	570	F12 / F10	
SQL351B570		4..20mA	4..20mA	47	570	F12 / F10	
SQL321B1400		2-position (SPDT)	-	76	1400	F14	
SQL361B1400		DC 0…10 V	DC 0…10 V	76	1400	F14	
SQL351B1400		4..20mA	4..20mA	76	1400	F14	
SQL321B2650		2-position (SPDT)	-	105	2650	F16	
SQL361B2650		DC 0…10 V	DC 0…10 V	105	2650	F16	
SQL351B2650		4..20mA	4..20mA	105	2650	F16	

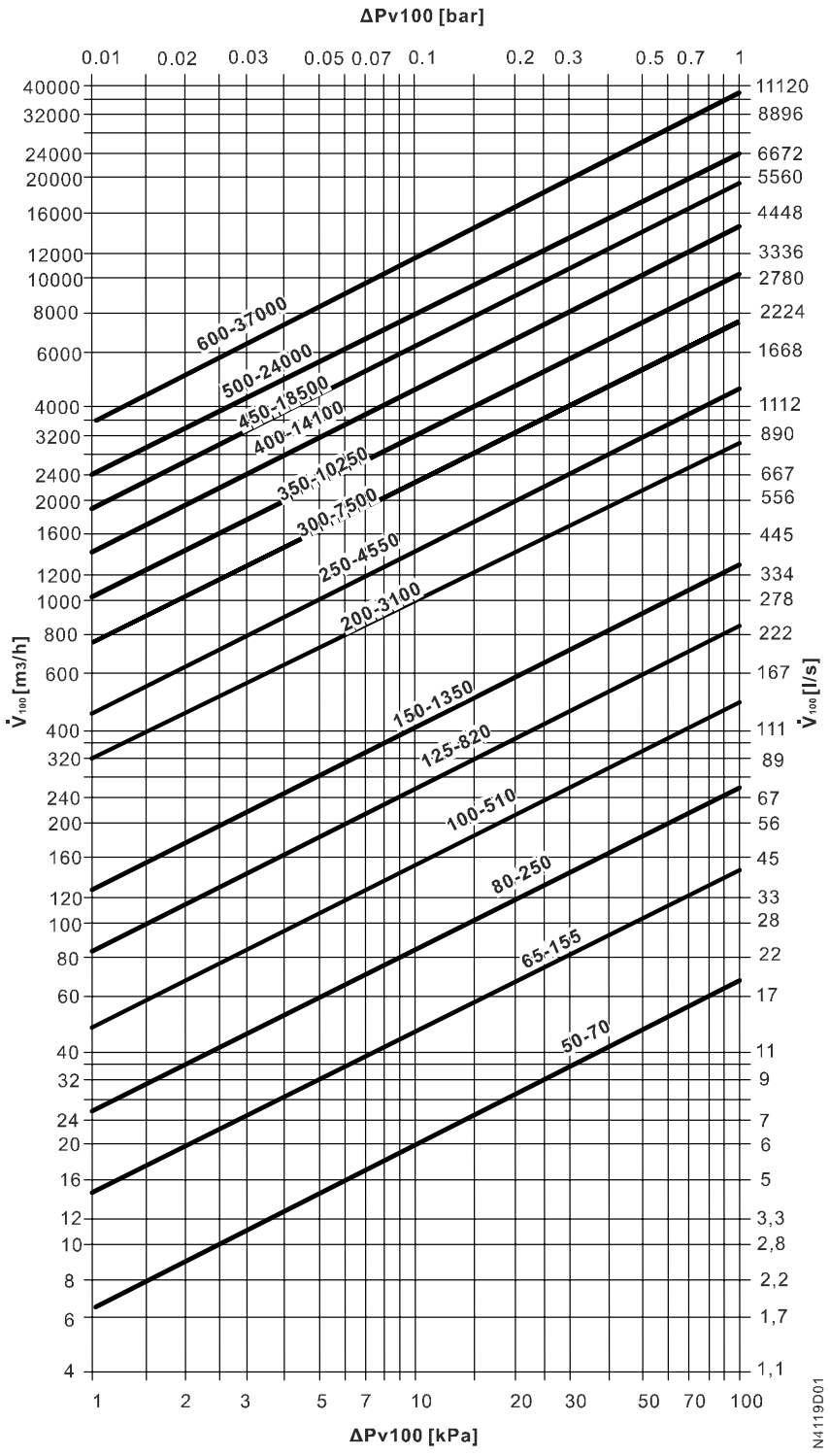
Type		Operating voltage	Positioning signal	Positioning time	Torque	Connecting cable	Data sheet
GEB341.1E	**GEB346.1E**	AC 100..240 V	2-position	150 s	20 Nm	0.9 m	A6V11449860
GEB141.1E	**GEB146.1E**	AC/DC 24 V	3-position				
GEB161.1E	**GEB166.1E**		DC 0/2…10V				
GBB331.1E	**GBB336.1E**	AC 230 V	3-position	150 s	25 Nm	0.9 m	N4626
GBB131.1E	**GBB136.1E**	AC 24 V					
GBB161.1E	**GBB166.1E**		DC 0…10 V				
GIB331.1E	**GIB336.1E**	AC 230 V	3-position	150 s	35 Nm	0.9 m	N4626
GIB131.1E	**GIB136.1E**	AC 24 V					
GIB161.1E	**GIB166.1E**		DC 0…10 V				

Mechanical design

Ring format, nodular cast iron valve body with EPDM seat and multiple shaft bushing.
The seat is also used to seal the flange. There is thus no contact between the medium and the valve body.
The valve has a swing-through disc (angle of rotation 360°). The position of the valve disc is indicated by a notch on the front of the shaft.

Sizing

Flow diagram



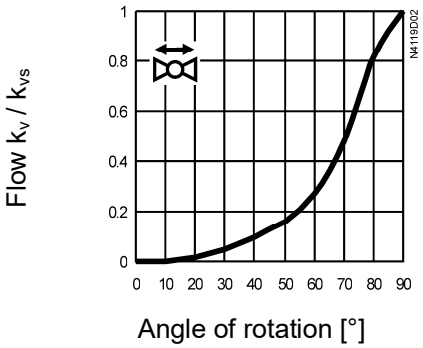
Δp_{v100} = Differential pressure across the fully open butterfly valve by a volume flow $\dot{V}_{100}$

$\dot{V}_{100}$ = Volume flow through the fully open butterfly valve

100 kPa = 1 bar ≈ 10 mWC

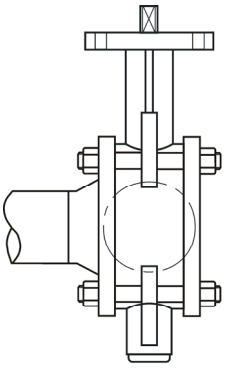
1 m^3/h = 0.278 l/s water at 20 °C

Flow characteristic



Engineering notes

Single flange mounting is possible: 700 kPa



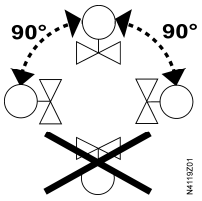
The VKF42.. butterfly valves can accommodate flow in either direction.

Warning ⚠ **To avoid pressure shocks on the butterfly valve, the VKF42.. must be driven to its fully open position either manually or via control signal Y14 prior to activating the pump(s).**

Mounting notes

The mounting instruction 74 319 0808 0 (M4119) is enclosed in the product packaging.
DN 50…500 butterfly valves can be mounted in PN 10, PN 16, ANSI150, JIS10K applications.
DN 600 butterfly valve can be mounted in PN 16 applications only!
Do not use additional flange sealing.

Orientation



Upright to horizontal

Maintenance notes

The VKF42.. butterfly valves require no maintenance.

Caution ⚠

Before performing any service works on the valve, actuator or mounting kit:

- Switch off the pump and power supply
- Close the main shut-off valves in the pipe work
- Release pressure in the pipes and allow them to cool down completely

If necessary, disconnect electrical connections from terminals.

The valve must be commissioned only with the actuator correctly assembled.

Disposal

The valve is considered an electronics device for disposal in terms of European Directive 2012/19/EU and may not be disposed of as domestic garbage.

- Disassemble the valve into individual parts prior to disposing of it and sort the individual parts by the various types of materials.
- Comply with all local and currently applicable laws and regulations.

Warranty

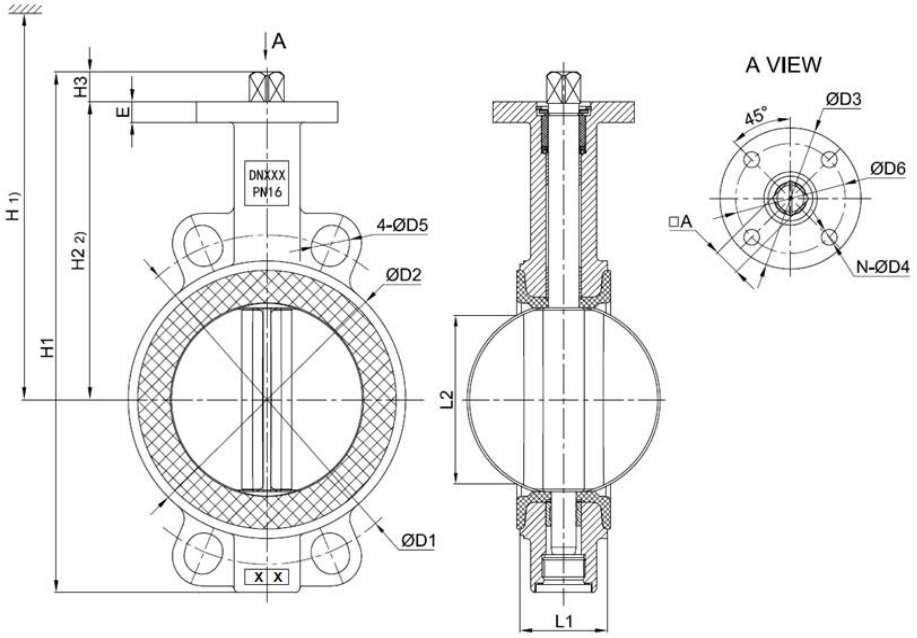
The technical data given for these applications is valid only in conjunction with the Siemens actuators as detailed under "Equipment combinations", page 2.
All terms of the warranty will be invalidated by the use of actuators from other manufacturers.

Technical data

Operating data	PN class		PN10 and PN16 to ISO 7005 ANSI150 to ASME B16.5 JIS10K to JIS B2220
	Permissible operating pressure		1600 kPa (16 bar)
	Flow characteristic		according to the diagram on page 5
	Leakage rate		A to ISO 5208 (tight-closing)
	Permissible medium		Chilled water, low temperature hot water, cooling water, brine, demineralized water (softened), water with anti-freeze Recommendation: Water treatment to VDI 2035
	Medium temperature		-10…80 °C
	Flange connection for pipes [1)]		PN10 and PN16 to ISO 7005 ANSI150 to ASME B16.5 JIS10K to JIS B2220
	Face to face dimension		DIN EN 558, series 20
	Top flange (flange for actuator)		EN ISO 5211
	Angle of rotation		90°
Standards	Environmental compatibility		ISO 14001 (Environment) ISO 9001 (Quality) Directive 2002/95/EC (RoHS)
Materials	Body	DN 50…600	Nodular cast iron EN-GJS-450-10 (QT450-10)
	Shaft		Stainless steel 1.4021 (2Cr13)
	Valve disc		Nodular cast iron EN-GJS-450-10 (QT450-10), Nylon coating
	Seat		EPDM
Dimensions			Refer to page 7 “Dimensions”
Weight			Refer to page 7 “Dimensions”

[1)] VKF42.., DN 600 is only suited for PN 16

Dimensions (mm)



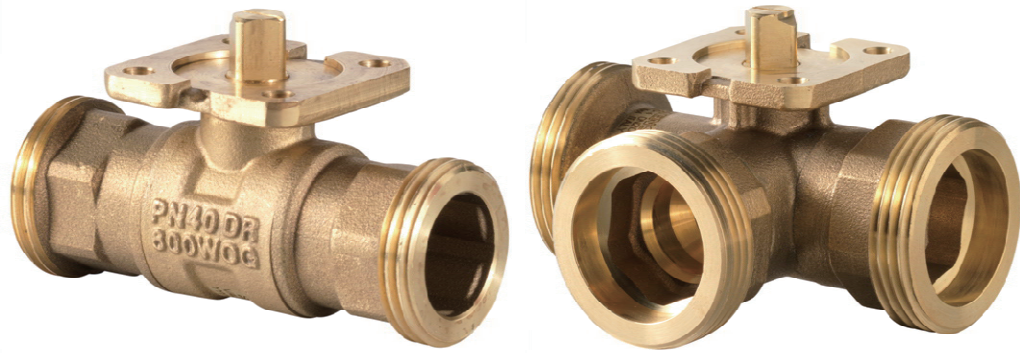
Product No.	DN	L1	L2	H[1)]	H1	H2[2)]	H3	ØD3	E	PN 16			EN ISO 5211	n-ØD4	ØD6	A	Weight
										D1	D2	ØD5				□	kg
VKF42.50	50	43	29	607	229	143	14	90	9	125	93	19					2.72
VKF42.65	65	46	46	620	248	156	14	90	9	145	108	19				11	3.44
VKF42.80	80	46	66	626	271	162	14	90	9	160	124	19					4.03
VKF42.100	100	52	93	641	299	177	14	90	11	180	152	19	F07	4-10	70		5.2
VKF42.125	125	56	104	654	332	190	19	90	13	210	177	19					7.24
VKF42.150	150	56	148	669	362	205	19	90	13	240	210	23				17	9
VKF42.200	200	60	196	700	426	236	22	125	15	295	265	23					14.1
VKF42.250	250	68	244	803	498	267	24	125	17	355	313	28	F10	4-12	102	22	21.14
VKF42.300	300	78	295	844	575	308	24	125	17	410	371	28	F10	4-12	102	22	31.8
VKF42.350	350	78	328	904	669	368	29	150	20	470	434	28	F12	4-14	125	27	50
VKF42.400	400	102	380	936	778	400	29	150	21	525	480	31	F12	4-14	125	27	71.4
VKF42.450	450	114	430	1163	846	422	45	175	22	585	536	31	F14	4-18	140	36	90
VKF42.500	500	127	478	1221	934	480	45	175	24	650	590	34	F14	4-18	140	36	114
VKF42.600	600	154	576	1303	1086	562	50	210	28	770	693	37	F16	4-22	165	46	189

L1	Corresponds to overall length according to EN 558, series 20	
H[1)]	Overall height of valve and actuator	
	=	Valve installation height (H2) from middle of pipe
	+	Installation height of actuator
		- SQL321B25 = 195 mm (DN50…100)
		- SQL3..1B50, SQL3..1B150 = 264 mm (DN50…200)
		- SQL3..1B270, SQL3..1B570 = 336 mm (DN250…350)
		- SQL3..1B1400, SQL3..1B2650 = 541 mm (DN400…600)
	+	Minimum clearance (⩾200 mm) from ceiling or wall for mounting, connection, operation, service etc.
H2[2)]	Dimension for actuator connection from centre of pipe	

Revision numbers

Product No.	Valid from Rev. No.	Product No.	Valid from Rev. No.	Product No.	Valid from Rev. No.
VKF42.50	..C	VKF42.150	..C	VKF42.400	..C
VKF42.65	..C	VKF42.200	..C	VKF42.450	..C
VKF42.80	..C	VKF42.250	..C	VKF42.500	..C
VKF42.100	..C	VKF42.300	..C	VKF42.600	..C
VKF42.125	..C	VKF42.350	..C		

SIEMENS



ACVATIX™

2-port shutoff valves and 3-port changeover ball valves, PN 40, with externally threaded connection

VAG60..
VBG60..L
VBG60..T

For use in heating, ventilation, and air conditioning plants as shutoff or changeover ball valve. In closed circuits.

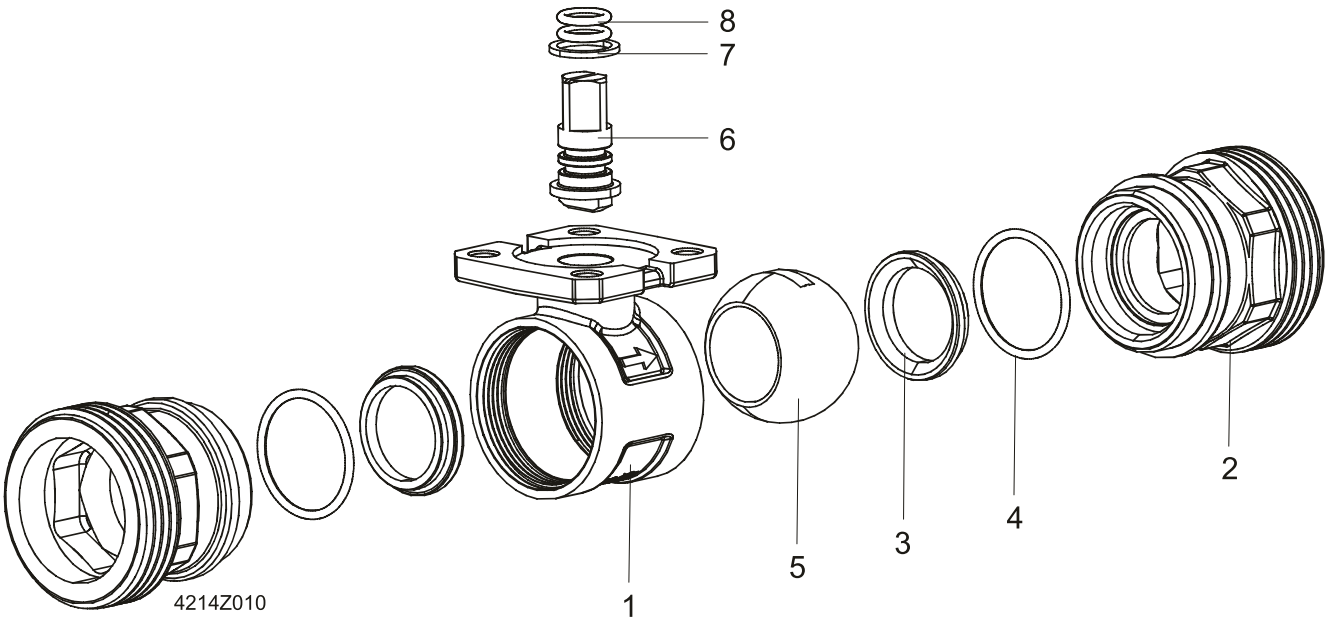
- Ball valve body made of brass CW602N (DZR)
- DN 15...50
- k_{vs} 5…96 m^3/h
- Flat sealing, externally threaded connections G..B, as per ISO 228-1
- Fitting sets ALG.. with threaded connection
- Rotational angle 90°
- Can be combined with electromotoric rotary actuators GQD..9A, GMA..9E with spring return and GSD..9A, GDB..9E, GLB..9E without spring return
- For applications with auxiliary functions (e.g. auxiliary switchs, potentiometers, standard rotary actuators from the DAC product range can also be combined)

Features

- Moderately priced:
  Optimized flow rates mean smaller ball valves can be selected. Low torque means you can combine them with small, less expensive rotary actuators.
- Long life expectancy:
  Maintenance-free construction, also thanks to low friction stem and polished ball made of chrome-plated DZR brass.
- Simple mounting:
  The brackets, pre-mounted on the actuators, means you can mount them on the ball valves without tools.

Technical design

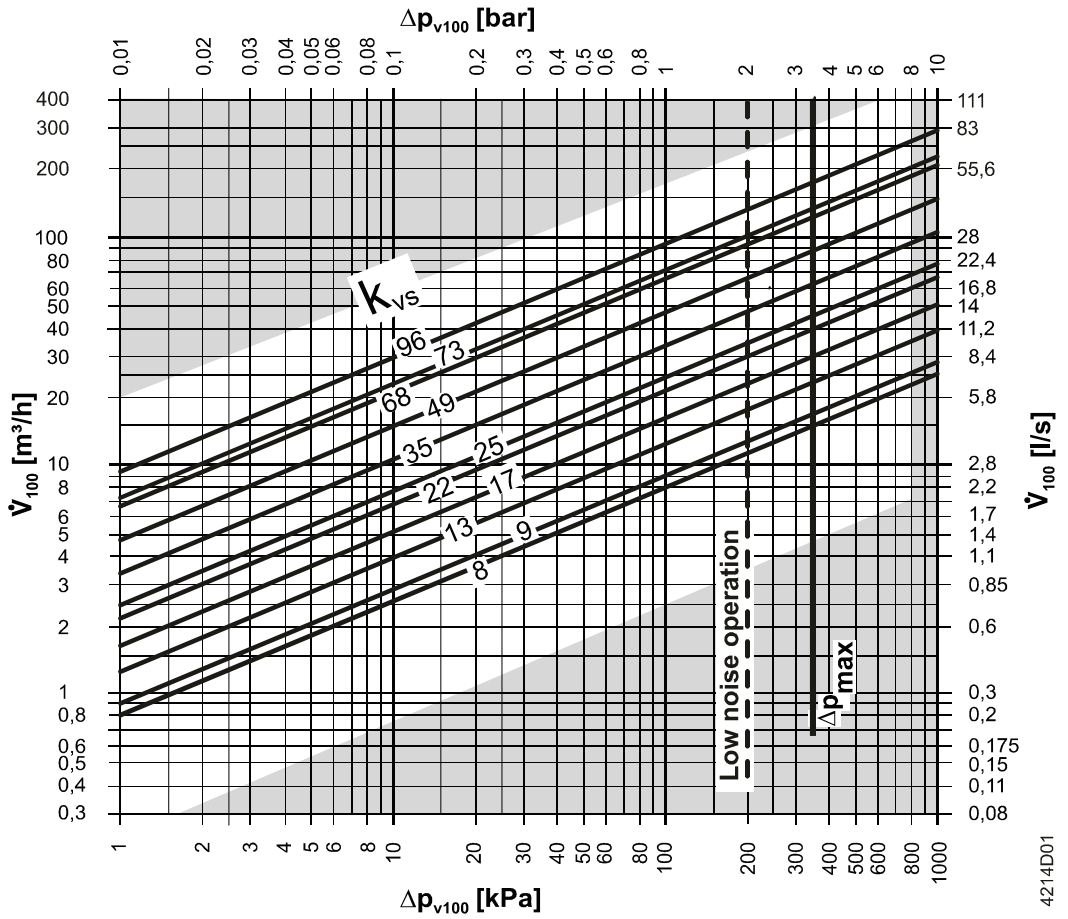
Design



1 Housing	2 Connection with external threading
3 Seat	4 O-ring seal
5 Marble	6 Stem, squared
7 Slide clutch	8 O-ring seal

Sizing

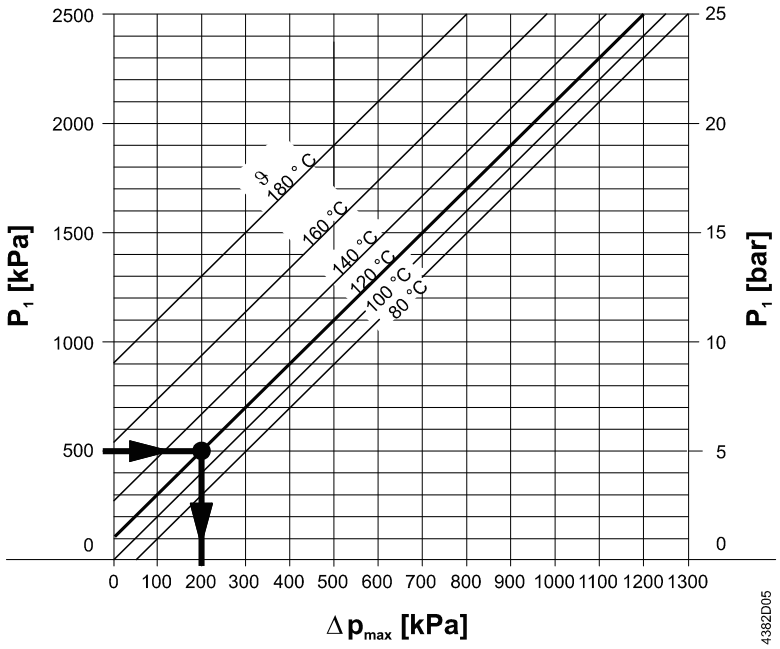
Flow diagram:



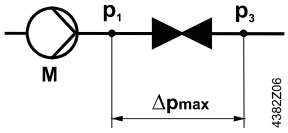
---		Δp_{max} for VAG60.. and VBG60.., for details, see table on equipment combinations
Δp_{max}	=	Maximum permissible differential pressure over the ball valve, valid for the entire positioning range of the ball valve rotary actuator unit; if low noise operation is desired, we recommend a maximum permissible differential pressure of 200 kPa
Δp_{v100}	=	Differential pressure over the fully opened ball valve and over the control path at a volume flow V_{100}
$\dot{V}_{100}$	=	Volume flow through the fully opened ball valve
100 kPa	=	1 bar ≈ 10 mWS
1 m^3/h	=	0.278 l/s water at 20 °C

Cavitation

Cavitation increases wear and tear of the ball and seat and results in unwanted noise. Cavitation can be prevented by not exceeding the differential pressures as per the flow diagram and maintaining the static pressures depicted below.



Δp_{max}	=	Differential pressure at a nearly closed ball valve to largely avoid cavitation
p_1	=	Static pressure at the ball valve inlet
P_3	=	Static pressure at the ball valve outlet
M	=	Pump
J	=	Water temperature



Example with hot water:

Pressure p_1 at ball valve inlet: 500 kPa (5 bar)

Water temperature: 120 °C

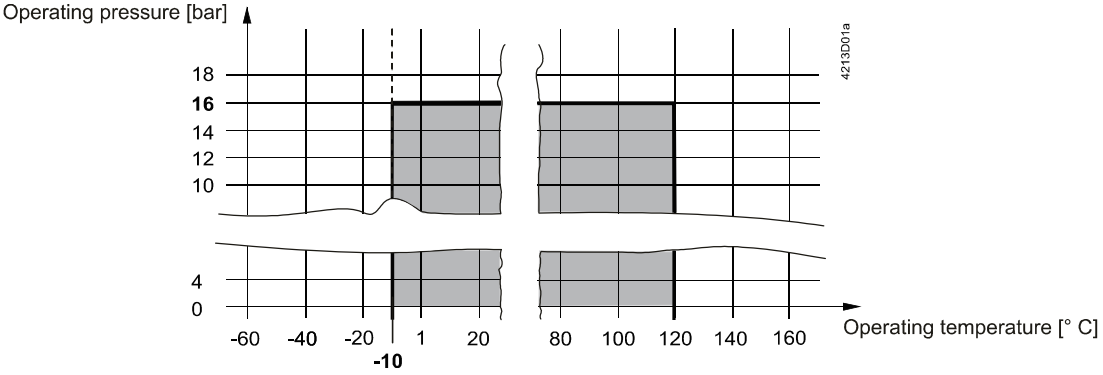
The above diagram clearly indicates that the maximum permissible differential pressure is Δp_{max} → 200 kPa (2 bar) at a nearly closed ball valve.

Note on chilled water applications:

UTo prevent cavitation in chilled water circuits, sufficient counter pressure must be supplied to the ball valve outlet, e.g. using an additional butterfly valve downstream of the ball valve. Maximum permissible differential pressure over the ball valve: See 80 °C curve in the above diagram.

Operating pressure and operating temperature

Liquids:



Operating pressure and medium temperature per IS0 7005
(Observe all local and applicable laws).

Type summary

Type						DN	k_{vs}
Shut-off ball valve 2-port		Change-over ball valve 3-port (T)		Change-over ball valve 3-port (L)			
Product no.	Stock number	Product no.	Stock number	Product no.	Stock number		
-	-	-	-	VBG60.15-5 L	S55230-V215	15	5
-	-	VBG60.15-8T	S55230-V136	-	-		8 [1]
VAG60.15-9	S55230-V130	-	-	-	-		9
-	-	-	-	VBG60.20-8 L	S55230-V202	20	8
-	-	VBG60.20-13T	S55230-V137	-	-		13 [1]
VAG60.20-17	S55230-V131	-	-	-	-		17
-	-	-	-	VBG60.25-9 L	S55230-V216	25	9
-	-	VBG60.25-13T	S55230-V138	-	-		13 [1]
VAG60.25-22	S55230-V132	-	-	-	-		22
-	-	-	-	VBG60.32-13 L	S55230-V217	32	13
-	-	VBG60.32-25T	S55230-V139	-	-		25 [1]
VAG60.32-35	S55230-V133	-	-	-	-		35
-	-	-	-	VBG60.40-25 L	S55230-V218	40	25
-	-	VBG60.40-49T	S55230-V140	-	-		49 [1]
VAG60.40-68	S55230-V134	-	-	-	-		68
-	-	-	-	VBG60.50-37 L	S55230-V219	50	37
-	-	VBG60.50-73T	S55230-V141	-	-		73 [1]
VAG60.50-96	S55230-V135	-	-	-	-		96

[1] k_{vs} Bypass B > 50 % of k_{vs} A – AB

DN = Nominal size

k_{vs} = Flow nominal value for chilled water (5…30 °C) through a fully opened ball valve at a differential pressure of 100 kPa (1 bar)

Temperature adapter ALJ100

⚠ DANGER

Hazard to life caused by a lack of ground for the combination ALJ100 with G.. and ASK77.2!

Combining temperature adapter ALJ100 with ASK77.2 and rotary actuators G.. operated at AC 230 V ~ or AC 100…240 V ~ or rotary actuators G.. with auxiliary switch voltage AC 230 V ~ results in life-threatening shocks due to a lack of ground.

- Never combine rotary actuators G.. operated at voltage of AC 230 V ~ or AC 100…240 V ~ with temperature adapter ALJ100.
- Never combine ASK77.2 with temperature adapter ALJ100.
- Never combine rotary actuators with auxiliary switch voltage AC 230 V ~ with tempera-ture adapter ALJ100.

Type	Stock number	Description
ALJ100	S55846-Z115	Temperature adapter for ball valves

Fittings

Type	Stock number	Description
ALG..2	BPZALG..2	2 piece fittings set for 2-port valves, existing of 2 cap nuts, 2 insert nuts, and 2 flat seals ALG..2B are fittings made of brass for media temperatures up to 100 °C
ALG..2B	S55846-Z1..	
ALG..3	BPZ:ALG..3	3 piece fittings set for 3-port valves, existing of 3 cap nuts, 3 insert nuts, and 3 flat seals. ALG..3B are fittings made of brass for media temperatures up to 100 °C
ALG..3B	S55846-Z1..	

Filter

Installed upstream of ball valve:

Type	Stock number	Description	DN	Mesh width [mm]
ALX15	S55845-Z174	Filter with internal threading	15	0.5
ALX20	S55845-Z175		20	0.8
ALX25	S55845-Z176		25	
ALX32	S55845-Z177		32	
ALX40	S55845-Z178		40	
ALX50	S55845-Z179		50	

Equipment combinations

Type	Rotary actuators									
	GSD..9A		GQD..9A		GDB..9E..		GMA..9E..		GLB..9E..	
	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s
	[kPa]									
VAG60.15-9	350	1400	350	1400	350	1400	350	1400	350	1400
VAG60.20-17										
VAG60.25-22										
VAG60.32-35	-	-	-	-	-	-	-	1000		1000
VAG60.40-68								800		800
VAG60.50-96								600		600
VBG60.15-8T	350	-	350	-	350	-	-	350	-	350
VBG60.20-13T										
VBG60.25-13T										
VBG60.32-25T	-		-		-					
VBG60.40-49T										
VBG60.50-73T										
VBG60.15-5L	350	-	350	-	350	-	-	350	-	350
VBG60.20-8L										
VBG60.25-9L										
VBG60.32-13L	-		-		-					
VBG60.40-25L										
VBG60.50-37L										

Δp_{max} = Maximum permissible differential pressure over the ball valve control path, valid for the entire positioning range of the ball valve rotary actuator unit; if low noise operation is desired, we recommend a differential pressure of ≤ 200 kPa

Δp_s = Maximum permissible differential pressure (closing pressure) at which the ball valve rotary actuator unit securely closes against the pressure

Overview of rotary actuators for ball valves

Type [1]		Operating voltage	Positioning		Spring return		Data sheet
Product no.	Stock number		Signal	Time	Function	Time	
GSD141.9A [2]	BPZ:GSD141.9A	AC/DC 24 V	Open-close [3]	30 s	-	-	N4655
GSD341.9A [2]	BPZ:GSD341.9A	AC 230 V					
GQD121.9A [2]	BPZ:GQD121.9A	AC/DC 24 V	2-position	30/15 s [4]	Ja	15 s	N4659
GQD321.9A [2]	BPZ:GQD321.9A	AC 230 V					
GMA121.9E	BPZ:GMA121.9E	AC/DC 24 V		90/15 s [4]			N4658
GMA321.9E	BPZ:GMA321.9E	AC 230 V					
GMA131.9E	BPZ:GMA131.9E	AC/DC 24 V	3-position				
GDB141.9E [2]	S55499-D200	AC/DC 24 V	2- or 3-position	150 s	-	-	A6V10636203
GDB341.9E [2]	S55499-D201	AC 100-240 V					
GLB141.9E	S55499-D204	AC/DC 24 V	2- or 3-position				A6V10636150
GLB341.9E	S55499-D205	AC 100…240 V					

[1] Actuator type: electromotoric

[2] Actuator only approved for medium temperature > 0 °C

[3] 2-wire SPDT (single pole double throw)

[4] open / close

Ordering

Please indicate material, article type, order text, and quantity; example:

Material	Article type	Order text	Quantity
VAG60.25-22	VAG60.25-22	Open/close ball valve, externally threaded, 2-port	2
GLB131.9E	GLB131.9E	Electromotoric rotary actuator without spring return for ball valves	2

Delivery

Ball valves, rotary actuators, and mounting kits are not assembled and are delivered in individual packaging.

Applications with auxiliary functions

A standard actuator with corresponding functionality can be used if a ball valve application requires a rotary actuator with auxiliary functions (e.g. auxiliary switch or potentiometer). In this case, mounting kit ASK77.. is required in **addition** to the rotary actuator.

Follow the mounting instructions when mounting.

Rotary actuator	Options	Order text mounting kit
GMA..1E (with spring return)	Potentiometer, auxiliary switch	ASK77.2 Accessory Kit BV for GMA..1.9E
GDB..1E (without spring return)		ASK77.3 Accessory Kit BV for GDB..1.9E
GLB..1E (without spring return)		ASK77.3 Accessory Kit BV for GLB..1.9E
GQD..1A (with spring return)	Auxiliary switch	ASK77.5 Accessory Kit BV for GQD..1.9A
GSD..1A [1)] (without spring return)		ASK77.5 Accessory Kit BV for GSD..1.9A

1) GSD..4..1A are not compatible with ball valves.

Product documentation

Title	Content	Document ID
Mounting instructions Ball valve VAG60.., VBG60..L, VBG60..T	Mounting instructions	M4214 (74 319 0923 0)
Rotary actuators for ball valves GSD..41.9A	Data sheet: product description	N4655
Rotary actuators for ball valves GQD..9A	Data sheet: product description	N4659
Rotary actuators for ball valves GMA..9E..	Data sheet: product description	N4658
Rotary actuators for ball valves GDB..9E..	Data sheet: product description	A6V10636150
Rotary actuators for ball valves GLB..9E..	Data sheet: product description	A6V10636203
Mounting instructions Mounting kit ASK77.2, ASK77.3	Mounting instructions	M4696 (74 319 0648 0)
Mounting instructions Mounting kit ASK77.5	Mounting instructions	A6V11171911 (A5W00032790)

Related documents such as environmental declarations, CE declarations, etc., can be downloaded at the following Internet address:

http://siemens.com/bt/download

Notes

Safety

⚠ DANGER

There is a risk to operating personnel and device when working on the unit

Failure to comply with these safety notes can result in personal injury and damage to property from pipe pressure, electrical voltage, or device in operation.

▷ Note the following when servicing a ball valve/rotary actuator:

- Switch off both pump and operating voltage.
- Close shutoff valves.
- Release pressure in the pipes and allow them to cool down completely.
- Disconnect electrical connections from the terminals as needed.
- The rotary actuator must be properly installed prior to recommissioning the ball valve.

⚠ CAUTION

National safety regulations

Failure to comply with national safety regulations may result in personal injury and property damage.

- Observe national provisions and comply with the appropriate safety regulations.

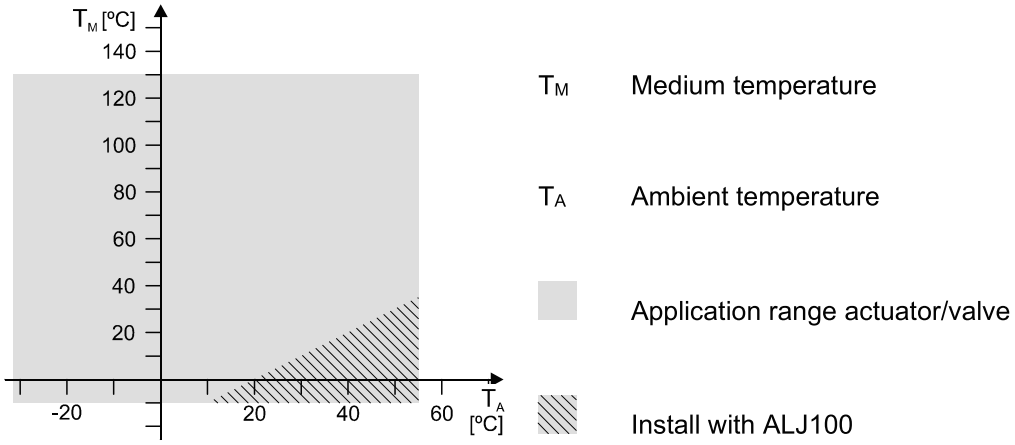
Engineering

We recommend installing the ball valve with spring return since temperatures are lower on heating plants which increases the lifespan of the sealing gland on the stem.

Ensure there is no cavitation (see section Technical design [→ 2]).

A filter must be installed upstream of the ball valve to increase functional safety.

We recommend using temperature adapter ALJ100 in locations exposed to condensation to protect the actuator. Lubricate the adapter axle with silicon grease at medium temperatures ≤ 0 °C.



Only use GDB.., GDD..,GSD.. and GQD.. actuators at medium temperatures > 0 °C.

Permissible media

Using the ball valve in combination with potassium formate-based media, such as Hycool or Temper, can result in leakage over the stem to the outside. The reason is the high level of penetration at low surface tension of media based on potassium formate.

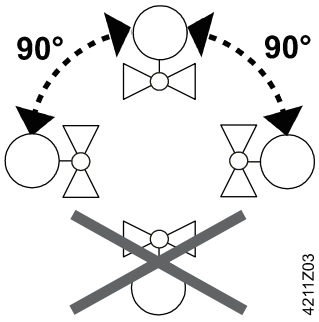
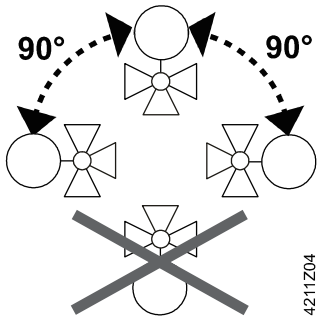
Siemens rejects any and all liability for damages or consequential damages resulting from the use of this media in combination with our ball valves.

Mounting

It is easy to assemble the ball valve and rotary actuator; it can be done at the construction site. No special tools or settings required.

Ball valve VAG60.. / VBG60.. is supplied together with mounting instructions M4214 (74 319 0923 0).

Mounting position

VAG60..	VBG60..
	

Pipe connection

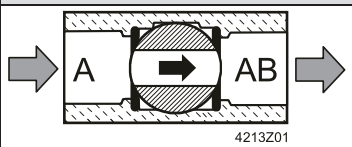
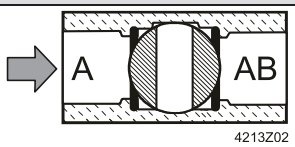
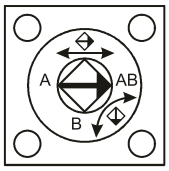
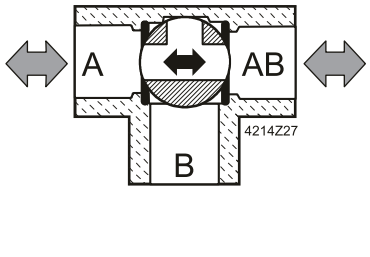
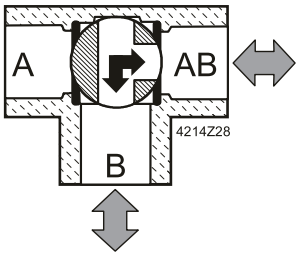
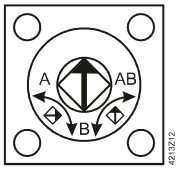
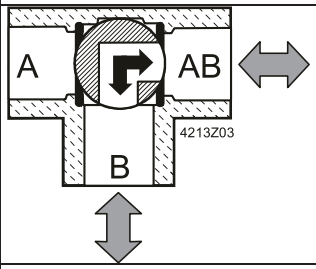
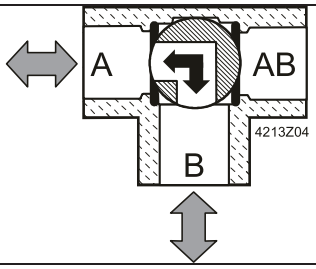
Avoid leakage:

- Install fittings as per ISO 7-1. Ball valves (internal threading) = „Rp“; Piping (external threading) = „R“.
- Do not use too much hemp or PTFE tape.
- Do not tighten pipe threading to the very end.
- Place the pliers/wrench on the ball valve union nut that is closer to the pipe to be tightened or loosened.

Flow direction

Make sure that the valve is mounted in the proper flow direction. A symbol is applied to the ball valve body:

VAG60..	VBG60..
	

Ball valve	Laser marking	Position as delivered	90 ° turned (clockwise)
VAG60.. 2-port shut-off ball valve	-		
		A – AB = 100 %	A – AB = 0 %
VBG60..T 3-port change-over ball valve, T-shaped			
		A – AB = 100 % B – AB = 0 %	A – AB = 0 % B – AB = 100 %
VBG60..L 3-port change-over ball valve, L-shaped			
		B – AB (AB – B) = 100 %	A – B (B – A) = 100 %

Maintenance

Ball valves VAG60.. and VBG60.. are maintenance free.

Disposal

The valve should not be disposed of as domestic garbage.

- Special treatment for individual components may be required by law or make ecological sense.
- Comply with all local and currently applicable laws and regulations.

Warranty

Technical data on specific applications are valid only together with Siemens products listed under "Equipment combinations". Siemens rejects any and all warranties in the event that third-party products are used.

Technical data

Functional data		
	VAG60..	VBG60..
PN class	PN 40 per ISO 7268	
Operating pressure	per ISO 7005 wihtin the permissible media temperature as per section Technical design [→ 2]	
Leakage through-port	Water proof per EN 60534-4 L/1, improved class 5	Water proof per EN 60534-4 L/1, improved class 4
Leakage bypass	-	< 1 %
Permissible media	Chilled water, low temperature hot water, hot water, water with antifreeze. Recommendation: Water treatment per VDI 2035 Note: section Engineering [→ 10]	
Medium temperature	-10…120 °C [1]	
Rotational angle	90 °	

Materials	
Ball valve body	Dezincification-resistant hot-pressed brass (DZR [2]), CW602N
Marble	Dezincification-resistant hot-pressed brass (DZR [2]), CW602N, chrome plated
Stem	Dezincification-resistant hot-pressed brass (DZR [2]), CW602N
Sealing gland	EPDM O-rings

Dimensions / Weight	
See section Dimensions [→ 14]	
Connections with external threading	G..B per ISO 228-1

Standards, directives and approvals	
Pressure Equipment Directive	DGR 2014/68/EU
Pressure accessories Fluid group 2	Range: Article 1, para. 1 Definition: Article 2, para. 5 Without CE certification as per article 3, para. 3 (generally applicable engineering practice) [3]
EAC compliance	Eurasien compliance
Environmental compatibility	Environmental Declaration CE1E4214en [4] contains data on environmental-compatible product design and assessment (RoHS compliance, compositions, packaging, environmental benefits and disposal).

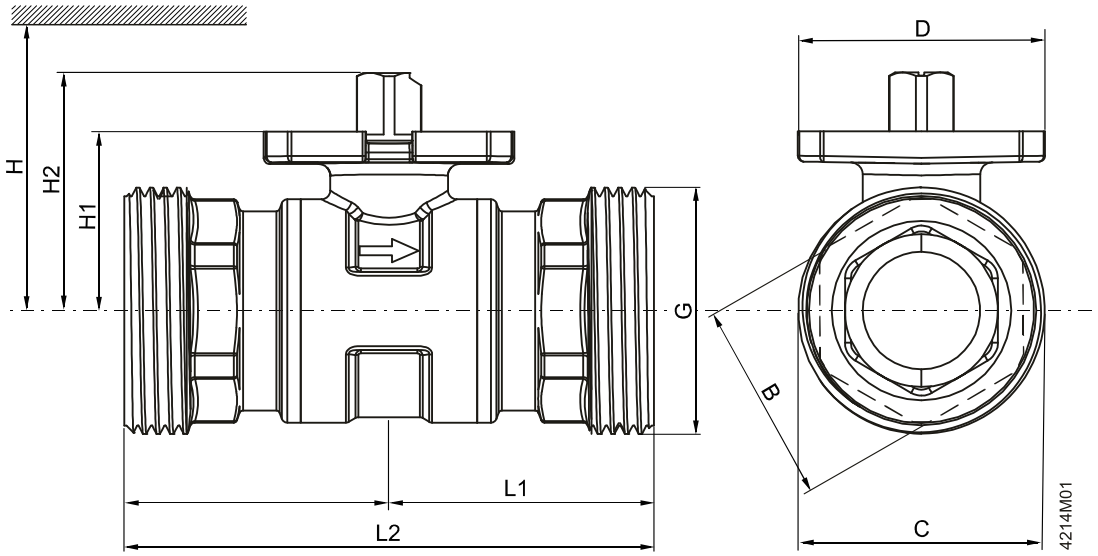
1) Only GLB.., GLD.. and GMA.. actuators are approved for medium temperatures ≤ 0 °C.

2) Dezincification resistant

3) Fittings for a product where PS x DN < 1000 do not require special testing and cannot have CE labeling.

4) Related documents such as environmental declarations, CE declarations, etc., can be downloaded at the following Internet address: http://siemens.com/bt/download

VAG60..



DN = Nominal size

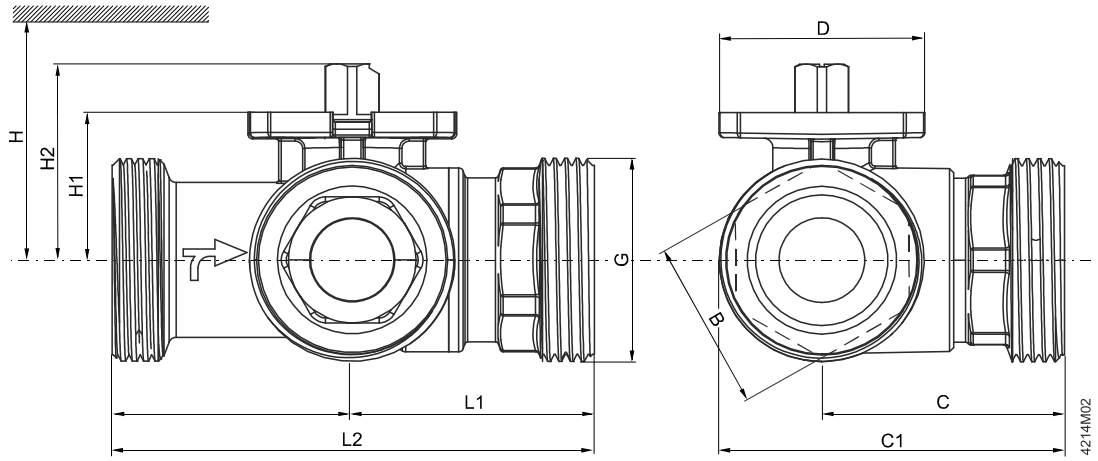
H = Total height of actuator plus minimum mounting distance to wall or ceiling, for mounting, connection, operation, maintenance, etc.

H1 = Dimension from the pipe to the center to install actuator (upper edge)

Type	DN	B	C	D	G	L1	L2	H1	H2
		mm			Inch	mm			
VAG60.15-9	15	27	33	42	G 1 B	43.5	87	27.6	37.6
VAG60.20-17	20	35	42		G 1 ¼ B	44.7	89.4	30.5	40.5
VAG60.25-22	25		48		G 1 ½ B	44.7			
VAG60.32-35	32	38	59.7		G 2 B	50.1	100.2	34.3	44.3
VAG60.40-68	40	49	65.7		G 2 ¼ B	58.3	116.6	39.8	49.8
VAG60.50-96	50	61	81.6		G 2 ¾ B	62	124	52.8	62.8

Type	H					Weight
	GSD..9A	GQD..9A	GDB..9E..	GMA..9E..	GLB..9E..	
	mm					kg
VAG60.15-9	> 300	> 300	> 300	> 300	> 300	0.36
VAG60.20-17						0.55
VAG60.25-22	> 320	> 320	> 320	> 320	> 320	0.57
VAG60.32-35	-	-	-			0.84
VAG60.40-68						1.29
VAG60.50-96				> 335	> 335	1.98

VBG60..



DN = Nominal size

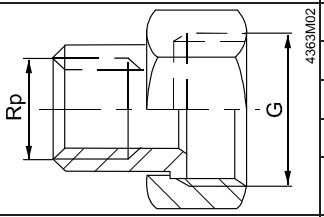
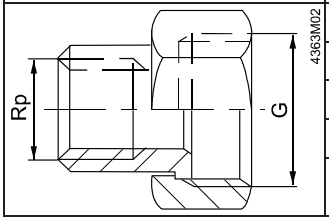
H = Total height of actuator plus minimum mounting distance to wall or ceiling, for mounting, connection, operation, maintenance, etc.

H1 = Dimension from the pipe to the center to install actuator (upper edge)

Type	DN	B	C	C1	D	G	L1	L2	H1	H2
		mm				Inch	mm			
VBG60.15-8T	15	27	44.4	61	42	G 1 B	44.3	88.6	27.6	37,6
VBG60.20-13T	20	35	49.5	70		G 1 ¼ B	49	98	30.5	40.5
VBG60.25-13T	25			73		G 1 ½ B	49.2	98.4		
VBG60.32-25T	32	38	63.7	94		G 2 B	57	114	34.3	44,3
VBG60.40-49T	40	49	74.3	107		G 2 ¼ B	63.8	127.6	39.8	49.8
VBG60.50-73T	50	61	82,3	123		G 2 ¾ B	69	138	52.8	62.8
VBG60.15-5L	15	27	44,4	61	42	G 1 B	44,3	88,6	27,6	37,6
VBG60.20-8L	20	35	49,5	70		G 1 ¼ B	49	98	30,5	40,5
VBG60.25-9L	25			73		G 1 ½ B	49,2	98,4		
VBG60.32-13L	32	38	63,7	94		G 2 B	57	114	34,3	44,3
VBG60.40-25L	40	49	74,3	107		G 2 ¼ B	63,8	127,6	39,8	49,8
VBG60.50-37L	50	61	82,3	123		G 2 ¾ B	69	138	52,8	62,8

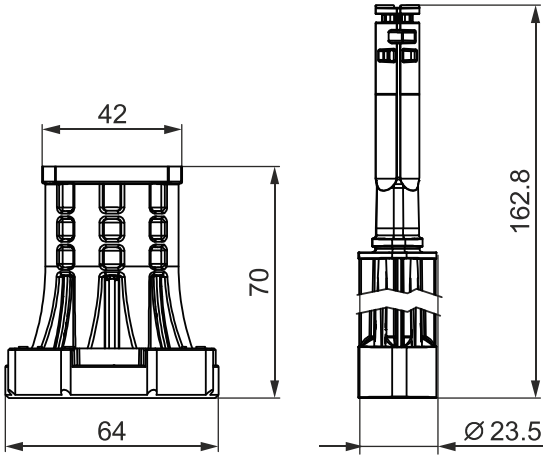
Type	H					Weight
	GSD..9A	GQD..9A	GDB..9E..	GMA..9E..	GLB..9E..	
	mm					kg
VBG60.15-8T	> 300	> 300	> 300	> 300	> 300	0.45
VBG60.20-13T						0.68
VBG60.25-13T	> 320	> 320	> 320	> 320	> 320	0.75
VBG60.32-25T	-	-	-			1.2
VBG60.40-49T						1.84
VBG60.50-73T				> 335	> 335	2.83
VBG60.15-5L	> 300	> 300	> 300	> 300	> 300	0,45
VBG60.20-8L						0,68
VBG60.25-9L	> 320	> 320	> 320	> 320	> 320	0,75
VBG60.32-13L	-	-	-			1,2
VBG60.40-25L						1,84
VBG60.50-37L				> 335	> 335	2,83

Fittings

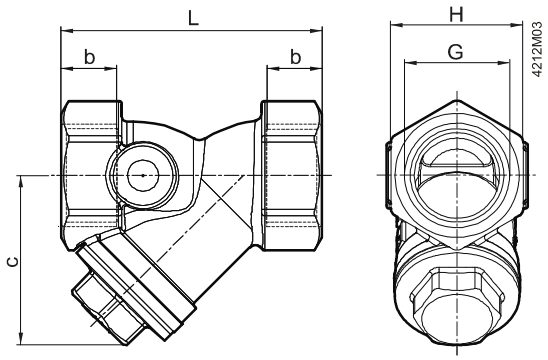
	Type	Stock number	Type	Stock number	Valve type	G	Rp
						Inch	Inch
VAG60..	ALG152	BPZ:ALG152	ALG152B	S55846-Z100	VAG60.15..	G 1 B	Rp ½
	ALG202	BPZ:ALG202	ALG202B	S55846-Z102	VAG60.20..	G 1¼ B	Rp ¾
	ALG252	BPZ:ALG252	ALG252B	S55846-Z104	VAG60.25..	G 1½ B	Rp 1
	ALG322	BPZ:ALG322	ALG322B	S55846-Z106	VAG60.32..	G 2 B	Rp 1¼
	ALG402	BPZ:ALG402	ALG402B	S55846-Z108	VAG60.40..	G 2¼ B	Rp 1½
	ALG502	BPZ:ALG502	ALG502B	S55846-Z110	VAG60.50..	G 2¾B	Rp 2
VBG60..	ALG153	BPZ:ALG153	ALG153B	S55846-Z101	VBG60.15..	G 1 B	Rp ½
	ALG203	BPZ:ALG203	ALG203B	S55846-Z103	VBG60.20..	G 1¼ B	Rp ¾
	ALG253	BPZ:ALG253	ALG253B	S55846-Z105	VBG60.25..	G 1½ B	Rp 1
	ALG323	BPZ:ALG323	ALG323B	S55846-Z107	VBG60.32..	G 2 B	Rp 1¼
	ALG403	BPZ:ALG403	ALG403B	S55846-Z109	VBG60.40..	G 2¼ B	Rp 1½
	ALG503	BPZ:ALG503	ALG503B	S55846-Z111	VBG60.50..	G 2¾B	Rp 2

- Valve side with cyclindrical threading per ISO 228-1
- Pipe side with cyclindrical threading per ISO 7-1
- ALG..B fittings up to 100 °C medium temperature

Temperature adapter (optional)



Filter



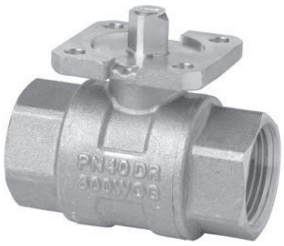
Type	DN	b	c	G	L	H	k_{vs}	Weight
		mm		Zoll [1]	mm			kg
ALX15	15	12	38	G ½	54	27	3.5	0.178
ALX20	20	15	43	G ¾	67	34	5.8	0.290
ALX25	25	16	53	G 1	79	41	9.1	0.410
ALX32	31	17	64	G 1¼	98	51	19	0.680
ALX40	40	18	70	G 1½	106	57	24	0.874
ALX50	50	20	85	G 2	122	69	36	1.428

[1] ISO 228-1

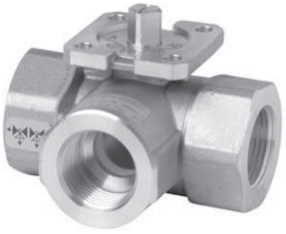
Revision numbers

Type	Valid from rev. no.	Type	Valid from rev. no.	Type	Valid from rev. no.
Shutoff ball valve VAG60..		Changeover ball valve VBG60..T		Changeover ball valve VBG60..L	
2-port		3-port		3-port	
VAG60.15-9	..A	VBG60.15-8T	..A	VBG60.15-5L	..A
VAG60.20-17	..A	VBG60.20-13T	..A	VBG60.20-8L	..A
VAG60.25-22	..A	VBG60.25-13T	..A	VBG60.25-9L	..A
VAG60.32-35	..A	VBG60.32-25T	..A	VBG60.32-13L	..A
VAG60.40-68	..A	VBG60.40-49T	..A	VBG60.40-25L	..A
VAG60.50-96	..A	VBG60.50-73T	..A	VBG60.50-37L	..A

SIEMENS



VAI60..



VBI60..L

VBI60..T

ACVATIX™

2-port shutoff valves and 3-port changeover ball valves, PN 40, with internally threaded connection

VAI60.., VBI60..L, VBI60..T

For use in heating, ventilation, and air conditioning plants as shutoff or change-over ball valve. In closed circuits.

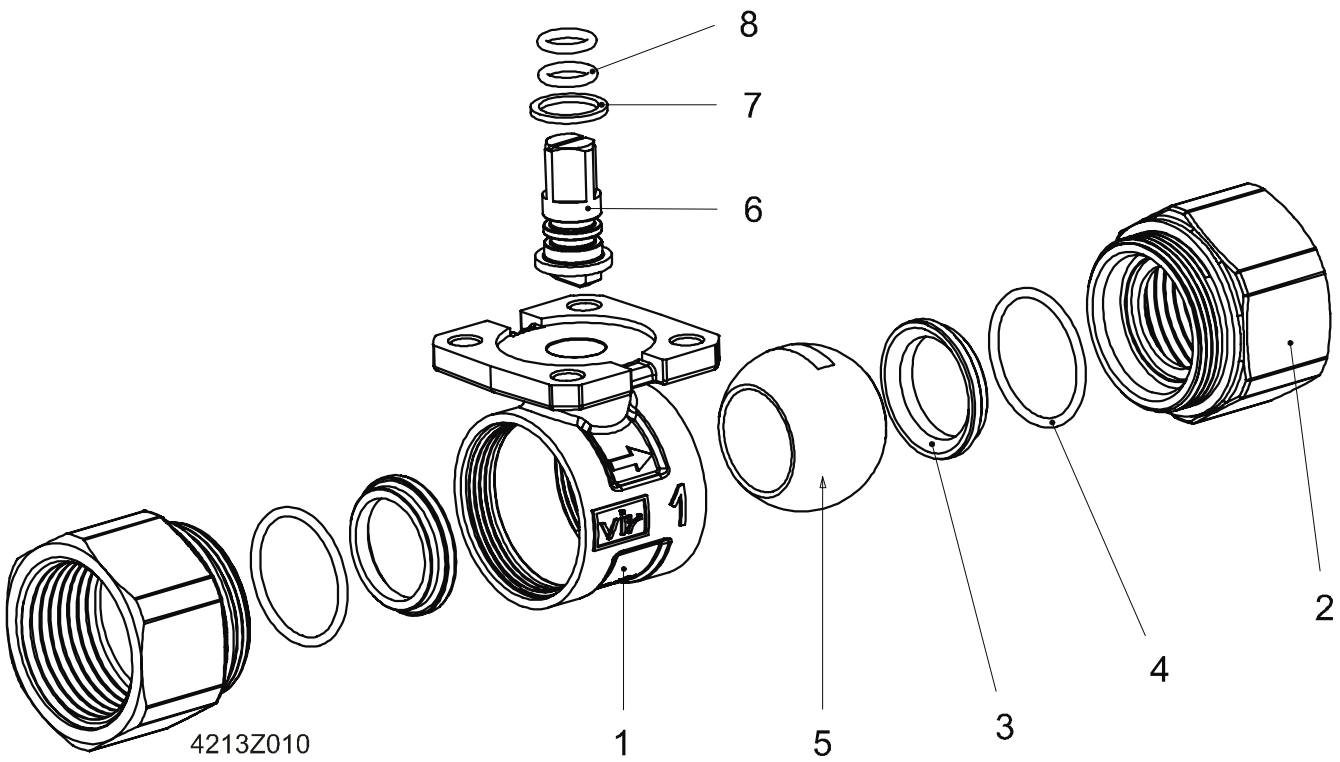
- Ball valve body made of brass, UNS C35330 (DZR)
- DN 15...50
- k_{vs} 5…96 m^3/h
- Connections with internal threading Rp per ISO 7-1
- Rotational angle 90°
- Can be used with electromotorized rotary actuators GQD..9A, GMA..9E with spring return and GSD..9A, GDB..9E, GLB..9E without spring return
- For applications with auxiliary functions (e.g. auxiliary switchs, potentiometers, standard rotary actuators from the DAC product range can also be combined)

Features

- Moderately price:
  Optimized flow rates mean smaller ball valves can be selected. Low torque means you can combine them with small, less expensive rotary actuators.
- Long life expectancy:
  Maintenance-free construction, also thanks to low friction stem and polished ball made of chrome-plated DZR brass.
- Simple mounting:
  The brackets, premounted on the actuators, means you can mount them on the ball valves without tools.

Technical design

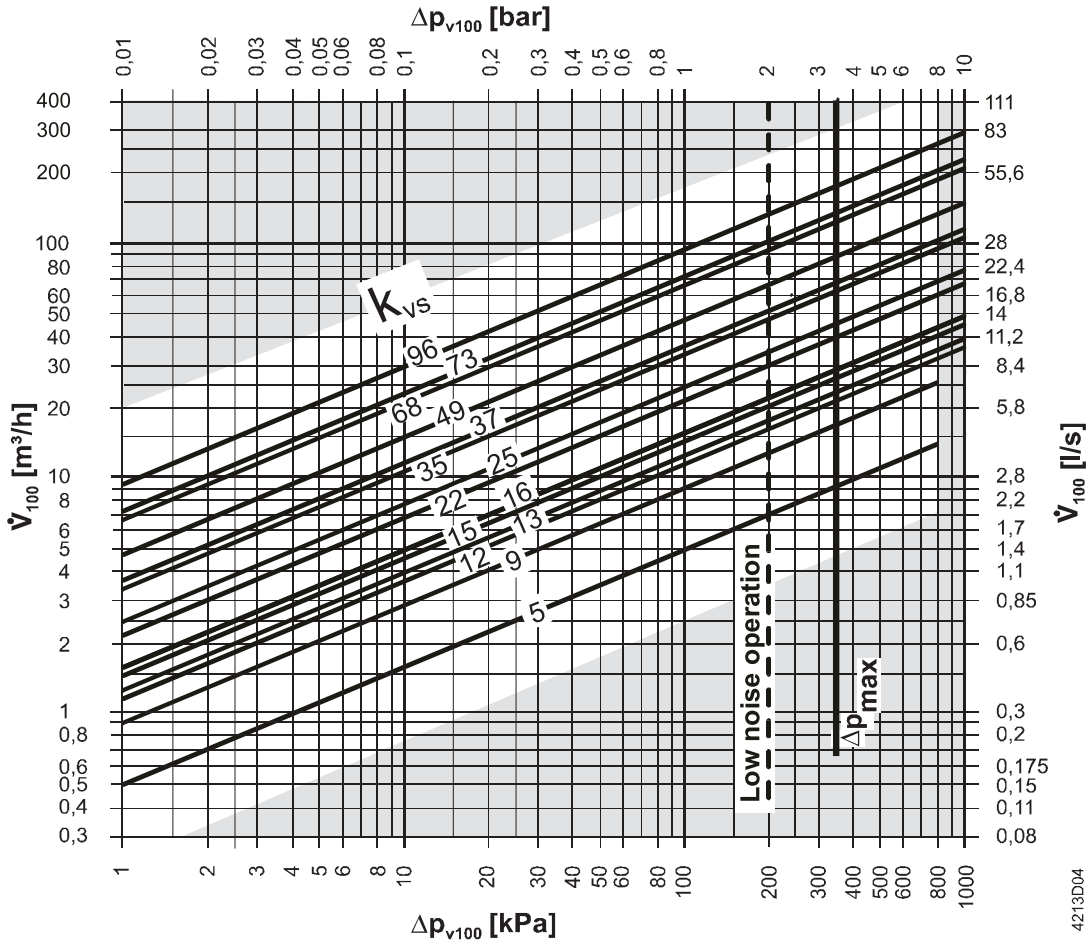
Design



1 Housing
2 Internally threaded connection
3 Seat
4 O-ring seal
5 Marble
6 Stem, squared
7 Slide clutch
8 O-ring seal

Sizing

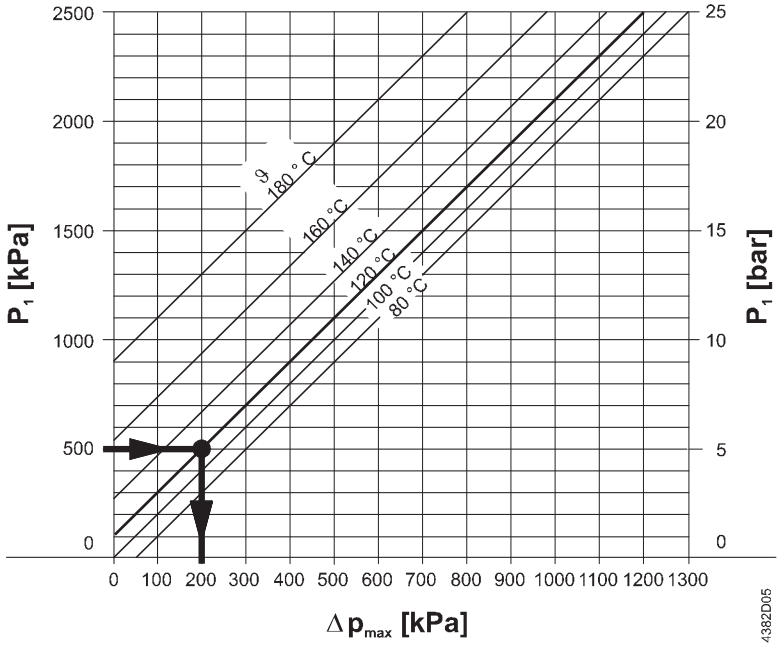
Flow diagram:



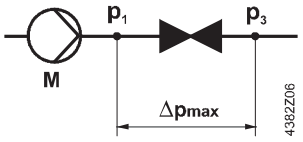
---		Δp_{max} for VAI60.. and VBI60.., for details, see table on equipment combinations
Δp_{max}	=	Maximum permissible differential pressure over the ball valve, valid for the entire positioning range of the ball valve rotary actuator unit; if low noise operation is desired, we recommend a maximum permissible differential pressure of 200 kPa
Δp_{v100}	=	Differential pressure over the fully opened ball valve and over the control path at a volume flow V_{100}
$\dot{V}_{100}$	=	Volume flow through the fully opened ball valve
100 kPa	=	1 bar ≈ 10 mWS
1 m^3/h	=	0.278 l/s water at 20 °C

Cavitation

Cavitation increases wear and tear of the ball and seat and results in unwanted noise. Cavitation can be prevented by not exceeding the differential pressures as per the flow diagram and maintaining the static pressures depicted below.



Δp_{max}	=	Differential pressure at a nearly closed ball valve to largely avoid cavitation
p_1	=	Static pressure at the ball valve inlet
P_3	=	Static pressure at the ball valve outlet
M		Pump
J		Water temperature



Example with hot water:

Pressure p_1 at ball valve inlet: 500 kPa (5 bar)

Water temperature: 120 °C

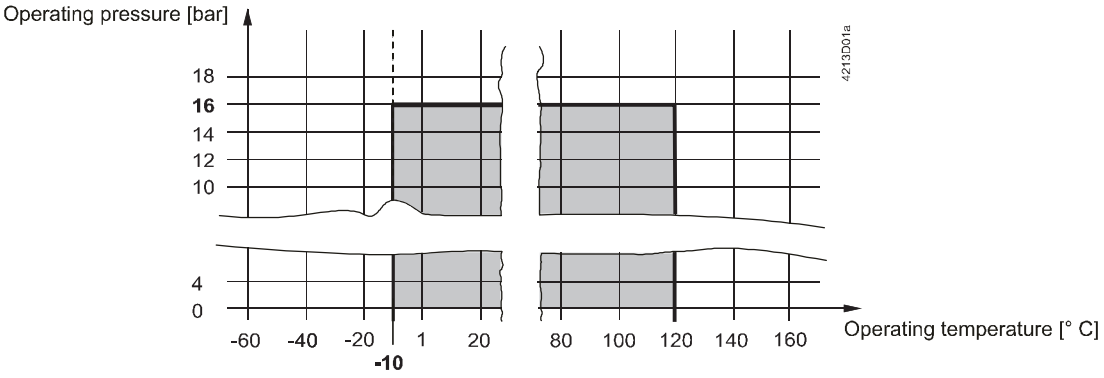
The above diagram clearly indicates that the maximum permissible differential pressure is Δp_{max} → 200 kPa (2 bar) at a nearly closed ball valve.

Note on chilled water applications

To prevent cavitation in chilled water circuits, sufficient counter pressure must be supplied to the ball valve outlet, e.g. using an additional butterfly valve downstream of the ball valve. Maximum permissible differential pressure over the ball valve: See 80 °C curve in the above diagram.

Operating pressure and operating temperature

Liquids:



Operating pressure and medium temperature per IS0 7005
(Observe all local and applicable laws).

Type summary

Type						DN	k_{vs}
Shutoff ball valve 2-port		3-port changeover valve (L)		3-port changeover valve (T)			[m^3/h]
Product no.	Stock number	Product no.	Stock number	Product no.	Stock number		
–	–	VBI60.15-5L	BPZ:VBI60.15-5L	–	–	15	5
–	–	–	–	VBI60.15-12T	BPZ:VBI60.15-12T		12 [1]
VAI60.15-15	BPZ:VAI60.15-15	–	–	–	–		15
–	–	VBI60.20-9L	BPZ:VBI60.20-9L	–	–	20	9
–	–	–	–	VBI60.20-16T	BPZ:VBI60.20-16T		16 [1]
VAI60.20-22	BPZ:VAI60.20-22	–	–	–	–		22
–	–	VBI60.25-9L	BPZ:VBI60.25-9L	–	–	25	9
–	–	–	–	VBI60.25-16T	BPZ:VBI60.25-16T		16 [1]
VAI60.25-22	BPZ:VAI60.25-22	–	–	–	–		22
–	–	VBI60.32-13L	BPZ:VBI60.32-13L	–	–	32	13
–	–	–	–	VBI60.32-25T	BPZ:VBI60.32-25T		25 [1]
VAI60.32-35	BPZ:VAI60.32-35	–	–	–	–		35
–	–	VBI60.40-25L	BPZ:VBI60.40-25L	–	–	40	25
–	–	–	–	VBI60.40-49T	BPZ:VBI60.40-49T		49 [1]
VAI60.40-68	BPZ:VAI60.40-68	–	–	–	–		68
–	–	VBI60.50-37L	BPZ:VBI60.50-37L	–	–	50	37
–	–	–	–	VBI60.50-73T	BPZ:VBI60.50-73T		73 [1]
VAI60.50-96	BPZ:VAI60.50-96	–	–	–	–		96

[1] k_{vs} Bypass B > 50 % of k_{vs} A ─ AB

DN = Nominal size

k_{vs} = Flow nominal value for chilled water (5…30 °C) through a fully opened ball valve at a differential pressure of 100 kPa (1 bar)

Accessories

Temperature adapter ALJ100

⚠ DANGER

Hazard to life caused by a lack of ground for the combination ALJ100 with G.. and ASK77.2!

Combining temperature adapter ALJ100 with ASK77.2 and rotary actuators G.. operated at AC 230 V ~ or AC 100…240 V ~ or rotary actuators G.. with auxiliary switch voltage AC 230 V ~ results in life-threatening shocks due to a lack of ground.

- Never combine rotary actuators G.. operated at voltage of AC 230 V ~ or AC 100…240 V ~ with temperature adapter ALJ100.
- Never combine ASK77.2 with temperature adapter ALJ100.
- Never combine rotary actuators with auxiliary switch voltage AC 230 V ~ with tempera-ture adapter ALJ100.

Type	Stock number	Description
ALJ100	S55846-Z115	Temperature adapter for ball valves

Filter

Installed upstream of the ball valve:

Type	Stock number	Description	DN	Mesh width [mm]
ALX15	S55845-Z174	Filter with internal threading	15	0.5
ALX20	S55845-Z175	Filter with internal threading	20	0.8
ALX25	S55845-Z176	Filter with internal threading	25	0.8
ALX32	S55845-Z177	Filter with internal threading	32	0.8
ALX40	S55845-Z178	Filter with internal threading	40	0.8
ALX50	S55845-Z179	Filter with internal threading	50	0.8

Equipment combinations

Type	Rotary actuators									
	GSD..9A		GQD..9A		GDB..9E..		GMA..9E..		GLB..9E..	
	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s
Ball valve	[kPa]									
VAI60.15-15	350	1400	350	1400	350	1400	350	1400	350	1400
VAI60.20-22										
VAI60.25-22										
VAI60.32-35	-	-	-	-	-	-		1000		1000
VAI60.40-68								800		800
VAI60.50-96								600		600
VBI60.15-5L	350		350		350	-	350	-	350	-
VBI60.20-9L										
VBI60.25-9L										
VBI60.32-13L	-		-		-					
VBI60.40-25L										
VBI60.50-37L										
VBI60.15-12T	350		350		350		350			
VBI60.20-16T										
VBI60.25-16T										
VBI60.32-25T	-		-		-					
VBI60.40-49T										
VBI60.50-73T										

Δp_{max} = Maximum permissible differential pressure over the valve ball control path, valid for the entire positioning range of the ball valve rotary actuator unit; if low noise operation is desired, we recommend a differential pressure of 200 kPa

Δp_s = Maximum permissible differential pressure (closing pressure) at which the ball valve rotary actuator unit securely closes against the pressure

Overview of rotary actuators for ball valves

Type [1]		Operating voltage	Positioning		Spring return		Data sheet
Product no.	Stock number		Signal	Time	Function	Time	
GSD141.9A [2]	BPZ:GSD141.9A	AC/DC 24 V	Open-close [3]	30 s	-	-	N4655
GSD341.9A [2]	BPZ:GSD341.9A	AC 230 V					
GQD121.9A [2]	BPZ:GQD121.9A	AC/DC 24 V	2-position	30/15 s [4]	Yes	15 s	N4659
GQD321.9A [2]	BPZ:GQD321.9A	AC 230 V					
GMA121.9E	BPZ:GMA121.9E	AC/DC 24 V		90/15 s [4]			N4658
GMA321.9E	BPZ:GMA321.9E	AC 230 V					
GMA131.9E	BPZ:GMA131.9E	AC/DC 24 V	3-position				
GLB141.9E	S55499-D204	AC/DC 24 V	2 or 3 point	150 s	-	-	A6V10636203
GLB341.9E	S55499-D205	AC 100...240 V					
GDB141.9E [2]	S55499-D200	AC/DC 24 V	2 or 3 point				A6V10636150
GDB341.9E [2]	S55499-D201	AC 100...240 V					

[1] Actuator type: Electromotive

[2] Actuator only approved for medium temperature > 0 °C

[3] 2-wire SPDT (single pole double throw)

[4] Open/close

Ordering

Please indicate material, article type, order text, and quantity; example:

Material	Article type	Order text	Quantity
VAI60.25-22	VAI60.25-22	Open/close ball valve internally threaded, 2-port	2
GLB131.9E	GLB131.9E	Actuator for ball valve, NSR	2

Delivery

Ball valves, rotary actuators, and mounting kits are not assembled and are delivered in individual packaging.

Applications with auxiliary functions

A standard actuator with corresponding functionality can be used if a ball valve application requires a rotary actuator with auxiliary functions (e.g. auxiliary switch or potentiometer). In this case, mounting kit ASK77.x is required in **addition** to the rotary actuator.

Follow the mounting instructions when mounting.

Rotary actuator	Options	Order text: Mounting kit
GMA..1E (with spring return)	Potentiometer, auxiliary switch	ASK77.2 Accessory Kit BV for GMA..1.9E
GLB..1E (without spring return)		ASK77.3 Accessory Kit BV for GLB..1.9E
GDB..1E (without spring return)		ASK77.3 Accessory Kit BV for GDB..1.9E
GQD..1A (with spring return)	Auxiliary switch	ASK77.5 Accessory Kit BV for GQD..1.9A
GSD..1A [1)] (without spring return)		ASK77.5 Accessory Kit BV for GSD..1.9A

[1)] GSDx4x.1A are not compatible with ball valves.

Product documentation

Title	Content	Document ID
Mounting instructions Ball valve VAI60.. , VBI60..L, VBI60..T	Mounting instructions	M4213 (74 319 0883 0)
Rotary actuators for ball valves GSD..41.9A	Data sheet: product description	N4655
Rotary actuators for ball valves GQD..9A	Data sheet: product description	N4659
Rotary actuators for ball valves GMA..9E..	Data sheet: product description	N4658
Rotary actuators for ball valves GLB..9E..	Data sheet: product description	A6V10636203
Rotary actuators for ball valves GDB..9E..	Data sheet: product description	A6V10636150
Mounting instructions Mounting kit ASK77.2, ASK77.3	Mounting instructions	M4696 (74 319 0648 0)
Mounting instructions Mounting kit ASK77.5	Mounting instructions	A6V11171911 (A5W00032790)

Related documents such as environmental declarations, CE declarations, etc., can be downloaded at the following Internet address:

http://siemens.com/bt/download

Safety

⚠ DANGER

There is a risk to operating personnel and device when working on the unit

Failure to comply with these safety notes can result in personal injury and damage to property from pipe pressure, electrical voltage, or devic in operation.

▷ Note the following when servicing a ball valve/rotary actuator:

- Switch off both pump and operating voltage.
- Close shutoff valves.
- Release pressure in the pipes and allow them to cool down completely.
- Disconnect electrical connections from the terminals as needed.
- The rotary actuator must be properly installed prior to recommissioning the ball valve.

⚠ CAUTION

National safety regulations

Failure to comply with national safety regulations may result in personal injury and property damage.

- Observe national provisions and comply with the appropriate safety regulations.

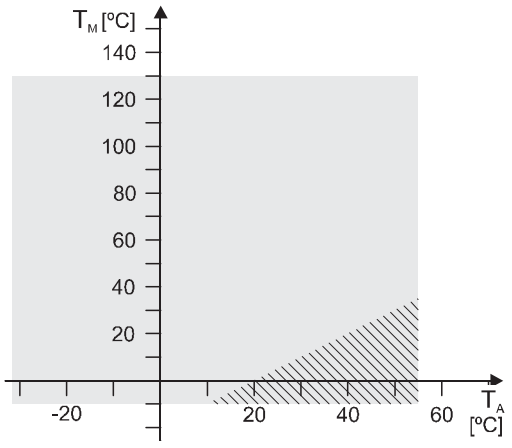
Engineering

We recommend installing the ball valve with spring return since temperatures are lower on heating plants which increases the lifespan of the sealing gland on the stem.

Ensure there is no cavitation (see Section Technical design [→ 2]).

A filter must be installed upstream of the ball valve to increase functional safety.

We recommend using temperature adapter ALJ100 in locations exposed to condensation to protect the actuator. Lubricate the adapter axle with silicon grease at medium temperatures ≤ 0 °C.



T_M Medium temperature

T_A Ambient temperature

Application range actuator/valve

Install with ALJ100

Only use GDB.., GDD..,GSD.. and GQD.. actuators at medium temperatures > 0 °C.

Permissible media

Using the ball valve together with potassium formate-based media can result in leakage over the stem to the outside. The reason is the high level of penetration at low surface tension of media based on potassium formate.

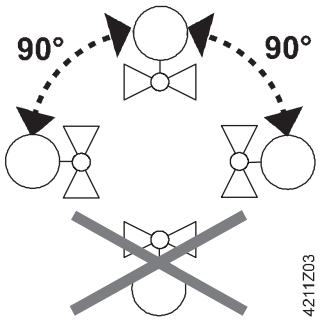
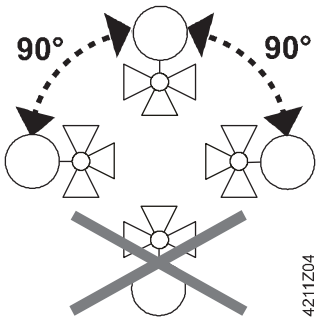
Siemens rejects any and all liability for damages or consequential damages resulting from the use of this media together with our ball valves.

Mounting

It is easy to assemble the ball valve and rotary actuator; it can be done at the construction site. No special tools or settings required.

Ball valve VAI60.. / VBI60.. is supplied together with mounting instructions M4213 (74°319°0883°0).

Mounting position

VAI60..	VBI60..
	

Pipe connection

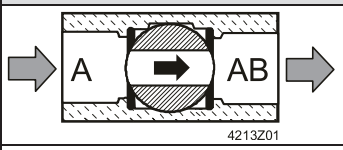
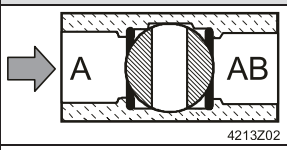
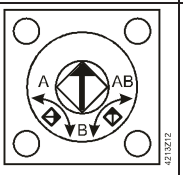
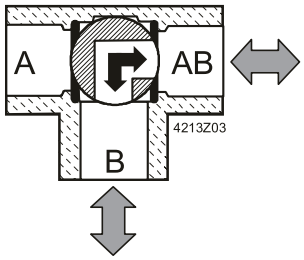
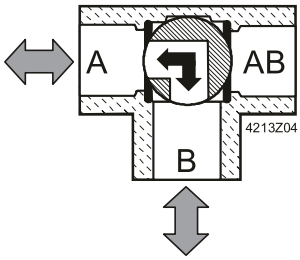
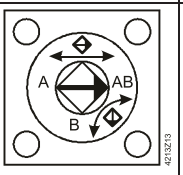
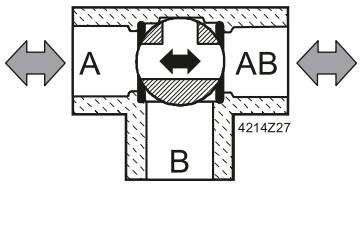
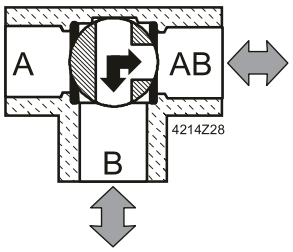
Avoid leakage:

- Install fittings as per ISO 7-1. Ball valves (internal threading) = "Rp"; Piping (external threading) = "R".
- Do not use too much hemp or PTFE tape.
- Do not tighten pipe threading to the very end.
- Place the pliers/wrench on the ball valve union nut that is closer to the pipe to be tightened or loosened.

Flow direction

Make sure that the valve is mounted in the proper flow direction. A symbol is applied to the ball valve body:

VAI60..	VBI60..
→	⊣⇨

Ball valve	Laser marking	Position as delivered	90 ° turned (clockwise)
VAI60.. 2-port shutoff ball valve	-		
		A – AB = 100 %	A – AB = 0 %
VBI60..L 3-port changeover ball valve with L shaped			
		B – AB (AB – B) = 100 %	A – B (B – A) = 100 %
VBI60..T 3-port changeover ball valve with T shaped			
		A – AB = 100 % B – AB = 0 %	A – AB = 0 % B – AB = 100 %

Maintenance

Ball valves VAI60.. and VBI60.. are maintenance free.

Disposal

Do not dispose of the device as part of domestic waste.

- Special handling of individual components may be required by law or make ecological sense.
- Adhere to all local and currently applicable laws and regulations.

Warranty

Technical data on specific applications are valid only together with Siemens products listed under "Equipment combinations". Siemens rejects any and all warranties in the event that third-party products are used.

Technical data

Functional data			
	VAI60..	**VBI60..L**	**VBI60..T**
PN class	PN 40 per ISO 7268		
Operating pressure	Per ISO 7005 within the permissible media temperature as per Section Technical design [→ 2]		
Leakage through-port	Water proof per EN 60534-4 L/1, improved class 5	-	Water proof per EN 60534-4 L/1, improved class 4
Leakage A (Flow B-AB) Leakage AB (Flow A-B)	-	Water proof per EN 60534-4 L/1, improved class 4	-
Leagage bypass	-	-	< 1 %
Permissible media	Chilled water, low temperature hot water, hot water, water with antifreeze. Recommendation: Water treatment per VDI 2035 Note: Page 10		
Medium temperature	-10…120 °C [1)]		
Rangeability Sv	> 500		
Rotational angle	90 °		

Materials	
Ball valve body	Dezincification-resistant hot-pressed brass (DZR [2)]), CW602N
Marble	Dezincification-resistant hot-pressed brass (DZR [2)]), CW602N, chrome plated
Stem	Dezincification-resistant hot-pressed brass (DZR [2)]), CW602N
Sealing gland	EPDM-O rings

Dimensions / Weight	
See Dimensions [→ 13]	
Internally threaded connection	Rp per ISO 7-1

Standards, directives and approvals	
Pressure Equipment Directive	DGR 2014/68/EU
Pressure accessories Fluid group 2	Range: Article 1, para. 1 Definition: Article 2, para. 5 Without CE certification as per article 3, para. 3 (generally applicable engineering practice) [3)]
EAC compliance	Eurasian compliance
Environmental compatibility	Environmental Declaration E1E4213en [4)] contains data on environmental-compatible product design and assessment (RoHS compliance, compositions, packaging, environmental benefits and disposal).

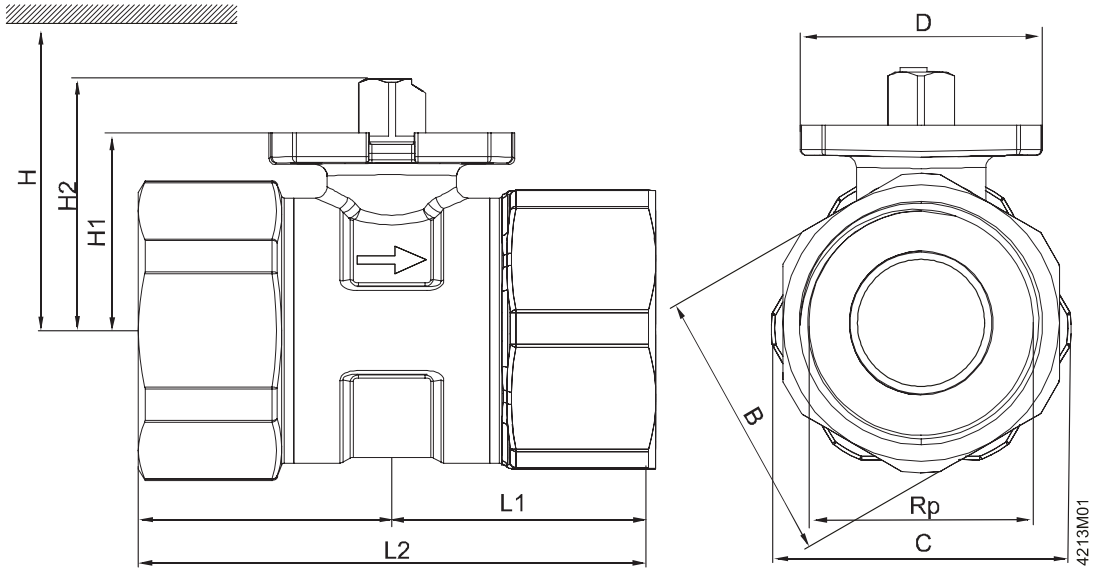
1) Only GLB.., GLD.. and GMA.. actuators are approved for medium temperatures ≤ 0 °C.

2) Dezincification resistant

3) Fittings for a product where PS x DN < 1000, do not require special testing and cannot have CE labeling

4) Related documents such as environmental declarations, CE declarations, etc., can be downloaded at the following Internet address: http://siemens.com/bt/download

VAI60..



DN = Nominal size

H = Total height of actuator plus minimum mounting distance to wall or ceiling, for mounting, connection, operation, maintenance, etc.

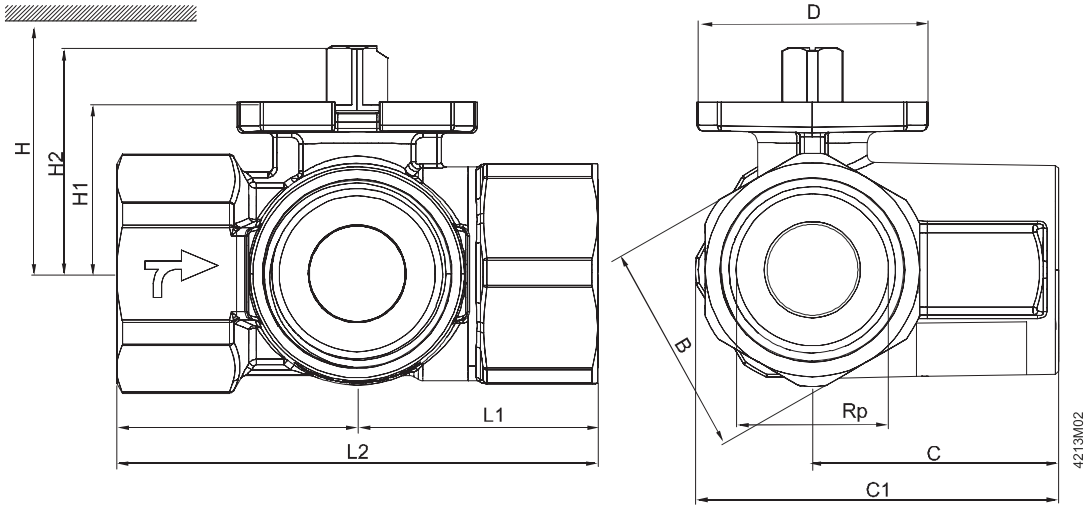
H1 = Dimension from the pipe to the center to install actuator (upper edge)

Type	DN	B	C	D	Rp	L1	L2	H1	H2
		[mm]			[inch]	[mm]			
VAI60.15-15	15	26	31 [1)]	42	Rp ½	30.8	61.6	27.6	37.6
VAI60.20-22	20	31	38	42	Rp ¾	33,5	67	30.5	40.5
VAI60.25-22	25	39	42.5	42	Rp 1	38.4	76.8	30.5	40.5
VAI60.32-35	32	48	52	42	Rp 1¼	44	88	34.3	44.3
VAI60.40-68	40	55	61	42	Rp 1½	50.9	101.8	39.8	49.8
VAI60.50-96	50	67	74	42	Rp 2	58.1	116.2	52.8	62.8

[1)] Ball valve body extends above threaded connection

Type	H					Weight
	GSD..9A	GQD..9A	GDB..9E..	GMA..9E..	GLB..9E..	
	[mm]					[kg]
VAI60.15-15	> 300	> 300	> 300	> 300	> 300	0.28
VAI60.20-22						0.36
VAI60.25-22	> 320	> 320	> 320	> 320	> 320	0.46
VAI60.32-35	-	-	-			0.7
VAI60.40-68						1.1
VAI60.50-96				> 335	> 335	1.74

VBI60..L / VBI60..T



DN = Nominal size

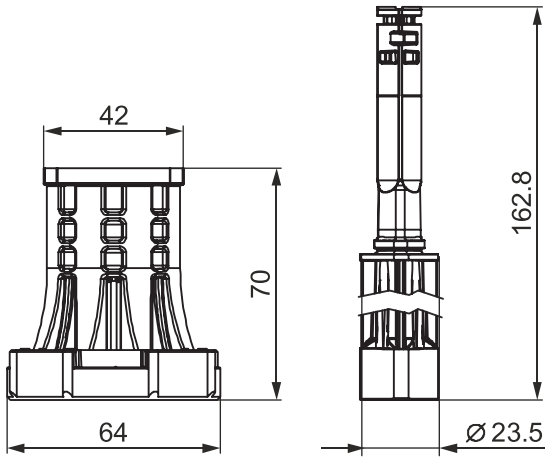
H = Total height of actuator plus minimum mounting distance to wall or ceiling, for mounting, connection, operation, maintenance, etc.

H1 = Dimension from the pipe to the center to install actuator (upper edge)

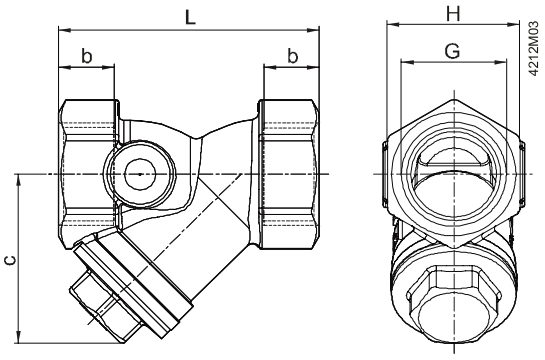
Type	DN	B	C	C1	D	Rp	L1	L2	H1	H2
		[mm]				[inch]	[mm]			
VBI60.15-5L	15	26	34	49.5	42	Rp ½	33.3	66.6	27.6	37.6
VBI60.20-9L	20	39	39.8	61.05	42	Rp ¾	40.2	80.4	30.5	40.5
VBI60.25-9L	25	39	44.8	66.5	42	Rp 1	42.7	85.4	30.5	40.5
VBI60.32-13L	32	48	52.6	78.6	42	Rp 1¼	49.6	99.2	34.3	44.3
VBI60.40-25L	40	55	57.1	87.6	42	Rp 1½	54.8	109.6	39.8	49.8
VBI60.50-37L	50	67	68.9	105.9	42	Rp 2	65.7	131.4	52.8	62.8
VBI60.15-12T	15	26	34	49.5	42	Rp ½	33.3	66.6	27.6	37.6
VBI60.20-16T	20	39	39.8	61.05	42	Rp ¾	40.2	80.4	30.5	40.5
VBI60.25-16T	25	39	44.8	66.5	42	Rp 1	42.7	85.4	30.5	40.5
VBI60.32-25T	32	48	52.6	78.6	42	Rp 1¼	49.6	99.2	34.3	44.3
VBI60.40-49T	40	55	57.1	87.6	42	Rp 1½	54.8	109.6	39.8	49.8
VBI60.50-73T	50	67	68.9	105.9	42	Rp 2	65.7	131.4	52.8	62.8

Type	H					Weight
	GSD..9A	GQD..9A	GDB..9E..	GMA..9E..	GLB..9E..	
	[mm]					[kg]
VBI60.15-5L	> 300	> 300	> 300	> 300	> 300	0.32
VBI60.20-9L						0.73
VBI60.25-9L	> 320	> 320	> 320	> 320	> 320	0.62
VBI60.32-13L	-	-	-			0.97
VBI60.40-25L						1.43
VBI60.50-37L				> 335	> 335	2.36
VBI60.15-12T	> 300	> 300	> 300	> 300	> 300	0.31
VBI60.20-16T						0.74
VBI60.25-16T	> 320	> 320	> 320	> 320	> 320	0.63
VBI60.32-25T	-	-	-			0.69
VBI60.40-49T						1.38
VBI60.50-73T				> 335	> 335	2.26

Temperature adapter (optional)



Filter



Type	DN	b	c	G	L	H	k_{vs}	Weight
		mm		Inch [1]	mm			kg
ALX15	15	12	38	G ½	54	27	3.5	0.178
ALX20	20	15	43	G ¾	67	34	5.8	0.290
ALX25	25	16	53	G 1	79	41	9.1	0.410
ALX32	31	17	64	G 1¼	98	51	19	0.680
ALX40	40	18	70	G 1½	106	57	24	0.874
ALX50	50	20	85	G 2	122	69	36	1.428

[1] ISO 228-1

Revision numbers

Type	Valid from rev. no.	Type	Valid from rev. no.	Type	Valid from rev. no.
Shutoff ball valve VAI60..		Changeover ball valve VBI60..L		Changeover ball valve VBI60..T	
2-port		3-port		3-port	
VAI60.15-15	..A	VBI60.15-5L	..A	VBI60.15-12T	..A
VAI60.20-22	..A	VBI60.20-9L	..A	VBI60.20-16T	..A
VAI60.25-22	..A	VBI60.25-9L	..A	VBI60.25-16T	..A
VAI60.32-35	..A	VBI60.32-13L	..A	VBI60.32-25T	..A
VAI60.40-68	..A	VBI60.40-25L	..A	VBI60.40-49T	..A
VAI60.50-96	..A	VBI60.50-37L	..A	VBI60.50-73T	..A

ACVATIX™

Modulating refrigerant valves with magnetic actuator, PS45

MVL661..-..

Hermetically sealed, for safety refrigerants

- **One valve type for expansion, hot-gas and suction throttle applications**
- **Hermetically sealed towards outside**
- **Selectable standard interface DC 0/2...10 V or DC 0/4...20 mA**
- **High resolution and control accuracy**
- **Precise positioning control and position feedback signal**
- **Short positioning time (< 1 s)**
- **Closed when deenergized**
- **Robust and maintenance-free**
- **Six valve sizes with k_{vs} values from 0.25 to 12 m³/h**

Use

The MVL661..-.. refrigerant valve is designed for modulating control of refrigerant circuits including chillers and heat pumps. It can be used in expansion, hot-gas and suction throttle applications as well as with all commonly used refrigerants (R134a, R448A, R449A, R450A, R452A, R513A etc.) and R744 (CO_2).

Type summary

Type reference	DN	k_{vs} [m^3/h]	k_{vs} reduced [1] [m^3/h]	Δp_{max} [MPa]	Q_0 E [kW]	Q_0 H [kW]	Q_0 D [kW]
MVL661.15-0.4	15	0.40		2.5	38	11	1.6
			0.25		24	6.9	1.0
MVL661.15-1.0	15	1.0			96	27	4.1
			0.63		61	17	2.6
MVL661.20-2.5	20	2.5			242	69	10
			1.6		155	44	6.6
MVL661.25-6.3	25	6.3			610	176	26
			4		387	111	16
MVL661.32-10	32	10		1.6	969	279	41
			6.3		610	176	26
MVL661.32-12	32	12		0.2	[2]	[2]	49
			8		[2]	[2]	33

[1] 63% of k_{vs}, refer to "k_{vs} reduction" on page 4

[2] MVL661.32-12.0 is only approved for suction throttle applications

k_{vs} Nominal flow rate of refrigerant through the fully open valve (H_{100}) at a differential pressure of 100 kPa (1 bar) to VDI 2173

Q_0 E Refrigeration capacity in expansion applications

Q_0 H Refrigeration capacity in hot-gas compressor bypass applications
Calculated base: Isentropic efficiency of 0.67

Q_0 D Refrigeration capacity in suction throttle applications and Δp = 0.5 bar

Q_0 With R448A at t_o = -10°C and t_c = 45°C

The pressure drop across evaporator and condenser is assumed to be 0.3 bar each, and 1.6 bar upstream of the evaporator (e.g. spider).
The capacities specified are based on superheating by 6 K and subcooling by 2 K.

The refrigeration capacity for various refrigerants and operating conditions can be calculated for the 3 types of application using the tables on page 15 .
For accurate valve sizing, we recommend the valve selection program "Refrigeration VASP".

Accessories

PTC conductive heating element ASR70

ASR70 extends the application range of valves for refrigerant temperatures at the valve inlet below 0° C. Typical applications pump systems with CO_2 refrigerant machines.

Direct mounting on refrigerant valve, no adjustments.

See data sheet A6V11858863.
The PTC conductive heating element is supplied complete with Mounting Instructions A6V11858868.

Ordering

Valve body and magnetic actuator form one integral unit and cannot be separated.

Example:

Product number	*Stock number*	*Designation*
MVL661.15-0.4	MVL661.15-0.4	Refrigerant valve

Spare parts

If the valve's electronics become faulty, the entire electronics housing must be replaced by spare part ASR61, supplied complete with mounting instructions (74 319 0270 0).

Rev. no.

See table on page 20.

Features and benefits

- 4 selectable standard signals for setpoint and measured value
- DIP switch to reduce the k_{vs} value to 63% of the nominal value
- Potentiometer for adjustment of minimum stroke for suction throttle applications
- Automatic stroke calibration
- Forced control input for “Valve closed” or “Valve fully open”
- LED for indicating the operating state

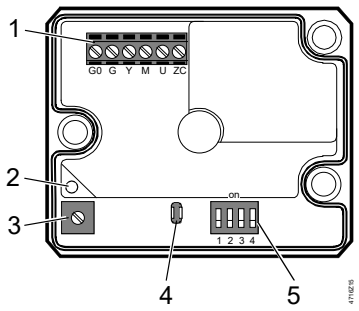
Drive

The MVL661..-.. can be driven by Siemens or third-party controllers that deliver a DC 0/2...10 V or DC 0/4...20 mA output signal.
For optimum control performance, we recommend a 4-wire connection between controller and valve. When operating on DC voltage, a 4-wire connection is **mandatory**!
The valve stroke is proportional to the control signal.

Spring return facility

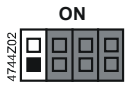
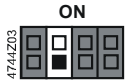
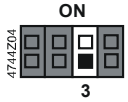
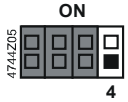
If the positioning signal is interrupted, or in the event of a power failure, the valve’s return spring will automatically close control path A → AB.

Operator controls and indicators in the electronics housing



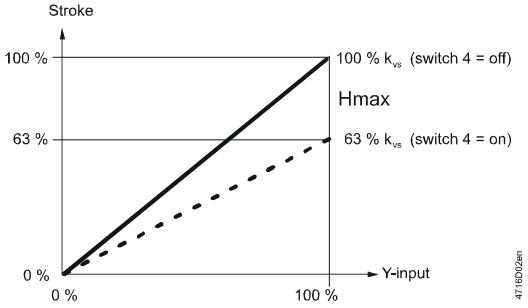
1 Connection terminals
2 LED for indication of operating state
3 Minimal stroke setting potentiometer Rv
4 Autocalibration
5 DIL switches for mode control

Configuration of DIL switches

Switch	Function	ON / OFF	Description
	Positioning signal Y	ON	Current [mA]
		OFF	**Voltage [V]** [1]
	Positioning range Y and U	ON	DC 2…10 V, 4…20 mA
		OFF	**DC 0…10 V**, 0…20 mA [1]
	Position feedback U	ON	Current [mA]
		OFF	**Voltage [V]** [1]
	Nominal flow rate k_{vs}	ON	63%
		OFF	**100%** [1]

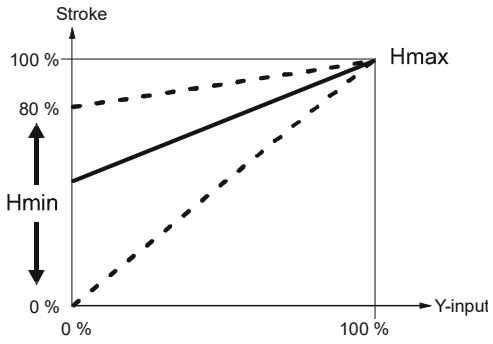
[1] **Factory setting**

k_{vs}-reduction



For k_{vs} reduction (DIL switch 4 in position ON), the stroke is limited to 63% mechanical stroke. 63% of full stroke then corresponds to an input/output signal of 10 V.
If, in addition, the stroke is limited to 80%, for example, the minimum stroke is 0.63 x 0.8 = 0.50 of full stroke.

Minimum stroke setting

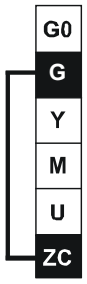
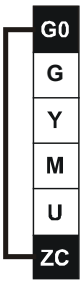
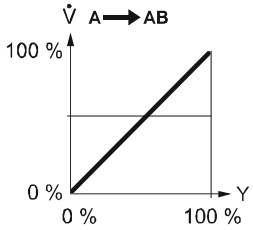
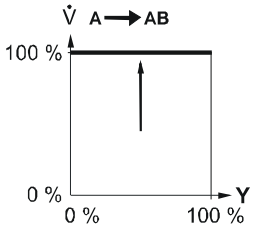
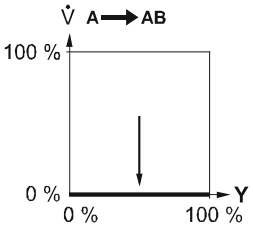


In the case of a suction throttle valve, it is essential that a minimum stroke limit be maintained to ensure compressor cooling and efficient oil return. This can be achieved with a reinjection valve, a bypass line across the valve, or a guaranteed minimum opening of the valve. The minimum stroke can be defined via the controller and control signal Y, or it can be set directly with potentiometer Rv.

The **factory setting** is zero (mechanical stop in counterclockwise direction, CCW). The minimum stroke can be set by turning the potentiometer clockwise (CW) to a maximum of 80% k_{vs}.

Caution ⚠ **Do not under any circumstances use potentiometer Rv to limit the stroke on expansion applications. It must be possible to close the valve fully.**

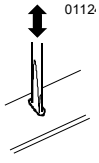
Forced control input ZC

	ZC – Function		
	No function	Fully open	Closed
Connections			 4717Z06
Transfer			
function	• ZC not connected • Valve will follow the Y-signal • Minimum stroke set-ting with potentiometer Rv possible	• ZC connected to G • Valve will fully open control path A → AB	• ZC connected to G0 • Valve will close control path A → AB

Signal priority

1. Forced control signal ZC
2. Signal input Y and/or minimum stroke setting with potentiometer Rv possible.

Calibration



The printed circuit board of the MVL661..-.. has a slot to facilitate calibration. To calibrate, insert a screwdriver in the slot so that the contacts inside are connected. As a result, the valve will first be fully closed and then fully opened.
Calibration matches the electronics to the valve mechanism.
During calibration, the green LED flashes for about 10 seconds; refer to "Indication of operating state" (page 5).
MVL661..-.. refrigerant valves are supplied fully calibrated.

When is a calibration required?

Execute a calibration after replacing the electronics, when the red LED is lit or flashing or when the valve is leaking (at seat).

Indication of operating state

LED	Indication	Function	Remarks, troubleshooting
Green	Lit 	Control mode	Automatic operation; everything o.k.
	Flashing 	Calibration in progress	Wait until calibration is finished (green or red LED will be lit)
Red	Lit 	Calibration error Internal error	Recalibrate (operate button in opening 1x) Replace electronics module
	Flashing 	Mains fault	Check mains network (outside the frequency or voltage range)
Both	Dark ○	No power supply Electronics faulty	Check mains network, check wiring Replace electronics module

Connection type [1)]

Always give preference to a 4-wire connection!

Product number	S_{NA} [VA]	P_{MED} [W]	S_{TR} [VA]	P_{TR} [W]	I_F [A]	Wire cross-section [mm²] 1.5 | 2.5 | 4.0 [2)] **max. cable length L [m]**		
4-wire connection MVL661..-..	32	12	≥50	≥40	1.6…4 A	65	110	160
3-wire connection MVL661..-..	32	12	≥50	≥40	1.6…4 A	20	35	50

S_{NA} = Nominal apparent power
P_{med} = Typical power consumption in the application
S_{TR} = Minimum apparent transformer power
P_{TR} = Minimum DC supply power
I_F = Minimal Required slow fuse
L = Max. cable length; with 4-wire connections, the max. permissible length of the separate 1.5 mm² copper positioning signal wire is 200 m

[1)] All information at AC 24 V or DC 24V

[2)] With 4 mm² electrical wiring reduce wiring cross-section for connection inside valve to 2.5 mm².

Sizing

For straightforward valve sizing, refer to the tables for the relevant application (from page 12).
For accurate valve sizing, we recommend to make use of the valve sizing software " Refrigeration Valve Selection Program RVASP", available from your local Siemens office.

Notes

The refrigeration capacity Q_0 is calculated by multiplying the mass flow by the specific enthalpy differential found in the h, log p-chart for the relevant refrigerant. To help determine the refrigeration capacity more easily, a selection chart is provided for each application (page 12 and following). With direct or indirect hot-gas bypass applications, the enthalpy differential of Q_c (the condenser capacity) must also be taken into account when calculating the refrigeration capacity.
If the evaporating and / or condensing temperatures are between the values shown in the tables, the refrigeration capacity can be determined with reasonable accuracy by linear interpolation (refer to the application examples on page 12 and following).
At the operating conditions given in the tables, the permissible differential pressure Δp_{max} across the valve is not considered.
If the evaporating temperature is raised by 1 K, the refrigeration capacity increases by about 3%. If, by contrast, subcooling is increased by 1 K, the refrigeration capacity increases by about 1 to 2% (this applies only to subcooling down to approximately 8 K).

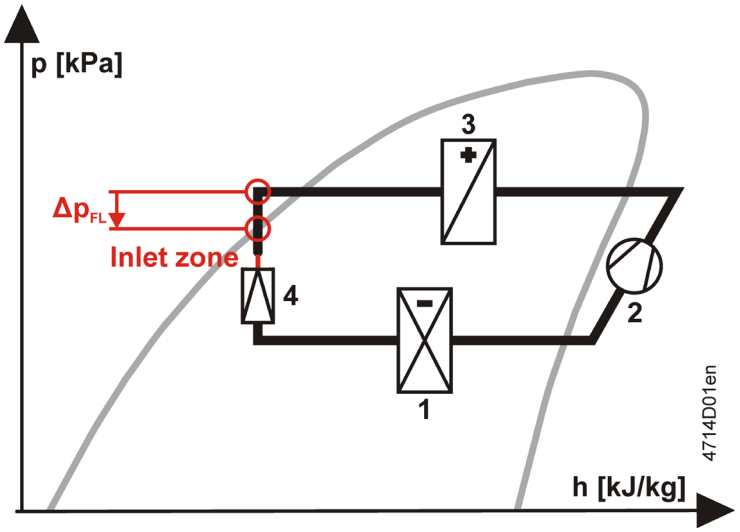
Depending on the application, additional installation instructions may need to be observed and appropriate safety devices (e.g. pressostats, full motor protection, etc.) fitted.

Warning ⚠ To prevent damage to the seal inside the valve insert, the plant must be vented on the low-pressure side following a pressure test (valve port AB), or the valve must be fully open during the pressure test and during venting (power supply connected and positioning signal at maximum or forced opening by G → ZC).

Expansion application

To prevent formation of flash gas on expansion applications, the velocity of the refrigerant in the fluid pipe may not exceed 1 m/s. To assure this, the diameter of the fluid pipe must be greater than the nominal size of the valve, using reducing pieces for making the connections to the valve.

Engineering notes



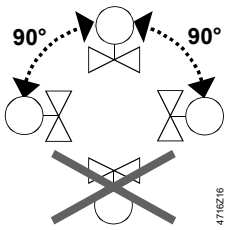
1 = Evaporator
2 = Compressor
3 = Condenser
4 = Expansion valves

a) The differential pressure over reduction must be less than half the differential pressure Δp_{FL}.
b) The inlet path between diameter reduction and expansion valve inlet
   - Must straight for at least 600 mm
   - May not contain any valves

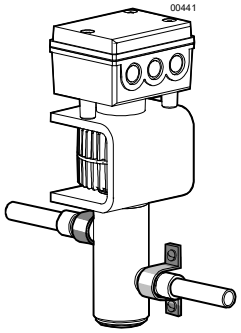
A filter / dryer must be mounted upstream of the expansion valve.
The valve is not explosion-proof.
It is not approved for use with ammonia (NH3, R717).

Mounting notes

The valve should be mounted and commissioned by qualified staff. The same applies to the replacement electronics and the configuration of the controller (e.g. SAPHIR or PolyCool).



- The refrigerant valves can be mounted in any orientation, but upright mounting is preferable.
- Arrange the pipework in such a way that the valve is not located at a low point in the plant where oil can collect.
- The pipes should be fitted in such a way that the alignment does not distort the valve connections. Fix the valve body so that that it cannot vibrate. Vibration can lead to burst connection pipes.
- Before soldering the pipes, ensure that the direction of flow through the valve is correct.
- The pipes must be soldered with care. To avoid dirt and the formation of scale (oxide), inert gas is recommended for soldering.



- The flame should be large enough to ensure that the junction heats up quickly and the valve does not get too hot.
- The flame should be directed away from the valve.
- During soldering, cool the valve with a wet cloth, for example, to ensure that it does not become too hot.
- The valve body and the connected pipework should be lagged.
- The actuator must not be lagged.

The valve is supplied complete with mounting instructions 74 319 0232 0.

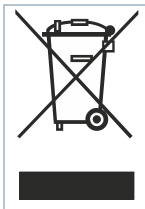
Maintenance

The refrigerant valve is maintenance-free.

Repair

The valve cannot be repaired. It has to be replaced as a complete unit.

Disposal



The valve is considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the valve through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Warranty

Observe all application-specific technical data.
If you ignore specified limits, Siemens will not assume any responsibility.

Technical data

Functional actuator data

Power supply	Extra low-voltage only (SELV, PELV)		
• AC 24 V	Operating voltage		AC 24 V ±20% (SELV) or AC 24 V class 2 (US)
	Frequency		45...65 Hz
	Typical power consumption	P_{med}	12 W
		Standby	< 1 W (valve closed)
	Rated apparent power S_{NA}		32 VA (for selecting the transformer)
	Required fuse		1.6...4 A (slow)
	External supply line protection		Fuse slow max. 10 A or Circuit breaker max. 13 A Characteristic B, C, D according to EN 60898 or Power source with current limitation of max. 10 A
• DC 24 V	Operating voltage		DC 20...30 V
	Current draw		0.5 A / 2 A (max.)
Signal inputs	Control signal Y		DC 0/2...10 V or DC 0/4...20 mA
	Impedance DC 0/2...10 V		100 kΩ / 5nF
	Impedance DC 0 / 4...20 mA		240 Ω / 5nF
	Forced control ZC		
	Input impedance		22 kΩ
	Close valve (ZC connected to G0)		< AC 1 V; < DC 0.8 V
	Open valve (ZC connected to G)		> AC 6 V; > DC 5 V
	No function (ZC not wired)		Positioning signal Y active
Signal outputs	Position feedback signal U	Voltage	DC 0/2…10 V; load resistance ≥ 500 Ω
		Current	DC 0/4…20 mA; load resistance ≤ 500 Ω
	Stroke detection		Inductive
	Nonlinearity		Accuracy ± 3 % full scale
Positioning time	Positioning time		< 1 s
Electrical connections	Cable entry glands		3 x Ø 17 mm (for M16)
	Min. wire cross-section		0.75 mm^2
	Max. cable length		See «Connection type», page 5
Product data valve	Permissible operating pressure		max. 4.5 MPa (45 bar) [1]
	Max. differential pressure □p_{max}		2.5 MPa (25 bar) MVL661.32-10: 1.6 MPa (16 bar) MVL661.32-12: 200 kPa (2 bar)
	Valve characteristic (stroke, k_v)		Linear (to VDI / VDE 2173)
	Leakage rate (internally across seat)		Max. 0.002% k_{vs} or Max. 1 Nl/h gas at □p = 4 bar Shut/off function, like solenoid normally closed (NC) function
	External seal		Hermetically sealed (fully welded, no static or dynamic seals)
	Permissible media		Commonly used refrigerants (R134a, R448A, R449A, R450A, R452A, R513A etc. such as R744 (CO_2)). Not suitable for ammonia (R717).
	Medium temperature		
	Refrigerant outlet (AB)		-40...120 °C; max. 140 °C for 10 min; without ASR70
	Refrigerant inlet (A)		1...120°C; max. 140°C für 10min; without ASR70
	Refrigerant inlet (A)		-40...0°C with ASR70 [6]

	Stroke resolution $\square^{H}/_{H100}$	1 : 1000 (H = stroke)
	Hysteresis	Typically 3 %
	Mode of operation	Modulating
	Position when deenergized	Control path A → AB closed
	Orientation	Upright to horizontal [2]
Materials	Valve body and parts	Steel / CrNi steel
	Seat / piston	CrNi steel / brass
	Sealing disk	PTFE
Pipe connections	Sleeves	Internally soldered, CrNi steel
Dimensions and weight	Dimensions	See "Dimensions" page 11
	Weight	See "Dimensions" page 11
Norms and directives	Electromagnetic compatibility (Application)	For residential, commercial and light-industrial environments
	Product standard	EN60730-x
	EU Conformity (CE)	CA2T4714xx [3]
	RCM Conformity	A5W00004451 [3]
	EAC Conformity	Eurasia Conformity for all MVL..
	Electrical safety	EN 60730-1
	Protection class	Class III as per EN 60730
	Degree of pollution	Degree 2 as per EN 60730
	Housing protection Upright to horizontal	 IP65 as per EN 60529 [2]
	Vibration [4]	EN 60068-2-6 5 g acceleration, 10...150 Hz, 2.5 h (5 g horizontal, max. 2 g upright)
	UL certification (US) CSA certification	UL 873, http://ul.com/database C22.2 No. 24, http://csagroup.org
	Environmental compatibility	The product environmental declarations CA2E4714.1en [3], CA2E4714.2en [3] and CA2E4714.3en [3] contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).
	Permissible operating pressure	PED 2014/68/EU
	Pressure accessories	Scope: Article 1, section 1 Definitions: Article 2, section 5
	Fluid group 2: DN 15…32 Fluid group 1 [5]: DN 15…25	Without CE-marking as per article 4, section 3 (sound engineering practice)

[1] To EN 12284 tested with 1,43 x operating pressure at 65 bar

[2] At 45 °C < T_{amb} < 55 °C and 80 °C < T_{med} < 120 °C the valve must be installed on its side to avoid shortening the service life of the valve electronics

[3] The documents can be downloaded from http://siemens.com/bt/download.

[4] In case of strong vibrations, use high-flex stranded wires for safety reasons.

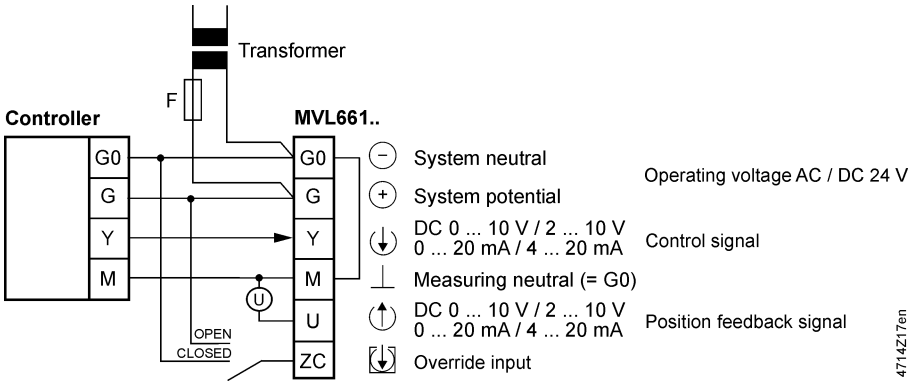
[5] The manufacturer as well as the operator is obliged to comply with all legal requirements while handling with media belonging to fluid group 1.

[6] See ASR70, data sheet A6V11858863

General environmental conditions

	Operation EN 60721-3-3	**Transport** EN 60721-3-2	**Storage** EN 60721-3-1
Climatic conditions	Class 3K6	Class 2K3	Class 1K3
Temperature	–25...55 °C	–25...70 °C	–5...45 °C
Humidity	10...100% r. h.	< 95% r. h.	5...95% r. h.

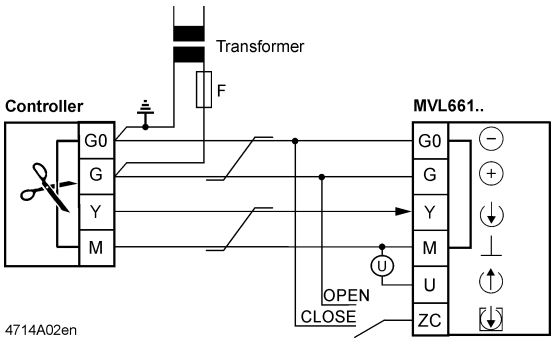
Connection terminals



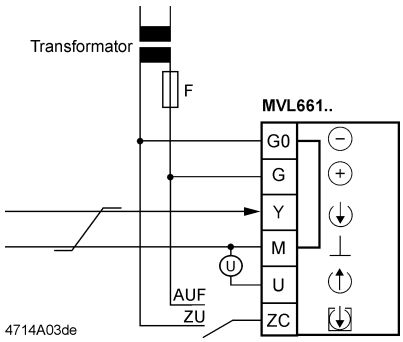
Connection diagrams

Terminal assignment for controller with 4-wire connection
(to be preferred!)

Common transformer

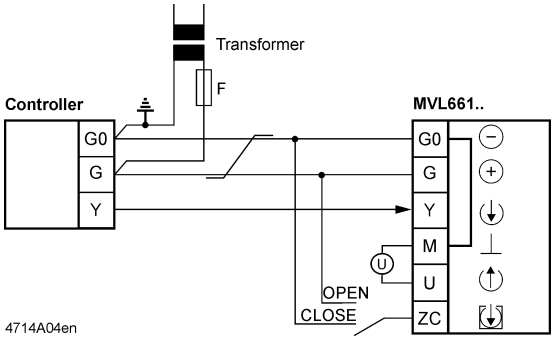


Separate transformer

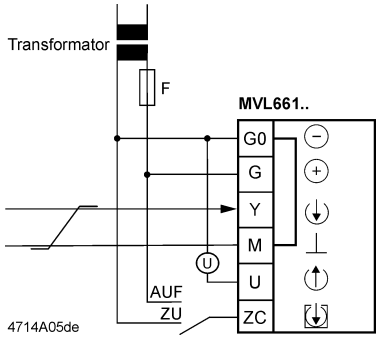


Terminal assignment for controller with 3-wire connection

Common transformer



Separate transformer



Ⓤ Indication of valve position (only if required). DC 0...10 V → 0...100% volumetric flow V100

Twisted pairs. If the lines for AC 24 V power supply and the DC 0...10 V (DC 2...10 V, DC 0... 20 mA, DC 4... 20 mA) positioning signal are routed separately, the AC 24 V line need not be twisted.

Warning ⚠ **Piping must be connected to potential earth!**

⚠ **Ground only one transformer on the secondary side if the controller and valve are powered separately.**

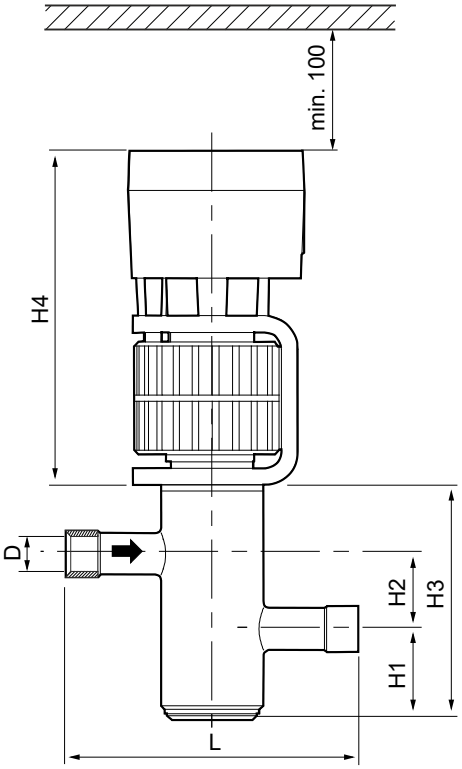
Caution ⚠ **In case of DC power supply, a 4-wire connection is mandatory!**

DIL switch Factory setting: Valve characteristics linear, positioning signal DC 0...10 V. Details see "Configuration DIL switches", page 3.

Calibration See "Calibration", page 4.

Dimensions

Dimensions in mm



Type reference	DN	D [inch]	D [mm]	L [mm]	H1 [mm]	H2 [mm]	H3 [mm]	H4 [mm]	T [mm]	M [kg]
MVL661.15-0.4	15	5/8"	16	140	44	36	113	160	103	4.4
MVL661.15-1.0	15	5/8"	16	140	44	36	113	160	103	4.4
MVL661.20-2.5	20	7/8"	22	150	41	41	119	160	103	4.5
MVL661.25-6.3	25	1 1/8"	28	160	40	47	126	160	103	4.6
MVL661.32-10	32	1 3/8"	35	190	43	54	142	160	103	6.1
MVL661.32-12	32	1 3/8"	35	190	43	54	142	160	103	6.1

DN Nominal size
D Nominal diameter [inch] and [mm] of copper pipe congenial to the connecting branch
T Depth
M Weight including packaging [kg]

Valve sizing with correction factor

The applications and tables on the following pages are designed for help with selecting the valves. To select the correct valve, the following data is required:

- **Application**
  - Expansion (starting on page 12)
  - Hot-gas (starting on page 16)
  - Suction throttle (starting on page 18)
- **Refrigerant type**
- **Evaporating temperature t_0** [°C]
- **Condensing temperature t_c** [°C]
- **Refrigeration capacity Q_0** [kW]

To calculate the nominal capacity, use the following formula:

- **k_{vs} [m³/h] = Q_0 [kW] / K...*** *** K...** for expansion = **KE**; for hot-gas = **KH**; for suction throttle = **KS**
- The theoretical kv value for the nominal refrigeration capacity of the plant should not be less than 40% of the kvs value of the selected valve.
- For accurate valve sizing, we recommend the valve selection program "Refrigeration Valve Selection Program RVASP".

The application examples on the following pages deal with the principles only. They do not include installation-specific details such as safety elements, refrigerant collectors, etc.

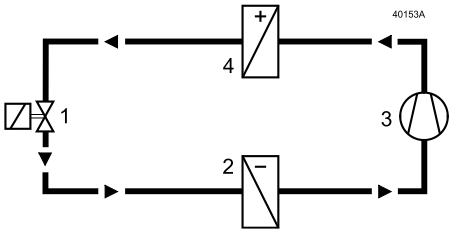
Use of the MVL661..-.. as an expansion valve

Note

Observe engineering notes page 6

- Typical control range 20...100%.
- Increased capacity through better use of the evaporator.
- The use of two or more compressors or compressor stages significantly increases efficiency with low loads.
- Especially suitable for fluctuating condensing and evaporating pressures.

Capacity optimization



1 = MVL661..-..
2 = evaporator
3 = compressor
4 = condenser

Electronic superheat control is achieved by using additional control equipment (e.g. PolyCool).

Application example

Refrigerant R513A; Q_o = 120 kW; t_o = +5°C; t_c = +45°C
The correct k_{vs} value for the MVL661..-.. valve needs to be determined.

The important section of table KE for R513A (see page 15) is the area around the working point. The correction factor KE relevant to the working point should be determined by linear interpolation from the four guide values.

Note on interpolation

In practice, the KE, KH or KS value can be estimated because the theoretical k_{vs}-value ascertained will be rounded off by up to 30% to one of the ten available k_{vs}-values, allowing you to proceed directly at Step 4.

Step 1: For t_c = 45, calculate the value for t_o = 0 between values 40 and 60 in the table; result: **63.75**

Step 2: For t_c = 45, calculate the value for t_o = 10 between values 40 and 60 in the table; result: **67**

Step 3: For t_0 = 5, calculate the value for t_c = 45 between correction factors 63.75 and 67; calculated in steps 1 and 2; result: **65.375**

Step 4: Calculate the theoretical k_{vs} value; result: **1.84 m³/h**

Step 5: Select the valve; the valve closest to the theoretical k_{vs} value is the **MVL661.20-2.5**

Step 6: Check that the theoretical k_{vs} value is not less than 40 % of the nominal k_{vs} value

KE-R407C	t_0 = –10 °C	t_0 = 0 °C
t_c = 40 °C	**64**	**67**
t_c = 45 °C	-	-
t_c = 60 °C	**63**	**67**

Interpolation at	t_c = 45 °C
64 - [(64-63) x (45 - 40) / (60 - 40)]	63.75
67 - [(67 - 67) x (45 - 40) / (60 - 40)]	67

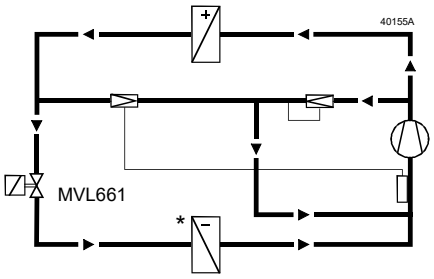
Interpolation at	t_o = 5 °C
63.75 + [(67 - 63.75) x (5 - 0) / ((10 - 0)]	65.375

k_v theoretical = 120 kW / 65.375 kW/(m^3/h) = 1,84 m^3/h
Valve MVL661.20-2.5 is suitable, since: 1.84 m^3/h / 2.5 m^3/h x 100% = 74% (>40%)

Capacity control

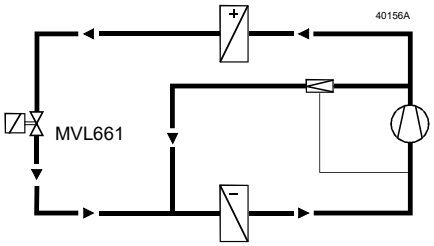
a) Refrigerant valve MVL661..-.. for capacity control of a dry expansion evaporator. Suction pressure and temperature are monitored with a mechanical capacity controller and reinjection valve.

- Typical control range 0...100%
- Energy-efficient operation with low loads
  - Ideal control of temperature and dehumidification



b) Refrigerant valve MVL661..-.. for capacity control of a chiller.

- Typical control range 10...100%
- Energy-efficient operation with low loads
  - Allows wide adstment of condensing and evaporating temperatures
  - Ideal for use with plate heat exchangers
  - Very high degree of frost protection



Note

A larger valve may be required for low load operation than is needed for full load conditions. To ensure that the selected valve will not be too small for low loads, sizing should take account of both possibilities.

Correction table KE
Expansion valve

$t_c \setminus t_o$	R32 [1]					
°C	-30	-20	-10	0	10	20
0	125	126	30	-	-	-
20	154	156	158	159	98	-
40	175	178	180	182	184	184
60	-	-	-	-	-	190

$t_c \setminus t_o$	R134a					
°C	-30	-20	-10	0	10	20
20	57	59	62	43	-	-
40	64	68	71	74	77	73
60	65	69	73	77	81	85
80	54	59	64	69	74	78

$t_c \setminus t_o$	R290 [1]					
°C	-40	-30	-20	-10	0	10
0	71	67	23	-	-	-
20	83	86	90	93	80	-
40	88	93	97	102	106	110
60	83	89	94	100	106	111

$t_c \setminus t_o$	R448A					
°C	-40	-30	-20	-10	0	10
20	64	66	45	-	-	-
40	77	80	83	86	86	33
60	84	88	92	95	99	102
80	80	84	89	94	98	102

$t_c \setminus t_o$	R449A					
°C	-40	-30	-20	-10	0	10
0	63	65	44	-	-	-
20	76	79	82	84	84	32
40	83	87	90	94	97	100
60	78	82	87	92	96	100

$t_c \setminus t_o$	R450A					
°C	-30	-20	-10	0	10	20
20	49	51	51	25	-	-
40	52	58	61	64	67	60
60	54	58	62	66	70	74
80	44	49	54	59	64	69

$t_c \setminus t_o$	R452A					
°C	-40	-30	-20	-10	0	10
0	54	56	42			
20	62	65	68	71	70	30
40	63	67	71	75	78	82
60	50	55	60	65	70	74

$t_c \setminus t_o$	R452B [1]					
°C	-30	-20	-10	0	10	20
0	98	93	-	-	-	-
20	119	121	124	126	72	-
40	132	135	138	141	143	145
60	-	-	-	-	143	145

$t_c \setminus t_o$	R454B [1]					
°C	-30	-20	-10	0	10	20
0	99	93	-	-	-	-
20	119	122	124	126	71	-
40	133	136	139	142	144	146
60	-	-	-	-	145	147

$t_c \setminus t_o$	R513A					
°C	-30	-20	-10	0	10	20
20	50	53	55	40	-	-
40	54	57	61	64	67	63
60	50	55	59	63	67	71
80	34	39	45	50	55	60

$t_c \setminus t_o$	R744 (see Note)					
°C	-40	-30	-20	-10	0	10
-10	198	199	181	-	-	-
-5	204	206	206	124	-	-
0	209	211	211	179	-	-
5	-	214	214	213	120	-

$t_c \setminus t_o$	R1233zd(E)					
°C	30	40	50	60	70	80
60	19	-	-	-	-	-
80	49	51	52	31	-	-
100	50	54	57	60	63	51
120	46	50	54	58	62	66

$t_c \setminus t_o$	R1234yf [1]					
°C	-30	-20	-10	0	10	20
20	44	46	49	32	-	-
40	46	49	52	56	59	53
60	41	45	49	53	57	61
80	24	29	34	39	44	49

$t_c \setminus t_o$	R1234ze(E) [1]					
°C	-30	-20	-10	0	10	20
20	42	45	37	-	-	-
40	47	50	53	56	59	49
60	47	51	55	59	62	66
80	37	42	47	52	57	62

Note

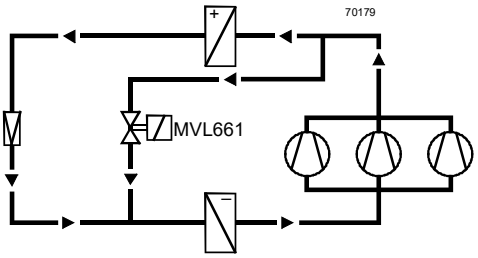
- Correction table with: superheat R744 = 2 K subcooling R744 = 1 K
  For R744: Δp upstream of evaporator = 0,1 bar
  For all refrigerants (except R744): Δp upstream of evaporator = 1.6 bar
- Δp condenser = 0.3 bar Δp evaporator = 0.3 bar

[1] For refrigerants belonging to Fluid group 1 (flammable), please contact your local Siemens representative.

Use of the MVL661..-.. as a hot-gas valve

The control valve throttles the capacity of a compressor stage. The hot gas passes directly to the evaporator, thus permitting capacity control in the range from 100% down to approximately 0%.

Indirect hot-gas bypass application



Suitable for use in large refrigeration systems in air conditioning plant, to prevent unacceptable temperature fluctuations between the compressor stages.

Application example

With low loads, the evaporating and condensing pressures can fluctuate depending on the type of pressure control. In such cases, evaporating pressure increases and condensing pressure decreases. Due to the reduction in differential pressure across the fully open valve, the volumetric flow rate will drop – the valve is undersized. This is why the effective pressures must be taken into account when sizing the valve for low loads.

Refrigerant R448A; 3 compressor stages; Q_o = 160 kW; t_o = -15 °C; t_c = 50 °C
Part load Q_o per stage = 55 kW; t_o= -15 °C; t_c = 45 °C

KH R448	t_0 = -20 °C	t_0 = -10 °C
t_c = 40 °C	**25**	**25**
t_c = 45 °C	-	-
t_c = 60 °C	**38**	**36**

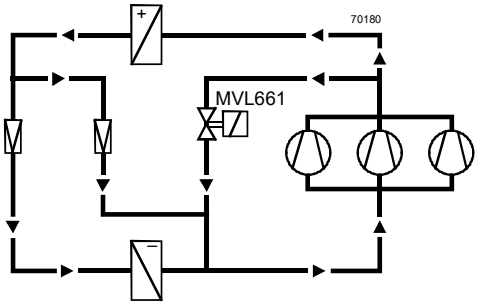
Interpolation at	t_c = 45 °C
25 + [(38 - 25) x (45 - 40) / (60 - 40)]	25.25
25 + [(36 - 25) x (45-40) / (60 - 40)]	27.75

Interpolation at	t_0 = 4 °C
28.25 - [(28.25 – 27.75) x (-20 - {-15}) / ((-20 - {-10})]	28.00

k_{vs} theoretical = 55 kW / 28.00 = 3 m^3/h = 1.96 3 m^3/h
Valve MVL661.20-2.5 is suitable, since: 1.96 m^3/h / 2.5 m^3/h x 100 % = 78 % (> 40 %)

Direct hot-gas bypass application

The control valve throttles the capacity of one compressor stage. The gas is fed to the suction side of the compressor and then cooled using a reinjection valve. Capacity control ranges from 100% down to approximately 10%.



Suitable for large refrigeration systems in air conditioning applications with several compressors or compressor stages, and where the evaporator and compressor are some distance apart (attention must be paid to the oil return).

Correction table KH
Hot-gas valve
Condenser Bypass

$t_c \setminus t_o$	R32 [1]					
°C	-30	-20	-10	0	10	20
0	17	16	8.2	-	-	-
20	30	30	29	28	20	-
40	-	-	46	45	44	42
60	-	-	-	-	-	61

$t_c \setminus t_o$	R134a					
°C	-30	-20	-10	0	10	20
20	9.9	9.7	9.3	7.5	-	-
40	16	15	15	15	15	13
60	24	23	23	22	22	21
80	-	-	32	31	30	29

$t_c \setminus t_o$	R290 [1]					
°C	-40	-30	-20	-10	0	10
0	11	10	0	-	-	-
20	18	18	20	17	15	-
40	28	27	40	26	25	25
60	40	39	60	36	36	35

$t_c \setminus t_o$	R448A					
°C	-40	-30	-20	-10	0	10
0	9.6	9.2	7.3	-	-	-
20	17	16	16	15	14	8,5
40	27	26	25	25	24	24
60	-	-	38	36	35	34

$t_c \setminus t_o$	R449A					
°C	-40	-30	-20	-10	0	10
0	9.5	9.1	7.2	-	-	-
20	16	16	16	15	14	8,3
40	27	26	25	24	24	23
60	-	-	37	36	34	34

$t_c \setminus t_o$	R450A					
°C	-30	-20	-10	0	10	20
20	8.3	8.2	7.6	5.5	-	-
40	13	13	13	13	12	11
60	20	20	19	19	19	18
80	28	27	26	26	25	25

$t_c \setminus t_o$	R452A					
°C	-40	-30	-20	-10	0	10
0	9,1	8,8	7,3	-	-	-
20	15	15	14	14	13	8,2
40	23	23	22	22	21	21
60	-	-	-	30	29	28

$t_c \setminus t_o$	R452B [1]					
°C	-30	-20	-10	0	10	20
0	14	13	-	-	-	-
20	25	24	24	22	15	-
40	-	38	37	36	35	34
60	-	-	-	-	-	49

$t_c \setminus t_o$	R454B [1]					
°C	-30	-20	-10	0	10	20
0	14	13	-	-	-	-
20	25	24	24	22	15	-
40	-	38	37	36	35	33
60	-	-	-	-	-	49

$t_c \setminus t_o$	R513A					
°C	-30	-20	-10	0	10	20
20	9.6	9.4	9.1	7.5	-	-
40	15	14	14	14	14	13
60	22	21	21	20	20	20
80	-	-	27	26	26	25

$t_c \setminus t_o$	R1233zd(E)					
°C	30	40	50	60	70	80
60	4.5	-	-	-	-	-
75	8.6	8.4	7.1	-	-	-
90	11	11	11	11	9,3	-
105	14	14	14	14	14	13

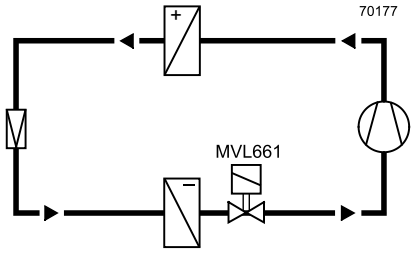
$t_c \setminus t_o$	R1234yf [1]					
°C	-30	-20	-10	0	10	20
20	8.7	8.5	8.2	6.6	-	-
40	13	13	13	12	12	11
60	19	18	18	18	17	17
80	24	23	22	22	22	21

$t_c \setminus t_o$	R1234ze(E) [1]					
°C	-30	-20	-10	0	10	20
20	7.1	6.8	6.1	-	-	-
40	11	11	11	11	10	9
60	17	17	16	16	16	16
80	24	23	23	22	22	21

- Correction table with: superheat = 6 K subcooling = 2 K Δp upstream of evaporator = 1.6 bar
- Δp condenser = 0.3 bar Δp evaporator = 0.3 bar

[1] For refrigerants belonging to Fluid group 1 (flammable), please contact your local Siemens representative.

Use of the MVL661..-.. as a suction throttle valve



Typical control range 50...100%.

Minimum stroke limit control:
To ensure optimum cooling of the compressor, either a capacity controller must be provided for the compressor, or a minimum stroke must be set via the valve electronics.
The minimum stroke can be limited to a maximum of 80%. At zero load, the minimum stroke must be sufficient to ensure that the minimum gas velocity in the suction line is > 0.7 m/s and that the compressor is adequately cooled.
As the control valve closes, the evaporating temperature rises and the air cooling effect decreases continuously. The electronic control system provides demand-based cooling without unwanted dehumidification and costly retreatment of the air.
The pressure at the compressor inlet falls and the power consumption of the compressor is reduced. The energy savings to be anticipated with low loads can be determined from the compressor selection chart (power consumption at minimum permissible suction pressure). Compressor energy savings of up to 40% can be achieved.
The recommended differential pressure Δp_{v100} across the fully open control valve is between 0.06 < Δp_{v100} < 0.7 bar. At the same time, the optimum pressure difference can be selected for each refrigerant and the related application.

Application example

Refrigerant R513A; Q_o = 10 kW; t_o = -8 °C; t_c = 45 °C;
Differential pressure across MVL661: Δp_{v100} = 0.13 bar

In this application example, t_o, t_c and Δp_{v100} are to be interpolated.

KS R513A Δp_{v100}	t_c	t_o = -10 °C	t_o = 0 °C
0.06 bar	20°C	**1.1**	**1.3**
0.06 bar	60°C	**0.66**	**0.85**
0.3 bar	20°C	**2.2**	**2.9**
0.3 bar	60°C	**1.3**	**1.8**

Interpolation at	t_o = -8 °C
1.1 + [(1.3 – 1.1) x (-10 - {-8}) / (-10 - 0)]	1.14
0.66 + [(0.85 – 0.66) x (-10 - {-8}) / (-10 - 0)]	0.698
2.2 + [(2.9 – 2.2) x (-10 - {-8}) / (-10 - 0)]	2.34
1.3 + [(1.8 – 1.3) x (-10 - {-8}) / (-10 - 0)]	1.40

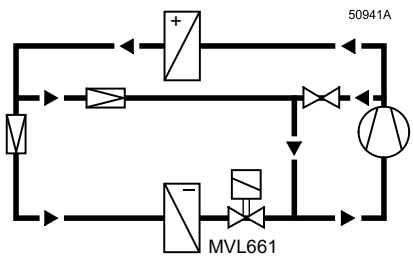
Δp_{v100}	t_o	t_c = 20 °C	t_c = 60 °C
0.06 bar	-8°C	1.14	0.698
0.3 bar	-8°C	2.34	1.4

Interpolation at	t_c = 45 °C
1,14.- [(1.14 – 0.698) x (45 - 20) / (60-20)]	0.864
2.34 - [(2.34 – 1.4) x (45 - 20) / (60-20)]	1.753

t_c	t_o	Δp_{v100}	Δp_{v100}
-	-	0.06bar	0.3bar
45 °C	-8 °C	0.864	1.753

Interpolation at	Δp_{v100}
0.864 + [(1.753 – 0.864) x (0.13 – 0.06) / (0.3 – 0.06)]	2.5

k_{vs} theoretical = 10 kW / 1.123 kW / m^3/h = 8.9 m^3/h
Valve MVL661.25-6.3 is suitable, since 8.9 m^3/h / 10 m^3/h x 100 % = 89 % (> 40 %)
It is recommended that the k_{vs} value be set to 63 % = 4 m^3/h eingestellt.



Typical control range 10...100%.
The capacity controller ensures that the compressor is adequately cooled, making it unnecessary to set a minimum stroke in the refrigerant valve.

Correction table KS
Suction throttle valve

Δp_{v100}	t_c	R32 [1]					
bar	°C	-30	-20	-10	0	10	20
0.2	20	2.8	3.5	4.3	5.1	6.1	-
0.2	55	-	-	3.2	3.8	4.5	5.3
0.7	20	4.6	6.1	7.6	9.3	11.1	-
0.7	55	-	-	5.7	6.9	8.3	9.8

Δp_{v100}	t_c	R134a					
bar	°C	-30	-20	-10	0	10	20
0.06	20	0.69	0.90	1.1	1.4	-	-
0.06	60	0.43	0.57	0.75	0.95	1.1	1.4
0.3	20	1.1	1.7	2.3	3.0	-	-
0.3	60	0.99	1.1	1.5	2.0	2.5	3.1

Δp_{v100}	t_c	R290 [1]					
bar	°C	-40	-30	-20	-10	0	10
0.07	20	1.0	1.3	1.6	2.0	2.4	-
0.07	60	0.62	0.82	1.0	1.3	1.6	1.9
0.4	20	1.9	2.7	3.6	4.5	5.6	-
0.4	60	1.1	1.5	2.2	2.9	3.7	4.5

Δp_{v100}	t_c	R448A					
bar	°C	-40	-30	-20	-10	0	10
0.07	20	0.78	1.0	1.3	1.6	2.0	2.4
0.07	60	0.49	0.62	0.81	1.0	1.2	1.5
0.4	20	1.4	2.1	2.8	3.6	4.6	5.6
0.4	60	0.83	1.2	1.7	2.3	2.9	3.6

Δp_{v100}	t_c	R449A					
bar	°C	-40	-30	-20	-10	0	10
0.07	20	0.78	1.0	1.3	1.6	2.0	2.4
0.07	60	0.45	0.61	0.80	1.0	1.2	1.5
0.4	20	1.3	2.0	2.8	3.6	4.5	5.6
0.4	60	0.81	1.2	1.7	2.2	2.9	3.6

Δp_{v100}	t_c	R450A					
bar	°C	-30	-20	-10	0	10	20
0.06	20	0.61	0.81	1.0	1.3	-	-
0.06	60	0.37	0.50	0.66	0.85	1.0	1.3
0.3	20	1.0	1.5	2.0	2.7	-	-
0.3	60	0.60	0.95	1.3	1.7	2.2	2.8

Δp_{v100}	t_c	R452A					
bar	°C	-40	-30	-20	-10	0	10
0.07	20	0.70	0.92	1.1	1.4	1.8	2.2
0.07	60	0.33	0.46	0.62	0.80	1.0	1.2
0.4	20	1.3	1.9	2.5	3.3	4.1	5.1
0.4	60	0.63	0.96	1.3	1.8	2.3	2.9

Δp_{v100}	t_c	R452B [1]					
bar	°C	-30	-20	-10	0	10	20
0.2	20	2.3	2.9	3.6	4.4	5.2	-
0.2	60	-	1.9	2.4	2.9	3.5	4.1
0.7	20	3.8	5.0	6.4	7.8	9.5	-
0.7	60	-	3.3	4.2	5.2	6.3	7.5

Δp_{v100}	t_c	R454B [1]					
bar	°C	-30	-20	-10	0	10	20
0.2	20	2.3	3.0	3.6	4.4	5.2	-
0.2	60	-	1.9	2.4	2.9	3.5	4.2
0.7	20	3.8	5.0	6.4	7.9	9.5	-
0.7	60	-	3.3	4.2	5.3	6.4	7.6

Δp_{v100}	t_c	R513A					
bar	°C	-30	-20	-10	0	10	20
0.06	20	0.66	0.87	1.1	1.3	-	-
0.06	60	0.37	0.51	0.66	0.85	1.0	1.3
0.3	20	1.2	1.7	2.2	2.9	-	-
0.3	60	0.68	1.0	1.3	1.8	2.3	2.8

Δp_{v100}	t_c	R1233zd(E)					
bar	°C	30	40	50	60	70	80
0.06	80	0.81	1.0	1.2	1.4	-	-
0.06	120	0.46	0.6	0.75	0.94	1.1	1.3
0.3	80	1.6	2.0	2.5	3.1	-	-
0.3	120	0.92	1.2	1.5	2.0	2.4	3.0

Δp_{v100}	t_c	R1234yf [1]					
bar	°C	-30	-20	-10	0	10	20
0.06	20	0.62	0.81	1.0	1.2	-	-
0.06	60	0.32	0.44	0.59	0.76	0.97	1.2
0.3	20	1.1	1.5	2.1	2.7	-	-
0.3	60	0.59	0.88	1.2	1.6	2.0	2.6

Δp_{v100}	t_c	R1234ze(E) [1]					
bar	°C	-30	-20	-10	0	10	20
0.06	20	0.54	0.73	0.94	-	-	-
0.06	60	0.32	0.45	0.59	0.77	0.98	1.2
0.3	20	-	1.3	1.8	-	-	-
0.3	60	-	0.80	1.1	1.5	2.0	2.6

- Correction table with: superheat = 6 K subcooling = 2 K Δp upstream of evaporator = 1.6 bar
- Δp condenser = 0.3 bar Δp evaporator = 0.3 bar

[1] For refrigerants belonging to Fluid group 1 (flammable), please contact your local Siemens representative.

Revision numbers

Product number	Valid from rev. no.
MVL661.15-0.4	C
MVL661.15-1.0	C
MVL661.20-2.5	D
MVL661.25-6.3	C
MVL661.32-10	A
MVL661.32-12	C

SIEMENS

4717

ACVATIX™

Modulating refrigerant valves, PN 63

MVS661..N

for ammonia (R717) and safety refrigerants

- **One valve type for expansion, hot-gas and suction throttle applications**
- **Hermetically sealed**
- **Selectable standard interface DC 0/2...10 V or DC 0/4...20 mA**
- **High resolution and control accuracy**
- **Precise positioning control and position feedback signal**
- **Short positioning time (< 1 second)**
- **Closed when deenergized**
- **Robust and maintenance-free**
- **DN 25 with k_{vs} values from 0.10 to 6.3 m³/h**

Use

The MVS661..N refrigerant valve is designed for modulating control of refrigerant circuits including chillers and heat pumps. It is suitable for use in expansion, hot-gas and suction throttle applications. In addition to ammonia (R717), the valve can handle all standard safety refrigerants, noncorrosive gases / liquids and CO_2 (R744). It is not suited for use with inflammable refrigerants.

Type summary

The refrigeration capacity refers to applications using ammonia.

Product number	DN	k_{vs} [m^3/h]	k_{vs} reduced [m^3/h]	Δp_{max} [MPa]	Q_0 E [kW]	Q_0 H [kW]	Q_0 D [kW]	S_{NA} [VA]	P_{med} [W]
MVS661.25-016N	25	0,16	0,10	2,5	95	10	2	22	12
MVS661.25-0.4N	25	0,40	0,25		245	26	5		
MVS661.25-1.0N	25	1,0	0,63		610	64	12		
MVS661.25-2.5N	25	2,5	1,6		1530	159	29		
MVS661.25-6.3N	25	6,3	4,0		3850	402	74		

k_{vs} = Nominal flow rate of refrigerant through the fully open valve (H_{100}) at a differential pressure of 100 kPa (1 bar) to VDI 2173
If required k_{vs}-value and refrigeration capacity Q_0 can be reduced to 63 %, refer to «k_{vs} reduction» on page 4

Δp_{max} = Maximum permissible differential pressure across the control path A → AB of the valve, valid for the entire actuating range of the motorized valve

Q_0 E = Refrigeration capacity in expansion applications

Q_0 H = Refrigeration capacity in hot-gas bypass applications

Q_0 D = Refrigeration capacity in suction throttle applications and Δp = 0.5 bar

S_{NA} = nominal apparent power for selecting the transformer

P_{med} = typical power consumption

The pressure drop across evaporator and condenser is assumed to be 0.3 bar each, and 1.6 bar upstream of the evaporator (e.g. spider).
The capacities specified are based on superheating by 6 K and subcooling by 2 K.

Accessories

Valve insert ASR..N

Product number	DN	k_{vs} [m^3/h]
ASR0.16N	25	0,16
ASR0.4N	25	0,40
ASR1.0N	25	1,0
ASR2.5N	25	2,5
ASR6.3N	25	6,3

The refrigeration capacity for various refrigerants and operating conditions can be calculated for the 3 types of application using the tables starting from page 15.
For accurate valve sizing, the valve selection program "Refrigeration VASP" is recommended.

If plant is resized, or should excessive wear impact the valve's performance, a new valve insert ASR…N will restore the valve's characteristics to its original specifications.
The valve insert is supplied complete with Mounting Instructions 74 319 0486 0.

PTC conductive heating element ASR70

ASR70 extends the application range of valves for refrigerant temperatures at the valve inlet below 0° C. Typical applications pump systems with ammonia or CO_2 refrigerant machines.

Direct mounting on refrigerant valve, no adjustments.

See data sheet A6V11858863.
The PTC conductive heating element is supplied complete with Mounting Instructions A6V11858868.

Ordering

Valve body and magnetic actuator form one integral unit and cannot be separated.

Example:

Product number	*Stock number*	*Designation*	*Quantity*
MVS661.25-0.4N	MVS661.25-0.4N	Refrigerant valve	1

Spare parts
Replacement electronics ASR61

Should the valve's electronics become faulty, the entire electronics housing is to be replaced by spare part ASR61, which is supplied complete with Mounting Instructions (74 319 0270 0).

Rev. no.

See table on page 20.

Technical design / functions

Features and benefits

- 4 selectable standard signals for setpoint and measured value
- DIL switch to reduce the k_{vs} value to 63 % of the nominal value
- Potentiometer for adjustment of minimum stroke for suction throttle applications
- Automatic stroke calibration
- Forced control input for "Valve closed" or "Valve fully open"

- LED for indicating the operating state

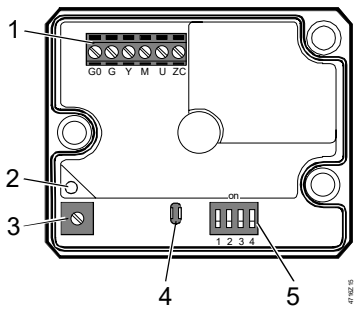
Control

The MVS661..N refrigerant valve can be driven by Siemens or third-party controllers that deliver a DC 0/2...10 V or DC 0/4...20 mA output signal.
For optimum control performance, we recommend a 4-wire connection between controller and valve. When operating on DC voltage, a 4-wire connection is **mandatory**!
The valve stroke is proportional to the control signal.

Spring return function

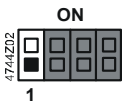
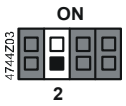
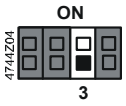
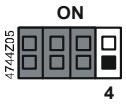
If the positioning signal is interrupted, or in the event of a power failure, the valve's return spring will automatically close control path 1 → 3.

Operator controls and indicators in the electronics housing



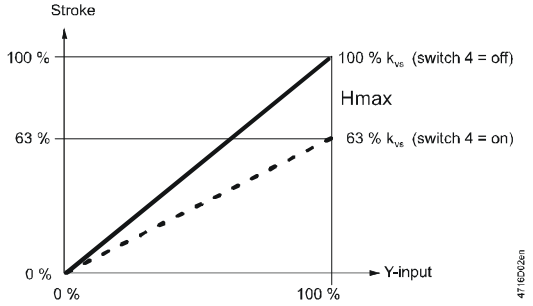
1 Connection terminals
2 LED for indication of operating state
3 Minimal stroke setting potentiometer Rv
4 Autocalibration
5 DIL switches for mode control

Configuration of DIL switches

Switch	Function	ON / OFF	Description
	Positioning signal Y	ON	Current [mA]
		OFF	**Voltage [V]** [1]
	Positioning range Y and U	ON	DC 2…10 V, 4…20 mA
		OFF	**DC 0…10 V**, 0…20 mA [1]
	Position feedback U	ON	Current [mA]
		OFF	**Voltage [V]** [1]
	Nominal flow rate k_{vs}	ON	63 %
		OFF	**100 %** [1]

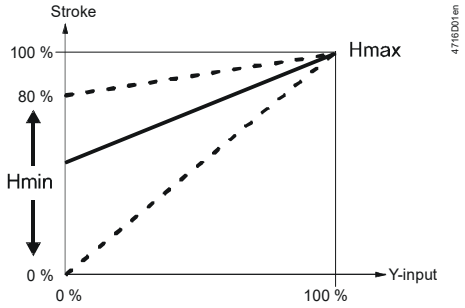
[1] **Factory setting**

k_{vs}-reduction



When k_{vs} reduction (DIL switch 4 in position ON) the stroke will be limited to 63 % mechanical stroke. 63 % of full stroke then corresponds to an input / output signal of 10 V.
If, in addition, the stroke is limited to 80 %, for example, the minimum stroke will be
0.63 x 0.8 = 0.50 of full stroke.

Minimum stroke setting

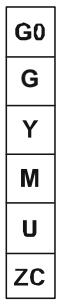
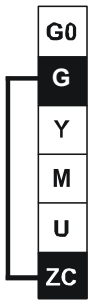
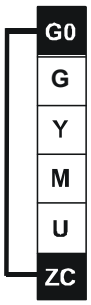
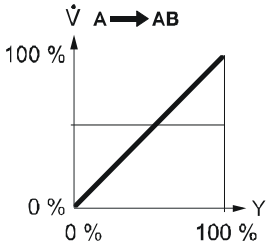
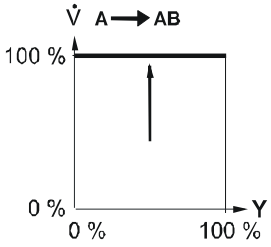
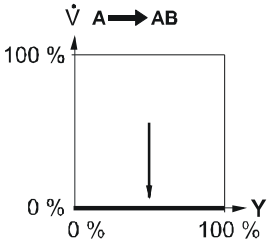


In the case of the suction throttle valve, it is essential that a minimum stroke limit be maintained to ensure compressor cooling and efficient oil return. This can be achieved with a reinjection valve, a bypass line across the valve, or a guaranteed minimum opening of the valve. The minimum stroke can be defined via the controller and control signal Y, or it can be set directly with potentiometer Rv.

The **factory setting** is zero (mechanical stop in counterclockwise direction, CCW). The minimum stroke can be set by turning the potentiometer clockwise (CW) to a maximum of 80 % k_{vs}.

Attention ⚠ **Under no circumstances must potentiometer Rv be used to limit the stroke on expansion applications. It must be possible to close the valve fully.**

Forced control input ZC

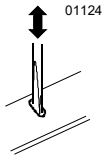
	ZC – Function		
	no function	fully open	closed
Connections			 
Transfer			
function	• ZC not connected • Valve will follow the Y-signal • Minimum stroke set-ting with potentiometer Rv pos-sible	• ZC connected to G • Valve will fully open control path A → AB	• ZC connected to G0 • Valve will close control path A → AB

Signal priority

1. Forced control signal ZC
2. Signal input Y and/or minimum stroke set-ting with potentiometer Rv possible

Calibration

The printed circuit board of the MVS661..N has a slot to facilitate calibration. To make the calibration, insert a screwdriver in the slot so that the contacts inside are connected. As a result, the valve will first be fully closed and then fully opened.
Calibration matches the electronics to the valve's mechanism.
During the calibration process the green LED flashes for about 10 seconds; refer to "Indication of operating state" (page 5).



MVS661..N refrigerant valves are supplied fully calibrated.

When is a calibration required?

Execute a calibration after replacing the electronics, when the red LED is on or when the valve is leaking (at seat).

Indication of operating state

LED	Indication	Function	Remarks, troubleshooting
Green	Lit	Control mode	Automatic operation; everything o.k.
	Flashing	Calibration in pro-gress	Wait until calibration is finished (green or red LED will be lit)
Red	Lit	Calibration error Internal error	Recalibrate (operate button in opening 1x) Replace electronics module
	Flashing	Mains fault	Check mains network (outside the frequency or voltage range)
Both	Dark	No power supply Electronics faulty	Check mains network, check wiring Replace electronics module

Connection type [1)]

The 4-wire connection should always be given preference!

Product number	S_{NA} [VA]	P_{MED} [W]	S_{TR} [VA]	P_{TR} [W]	I_F [A]	Wire cross-section [mm²] 1.5 max. cable length L [m]	2.5	4.0 [2)]
4-wire connection MVS661..N	32	12	≥50	≥40	1.6…4 A	65	110	160
3-wire connection MVS661..N	32	12	≥50	≥40	1.6…4 A	20	35	50

S_{NA} = nominal apparent power for selecting the transformer

P_{med} = Typical power consumption in the application

S_{TR} = Minimum apparent transformer power

P_{TR} = Minimum DC supply power

I_F = Minimal Required slow fuse

L = max. cable length; with 4-wire connections, the max. permissible length of the separate 1.5 mm² copper positioning signal wire is 200 m

[1)] All information at AC 24 V or DC 24V

[2)] With 4 mm² electrical wiring reduce wiring cross-section for connection inside valve to 2.5 mm².

Sizing

For straightforward valve sizing, refer to the tables for the relevant application (from page 15).
For accurate valve sizing, we recommend to make use of the valve sizing software "Refrigeration VASP", available from your local Siemens office.

Notes

The refrigeration capacity Q_0 is calculated by multiplying the mass flow by the specific enthalpy differential found in the h, log p-chart for the relevant refrigerant. To help determine the refrigeration capacity more easily, a selection chart is provided for each application (from page 15). With direct or indirect hot-gas bypass applications, the enthalpy differential of Q_c (the condenser capacity) must also be taken into account when calculating the refrigeration capacity.
If the evaporating and/or condensing temperatures are between the values shown in the tables, the refrigeration capacity can be determined with reasonable accuracy by linear interpolation (refer to the application examples from page 14).
At the operating conditions given in the tables, the permissible differential pressure Δp_{max} (25 bar) across the valve is within the admissible range for these valves.
If the evaporating temperature is raised by 1 K, the refrigeration capacity increases by about 3 %. If, by contrast, subcooling is increased by 1 K, the refrigeration capacity increases by about 1 to 2 % (this applies only to subcooling down to approximately 8 K).

Depending on the application, it may be necessary to observe additional Installation Instructions and fit appropriate safety devices (e.g. pressurestats, full motor protection, etc.).

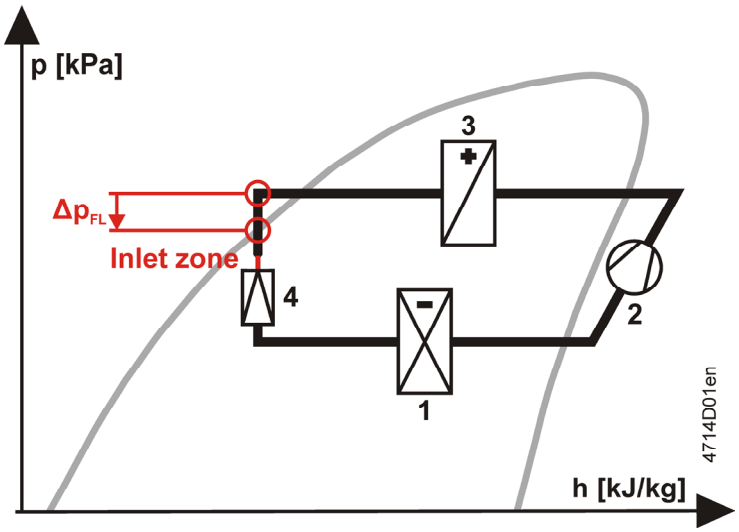
Warning ⚠

In order not to damage the seal inside the valve insert, the plant must be vented on the low-pressure side after the pressure test has been made (valve port AB), or the valve must be fully open during the pressure test and during venting (power supply connected and positioning signal at maximum or forced opening by G → ZC).

Expansion application

To prevent the formation of flash gas on expansion applications, the velocity of the refrigerant in the fluid pipe must not exceed 1 m/s. To assure this, the diameter of the fluid pipe must under certain circumstances be greater than the nominal size of the valve.

Engineering notes



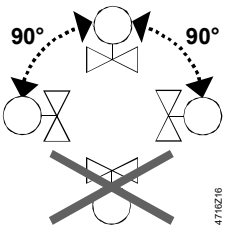
1 = evaporator
2 = compressor
3 = condenser
4 = expansion valves

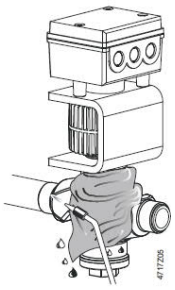
a) The differential pressure over reduction must be less than half the differential pressure Δp_{FL}.
b) The inlet path between diameter reduction and expansion valve inlet
   - Must straight for at least 600 mm
   - May not contain any valves

A filter / dryer must be mounted upstream of the expansion valve.
The valve is not explosion-proof.

Mounting notes

The valve should be mounted and commissioned by qualified staff. The same applies to the replacement electronics and the configuration of the controller (e.g. SAPHIR or PolyCool).





- The refrigerant valves can be mounted in any orientation, but upright mounting is preferable.
- Arrange the pipework in such a way that the valve is not located at a low point in the plant where oil can collect.
- The pipes should be fitted in such a way that the alignment does not distort the valve connections. Fix the valve body so that that it cannot vibrate. Vibration can lead to burst connection pipes.
- Before welding/soldering the pipes, ensure that the direction of flow through the valve is correct.
- The pipes must be welded/soldered with care. To avoid dirt and the formation of scale (oxide), inert gas is recommended for welding/soldering.
- The flame should be large enough to ensure that the junction heats up quickly and the valve does not get too hot.
- The flame should be directed away from the valve.
- During welding/soldering, cool the valve with a wet cloth, for example, to ensure that it does not become too hot.
- The valve body and the connected pipework should be lagged.
- The actuator must not be lagged.

The valve is supplied complete with Mounting Instructions 74 319 0707 0.

Maintenace notes

The refrigerant valve is maintenance-free.

Repair

If the valve's interior is subjected to great wear, the valve can be repaired by replacing the ASR..N valve insert.

Disposal

The valve is considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the valve through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Warranty

Application-specific technical data must be observed.
If specified limits are not observed, Siemens will not assume any responsibility.

Technical data

Functional actuator data

Power supply		Extra low-voltage only (SELV, PELV)	
	AC 24 V	Operating voltage	AC 24 V ±20% (SELV) or AC 24 V class 2 (US)
		Frequency	45...65 Hz
		Typical power consumption P_{med}	12 W
		Stand by	< 1 W (valve closed)
		Rated apparent power S_{NA}	32 VA (for selecting the transformer)
		Required fuse I_F	1,6…4 A, slow
		External supply line protection	Fuse slow max. 10 A or Circuit breaker max. 13 A Characteristic B, C, D according to EN 60898 or Power source with current limitation of max. 10 A
	DC 24 V	Operating voltage	DC 20…30 V
		Current draw	0,5 A / 2 A (max.)
Signal inputs		Positioning signal Y	DC 0/2…10 V or DC 0/4…20 mA
		Impedance DC 0/2…10 V	100 kΩ // 5nF (load < 0,1 mA)
		DC 0/4…20 mA	240 Ω // 5nF
		Forced control ZC	
		Input impedance	22 kΩ
		Close valve (ZC connected to G0)	< AC 1 V; < DC 0,8 V
		Open valve (ZC connected to G)	> AC 6 V; > DC 5 V
		No function (ZC not wired)	Positioning signal Y active
Signal outputs		Position feedback U Voltage	DC 0/2…10 V; load resistance ≥ 500 Ω
		Current	DC 0/4…20 mA; load resistance ≤ 500 Ω
		Stroke measurement	Inductive
		Nonlinearity	± 3 % of end value
Positioning time		Positioning time	< 1 s
Electrical connection		Cable entry	3 x Ø 17 mm (for M16)
		Minimal wire cross-section	0.75 mm²
		Maximum cable length	Refer to "Connection type", page 6

Functional valve data

Permissible operating pressure	max.6.3 MPa (63 bar) [1]
Differential pressure Δp_{max}	2.5 MPa (25 bar)
Valve characteristic (stroke, k_v)	linear (to VDI / VDE 2173)
Leakage rate (internally across seat)	max. 0,002 % k_{vs} resp. max. 1 Nl/h gas at Δp = 4 bar Shut/off function, like solenoid normally closed (NC) function
External seal	hermetically sealed!
Permissible media	Ammonia (R717), CO2 (R744) and all safety refrigerants (R22, R134a, R404A, R407C, R507, etc); Not suited for use with inflammable refrigerants
Medium temperature	
Refrigerant outlet (AB)	-40...120 °C; max. 140 °C for 10 min; without ASR70
Refrigerant inlet (A)	1...120°C; max. 140°C für 10min; without ASR70
Refrigerant inlet (A)	-40...0°C with ASR70 [6]
Stroke resolution $\Delta H / H_{100}$	1 : 1000 (H = stroke)

	Hysteresis	typically 3 %
	Mode of operation	modulating
	Position when deenergized	control path A → AB closed
	Mounting position [2]	Upright to horizontal
Materials	Valve body	steel / CrNi steel
	Seat / piston	CrNi steel
	Sealing disk / O-rings	PTFE / CR (chloroprene)
Dimensions and weight	Dimensions	refer to "Dimensions", page 13
	Weight	5.17 kg
Pipe connections	Weld-on-ends / Solder connections	Referring to EN 1092-1 and ASME B16.25 schedule 40 Inner diameter 22.4 mm Outer diameter 33.7 mm
Standards, directives and approvals	Electromagnetic compatibility (Application)	For use in residential, commercial and light-industrial environments
	Product standard EN60730-x	Automatic electrical controls for household and similar use
	EU Conformity (CE)	CE2T4717xx [3]
	RCM Conformity	A5W00004452 [3]
	EAC Conformity	Eurasia Conformity for all MVS..
	Electrical safety	EN 60730-1
	Protection class	Class III to EN 60730
	Pollution degree	Degree 2 to EN 60730
	Housing protection Upright to horizontal	IP65 to EN 60529 [2]
	Vibration [4]	EN 60068-2-6 5 g acceleration, 10...150 Hz, 2.5 h (5 g horizontal, max. 2 g upright)
	UL certification (US) CSA certification	UL 873, http://ul.com/database C22.2 No. 24, http://csagroup.org
	Environmental compatibility	The product environmental declaration contains data on environmentally compatible product esign and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).
	Permissible operating pressure	PED 2014/68/EU
	Pressure accessories	Scope: Article 1, section 1 Definitions: Article 2, section 5
	Fluid group 1 [5]: DN 25	Without CE-marking as per article 4, section 3 (sound engineering practice)

[1] To EN 12284 tested with 1,43 x operating pressure at 90 bar

[2] At 45 °C < Tamb < 55 °C and 80 °C < Tmed < 120 °C the valve must be installed on its side to avoid shortening the service life of the valve electronics

[3] The documents can be downloaded from http://siemens.com/bt/download.

[4] In case of strong vibrations, use high-flex stranded wires for safety reasons.

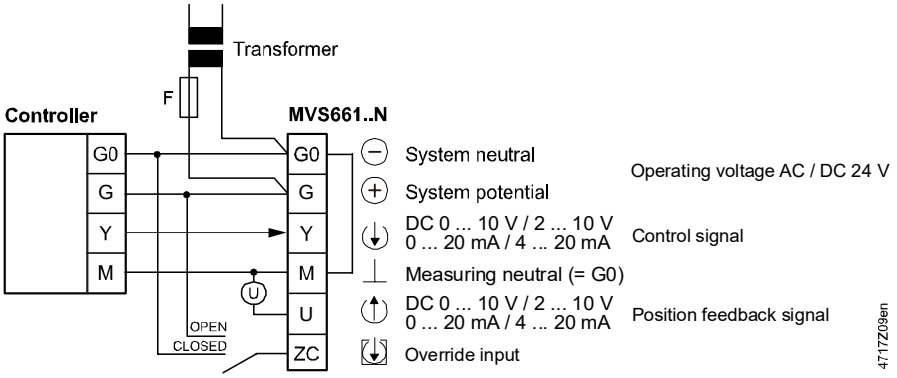
[5] The manufacturer as well as the operator is obliged to comply with all legal requirements while handling with media belonging to fluid group 1.

[6] See ASR70, data sheet A6V11858863

General environmental conditions

	Operation EN 60721-3-3	**Transport** EN 60721-3-2	**Storage** EN 60721-3-1
Climatic conditions	Class 3K6	Class 2K3	Class 1K3
Temperature	–25...55 °C	–25...70 °C	–5...45 °C
Humidity	10...100 % r. h.	< 95 % r. h.	5...95 % r. h.

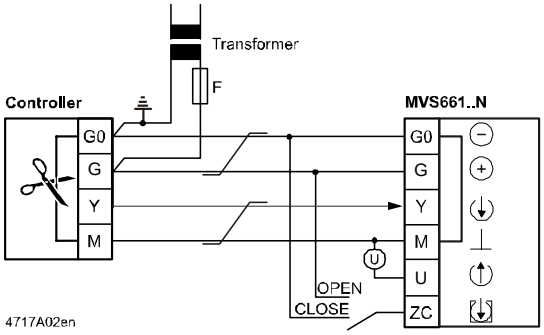
Connection terminals



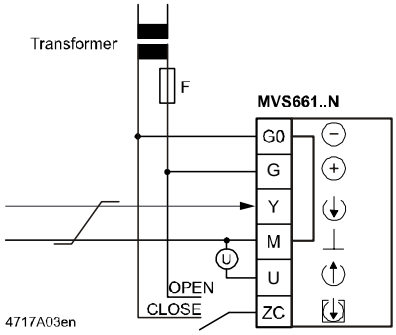
Connection diagrams

Terminal assignment for controller with 4-wire connection
(to be preferred!)

Common Transformer

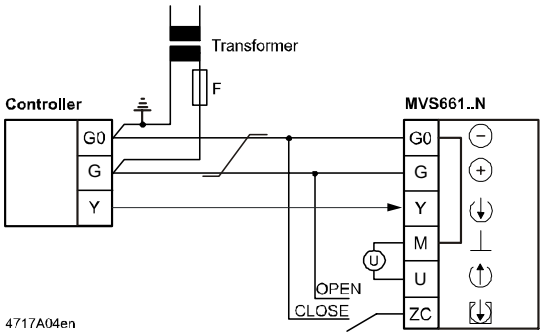


Separate Transformer

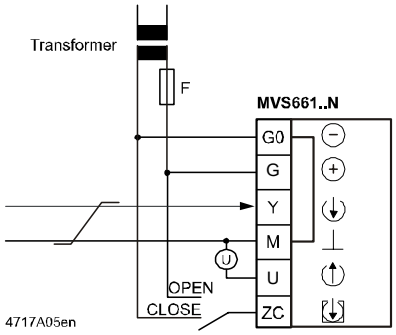


Terminal assignment for controller with 3-wire connection

Common Transformer



Separate Transformer



Ⓤ Indication of valve position (only if required). DC 0...10 V → 0...100 % volumetric flow V100

Twisted pairs. If the lines for AC 24 V power supply and the DC 0...10 V (DC 2...10 V, DC 0... 20 mA, DC 4... 20 mA) positioning signal are routed separately, the AC 24 V line need not be twisted.

Warning ⚠ Piping must be connected to potential earth!

⚠ Ground only one transformer on the secondary side if the controller and valve are powered separately.

Caution ⚠ In case of DC power supply, a 4-wire connection is mandatory!

DIL switch

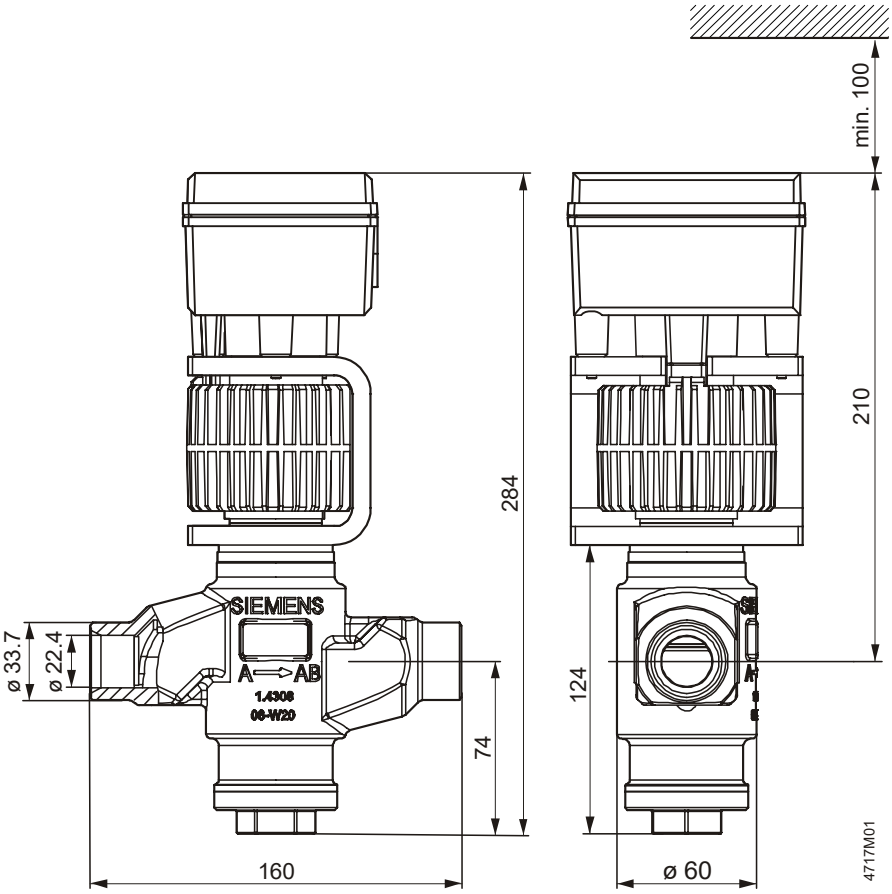
Factory setting: Valve characteristics linear, positioning signal DC 0...10 V. Details see "Configuration DIL switches", page 4.

Calibration

See "Calibration", page 5.

Dimensions

Dimensions in mm



Valve sizing with correction factor

The applications and correction tables on the following pages are designed for help with selecting the valves. To select the correct valve, the following data is required:

- **Application**
  - Expansion (starting on page 14)
  - Hot-gas (starting on page 16)
  - Suction throttle (starting on page 18)
- **Refrigerant type**
- **Evaporating temperature t_o** [°C]
- **Condensing temperature t_c** [°C]
- **Refrigeration capacity Q_0** [kW]

To calculate the nominal capacity, use the following formula:

- **k_{vs} [m³/h] = Q_0 [kW] / K…*** *** K…** for Expansion = **KE**; for hot-gas = **KH**; for suction throttle = **KS**

- The theoretical k_v value for the nominal refrigeration capacity of the plant should not be less than 50 % of the k_{vs} value of the selected valve
- For accurate valve sizing, the valve selection program "Refrigeration VASP" is recommended

The application examples on the following pages deal with the principles only. They do not include installation-specific details such as safety elements, refrigerant collectors, etc.

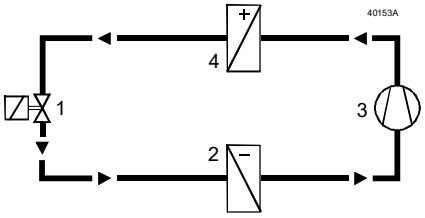
Use of the MVS661..N as an expansion valve

Note

Observe engineering notes page 7

- Typical control range 20...100 %.
- Increased capacity through better use of the evaporator
- The use of 2 or more compressors or compressor stages significantly increases efficiency with low loads
- Especially suitable for fluctuating condensing and evaporating pressures

Capacity optimization



1 = MVS661..N
2 = evaporator
3 = compressor
4 = condenser

Electronic superheat control is achieved by using additional control equipment (e.g. PolyCool).

Application example

Refrigerant R717C; Q_0 = 205 kW; t_o = -5 °C; t_c = 35 °C
The correct k_{vs} value for the MVS661..N valve needs to be determined.

The important section of table KE for R717 is the area around the working point. The correction factor KE relevant to the working point should be determined by linear interpolation from the 4 guide values.

Note on interpolation

In practice, the KE, KH or KS value can be estimated because the theoretical k_{vs}-value ascertained will be rounded off by up to 30 % to 1 of the 10 available k_{vs}-values. So you can proceed directly with Step 4.

Step 1: For t_c = 35 °C, calculate the value for t_o = -10 °C between values 20 °C and 40 °C in the table; result: **574**
Step 2: For t_c = 35 °C, calculate the value for t_o = 0 °C between values 20 °C and 40 °C in the table; result: **553**
Step 3: For t_o = -5 °C, calculate the value for t_c = 35 °C between correction factors 574 and 553; calculated in steps 1 and 2; result: **450**
Step 4: Calculate the theoretical k_{vs} value; result: **0.46 m³/h**
Step 5: Select the valve; the valve closest to the theoretical k_{vs} value is the **MVS661.25-0.4N**
Step 6: Check that the theoretical k_{vs} value is greater than 50 % of nominal k_{vs} value

KE R717C	t_o = –10 °C	t_o = 0 °C
t_c = 20 °C	**481**	**376**
t_c = 35 °C	*574*	*553*
t_c = 40 °C	**605**	**612**

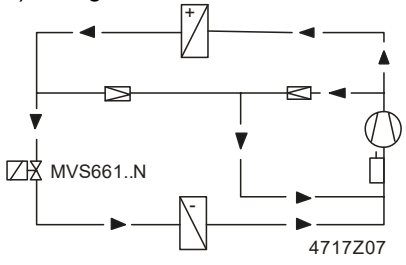
Interpolation at	t_c = 35 °C
481 + [(605 - 481) x (35 - 20) / (40 - 20)]	574
376 + [(612 - 376) x (35 - 20) / (40 - 20)]	553

Interpolation at	t_o = -5 °C
574 +[(553 - 574) x (-5 - 0) / (-10 - 0)]	450

k_{vs} theoretical = 205 kW / 450 = 0.46 m³/h
Valve MVS661.25-0.4N is suitable, since: 0.46 m³/h / 0.4 m³/h x 100 % = 115 % (> 50 %)

Capacity control

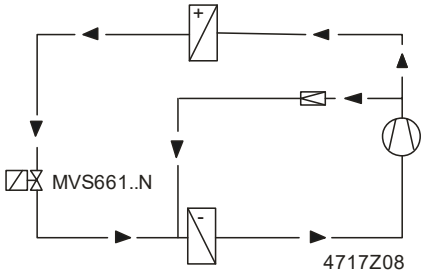
a) Refrigerant valve MVS661..N for capacity control of a dry expansion evaporator.



Suction pressure and temperature are monitored with a mechanical capacity controller and reinjection valve.

- Typical control range 0...100 %
- Energy-efficient operation with low loads
- Ideal control of temperature and dehumidification

b) Refrigerant valve MVS661..N for capacity control of a chiller.



- Typical control range 10...100 %
- Energy-efficient operation with low loads
- Allows wide adjustment of condensing and evaporating temperatures
- Ideal for use with plate heat exchangers
- Very high degree of frost protection

Note

A larger valve may be required for low-load operation than is needed for full load conditions. To ensure that the selected valve will not be too small for low loads, sizing should take account of both possibilities.

Correction table KE
Expansion valve

	R717					
$t_c \setminus t_o$	-40	-30	-20	-10	0	10
00	324	265	124			
20	481	488	494	481	376	124
40	581	590	598	605	612	618
60	662	673	683	693	701	708

	R22					
$t_c \setminus t_o$	-40	-30	-20	-10	0	10
00	82	68	37			
20	101	104	107	105	81	18
40	108	111	114	118	120	123
60	104	108	112	116	119	122

	R744					
$t_c \setminus t_o$	-40	-30	-20	-10	0	10
-20	226	149				
00	262	264	241	166		
20	245	247	247	246	213	

	R134a					
$t_c \setminus t_o$	-40	-30	-20	-10	0	10
00	27					
20	71	74	77	66	43	
40	74	78	81	85	89	92
60	67	72	76	81	85	89

	R402A					
$t_c \setminus t_o$	-40	-30	-20	-10	0	10
00	73	69	50			
20	77	81	85	88	74	35
40	71	75	80	84	88	91
60	50	55	60	65	69	74

	R401A					
$t_c \setminus t_o$	-40	-30	-20	-10	0	10
00	31					
20	80	83	85	72	46	
40	87	90	94	97	101	102
60	85	89	94	98	102	106

	R407A					
$t_c \setminus t_o$	-40	-30	-20	-10	0	10
00	79	67	40			
20	91	95	98	102	82	30
40	89	94	98	102	106	110
60	72	77	82	87	92	96

	R404A					
$t_c \setminus t_o$	-40	-30	-20	-10	0	10
00	69	63	44			
20	70	74	78	81	68	30
40	61	65	70	74	78	81
60	36	41	46	51	55	59

	R407C					
$t_c \setminus t_o$	-40	-30	-20	-10	0	10
00	79	65	31			
20	98	101	105	108	85	21
40	100	104	109	113	117	121
60	87	93	98	103	108	113

	R407B					
$t_c \setminus t_o$	-40	-30	-20	-10	0	10
00	72	66	45			
20	77	80	84	88	75	34
40	69	74	78	83	87	91
60	46	51	56	61	66	70

	R507					
$t_c \setminus t_o$	-40	-30	-20	-10	0	10
00	72	66	47			
20	78	81	83	86	71	33
40	74	78	81	84	87	90
60	53	57	61	64	68	71

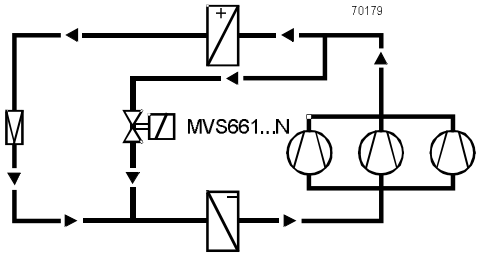
	R410A					
$t_c \setminus t_o$	-40	-30	-20	-10	0	10
00	116	117	91	12		
20	125	130	133	137	120	69
40	119	124	129	133	137	140
60	90	96	101	106	110	114

- With superheat = 6 K With subcooling = 2 K Δp upstream of evaporator = 1.6 bar
- Δp condenser = 0.3 bar Δp evaporator = 0.3 bar

Use of the MVS661..N as a hot-gas valve

The control valve throttles the capacity of a compressor stage. The hot gas passes directly to the evaporator, thus permitting capacity control in the range from 100 % down to approximately 0 %.

Indirect hot-gas bypass application



Suitable for use in large refrigeration systems in air conditioning plant, to prevent unacceptable temperature fluctuations between the compressor stages.

Application example

With low loads, the evaporating and condensing pressures can fluctuate depending on the type of pressure control. In such cases, evaporating pressure increases and condensing pressure decreases. Due to the reduction in differential pressure across the fully open valve, the volumetric flow rate will drop – the valve is undersized. This is why the effective pressures must be taken into account when sizing the valve for low loads.

Refrigerant R507; 3 compressor stages; Q_0 = 75 kW; t_o = 4 °C; t_c = 40 °C
Part load Q_0 per stage = 28 kW; t_o = 4 °C; t_c = 23 °C

KH R507	t_o = 0 °C	t_o = 10 °C
t_c = 20 °C	**14,4**	**9,0**
t_c = 23 °C	*15,6*	*11,0*
t_c = 40 °C	**22,4**	**22,0**

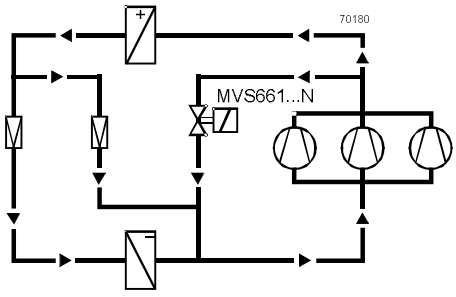
Interpolation at	t_c = 23 °C
14,4 + [(22,4 - 14,4) x (23 - 20) / (40 - 20)]	15,6
9,0 + [(22,0 - 9,0) x (23 - 20) / (40 - 20)]	11,0

Interpolation at	t_o = 4 °C
15,6 + [(11,0 - 15,6) x (4 - 0) / (10 - 0)]	13.8

k_{vs} theoretical = 28 kW / 13,8 = 2,03 m^3/h
Valve MVS661.25-2.5N is suitable, since: 2.03 m^3/h / 2.5 m^3/h x 100 % = 81 % (> 50 %)

Direct hot-gas bypass application

The control valve throttles the capacity of one compressor stage. The gas is fed to the suction side of the compressor and then cooled using a reinjection valve. Capacity control ranges from 100 % down to approximately 10 %.



Suitable for large refrigeration systems on air conditioning applications with several compressors or compressor stages, and where the evaporator and compressor are some distance apart (attention must be paid to the oil return).

Correction table KH
Hot-gas valve

$t_c \setminus t_o$	R717 -40	-30	-20	-10	0	10
00	20	19	14			
20	38	38	38	38	35	19
40	67	66	65	64	64	63
60	110	107	105	103	102	100

$t_c \setminus t_o$	R22 -40	-30	-20	-10	0	10
00	8,9	8,4	6,3			
20	15,3	15,1	14,8	14,6	13,2	6,5
40	24,2	23,7	23,2	22,8	22,4	22,1
60	35,7	34,7	33,8	33,0	32,3	31,7

$t_c \setminus t_o$	R744 -40	-30	-20	-10	0	10
-20	38,1	30,5				
00	60,9	59,8	58,1	47,1		
20	87,3	84,9	82,5	80,2	76,1	

$t_c \setminus t_o$	R134a -40	-30	-20	-10	0	10
00	4,5					
20	9,8	9,6	9,5	9,2	7,4	
40	15,9	15,6	15,3	15,1	14,9	14,7
60	23,8	23,2	22,7	22,3	21,9	21,6

$t_c \setminus t_o$	R402A -40	-30	-20	-10	0	10
00	9,7	9,5	8,3			
20	15,9	15,7	15,4	15,2	14,5	9,3
40	23,7	23,2	22,7	22,4	22,0	21,7
60	31,5	30,7	29,9	29,2	28,7	28,1

$t_c \setminus t_o$	R401A -40	-30	-20	-10	0	10
00	4,7					
20	10,2	10,0	9,9	9,5	7,6	
40	16,9	16,6	16,2	16,0	15,8	15,6
60	25,9	25,2	24,6	24,1	23,7	23,3

$t_c \setminus t_o$	R407A -40	-30	-20	-10	0	10
00	8,9	8,6	6,7			
20	15,7	15,4	15,2	15,0	14,1	8,0
40	24,9	24,4	23,9	23,5	23,1	22,8
60	35,9	34,9	34,0	33,2	32,6	32,0

$t_c \setminus t_o$	R404A -40	-30	-20	-10	0	10
00	9,4	9,2	7,8			
20	15,2	15,0	14,8	14,6	13,9	8,6
40	22,3	21,8	21,5	21,1	20,9	20,6
60	28,8	28,0	27,4	26,8	26,4	25,9

$t_c \setminus t_o$	R407C -40	-30	-20	-10	0	10
00	8,6	8,1	5,9			
20	15,3	15,0	14,8	14,6	13,6	7,0
40	24,7	24,2	23,7	23,3	22,9	22,6
60	36,3	35,3	34,4	33,6	33,0	32,4

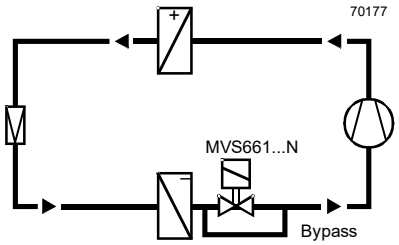
$t_c \setminus t_o$	R407B -40	-30	-20	-10	0	10
00	9,0	8,8	7,4			
20	15,3	15,1	14,8	14,7	14,0	8,8
40	23,3	22,8	22,4	22,0	21,7	21,5
60	31,6	30,7	30,0	29,3	28,8	28,3

$t_c \setminus t_o$	R507 -40	-30	-20	-10	0	10
00	9,8	9,5	8,1			
20	16,1	15,8	15,5	15,3	14,4	9,0
40	24,5	23,8	23,3	22,8	22,4	22,0
60	33,1	31,8	30,7	29,8	29,0	28,3

$t_c \setminus t_o$	R410A -40	-30	-20	-10	0	10
00	14,5	14,3	13,2	6,2		
20	24,2	23,7	23,3	23,0	22,1	15,9
40	36,8	35,9	35,1	34,4	33,7	33,1
60	50,0	48,5	47,2	46,0	44,9	43,8

- With superheat = 6 K — With subcooling = 2 K — Δp upstream of evaporator = 1.6 bar
- Δp condenser = 0.3 bar — Δp evaporator = 0.3 bar

Use of the MVS661..N as a suction throttle valve



Typical control range 50...100 %.
Minimum stroke limit control:
To ensure optimum cooling of the compressor, either a capacity controller must be provided for the compressor, or a minimum stroke must be set via the valve electronics.

The minimum stroke can be limited to a maximum of 80 %. At zero load, the minimum stroke must be sufficient to ensure that the minimum gas velocity in the suction line is > 0.7 m/s and that the compressor is adequately cooled.
As the control valve closes, the evaporating temperature rises and the air-cooling effect decreases continuously. The electronic control system provides demand-based cooling without unwanted dehumidification and costly retreatment of the air.
The pressure at the compressor inlet falls and the power consumption of the compressor is reduced. The energy savings to be anticipated with low loads can be determined from the compressor selection chart (power consumption at minimum permissible suction pressure). Compressor energy savings of up to 40 % can be achieved.
The recommended differential pressure Δp_{V100} across the fully open control valve is between 0.15 < Δp_{V100} < 0.5 bar.

Application example

Refrigerant R134A; Q_0 = 9,5 kW; t_o = 4 °C; t_c = 40 °C;
Differential pressure across MVS661..N: Δp_{V100} = 0,25 bar

In this application example, t_o, t_c and Δp_{V100} are to be interpolated.

KS R134a	t_o = 0 °C	t_o = 10 °C
0,15 / 20	**2.2**	**2.7**
0,15 / 50	**1.7**	**2.1**
0,45 / 20	**3.6**	**4.5**
0,45 / 50	**2.7**	**3.4**

Interpolation at	t_o = 4 °C
2,2 + [(2,7 - 2,2) x (4 - 0) / (10 - 0)]	2,4
1,7 + [(2,1 - 1,7) x (4 - 0) / (10 - 0)]	1,9
3,6 + [(4,5 - 3,6) x (4 - 0) / (10 - 0)]	4,0
2,7 + [(3,4 - 2,7) x (4 - 0) / (10 - 0)]	3,0

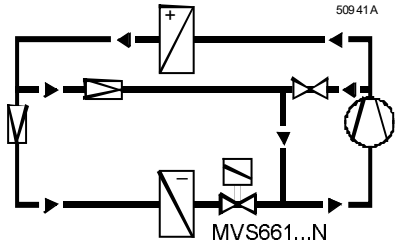
t_o = 4 °C	t_c = 20 °C	t_c = 50 °C
Δp_{V100} 0,15	**2.4**	**1.9**
Δp_{V100} 0,45	**4.0**	**3.0**

Interpolation at	t_c = 40 °C
2,4 + [(1,9 - 2,4) x (40 - 20) / (50 - 20)]	2,1
4,0 + [(3,0 - 4,0) x (40 - 20) / (50 - 20)]	3,3

t_c = 40 °C	Δp_{V100} 0.15	Δp_{V100} 0.45
	2.1	**3.3**

Interpolation at	Δp_{V100} 0,25
2,1 + [(3,3 - 2,1) x (0,25 - 0,15) / (0,45 - 0,15)]	2,5

k_{vs} theoretical = 9,5 kW / 2,5 = 3,8 m^3/h
Valve MVS661.25-6.3N is suitable, since 3.8 m^3/h / 6.3 m^3/h x 100 % = 60 % (> 50 %)
It is recommended that the k_{vs} value be set to 63 % = 4 m^3/h



Typical control range 10...100 %.
The capacity controller ensures that the compressor is adequately cooled, making it unnecessary to set a minimum stroke in the refrigerant valve.

Correction table KS
Suction throttle valve

t_c	R717					
$\Delta p_{v100} \setminus t_o$	-40	-30	-20	-10	0	10
0.15 / 20	2.7	3.7	4.8	6.0	7.3	8.8
0.15 / 50	2.3	3.2	4.2	5.2	6.4	7.8
0.45 / 20	3.2	5.2	7.4	9.7	12.1	14.8
0.45 / 50	2.8	4.6	6.5	8.5	10.7	13.1

t_c	R22					
$\Delta p_{v100} \setminus t_o$	-40	-30	-20	-10	0	10
0.15 / 20	1,2	1,5	1,9	2,4	2,9	3,4
0.15 / 50	0,9	1,2	1,5	1,9	2,3	2,7
0.45 / 20	1,5	2,3	3,0	3,9	4,8	5,7
0.45 / 50	1,2	1,8	2,4	3,0	3,8	4,6

t_c	R152A					
$\Delta p_{v100} \setminus t_o$	-40	-30	-20	-10	0	10
0.15 / 20	0,9	1,3	1,7	2,2	2,7	3,3
0.15 / 50	0,7	1,0	1,4	1,7	2,2	2,7
0.45 / 20	1,0	1,5	2,4	3,3	4,3	5,3
0.45 / 50	0,7	1,2	1,9	2,6	3,5	4,4

t_c	R134a					
$\Delta p_{v100} \setminus t_o$	-40	-30	-20	-10	0	10
0.15 / 20	0,7	1,0	1,4	1,8	2,2	2,7
0.15 / 50	0,5	0,7	1,0	1,3	1,7	2,1
0.45 / 20	0,7	1,2	1,9	2,7	3,6	4,5
0.45 / 50	0,5	0,9	1,4	2,0	2,7	3,4

t_c	R402A					
$\Delta p_{v100} \setminus t_o$	-40	-30	-20	-10	0	10
0.15 / 20	1,1	1,4	1,8	2,2	2,7	3,3
0.15 / 50	0,7	0,9	1,2	1,5	1,8	2,3
0.45 / 20	1,5	2,2	2,9	3,7	4,6	5,6
0.45 / 50	0,9	1,4	1,9	2,4	3,1	3,8

t_c	R401A					
$\Delta p_{v100} \setminus t_o$	-40	-30	-20	-10	0	10
0.15 / 20	0,8	1,1	1,5	1,9	2,3	2,9
0.15 / 50	0,6	0,8	1,1	1,5	1,8	2,3
0.45 / 20	0,8	1,3	2,1	2,9	3,7	4,7
0.45 / 50	0,6	1,0	1,6	2,3	3,0	3,7

t_c	R407A					
$\Delta p_{v100} \setminus t_o$	-40	-30	-20	-10	0	10
0.15 / 20	1,0	1,4	1,8	2,3	2,9	3,5
0.15 / 50	0,7	1,0	1,3	1,6	2,1	2,6
0.45 / 20	1,3	2,0	2,9	3,8	4,7	5,9
0.45 / 50	0,9	1,4	2,0	2,7	3,4	4,3

t_c	R404A					
$\Delta p_{v100} \setminus t_o$	-40	-30	-20	-10	0	10
0.15 / 20	1,0	1,3	1,7	2,2	2,7	3,3
0.15 / 50	0,6	0,8	1,1	1,4	1,7	2,1
0.45 / 20	1,4	2,1	2,8	3,6	4,5	5,5
0.45 / 50	0,8	1,2	1,7	2,3	2,9	3,6

t_c	R407C					
$\Delta p_{v100} \setminus t_o$	-40	-30	-20	-10	0	10
0.15 / 20	1,0	1,4	1,8	2,3	2,9	3,5
0.15 / 50	0,7	1,0	1,3	1,7	2,1	2,6
0.45 / 20	1,3	2,0	2,8	3,8	4,8	5,9
0.45 / 50	0,9	1,4	2,1	2,8	3,5	4,4

t_c	R407B					
$\Delta p_{v100} \setminus t_o$	-40	-30	-20	-10	0	10
0.15 / 20	1,0	1,3	1,7	2,2	2,7	3,3
0.15 / 50	0,6	0,8	1,1	1,4	1,8	2,2
0.45 / 20	1,3	2,0	2,7	3,5	4,5	5,5
0.45 / 50	0,8	1,2	1,7	2,3	3,0	3,8

t_c	R507					
$\Delta p_{v100} \setminus t_o$	-40	-30	-20	-10	0	10
0.15 / 20	1.1	1.4	1.8	2.3	2.7	3.3
0.15 / 50	0.7	1.0	1.3	1.6	1.9	2.4
0.45 / 20	1.6	2.2	2.9	3.7	4.6	5.6
0.45 / 50	1.1	1.5	2.0	2.6	3.2	4.0

t_c	R410A					
$\Delta p_{v100} \setminus t_o$	-40	-30	-20	-10	0	10
0.15 / 20	1,5	2,0	2,5	3,0	3,6	4,4
0.15 / 50	1,0	1,3	1,7	2,1	2,6	3,1
0.45 / 20	2,3	3,1	4,0	5,0	6,1	7,4
0.45 / 50	1,6	2,1	2,8	3,5	4,4	5,3

- With superheat = 6 K With subcooling = 2 K Δp upstream of evaporator = 1.6 bar
- Δp condenser = 0.3 bar Δp evaporator = 0.3 bar

Revision numbers

Product number	Valid from rev. no.
MVS661.25-016N	A
MVS661.25-0.4N	A
MVS661.25-1.0N	A
MVS661.25-2.5N	A
MVS661.25-6.3N	A

지멘스㈜
스마트 인프라
03155 서울특별시 종로구 종로3길 17 디타워 10층
Tel: 02) 3450-7302
Fax: 02) 3459-7359
www.siemens.co.kr/si

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