SIEMENS

VVF53..

VXF53..

VVG41..

VXG41..

Acvatix™
Valves VVF..,VXF.., VVG41.., VXG41.., VVI41.., VXI41..
Basic Documentation - Version changes

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Building Technologies

Siemens Switzerland Ltd.
Industry Sector
Building Technologies Division
Gubelstrasse 22
6301 Zug
Switzerland
Phone +41 41-724 24 24
www.siemens.com/sbt

Table of contents

1 About this document

1.1 Navigation

You will find information about a specific valve throughout the document. The structure of chapters 2 to 4 is as follows:

2 Engineering	**device oriented**
3 Handling	**process oriented**
3.1 Mounting and installation	
3.2 Commissioning and maintenance	
3.3 ...	
4 Functions and control	**assembly oriented**
4.1 Selection of acting direction and valve characteristic	
4.2 Calibration	
4.3 ...	

1.2 Revision history

Revision	Date	Changes	Chapter	Page(s)
First edition	2011-09-11	-	-	-
Rev. 2	2014-02-03	VVF/VXF22/32/42 implemented VVF43/53..K implemented	all	-

1.3 Reference documents

1.3.1 2- and 3-port valves with flanged connections

Type of document	VVF22.. VXF22..	VVF32.. VXF32..	VVF42.. VXF42..	VVF43.. VXF43..	VVF53.. VXF53..
Data Sheet	N4401	N4402	N4403	N4404	N4405
Mounting Instructions	M4030	M4030	M4030	M4030	M4030
CE Declaration of Conformity (PED)	-	T4030	T4030	T4030	T4030
Environmental Declaration	E4401	E4402	E4403	E4404	E4405

1.3.2 2- and 3-port valves with threaded connections

Type of document	VVG41..	VXG41..	VVI41.. VXI41..
Data Sheet	N4363	N4464	N4362
Mounting Instructions	M4363	M4363	M4362
CE Declaration of Conformity (PED)	-	-	-
Environmental Declaration	E4363	E4363	E4362

1.3.3 2- port valves with flanged connections and pressure compensation

Type of document	VVF42..K	VVF43..K	VVF53..K
Data Sheet	N4403	N4404	N4405
Mounting Instructions	M4030	M4030	M4030
CE Declaration of Conformity (PED)	T4030	T4030	T4030
Environmental Declaration	E4403	E4404	E4405

1.4 Before you start

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1.5 Validity of documentation

This document shall serve as a knowledge base. In addition to basic knowledge, it provides general technical information about valves used in HVAC plants.

For project engineers, electrical HVAC planners, system integrators, and service engineers, the document contains all information required for planning, engineering, correct installation, commissioning, and servicing.

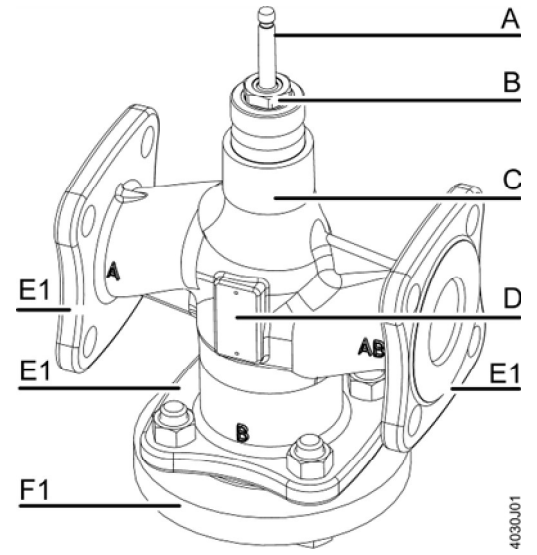
2 Engineering

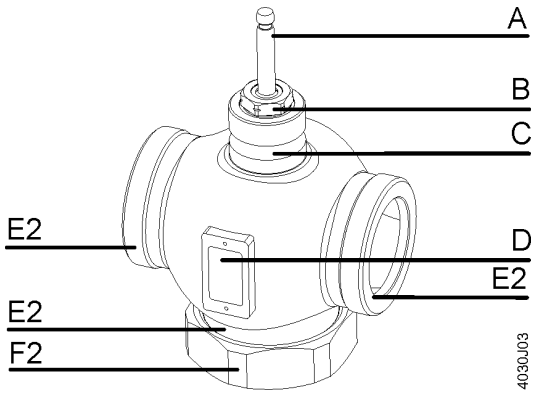
2.1 Product description

The large-stroke valve line consists of 2-port and 3-port valves.

2.1.1 2-port valves

Type of valve	Product number	Connections
Standard valves	VVF22.., VVF32.., VVF42..	Flanged
	VVG41..	Externally threaded
	VVI41..	Internally threaded
High-performance valves for higher medium temperatures	VVF43.., VVF53..	Flanged
Pressure-compensated valves	VVF42..K, VVF43..K, VVF53..K	Flanged

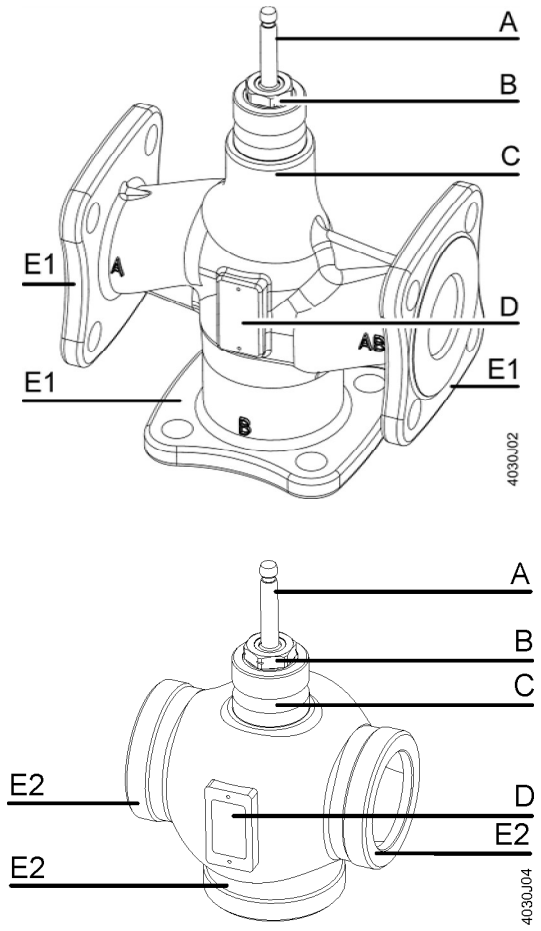




			Page
A	Valve stem		72
B	Stem sealing gland		33
C	Valve neck		72
D	Type plate		10
E1	Flange	Connections	73
E2	External or internal thread		
F1	Blank flange		
F2	Blank fitting		

2.1.2 3-port valves

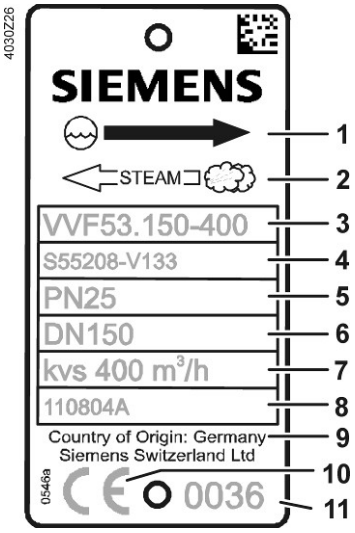
Type of valve	Product number	Connections
Standard valves	VXF22.., VXF32.., VXF42..	Flanged
	VXG41..	Externally threaded
	VXI41..	Internally threaded
High-performance valves for higher medium temperatures	VXF43.., VXF53..	Flanged



			Seite
A	**Valve stem**		72
B	**Stem sealing gland**		33
C	**Valve neck**		72
D	**Type plate**		10
E1	**Flange**	**Connections**	73
E2	**External or internal thread**		

2.1.3 Type plate

2-port valves



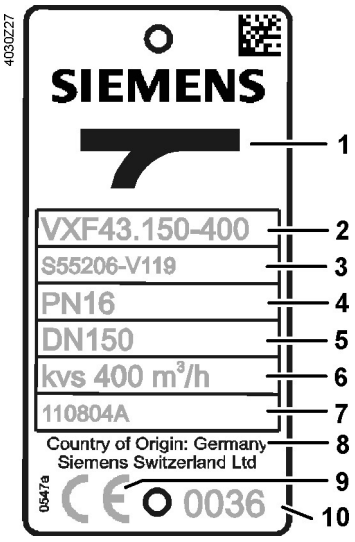
1 Flow direction for fluids
2 Flow direction for steam
Port markings are cast integral
3 Product number
4 Stock number
5 Nominal pressure class
6 Nominal size
7 k_{vs} value
8 Serial number
9 Country of origin
10 CE mark conforming to PED 97/23/EC. Applies only to valves of category I or II conforming to PED 97/23/EC
11 Notified body number for monitoring production centers as per module A1 of PED 97/23/EC. Applies only to valves of category II

Fluids

Steam

QR code (Siemens in-house usage)

3-port valves



1 Flow direction for fluids
Port markings are cast integral
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10 Notified body number for monitoring production centers as per module A1 of PED 97/23/EC. Applies only to valves of category II

QR code (Siemens in-house usage)

2.2 Use

The valves are used as control or shutoff valves in heating, ventilation and air conditioning plants for the production and distribution of heat or cooling energy, as well as in district heating plants and in steam applications.

All 3-port valves can be used as mixing valves (preferred use) or diverting valves. For use in closed or open hydraulic circuits, observe chapter "Cavitation", page 57.

2.2.1 Compatibility with medium and temperature ranges

Type of medium			Product number																Notes
Version [1]			S			H				S					D		W		
	Temperature range		V..F22..	V..F32..	V..F42..	VVF43..	VXF43..	VVF53..	VXF53..	VVG41..	VXG41..	VXG41..01	VVI41..	VXI41..	VVF42..K	VVF43..K	VVF53..K		
	T_{min} [°C]	T_{max} [°C]																	
Type of connection [2]			F							ET			IT		F				-
Cold water	1	25	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		-
Low-temperature hot water	1	130	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		-
High-temperature hot water [3]	130	150	-	■	■	■	■	■	■	■	■	■	■	■	■	■	■		-
	150	180	-	-	-	■	■	■	■	-	-	-	-	-	-	■	■		-
	180	220	-	-	-	-	-	■	■	-	-	-	-	-	-	-	■		-
Water with antifreeze	-25	130	-	-	-	-	-	-	-	■	■	■	■	■	-[7]	-[7]	-[7]		When using V..F43/53 for medium temperatures below -5 °C, the stem sealing gland must be replaced by 428488060.
	-20	130	-	-	-	■	■	■	■	■	■	■	■	■	-[7]	-[7]	-[7]		
	-10	130	■	■	■	■	■	■	■	■	■	■	■	■	-[7]	-[7]	-[7]		
	-5	130	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
	130	150	-	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
Cooling water [4]	1	25	-	-	-	■	■	■	■	■	■	■	■	■	-	■	■		-
Drinking water [6] – DVGW tested	1	90	-	-	-	-	-	-	-	-	-	■	-	-	-	-	-		• VXG41..01: - Tight bypass
Brines	-25	130	-	-	-	-	-	-	-	■	■	■	■	■	-[7]	-[7]	-[7]		When using V..F43/53 for medium temperatures below -5 °C, the stem sealing gland must be replaced by 428488060.
	-20	130	-	-	-	■	■	■	■	■	■	■	■	■	-[7]	-[7]	-[7]		
	-10	130	■	■	■	■	■	■	■	■	■	■	■	■	-[7]	-[7]	-[7]		
	-5	130	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
	130	150	-	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
Saturated steam	100	150	-	-	-	■	-	■	-	■	-	-	■	-	-	■	■		-
	150	200	-	-	-	■	-	■	-	-	-	-	-	-	-	■	■		-
	200	220	-	-	-	-	-	■	-	-	-	-	-	-	-	-	■		-
Superheated steam [5]	120	150	-	-	-	■	-	■	-	■	-	-	■	-	-	■	■		-
	150	220	-	-	-	■	-	■	-	-	-	-	-	-	-	■	■		-
Heat transfer oils	20	220	-	-	-	■	■	■	■	-	-	-	-	-	-	■	■		On the basis of mineral oil
Super-clean water (Demineralized and deionized water)	1	150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-
Demineralized water according to VDI2035 / SWKI_BT102-01	1	130	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		

[1] Version: S = standard / H = high-performance / D = pressure-compensated / W = heat transfer oils
[2] Type of connection: F = flanged / ET = externally threaded / IT = internally threaded
[3] Differentiation due to saturated steam curve. For details, refer to chapter 2.12, page 51
[4] Open circuits
[5] Min. dryness at inlet: 0.98
[6] Use version with tight bypass VXG41..01!
[7] VVF42..K / VVF43..K / VVF53..K due to the sealing material in the pressure compensation these valves cannot been used for media temperatures below -5°C

Note

For a detailed list of the permissible types of antifreeze and brines, refer to "8.1.7 Overview of antifreeze and brines used in the trade", page 90. The notes given under "2.14 Medium quality and medium treatment", page 58 must also be observed.

2.2.2 Fields of use

Fields of use	Product number																		
	3-port valves								2-port valves										
Version [1]	S			H		S			S			H		S		D			
	VXF22..	VXF32..	VXF42..	VXF43..	VXF53..	VXG41..	VXG41..01	VXI41..	VVF22..	VVF32..	VVF42..	VVF43..	VVF53..	VVG41..	VVI41..	VVF42..K	VVF43..K	VVF53..K	
Type of connection [2]	F	F	F	F	F	ET		IT	F	F	F	F	F	ET	IT	F	F	F	
Generation																			
Boiler plants	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
District heating plants	-	-	-	-	-	-	-	-	-	■	■	■	■	■	-	■	■	■	
Chiller plants	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Cooling towers [3]	-	-	-	■	■	■	■	■	-	-	-	■	■	■	■	-	■	■	
Distribution																			
Heating groups	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Air handling units	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	

[1] Version: S = standard / H = high-performance / D = pressure-compensated / W = heat transfer oils
[2] Type of connection: F = flanged / ET = externally threaded / IT = internally threaded
[3] Open circuits

2.3 Type summary and equipment combinations

2.3.1 2-port valves with flanged connections

PN 6 [1]	Actuators	Data Sheet	Stroke Positioning force	800 N		20 mm 1000 N		2800 N		40 mm 2800 N	
	SAX.. SKD.. SKB.. SKC..	N4501 N4561 N4564 N4566									
Data Sheet N4401				SAX..		SKD..		SKB..		SKC..	
		DN	k_{vs}	S_V	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}
-10…130 °C	Stock number		[m^3/h]		[kPa]							
VVF22.25-2.5	S55200-V100	25	2.5	> 50	600	300	600	300	600	300	-	-
VVF22.25-4	S55200-V101	25	4									
VVF22.25-6.3	S55200-V102	25	6.3									
VVF22.25-10	S55200-V103	25	10									
VVF22.40-16	S55200-V104	40	16	> 100	550							
VVF22.40-25	S55200-V105	40	25									
VVF22.50-40	S55200-V106	50	40		350		450					
VVF22.65-63	S55200-V107	65	63		200	150	250	200				
VVF22.80-100 [2]	S55200-V108	80	100		125	75	175	125	450			
VVF22.100-160 [2]	S55200-V109	100	160		-	-	-	-	-	-	300	250

[1] Flange type: 21; flange design: B (see "Flange types", page 73)

[2] Valve characteristic for k_{vs} value 100 m^3/h from 70% stroke and k_{vs} value 160 m^3/h from 85% stroke is optimized for maximum volumetric flow

PN 10 [1]	Actuators	Data Sheet	Stroke Positioning force	800 N		20 mm 1000 N		2800 N		40 mm 2800 N	
	SAX.. SKD.. SKB.. SKC..	N4501 N4561 N4564 N4566									
Data Sheet N4402				SAX.. [2]		SKD..		SKB..		SKC..	
		DN	k_{vs}	S_V	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}
-10…150 °C	Stock number		[m^3/h]		[kPa]							
VVF32.15-1.6	S55202-V100	15	1.6	>50	1000	400	1000	400	1000	400	-	-
VVF32.15-2.5	S55202-V101	15	2.5									
VVF32.15-4	S55202-V102	15	4									
VVF32.25-6.3	S55202-V103	25	6.3									
VVF32.25-10	S55202-V104	25	10									
VVF32.40-16	S55202-V105	40	16	>100	550		750					
VVF32.40-25	S55202-V106	40	25									
VVF32.50-40	S55202-V107	50	40		350	300	450					
VVF32.65-63	S55202-V108	65	63		200	150	250	200	700			
VVF32.80-100 [3]	S55202-V109	80	100		125	75	175	125	450			
VVF32.100-160 [3]	S55202-V110	100	160		-	-	-	-	-	-	300	250
VVF32.125-250	S55202-V111	125	250								190	160
VVF32.150-400 [3]	S55202-V112	150	400								125	100

[1] Flange type: 21; flange design: B (see "Flange types", page 73)

[2] Suitable for medium temperatures up to 130 °C

[3] Valve characteristic for k_{vs} value 100 m^3/h from 70% stroke, k_{vs} value 160 m^3/h from 85% stroke and k_{vs} value 400 m^3/h from 90% stroke is optimized for maximum volumetric flow

	Actuators	Data Sheet	Stroke Positioning force		800 N		20 mm 1000 N		2800 N		40 mm 2800 N	
PN 16 Product photo – to be created [1]	**SAX..** **SKD..** **SKB..** **SKC..**	N4501 N4561 N4564 N4566										
Data Sheet N4403					**SAX..** [2]		**SKD..**		**SKB..**		**SKC..**	
		DN	k_{vs}	S_V	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}
-10…150 °C	**Stock number**		[m^3/h]		[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					
VVF42.40-25	S55204-V108	40	25									
VVF42.50-31.5	S55204-V109	50	31.5		350	300	450		1200			
VVF42.50-40	S55204-V110	50	40									
VVF42.65-50	S55204-V111	65	50		200	150	250	200	700			
VVF42.65-63	S55204-V112	65	63									
VVF42.80-80	S55204-V113	80	80		125	75	175	125	450			
VVF42.80-100[3]	S55204-V114	80	100									
VVF42.100-125	S55204-V115	100	125		-	-	-	-	-	-	300	250
VVF42.100-160[3]	S55204-V116	100	160									
VVF42.125-200	S55204-V117	125	200								190	160
VVF42.125-250	S55204-V118	125	250									
VVF42.150-315	S55204-V119	150	315								125	100
VVF42.150-400[3]	S55204-V120	150	400									

[1] Flange type: 21; flange design: B (see "Flange types", page 73)

[2] Suitable for medium temperatures up to 130 °C

[3] Valve characteristic for k_{vs} value 100 m^3/h from 70% stroke, k_{vs} value 160 m^3/h from 85% stroke and k_{vs} value 400 m^3/h from 90% stroke is optimized for maximum volumetric flow

PN 16	Actuators	Data Sheet	Stroke	Positioning force	800 N		20 mm 1000 N		2800 N		40 mm 2800 N	
 [1]	SAX.. [5] SKD.. [2] SKB.. SKC..	N4501 N4561 N4564 N4566										
Data Sheet N4404					SAX.. [5]		SKD.. [2]		SKB..		SKC..	
		DN	k_{vs}	S_V	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}
-20…220 °C	Stock number		[m^3/h]		[kPa]							
VVF53.15-.. [3]	S55208-..	15	0.16…1.25	> 50	2500	1200	2500	1200	2500	1200	-	-
VVF53.15-.. [3]	S55208-..	15	1.6…4	> 100								
VVF53.20-.. [3]	S55208-..	20	6.3									
VVF53.25-.. [3]	S55208-..	25	5…10		1600		2100					
VVF53.32-.. [3]	S55208-..	32	16		900	750	1200	1100				
VVF53.40-.. [3]	S55208-..	40	12.5…25		550	500	750	650	2000			
VVF53.50-.. [3]	S55208-..	50	31.5…40		350	300	450	400	1200	1150		
VVF43.65-50	S55206-V100	65	50	> 100	-	-	-	-	-	-	700	650
VVF43.65-63 [4]	S55206-V101		63									
VVF43.80-80	S55206-V102	80	80								450	400
VVF43.80-100 [4]	S55206-V103		100									
VVF43.100-125	S55206-V104	100	125								300	250
VVF43.100-160 [4]	S55206-V105		160									
VVF43.125-200 [4]	S55206-V106	125	200								190	160
VVF43.125-250 [4]	S55206-V107		250									
VVF43.150-315 [4]	S55206-V108	150	315								125	100
VVF43.150-400	S55206-V109		400									

[1] Flange type: 21; flange design: B (see "Flange types", page 73)

[2] Suitable for medium temperatures up to 150 °C

[3] See VVF53.., PN 25 (Data Sheet N4405): Flange dimensions for PN 25 are the same as those for PN 16

[4] Valve characteristic is optimized for maximum volumetric flow:
- k_{vs} value 63 m^3/h from 90% stroke,
- k_{vs} values 100, 160, 200 and 250 m^3/h from 80% stroke,
- k_{vs} value 315 m^3/h from 70% stroke

[5] Suitable for medium temperatures up to 130 °C

Note

For applications with steam the maximum differential and closing pressures differ from the values above. For further details refer to “Applications with steam” on page 22.

	Actuators	Data Sheet	Stroke Positioning force	800 N		20 mm 1000 N		2800 N		40 mm 2800 N	
PN 25 **PN 16** [1] [2]  **Data Sheet N4405**	**SAX..** [5] **SKD..** [3] **SKB..** **SKC..**	N4501 N4561 N4564 N4566		 **SAX..** [5]		 **SKD..** [3]		 **SKB..**		 **SKC..**	
-20…220 °C	**Stock number**	**DN**	**k_{vs}** [m^3/h]	**S_V**	**Δp_s**	**Δp_{max}**	**Δp_s**	**Δp_{max}**	**Δp_s**	**Δp_{max}**	**Δp_s**	**Δp_{max}**
					[kPa]							
VVF53.15-0.16	S55208-V100	15	0.16	> 50	2500	1200	2500	1200	2500	1200	-	-
VVF53.15-0.2	S55208-V101		0.2									
VVF53.15-0.25	S55208-V102		0.25									
VVF53.15-0.32	S55208-V103		0.32									
VVF53.15-0.4	S55208-V104		0.4									
VVF53.15-0.5	S55208-V105		0.5									
VVF53.15-0.63	S55208-V106		0.63									
VVF53.15-0.8	S55208-V107		0.8									
VVF53.15-1	S55208-V108		1									
VVF53.15-1.25	S55208-V109		1.25									
VVF53.15-1.6	S55208-V110		1.6	> 100								
VVF53.15-2	S55208-V111		2									
VVF53.15-2.5	S55208-V112		2.5									
VVF53.15-3.2	S55208-V113		3.2									
VVF53.15-4	S55208-V114		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		6.3									
VVF53.25-8	S55208-V119		8									
VVF53.25-10	S55208-V120		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			
VVF53.40-16	S55208-V124		16									
VVF53.40-20	S55208-V125		20									
VVF53.40-25	S55208-V126		25									
VVF53.50-31.5	S55208-V127	50	31.5		350	300	450	400	1200	1150		
VVF53.50-40	S55208-V128		40									
VVF53.65-63 [4]	S55208-V129	65	63		-	-	-	-	-	-	700	650
VVF53.80-100 [4]	S55208-V130	80	100								450	400
VVF53.100-160 [4]	S55208-V131	100	160								300	250
VVF53.125-250 [4]	S55208-V132	125	250								190	160
VVF53.150-400	S55208-V133	150	400								125	100

[1] DN 15…50: Flange dimensions for PN 16 and PN 25
DN 65…150: Flange dimensions for PN 25 only

[2] Flange type: 21; flange design: B (see "Flange types", page 73)

[3] Suitable for medium temperatures up to 150 °C

[4] Valve is optimized for maximum volumetric flow:
- k_{vs} value 63 m^3/h from 90% stroke,
- k_{vs} values 100, 160 and 250 m^3/h from 80% stroke

[5] Suitable for medium temperatures up to 130 °C

Note

Other maximum differential and closing pressures are valid for applications with steam, for further details refer to “Applications with steam” on page 22.

Applications with steam

Valves of the product lines VVF43.. and VVF53.. have to be operated with inverted flow direction for steam. This results in combination with electrohydraulic actuators of the product lines SKD.., SKB.. und SKC.. with significantly higher closing pressures Δp_s and higher maximum differential pressures Δp_{max}. In individual cases the k_{vs} value is reduced and it has to be assured from the system side, when the system is starting up that the maximum differential pressure Δp_{max} is not exceeded so that the actuator can reliably open the valve.

Steam

PN 25 PN 16 [1]  [2] Data Sheet N4405 +100…220 °C	Actuators SAX.. [5] SKD.. [3] SKB.. SKC.. Stock number	Data Sheet N4501 N4561 N4564 N4566	DN	Stroke Positioning force k_{vs} [m³/h]	S_V	800 N  SAX.. [5] Δp_s	Δp_{max}	20 mm 1000 N  SKD.. [3] Δp_s	Δp_{max}	2800 N  SKB.. Δp_s	Δp_{max}	40 mm 2800 N  SKC.. Δp_s	Δp_{max}
						[kPa]							
VVF53.15-0.16	S55208-V100			0.16									
VVF53.15-0.2	S55208-V101			0.2									
VVF53.15-0.25	S55208-V102			0.25									
VVF53.15-0.32	S55208-V103			0.32									
VVF53.15-0.4	S55208-V104			0.4									
VVF53.15-0.5	S55208-V105			0.5	> 50								
VVF53.15-0.63	S55208-V106			0.63									
VVF53.15-0.8	S55208-V107		15	0.8									
VVF53.15-1	S55208-V108			1									
VVF53.15-1.25	S55208-V109			1.25									
VVF53.15-1.6	S55208-V110			1.6					1200				
VVF53.15-2	S55208-V111			2									
VVF53.15-2.5	S55208-V112			2.5									
VVF53.15-3.2	S55208-V113			3.2				2500		2500	1200	-	-
VVF53.15-4 [4]	S55208-V114			3.6									
VVF53.20-6.3 [4]	S55208-V116		20	5		-	-						
VVF53.25-5	S55208-V117			5									
VVF53.25-6.3	S55208-V118		25	6.3									
VVF53.25-8	S55208-V119			8									
VVF53.25-10 [4]	S55208-V120			8									
VVF53.32-16 [4]	S55208-V122		32	15									
VVF53.40-12.5	S55208-V123			12.5	> 100								
VVF53.40-16	S55208-V124		40	16					1000				
VVF53.40-20	S55208-V125			20									
VVF53.40-25 [4]	S55208-V126			23									
VVF53.50-31.5	S55208-V127		50	31.5					600				
VVF53.50-40	S55208-V128			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	S55208-V133		150	360									200

[1] DN 15…50: Flange dimensions for PN 16 and PN 25
DN 65…150: Flange dimensions for PN 25 only
[2] Flange type: 21; flange design: B (see "Flange types", page 73)
[3] Suitable for medium temperatures up to 150 °C
[4] Reduced k_{vs} value
[5] Suitable for medium temperatures up to 130 °C

PN 16 [1]	Actuators	Data Sheet	Stroke Positioning force	800 N		20 mm 1000 N		2800 N		40 mm 2800 N	
	SAX.. [5]	N4501									
	SKD.. [2]	N4561									
	SKB..	N4564									
	SKC..	N4566									
Data Sheet N4404				SAX.. [5]		SKD.. [2]		SKB..		SKC..	
	Stock number	DN	k_{vs}	S_V	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}
+100…220 °C	Stock number		[m³/h]		[kPa]							
VVF43.65-50	S55206-V100	65	50	> 100	-	-	-	-	-	-	1600	800
VVF43.65-63	S55206-V101		63									
VVF43.80-80	S55206-V102	80	80									750
VVF43.80-100	S55206-V103		100									
VVF43.100-125	S55206-V104	100	125									500
VVF43.100-160 [3]	S55206-V105		150									
VVF43.125-200	S55206-V106	125	200									300
VVF43.125-250 [3]	S55206-V107		220									
VVF43.150-315 [3]	S55206-V108	150	280									200
VVF43.150-400 [3]	S55206-V109		360									

[1] Flange type: 21; flange design: B (see "Flange types", page 73)
[2] Suitable for medium temperatures up to 150 °C
[3] Reduced k_{vs} value
[4] Suitable for medium temperatures up to 130 °C

2.3.2 2- port valves with threaded connections

PN 16	Actuators	Data Sheet	Stroke Positioning force	800 N		20 mm 1000 N		2800 N	
	SAX..	N4501							
	SKD..	N4561							
	SKB..	N4564							
Data Sheet N4363				SAX.. [1]		SKD..		SKB..	
	DN	k_{vs}	S_V	Threaded connection	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}
-25…150 °C Stock number		[m³/h]		[Inch]	[kPa]					
VVG41.11	15	0.63	> 50	G 1B	1600	800	1600	800	1600	800
VVG41.12	15	1		G 1B						
VVG41.13	15	1.6		G 1B						
VVG41.14	15	2.5		G 1B						
VVG41.15	15	4		G 1B						
VVG41.20	20	6.3	> 100	G 1¼B						
VVG41.25	25	10		G 1½B	1550					
VVG41.32	32	16		G 2B	875		1275			
VVG41.40	40	25		G 2¼B	525	525	775	775		
VVG41.50	50	40		G 2¾B	300	300	450	450	1225	

[1] Suitable for medium temperatures up to 130 °C

	Actuators	Data Sheet			Stroke Positioning force	20 mm 800 N		1000 N	
PN 16	**SAX..** **SKD..**	N4501 N4561							
						SAX.. [1]		SKD..	
Data Sheet N4362		**DN**	**k_{vs}**	**S_V**	**Threaded connection**	**Δp_s**	**Δp_{max}**	**Δp_s**	**Δp_{max}**
-25…150 °C	**Stock number**		[m^3/h]		[Inch]	[kPa]			
VVI41.15-2.5	C/VVI41.15-2.5	15	2.5	> 50	Rp ½	1600	400	1600	400
VVI41.15-4	C/VVI41.15-4	15	4		Rp ½				
VVI41.20-6.3	C/VVI41.20-6.3	20	6.3	> 100	Rp ¾				
VVI41.25-10	C/VVI41.25-10	25	10		Rp 1	1550			
VVI41.32-16	C/VVI41.32-16	32	16		Rp 1¼	875		1275	
VVI41.40-25	C/VVI41.40-25	40	25		Rp 1½	525		775	
VVI41.50-40	C/VVI41.50-40	50	40		Rp 2	300	300	450	

[1] Suitable for medium temperatures up to 130 °C

Valves of series VVI41... are only available in Asia.

2.3.3 2- port valves with flanged connections and pressure compensation

Fluids

PN 16 Product Photo [1] Data Sheet N4403 -5…150 °C	Actuators SAX.. SKD.. SKB.. SKC.. Stock number	Data Sheet N4501 N4561 N4564 N4566 DN	k_{vs} [m³/h]	Stroke Positioning force S_V	800 N  SAX.. [2] Δp_s / Δp_{max} [kPa]		20 mm 1000 N  SKD.. Δp_s / Δp_{max} [kPa]		2800 N  SKB.. Δp_s / Δp_{max} [kPa]		40 mm 2800 N  SKC.. Δp_s / Δp_{max} [kPa]	
VVF42.50-40K [3]	S55204-V121	50	40	> 100	1600	400	1600	400	1600	400	-	-
VVF42.65-63K [3]	S55204-V122	65	63									
VVF42.80-100K [3]	S55204-V123	80	100									
VVF42.100-160K [3]	S55204-V124	100	160		-	-	-	-	-	-	1600	400
VVF42.125-250K [3]	S55204-V125	125	250									
VVF42.150-360K	S55204-V126.	150	360									

1) Flange type: 21; flange design: B (see "Flange types", page 73)
2) Suitable for medium temperatures up to 130 °C
3) Valve characteristics for pressure compensated valves for k_{vs} value 100 m³/h from 70% stroke, k_{vs} value 40,160 and 250 m³/h from 80% stroke and k_{vs} value 63 m³/h from 90% stroke is optimized for maximum volumetric flow.

PN 16  [1] Data Sheet N4404 -5..220 °C	Actuators SAX.. [3] SKD.. [2] SKB.. SKC.. Stock number	Data Sheet N4501 N4561 N4564 N4566 DN	k_{vs} [m³/h]	Stroke Positioning force S_V	800 N  SAX.. [4] Δp_s / Δp_{max} [kPa]		20 mm 1000 N  SKD.. [2] Δp_s / Δp_{max} [kPa]		2800 N  SKB.. Δp_s / Δp_{max} [kPa]		40 mm 2800 N  SKC.. Δp_s / Δp_{max} [kPa]	
VVF43.65-63K [3]	S55206-V110	65	63	> 100	-	-	-	-	-	-	1600	800
VVF43.80-100K [3]	S55206-V111	80	100									
VVF43.100-160K [3]	S55206-V112	100	160									
VVF43.125-250K [3]	S55206-V113	125	250									
VVF43.150-360K	S55206-V114	150	360									

1) Flange type: 21; flange design: B (see "Flange types", page 73)
2) Suitable for medium temperatures up to 150 °C
3) Valve characteristics for pressure compensated valves for k_{vs} value 63 m³/h from 90% stroke, k_{vs} value 100,160 and 250 m³/h from 80% stroke is optimized for maximum volumetric flow.
4) Suitable for medium temperatures up to 130 °C

	Actuators	Data Sheet	Stroke Positioning force		800 N		20 mm 1000 N		2800 N		40 mm 2800 N	
PN 16 PN 25 [1]  [2]	SAX.. [5] SKD.. [3] SKB.. SKC..	N4501 N4561 N4564 N4566			 SAX.. [5]		 SKD.. [3]		 SKB..		 SKC..	
Data Sheet N4405 -5…220 °C	Stock number	DN	k_{vs} [m^3/h]	S_V	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}
					[kPa]							
VVF53.50-40K	S55208-V134	50	40	> 100	2500	1250	2500	1250	2500	1250	-	-
VVF53.65-63K [4]	S55208-V135	65	63		-	-	-	-	-	-	2500	1250
VVF53.80-100K [4]	S55208-V136	80	100									
VVF53.100-160K [4]	S55208-V137	100	160									
VVF53.125-250K [4]	S55208-V138	125	250									
VVF53.150-360K	S55208-V139	150	360									

[1] DN 15…50: Flange dimensions for PN 16 and PN 25
DN 65…150: Flange dimensions for PN 25 only
[2] Flange type: 21; flange design: B (see "Flange types", page 73)
[3] Suitable for medium temperatures up to 150 °C
[4] Valve characteristics for pressure compensated valves for k_{vs} value 63 m^3/h from 90% stroke, k_{vs} value 100,160 and 250 m^3/h from 80% stroke is optimized for maximum volumetric flow.
[5] Suitable for medium temperatures up to 130 °C

Steam

Applications with steam

Valves of the product lines VVF43.. and VVF53.. have to be operated with inverted flow direction for steam. This results in combination with electrohydraulic actuators of the product lines SKD.., SKB.. und SKC.. with significantly higher closing pressures Δp_s and higher maximum differential pressures Δp_{max}. In individual cases the k_{vs} value is reduced and it has to be assured from the system side, when the system is starting up that the maximum differential pressure Δp_{max} is not exceeded so that the actuator can reliably open the valve.

	Actuators	Data Sheet	Stroke Positioning force		800 N		20 mm 1000 N		2800 N		40 mm 2800 N	
PN 16  [1]	SAX.. [4] SKD.. [2] SKB.. SKC..	N4501 N4561 N4564 N4566			 SAX.. [4]		 SKD.. [2]		 SKB..		 SKC..	
Data Sheet N4404 +100...220 °C	Stock number	DN	k_{vs} [m^3/h]	S_V	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}
					[kPa]							
VVF43.65-63K	S55206-V110	65	63	> 100	-	-	-	-	-	-	1600	800
VVF43.80-100K	S55206-V111	80	100									
VVF43.100-160K [3]	S55206-V112	100	150									
VVF43.125-250K [3]	S55206-V113	125	220									
VVF43.150-360K [3]	S55206-V114	150	315									

[1] Flange type: 21; flange design: B (see "Flange types", page 73)
[2] Suitable for medium temperatures up to 150 °C
[3] Reduced k_{vs} value
[4] Suitable for medium temperatures up to 130 °C

	Actuators	Data Sheet		Stroke Positioning force	800 N		20 mm 1000 N		2800 N		40 mm 2800 N	
PN 16 **PN 25** [1]  [2]	**SAX..** [5] **SKD..** [3] **SKB..** **SKC..**	N4501 N4561 N4564 N4566										
Data Sheet N4405					**SAX..** [5]		**SKD..** [3]		**SKB..**		**SKC..**	
		DN	k_{vs}	S_V	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}
+100…220 °C	**Stock number**		[m^3/h]		[kPa]							
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									
VVF53.100-160K [4]	S55208-V137	100	150									
VVF53.125-250K [4]	S55208-V138	125	220									
VVF53.150-360K [4]	S55208-V139	150	315									

1) DN 15…50: Flange dimensions for PN 16 and PN 25
DN 65…150: Flange dimensions for PN 25 only
2) Flange type: 21; flange design: B (see "Flange types", page 73)
3) Suitable for medium temperatures up to 150 °C
4) Reduced k_{vs} value
5) Suitable for medium temperatures up to 130 °C

2.3.4 3-port valves with flanged connections

PN 6	Actuators	Data Sheet	Stroke Positioning force		800 N		20 mm 1000 N		2800 N		40 mm 2800 N	
 [1]	SAX..	N4501										
	SKD..	N4561										
	SKB..	N4564										
	SKC..	N4566										
Data Sheet N4401			DN	k_{vs}	S_V	SAX.. Δp_{max}		SKD.. Δp_{max}		SKB.. Δp_{max}		SKC.. Δp_{max}	
						[kPa]							
-10…130 °C	Stock number			[m³/h]		A⇨AB B	AB⇨A B	A⇨AB B	AB⇨A B	A⇨AB B	AB⇨A B	A⇨AB B	AB⇨A B
VXF22.25-2.5	S55200-V110		25	2,5	> 50	300	100	300	100	300	100	-	-
VXF22.25-4	S55200-V111		25	4									
VXF22.25-6.3	S55200-V112		25	6,3									
VXF22.25-10	S55200-V113		25	10									
VXF22.40-16	S55200-V114		40	16	> 100								
VXF22.40-25	S55200-V115		40	25									
VXF22.50-40	S55200-V116		50	40									
VXF22.65-63	S55200-V117		65	63		150	50	200	80				
VXF22.80-100 [2]	S55200-V118		80	100		75		125	50				
VXF22.100-160 [2]	S55200-V119		100	160		-	-	-	-	-	-	250	100

[1] Flange type: 21; flange design: B (see "Flange types", page 73)

[2] Valve characteristic for k_{vs} value 100 m³/h from 70% stroke and k_{vs} value 160 m³/h from 85% stroke is optimized for maximum volumetric flow

PN 10 Product photo [1]	Actuators	Data Sheet	Stroke Positioning force		800 N		20 mm 1000 N		2800 N		40 mm 2800 N	
	SAX..	N4501										
	SKD..	N4561										
	SKB..	N4564										
	SKC..	N4566										
Data Sheet N4402			DN	k_{vs}	S_V	SAX.. [2] Δp_{max}		SKD.. Δp_{max}		SKB.. Δp_{max}		SKC.. Δp_{max}	
						[kPa]							
-10…150 °C	Stock number			[m³/h]		A⇨AB B	AB⇨A B	A⇨AB B	AB⇨A B	A⇨AB B	AB⇨A B	A⇨AB B	AB⇨A B
VXF32.15-1.6	S55202-V113		15	1.6	>50	400	100	400	100	400	100	-	-
VXF32.15-2.5	S55202-V114		15	2.5									
VXF32.15-4	S55202-V115		15	4									
VXF32.25-6.3	S55202-V116		25	6.3									
VXF32.25-10	S55202-V117		25	10									
VXF32.40-16	S55202-V118		40	16	>100								
VXF32.40-25	S55202-V119		40	25									
VXF32.50-40	S55202-V120		50	40		300							
VXF32.65-63	S55202-V121		65	63		150	50	200	80				
VXF32.80-100 [3]	S55202-V122		80	100		75		125	50				
VXF32.100-160 [3]	S55202-V123		100	160		-	-	-	-	-	-	250	50
VXF32.125-250	S55202-V124		125	250								160	
VXF32.150-400 [3]	S55202-V125		150	400								125	

[1] Flange type: 21; flange design: B (see "Flange types", page 73)

[2] Suitable for medium temperatures up to 130 °C

[3] Valve characteristic for k_{vs} value 100 m³/h from 70% stroke, k_{vs} value 160 m³/h from 85% stroke and k_{vs} value 400 m³/h from 90% stroke is optimized for maximum volumetric flow

	Actuators	Data Sheet	Stroke Positioning force		800 N		20 mm 1000 N		2800 N		40 mm 2800 N	
PN 16	**SAX..**	N4501										
	SKD..	N4561										
	SKB..	N4564										
	SKC..	N4566										
Product photo [1]												
Data Sheet N4403					**SAX..** [2] **Δp_{max}**		**SKD.. Δp_{max}**		**SKB.. Δp_{max}**		**SKC.. Δp_{max}**	
		DN	**k_{vs}**	**S_V**	[kPa]							
-10…150 °C	**Stock number**		[m^3/h]		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	300							
VXF42.40-16	S55204-V134	40	16		150	50	200	80				
VXF42.40-25	S55204-V135	40	25									
VXF42.50-31.5	S55204-V136	50	31.5		75		125	50				
VXF42.50-40	S55204-V137	50	40									
VXF42.65-50	S55204-V138	65	50		-	-	-	-	-	-	250	100
VXF42.65-63	S55204-V139	65	63									
VXF42.80-80	S55204-V140	80	80								160	50
VXF42.80-100 [3]	S55204-V141	80	100									
VXF42.100-125	S55204-V142	100	125								125	
VXF42.100-160 [3]	S55204-V143	100	160									
VXF42.125-200	S55204-V144	125	200									
VXF42.125-250	S55204-V145	125	250									
VXF42.150-315	S55204-V146	150	315									
VXF42.150-400 [3]	S55204-V147	150	400									

[1] Flange type: 21; flange design: B (see "Flange types", page 73)

[2] Suitable for medium temperatures up to 130 °C

[3] Valve characteristic for k_{vs} value 100 m^3/h from 70% stroke, k_{vs} value 160 m^3/h from 85% stroke and k_{vs} value 400 m^3/h from 90% stroke is optimized for maximum volumetric flow

PN 16	Actuators	Data Sheet	Hub Stellkraft	20 mm 800 N	20 mm 1000 N	20 mm 2800 N	40 mm 2800 N
 1)	**SAX..** [5]	N4501					
Data Sheet N4404	**SKD..** [2]	N4561		**SAX..** [5] Δp_{max}	**SKD..** [2] Δp_{max}	**SKB..** Δp_{max}	**SKC..** Δp_{max}
	SKB..	N4564					
	SKC..	N4566					

-20…220 °C	Stock number	DN	k_{vs} [m^3/h]	S_V	[kPa] A⇒AB	[kPa] AB⇒A	[kPa] A⇒AB	[kPa] AB⇒A	[kPa] A⇒AB	[kPa] AB⇒A	[kPa] A⇒AB	[kPa] AB⇒A
VXF53.15-.. [3]	S55208-..	15	1.6/2.5/4	> 100	1200	200	1200	200	1200	200	-	-
VXF53.20-.. [3]	S55208-..	20	6.3									
VXF53.25-.. [3]	S55208-..	25	6.3/10									
VXF53.32-.. [3]	S55208-..	32	16		750		1100					
VXF53.40-.. [3]	S55208-..	40	16/25		500		650					
VXF53.50-.. [3]	S55208-..	50	40		300		400		1150			
VXF43.65-63 [4]	S55206-V115	65	63	> 100	-	-	-	-	-	-	650	200
VXF43.80-100 [4]	S55206-V116	80	100								400	200
VXF43.100-160 [4]	S55206-V117	100	160								250	150
VXF43.125-250 [4]	S55206-V118	125	250								160	100
VXF43.150-400	S55206-V119	150	400								100	70

1) Flange type: 21; flange design: B (see "Flange types", page 73)
2) Suitable for medium temperatures up to 150 °C
3) See VXF53.., PN 25 (data sheet N4405): Flange dimensions for PN 25 are the same as for PN 16
4) Valve is optimized for maximum volumetric flow:
- kvs value 63 m3/h from 90% stroke,
- kvs values 100, 160 and 250 m3/h from 80% stroke
5) Suitable for medium temperatures up to 130 °C

PN 25 PN 16 [1]	Actuators	Data Sheet	Stroke Positioning force	20 mm 800 N	20 mm 1000 N	20 mm 2800 N	40 mm 2800 N
 2)	**SAX..** [5]	N4501					
Data Sheet N4405	**SKD..** [3]	N4561		**SAX..** [5] Δp_{max}	**SKD..** [3] Δp_{max}	**SKB..** Δp_{max}	**SKC..** Δp_{max}
	SKB..	N4564					
	SKC..	N4566					

-20…220 °C	Stock number	DN	k_{vs} [m^3/h]	S_V	[kPa] A⇒AB	[kPa] AB⇒A	[kPa] A⇒AB	[kPa] AB⇒A	[kPa] A⇒AB	[kPa] AB⇒A	[kPa] A⇒AB	[kPa] AB⇒A
VXF53.15-1.6	S55208-V140	15	1.6	> 100	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 [4]	S55208-V148	32	16		750		1100					
VXF53.40-16	S55208-V149	40	16		500		650					
VXF53.40-25 [4]	S55208-V150	40	25									
VXF53.50-40 [4]	S55208-V152	50	40		300	100	400		1150			
VXF53.65-63 [4]	S55208-V153	65	63		-	-	-	-	-	-	650	200
VXF53.80-100 [4]	S55208-V154	80	100								400	200
VXF53.100-160 [4]	S55208-V155	100	160								250	150
VXF53.125-250 [4]	S55208-V156	125	250								160	100
VXF53.150-400	S55208-V157	150	400								100	70

1) DN 15…50: Flange dimensions for PN 16 and PN 25
DN 65…150: Flange dimensions for PN 25 only
2) Flange type: 21; flange design: B (see "Flange types", page 73)
3) Suitable for medium temperatures up to 150 °C
4) Valve is optimized for maximum volumetric flow:
- k_{vs} value 63 m^3/h from 90% stroke,
- k_{vs} values 16, 25, 40, 100, 160 and 250 m^3/h from 80% stroke
5) Suitable for medium temperatures up to 130 °C

2.3.5 3- port valves with threaded connections

PN 16	Actuators	Data Sheet	Stroke 20 mm Positioning force	800 N		1000 N		2800 N	
	SAX.. [2] SKD.. SKB..	N4501 N4561 N4564		 SAX.. [2] Δp_{max}		 SKD.. Δp_{max}		 SKB.. Δp_{max}	
 Data Sheet N4463				[kPa]					
-25…150 °C			DN	k_{vs} [m^3/h]	S_V	Threaded connection [Inch]	A⇨AB B	AB⇨A B	A⇨AB B	AB⇨A B	A⇨AB B	AB⇨A B
Typ	**Art.-Nr.**	**Typ** [1]	**Art.-Nr.** [1]									
-	-	**VXG41.1301**	VXG41.1301	15	1.6	> 50	G 1B	800	200	800	200	800	200
-	-	**VXG41.1401**	VXG41.1401	15	2.5		G 1B						
VXG41.15	VXG41.15	**VXG41.1501**	VXG41.1501	15	4		G 1B						
VXG41.20	VXG41.20	**VXG41.2001**	VXG41.2001	20	6.3	> 100	G 1¼B						
VXG41.25	VXG41.25	**VXG41.2501**	VXG41.2501	25	10		G 1½B						
VXG41.32	VXG41.32	**VXG41.3201**	VXG41.3201	32	16		G 2B						
VXG41.40	VXG41.40	**VXG41.4001**	VXG41.4001	40	25		G 2¼B	525	150	775	150		150
VXG41.50	VXG41.50	**VXG41.5001**	VXG41.5001	50	40		G 2¾B	300	100	450	100		200

[1] These types, as a standard, are equipped with a tight bypass. DVGW and SVGW verified DVGW applications according to drinking water regulation 2001. For medium temperatures up to 90 °C

[2] Suitable for medium temperatures up to 130 °C

PN 16	Actuators	Data Sheet	Stroke 20 mm Positioning force	800 N		1000 N	
	SAX.. SKD..	N4501 N4561		 SAX.. [1] Δp_{max}		 SKD.. Δp_{max}	
 Data Sheet N4362				[kPa]			
-25…150 °C	**Artikelnummer**	DN	k_{vs} [m^3/h]	S_V	Threaded connection [Inch]	A⇨AB B	AB⇨A B	A⇨AB B	AB⇨A B
VXI41.15-2.5	C/VXI41.15-2.5	15	2.5	> 50	Rp ½	400	100	400	100
VXI41.15-4	C/VXI41.15-4	15	4		Rp ½				
VXI41.20-6.3	C/VXI41.20-6.3	20	6.3	> 100	Rp ¾				
VXI41.25-10	C/VXI41.25-10	25	10		Rp 1				
VXI41.32-16	C/VXI41.32-16	32	16		Rp 1¼				
VXI41.40-25	C/VXI41.40-25	40	25		Rp 1½				
VXI41.50-40	C/VXI41.50-40	50	40		Rp 2	300			

[1] Suitable for medium temperatures up to 130 °C

Valves of series VXI41... are only available in Asia.

2.3.6 Overview of actuators

Product number	Stock number	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	S55150-A100			AC 24 V DC 24 V	0…10 V 4…20 mA 0…1000 Ω			✓		2) 3)
SAX81.00	S55150-A102				3-position	-	120 s	-	Press and fix	1)
SAX81.03	S55150-A103						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	✓		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: 20 s	✓		2)
SKB62 **SKB62U**	SKB62 SKB62U					10 s				
SKB62UA	SKB62UA									4)
SKB82.50 **SKB82.50U**	SKB82.50 SKB82.50U				3-position	-	120 s	-		1)
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)
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	✓		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, and selection of acting direction

2.4 Ordering

Example

Product number	Stock number	Description	Quantity
VVF53.15-0.16	S55208-V100	2-port valve	1
ASZ6.6	S55845-Z108	Stem heating element	1
-	4 284 8806 0	Stem sealing gland EPDM	1

Delivery — Actuator, valve and accessories are packed and supplied as separate items.

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

2.5 Accessories

2.5.1 Electrical accessories

Product number	Stock no.	Description	Note	
ASZ6.5	ASZ6.5	Stem heating element	Required for medium temperatures < 0 °C	
ASZ6.6	S55845-Z108	Stem heating element	Required for medium temperatures < 0 °C	

Note
Valve lines V..F43/53..

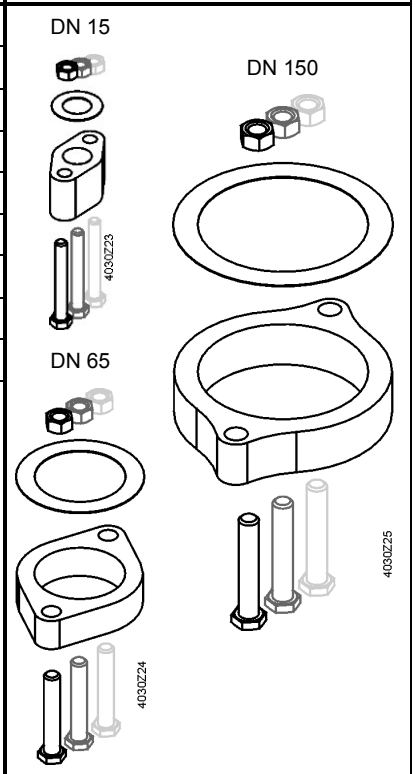
When using a stem heating element and the medium temperature is below –5 °C, the stem sealing gland must be replaced. In that case, the sealing gland must be ordered also (stock number 4 284 8806 0).

2.5.2 Mechanical accessories

Product number	Stock number	Mechanical stroke inverter								
		Description	Valves	DN	SAX..	SKD..	SKB..	SKC..	SAV..	
ASK50	ASK50	• Mechanical change of acting direction for valves with 20 mm stroke • 0% stroke of the actuator corresponds to 100% stroke of the valve • To be fitted between valve and actuator	V..F22..	25…80	-	✓	-	-	-	
			V..F32..	15…80						
			V..F42..	15…80						
			V..F53..	15…50						
			V..G41..	15…50						
			V..I41..	15…50						
ASK51	ASK51	• Mechanical change of acting direction for valves with 20 mm stroke • 0% stroke of the actuator corresponds to 100% stroke of the valve • To be fitted between valve and actuator	V..F22..	25…80	-	-	✓	-	-	
			V..F32..	15…80						
			V..F42..	15…80						
			V..F53..	15…50						
			V..G41..	15…50						

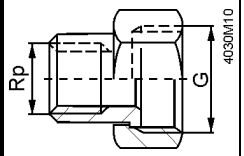
Product number	Stock number	Description	Remark	
-	428488060	Sealing gland	When using valves of the V..F43.. or V..F53.. lines with a stem heating element and a medium temperature of below -5 °C, the stem sealing gland must be replaced. With the gland 428488060 the valve can be used with water, water with antifreeze and brines between -20°C and + 150 °C.	

2.5.3 Adapters

Adapter type	Stock number	Bolts included	Description	VXF41..	Examples
ALF41B15	S55845-Z110	4x M12x90mm	Adapter for replacing 3-port valves VXF41.. by VXF43.. for DN ≥ 65 and VXF53.. for DN 15…50. • 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	DN 15	
ALF41B25	S55845-Z111	4x M12x90mm		DN 25	
ALF41B40	S55845-Z112	4x M16x90mm		DN 40	
ALF41B50	S55845-Z113	4x M16x90mm		DN 50	
ALF41B65	S55845-Z114	4x M16x90mm		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	

2.5.4 Fittings

Product number	Stock number	Product number	Stock number	Description	VVG41..	Threaded connection G [Inch]	Threaded connection Rp [Inch]	
ALG152	ALG152	**ALG152B**	S55846-Z100	Set of 2 fittings for 2-port valves, consisting of • 2 cap nuts • 2 inserts • 2 flat seals ALG..2B are fittings made from brass and for medium temperatures up to 100 °C	DN 15	G 1	Rp ½	
ALG202	ALG202	**ALG202B**	S55846-Z102		DN 20	G 1¼	Rp ¾	
ALG252	ALG252	**ALG252B**	S55846-Z104		DN 25	G 1½	Rp 1	
ALG322	ALG322	**ALG322B**	S55846-Z106		DN 32	G 2	Rp 1¼	
ALG402	ALG402	**ALG402B**	S55846-Z108		DN 40	G 2¼	Rp 1½	
ALG502	ALG502	**ALG502B**	S55846-Z110		DN 50	G 2¾	Rp 2	
					VXG41..			
ALG153	ALG153	**ALG153B**	S55846-Z101	Set of 3 fittings for 2-port valves, consisting of • 3 cap nuts • 3 inserts • 3 flat seals ALG..3B are fittings made from brass and for medium temperatures up to 100 °C	DN 15	G 1	Rp ½	
ALG203	ALG203	**ALG203B**	S55846-Z103		DN 20	G 1¼	Rp ¾	
ALG253	ALG253	**ALG253B**	S55846-Z105		DN 25	G 1½	Rp 1	
ALG323	ALG323	**ALG323B**	S55846-Z107		DN 32	G 2	Rp 1¼	
ALG403	ALG403	**ALG403B**	S55846-Z109		DN 40	G 2¼	Rp 1½	
ALG503	ALG503	**ALG503B**	S55846-Z111		DN 50	G 2¾	Rp 2	



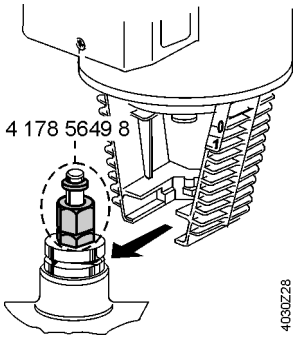
Note

Fittings for drinking water applications according to DVGW, drinking water ordinance 2001, have to be purchased locally from specialized trade.

2.6 Product replacement

The valves covered by this document replace the valves of the VVF../VXF.. lines that have been produced by Siemens, Landis & Staefa and Landis & Gyr since 1974.

For most types of valves operating in the field, a one-to-one replacement is available.
This does not apply to a small number of special valves that were marketed in certain regions. If there is a need to replace such valves, please contact your Siemens branch office. In that case, it might be necessary to change the piping.



Stem coupling for SKC32../62/82..
(stock no. 4 178 5649 8)

Further use of actuators of the SKD32../60/62/82.., SKB32../60/62/82.., SQX31../61../81.., and SQX32../62../82.. lines is possible.
Actuators of the SKC32../62/82.. lines require a new stem coupling since the diameter of the new stem is only 10 mm. Stem couplings must be ordered as separate items (stock no. 4 178 5649 8).

If the valve to be replaced was driven by an actuator of the SKD31../61../81.., SKB31../61../81.. or SKC31../61../81.. lines, Siemens recommends to replace the actuator as well, the reason being the actuator's age.

The tables below list former valve types and their successors. There is also an online replacement guide "Old2New" available; for access, go to www.siemens.com/hit under "Old2New replacement guide".

2.6.1 2-port valves

2-port valves with flanged connections									Replacement	
Type						DN	Adapter	Stem coupling [1]	Product number	DN
VVF21..	-	-	-	-	-	25...80	-	-	VVF22..	25...80
VVF21..	-	-	-	-	-	100	-	4 178 5649 8	VVF22..	100
VVF31..	-	-	-	-	-	15...80	-	-	VVF32..	15...80
VVF31..	-	-	-	-	-	100...150	-	4 178 5649 8	VVF32..	100...150
VVF40..	-	-	-	-	-	15...80	-	-	VVF42..	15...80
VVF40..	-	-	-	-	-	100...150	-	4 178 5649 8	VVF42..	100...150
VVF41.49	VVF41.494			VVF41.495		50	-	-	VVF53.50..[2]	50
VVF41.50	VVF41.504	-	-	VVF41.505	-	50	-	-	VVF53.50..	50
VVF41..	**VVF41..4**			**VVF41..5**		65...150	-	4 178 5649 8	VVF43..	65...150
VVF45.49	VVF45.494					50	-	4 178 5649 8	-	-
VVF45.50	VVF45.504	-	-	-	-	50	-	4 178 5649 8	VVF53.50	50
VVF45..	**VVF45..4**					65...150	-	4 178 5649 8	VVF43..[3]	65...150
VVF52..	**VVF52..A**	**VVF52..G**	**-**	**VVF52..M**	-	15...40	-	-	VVF53..	15...40

1) Since the new valves use uniform stem couplings, valves driven by electrohydraulic actuators SKC.. require a new stem coupling

2) Replacement valves are the same nominal size DN, but have different k_{vs} values. This must be taken into consideration when replacing a valve in the plant (stability, active stroke range)

3) If differential pressures are high, VVF43..K can be used as a replacement

Note

When using valves of the V..F43.. or V..F53.. lines with a stem heating element and a medium temperature of below -5 °C, the stem sealing gland must be replaced. In that case, the sealing gland must be ordered also (stock number 4 284 8806 0).

Note
Valve line VVF45..

Valves of the VVF45.. line close with the pressure, which means that when used in combination with SKB.. or SKC.. actuators, very high closing pressures are permitted. If such closing pressures are indeed required, valves of the VVF43..K line should be used as a replacement

2.6.2 3-port valves

3-port valves with flanged connections								Replacement	
Type					DN	Adapter	Stem coupling [1]	Product number	DN
VXF21..	-	-	-	-	25...80	-	-	VXF22..	25...80
VXF21..	-	-	-	-	100		4 178 5649 8	VXF22..	100
VXF31..	-	-	-	-	15...80	-	-	VXF32..	15...80
VXF31..	-	-	-	-	100...150		4 178 5649 8	VXF32..	100...150
VXF40..	-	-	-	-	15...80	-	-	VXF42..	15...80
VXF40..	-	-	-	-	100...150	-	4 178 5649 8	VXF42..	100...150
VXF41..	**VXF41..4**		**VXF41..5**		15	ALF41B15	-	VXF53..	15
					25	ALF41B25	-		25
					40	ALF41B40	-		40
VXF41.49..	VXF41.494..		VXF41.495..		50	ALF41B50	-	VXF53.50..[2]	50
VXF41.50..	VXF41.504..	-	VXF41.505..	-		ALF41B50	-	VXF53.50..	
VXF41..	**VXF41..4**		**VXF41..5**		65	ALF41B65	4 178 5649 8 [3]	VXF43..	65
					80	ALF41B80	4 178 5649 8 [3]		80
					100	ALF41B100	4 178 5649 8 [3]		100
					125	ALF41B125	4 178 5649 8 [3]		125
					150	ALF41B150	4 178 5649 8 [3]		150

1) Since the new valves use uniform stem couplings, valves driven by electrohydraulic actuators SKC.. require a new stem coupling

2) Replacement valves are the same nominal size DN, but have different k_{vs} values. This must be taken into consideration when replacing a valve in the plant (stability, active stroke range)

3) ALF41B65 .. 150 include the 10 mm stem washer to connect the existing SKC with the ne VXF43.. valves.

Note

When using valves of the V..F43.. or V..F53.. lines with a stem heating element and the medium temperature is below -5 °C, the stem sealing gland must be replaced. In that case, the sealing gland must be ordered also (stock number 4 284 8806 0).

Notes

When replacing old valves by new valves, the installation might have to be modified.

Valve lines VXF53../VXF43..

The dimension of the bypass is smaller than that of the valves of the former VXF41.. line. This means that a one-to-one replacement of the VXF41.. valves requires an ALF41B.. adapter. This adapter compensates for the difference in dimensions, thus facilitating replacement of the valve without having to modify the piping. The washer to fit the existing SKC actuator to the new valve with 10 mm stem diameter is added to the ALF41B65 to ..150.

2.6.3 Accessories

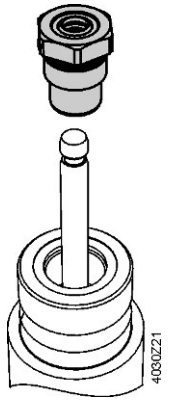
Product number	Stock number	Description	Note	
ASZ6.5	ASZ6.5	Stem heating element	Required for medium temperatures < 0 °C	

Note

The ASZ6.5 stem heating element is suitable for use with the SKB.., SKC.., SKD.., and SQX.. actuators. However, when replacing both the valve and the actuator, actuators of the SAX.. line also require replacement of the ASZ6.6 stem heating element.

2.7 Spare parts

Stem sealing gland



Product number	DN	Stock number	Comments
2-port valves (Standard)			
VVF22..	DN 25…100	4 284 8806 0	-
VVF32..	DN 15…150	4 284 8806 0	-
VVF42..	DN 15…150	4 284 8806 0	-
VVG41..	DN 15…50	4 284 8874 0	-
VVI41..	DN 15…50	4 284 8874 0	-
3-port valves (Standard)			
VXF22..	DN 25…100	4 284 8806 0	-
VXF32..	DN 15…150	4 284 8806 0	-
VXF42..	DN 15…150	4 284 8806 0	-
VXG41..	DN 15…50	4 284 8874 0	-
VXG41..01	DN 15…50	74 284 0047 0	-
VXI41..	DN 15…50	4 284 8874 0	-
2-port valves (high-performance)			
VVF53..	DN 15…150	74 284 0061 0	-
		4 284 8806 0	For medium temperatures below -5 °C
VVF43..	DN 65…150	74 284 0061 0	-
		4 284 8806 0	For medium temperatures below -5 °C
3-port valves (high-performance)			
VXF53..	DN 15…150	74 284 0061 0	-
		4 284 8806 0	For medium temperatures below -5 °C
VXF43..	DN 65…150	74 284 0061 0	-
		4 284 8806 0	For medium temperatures below -5 °C

2-port valves VVF..

Spare parts for expired product lines

Product number	DN	Stock number	Stem diameter	Remarks
2-port valves (Standard)				
VVF21..	DN 25…80	4 284 8806 0	10 mm	-
	DN 100	4 679 5629 0	14 mm	-
VVF31..	DN 15…80	4 284 8806 0	10 mm	-
	DN 100…150	4 679 5629 0	14 mm	-
VVF40..	DN 15…80	4 284 8806 0	10 mm	-
	DN 100…150	4 679 5629 0	14 mm	-
2-port valves (high-performance)				
VVF41..	DN 50…150	4 679 5629 0	14 mm	-
VVF41..4		4 679 5630 0	14 mm	• PTFE sleeve • For temperatures ≤ 180 °C
VVF41..5		4 284 9540 0	14 mm	• PTFE sleeve • Silicone-free version • For temperatures ≤ 180 °C
VVF45..	DN 50…150	4 679 5629 0	14 mm	-
VVF45..4		4 679 5630 0	14 mm	• PTFE sleeve • For temperatures ≤ 180 °C
VVF52..	DN 15…40	4 284 8806 0	10 mm	-
VVF52..A VVF52..G		4 284 8829 0	10 mm	• PTFE sleeve • For temperatures ≤ 180 °C
VVF52..M		4 284 9538 0	10 mm	• PTFE sleeve • Silicone-free version • For temperatures ≤ 180 °C

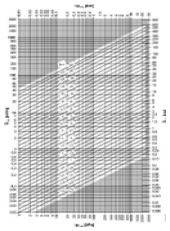
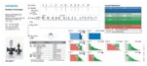
3-port valves VXF..
Spare parts for expired product lines

Product number	DN	Stock number	Stem diameter	Remarks
3-port valves (Standard)				
VXF21..	DN 25…80	4 284 8806 0	10 mm	-
	DN 100	4 679 5629 0	14 mm	-
VXF31..	DN 15…80	4 284 8806 0	10 mm	-
	DN 100…150	4 679 5629 0	14 mm	-
VXF40..	DN 15…80	4 284 8806 0	10 mm	-
	DN 100…150	4 679 5629 0	14 mm	-
3-port valves (high-performance)				
VXF41..	DN 15…40	4 284 8806 0	10 mm	-
VXF41..4		4 284 8829 0	10 mm	• PTFE sleeve • For temperatures ≤ 180 °C
VXF41..5		4 284 9538 0	10 mm	• PTFE sleeve • Silicone-free version • For temperatures ≤ 180 °C
VXF41..	DN 50…150	4 679 5629 0	14 mm	-
VXF41..4		4 679 5630 0	14 mm	• PTFE sleeve • For temperatures ≤ 180 °C
VXF41..5		4 284 9540 0	14 mm	• PTFE sleeve • Silicone-free version • For temperatures ≤ 180 °C

2.8 Valve sizing for fluids (water, heat transfer oil)

2.8.1 Procedure for valve sizing

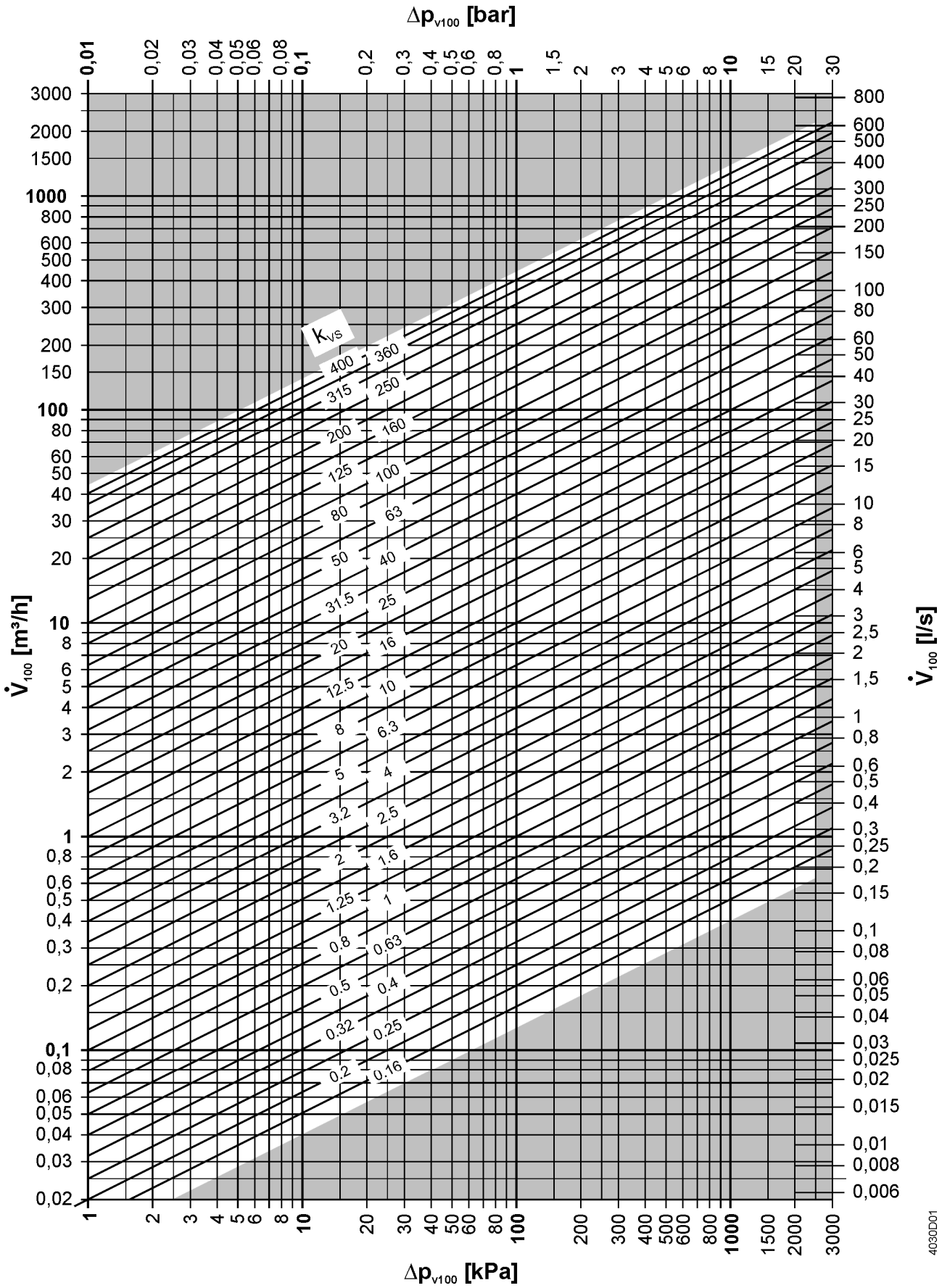
Essential values and formulas required for valve sizing:

<table>
<tr><th colspan="3">Sizing and selection of valves and actuators</th></tr>
<tr><td>1</td><td>Determine the basic hydraulic circuit</td><td>-</td></tr>
<tr><td>2</td><td>Determine Δp_{VR} or Δp_{MV}</td><td>One of the factors that determines control stability is the valve authority P_V. It is determined depending on the type of header and the hydraulic circuit
• Header with pressure and variable volumetric flow
Continue with Δp_{VR}
• Header with pressure and constant volumetric flow, or
• Header with low differential pressure and variable volumetric flow
Continue with Δp_{MV}</td></tr>
<tr><td>3</td><td>Determine Δp_{V100}</td><td>$\Delta p_{V100} \geq \frac{\Delta p_{VR}}{2}$
$\Delta p_{V100} \geq \Delta p_{MV}$</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Determine the volumetric flow V_{100}</td><td>Determine V_{100} depending on the type of medium
Water without antifreeze:
$\dot{V}_{100} = \frac{\dot{Q}_{100}}{1.163 \cdot \Delta T}$
Water with antifreeze, heat transfer oil:
$\dot{V}_{100} = \frac{\dot{Q}_{100} \cdot 3600}{c \cdot \rho \cdot \Delta T}$</td></tr>
<tr><td>For steam, see "2.9 Sizing valves for steam", page 41</td></tr>
<tr><td>5</td><td>Determine the k_{vs} value</td><td>There are different ways to determine the k_{vs} value:
Flow chart
 
By way of calculation
$k_V = \frac{\dot{V}_{100}}{\sqrt{\frac{\Delta p_{V100}}{100}}}$
Determine the k_{vs} value according to:
$0.85 \cdot k_V - \text{value} < k_{VS} - \text{value}$ [1)]
or within the following band:
$0{,}74 \cdot k_{VS} - \text{value} < k_V < 1.175 \cdot k_{VS} - \text{value}$
HIT sizing and selection:
www.siemens.com/hit
Valve slide rule
 
This procedure shows the mathematical approach. The following examples make use of the flow chart and show the way of calculation</td></tr>
<tr><td>6</td><td>Check the resulting differential pressure Δp_{V100}</td><td>The resulting differential pressure Δp_{V100} is used for calculating the valve authority P_V:
$\Delta p_{V100} = 100 \cdot \left(\frac{\dot{V}_{100}}{k_{vs}}\right)^2$</td></tr>
<tr><td>7</td><td>Select a suitable line of valves</td><td>Select the type of valve (2-port, 3-port, or 3-port valve with bypass):
• Type of connection (flanged, externally or internally threaded, soldered)
• PN class
• Nominal size DN
• Maximum or minimum medium temperature
• Type of medium</td></tr>
<tr><td>8</td><td>Check the valve authority P_V (control stability)</td><td>Check P_V with the resulting differential pressure Δp_{V100}:
• Header with pressure and variable volumetric flow
$P_V = \frac{\Delta p_{V100}}{\Delta p_{VR}}$
• Header with pressure and constant volumetric flow, or
• Header with low differential pressure and variable volumetric flow
$P_V = \frac{\Delta p_{V100}}{\Delta p_{V100} + \Delta p_{MV}}$</td></tr>
<tr><td>9</td><td>Select the actuator</td><td>Select the actuator according to the following criteria:
• Operating voltage
• Positioning signal
• Positioning time
• Spring return function
• Auxiliary functions</td></tr>
<tr><td>10</td><td>Check the working ranges</td><td>Differential pressure $\Delta p_{max} > \Delta p_{V0}$
Closing pressure $\Delta p_s > H_0$</td></tr>
<tr><td>11</td><td>Valve and actuator</td><td>Write down product and stock number of the selected valve and actuator</td></tr>
</table>

[1)] Experience shows that the selected k_{vs} value is usually too high. To the benefit of a higher valve authority Siemens recommends to check sensibly whether a valve with a k_{vs} value of approx. 85% of the calculated k_{vs} value is possible. If this is not possible, the second rule applies.

2.8.2 Flow chart

Fluids Kinematic viscosity υ < 10 mm^2/s



2.8.3 Impact of fluid properties on valve sizing

Valves are sized based on the volumetric flow passing through them. The most important characteristic of a valve is its k_{vs} value. Since this value is determined with water at a temperature of +5…30 °C and a differential pressure Δp of 100 kPa (1 bar), additional influencing factors must be taken into consideration if the properties of the medium passing through the valve are different.

The following properties of a medium affect valve sizing:

- The density ρ and the specific heat capacity c have a direct impact on the volumetric flow, which transfers the required amount of heat or cooling energy
- The kinematic viscosity ν influences the flow conditions (laminar or turbulent) in the valve and thus the differential pressure Δp at a given volumetric flow V

2.8.3.1 Density ρ

The amount of heat Q carried by a fluid depends on the available mass flow m, the specific heat capacity c, and the temperature spread ΔT:

$$\dot{Q} = \dot{m} \cdot c \cdot \Delta T$$

In the HVAC field, calculations are usually based on the volumetric flow V, resulting from the available mass flow m and the density ρ:

$$\dot{Q} = \dot{V} \cdot \rho \cdot c \cdot \Delta T$$

Within the temperature range normally used in the HVAC field, the density ρ of water is assumed to be about 1000 kg/m^3 and the specific heat capacity c 4.19 kJ/(kg·K). This makes it possible to apply a simplified formula with a constant of 1.163 kWh/(m^3·K) for calculating the volumetric flow V in m^3/h:

$$\dot{V} = \frac{\dot{Q}}{1.163 \cdot \Delta T}$$

The rated capacity Q_{100} of a plant with the valve fully open is calculated with the following formula:

$$\dot{V}_{100} = \frac{\dot{Q}_{100}}{1.163 \cdot \Delta T}$$

For watery solutions, such as mixtures of water and antifreeze, or other fluids like heat transfer oils, refer to the chapters below.

2.8.3.2 Specific heat capacity c

The amount of heat Q carried by a fluid depends on the available mass flow m, the specific heat capacity c, and the temperature spread ΔT.

Within the temperature range normally used in the HVAC field, the specific heat capacity c of water changes only slightly. Therefore, the approximate value used for the specific heat capacity c is 4.19 kJ/(kg·K). This makes it possible to apply a simplified formula with a constant of 1.163 kWh/(m^3·K) for calculating the volumetric flow V in m^3/h:

$$\dot{V} = \frac{\dot{Q}}{1.163 \cdot \Delta T}$$

If watery solutions, such as mixtures of water and antifreeze, or other fluids like heat transfer oils are used for the transmission of heat, the required volumetric flow

V is to be calculated with the density ρ and the specific heat capacity c at the operating temperature:

$$\dot{V} = \frac{\dot{Q}}{\rho \cdot c \cdot \Delta T}$$

The specific heat capacity of fluids is specified in trade literature. For mixtures, the specific heat capacity c is calculated on the basis of the mixture's mass proportions m_1 and m_2:

$$c_{Gemisch} = \frac{m_1 \cdot c_1 + m_2 \cdot c_2}{m_1 + m_2}$$

In the case of heating applications, the specific heat capacity c_1 or c_2 at the highest temperature must be used, and in the case of cooling applications that at the lowest temperature.

2.8.3.3 Kinematic viscosity ν

The kinematic viscosity ν affects the type of flow (laminar or turbulent) and thus the friction losses inside the valve. It has a direct impact on the differential pressure at a given volumetric flow.

The kinematic viscosity ν is specified either in mm^2/s or centistokes (cSt):
1 cSt = 10^{-6} m^2/s = 1 mm^2/s

Water at a temperature of between 5 and 30 °C is used to determine the k_{vs} value as a comparison value. Within this temperature range, water has a kinematic viscosity of 1.6 to 0.8 mm^2/s. The flow inside the valve is turbulent.

When sizing valves for media with other kinematic viscosities ν, a correction must be made. Up to a kinematic viscosity ν of less than 10 mm^2/s, the impact is negligible since it is smaller than the permissible tolerance of the k_{vs} value (+/- 10%).

In general practice, the correction is made by applying a correction factor F_R, which gives consideration to the different flow and friction conditions when calculating the k_{vs} value.

F_R is the factor used for the impact of the valve's Reynolds number. It must be applied when there is nonturbulent flow in the valve, when the differential pressure is low, for example, in the case of high-viscosity fluids, very low flow coefficients, or combinations of them. It can be determined by way of experiment.

F_R = flow coefficient for nonturbulent flow conditions divided by the flow coefficient ascertained under the same plant conditions for turbulent flow (EN 60534-2-1[1998])

k_v value under nonturbulent flow conditions

$$k_V = \frac{\dot{V}_{100}}{F_R} \cdot \frac{1}{\sqrt{\frac{\Delta p_{100}}{100}}}$$

Correction factor F_R for different kinematic viscosities ν

Kinematic viscosity [mm^2/s]	Correction factor F_R	Kinematic viscosity [mm^2/s]	Correction factor F_R
2000	0.52	60	0.73
1500	0.53	40	0.77
1000	0.55	30	0.8
800	0.56	25	0.82
600	0.57	20	0.83
400	0.60	15	0.86
300	0.61	10	0.90
250	0.62	8	(0.93) [1]
200	0.64	6	(0.94) [1]
150	0.70	4	(0.95) [1]
100	0.69	3	(0.97) [1]
80	0.70		

[1] Impact in the case of kinematic viscosities up to 10 mm^2/s is negligible

2.8.4 Influencing factors with selected groups of fluids

Media properties to be considered for a few selected groups of fluids:

	Density ρ	Specific heat capacity c	Kinematic viscosity ν
Formula	$\dot{V}_{100} = \frac{\dot{Q}_{100} \cdot 3600}{c \cdot \rho \cdot \Delta T}$	$\dot{V}_{100} = \frac{\dot{Q}_{100} \cdot 3600}{c \cdot \rho \cdot \Delta T}$	$k_V = \frac{\dot{V}_{100}}{F_R} \cdot \frac{1}{\sqrt{\frac{\Delta p_{100}}{100}}}$
Group of fluids			
Water	No	No	No (F_R = 1)
Water with antifreeze	Yes	Yes	No (F_R = 1)
Heat transfer oils	Yes	Yes	Yes
Brines	Yes	Yes	Yes

Notes on water and water with antifreeze

The HVAC Integrated Tool (HIT) supports sizing and selection of valves for water and water with antifreeze (www.siemens.com/hit).

Notes on heat transfer oils and brines

When sizing valves for use with heat transfer oils or brines, the medium properties specified by the suppliers must be taken into account:

- Specific heat capacity c
- Kinematic viscosity ν
- Specific density ρ
- During the heating up phase, the kinematic viscosity ν can reach a high level while the volumetric flow V and thus the available amount of heat $Q_{heating\ up\ phase}$ are much smaller than planned. This must be taken into account during the planning phase and when sizing the valves, see "2.10.3 Example for heat transfer oil", page 46.

2.8.5 Rangeability S_v, minimum controllable output Q_{min}

When sizing and selecting a valve, it must be ensured that – in the controlled operating state – the output does not drop below the minimum controllable output Q_{min}. Otherwise, the controlling element only regulates in on/off mode within the range of the initial flow surge. On/off mode reduces the plant's energy efficiency and adversely affects the controlling element's life.

The rangeability S_V is an important characteristic used for assessing the controllable range of a controlling element.

The smallest volumetric flow k_{vr} that can be controlled is the volumetric flow passing through the valve when it opens. Output Q_{min} is the smallest output of a consumer (e.g. of a radiator) that can be controlled in modulating mode.

$$S_V = \frac{k_{vs}}{k_{vr}}$$

For more detailed information on the subject, refer to the brochure "Hydraulics in building systems" (ordering no. 0-91917-en).

2.9 Sizing valves for steam

Since steam is compressible, valve sizing for steam must be based on other criteria. The most important characteristic of compressible flow is that the speed of flow in the throttling section can only increase up to the speed of sound. When this limit is reached, the speed of flow and thus the volumetric flow, or the steam mass flow, no longer increases, even if the differential pressure Δp rises. To ensure good controllability and favorably priced valve selection, it is advisable to have the differential pressure in normal operation as close as possible to the critical pressure ratio.

Before starting valve sizing, the plant-related process parameters and the prevailing operating state must be defined:
- Absolute steam pressure [kPa abs], [bar abs]
- Temperature of saturated or superheated steam [°C]
- Differential pressure Δp_{max} in normal operation

The dryness of saturated steam at the valve's inlet must be > 0.98.

During plant startup or shutdown, supercritical pressure conditions can occur:
- In terms of potential damage to the valve, a subcritical pressure ratio is far less crucial since the speed of flow lies below the speed of sound, material abrasion is reduced, and the noise level is lower

Sizing procedure

1. Calculate the steam mass flow m based on the amount of energy required Q_{100}, the steam pressure, and the steam temperature.
2. Determine whether the pressure ratio is in the sub- or supercritical range.
3. Determine the k_{vs} value based on the steam mass flow and the steam pressure.

Steam mass flow $\dot{m} = \frac{Q_{100} \cdot 3600}{r_{p_1}}$	Pressure ratio = $\frac{p_1 - p_3}{p_1} \cdot 100\%$

Calculation of k_{vs} value for steam

Subcritical range

$$\frac{p_1 - p_3}{p_1} \cdot 100\% < 42\%$$

Pressure ratio < 42% subcritical

$$k_{vs} = 4.4 \cdot \frac{\dot{m}}{\sqrt{p_3 \cdot (p_1 - p_3)}} \cdot k$$

Supercritical range

$$\frac{p_1 - p_3}{p_1} \cdot 100\% \geq 42\%$$

Pressure ratio ≥ 42% supercritical (not recommended)

$$k_{vs} = 8.8 \cdot \frac{\dot{m}}{p_1} \cdot k$$

Q_{100} = rated capacity in kW

r_{p1} = specific heat capacity of steam in kJ/kgK

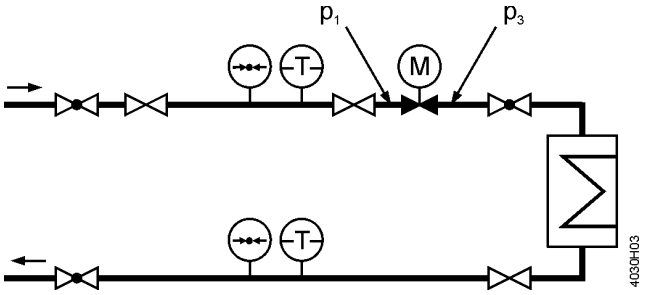
p_1 = absolute pressure at the valve inlet in kPa (prepressure)

p_3 = absolute pressure at the valve outlet in kPa

$\dot{m}$ = steam mass flow in kg/h

k = factor for superheating the steam = 1 + 0.0012 x ΔT (for saturated steam, k = 1)

ΔT = temperature spread in K of saturated steam and superheated steam



Note

The level of absolute pressure p_1 at the valve inlet must be at least such that the absolute pressure p_3 at the valve outlet is higher than the atmospheric pressure.

Notes on the supercritical range

When there is a pressure ratio $(p_1 – p_3) / p_1 > 0.42$, the flow passing through the narrowest section of the valve reaches the speed of sound. This can lead to higher noise levels. A throttling system operating at a lower noise level (multistage pressure reduction, damping throttle by the outlet) alleviates the problem.

Subcritical < 42%

- Steam-controlled heat transfer medium without condensation
- Shutoff valve on the steam side of condensation-controlled heat transfer media

Supercritical ≥ 42%

- Steam humidifier
- Steam-controlled heat transfer medium with condensation in the heat exchanger

Recommendation for differential pressure Δp_{max}

For saturated and superheated steam, the differential pressure Δp_{max} across the valve should be as close as possible to the critical pressure ratio.

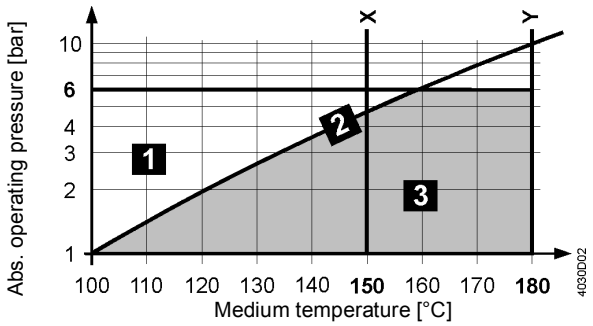


Chart example: The chart of the selected valve must be observed X and Y: Suitable actuators, depending on the 2-port valve

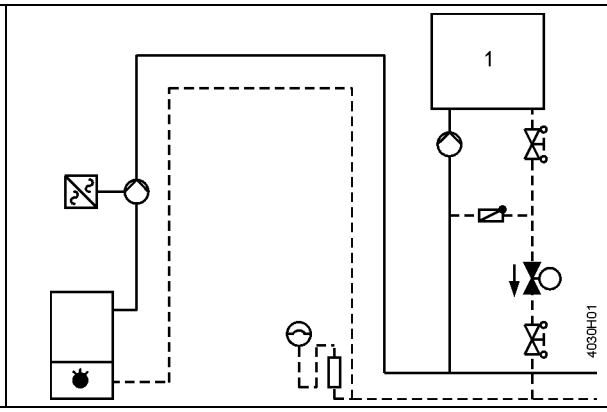
1	Wet steam	To be avoided
2	Saturated steam	Permissible operating range
3	Superheated steam	

Water vapor table Water vapor table for the saturated state (pressure table)

Pressure		Temperature	Spec. volume water	Spec. volume steam	Density steam	Enthalpy water	Enthalpy steam	Heat of vaporization
p [kPa]	p [bar]	T [°C]	V' [dm^3/kg]	V'' [m^3/kg]	ρ'' [kg/$m^{3]}$	h' [kJ/kg]	h'' [kJ/kg]	r [kJ/kg]
1	0.010	6.9808	1.0001	129.20	0.007739	29.34	2514.1	2485.0
2	0.020	17.513	1.0012	67.01	0.01492	73.46	2533.6	2460.2
3	0.030	24.100	1.0027	45.67	0.02190	101.00	2545.6	2444.6
4	0.040	28.983	1.0040	34.80	0.02873	121.41	2554.5	2433.1
5	0.050	32.898	1.0052	28.19	0.03547	137.77	2561.6	2423.8
6	0.060	36.183	1.0064	23.74	0.04212	151.50	2567.5	2416.0
7	0.070	39.025	1.0074	20.53	0.04871	163.38	2572.6	2409.2
8	0.080	41.534	1.0084	18.10	0.05523	173.86	2577.1	2403.2
9	0.090	43.787	1.0094	16.20	0.06171	183.28	2581.1	2397.9
10	0.10	45.833	1.0102	14.67	0.06814	191.83	2584.8	2392.9
20	0.20	60.086	1.0172	7.650	0.1307	251.45	2609.9	2358.4
30	0.30	69.124	1.0223	5.229	0.1912	289.30	2625.4	2336.1
40	0.40	75.886	1.0265	3.993	0.2504	317.65	2636.9	2319.2
50	0.50	81.345	1.0301	3.240	0.3086	340.56	2646.0	2305.4
60	0.60	85.954	1.0333	2.732	0.3661	359.93	2653.6	2293.6
70	0.70	89.959	1.0361	2.365	0.4229	376.77	2660.1	2283.3
80	0.80	93.512	1.0387	2.087	0.4792	391.72	2665.8	2274.0
90	0.90	96.713	1.0412	1.869	0.5350	405.21	2670.9	2265.6
100	1.0	99.632	1.0434	1.694	0.5904	417.51	2675.4	2257.9
150	1.5	111.37	1.0530	1.159	0.8628	467.13	2693.4	2226.2
200	2.0	120.23	1.0608	0.8854	1.129	504.70	2706.3	2201.6
250	2.5	127.43	1.0675	0.7184	1.392	535.34	2716.4	2181.0
300	3.0	133.54	1.0735	0.6056	1.651	561.43	2724.7	2163.2
350	3.5	138.87	1.0789	0.5240	1.908	584.27	2731.6	2147.4
400	4.0	143.62	1.0839	0.4622	2.163	604.67	2737.6	2133.0
450	4.5	147.92	1.0885	0.4138	2.417	623.16	2742.9	2119.7
500	5.0	151.84	1.0928	0.3747	2.669	640.12	2747.5	2107.4
600	6.0	158.84	1.1009	0.3155	3.170	670.42	2755.5	2085.0
700	7.0	164.96	1.1082	0.2727	3.667	697.06	2762.0	2064.9
800	8.0	170.41	1.1150	0.2403	4.162	720.94	2767.5	2046.5
900	9.0	175.36	1.1213	0.2148	4.655	742.64	2772.1	2029.5
1'000	10	179.88	1.1274	0.1943	5.147	762.61	2776.2	2013.6
1'100	11	184.07	1.1331	0.1774	5.637	781.13	2779.7	1998.5
1'200	12	187.96	1.1386	0.1632	6.127	798.43	2782.7	1984.3
1'300	13	191.61	1.1438	0.1511	6.617	814.70	2785.4	1970.7
1'400	14	195.04	1.1489	0.1407	7.106	830.08	2787.8	1957.7
1'500	15	198.29	1.1539	0.1317	7.596	844.67	2798.9	1945.2
1'600	16	201.37	1.1586	0.1237	8.085	858.56	2791.7	1933.2
1'700	17	204.31	1.1633	0.1166	8.575	871.84	2793.4	1921.5
1'800	18	207.11	1.1678	0.1103	9.065	884.58	2794.8	1910.3
1'900	19	209.80	1.1723	0.1047	9.555	896.81	2796.1	1899.3
2'000	20	212.37	1.1766	0.09954	10.05	908.59	2797.2	1888.6
2'500	25	223.94	1.1972	0.07991	12.51	961.96	2800.9	1839.0
3'000	30	233.84	1.2163	0.06663	15.01	1008.4	2802.3	1793.9
4'000	40	250.33	1.2521	0.04975	10.10	1087.4	2800.3	1712.9
5'000	50	263.91	1.2858	0.03743	25.36	1154.5	2794.2	1639.7
6'000	60	275.55	1.3187	0.03244	30.83	1213.7	2785.0	1571.3
7'000	70	285.79	1.3513	0.02737	36.53	1267.4	2773.5	1506.0
8'000	80	294.97	1.3842	0.02353	42.51	1317.1	2759.9	1442.8
9'000	90	303.31	1.4179	0.02050	48.79	1363.7	2744.6	1380.9
10'000	100	310.96	1.4526	0.01804	55.43	1408.0	2727.7	1319.7
11'000	110	318.05	1.4887	0.01601	62.48	1450.6	2729.3	1258.7
12'000	120	324.65	1.5268	0.01428	70.01	1491.8	2689.2	1197.4
13'000	130	330.83	1.5672	0.01280	78.14	1532.0	2667.0	1135.0
14'000	140	336.64	1.6106	0.01150	86.99	1571.6	2642.4	1070.7
15'000	150	342.13	1.6579	0.01034	96.71	1611.0	2615.0	1004.0
20'000	200	365.70	2.0370	0.005877	170.2	1826.5	2418.4	591.9
22'000	220	373.69	2.6714	0.003728	268.3	2011.1	2195.6	184.5
22'120	221.2	374.15	3.17	0.00317	315.5	2107.4	2107.4	0

2.10 Calculation examples for water, heat transfer oil and steam

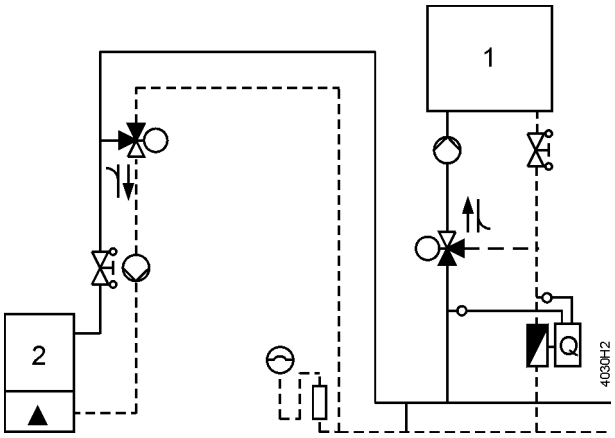
2.10.1 Example for water: Heater with pressure and variable volumetric flow

HVAC plant using a header with pressure, header with variable volumetric flow		**Air heating coil 1** Flow 60 °C Return 40 °C Supply air 20 °C Outside air 10 °C Output 55 kW Δp_{VR} 34 kPa Δp_{piping} 11 kPa **Other plant data** Pressure class PN 16 Control DC 0…10 V Operating voltage AC 24 V

1	Determine the basic hydraulic circuit	Injection circuit with 2-port valve
2	Determine Δp_{VR} or Δp_{MV}	With pressure and variable volumetric flow → Δp_{VR} Δp_{VR} = 34 kPa
3	Determine Δp_{V100}	With pressure and variable volumetric flow → $\Delta p_{V100} \geq \frac{\Delta p_{VR}}{2}$ Δp_{V100} = 17 kPa
4	Determine the volumetric flow V_{100}	$\dot{V}_{100} = \frac{Q_{100}}{1.163 \cdot \Delta T} = \frac{55\,kW}{1.163 \cdot (60\,°C - 40\,°C)} = 2.36\,m^3/h$
5	Determine the k_{vs} value	*Flow chart* Use the flow chart to determine the k_{vs} value: 1. k_{vs} value: 5 m^3/h 2. k_{vs} value: 6.3 m^3/h *By way of calculation* $k_v = \frac{\dot{V}_{100}}{\sqrt{\frac{\Delta p_{V100}}{100}}} = \frac{2.36\,m^3/h}{\sqrt{\frac{17\,kPa}{100}}} = 5.7\,m^3/h$ k_{vs} value ≥ 0.85 • 5.7 m^3/h = 4.8 m^3/h → k_{vs} value = 5 m^3/h or 6.3 m^3/h 1. k_{vs} value: 5 m^3/h 2. k_{vs} value: 6.3 m^3/h
6	Check the resulting differential pressure Δp_{V100}	First k_{vs} value: $\Delta p_{V100} = 100 \cdot \left(\frac{\dot{V}_{100}}{k_{vs}}\right)^2 = 100 \cdot \left(\frac{2.36\,m^3/h}{5\,m^3/h}\right)^2 = 22.3\,kPa$ Second k_{vs} value: $\Delta p_{V100} = 100 \cdot \left(\frac{\dot{V}_{100}}{k_{vs}}\right)^2 = 100 \cdot \left(\frac{2.36\,m^3/h}{6.3\,m^3/h}\right)^2 = 14\,kPa$
7	Select suitable line of valves	• 2-port valve (resulting from the basic hydraulic circuit) • Flanged (specified by the planner) • PN class 16 (specified by the planner) • Nominal size DN (resulting from the selected valve) • Maximum medium temperature: 60 °C • Type of medium: Water → 1st selection: VVF53.25-5 2nd selection: VVF53.20-6.3 or VVF53.25-6.3

8	Check the valve authority P_V (control stability)	Check P_V using the resulting differential pressure Δp_{V100}: First k_{vs} value: $P_V = \frac{\Delta p_{V100}}{\Delta p_{VR}} = \frac{22.3\,kPa}{34\,kPa} = 0.66$ Second k_{vs} value: $P_V = \frac{\Delta p_{V100}}{\Delta p_{VR}} = \frac{14\,kPa}{34\,kPa} = 0.41$ → Higher valve authority P_V → k_{vs} value = 5 m^3/h
9	Select the actuator	Select actuator according to the following criteria: • Operating voltage • Positioning signal • Positioning time • Spring return function • Auxiliary functions
10	Check the working ranges	Differential pressure $\Delta p_{max} > \Delta p_{V0}$ Closing pressure $\Delta p_s > H_0$
11	Select valve and actuator	Type of valve: VVF53.25-5 Type of actuator: According to the table

2.10.2 Example for water: Heater with low differential pressure without main pump

HVAC plant using a header with low differential pressure without main pump		**Heating group 1** Flow 60 °C Return 45 °C Output 70 kW $\Delta p_{heat\ meter}$ 8 kPa Δp_{piping} 3 kPa **Other plant data** Pressure class PN 16 Control 3-position Operating voltage AC 230 V **1** Heating group 1 **2** Boiler 1

1	Determine the basic hydraulic circuit	Mixing circuit
2	Determine Δp_{VR} or Δp_{MV}	Header with low differential pressure and variable volumetric flow → Δp_{MV} $\Delta p_{MV} = \Delta p_{piping} + \Delta p_{heat\ meter}$ = 3 kPa + 8 kPa = 11 kPa
3	Determine Δp_{V100}	Header with low differential pressure and variable volumetric flow → $\Delta p_{V100} \geq \Delta p_{MV}$ Δp_{V100} = 11 kPa
4	Determine the volumetric flow V_{100}	$\dot{V}_{100} = \frac{Q_{100}}{1.163 \cdot \Delta T} = \frac{70\,kW}{1.163 \cdot (60\,°C - 45\,°C)} = 4\,m^3/h$
5	Determine the k_{vs} value	*Flow chart* Use the flow chart to determine the k_{vs} value: k_{vs} value: 12 m^3/h *By way of calculation* $k_v = \frac{\dot{V}_{100}}{\sqrt{\frac{\Delta p_{V100}}{100}}} = \frac{4\,m^3/h}{\sqrt{\frac{11\,kPa}{100}}} = 12.1\,m^3/h$ k_{vs} value ≥ 0.85 • 12 m^3/h = 10.2 m^3/h → k_{vs} value = 10 m^3/h k_{vs} value: 10 m^3/h

6	Check the resulting differential pressure Δp_{V100}	$\Delta p_{V100} = 100 \cdot \left(\frac{\dot{V}_{100}}{k_{vs}} \right)^2 = 100 \cdot \left(\frac{4\,m^3/h}{10\,m^3/h} \right)^2 = 16\ kPa$
7	Select suitable line of valves	• 2-port valve (resulting from the basic hydraulic circuit) • Flanged (specified by the planner) • PN class 16 (specified by the planner) • Nominal size DN (resulting from selected valve) • Maximum medium temperature: 60 °C • Type of medium: Water → Selection: VXF53.25-10
8	Check the valve authority P_V (control stability)	Check P_V using the resulting differential pressure Δp_{V100}: $P_V = \frac{\Delta p_{V100}}{\Delta p_{V100} + \Delta p_{MV}} = \frac{16\,kPa}{16\,kPa + 11kPa} = 0.59$
9	Select the actuator	Select actuator according to the following criteria: • Operating voltage • Positioning signal • Positioning time • Spring return function • Auxiliary functions
10	Check the working ranges	Differential pressure $\Delta p_{max} > \Delta p_{V0}$ Closing pressure $\Delta p_s > H_0$
11	Select valve and actuator	Type of valve: VXF53.25-10 Type of actuator: According to the table

2.10.3 Example for heat transfer oil

As outlined in chapter "2.8.3 Impact of fluid properties on valve sizing", page 38, when sizing a valve, the density ρ, the specific heat capacity c, and the kinematic viscosity ν must be taken into consideration. Also, to ensure correct and efficient operation, a closer look should be taken at the controlled mode and the startup mode.

Properties	
Description	Mobiltherm 603
Max. permissible flow temperature	285 °C
Max. permissible film temperature	315 °C
Kinematic viscosity at 20 °C	50.5 mm^2/s
Kinematic viscosity at 100/200/300 °C	4.2/1.2/0.58 mm^2/s
Density at 20 °C	859 kg/m^3
Density at 100/200/300 °C	811/750/690 kg/m^3
Specific heat capacity c at 20 °C	1.89 kJ/kgK
Specific heat capacity c at 100/200/300 °C	2.18/2.54/2.91 kJ/kgK

When planning and commissioning a plant or when sizing valves, the suppliers' specifications must be observed. The experience and know-how of the suppliers help select the right type of heat transfer oil.

Plant data	Consumer: Air-heat transfer oil heat exchanger Differential pressure Δp_{VR}: 50 kPa (0.5 bar) Flow temperature T_{VL}: 280 °C Return temperature T_{RL}: 230 °C Required capacity Q_{100}: 55 kW Basic hydraulic circuit: Throttling circuit	
Operating data	**Controlled mode when heated up**	**Heating up mode**
Required capacity Q	Q_{100} = 55 kW	Q is undefined
Temperature spread ΔT	50 K	-
Determine the volumetric flow V_{100}	$\dot{V}_{100} = \frac{\dot{Q}_{100} \cdot 3600}{c \cdot \rho \cdot \Delta T}$ $\dot{V}_{100} = \frac{55\,kW \cdot 3600}{2.91\,kJ/kgK \cdot 690\,kg/m^3 \cdot 50\,K}$ $\dot{V}_{100} = 1.97\,m^3/h$	-
Differential pressure Δp_{V100}	With pressure and variable volumetric flow → $\Delta p_{V100} \geq \frac{\Delta p_{VR}}{2}$ → Δp_{V100} = 25 kPa (0.25 bar)	Must be calculated
Flow temperature T_{VL}	280 °C	Approx. 20 °C
Kinematic viscosity ν	At 300 °C: 0.58 mm^2/s	50.5 mm^2/s
Correction factor F_R	At 280 °C: 1 Kinematic viscosity υ <10 mm^2/s	At 20 °C: 0.75 Interpolated according to the correction factor table on page 40
Determine the k_{vs} value	$k_V = \frac{\dot{V}_{100}}{F_R} \cdot \frac{1}{\sqrt{\frac{\Delta p_{100}}{100}}}$ F_R = 1 $k_v = \frac{\dot{V}_{100}}{\sqrt{\frac{\Delta p_{V100}}{100}}} = \frac{1.97\,m^3/h}{\sqrt{\frac{25\,kPa}{100}}} = 3.94\,m^3/h$ k_{vs} value ≥ 0.85 • 3.94 m^3/h = 3.35 m^3/h -> k_{VS} value = 5 m^3/h	-
Volumetric flow resulting from the selected k_{vs} value	$\dot{V}_{100} = k_{vs} \cdot F_R \cdot \sqrt{\frac{\Delta p_{V100}}{100}}$ $\dot{V}_{100} = 5\,m^3/h \cdot 1 \cdot \sqrt{\frac{25\,kPa}{100}}$ $\dot{V}_{100} = 2.5\,m^3/h$	$\dot{V}_{100} = k_{vs} \cdot F_R \cdot \sqrt{\frac{\Delta p_{V100}}{100}}$ $\dot{V}_{100} = 5\,m^3/h \cdot 0.75 \cdot \sqrt{\frac{25\,kPa}{100}}$ $\dot{V}_{100} = 1.9\,m^3/h$ → In the heating up phase, the volumetric flow is reduced by 5%!
Select the 2-port valve	VVF61.242	

2.10.4 Example for steam

As outlined in chapter "2.9 Sizing valves for steam", page 41, it must be determined first whether a supercritical or subcritical pressure ratio exists in the plant.

Example 1:
By way of calculation

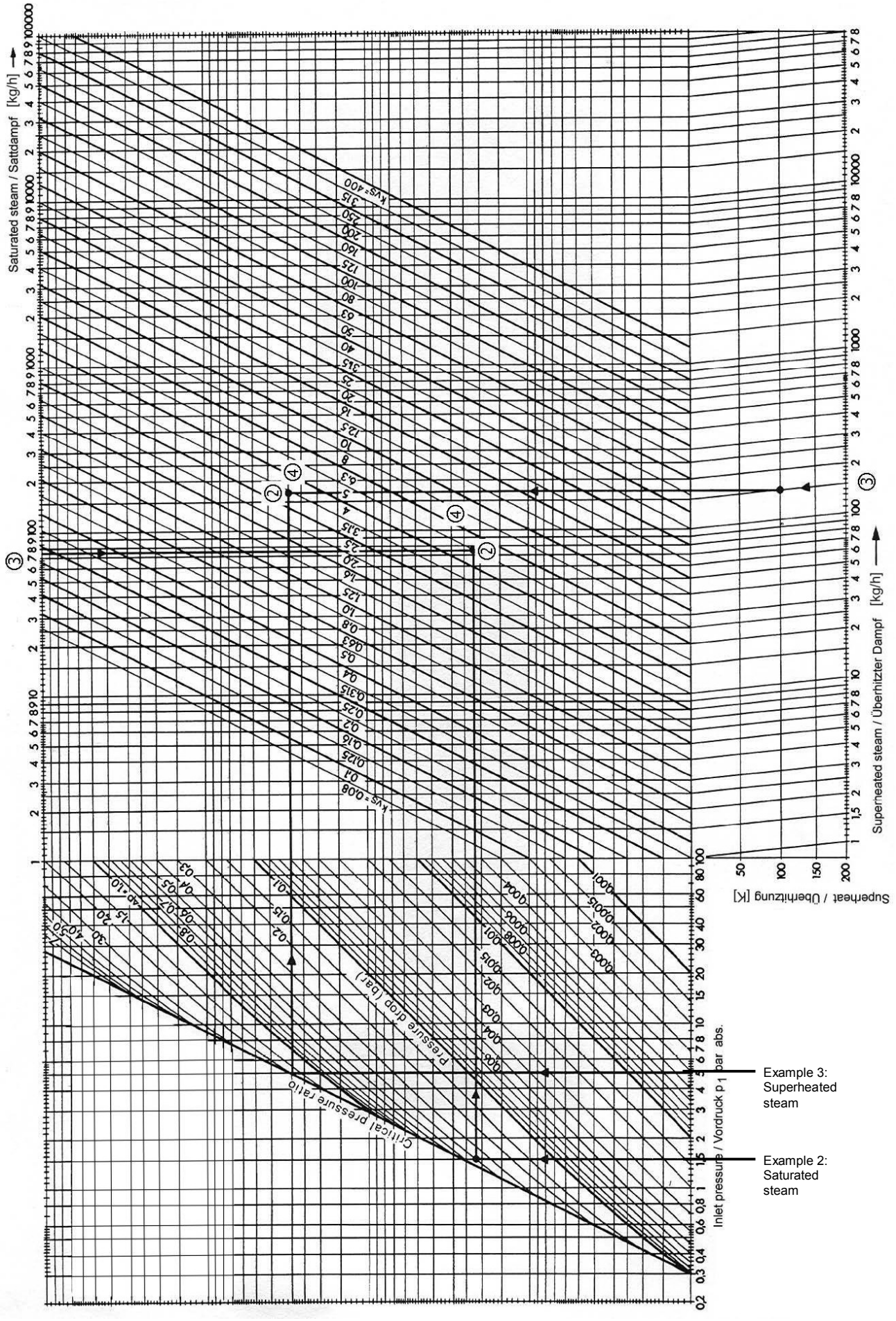
	Saturated steam = 151.8 °C Prepressure p_1 = 500 kPa (5 bar) Steam mass flow $\dot{m}$ = 460 kg/h	
Given	Pressure ratio = 30%	Pressure ratio ≥ 42% (supercritical permitted)
	Subcritical pressure ratio	**Supercritical pressure ratio**
Required	k_{vs}, valve type	k_{vs}, valve type
Solution	$p_3 = p_1 - \frac{30\% \cdot p_1}{100\%}$ $p_3 = 500\,kPa - \frac{30\% \cdot 500\ kPa}{100\%} = 350\ kPa\ (3.5bar)$ $k_v = 4.4 \cdot \frac{460\ kg/h}{\sqrt{350\,kPa \cdot (500\,kPa - 350\,kPa)}} \cdot 1$ k_v = 8.83 m^3/h	$k_v = 8.8 \cdot \frac{460\,kg/h}{500\,kPa} \cdot 1$ k_v = 8.09 m^3/h
Selected	k_{vs} = 10 m^3/h → VVF53.25-10	k_{vs} = 8 m^3/h → VVF53.25-8

Example 2:
With chart

Given	Saturated steam = 133.5 °C Prepressure p_1 = 150 kPa (1.5 bar) Steam mass flow $\dot{m}$ = 75 kg/h Differential pressure = 40 kPa (0.4 bar)
Required	k_{vs}, valve type
Solution	1. Vertical line upward to an absolute prepressure p_1 = 1.5 bar (150 kPa). 2. Horizontal line to the right to the point of intersection 1.5 bar (15 kPa) and differential pressure 0.4 bar (40 kPa). 3. Vertical line downward to 75 kg/h. 4. Point of intersection k_{vs} value Select available k_{vs} value of VVF.. valve lines. 5. Selected kvs value: 5 m^3/h.
Selected	k_{vs} value: 5 m^3/h → VVF53.25-5

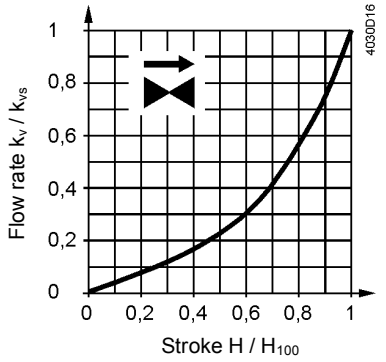
Example 3:
With chart

Given	Superheated steam = 251.8 °C Saturated steam = 151.8 °C Superheating ΔT = 100 K Prepressure p_1 = 500 kPa (5 bar) Steam mass flow $\dot{m}$ = 150 kg/h Differential pressure = 200 kPa (2 bar)
Required	k_{vs}, valve type
Solution	1. Vertical line upward to an absolute prepressure p_1 = 5 bar (500 kPa). 2. Horizontal line to the right to the point of intersection 5 bar (500 kPa) and differential pressure 2 bar (200 kPa). 3. Scale "Superheated steam": Along the line at 150 kg/h upward to superheating at 100 K, then the vertical line upward. 4. Point of intersection k_{vs} value Select available k_{vs} value of VVF.. valve lines. 5. Selected kvs value: 3.15 m^3/h.
Selected	k_{vs} value: 3.15 m^3/h → VVF53.15-3.2


Saturated steam / Sattdampf [kg/h]
Superheated steam / Überhitzter Dampf [kg/h]
Superheat / Überhitzung [K]
Inlet pressure / Vordruck p1 bar abs.
Pressure drop [bar]
Critical pressure ratio
Example 3: Superheated steam
Example 2: Saturated steam

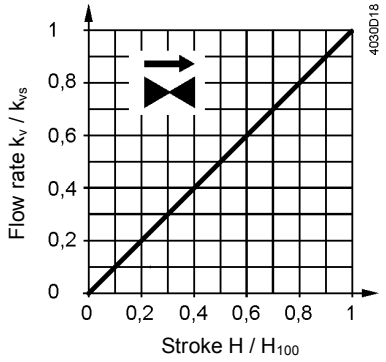
2.11 Valve characteristics

2.11.1 2-port valves



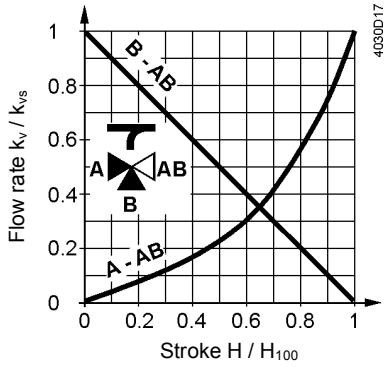
0…30%: Linear
30…100%: Equal-percentage
n_{gl} = 3 as per VDI / VDE 2173
For certain valve lines and high k_{vs} values, the valve characteristic is optimized for maximum volumetric flow k_{V100}.

For valves:
VVF32.125-250
VVF42.125-250
VVF42.125.250K
VVF43.125-250
VVF43.125-250K
VVF53.125-250
VVF53.125-250K
VVF32.150-400
VVF42.150-400
VVF42.150-360K
VVF43.150-400
VVF43.150-360K
VVF53.150-400
VVF53.150-360K



0…100%: Linear

2.11.2 3-port valves



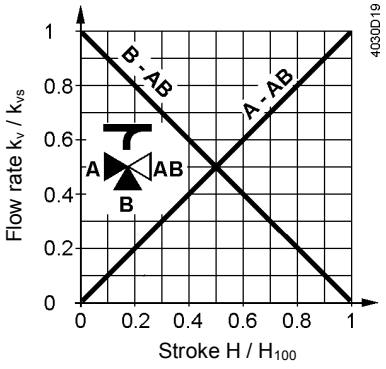
Throughport A-AB
0...30%: Linear
30...100%: Equal-percentage
n_{gl} = 3 as per VDI / VDE 2173
For certain valve lines and high k_{vs} values, the valve characteristic is optimized for maximum volumetric flow k_{v100}.

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 AB

For valves:
VXF32.125-250
VXF42.125-250
VXF43.125-250
VXF53.125-250
VXF32.150-400
VXF42.150-400
VXF43.150-400
VXF53.150-400



Throughport A-AB
0...100%: Linear

Bypass B-AB
0...100%: Linear

2.12 Operating pressure and medium temperature

2.12.1 ISO 7005 and EN 1092 – a comparison

ISO 7005 and EN 1092 cover PN-classified, round flanges for pipes, valves, plain fittings and accessories, plus their dimensions and tolerances, categorized according to different types of materials.
Both standards also contain the assignment of pressures and medium temperatures.
The connecting dimensions, flange and face types plus descriptions conform to the relevant ISO 7005 standards.

- ISO 7005, part 1: Steel flanges
- ISO 7005, part 2: Cast iron flanges
- ISO 7005, part 3: Flanges made of copper alloys

Since the valves covered by this document are used throughout the world, the international standard ISO 7005 was selected as a basis. The information given below explains the differences between ISO 7005 and EN 1092.

EN 1092: Part 1, steel flanges

The international standard ISO 7005-1 on steel flanges was used as a basis for the development of EN 1092. EN 1092 deviates from ISO 7005 in the following ways:

- It solely covers flanges with PN designation
- A number of technical requirements of flanges originating from DIN standards have been changed

The differences between EN 1092-1 and ISO 7005-1 are as follows:

- In many cases, the pressure-temperature assignments of this standard have been reduced, either by limiting the assignments at lower temperatures – which may no longer exceed the value of the PN class – or by increasing the rate at which the admissible pressure drops on temperature rise
- In addition to the PN 2.5 – PN 40 range of flanges originating from DIN standards, which is defined in ISO 7005, EN 1092 also contains flanges up to PN 400

EN 1092: Part 2, cast iron flanges

In terms of flanges of the same PN class, this standard refers to ISO 7005-2 and ISO 2531. Flange types and connecting dimensions are compatible with the same DN and PN class of ISO 7005 and ISO 2531.

- Pressure-temperature assignments: There are no differences between EN 1092-2 and ISO 7005-2

EN 1092: Part 3, flanges made of copper alloys

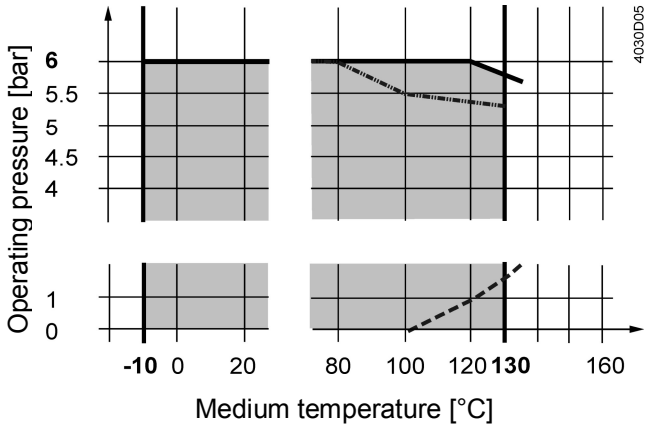
In terms of flanges of the same PN class, this standard refers to ISO 7005-3. Flange types and connecting dimensions are compatible with the same DN and PN class of ISO 7005.

- Pressure-temperature assignments: There are no differences between EN 1092-3 and ISO 7005-3

⚠ To be able to make use of the permissible operating pressures and operating temperatures according to EN 1092-1 as listed in the following tables/graphs, high-quality steel is required when using steel flanges.
Otherwise, the permissible plant operating pressures must be reduced as specified in EN 1092-1.

2.12.2 PN 6 valves with flanged connections

Fluids
with V..F22..



--- Curve for saturated steam; steam forms below this line
—.. Operating pressure according to EN 1092, valid for 2-port valves with blank flange

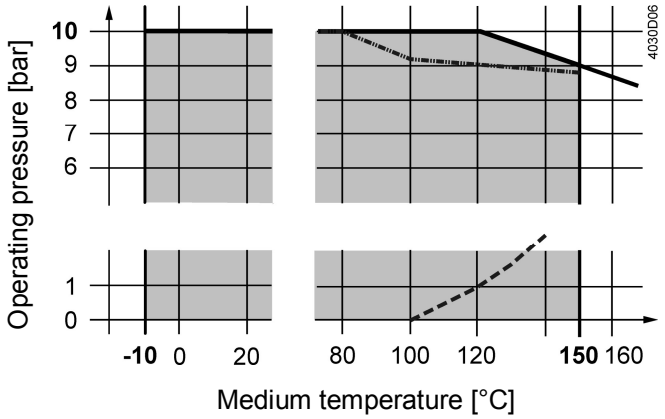
Operating pressure and operating temperatures as per ISO 7005 and EN 1092

Note

- All relevant local directives must be observed

2.12.3 PN 10 valves with flanged connections

Fluids
with V..F32..
V..F42..



--- Curve for saturated steam; steam forms below this line
—.. Operating pressure according to EN 1092, valid for 2-port valves with blank flange

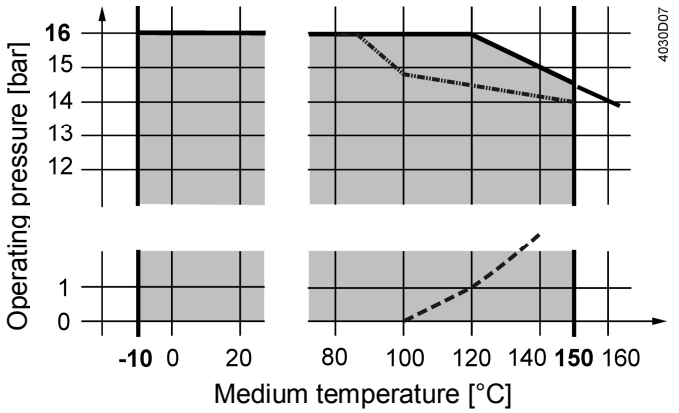
Operating pressure and operating temperatures as per ISO 7005 and EN 1092

Notes

- V..F42..: Applies when these valves are used in PN 10 plants
- All relevant local directives must be observed

2.12.4 PN 16 valves with flanged connections

Fluids
with V..F42..



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

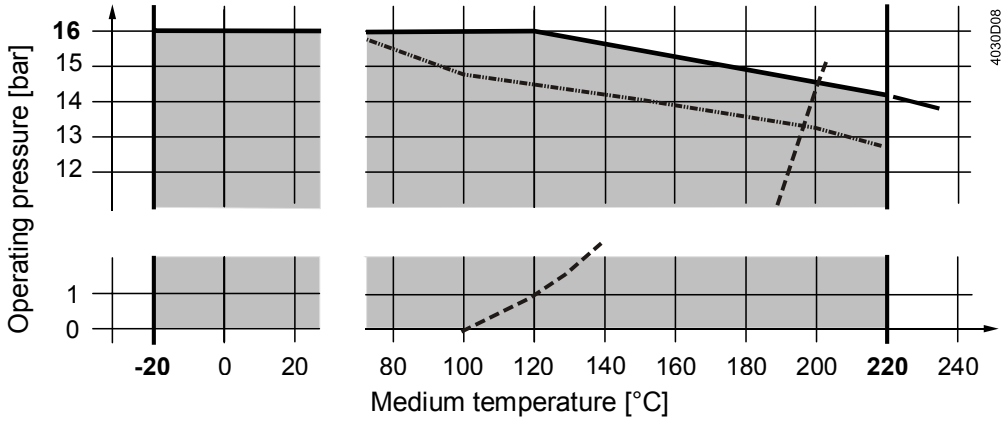
—.. Operating pressure according to EN 1092, valid for 2-port valves with blank flange

Operating pressure and operating temperatures as per ISO 7005 and EN 1092

Note

- All relevant local directives must be observed

Fluids
with V..F43..
V..F53..



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

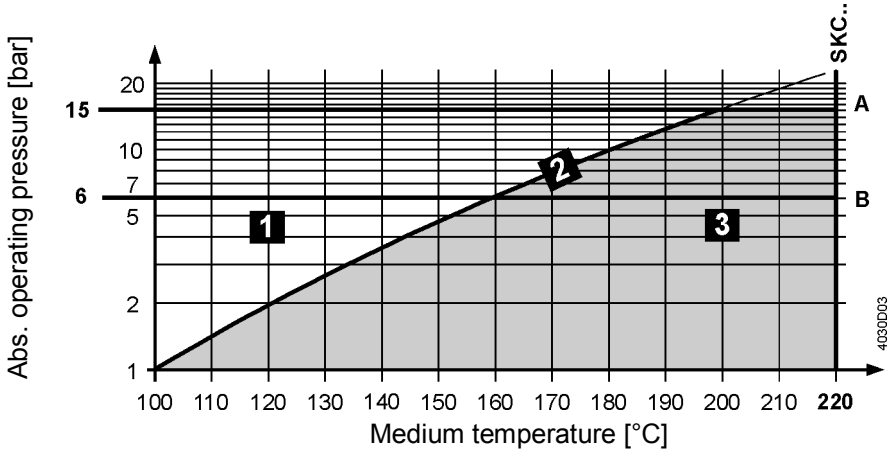
—.. Operating pressure according to EN 1092, valid for 2-port valves with blank flange

Operating pressure and operating temperatures as per ISO 7005, EN 1092 and EN 12284

Notes

- V..F53..: Applies when these valves are used in PN 16 plants
- All relevant local directives must be observed

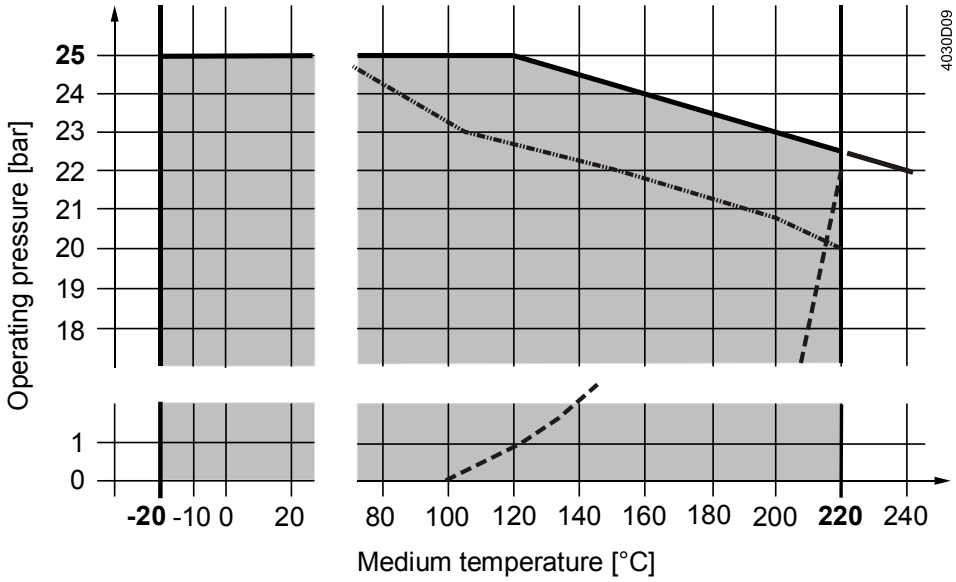
Saturated steam
Superheated steam
with VVF43..
VVF43..K



1	Wet steam	To be avoided
2	Saturated steam	Permissible operating range
3	Superheated steam	
A	Subcritical pressure ratio	
B	Supercritical pressure ratio	

2.12.5 PN 25 valves with flanged connections

Fluids
V..F53..



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

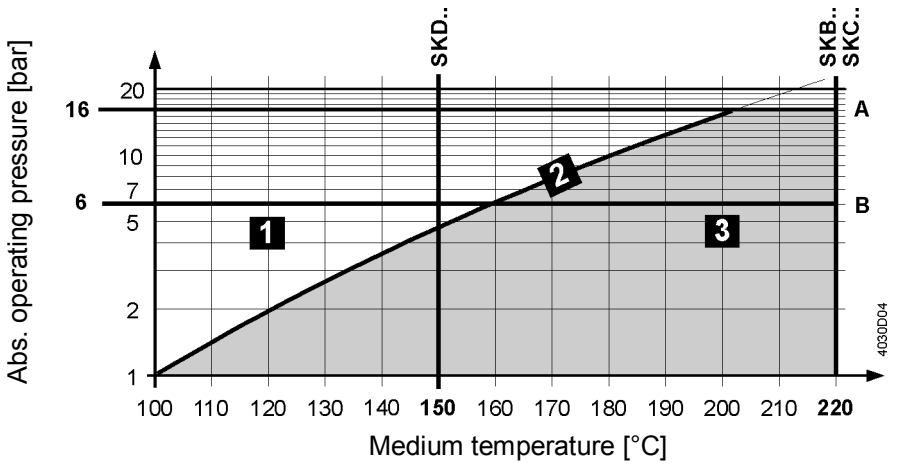
—·· Operating pressure according to EN 1092, valid for 2-port valves with blank flange

Operating pressure and operating temperatures as per ISO 7005, EN 1092 and EN 12284

Note

- All relevant local directives must be observed

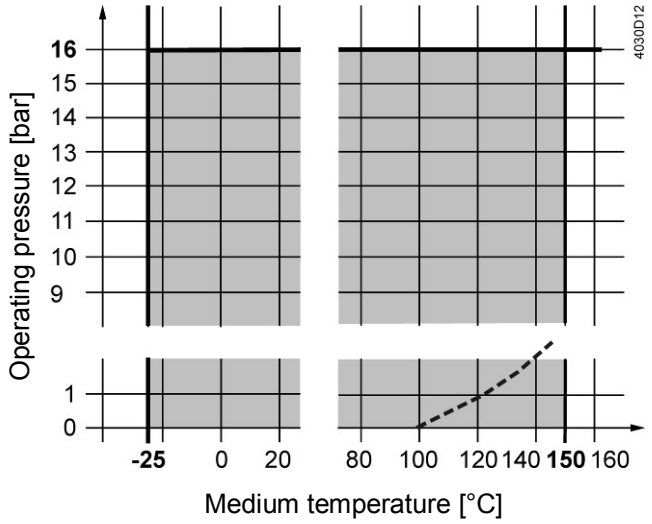
Saturated steam
Superheated steam
VVF53..



1	Wet steam	To be avoided
2	Saturated steam	Permissible operating range
3	Superheated steam	
A	Subcritical pressure ratio	
B	Supercritical pressure ratio	

2.12.6 PN 16 valves with threaded connections

Fluids
V..G41..
V..I41..



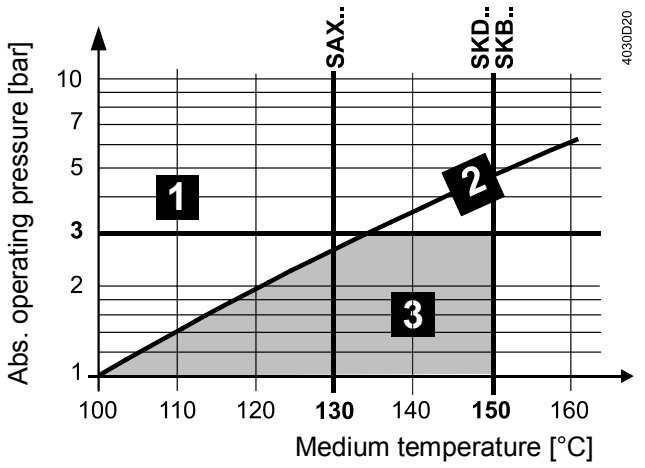
--- Curve for saturated steam; steam forms below this line

Operating pressure and operating temperatures as per ISO 7005 and EN 12284

Note

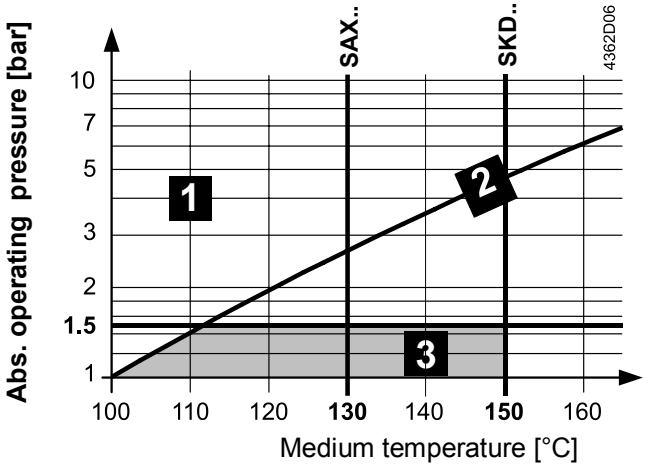
- All relevant local directives must be observed

Saturated steam
Superheated steam
VVG41..



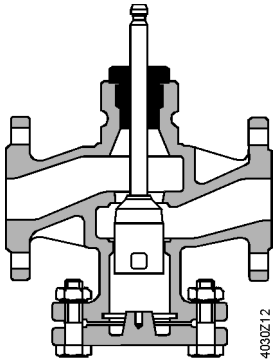
1	Wet steam	To be avoided
2	Saturated steam	Permissible operating range
3	Superheated steam	

VVI41..

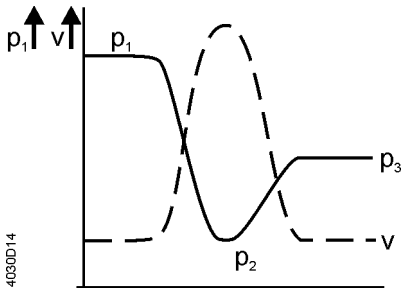


1	Wet steam	To be avoided
2	Saturated steam	Permissible operating range
3	Superheated steam	

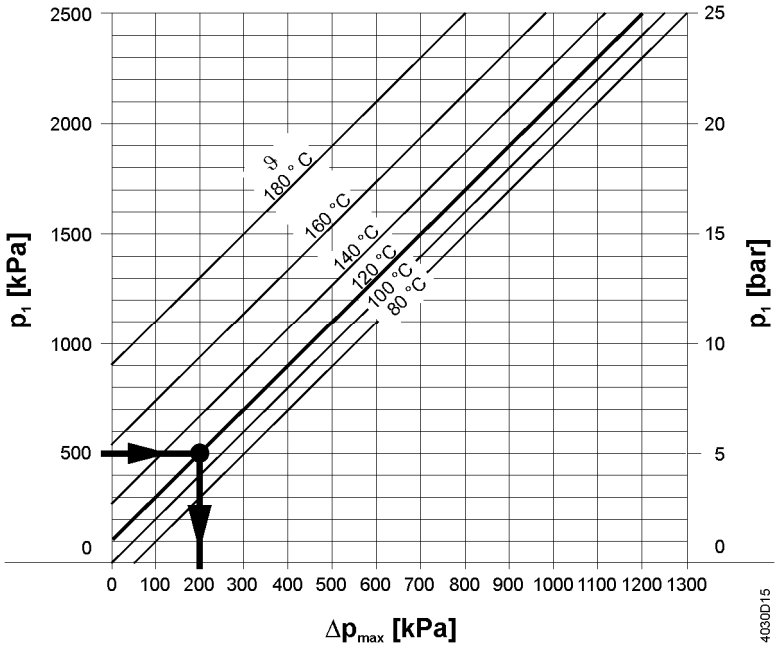
2.13 Cavitation



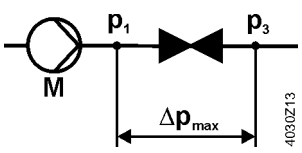
Due to high speeds of the medium in the narrowest section of the valve, local underpressure occurs (p_2). If this pressure drops below the medium's boiling pressure, cavitation occurs (steam bubbles), possibly leading to material removal (abrasion). Also, when cavitation sets in, the noise level increases abruptly. Cavitation can be avoided by limiting the pressure differential across the valve as a function of the medium temperature and the prepressure.



— — — Progression of speed
——— Progression of pressure p



Δp_{max} = differential pressure with valve almost fully closed at which cavitation can largely be avoided
p_1 = static pressure at valve inlet
p_3 = static pressure at valve outlet
M = pump
ϑ = water temperature



Example for low-temperature hot water

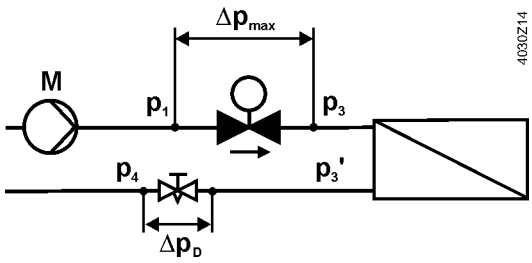
Pressure p_1 at valve inlet: 500 kPa (5 bar)
Water temperature: 120 °C

From the chart above it can be seen that with the valve almost fully closed, the maximum permissible differential pressure Δp_{max} is 200 kPa (2 bar).

Example for cold water

Spring water cooling as an example for avoiding cavitation:

Cold water	=	12 °C
p_1	=	500 kPa (5 bar)
p_4	=	100 kPa (1 bar) (atmospheric pressure)
Δp_{max}	=	300 kPa (3 bar)
$\Delta p_{3-3'}$	=	20 kPa (0.2 bar)
Δp_D (throttle)	=	80 kPa (0.8 bar)
p_3'	=	pressure downstream from the consumer in kPa



Note

To avoid cavitation in the case of cold water circuits, it must also be made certain that there is sufficient static counter-pressure at the valve's outlet. This can be ensured by installing a throttling valve downstream from the heat exchanger, for example. In that case, the maximum pressure drop across the valve should be selected according to the 80 °C curve in the flow chart above on page 57.

2.14 Medium quality and medium treatment

All relevant local directives must be observed whenever it comes to water quality, corrosion or contamination.

2.14.1 Water

Note

- Water treatment as per VDI 2035 to avoid boiler scale and damage due to corrosion on the water side
- The requirements of DIN EN 12953-10 should be observed
- Local guidelines and directives should be observed

Planning

Install a strainer (dirt trap).

Installation and commissioning

- The company making the installation is responsible for the water quality in HVAC plants
- Before filling a hydraulic HVAC circuit with water, the installer must observe the specifications of suppliers regarding water quality. If such specifications or regulations are not observed, severe damage to the plant can occur
- When commissioning a plant, the company that made the installation is obliged to write a commissioning report including information about water quality and filling (plant volume) and, if necessary, about water treatment and the additives used

Recommendation

Keep a plant record.

Maintenance and service

The installer should check hydraulic HVAC circuits at least once a year.

Before adding water to a hydraulic HVAC circuit, the installer must observe the specifications of suppliers regarding water quality (water treatment as per VDI 2035). If such specifications or regulations are not observed, severe damage to the plant can occur.

When adding water at a later stage, the company that made the installation is obliged to write a commissioning report including information about water quality and the filling (plant volume) and, if necessary, about water treatment and the additives used.

Recommendation

To prevent boiler scale and damage resulting from corrosion, the water quality in open or closed plants must be checked at regular intervals. The plant record must always be kept up to date.

2.14.2 Water with antifreeze

Note

For water with antifreeze, such as ethylene glycol or propylene glycol, the supplier-specific values for the density ρ, the specific heat capacity c, and the kinematic viscosity ν are to be determined by way of concentration and medium temperature. These values must be observed when sizing valves to make certain that correct k_{vs} values are obtained.

In the case of antifreeze concentrations with a kinematic viscosity of < 10 mm^2/s, correction factors for the sizing of valves are not required. Refer to chapter "2.8.3 Impact of fluid properties on valve sizing", page 38.

Planning

- The type of antifreeze (product and dosage) added to the system must be approved by the supplier for use in HVAC plants
- If several additives are used (e.g. antifreeze and hardness stabilizers), the required combination must be approved by the same supplier
- Install a strainer (dirt trap)

Installation and commissioning

- The company making the installation is responsible for the correct antifreeze concentration and water quality in HVAC plants
- Before filling a hydraulic HVAC circuit with a medium, the installer must observe the specifications of the supplier. If such specifications or regulations are not observed, severe damage to the plant can occur
- When commissioning a plant, the company that made the installation is obliged to write a commissioning report including information about water quality, antifreeze concentration and filling (plant volume) and, if necessary, about water treatment and the additives used

Recommendation

Keep a plant record.

Maintenance and service

The installer should check hydraulic HVAC circuits at least once a year.
According to supplier specifications, the antifreeze concentration, the pH value, and the concentration of inhibitors must be checked once a year, for example.

Recommendation

The antifreeze concentration and water quality in open or closed HVAC plants must be checked at regular intervals. The plant record must always be kept up to date.

2.14.3 Deionized, demineralized water and super-clean water

Note

These media have an impact on valve selection (material of O-rings, gaskets, plug/seat, and valve body). Compatibility must be checked.

Deionized water	Demineralized water	Super-clean water
The ions of salts contained in the water have been removed	The minerals contained in the water have been removed	Intensely treated water with a high specific resistance and containing no organic substances

To avoid corrosion and to ensure a long service life of the valves, gaskets and plugs, the following limits must be observed:

- Oxygen: < 0.02 mg/l
- pH value: 8.2…8.5
- Electric conductance: < 5 μSi
- Sum of alkaline earths: < 0.0051 mmol/l
- Hardness: < 0.03 °dH

Planning

- The media must be approved by the supplier for use in HVAC plants
- Install a strainer (dirt trap)

Installation and commissioning

- The company making the installation is responsible for the quality of the media used
- Before filling a hydraulic HVAC circuit with a medium, the installer must observe the supplier's specification. If such specifications or regulations are not observed, severe damage to the plant can occur
- When commissioning a plant, the company that made the installation is obliged to write a commissioning report including information about medium quality and filling (plant volume) and, if necessary, about water treatment and additives used

Recommendation

Keep a plant record.

Maintenance, service

The installer should check hydraulic HVAC circuits at least once a year.

Recommendation

The quality of the medium used in open or closed HVAC plants must be checked at regular intervals. The plant record must always be kept up to date.

2.14.4 Heat transfer oil (thermal oil)

Note

Heat transfer oil has an impact on valve selection (material of O-rings and gaskets). Compatibility must be checked.

When planning and commissioning a plant or when sizing valves, the suppliers' specifications must be observed. To make certain the right type of heat transfer oil is used, one should rely on the suppliers' experience and know-how.

When using heat transfer oil (thermal oil), the following supplier-specific values must be taken into consideration:

- Correction factor F_R, if the supplier-specific kinematic viscosity ν exceeds 10 mm^2/s
- Density ρ
- Room and operating temperature
- During the heating up phase, the kinematic viscosity ν is very high. The volumetric flow is much smaller than planned and thus the available amount of energy $Q_{heating\ up\ phase}$ as well. This must be taken into account during the planning phase and when sizing the valve

Refer to chapter "2.8.3 Impact of fluid properties on valve sizing", page 38.

Types of heat transfer oil

- Heat transfer media on the basis of mineral oil
- Synthetic heat transfer fluids
- Organic heat transfer fluids as per DIN 4754
- Heat transfer media of a uniform substance or mixture
- Heat transfer oils on the basis of silicon

Planning

Install a strainer (dirt trap).

Installation and commissioning

- The company making the installation is responsible for the quality of the media used
- Before filling a hydraulic HVAC circuit with a medium, the installer must observe the supplier's specification. If such specifications or regulations are not observed, severe damage to the plant can occur
- When commissioning a plant, the company that made the installation is obliged to write a commissioning report including information about medium quality and filling (plant volume) and, if necessary, about water treatment and the additives used

Recommendation

Keep a plant record.

Maintenance and service

The installer should check hydraulic HVAC circuits at least once a year.

Before adding medium to a hydraulic HVAC circuit, the installer must observe the supplier's specification. If such specifications or regulations are not observed, severe damage to the plant can occur.
When adding medium at a later stage, the company that made the installation is obliged to write a commissioning report including information about the quality of the medium and the filling (plant volume) and, if necessary, about treatment and additives used.

Recommendation

The quality of the medium in open or closed plants must be checked at regular intervals. The plant record must always be kept up to date.

2.15 Engineering notes

2.15.1 Strainer (dirt trap)

Open and closed HVAC plants require a strainer (dirt trap). This improves the quality of the water, ensures proper functioning of the valve, and a long service life of the HVAC plant with its components.

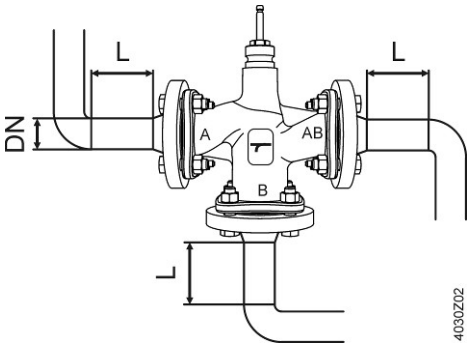
2.15.2 Avoiding flow noise

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 (refer to page 55).



2.15.3 Avoiding false circulation

When 3-port valves in HVAC plants are fully closed, false circulation can occur when hot water rises or when water is pulled away near rectangular pipe connections.

Note

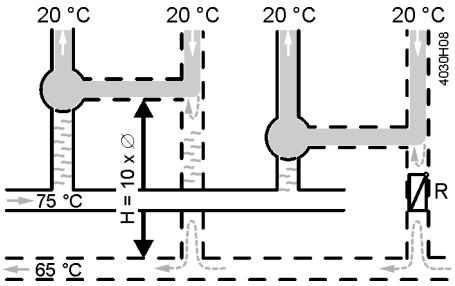
False circulation can be avoided by proper planning – with almost no extra cost – but remedy is usually very costly in existing plants.

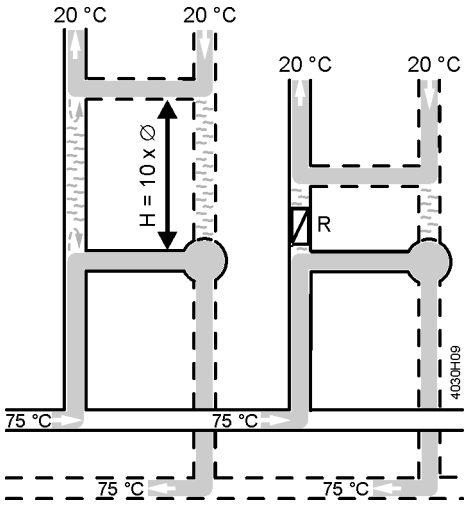
Measures against false circulation

- Observe guide value for the water speed: 0.5…1 m/s.
  The lower the water speed, the smaller the risk that the diverted flow pulls water from the critical piping section. If required, balancing valves can be installed to improve flow conditions
- Observe a certain distance between bypass and collector/header or short-circuit: H ≥ 10 x pipe dia., minimum 400 mm

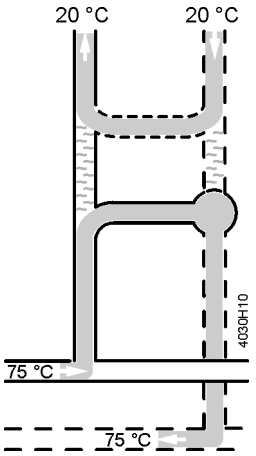
or

- Installation of a check valve or gravity brake R with small spring pressure in the critical piping section, aimed at ensuring a minimum flow in the opening range





- Welded elbows.

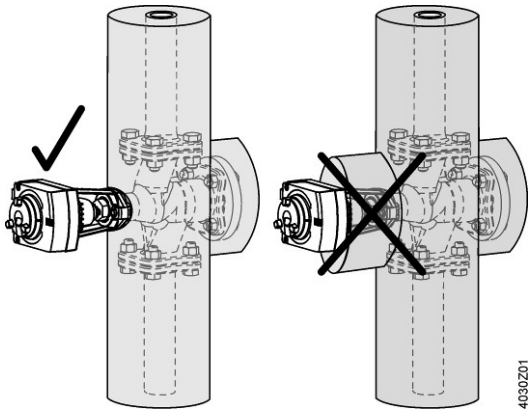


2.15.4 Thermal insulation

Insulated pipes and valves save energy.

Actuators must never be insulated. This is to make certain that heat produced by the actuator can be dissipated, thus preventing overheating.

Recommendation:
Thermal insulation of pipes and valves conforming to EnEV 2009



Recommendation [1)]

#	Type of pipes/valves	Minimum thickness of thermal insulation
1	Inside diameter up to 22 mm	20 mm
2	Inside diameter 22…35 mm	30 mm
3	Inside diameter 35…100 mm	Same as inside diameter
4	Inside diameter > 100 mm	100 mm
5	Through walls and ceilings, at pipe crossings and connections, at central network distributors	½ of requirements of # 1…4

6	Pipes of central heating systems which, after January 31, 2002, were installed between heated rooms of different users	½ of requirements of # 1…4
7	Pipes according to # 6 in the floor's structure	6 mm
8	Cooling energy distribution/cold water pipes and valves of room ventilation and air conditioning systems	6 mm

[1)] Applies to a heat conductance of 0.035 W/(m·K)

When using materials with a heat conductance other than 0.035 W/(m·K), the minimum thickness of the insulating layers must be appropriately adapted. For the conversion and heat conductance of insulating material, the calculation methods and data applied by established technical rules must be used.

2.16 Warranty

The engineering data listed in chapter "Type summary and equipment combinations" on page 14 are ensured only when the valves are used in connection with the specified Siemens actuators.

Note

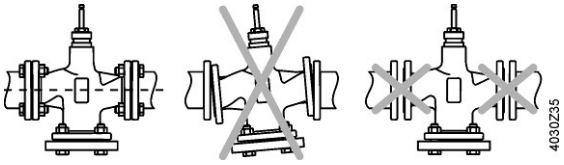
If the valves are used in combination with actuators supplied by thirds, proper functioning must be ensured by the user himself and Siemens Building Technologies will assume no liability.

3 Handling

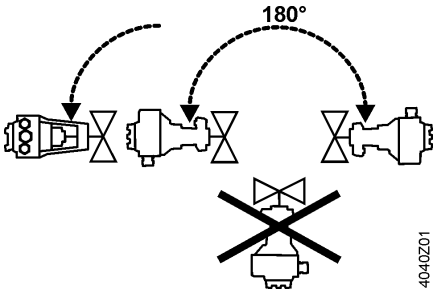
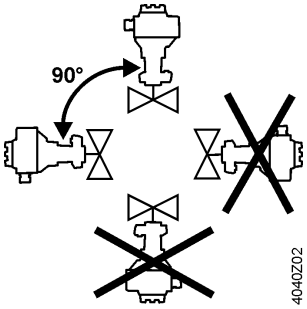
3.1 Mounting and installation

Note

The valves must be installed free from distortion:



3.1.1 Mounting positions

Indoors	Outdoors [1]
	

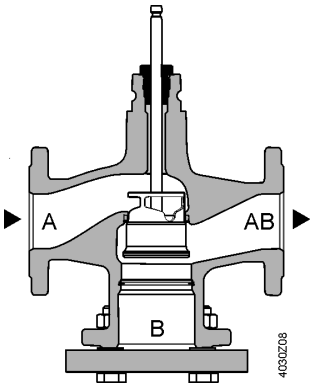
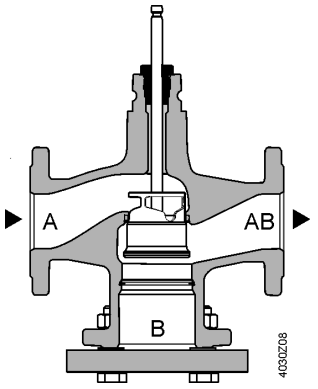
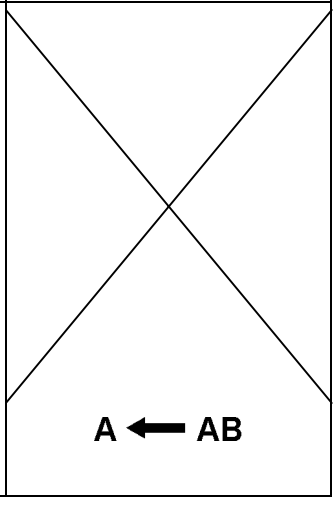
[1] Only in combination with weather shield ASK39.1 and actuators SAX..

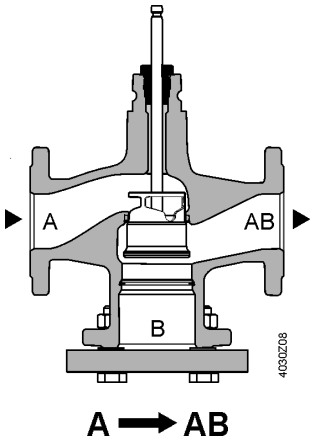
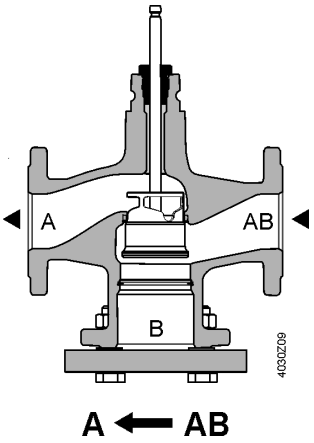
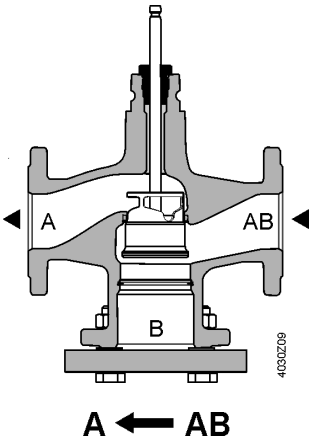
Mounting positions apply to both 2- and 3-port valves.

3.1.2 Direction of flow for fluids and steam

For general illustration and further details, refer to chapter "4.3 Technical and mechanical design", page 71.

2-port valves

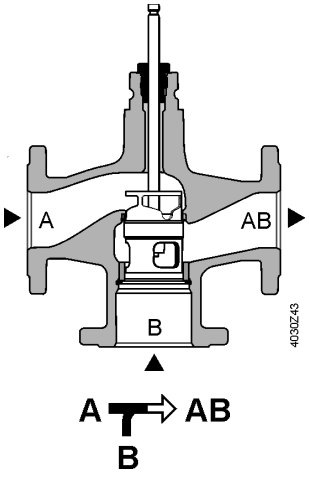
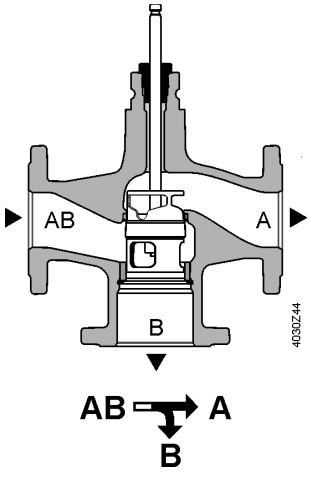
Fluids	Steam	
VVF22.., VVF32.., VVF42.., VVK42..K, VVG41.., VVI41..	VVG41.. VVI41..	
Closing against the pressure	Closing against the pressure	Closing with the pressure
 **A → AB** For use with all actuators	 **A → AB** For use with all actuators	 **A ← AB**

Fluids		Steam
VVF43.., VVF43..K, VVF53.., VVF53..K,	VVF43.., VVF53..	VVF43.., VVF43..K, VVF53.., VVF53..K
Closing against the pressure	Closing with the pressure	Closing with the pressure
		
A → AB For use with all actuators	A ← AB Use with electro-hydraulic actuators only	A ← AB Use with electro-hydraulic actuators only

Hinweis

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

3-port valves

Fluids	
Mixing valve (preferred use)	Diverting valve
	

3.1.3 Flanges

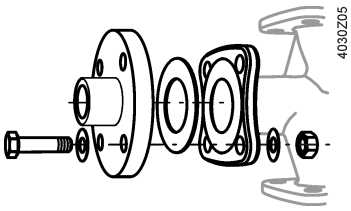
To ensure that flanges are correctly connected, the nominal, maximum and minimum tightening torques must be observed. They depend on the strength and size of the bolts and nuts, the material of the flanges, the PN class, the flange gaskets used and the medium in the hydraulic system.

The tightening torques also depend on the specification of the gasket supplier and must be observed, using a torque wrench.

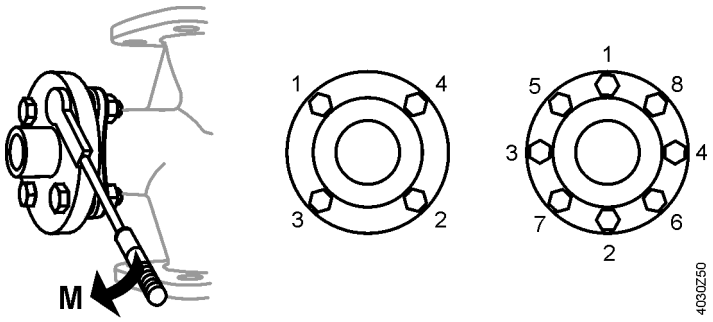
To determine the right tightening torques, refer to the suppliers' specifications. According to EN 1515-1, the selection of materials for bolts and nuts is also dependent on the PN class, the temperatures, and other operating conditions, such as the type of medium.

Recommendation Use a torque wrench.

Procedure



1. Clean the flanges.
2. Place the gaskets between the flanges.
3. Fit the bolts, washers and nuts and tighten them by hand.
4. Tighten the bolts crosswise in 3 steps as shown below (M = tightening torque):
   - Step 1: 25% M
   - Step 2: 50% M
   - Step 3: 100% M



1 to 8 = order for tightening the bolts
M = tightening torque

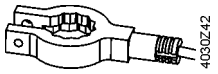
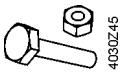
Notes:
- Too low or too high tightening torques can cause leakage at the flange connections or even lead to broken flanges
- Observe the following table "Guide values for tightening torques", page 67

5. When the operating temperature is reached, retighten the bolts.

Guide values for tightening torques

DN	**15**	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**
Max. tightening torque [Nm]											
PN 6	-	-	40	-	40	40	40	40	120-	-	-
PN 10	40	-	40	-	120	120	120	120	120	120	120
PN 16	40	40	40	120	120	120	120	120	120	120	200
PN 25	40	40	40	120	120	120	120	120	200	300	300
PN 40	40	40	40	120	120	120	120	120	200	300	300

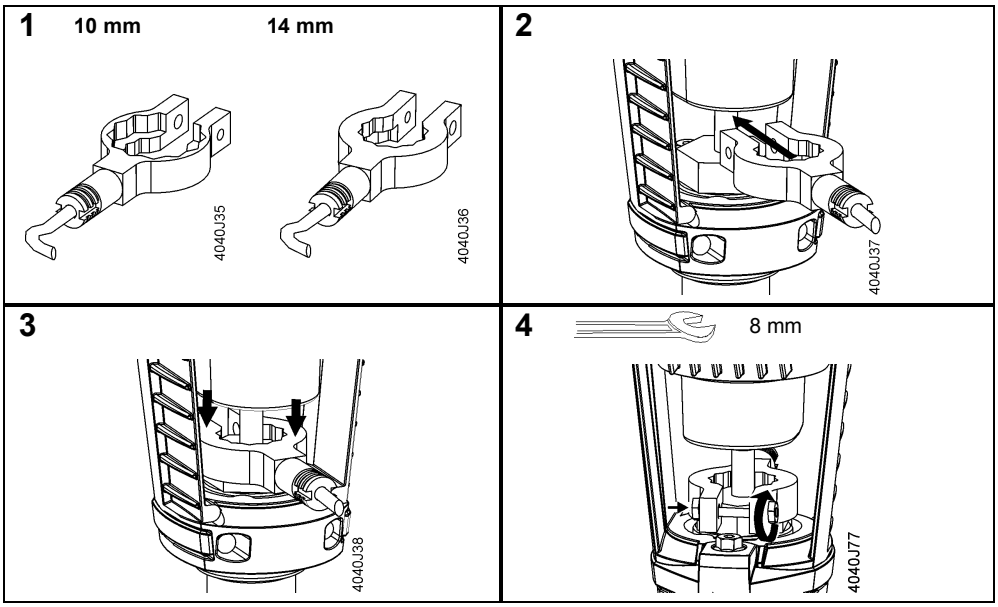
3.1.4 Stem heating element ASZ6.6

Scope of delivery	
1 Stem heating element ASZ6.6	1 screw M4 x 30 mm including nut
	

To fit the stem heating element, stroke actuator and valve must be assembled. The stem heating element is powered separately.

Special notes on mounting

Prior to mounting, check the following:
1. Actuator and Siemens valve are assembled.
2. Observe compatibility and choice of combinations.



Note
Valve lines V..F43/53..

When using a stem heating element and medium temperatures are below -5 °C, the stem sealing gland must be replaced.
In that case, the sealing gland must be ordered also (stock number 4 284 8806 0).

3.1.5 Thermal insulation

Refer to "Thermal insulation", page 63

3.2 Commissioning and maintenance

3.2.1 Commissioning

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	Bypass B→AB
Valve stem extends	Closes	Opens
Valve stem retracts	Opens	Closes

3.2.2 Maintenance

The valves are maintenance-free.

3.3 Disposal

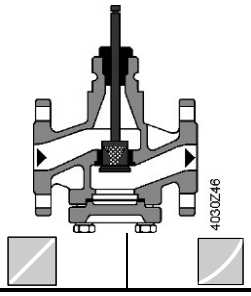
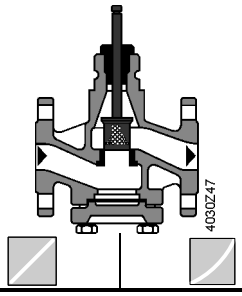
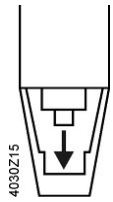
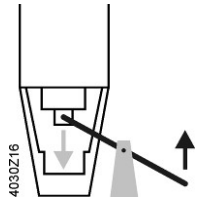
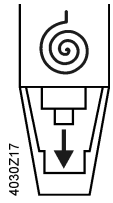
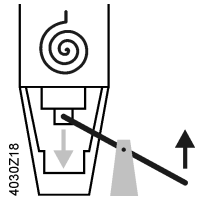
Before disposal, the valve must be dismantled and separated into its various constituent materials.
Legislation may demand special handling of certain components, or it may be sensible from an ecological point of view.
All local and currently valid legislation must be observed.

4 Functions and control

4.1 Selection of acting direction and valve characteristic

The valve's characteristic and acting direction (push to open, pull to open, normally open, normally closed) have an impact on the acting direction and valve characteristic selected with the actuator's DIL switches as well as on the required function in the event of a power failure (actuator with or without spring return function).

The objective is the following: As the positioning signal Y increases, the volumetric flow V through the valve shall rise or, in the event of a power failure, the valve shall fully open, V = 100% (NO = normally open), or fully close, V = 0% (NC = normally closed), depending on plant requirements.

			Push to open		Pull to open	
Actuator pushing						
	**DIL switches**	**Acting direction**	Direct		Reverse	
		Flow characteristic	Linear	Equal-percentage	Linear	Equal-percentage
	Without spring return function	**No power applied**	Maintains the position			
	**DIL switches**	**Acting direction**	No mechanical stroke inverter required Selection of acting direction via DIL switch			
		Flow characteristic				
	Without spring return function	**No power applied**				
	**DIL switches**	**Acting direction**	Direct		Reverse	
		Flow characteristic	Linear	Equal-percentage	Linear	Equal-percentage
	With spring return function	**No power applied**	Closed (NC function) V = 0%		Open (NO function) V = 100%	
	**DIL switches**	**Acting direction**	Reverse		Direct	
		Flow characteristic	Linear	Equal-percentage	Linear	Equal-percentage
	With spring return function	**No power applied**	Fully open (NO function) V = 100%		Fully closed (NC function) V = 0%	

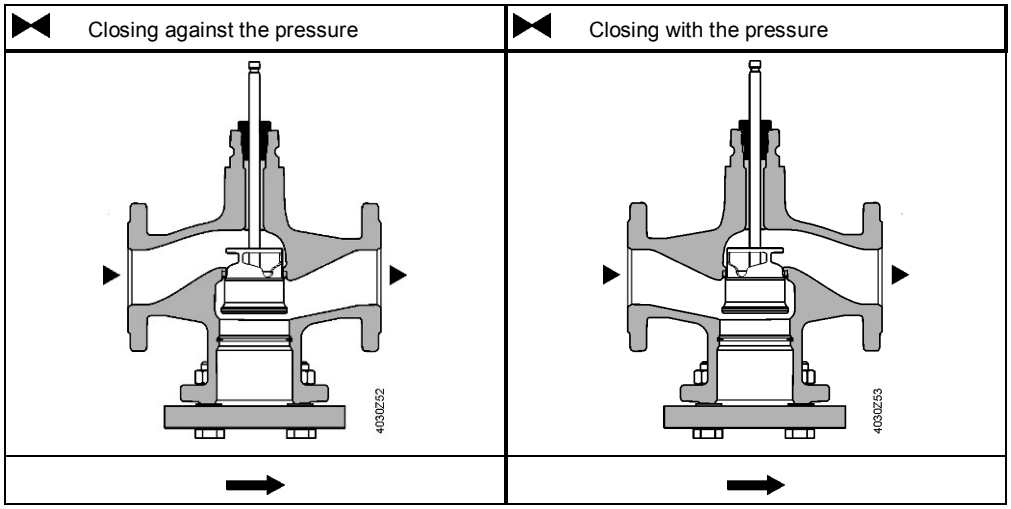
4.2 Calibration

Calibration must be performed when valve and actuator are correctly assembled.

4.3 Technical and mechanical design

The illustrations below only show the valves' basic design; constructional features, such as the shape of plugs, may differ.

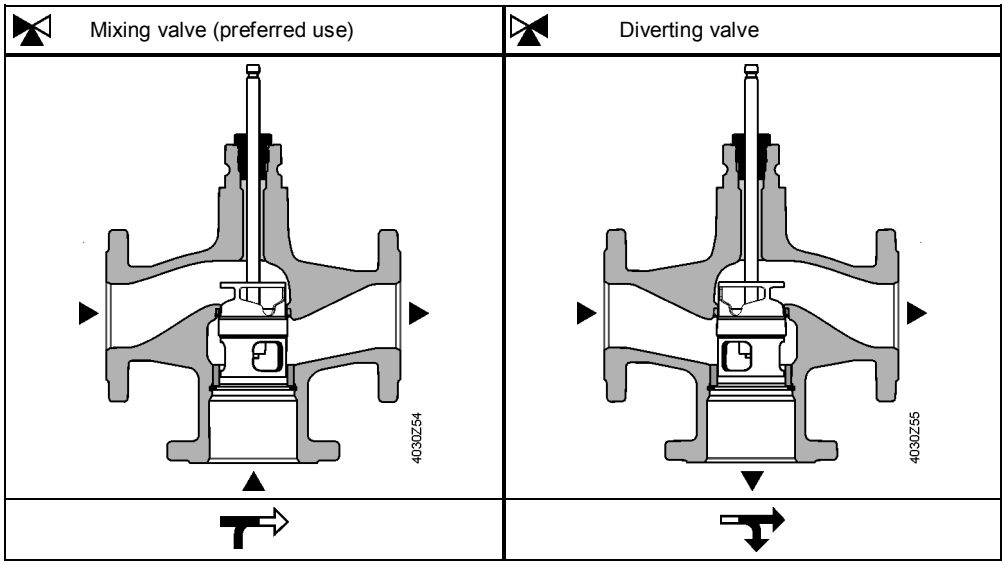
2-port valves



Note

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

3-port valves

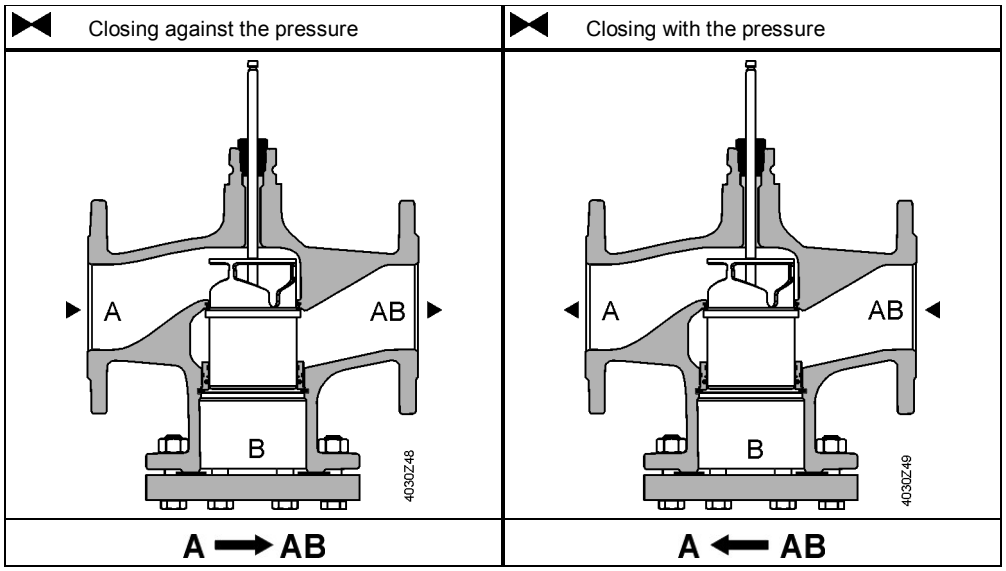


Depending on the nominal valve size, a guided parabolic, perforated or slot plug is used – rigidly connected to the valve stem.

The seat is pressed into the valve body together with a special sealing compound.

4.3.1 Vales with pressure compensation

The valves VVF42...K, VVF43...K and VVF53...K are equipped with a pressure-compensated plug. Thereby volume flow rates with same actuators at higher differential pressure can be controlled.

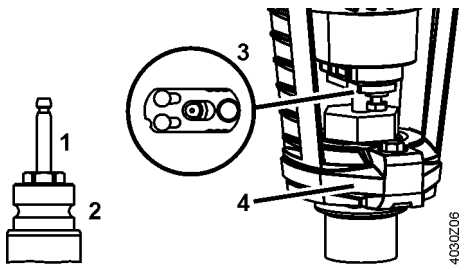


Note **2-port valves do not become 3-port valves by removing the blank flange!**

4.3.2 Plug stop

The built-in plug stop …
- supports secure guidance of the plug in all stroke positions,
- prevents the head of the stem from immersing into the sealing gland, thus avoiding damage to the seal,
- prevents loss of plug as long as no actuator is fitted.

4.3.3 Valve stem, valve neck, coupling



- The diameter of the valve stem is 10 mm with all types of valves
- The same valve stem design ensures compatibility with the actuators

1 Valve stem
2 Valve neck
3 Valve stem coupling
4 Valve neck coupling

4.3.4 Converting a 2-port to a 3-port valve

It is not possible to convert a 2-port valve to a 3-port valve.

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

4.3.5 Converting a 3-port to a 2-port valve

Every type of 3-port valve can be converted to a 2-port valve.

Notes

In that case, the type plate is no longer in compliance with the valve's function.
Siemens does not supply replacement type plates.

4.3.6 Flange types

Flanges, flange dimensions and flange connections conform to ISO 7005 and EN 1092 respectively.

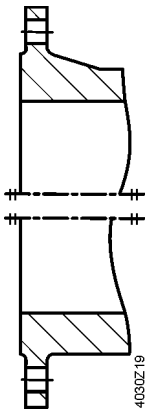
Valve types

- 2-port valves VVF..
- 3-port valves VXF..

Flange type

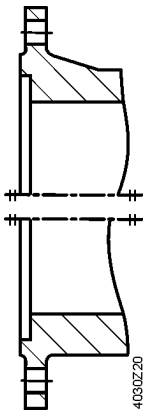
Type 21 (integral flange) as per ISO 7005 is an integral component of a pressure device.

Type of flange and flange face



Type B
(raised face)
Type B1

The illustration shows the transition from the flange to the valve body of the V..F.. valves (not true to scale, faces only outlined)



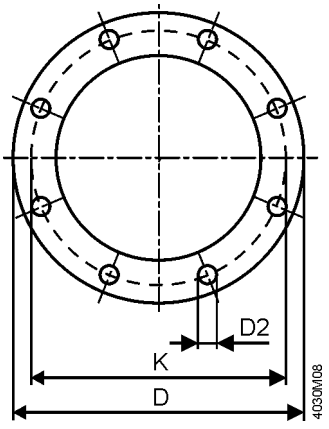
Type F
(with recess)

Gaskets

In the case of ISO 7005, the gaskets do not constitute part of the standard – in contrast to EN 1092.

Note
Up to DN 50, PN 25 is also used for PN 16

Up to DN 50, the flange dimensions of pressure classes PN 16 and PN 25 are identical. For this reason, for k_{vs} values ≤ 40 m^3/h and nominal sizes ≤ DN 50, the valves of the V..F53.. line (PN 25) are listed in place of the valves of the V..F43.. line (PN 16).



Connecting dimensions
[mm]
PN 16/PN 25 to DN 50

DN	D Outside diameter of flange	K Diameter of bolt circle	D2 Diameter of bolt holes	Bolts	
				Quantity	Size
10	90	60	14	4	M12
15	95	65	14	4	M12
20	105	75	14	4	M12
25	115	85	14	4	M12
32	140	100	18	4	M16
40	150	110	18	4	M16
50	165	125	18	4	M16

5 Technical data

		V..F22..	V..F32..	V..F42..	V..F43..	V..F53..	V..G41..	V..I41..
Function data	PN class	PN 6	PN 10	PN 16		PN 25 (PN 16)	PN 16	
	Type of connection	Flanged					Externally threaded	Internally threaded
	Operating pressure	Within the range of the permissible medium temperature according to the charts on pages 52.						
	Valve characteristic [1] Throughport 0…30% 30…100% k_{vs} = 250/360/400 m^3/h Bypass	Linear Equal-percentage; n_{gl} = 3 to VDI / VDE 2173 Linear Linear						
	Leakage rate Throughport	0…0.02% of k_{vs} value			0…0.01% of k_{vs} value (class IV)		0…0.02% of k_{vs} value	
	Bypass	0.5…2% of k_{vs} value for k_{VS} ≥ 6.3			0.5…2% of k_{vs} value with SKD.., SKB.., and SKC..		-	-
		0.5…4% of k_{vs} value for k_{VS} 2.5, 4	0.5…3% of k_{vs} value for k_{VS} 1.6, 2.5, 4		0.05% of k_{vs} value with SAX..		-	-
						VXG41.. VXI41..	0.5...2% of k_{vs} value	
						VXG41..01	0...0.02% of k_{vs} value	-
	Media Cold water Low-temperature hot water High-temperature hot water Water with antifreeze Cooling water Drinking water Brines Saturated steam Superheated steam Heat transfer oils	According to the table on page 12, "2.2.1 Compatibility with medium and temperature ranges"						
	Medium temperature Also refer to page 52	-10…130 °C	-10…150 °C		-20…220 °C [2]		-25…150 °C	
	VVF42..K; VVF43..K, VVF53..K	-	- 5…150 °C		-5…220 °C		-	
	Rangeability S_V DN 15, k_{vs} ≤ 1.25	-	-	-		> 50	> 50	> 50
	DN 15, k_{vs} > 1.6	-	> 50					
	DN 20	-	-	> 50				
	DN 25	> 50	> 50		-		> 100	> 100
	DN 32	-	-					
	DN 40 DN 50	> 100	> 100	> 100		> 100		
	DN 65 DN 80				> 100		-	-
	DN 100							
	DN 125 DN 150	-						
	Nominal stroke DN 15	-	20 mm	20 mm				
	DN 20		-					
	DN 25	20 mm	20 mm		-	20 mm	20 mm	20 mm
	DN 32	-	-					
	DN 40 DN 50	20 mm	20 mm					
	DN 65 DN 80				40 mm	40 mm	-	-
	DN 100	40 mm	40 mm	40 mm				
	DN 125 DN 150	-						

		V..F22..	V..F32..	V..F42..	V..F43..	V..F53..	V..G41..	V..I41..
Materials	Valve body	Grey cast iron EN-GJL-250			Spheroidal cast iron EN-GJS-400-18-LT		Bronze CuSn5Zn5 Pb2	Bronze CC491K (Rg5)
	Blank flange VVF..	S235JRG2			P265GH		-	
	Blank fitting VVG41.. VVI41..	-			-		Malleable cast iron / Stainless steel	Brass
	Valve stem	Stainless steel						
	Seat	Machined			Stainless steel			
	Plug	Brass/ Bronze			Stainless steel			
	Stem sealing gland	Brass			Stainless steel		Brass	
	Stem sealing gland [2]	EPDM O-rings, PTFE Washer, silicon-free-grease			FEPM-O-Ring, PTFE Washer, silicon-free-grease		EPDM-O-Ring, PTFE Washer, silicon-free-grease	
	Compensation sealing	Bronze, stainless steel, FEPM-O-Ring, silicon-free-grease			Stainless steel, FEPM-O-Ring, silicon-free-grease		-	
	Adapter ALF41B..	Steel S235JRG2						
	Fittings ALG..	Malleable cast iron						
	ALG..B	Brass						
Dimensions	-	See table on page 77						
Weight	-	See table on page 77						
Connections	Flanged	ISO 7005					-	
	Externally threaded	-					ISO 228-1	-
	Internally threaded (ALG..)	-					ISO 7-1	
Environmental conditions	Operation	IEC 60721-3-3						
	Class	3K5, 3Z11						
	Temperature	-15…+55 °C						
	Rel. humidity	5…95% r.h.						
	Storage	IEC 60721-3-1						
	Class	1K3 extended						
	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.						

[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 4 284 8806 0.

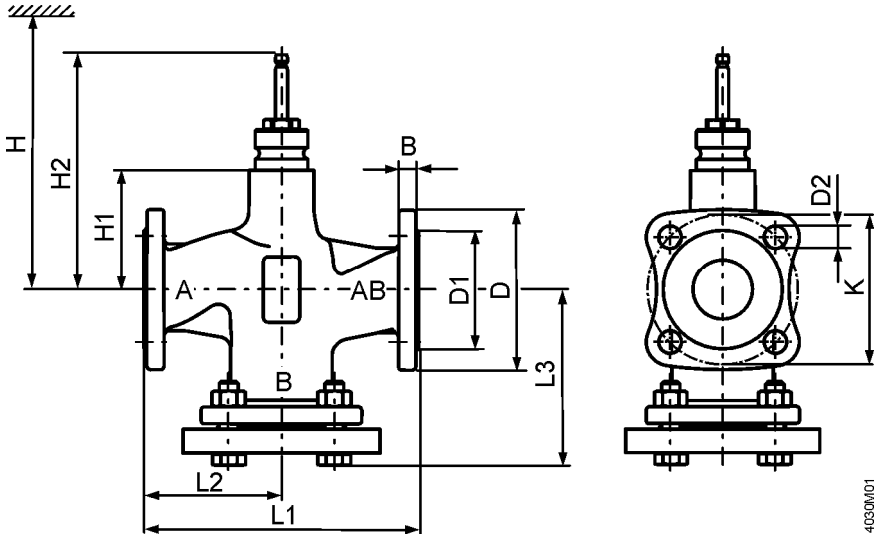
[3] Medium temperatures > 220°C are permitted for heat transfer oils only

6 Dimensions

Note

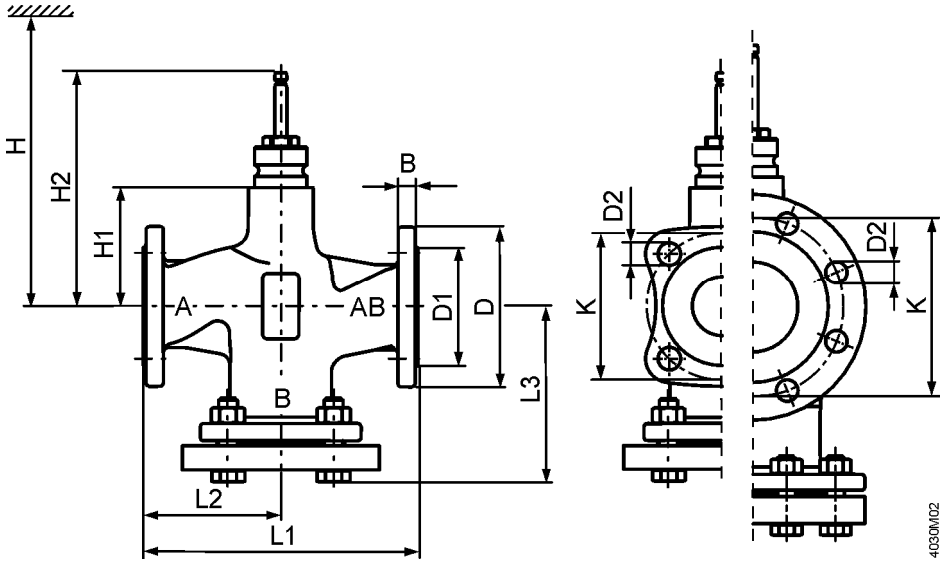
Dimensions in mm, weight in kg

VVF22..



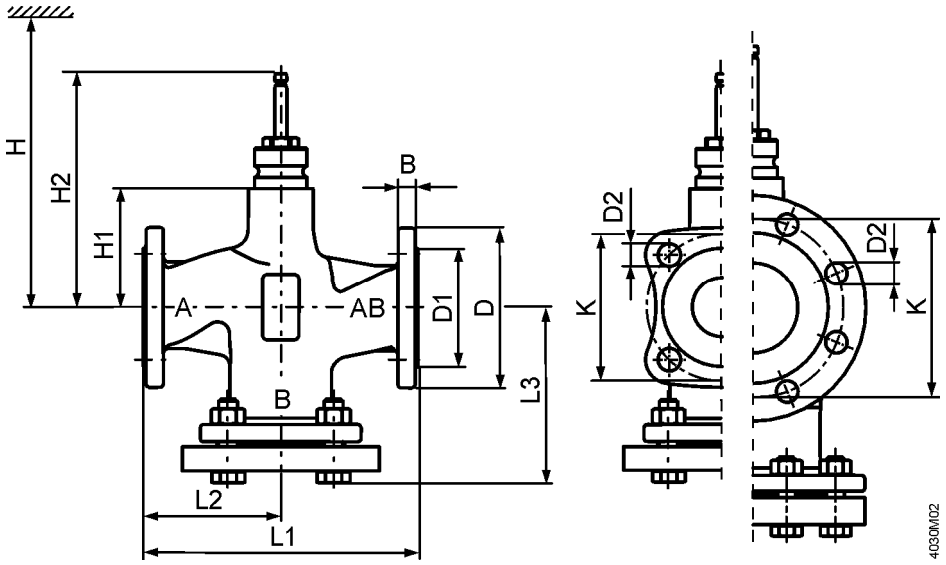
Product number	DN	kg	B	Ø D	Ø D1	Ø D2	L1	L2	L3	Ø K	H1	H2	H			
													SAX..	SKD..	SKB..	SKC..
VVF22..	25	4.1	11	100	58	11 (4x)	150	75	99	75	37	133.5	479	537	612	-
	40	6.5	13	130	78	14 (4x)	180	90	116	100	37	133.5	479	537	612	-
	50	8	14	140	88	14 (4x)	200	100	128	110	50	146.5	492	550	625	-
	65	11.9	14	160	108	14 (4x)	240	120	142.5	130	75	171.5	517	575	650	-
	80	17.1	16	190	124	19 (4x)	260	130	157	150	75	171.5	517	575	650	-
	100	23.8	16	210	144	19 (4x)	300	150	179	170	110	226.5	-	-	-	685

VVF32..



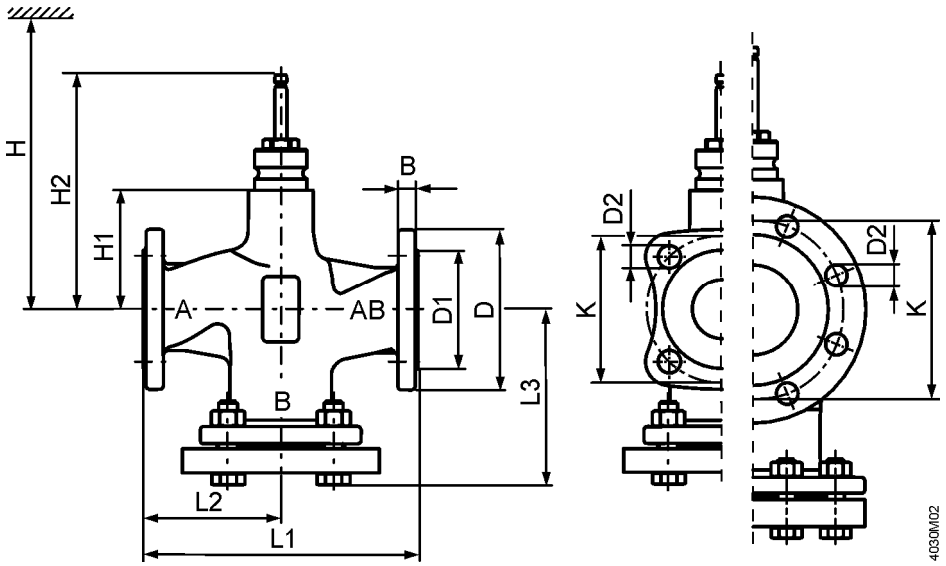
Product number	DN	kg	B	Ø D	Ø D1	Ø D2	L1	L2	L3	Ø K	H1	H2	H			
													SAX..	SKD..	SKB..	SKC..
VVF32..	15	3.7	14	95	46	14 (4x)	130	65	86	65	37	133.5	479	537	612	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	25	5.4	15	115	65	14 (4x)	160	80	104	85	37	133.5	479	537	612	-
	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	40	9.3	16	150	84	19 (4x)	200	100	126	110	37	133.5	479	537	612	-
	50	12.2	16	165	99	19 (4x)	230	115	143	125	50	146.5	492	550	625	-
	65	17	17	185	118	19 (4x)	290	145	173	145	75	171.5	517	575	650	-
	80	25	17	200	132	19 (8x)	310	155	185	160	75	171.5	517	575	650	-
	100	35.7	17	220	156	19 (8x)	350	175	205	180	110	226.5	-	-	-	685
	125	52.5	17	250	184	19 (8x)	400	200	232	210	123	239.5	-	-	-	698
	150	74.3	17	284	211	23 (8x)	480	240	275	240	150.5	267	-	-	-	726

VVF42..



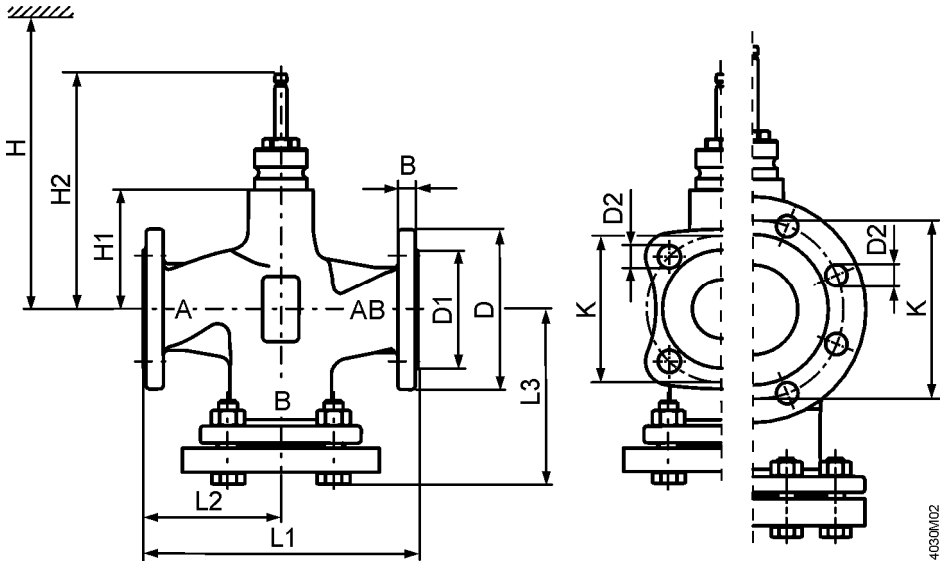
Product number	DN	kg	B	Ø D	Ø D1	Ø D2	L1	L2	L3	Ø K	H1	H2	H			
													SAX..	SKD..	SKB..	SKC..
VVF42..	15	3.7	14	95	46	14 (4x)	130	65	86	65	37	133.5	479	537	612	-
	20	4.7	16	105	56	14 (4x)	150	75	97	75	37	133.5	479	537	612	-
	25	5.4	15	115	65	14 (4x)	160	80	106.5	85	37	133.5	479	537	612	-
	32	8.4	17	140	76	19 (4x)	180	90	119	100	37	133.5	479	537	612	-
	40	9.3	16	150	84	19 (4x)	200	100	126	110	37	133.5	479	537	612	-
	50	12.2	16	165	99	19 (4x)	230	115	144	125	50	146.5	492	550	625	-
	65	17	17	185	118	19 (4x)	290	145	174	145	75	171.5	517	575	650	-
	80	25	17	200	132	19 (8x)	310	155	186	160	75	171.5	517	575	650	-
	100	35.7	17	220	156	19 (8x)	350	175	205	180	110	226.5	-	-	-	685
	125	52.5	17	250	184	19 (8x)	400	200	233	210	123	239.5	-	-	-	698
	150	74.3	17	284	211	23 (8x)	480	240	275.5	240	150.5	267	-	-	-	726

VVF43..
VVF43..K



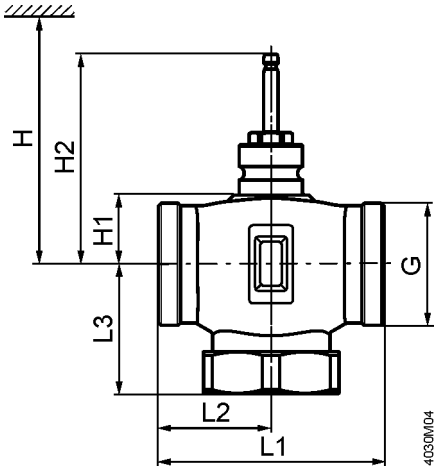
Product number	DN	kg	B	Ø D	Ø D1	Ø D2	L1	L2	L3	Ø K	H1	H2	H			
													SAX..	SKD..	SKB..	SKC..
VVF43..	65	22.1	17	185	118	19 (4x)	290	145	178	145	115	231.5	-	-	-	690
	80	28.1	17	200	132	19 (8x)	310	155	190	160	115	231.5	-	-	-	690
	100	34.1	17	220	156	19 (8x)	350	175	206	180	146	262.5	-	-	-	721
	125	46.6	17	250	184	19 (8x)	400	200	233	210	159	275.5	-	-	-	734
	150	67.5	17	284	211	23 (8x)	480	240	275.5	240	186.5	303	-	-	-	762
VVF43..K	65	22.0	17	185	118	19 (4x)	290	145	178	145	115	231.5	-	-	-	690
	80	27.9	17	200	132	19 (8x)	310	155	190	160	115	231.5	-	-	-	690
	100	33.9	17	220	156	19 (8x)	350	175	206	180	146	262.5	-	-	-	721
	125	46.9	17	250	184	19 (8x)	400	200	233	210	159	275.5	-	-	-	734
	150	67.7	17	284	211	23 (8x)	480	240	275.5	240	186.5	303	-	-	-	762

VVF53..
VVF53..K



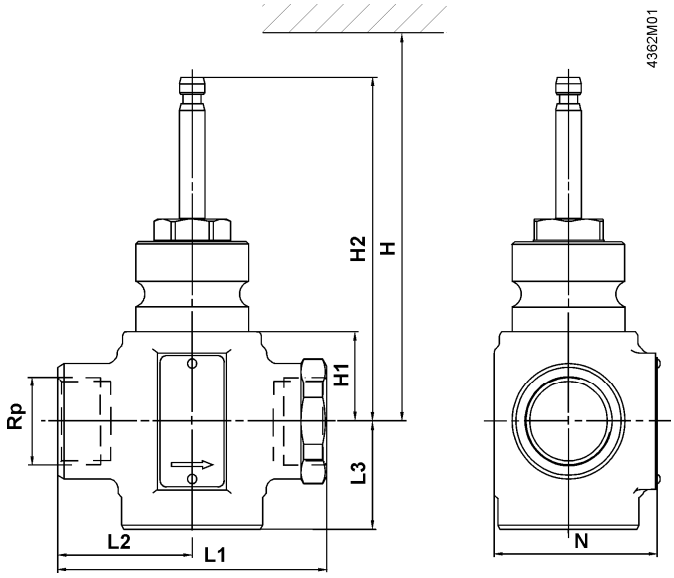
Product number	DN	kg	B	Ø D	Ø D1	Ø D2	L1	L2	L3	Ø K	H1	H2	H			
													SAX..	SKD..	SKB..	SKC..
VVF53..	15	4.2	14	95	46	14 (4x)	130	65	87.5	65	63	159.5	505	563	638	-
	20	5.4	16	105	56	14 (4x)	150	75	99.5	75	63	159.5	505	563	638	-
	25	6.1	15	115	65	14 (4x)	160	80	104.5	85	63	159.5	505	563	638	-
	32	8.8	17	140	76	19 (4x)	180	90	119	100	60	156.5	502	560	635	-
	40	10.2	16	150	84	19 (4x)	200	100	129	110	60	156.5	502	560	635	-
	50	13.7	16	165	99	19 (4x)	230	115	146	125	100	196.5	542	600	675	-
	65	21.8	17	185	118	19 (8x)	290	145	178	145	115	231.5	-	-	-	690
	80	28.1	17	200	132	19 (8x)	310	155	190	160	115	231.5	-	-	-	690
	100	38	17	235	156	23 (8x)	350	175	212.5	190	146	262.5	-	-	-	721
	125	51.9	17	270	184	28 (8x)	400	200	242	220	159	275.5	-	-	-	734
	150	74.1	17	297	211	28 (8x)	480	240	284	250	186.5	303	-	-	-	762
VVF53..K	50	13.6	16	165	99	19 (4x)	230	115	146	125	100	196.5	542	600	675	-
	65	22.3	17	185	118	19 (8x)	290	145	178	145	115	231.5	-	-	-	690
	80	27.9	17	200	132	19 (8x)	310	155	190	160	115	231.5	-	-	-	690
	100	39.0	17	235	156	23 (8x)	350	175	212.5	190	146	262.5	-	-	-	721
	125	54.4	17	270	184	28 (8x)	400	200	242	220	159	275.5	-	-	-	734
	150	75.8	17	297	211	28 (8x)	480	240	284	250	186.5	303	-	-	-	762

VVG41..



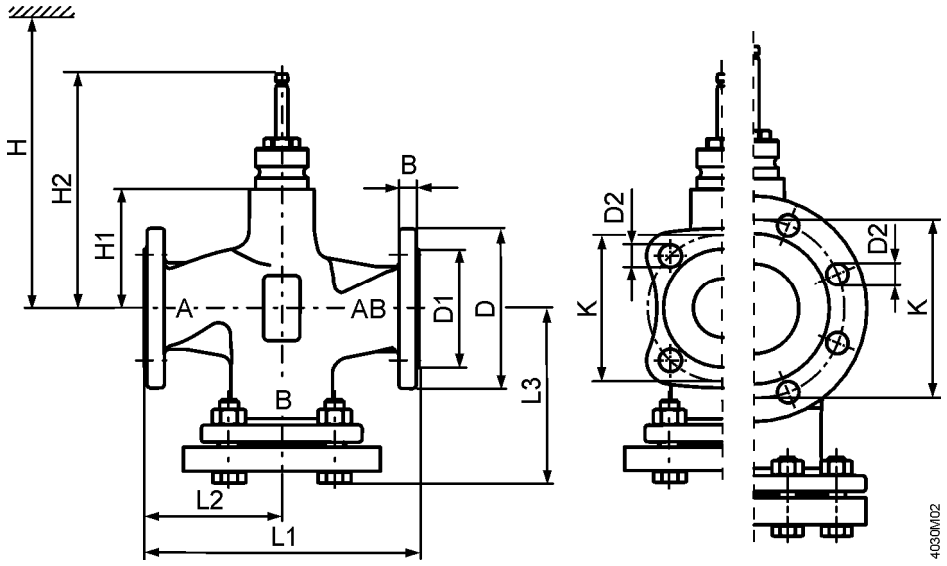
Product number	DN	kg	G [Inch]	L1	L2	L3	H1	H2	H		
									SAX..	SKD..	SKB..
VVG41..	15	1.25	G 1B	100	50	57	26	122,5	> 468	> 526	> 601
	20	1.3	G 1¼B								
	25	1.6	G 1½B	105	52.5	59	34	130,5	> 476	> 534	> 609
	32	2.2	G 2B			60					
	40	2.7	G 2¼B	130	65	73	46	142,5	> 488	> 546	> 621
	50	3.9	G 2¾B	150	75	83					

VVI41..



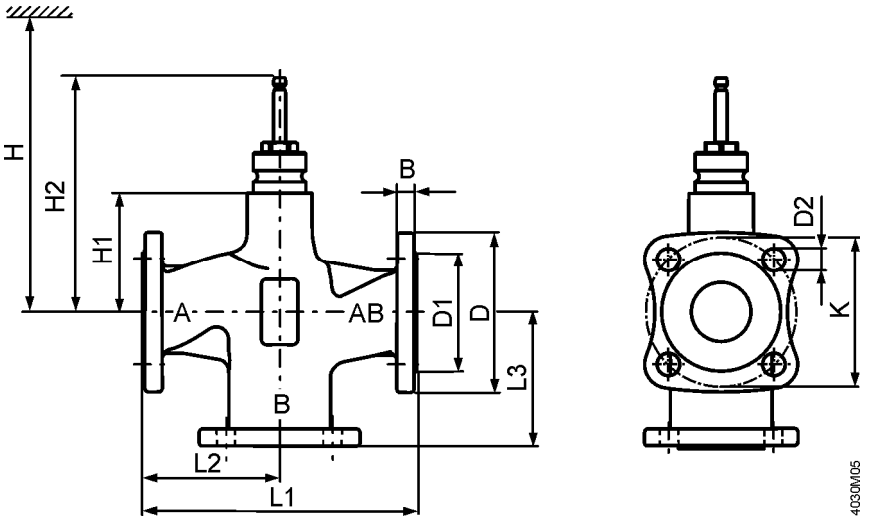
Product number	DN	kg	G [Inch]	L1	L2	L3	H1	H2	H	
									SAX..	SKD..
VVI41..	15	1.3	Rp ½	90	45	40	26	122,5	> 468	> 526
	20	1.35	Rp ¾							
	25	1.7	Rp 1	105	52.5	41	34	130,5	> 476	> 534
	32	2.1	Rp 1¼	115	57.5					
	40	2.75	Rp 1½	130	65	46	46	142,5	> 488	> 546
	50	3.7	Rp 2	150	75	56				

VVF42..K



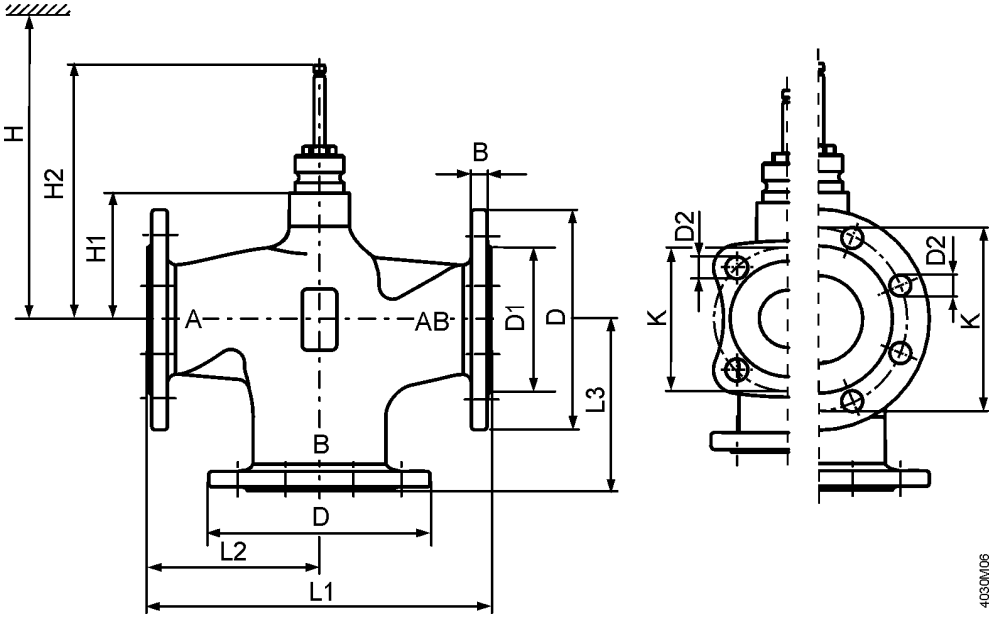
Product number	DN	kg	B	Ø D	Ø D1	Ø D2	L1	L2	L3	Ø K	H1	H2	H			
													SAX..	SKD..	SKB..	SKC..
VVF42..K	50	12.3	16	165	99	19 (4x)	230	115	144	125	50	146.5	492	550	625	-
	65	17.5	17	185	118	19 (4x)	290	145	174	145	75	171.5	517	575	650	-
	80	25.6	17	200	132	19 (8x)	310	155	186	160	75	171.5	517	575	650	-
	100	35.9	17	220	156	19 (8x)	350	175	206	180	110	226.5	-	-	-	685
	125	52.3	17	250	184	19 (8x)	400	200	233	210	123	239.5	-	-	-	698
	150	76.3	17	284	211	23 (8x)	480	240	275.5	240	150.5	267	-	-	-	726

VXF22..



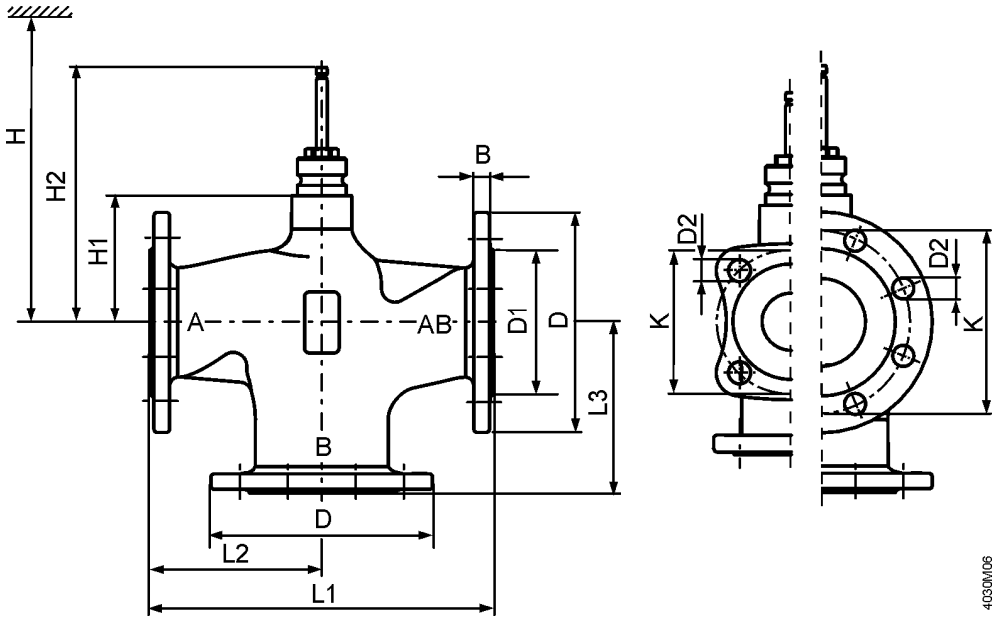
Product number	DN	kg	B	Ø D	Ø D1	Ø D2	L1	L2	L3	Ø K	H1	H2	H			
													SAX..	SKD..	SKB..	SKC..
VXF22..	25	3.1	11	100	58	11 (4x)	150	75	75	75	37	133.5	479	537	612	-
	40	4.9	13	130	78	14 (4x)	180	90	90	100	37	133.5	479	537	612	-
	50	6.2	14	140	88	14 (4x)	200	100	100	110	50	146.5	492	550	625	-
	65	9.5	14	160	108	14 (4x)	240	120	120	130	75	171.5	517	575	650	-
	80	13.1	16	190	124	19 (4x)	260	130	130	150	75	171.5	517	575	650	-
	100	19	16	210	144	19 (4x)	300	150	150	170	110	226.5	-	-	-	685

VXF32..



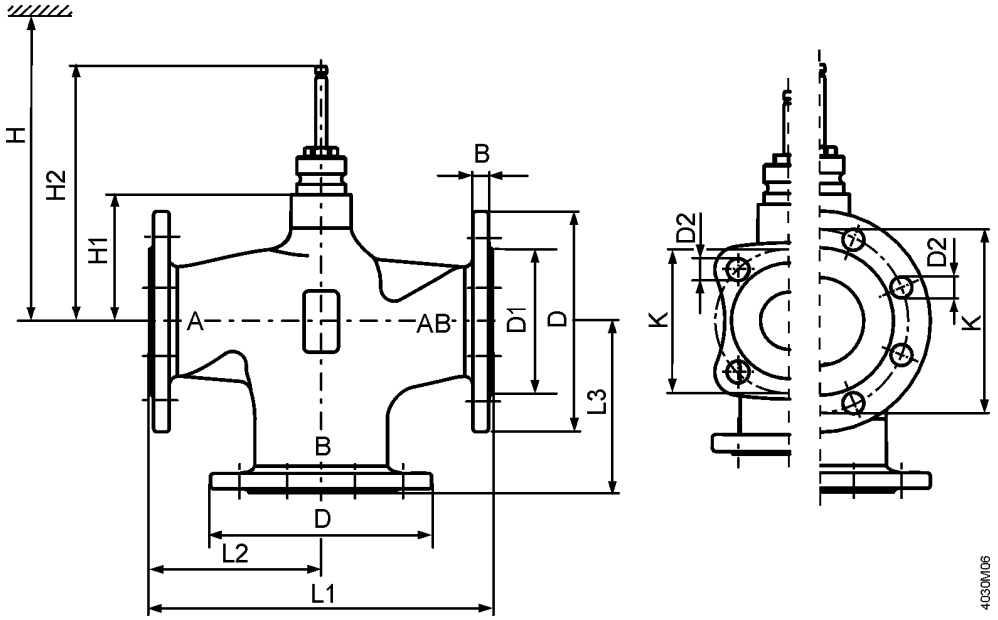
Product number	DN	kg	B	Ø D	Ø D1	Ø D2	L1	L2	L3	Ø K	H1	H2	H			
													SAX..	SKD..	SKB..	SKC..
VXF32..	15	2.6	14	95	46	14 (4x)	130	65	65	65	37	133.5	479	537	612	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	25	3.8	15	115	65	14 (4x)	160	80	80	85	37	133.5	479	537	612	-
	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	40	6.3	16	150	84	19 (4x)	200	100	100	110	37	133.5	479	537	612	-
	50	8.7	16	165	99	19 (4x)	230	115	115	125	50	146.5	492	550	625	-
	65	12.9	17	185	118	19 (4x)	290	145	145	145	75	171.5	517	575	650	-
	80	19.2	17	200	132	19 (8x)	310	155	155	160	75	171.5	517	575	650	-
	100	28.8	17	220	156	19 (8x)	350	175	175	180	110	226.5	-	-	-	685
	125	43.2	17	250	184	19 (8x)	400	200	200	210	123	239.5	-	-	-	698
	150	61.5	17	284	211	23 (8x)	480	240	240	240	150.5	267	-	-	-	726

VXF42..



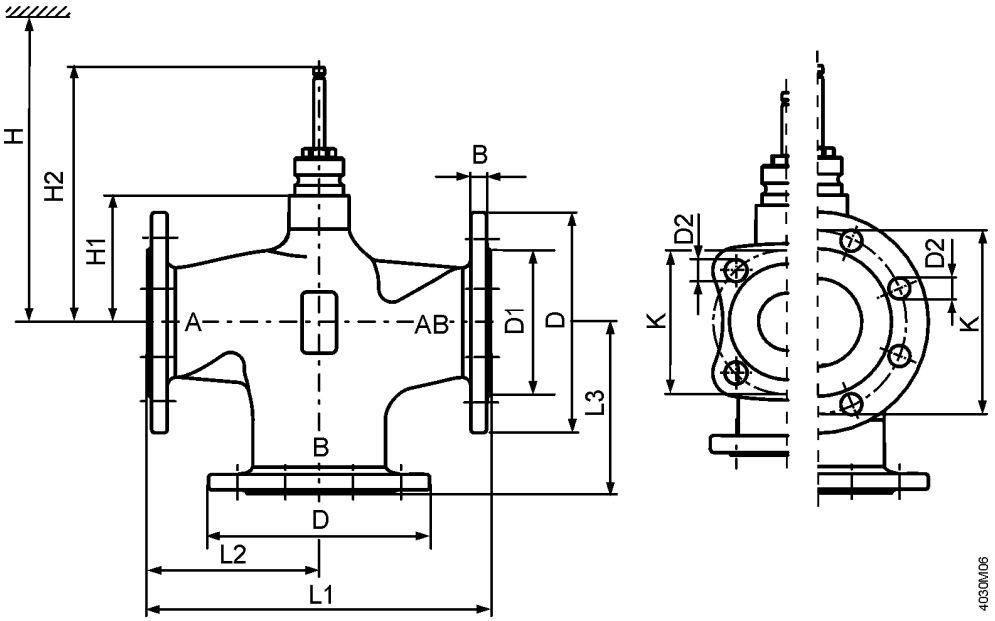
Product number	DN	kg	B	Ø D	Ø D1	Ø D2	L1	L2	L3	Ø K	H1	H2	H			
													SAX..	SKD..	SKB..	SKC..
VXF42..	15	2.6	14	95	46	14 (4x)	130	65	65	65	37	133.5	479	537	612	-
	20	3.3	16	105	56	14 (4x)	150	75	75	75	37	133.5	479	537	612	-
	25	3.8	15	115	65	14 (4x)	160	80	80	85	37	133.5	479	537	612	-
	32	5.7	17	140	76	19 (4x)	180	90	90	100	37	133.5	479	537	612	-
	40	6.3	16	150	84	19 (4x)	200	100	100	110	37	133.5	479	537	612	-
	50	8.7	16	165	99	19 (4x)	230	115	115	125	50	146.5	492	550	625	-
	65	12.9	17	185	118	19 (4x)	290	145	145	145	75	171.5	517	575	650	-
	80	19.2	17	200	132	19 (8x)	310	155	155	160	75	171.5	517	575	650	-
	100	28.8	17	220	156	19 (8x)	350	175	175	180	110	226.5	-	-	-	685
	125	43.2	17	250	184	19 (8x)	400	200	200	210	123	239.5	-	-	-	698
	150	61.5	17	284	211	23 (8x)	480	240	240	240	150.5	267	-	-	-	726

VXF43..



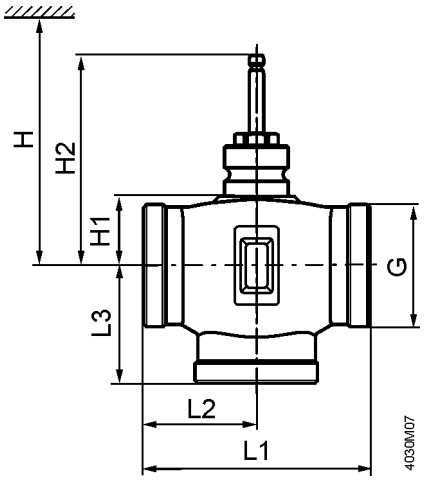
Product number	DN	kg	B	Ø D	Ø D1	Ø D2	L1	L2	L3	Ø K	H1	H2	H			
													SAX..	SKD..	SKB..	SKC..
VXF43..	65	17.1	17	185	118	19 (4x)	290	145	145	145	115	231.5	-	-	-	690
	80	21.2	17	200	132	19 (8x)	310	155	155	160	115	231.5	-	-	-	690
	100	27.1	17	220	156	19 (8x)	350	175	175	180	146	262.5	-	-	-	721
	125	37.1	17	250	184	19 (8x)	400	200	200	210	159	275.5	-	-	-	734
	150	54.5	17	284	211	23 (8x)	480	240	240	240	186.5	303	-	-	-	762

VXF53..



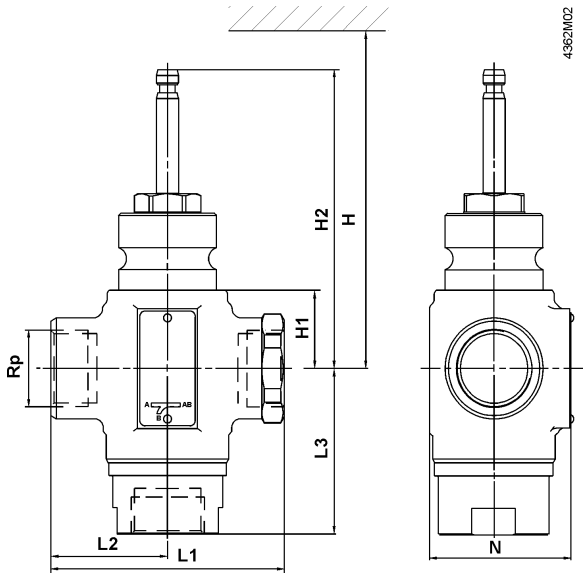
Product number	DN	kg	B	Ø D	Ø D1	Ø D2	L1	L2	L3	Ø K	H1	H2	H			
													SAX..	SKD..	SKB..	SKC..
VXF53..	15	3.2	14	95	46	14 (4x)	130	65	65	65	63	159.5	505	563	638	-
	20	4.1	16	105	56	14 (4x)	150	75	75	75	63	159.5	505	563	638	-
	25	4.6	15	115	65	14 (4x)	160	80	80	85	63	159.5	505	563	638	-
	32	6.1	17	140	76	19 (4x)	180	90	90	100	60	156.5	502	560	635	-
	40	7.2	16	150	84	19 (4x)	200	100	100	110	60	156.5	502	560	635	-
	50	9.8	16	165	99	19 (4x)	230	115	115	125	100	196.5	542	600	675	-
	65	16.8	17	185	118	19 (8x)	290	145	145	145	115	231.5	-	-	-	690
	80	21.2	17	200	132	19 (8x)	310	155	155	160	115	231.5	-	-	-	690
	100	29	17	235	156	23 (8x)	350	175	175	190	146	262.5	-	-	-	721
	125	39.7	17	270	184	28 (8x)	400	200	200	220	159	275.5	-	-	-	734
	150	57	17	297	211	28 (8x)	480	240	240	250	186.5	303	-	-	-	762

VXG41..



Product number	DN	kg	G [Inch]	L1	L2	L3	H1	H2	H		
									SAX..	SKD..	SKB..
VXG41..	15	1.3	G 1B	100	50	50	26	122.5	> 468	> 526	> 601
	20	1.42	G 1¼B								
	25	1.65	G 1½B	105	52.5	52.5	34	130.5	> 476	> 534	> 609
	32	2.1	G 2B								
	40	2.8	G 2¼B	130	65	65	46	142.5	> 488	> 546	> 621
	50	3.9	G 2¾B	150	75	75					

VXI41..



Product number	DN	kg	G [Inch]	L1	L2	L3	H1	H2	H	
									SAX..	SKD..
VVI41..	15	1.5	Rp ½	90	45	68	26	122.5	> 468	> 526
	20	1.6	Rp ¾			69				
	25	2.1	Rp 1	105	52.5	73.5	34	130.5	> 476	> 534
	32	2.3	Rp 1¼	115	57.5	74				
	40	3.1	Rp 1½	130	65	84	46	142.5	> 488	> 546

7 Revision numbers

VVF..

Product number	Valid from rev. no.	Product number	Valid from rev. no.	Product number	Valid from rev. no.
VVF22.25-2.5	..A	VVF53.15-0.16	..A		
VVF22.25-4	..A	VVF53.15-0.2	..A		
VVF22.25-6.3	..A	VVF53.15-0.25	..A		
VVF22.25-10	..A	VVF53.15-0.32	..A		
VVF22.40-16	..A	VVF53.15-0.4	..A		
VVF22.40-25	..A	VVF53.15-0.5	..A		
VVF22.50-40	..A	VVF53.15-0.63	..A		
VVF22.65-63	..A	VVF53.15-0.8	..A		
VVF22.80-100	..A	VVF53.15-1	..A		
VVF22.100-160	..A	VVF53.15-1.25	..A		
		VVF53.15-1.6	..A		
VVF32.15-1.6	..A	VVF53.15-2	..A		
VVF32.15-2.5	..A	VVF53.15-2.5	..A		
VVF32.15-4	..A	VVF53.15-3.2	..A		
VVF32.25-6.3	..A	VVF53.15-4	..A		
VVF32.25-10	..A	VVF53.20-6.3	..A		
VVF32.40-16	..A	VVF53.25-5	..A		
VVF32.40-25	..A	VVF53.25-6.3	..A		
VVF32.50-40	..A	VVF53.25-8	..A		
VVF32.65-63	..A	VVF53.25-10	..A		
VVF32.80-100	..A	VVF53.32-16	..A		
VVF32.100-160	..A	VVF53.40-12.5	..A		
VVF32.125-250	..A	VVF53.40-16	..A		
VVF32.150-400	..A	VVF53.40-20	..A		
		VVF53.40-25	..A		
VVF42.15-1.6	..A	VVF53.50-31.5	..A		
VVF42.15-2,5	..A	VVF53.50-40	..A		
VVF42.15-4	..A	VVF53.65-63	..A		
VVF42.20-6.3	..A	VVF53.80-100	..A		
VVF42.25-6.3	..A	VVF53.100-160	..A		
VVF42.25-10	..A	VVF53.125-250	..A		
VVF42.32-16	..A	VVF53.150-400	..A		
VVF42.40-16	..A				
VVF42.40-25	..A	VVF53.50-40K	..A		
VVF42.50-31.5	..A	VVF53.65-63K	..A		
VVF42.50-40	..A	VVF53.80-100K	..A		
VVF42.65-50	..A	VVF53.100-160K	..A		
VVF42.65-63	..A	VVF53.125-250K	..A		
VVF42.80-80	..A	VVF53.150-360K	..A		
VVF42.80-100	..A				
VVF42.100-125	..A				
VVF42.100-160	..A				
VVF42.125-200	..A				
VVF42.125-250	..A				
VVF42.150-300	..A				
VVF42.150-400	..A				
VVF42.50-40K	..A				
VVF42.65-63K	..A				
VVF42.80-100K	..A				
VVF42.100-160K	..A				
VVF42.125-250K	..A				
VVF42.150-360K	..A				
VVF43.65-50	..A				
VVF43.65-63	..A				
VVF43.80-80	..A				
VVF43.80-100	..A				
VVF43.100-125	..A				
VVF43.100-160	..A				
VVF43.125-200	..A				
VVF43.125-250	..A				
VVF43.150-315	..A				
VVF43.150-400	..A				
VVF43.65-63K	..A				
VVF43.80-100K	..A				
VVF43.100-160K	..A				
VVF43.125-250K	..A				
VVF43.150-360K	..A				

VXF..

Product number	Valid from rev. no.	Product number	Valid from rev. no.	Product number	Valid from rev. no.
VXF22.25-2.5	..A	VXF43.65-63	..A		
VXF22.25-4	..A	VXF43.80-100	..A		
VXF22.25-6.3	..A	VXF43.100-160	..A		
VXF22.25-10	..A	VXF43.125-250	..A		
VXF22.40-16	..A	VXF43.150-400	..A		
VXF22.40-25	..A				
VXF22.50-40	..A	VXF53.15-1.6	..A		
VXF22.65-63	..A	VXF53.15-2.5	..A		
VXF22.80-100	..A	VXF53.15-4	..A		
VXF22.100-160	..A	VXF53.20-6.3	..A		
		VXF53.25-6.3	..A		
VXF32.15-1.6	..A	VXF53.25-10	..A		
VXF32.15-2.5	..A	VXF53.32-16	..A		
VXF32.15-4	..A	VXF53.40-16	..A		
VXF32.25-6.3	..A	VXF53.40-25	..A		
VXF32.25-10	..A	VXF53.50-40	..A		
VXF32.40-16	..A	VXF53.65-63	..A		
VXF32.40-25	..A	VXF53.80-100	..A		
VXF32.50-40	..A	VXF53.100-160	..A		
VXF32.65-63	..A	VXF53.125-250	..A		
VXF32.80-100	..A	VXF53.150-400	..A		
VXF32.100-160	..A				
VXF32.125-250	..A				
VXF32.150-400	..A				
VXF42.15-1.6	..A				
VXF42.15-2.5	..A				
VXF42.15-4	..A				
VXF42.20-6.3	..A				
VXF42.25-6.3	..A				
VXF42.25-10	..A				
VXF42.32-16	..A				
VXF42.40-16	..A				
VXF42.40-25	..A				
VXF42.50-31.5	..A				
VXF42.50-40	..A				
VXF42.65-50	..A				
VXF42.65-63	..A				
VXF42.80-80	..A				
VXF42.80-100	..A				
VXF42.100-125	..A				
VXF42.100-160	..A				
VXF42.125-200	..A				
VXF42.125-250	..A				
VXF42.150-300	..A				
VXF42.150-400	..A				

VVG41.., VXG41..

Product number	Valid from rev. no.	Product number	Valid from rev. no.	Product number	Valid from rev. no.
		VVG41.11	..A		
		VVG41.12	..A		
VXG41.1301	..A	VVG41.13	..A		
VXG41.1401	..A	VVG41.14	..A		
VXG41.15	..A	VVG41.15	..A	VXG41.1501	..B
VXG41.20	..A	VVG41.20	..A	VXG41.2001	..B
VXG41.25	..A	VVG41.25	..A	VXG41.2501	..B
VXG41.32	..A	VVG41.32	..A	VXG41.3201	..B
VXG41.40	..A	VVG41.40	..A	VXG41.4001	..B
VXG41.50	..A	VVG41.50	..A	VXG41.5001	..B

VVI41.., VXI41..

Product number	Valid from rev. no.	Product number	Valid from rev. no.
C/VVI41.15-2.5	..A	C/VXI41.15-2.5	..A
C/VVI41.15-4	..A	C/VXI41.15-4	..A
C/VVI41.20-6.3	..A	C/VXI41.20-6.3	..A
C/VVI41.25-10	..A	C/VXI41.25-10	..A
C/VVI41.32-16	..A	C/VXI41.32-16	..A
C/VVI41.40-25	..A	C/VXI41.40-25	..A
C/VVI41.50-40	..A	C/VXI41.50-40	..A

8 Addendum

8.1.1 Abbreviations

Abbreviation	Unit	Term	Explanation
c	[kJ/kgK]	Specific heat capacity	See "Specific heat capacity", page 88
DN	-	Nominal size	Characteristic for matching parts of a piping system
F_R	-	Correction factor	Factor for impact of valve's Reynolds number
H	[mm]	Stroke	Travel of valve or actuator stem
H_0	[m]	Shutoff head	Pump head when medium is supplied. The head generated by a pump when the valve is fully closed
k_v	[m^3/h]	Nominal flow	Amount of cold water (5…30 °C) passing through the valve at the respective stroke and at a differential pressure of 100 kPa (1 bar)
k_{vr}	[m^3/h]	-	Smallest volumetric flow that can be controlled, that is, when the valve starts to open (opening step)
k_{vs}	[m^3/h]	Nominal flow	Nominal flow rate of cold water (5…30 °C) through the fully open valve (H_{100}) at a differential pressure of 100 kPa (1 bar)
m	[kg/h]	Mass flow Steam mass flow	-
PN	-	PN class	Characteristic relating to the combination of mechanical and dimensional properties of a component in a piping system
P_v	-	Valve authority	See "Valve authority Pv", page 88
Q_{100}	[kW]	Rated capacity	Design capacity of plant
Q_{min}	[kW]		Smallest output of a consumer that can be controlled in modulating mode
r_{p1}	[kJ/kgK]		Specific heat capacity of steam
S_v	-	Rangeability	See "Rangeability SV", page 88
V_{100}	[m^3/h], [l/s]	Volumetric flow	Volume per unit of time through the fully open valve (H_{100})
ρ	[kg/m^3]	Density	Mass per volume
υ	[mm^2/s], [cSt]	Kinematic viscosity	1 mm^2/s = 1 cSt (centistoke), also refer to 2.8.3.3 Kinematic viscosity ν, page 39
Δp	[kPa]	Differential pressure	Pressure difference between plant sections
Δp_{max}	[kPa]	Max. differential pressure	Maximum permissible differential pressure across the valve's throughport (control path) for the entire positioning range of the motorized valve
Δp_{MV}	[kPa]	-	Differential pressure across the section with variable flow
Δp_s	[kPa]	Closing pressure	Maximum permissible differential pressure at which the motorized valve still closes securely against the pressure
Δp_{v0}	[kPa]	-	Maximum differential pressure across the valve's fully closed throughport (control path)
Δp_{v100}	[kPa]	Differential pressure at nominal flow rate	Differential pressure across the fully open valve and the valve's throughport A – AB at the volumetric flow V_{100}
Δp_{VR}	[kPa]	-	Differential pressure of flow and return
ΔT	[K]	Temperature spread	Temperature difference of flow and return

8.1.2 Important formulas

Value	Formula		Unit
Differential pressure Δp_{V100} across the fully open valve	$\Delta p_{V100} = 100 \cdot \left(\frac{\dot{V}_{100}}{k_{vs}} \right)^2$		[kPa]
Rangeability S_V	$S_V = \frac{k_{vs}}{k_{vr}}$		-
Valve authority P_V	Header with pressure, variable volumetric flow $P_V = \frac{\Delta p_{V100}}{\Delta p_{VR}}$	• Header with pressure, constant volumetric flow • Header with low differential pressure, variable volumetric flow $P_V = \frac{\Delta p_{V100}}{\Delta p_{V100} + \Delta p_{MV}}$	-
Volumetric flow V_{100}	Water without antifreeze $\dot{V}_{V100} = \frac{Q_{V100}}{1{,}163 \cdot \Delta T}$	Water with antifreeze $\dot{V}_{V100} = \frac{Q_{V100} \cdot 3600}{c \cdot \rho \cdot \Delta T}$	[m^3/h]

8.1.3 Valve-related glossary

DIN EN 14597	Standard on temperature controls and temperature limiters for use in heat generating plants. This standard also covers actuating equipment (actuating devices) with safety function for temperature and pressure limitation as per DIN EN 14597
HIT	The HVAC Integrated Tool (HIT) supports sizing and selection of valves for water with antifreeze (www.siemens.com/hit)
Actuating device	Combination of valve and actuator
Rangeability S_V	Characteristic of an actuating device, used to assess the device's controllable range; ratio of the nominal flow rate k_{vs} to the smallest controllable flow k_{vr}
Valve authority P_v	Ratio of the differential pressure across the fully open valve (H_{100}) to the differential pressure across the valve plus that of the pipe section with variable volume. To ensure correct control, the valve authority must be a minimum of 0.25
Specific heat capacity	The specific heat capacity is the amount of heat required to heat the mass of 1 kg of a substance by 1 K. It increases as the temperature of the substance rises; in the case of gases, also as the pressure of the substance rises. Therefore, with gases, a distinction is made between c_P, the specific heat at a constant pressure, and c_V, the specific heat at a constant volume

8.1.4 Hydraulics-related glossary

Film temperature	Temperature of the valve surfaces that are in contact with the heat transfer oil at which the oil starts to disintegrate
Cavitation	Due to high speeds of the medium in the narrowest section of the valve, local underpressure occurs. If this pressure drops below the medium's boiling pressure, cavitation occurs (steam bubbles), possibly leading to material removal (abrasion). Also, when cavitation starts, the noise level increases abruptly. Cavitation can be avoided by limiting the pressure differential across the valve as a function of the medium temperature and the prepressure. For more detailed information, refer to "2.13 Cavitation", page 57
Selection of valve characteristic	Certain types of Siemens actuators are equipped with DIL switches for the selection of a linear or an equal-percentage valve characteristic. The objective is to linearize the volumetric flow through the consumer and the valve
Closed circuit	The medium circulates in a closed hydraulic system with no contact to the atmosphere
Open circuit	The circulating medium is in contact with the atmosphere, that is, the hydraulic system is open to atmosphere (e.g. cooling towers with open tanks, or showers). Hence, the system can absorb oxygen from the surrounding air, which can lead to rust; in addition, more attention is to be paid to cavitation; for more information, refer to "2.13 Cavitation", page 57
Control stability	The stability of a closed control loop depends on the degree of difficulty S of the controlled system and the circuit amplification V_0. For more detailed information, refer to the Siemens brochure "Control technology" (ordering no. 0-91913-en)
Return temperature T_{RL}	Temperature of the medium at which it returns from the consumer to the heat or cooling source
Gravity circulation	The density of a medium depends on its temperature. If a medium is hot in one place and cold in another, it starts to circulate due to different densities
Volumetric flow V	Volume of a medium that passes through an opening for a certain time
Flow temperature T_{VL}	Temperature of a heating or cooling medium at which it leaves its source to enter a hydraulic circuit
Selection of acting direction	Certain types of Siemens actuators are equipped with DIL switches for selection of the operating action of the respective valve (push to open, pull to open, normally open, normally closed). The objective is to drive the valve to the fully open or fully closed position should a power failure occur, depending on plant requirements
Forced control	If forced control is demanded, no consideration is given to any other control command. For example, if there is risk of frost, more heat is supplied to prevent freeze-ups

8.1.5 Media-related glossary

Enthalpy	Amount of energy contained in a thermodynamic system (heat content)
FDA	Food and Drug Administration (USA)
Saturated steam	Boundary between wet and superheated steam; Wet steam: Parts of the gaseous water condensate to become very fine droplets Superheated steam: "Dry" steam without water droplets
Brine	Solution consisting of salt and water
Heat transfer oil/thermal oil	Heat transfer fluid on the basis of mineral oil, synthetic, organic, or on the basis of silicon, uniform or mixed
Water	Chemical compound consisting of oxygen (O) and hydrogen (H). Also refer to VDI 2035 for information on avoiding damage to drinking and domestic hot water plants
Water with antifreeze	The water contains an antifreeze which also inhibits corrosion. For the types of antifreeze used in the trade, also refer to chapter "8.1.7 Overview of antifreeze and brines used in the trade", page 90
Glycol	Glycol is added to water to lower the water's melting point. Examples are ethylene glycol and propylene glycol. Refer to chapter "8.1.7 Overview of antifreeze and brines used in the trade", page 90
Water, deionized	The ions of salts contained in the water have been removed
Water, demineralized	The minerals contained in the water have been removed
Water, super-clean water	Specially treated water; various processes are used to remove dissolved salts and other undesirable substances. It has a high specific resistance and contains no organic substances

8.1.6 Trade names

Trademark	**Legal owner**
Acvatix	Siemens
Glythermin	BASF
Antifrogen, Protectogen	Clariant
Dowcal	Dow
Zitrec, Freezium	Arteco NV/SA
TYFOCOR, TYFOXIT	Tyforop Chemie GmbH
GLYKOSOL, PEKASOL, PEKASOLar	Glykol & Sole GmbH
Temper	Temper Technology

8.1.7 Overview of antifreeze and brines used in the trade

The list below is not exhaustive. It specifies manufacturer data and is not to be regarded as an official approval for Siemens products in the indicated temperature range. For temperature ranges of individual product lines, see chapter 2.12, page 51.
The notes given under "2.14 Medium quality and medium treatment", page 58 must also be observed.

	Supplier	Product number	Basic medium	Permissible limit weight fractions	Temperature range of medium	Usage
Water with antifreeze	**BASF** www.basf.com	Glythermin® NF	Heat transfer medium on the basis of ethylene glycol and inhibitors	-	-35…150 °C	No known restriction
		Glythermin® P 44-00	Basis: Propylene glycol plus anticorrosion additives	-	-50…150 °C	No known restriction
		Glythermin® P 44-92	Basis: Propylene glycol plus anticorrosion additives	-	-50…150 °C	No known restriction
		Glythermin® P 82-00	Heat transfer medium for solar plants on the basis of glycol and inhibitors	-	-27… 170 °C	No known restriction
		Glysantin FC	Basis Ethylene glycol → Automobile applications, engine test bed	60%	-40°C…120°C	No known restriction
	Clariant www.antifrogen.de	Antifrogen SOL	Basis: Propylene glycol and glycol with a higher boiling point plus anticorrosion additives. Ready to use, premixed with desalinated water (frost protection -27 °C)	Ready-to-use mixture	-27… 170 °C	No known restriction
		Antifrogen KF	Basis: Potassium formate plus anticorrosion additives	50%	-50…20 °C	Restricted - compatibility must be tested
		Antifrogen N	Basis: Monoethylene glycol plus anticorrosion additives	70%	-35…150 °C	No known restriction
		Antifrogen L	Basis: Propylene glycol plus anticorrosion additives	100%	-25…150 °C	No known restriction
	Dow www.dow.com/heattrans	Dowcal 10	Heat transfer medium on the basis of ethylene glycol and special inhibitor	-	-50…170 °C	No known restriction
		Dowcal 20	Heat transfer medium on the basis of propylene glycol for higher temperatures than other propylene glycol fluids	-	-45…160 °C	No known restriction
		Dowcal N	Heat transfer medium on the basis of propylene glycol with little acute toxicity if swallowed; widely used in the food and beverage industry and in other sectors to lower the freezing point	-	-45…120 °C	No known restriction
	Arteco NV/SA www.zitrec.com/	Zitrec MC	Multipurpose heat transfer medium on the basis of monoethylene glycol, mixed with an adequate amount of water	< 70%	-55…120 °C	No known restriction
		Zitrec LC	Multipurpose heat transfer medium on the basis of monopropylene glycol, mixed with an adequate amount of water	< 70%	-55…120 °C	No known restriction
		Zitrec FC	Multipurpose heat transfer medium on the basis of monopropylene glycol, mixed with an adequate amount of water; all substances contained in the medium are approved by FDA	< 70%	-50…120 °C	No known restriction
		Zitrec S	Multipurpose heat transfer medium without glycol, on the basis of a substance consisting of potassium formate and sodium propionate	Ready-to-use mixture	-55…120 °C	Restricted - compatibility must be tested
	Tyforop Chemie GmbH www.tyfo.de/index_deutsch.html	TYFOCOR® L	Freezing and anticorrosion agent, safe with regard to health, specifically for keeping food cool and for solar plants, virtually odourless, hygroscopic liquid. It is based on propylene glycol, which poses no hazard to health and which may be used as a coolant or heat-transfer fluid in food processing and water purification applications.	-	-25…140 °C	Restricted - compatibility, especially with respect to soft solder - individual case must be tested
		TYFOCOR® HTL	Ready-to-use heat transfer medium for solar plants with higher thermal loads, clear, blue-green colored liquid with a faint odour and is based on 1,2-propylene glycol and polyethylene glycol.	-	...170°C	Restricted - compatibility, especially with respect to soft solder - individual case must be tested
		TYFOCOR® LS	Special, ready-to-use heat transfer medium, evaporating without residue, for solar plants with high thermal loads (vacuum tube collectors); faint odour, based on physiologically unobjectionable propylene glycol, and water.	-	-25…170 °C	Restricted - compatibility, especially with respect to soft solder - individual case must be tested

	Supplier	Product number	Basic medium	Permissible limit weight fractions	Temperature range of medium	Usage
		Tyfocor	Clear, colorless, faint odour liquid, based on ethylene glycol.		-50…140 °C	Restricted - compatibility, especially with respect to soft solder - individual case must be tested
		Tyfocor G-LS	Reversibly evaporable special heat-transfer fluid based on 1,2-propylene glycol, for use in solar thermal systems		…170 °C	Restricted - compatibility, especially with respect to soft solder - individual case must be tested
		TYFO-SPEZIAL	High-quality, powerful brine, specifically for use in earth linked thermal heat pump systems		-10…30 °C	Restricted - copper, brass and bronze material is not resistant, test sealing material in individual case
	Glykol & Sole GmbH www.glykolundsole.com/	GLYKOSOL N	Yellowish fluid on the basis of monoethylene glycol for use as a heat transfer medium with highly efficient anticorrosion additives and hardness stabilizers; free from nitrite, amine and phosphate	25…40%, depending on the application	-50…170 °C	No known restriction
		GLYKOSL WP	Based on Ethandiol 1,2 (ethyleneglycol)	-	-	Check permissibility in individual case
		PEKASOL 2000	Aqueous solution of environmentally safe alkaline earth formate and acetate. PEKASOL 2000 is free of amine, nitrite and phosphate.	-	-60…60°C	Restricted - compatibility, especially with respect to soft solder and zinc - individual case must be tested
		PEKASOL L	Yellowish fluid on the basis of propylene glycol for use as a heat transfer medium with highly efficient anticorrosion additives and hardness stabilizers; free from nitrite, amine and phosphate	25…40%, depending on the application	-50…185 °C	No known restriction
		PEKASOLar 100 PEKASOLar 50	PEKASOLar 100 and its dilutions are colorless and odorless liquids on basis of propylene glycol with newly developed additives New installations must be adequately cleaned before filling. Recommended is a 5% pro KÜHLSOLE PEX 130 solution.	-	-50…150 °C	Restricted - compatibility, especially with respect to soft solder - individual case must be tested
	Arteco NV/SA www.zitrec.com/Products_Freezium.htm	Freezium	Salt brine on the basis of potassium formate, specially developed for use in indirect cooling systems and heat pumps. Suitable for a temperature range from -60 to 95 °C	24 ..50%	-60…35 °C	Restricted - individual case must be tested
	Tyforop Chemie GmbH www.tyfo.de/index_deutsch.html	TYFOXIT®F15-F50	High-performance coolant on the basis of potassium formate (safe with regard to food). Available as a ready-to-use mixture in 6 variants (F15 - F50), cooling limits from -15 to -60 °C. Excellent flow properties at low temperatures, due to low viscosity	-	-60…100 °C	Restricted permissibility, more precise evaluations at 20...80 °C necessary (test soft solder in individual case)
		TYFOXIT® 1.25	High-performance coolant on the basis of potassium acetate (safe with regard to food). Supplied as a concentrate or ready-to-fill mixture and suited for use at temperatures down to -55 °C	-	-55…100 °C	Restricted permissibility, more precise evaluations at 20...80 °C necessary (test soft solder in individual case)

	Supplier	Product number	Basic medium	Permissible limit weight fractions	Temperature range of medium	Usage
	Temper Technology www.temper.se/Temper_(eng)/Temper/Download_information/Temper_DXNI-2251_.aspx	Temper	Synthetic and homogenized, glycol-free solutions on the basis of salts; suitable for temperatures from -10 to -50 °C; colorless to slightly yellowish; contain no amines or nitrites, but additives to support protection against corrosion and to improve lubrication	Ready-to-use mixtures	-55…180 °C	Restricted [2] - check compatibility, especially with respect to fiber gasket, PTFE (Teflon), FPM (Viton), soft solder unsuitable Cast iron at higher temperatures unsuitable Non-ferrous metal suited to a limited extent, must be tested in individual case

[1] Supplier's Usage Instructions must be observed.
[2] Restricted usage with regard to concentration or temperature

Index

Siemens Switzerland Ltd.
Building Technologies Group
International Headquarters
Gubelstrasse 22
CH-6301 Zug
Phone +41 41-724 24 24
Fax +41 41-724 35 22
www.siemens.com/sbt