ACVATIX™

Combi valves PN 25 with flanged connections VPF53..

Pressure Independent Combi Valves

- **With integrated pressure differential controller**
- **Valve body made of nodular cast iron GJS-400-15**
- **DN 50 - 150**
- **Volumetric flow 15 to 195 m^3/h nominal, with presetting**
- **Equipped with pressure test points P/T**
- **Can be equipped with SAX..P.., SAV..P.. or SQV..P.. electromotoric actuators**

Use

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

Type summary

	Product number	Stock number	DN	H_{100} [mm]	$\dot{V}_{min}$ [m^3/h]	$\dot{V}_{100}$ [m^3/h]	Δp_{min} [kPa]
Standard flow rate	**VPF53.50F16**	**S55266-V112**	50	20	2.3	15	35
	VPF53.65F24	**S55266-V114**	65		4.4	25	
	VPF53.80F35	**S55266-V116**	80		5.3	34	
	VPF53. 100F70	**S55266-V118**	100	40	12.1	68	
	VPF53. 125F110	**S55266-V120**	125		18.5	110	
	VPF53. 150F160	**S55266-V122**	150	43	25.6	148	
High flow rate	**VPF53.50F25**	**S55266-V113**	50	20	4.3	25	70
	VPF53.65F35	**S55266-V115**	65		6	35	
	VPF53.80F45	**S55266-V117**	80		7	43	
	VPF53. 100F90	**S55266-V119**	100	40	14.8	90	75
	VPF53. 125F135	**S55266-V121**	125		23	135	53
	VPF53. 150F200	**S55266-V123**	150	43	32	195	65

DN = nominal size
H_{100} = nominal stroke
$\dot{V}_{100}$ = volumetric flow through fully open valve (H_{100})
$\dot{V}_{min}$ = smallest presettable volumetric flow through fully open valve (H_{100})
Δp_{min} = minimum differential pressure required across the valve's control path, so that the difference pressure regulator works reliably

Ordering

Example:

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

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

Revision numbers — See page 11

Equipment combinations

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

H_{100} = nominal stroke

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

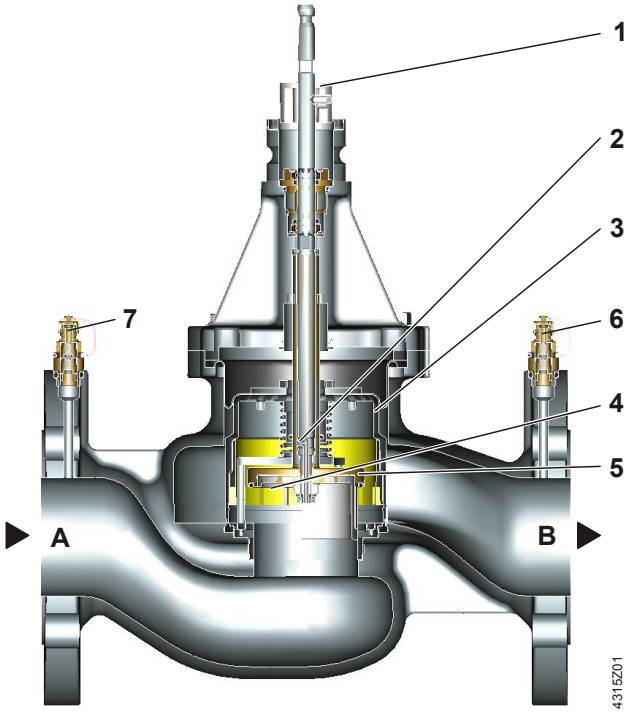
Δp_s = maximum permissible differential pressure at which the motorized Combi valve will close securely against the pressure (close off pressure

Actuator overview

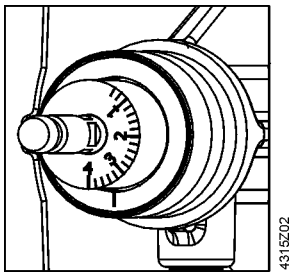
Type	Stock no.	Stroke	Pos. force	Operating voltage	Positioning signal	Spring return time	Spring return direction	Pos. time	LED	Manual adjuster	Extra functions
SAX31P03	S55150-A118	20 mm	500 N	AC 230 V	3-position	-	-	30 s	-	Push and fix	1)
SAX61P03	S55150-A114			AC/DC 24 V	DC 0…10 V DC 4…20 mA 0…1000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

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

Technical / mechanical design



1 Ring with dial for presetting



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

3 Differential pressure controller

4 Plug with variable presetting opening

5 Control valve

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

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

A Inlet port A

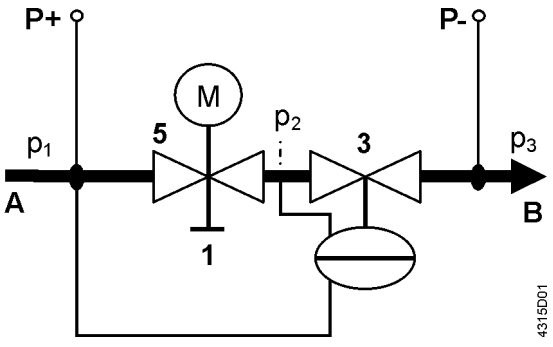
B Outlet port B

Functional principle

The Combi valves VPF53.. combine three functions:

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

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



A Inlet medium (inlet port A)

B Outlet medium (outlet port B)

1 Ring with dial for presetting

3 Differential pressure controller

5 Control valve with mounted actuator

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

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

p_1 = pressure at inlet port A of Combi valve

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

p_3 = pressure at outlet port B of Combi valve

Medium flow

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

Pressure test points

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

Manual control

Manual control is only possible with mounted actuator.

Advantages

The advantages of Combi valves are that:

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

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

Accessories

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

Engineering example

Basis of design

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

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

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

Example

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

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

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

4. Select Combi valve VPF53..
   Ideally, Combi valves should be selected such that they operate at about 80% of their maximum flow, enabling them to deliver spare capacity, if required.
   Selection: VPF53.65F24 Δp_{min} = 35 kPa
   VPF53.65F35 Δp_{min} = 70 kPa
5. Determine dial setting using volumetric flow/dial presetting tables:

VPF53.65F24	Volumetric flow	21.6 m^3/h
	Dial setting	3.6
VPF53.65F35	Volumetric flow	21.6 m^3/h
	Dial setting	2.7

Volumetric flow/dial presetting

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

Nominal flow

Standard flow rate

VPF53.50F16 — **16 m^3/h nominal**

[m^3/h]				2.3	3	3.8	4.5	5.3	6	6.8	7.5	8.3	9	9.8	10.5	11.3	12	12.8	13.5	14.3	**15**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4

VPF53.65F24 — **24 m^3/h nominal**

[m^3/h]				4.4	5.6	6.6	7.7	8.6	9.6	10.5	11.5	12.5	13.5	14.7	15.8	17.1	18.5	19.9	21.5	23.2	**25**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4

VPF53.80F35 — **35 m^3/h nominal**

[m^3/h]				5.3	6.9	8.3	9.6	10.9	12.2	13.5	14.8	16.2	17.6	19.1	20.7	22.4	24.3	26.4	28.7	31.2	**34**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4

VPF53.100F70 — **70 m^3/h nominal**

[m^3/h]				12.1	15	18	21	23	25	28	30	32	35	38	40	43	47	51	56	62	**68**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4

VPF53.125F110 — **110 m^3/h nomin**

[m^3/h]				18,5	23	28	33	37	42	46	51	55	60	65	69	74	80	85	92	99	**110**
Dial	Min,	0,2	0,4	0,6	0,8	1	1,2	1,4	1,6	1,8	2	2,2	2,4	2,6	2,8	3	3,2	3,4	3,6	3,8	4

VPF53.150F160 — **160 m^3/h nominal**

[m^3/h]				25,6	31	38	44	51	57	63	72	76	82	89	96	104	111	120	128	137	**148**
Dial	Min.	0,2	0,4	0,6	0,8	1	1,2	1,4	1,6	1,8	2	2,2	2,4	2,6	2,8	3	3,2	3,4	3,6	3,8	4

High flow rate

VPF53.50F25 — **25 m^3/h nominal**

[m^3/h]				4.3	5.2	6.2	7.2	8.1	9	10	11	12.1	13.2	14.3	15.4	16.5	18.2	19.9	21.6	23.3	**25**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4

VPF53.65F35 — **35 m^3/h nominal**

[m^3/h]				6.0	7.6	9.1	10.5	11.9	13.3	14.7	16.0	17.5	19.0	20.6	22.3	24.1	26.0	28.0	30.2	32.5	**35**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4

VPF53.80F45 — **45 m^3/h nominal**

[m^3/h]				7	9	11	12.8	14.5	16.2	18	19.6	21.4	23.2	25.1	27.1	29.3	31.6	34.1	36.8	39.8	**43**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4

VPF53.100F90 — **90 m^3/h nominal**

[m^3/h]				14.8	19	22	26	29	32	35	38	42	44	48	52	56	61	66	73	81	**90**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4

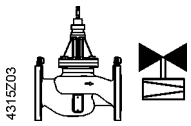
VPF53.125F135 — **135 m^3/h nominal**

[m^3/h]				23	29	36	42	48	53	59	64	70	76	81	87	93	100	107	114	122	**135**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4

VPF53.150F200 — **200 m^3/h nominal**

[m^3/h]				32	40	48	57	64	72	80	88	96	104	112	121	131	141	152	165	178	**195**
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4

Engineering notes

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

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

Symbol

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

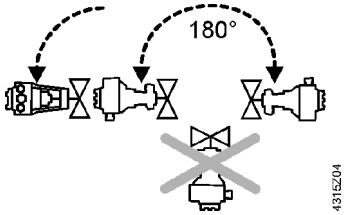
Recommendation

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

Mounting notes

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

Mounting positions

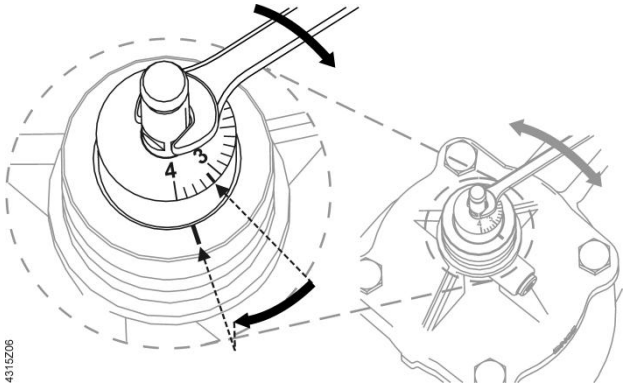


Installation notes

Presetting

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

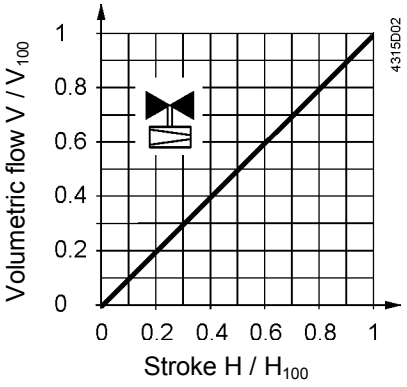
1. Mount actuator and fix valve neck coupling
2. Mount valve stem coupling and tighten slightly
3. Make presetting according to table under "Volumetric flow/dial presetting" on page 6. Do NOT adjust presetting to a dial reading lower than “0.6”.
4. Tighten stem coupling



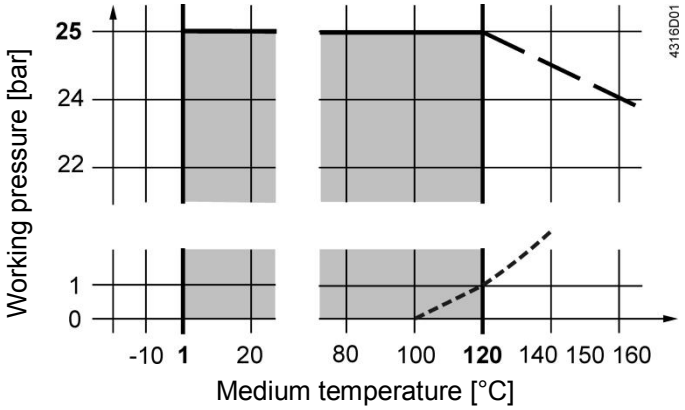
8 mm

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

Valve characteristic



Working pressure and medium temperature
Fluids



Curve for saturated steam; steam forms below this line

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

Working pressure and medium temperature staged as per ISO 7005

⚠ Current local legislation must be observed.

Commissioning notes

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

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

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

Manual control

Only possible with mounted actuator.

Maintenance notes

The VPF53.. Combi valves are maintenance-free.

⚠ When performing service work on the valve or actuator:

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

Remove the electrical connections only if necessary.

Sealing gland

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

Disposal

Due to the different types of material used, the valve must be disassembled prior to disposal. Special handling of certain valve components may be required by law or may be sensible from an ecological point of view.
Local and currently valid legislation must be observed.

Warranty

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

Technical data

Functional data	PN class	PN 25 as per EN 1333
	Permissible operating pressure	2500 kPa (25 bar) as per ISO 7628 / EN 1333
	Volumetric flow deviation	< ±10% within differential pressure range
	Valve characteristic	Linear as per VDI/VDE 2173
	Leakage rate	Class IV (0…0.01% of volumetric flow $\dot{V}_{100}$) to EN 1439
	Operating direction	Normally open (push to close)
	Permissible media	Low temperature hot water, medium temperature hot water, chilled water, water with antifreeze Recommendation: Water treatment to VDI 2035
	Medium temperature	1...120 °C (DN150; 110°C)
	Rangeability	1:100
	Nominal stroke DN 50, 65, 80	20 mm
	DN 100, 125	40 mm
	DN 150	43 mm
Standards	Pressure Equipment Directive EU Conformity (CE)	PED CE1T4315xx[1)]
	Pressure Accessories	As per article 1, section 2.1.4
	Fluid group 2 DN 50- 125	Category I, with CE-marking
	DN 150	Without CE-marking as per article 3, section 3 (sound engineering practice)
	Environmental compatibility	The product environmental declaration CE1E4315en) contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).
Materials	Valve body	Nodular cast iron GJS-400
	Stem, spring	Stainless steel
	Trim	Brass (DZR)
	Regulator	Stainless steel
	Seals	EPDM
Dimensions / weight	Dimensions	Refer to "Dimensions" on page 11
	Flange connections	To ISO 7005-2
	Pressure test points (P/T-ports)	G ¼ inch (connection)
		2 mm x 40 mm (measuring tips)
	Weight	Refer to "Dimensions" on page 11

General ambient conditions

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

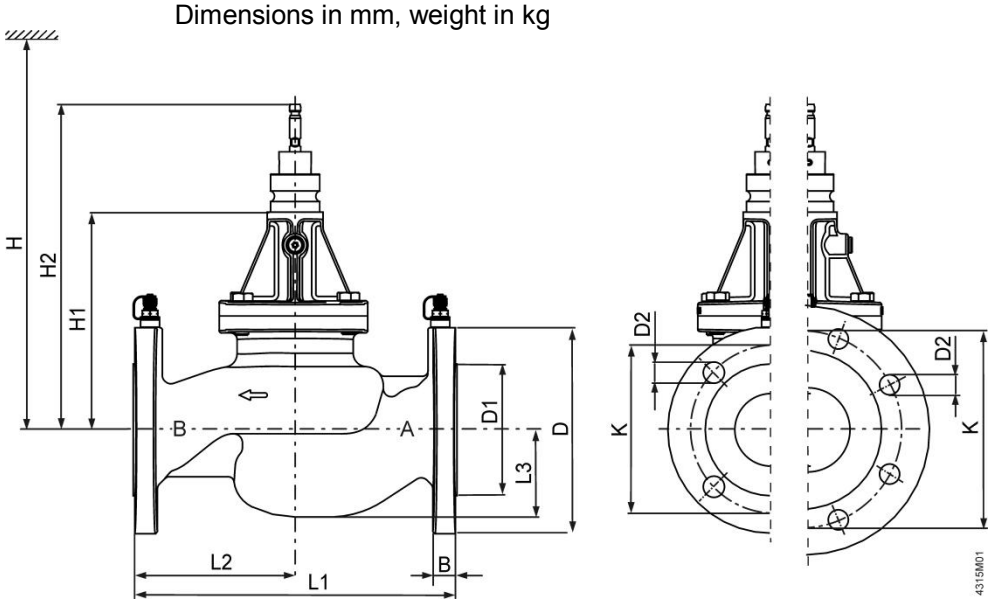
[1)] The documents can be downloaded from http://siemens.com/bt/download.

Application examples

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

Dimensions

Dimensions in mm, weight in kg



DN50 DN65 / DN80

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

DN = Nominal size
H = Total actuator height plus minimum distance to the wall or the ceiling for mounting, connection, operation, maintenance etc.
H1 = Dimension from the pipe center to install the actuator (upper edge)
H2 = Valve in the « OPEN » position means that the valve stem is fully extended.
1) SAX..P for DN50- 80; SAV..P for DN100- 150

Revision Numbers

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