SIEMENS

4853

VPI45..

VPI45..Q with pressure test points

ACVATIX™

Combi valves, PN 25

VPI45..
VPI45..Q

for rooms, zones, air handling units as well as small to medium heating, ventilation and air-conditioning systems

- **With integrated pressure differential controller**
- **Valve body made of dezincification resistant hot-pressed brass (DZR), CW602N**
- **Volumetric flow $\dot{V}_{100}$ 500…8500 l/h nominal, with presetting of min. 90 l/h**
- **DN 15…DN 50**
- **Internally threaded Rp conforming to ISO 7-1**
- **Version with pressure test points for Δp measurement (optional)**
- **For use with electromotoric SSD.. and SQD.. actuators (3-position or DC 0…10 V)**

Use

- In ventilation and air conditioning plants for control on the water side and automatic hydraulic balancing of terminal units, such as fan coils, induction units, and in heat exchangers for heating or cooling
- In heating zones like self-contained heating systems, apartments, individual rooms, etc., and for closed systems
- With flow rate of 8500 l/h also suited for small ventilation and air conditioning plants

Type summary

Type	DN	H_{100} [mm]	Connections		Test points	$\dot{V}_{min}$ [l/h]	$\dot{V}_{100}$ [l/h]	SSD.. Δp_{min} [1)] [kPa]	SSD.. Δp_{max} [kPa]	SQD.. Δp_{min} [1)] [kPa]	SQD.. Δp_{max} [kPa]
VPI45.15F0.5	15	5	Rp ½“	internally threaded		90	620	16	400		
VPI45.15F1.5						290	1730	18	400		
VPI45.20F0.9	20		Rp ¾“			160	1050	16	400		
VPI45.20F2						350	2040	22	400		
VPI45.25F1.5	25		Rp 1“			280	1720	16	400		
VPI45.25F2						350	2040	22	400		
VPI45.32F3	32		Rp 1¼“			560	3050	18	400		
VPI45.40F7	40	6.5	Rp 1½“			2355	7105			26	400
VPI45.50F8.5	50		Rp 2“			2664	8586			32	400
VPI45.15F0.5Q	15	5	Rp ½“		with pressure test points	90	620	16	400		
VPI45.15F1.5Q						290	1730	18	400		
VPI45.20F0.9Q	20		Rp ¾“			160	1050	16	400		
VPI45.20F2Q						350	2040	22	400		
VPI45.25F1.5Q	25		Rp 1“			280	1720	16	400		
VPI45.25F2Q						350	2040	22	400		
VPI45.32F3Q	32		Rp 1¼“			560	3050	18	400		
VPI45.40F7Q	40	6.5	Rp 1½“			2355	7105			26	400
VPI45.50F8.5Q	50		Rp 2“			2664	8586			32	400

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_{max} = max. permissible differential pressure across the valve's control path, valid for the entire actuating range of the motorised valve

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

[1)] The exact differential pressure Δp_{min} depends on the preset value, see following table:

Typ	Preset position			
	1.0	2.0	3.0	4.0
	Δp_{min} [kPa]	Δp_{min} [kPa]	Δp_{min} [kPa]	maximal Δp_{min} [kPa]
VPI45.15F0.5..	14.5	15.1	15.7	**16**
VPI45.15F1.5..	14	15.8	17.0	**18**
VPI45.20F0.9..	14	15.1	15.7	**16**
VPI45.20F2..	14	18	20.2	**22**
VPI45.25F1.5..	14	14.8	15.5	**16**
VPI45.25F2..	14	18.3	20.2	**22**
VPI45.32F3..	14.5	16	17	**18**
VPI45.40F7..	16.5	20	25	**26**
VPI45.50F8.5..	22	28	30	**32**

Ordering

When ordering, please give quantity, description and type of valve and actuator.

Example:
10 Combi valves VPI45.25F1.5
10 actuators SSD61

Delivery
Valves and actuators are supplied packed as individual items.

Rev. no.

See overview, page 11.

Equipment combinations

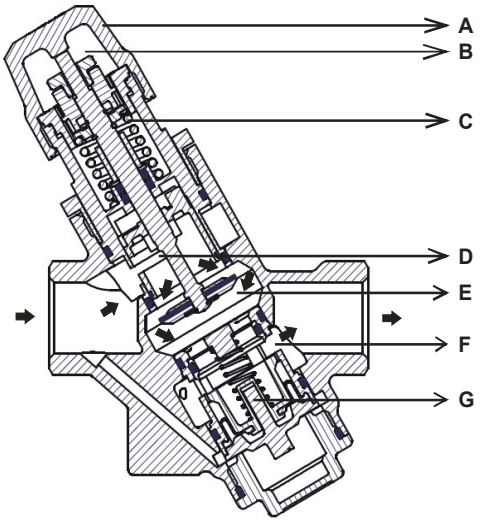
Overview of actuators

Actuators	Operating voltage	Positioning			Stroke	Connecting cable	Data-sheet
		signal	time	force			
SSD31	AC 230 V	3-position	150 s	> 250 N	5.5 mm	1.5 m	N4861
SSD81	AC 24 V						
SSD61		DC 0...10 V	75 s				
SSD61EP							
SSD31/00	AC 230 V	3-position	150 s			order separately, type overview see datasheet	
SSD81/00	AC 24 V						
SSD61/00		DC 0...10 V	75 s				
SSD61 EP/00							
SSD61.5	AC / DC 24V					Must be supplied by the installer	
SSD81.5	AC 24 V						
SQD35.00	AC 230 V	3-position	150	> 400 N	6.5 mm	Must be supplied by the installer	N4540
SQD85.03	AC 24 V		43				
SQD65		DC 0…10 V					

Technical / mechanical design

Construction

Combi valve VPI45..



A Manual control knob
B Ring with dial for presetting
C Closing spring
D Throttling point linked to B
E Seat of flow control valve
F Controller's throttling point
G Differential pressure controller
➔ Flow path

Combi valve VPI45.. is additionally equipped with pressure test points

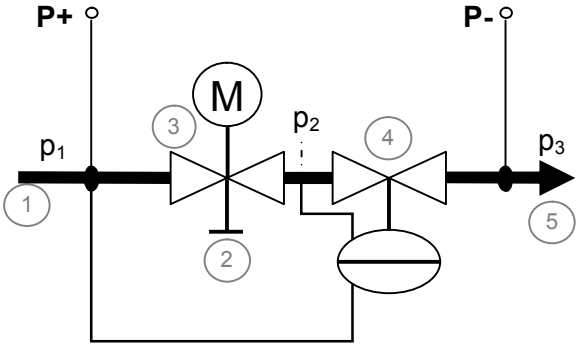
Functions

The medium entering the valve passes through a variable rectangular opening (D) which is connected to the ring with the dial (B) for presetting the maximum volumetric flow. Then, the medium flows through the flow control valve (E) with a linear characteristic and a stroke of 5 mm. A powerful spring (C) ensures safe closing.

Ring with dial for presetting (B)

The electromotoric actuator opens and accurately positions the valve (not shown here). Before leaving the valve, the medium passes through a second throttling point (F) which is controlled by the built-in mechanical differential pressure controller (G). This controller is the heart of the valve and ensures that the selected volumetric flow is maintained across the whole working range.

The valve VPI45..Q is additionally equipped with 2 pressure test points (P+, P-), which allow measurement of the total differential pressure across the valve. For that purpose, the electronic manometer, e.g. ALE10 can be used.



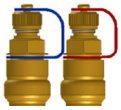
① Inlet medium
② Ring with dial for presetting (B), respectively throttling point
③ Flow control valve (E) with mounted actuator
④ Differential pressure controller (G), maintains pressure $p_1 - p_2$ across the flow control valve and the throttling point for presetting at a constant level
⑤ Outlet medium

P+ = P/T plug, pressure test point with red ribbon
P- = P/T plug, pressure test point with blue ribbon
p_1 = pressure at inlet of Combi valve
p_2 = pressure at outlet of flow control valve (E)
p_3 = pressure at outlet of Combi valve

Manual control

The black control knob is ready fitted and facilitates manual control of the Combi valve during commissioning without mounted actuator. Factory setting: the valve is fully open, thus making it possible to purge the system.	

Accessories

Accessory	Brief description	
ALE10		Electronic manometer excluding measuring lines and measuring tips. Measuring range 0-700 kPa. A differential pressure of more than 1000 kPa will destroy the pressure sensor. For measuring the differential pressure between P+ and P- of VPI45..Q Combi valves (refer to diagram under “Function“). Functions of the manometer: • Start/stop • Automatic zero position • Backlit display • Display: Out → outside the measuring range • Holding function Order measuring lines and measuring tips ALE11 separately. Delivery without batteries.
ALE11		Measuring lines and measuring tips for use with VPI45...Q Combi valves.
ALP45		Spare nipples (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
ALP46		Blanking plugs for P/T ports Connection to valve body: G ¼“ to ISO 228, inclusive O-ring
ALP47		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		Combined P/T port and drain ball valve with red ribbon Port: External threads G ⅛“ to ISO 228 Connection to valve body: G ¼” to ISO 228, inclusive O-ring

ALP49		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
ALP50		Spare black valve protection cap
ALP52		Pre-setting key for VPI45.. (set of 10 pieces)

Sizing

Engineering example

Basis of design

1. Determine energy demand Q [kW]
2. Determine temperature differential ΔT [K]
3. Calculate volumetric flow $\dot{V} = \frac{Q[kW] \cdot 1000}{1.163 \cdot \Delta T[K]} \left[\frac{l}{h}\right]$
4. Select suitable Combi valve VPI45..
5. Determine dial setting using Volumetric flow/dial presetting table, page 6

Example

1. Heat demand heat exchanger — Q = 8.4 kW
2. Temperature differential (flow - return) — ΔT = 6 K
3. Volumetric flow $\dot{V} = \frac{8.4 kW \cdot 1000}{1.163 \cdot 6\ K} = 1{,}203\ l/h$

   Hint: You can also determine the volumetric flow $\dot{V}$ using the valve slide rule.
4. Select Combi valve VPI45..
   Selection: VPI45.15F1.5 respectively VPI45.15F1.5Q (with pressure test points)
5. Determine dial setting using Volumetric flow/dial presetting table, page 6

   Volumetric flow 1,200 l/h
   Dial setting 2.4 dial graduations

Volumetric flow / dial presetting

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

VPI45.15F0.5, VPI45.15F0.5Q — **500 l/h nominal**

[l/h]				90	130	160	190	220	250	280	310	340	380	410	440	470	500	530	560	590	620
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	**3.2**	3.4	3.6	3.8	Max.

VPI45.15F1.5, VPI45.15F1.5Q — **1500 l/h nominal**

[l/h]				290	400	500	600	710	810	910	1010	1100	1200	1280	1370	1440	1520	1580	1640	1680	1730
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	**3.2**	3.4	3.6	3.8	Max.

VPI45.20F0.9, VPI45.20F0.9Q — **900 l/h nominal**

[l/h]				160	210	260	320	370	420	470	530	580	630	680	740	790	840	890	950	1000	1050
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	**3.2**	3.4	3.6	3.8	Max.

VPI45.20F2, VPI45.20F2Q — **2000 l/h nominal**

[l/h]				350	460	580	690	810	920	1040	1150	1270	1380	1490	1600	1700	1790	1880	1950	2000	2040
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	**3.2**	3.4	3.6	3.8	Max.

VPI45.25F1.5, VPI45.25F1.5Q — **1500 l/h nominal**

[l/h]				280	380	490	590	700	800	900	1010	1100	1200	1290	1370	1450	1520	1590	1640	1690	1720
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	**3.2**	3.4	3.6	3.8	Max.

VPI45.25F2, VPI45.25F2Q — **2000 l/h nominal**

[l/h]				350	460	580	690	810	920	1040	1150	1270	1380	1490	1600	1700	1790	1880	1950	2000	2040
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	**3.2**	3.4	3.6	3.8	Max.

VPI45.32F3, VPI45.32F3Q — **3000 l/h nominal**

[l/h]				560	740	920	1100	1290	1470	1640	1820	1980	2140	2300	2440	2570	2700	2810	2910	2990	3050
Dial	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	**3.2**	3.4	3.6	3.8	Max.

VPI45.40F7, VPI45.40F7Q — **7000 l/h nominal**

[l/h]				2355	2974	3538	4056	4534	4974	5376	5741	6065	6346	6582	6772	6916	7015	7073	7100	7105	7105
Skala	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	**2.6**	2.8	3	3.2	3.4	3.6	3.8	Max.

VPI45.50F8.5, VPI45.50F8.5Q — **8500 l/h nominal**

[l/h]				2664	3537	4337	5053	5682	6224	6684	7070	7389	7652	7870	8051	8204	8333	8441	8525	8578	8586
Skala	Min.	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	**2.6**	2.8	3	3.2	3.4	3.6	3.8	Max.

Presetting

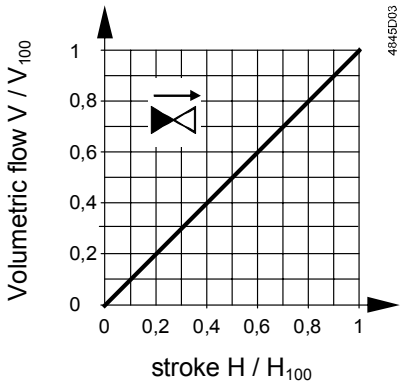
Prior to mounting the actuator, the presetting is to be made according to the following example:

1. Remove control knob from valve
2. Loosen knurled nut
3. Adjust the desired dial setting with the white knob
4. retighten knurled nut by hand

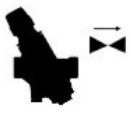
Circulating pump

The valve's authority P_V need not be calculated. When sizing the circulating pump, it must be made certain that the most critical heat exchanger in the system – usually the remotest from the pump – gets enough pressure (pump head).

Valve charactristic
VPI45.., VPI45..Q

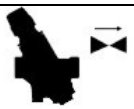
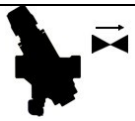


Engineering notes

Valve	Symbol		flow in control mode	valve stem	
	VPI45..	VPI45..Q		retracts	extends
Combi valve VPI45..			Variable	opens	closes

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

Symbols

Symbol used in catalogs and application descriptions	Direction of flow VPI45..	VPI45..Q	Symbol used in diagrams
			There are no standard symbols for Combi valves in diagrams

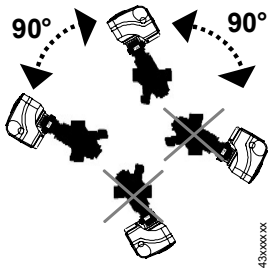
Recommendation

A strainer should be fitted upstream of the valve to enhance reliability.

Mounting notes

Valve and actuator can be straightforwardly assembled on site. Special tools or adjustments are not required.
Prior to mounting the actuator, the required volumetric flow must be set.
The valve is supplied complete with Mounting Instructions (74 319 06490a).

Mounting positions



Commissioning notes

⚠ **The valves must be commissioned with the manual control knob or actuator correctly fitted.**

⚠ **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 400 kPa.**

Manual control

When turning the manual control knob in clockwise direction or operating the actuator, the valve opens. A reset spring closes the valve. The valves are supplied fully open.

Maintenance notes

The VPI45.. valves are maintenance-free. .

Caution ⚠ When performing service work on the valve and / or actuator:

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

Remove the electrical connections only if necessary.

Sealing gland

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

Disposal

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

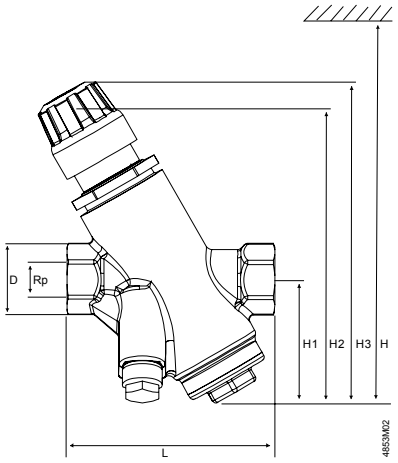
Application-related technical data are guaranteed only when the valves are used in connection with the Siemens actuators listed under ”Equipment combinations”, page 3. When used with actuators of other manufacture, any warranty by Siemens becomes void.

Technical data

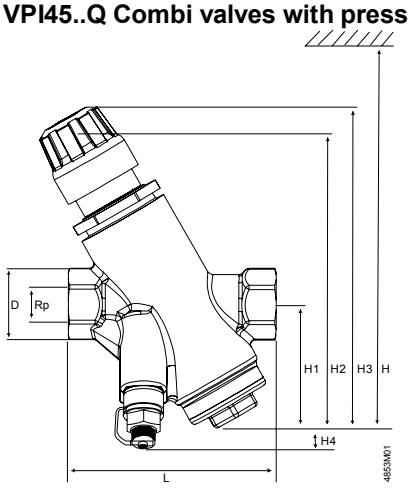
Functional data	PN class		PN 25 as per EN 1333		
	Perm. operating pressure		2,500 kPa (25 bar) as per ISO 7628 / EN 1333		
	Control range			Δp_{min} [kPa]	Δp_{max} [kPa]
	Differential pressure controller		VPI45.15F0.5..	16	400
			VPI45.15F1.5..	18	400
			VPI45.20F0.9..	16	400
			VPI45.20F2..	22	400
			VPI45.25F1.5..	16	400
			VPI45.25F2..	22	400
			VPI45.32F3..	18	400
			VPI45.40F7..	26	400
			VPI45.50F8.5..	32	400
	Valve characteristic		Linear		
	Leakage rate	DN15…32	0…0,05 % of volumetric flow $\dot{V}_{100}$		
		DN40…50	At p_{max} = 230 kPa: 0…0,05 % of volumetric flow $\dot{V}_{100}$ At Δp_{max} = 400 kPa: > 0,05 % of volumetric flow $\dot{V}_{100}$		
	Permissible media		Low temperature hot water, chilled water, water with antifreeze Recommendation: Water treatment to VDI 2035		
	Medium temperature		1...120 °C		
	Nominal stroke	DN15…DN32	5 mm		
		DN40…DN50	6.5 mm		
Standards	Pressure Equipment Directive		PED 97/23/EC		
	Pressure Accessories		as per article 1, section 2.1.4		
	Fluid group 2	DN15…40	• without CE-marking as per article 3, section 3 (sound engineering practice)		
		DN50	• category I, with CE-marking		
Materials	Valve body, plug, seat, sealing gland and test points		Dezincification resistant hot-pressed brass (DZR), CW602N		
	Stem, spring		Stainless steel		
	Presetting		PTFE, PPO, POM C und ABS		
	Regulator		PPS		
	Seals		EPDM 281 (O-ring)		
Dimensions / weight	Dimensions		Refer to “Dimensions“, page 10		
	Threaded connections		Rp to ISO 7-1 (internally threaded)		
	Actuator connection		M30 x 1.5 mm		
	Weight		Refer to “Dimensions“, page 10		

Dimensions

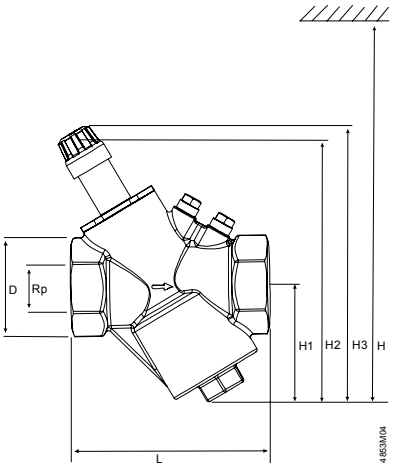
VPI45 .. Combi valves
DN15…32

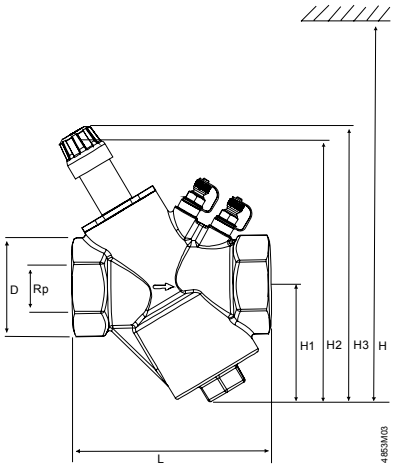


VPI45..Q Combi valves with pressure test points



DN40/50





Valves	Rp	D	L	H1	H2	H3	H4	H [1]		Weight
								SSD..	SQD..	
	[inch]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]		[kg]
VPI45.15F0.5	Rp ½	27	88	53	123	135		205		0.898
VPI45.15F1.5	Rp ½	27	88	53	123	135		205		0.898
VPI45.20F0.9	Rp ¾	32	88	53	123	135		205		0.908
VPI45.20F2	Rp ¾	32	88	53	123	135		205		0.908
VPI45.25F1.5	Rp 1	39	92	53	123	135		205		0.998
VPI45.25F2	Rp 1	39	92	53	123	135		205		0.998
VPI45.32F3	Rp 1¼	46	128	69	145	158		227		1.518
VPI45.40F7	Rp 1½	52	144	87	193	206			356	2.519
VPI45.50F8.5	Rp 2	68	155	93	206	219			368	3.156
VPI45.15F0.5Q	Rp ½	27	88	53	123	135	11	205		0.898
VPI45.15F1.5Q	Rp ½	27	88	53	123	135	11	205		0.898
VPI45.20F0.9Q	Rp ¾	32	88	53	123	135	13	205		0.908
VPI45.20F2Q	Rp ¾	32	88	53	123	135	13	205		0.908
VPI45.25F1.5Q	Rp 1	39	92	53	123	135	11	205		0.998
VPI45.25F2Q	Rp 1	39	92	53	123	135	11	205		0.998
VPI45.32F3Q	Rp 1¼	46	128	69	145	158	6	227		1.518
VPI45.40F7Q	Rp 1½	52	144	87	193	206			356	2.539
VPI45.50F8.5Q	Rp 2	68	155	93	206	219			368	3.176

[1] Total height including actuator SSD.. or SQD..

Revision numbers

Product number	Valid from rev. no.	Product number	Valid from rev. no.
VPI45.15F0.5	..A	**VPI45.15F0.5Q**	..A
VPI45.15F1.5	..A	**VPI45.15F1.5Q**	..A
VPI45.20F0.9	..A	**VPI45.20F0.9Q**	..A
VPI45.20F2	..A	**VPI45.20F2Q**	..A
VPI45.25F1.5	..A	**VPI45.25F1.5Q**	..A
VPI45.25F2	..A	**VPI45.25F2Q**	..A
VPI45.32F3	..A	**VPI45.32F3Q**	..A
VPI45.40F7	..A	**VPI45.40F7Q**	..A
VPI45.50F8.5	..A	**VPI45.50F8.5Q**	..A