



ACVATIX™

## Combi valves, PN 25

## VPI46..Q

for rooms, zones, ventilation and air-conditioning systems

- With integrated differential pressure controller
- Valve body made of dezincification resistant hot-pressed brass (DZR)
- Volumetric flow 30... 4000 l/h
- DN 15...DN 32
- Differential pressure range 15...400 kPa
- Internally threaded Rp conforming to ISO 7-1
- Supplied with pressure test points for  $\Delta p$  measurement
- Can be equipped with actuators
  - SSA.. (3-position or DC 0...10 V)
  - STA..3./STP..3.. (2-position or PDM)
  - STA63../STP63.. (DC 0...10 V)

### Use

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

## Type summary

Product no.	DN	H <sub>100</sub> [mm]	Connections		Test points	V̇ <sub>min</sub> [l/h]	V̇ <sub>100</sub> [l/h]	STA..3.. / STP..3..		SSA..	
			[inch]					Δp <sub>min</sub> [kPa]	Δp <sub>max</sub> [kPa]	Δp <sub>min</sub> [kPa]	Δp <sub>max</sub> [kPa]
VPI46.15L0.2QF--53-1362	15	2.5	Rp ½	Internally Threaded	with pressure test points P/T	30	200	15	400	15	400
VPI46.15L0.6QF-53-1364						100	575	15	400	15	400
VPI46.20F1.4QF-53-1368	20	4.5	Rp ¾			200	1190	15	400	-	-
		5				220	1330	-	-	20	400
VPI46.25F3.6QF-53-1373	25	5.5	Rp 1			600	3609	-	-	23	400
VPI46.32F4QF-53-1374	32	5.5	Rp 1 ¼			550	4001	-	-	28	400

DN = nominal size

H<sub>100</sub> = nominal stroke

V̇<sub>100</sub> = volumetric flow through fully open valve (H<sub>100</sub>)

V̇<sub>min</sub> = smallest pre-settable volumetric flow through fully open valve (H<sub>100</sub>)

Δp<sub>max</sub> = maximum permissible differential pressure across the valve's control path, valid for the entire actuating range of the motorized valve

Δp<sub>min</sub> = minimum differential pressure required across the valve's control path, so that the difference pressure regulator works reliably

## Ordering

### Example

Product no.	Designation
VPI46.15L0.2QF--53-1362	Combi valve, PN 25, externally threaded
SSA61	Actuator

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

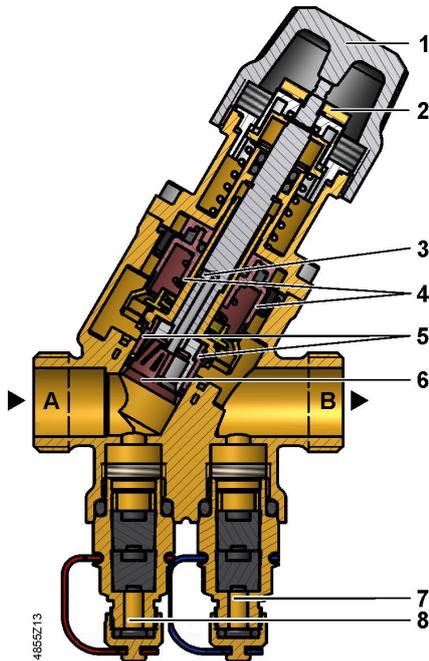
## Equipment combinations

Actuators	Operating voltage	signal	Positioning time		force	Position energized	Spring return	Stroke	Connecting cable	Data sheet						
			2.5 mm													
SSA31	AC 230 V	3-position	150 s	60 s/mm	100 N	NC	-	2.5 mm 5.5 mm	1.5 m	N4893						
SSA81	AC 24 V										DC 0...10 V	34 s	13.6 s/mm			
SSA61			AC 230 V	3-position										150 s	60 s/mm	
SSA61EP	AC 24 V										DC 0...10 V	75 s	30 s/mm			
SSA31/00		AC 230 V	2-position	210 s										80 s/mm	100 N	NO
SSA81/00	AC 24 V										2-position, PDM	270 s	110 s/mm			
SSA61/00		DC 0...10 V	30 s	12 s/mm												
SSA61EP/00	AC 230 V										2-position	210 s	80 s/mm			
STA23..		AC 24 V	2-position, PDM	270 s	110 s/mm											
STA73..	DC 0...10 V					30 s	12 s/mm									
STA63..		AC 230 V	2-position	210 s	80 s/mm											
STP23..	AC 24 V					2-position, PDM	270 s	110 s/mm								
STP73..		DC 0...10 V	30 s	12 s/mm												
STP63..																

<sup>1)</sup> NC = Normal Closed = VPI46.. powerless closed

NO = Normal open = VPI46.. powerless open

## Technical / mechanical design

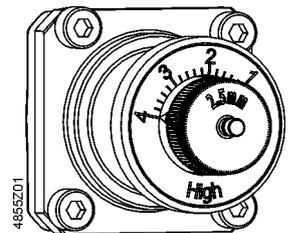


- 1 Manual control knob
- 2 Ring with dial for presetting
- 3 Aperture for differential pressure controller is linked with outlet port B
- 4 Differential pressure controller
- 5 Plug for presetting opening
- 6 Flow control valve
- 7 Pressure test point, blue ribbon, P-
- 8 Pressure test point, red ribbon,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

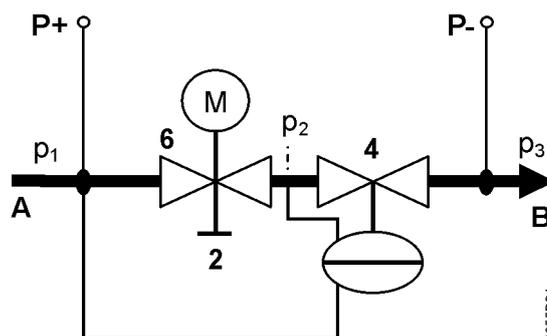
Combi valves VP..46..Q (shown here) are additionally equipped with pressure test points P/T.

## Functional principle

The medium entering the valve (inlet port A) passes through the variable presetting opening (5) which is connected to the ring with the dial (2) for presetting the desired maximum volumetric flow. Then, the medium flows through the flow control valve (6) with a linear characteristic and a stroke of 2.5 mm (DN 10...15), 5mm (DN 20) & 5.5mm (DN25 & DN32).



The actuator (not shown here) opens and accurately positions the control valve (6). Before leaving the Combi valve, the medium passes through a built-in mechanical differential pressure controller (4). This differential pressure controller is the heart of the Combi valve and ensures that the selected volumetric flow is maintained across the whole working range and independent of the inlet pressure  $p_1$ . The Combi valves VP..46..Q are additionally equipped with two pressure test points (P+, P-), which allow measurement of the differential pressure across the Combi valve. For that purpose, the electronic manometer ALE10 can be used.

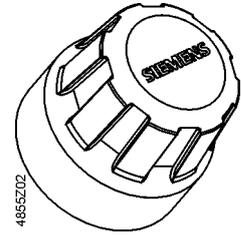


- A Inlet medium (inlet port)
- B Outlet medium (outlet port)
- 2 Ring with dial for presetting
- 4 Differential pressure controller maintains the pressure  $p_1 - p_2$  constant across the flow control valve (6) and the presetting (2)
- 6 Control valve with mounted actuator

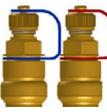
- P- = P/T port, pressure test point with blue ribbon (7)  
P+ = P/T port, pressure test point with red ribbon (8)  
p<sub>1</sub> = pressure at inlet of Combi valve  
p<sub>2</sub> = pressure at outlet of flow control valve  
p<sub>3</sub> = pressure at outlet of Combi valve

## Manual control

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



## Accessories

Product no.	Stock no.		Description
ALE10	ALE10		Electronic manometer <b>excluding</b> measuring lines and measuring tips. Measuring range 0-700 kPa. A differential pressure of more than 1000 kPa will destroy the pressure sensor. For measuring the differential pressure between P+ and P- of the Combi valves (refer to diagram under "Functional principle" on page 3). Functions of the manometer: <ul style="list-style-type: none"> <li>• Start/stop</li> <li>• Automatic zero position</li> <li>• Backlit display</li> <li>• Display: Out → outside the measuring range</li> <li>• Holding function</li> </ul>
ALE11	ALE11		Measuring lines and straight measuring tips for use with Siemens Combi valves. Equipped with G 1/8" connection with 2 x 40 mm needles.
ALP45	ALP45		Spare nipples P/T ports (set of 2 pieces) Set contains 1 piece each with a red and blue ribbon. Port: External threads G 1/8" to ISO 228 Connection to valve body: G 1/4" to ISO 228, inclusive O-ring
ALP46	S55264-V115		Blanking plugs for P/T ports Connection to valve body: G 1/4" to ISO 228, inclusive O-ring
ALP47	S55264-V116		Drain ball valve inclusive O-ring Port: External threads G 1/2" to ISO 228 Connection to valve body: G 1/4" to ISO 228, inclusive O-ring
ALP48	S55264-V117		Combined P/T port and drain ball valve with red ribbon Port: External threads G 1/8" to ISO 228 Connection to valve body: G 1/4" to ISO 228, inclusive O-ring

Product no.	Stock no.		Description
ALP49	S55264-V118		Long P/T ports (set of 2 pieces) Set contains 1 piece each with a red and blue ribbon. Port: External threads G 1/8" to ISO 228 Connection to valve body: G 1/4" to ISO 228, inclusive O-ring
ALP50	S55264-V119		Spare black valve protection cap

## Sizing

### Engineering example

#### Basis of calculation

1. Determine energy demand Q [kW]
2. Determine temperature differential  $\Delta T$  [K]
3. Calculate volumetric flow
 
$$\dot{V} = \frac{Q[\text{kW}] \cdot 1000}{1.163 \cdot \Delta T[\text{K}]} \left[ \frac{\text{l}}{\text{h}} \right]$$
4. Select suitable Combi valve
  - pipe connections (internally or externally threaded)
  - with or without P/T ports
5. Determine dial setting using volumetric flow/dial presetting table, see the following page

#### Example

1. Given is a heat exchanger with  $Q = 1.9 \text{ kW}$
2. Temperature differential (supply - return)  $\Delta T = 6 \text{ K}$
3. Volumetric flow
 
$$\dot{V} = \frac{1.9 \text{ kW} \cdot 1000}{1.163 \cdot 6 \text{ K}} = 272,28 \text{ l/h}$$

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

4. The valve shall have connections with external threads to ISO 228-1 and size DN 15.
5. Combi valve selection:  
VPP46.15L0.6 (externally threaded connections, no pressure test points P/T, nominal volumetric flow 600 l/h)
6. Determine dial setting using volumetric flow/dial presetting table below:
 

Volumetric flow	270 l/h
Dial setting	1.8

## Volumetric flow/dial presetting

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

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

### VPI46.15L0.2QF--53-1362

200 l/h nominal

[l/h]				30	35	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
Dial	Min.	0.2	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.

### VPI46.15L0.6QF-53-1364

600 l/h nominal

[l/h]				100	115	130	160	180	210	240	270	300	320	350	380	410	440	460	490	520	550	575
Dial	Min.	0.2	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.

### VPI46.20F1.4QF-53-1368 with STA/STP

1200 l/h nominal

[l/h]				200	260	310	380	430	490	550	610	660	730	780	840	900	960	1010	1070	1130	1190	
Dial	Min.	0.2	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.

### VPI46.20F1.4QF-53-1368 with SSA...

1400 l/h nominal

[l/h]				220	290	350	420	480	550	610	680	740	810	870	940	1000	1070	1130	1200	1260	1330	
Dial	Min.	0.2	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.

### VPI46.25F3.6QF-53-1373

3600 l/h nominal

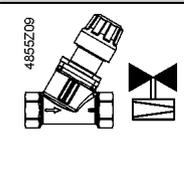
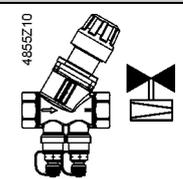
[l/h]				600	777	954	1131	1308	1485	1662	1839	2016	2193	2370	2547	2724	2901	3078	3255	3432	3609	
Dial	Min.	0.2	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.

### VPI46.32F4QF-53-1374

4000 l/h nominal

[l/h]				550	573	956	1159	1362	1565	1768	1971	2174	2377	2580	2783	2986	3189	3392	3595	3798	4001	
Dial	Min.	0.2	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	Max.

## Engineering notes

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



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

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

Symbols

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

Recommendation

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

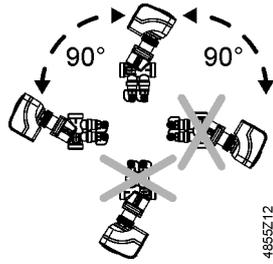
## Mounting notes

Combi valve and actuator can be straightforwardly assembled on site. Special tools or adjustments are not required.

Prior to mounting the actuator, the required volumetric flow must be set.

The valve is supplied complete with Mounting Instructions (74 319 0649 0).

## Mounting positions

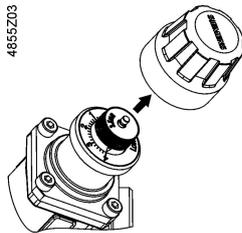


## Installation notes

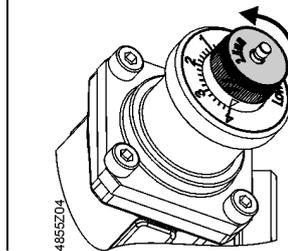
### Presetting

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

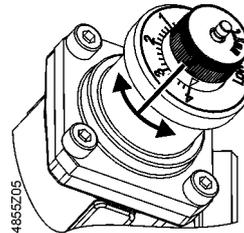
1. Remove control knob from Combi valve.



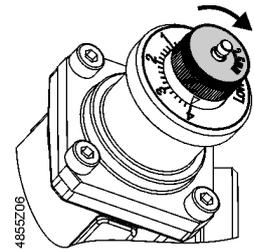
2. Loosen knurled nut.



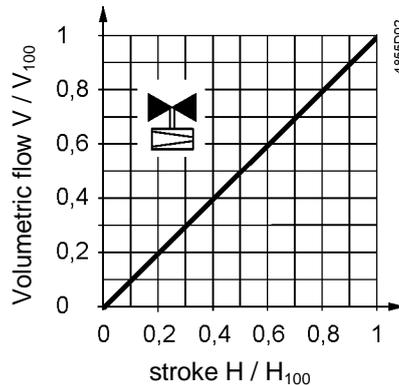
3. Adjust the desired dial setting with the white knob.



4. Retighten knurled nut by hand.



### Valve characteristic VPI46..Q



## Commissioning notes



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



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



Differential pressure  $\Delta p_{\max}$  across the valve's control path is not allowed to exceed 400 kPa.

### Manual control

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

## Maintenance notes

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The VPI46.. Combi valves are maintenance-free.



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

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

Remove the electrical connections only if necessary.

### Sealing gland

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

### Disposal



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

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Application-related technical data are guaranteed only when the valves are used in connection with the Siemens actuators listed under "Equipment combinations" on page 2. When used with actuators of other manufacture, any warranty by Siemens becomes void.

## Technical data

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Functional data	PN class	PN 25 as per EN 1333	
	Permissible operating pressure	2.500 kPa (25 bar) as per ISO 7628 / EN 1333	
	Differential pressure control range		
		DN 15	15...400 kPa
		DN 20	20...400 kPa
		DN 25	23...400 kPa
		DN 32	28...400 kPa
	Valve characteristic		Linear as per VDI/VDE 2173 or Linear
	Leakage rate	DN 15...DN 32	Class IV (0...0.01% of volumetric flow $V_{100}$ ) to EN 1349
	Permissible media		Low-temperature hot water, chilled water, water with antifreeze Recommendation: Water treatment to VDI 2035
	Medium temperature:		
	Valve with actuator		1...110 °C
	Permissible ambient temperature		1...50 °C
	Nominal stroke	DN 15	2.5 mm
	DN 20	5 mm	
	DN 25.. DN 32	5.5 mm	

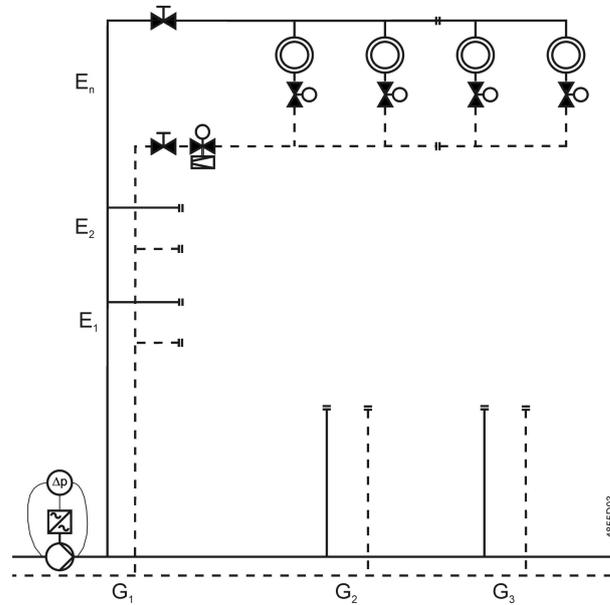
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Standards	Pressure Equipment Directive	PED 97/23/EC
	Pressure Accessories	As per article 1, section 2.1.4
	Fluid group 2 DN 15...DN 32	Without CE-marking as per article 3, section 3 (sound engineering practice)
	Environmental compatibility	ISO 14001 (Environment) ISO 9001 (Quality) SN 36350 (Environmentally compatible products) RL 2002/95/EG (RoHS)
Materials	Valve body, port, seat, sealing gland and test points	Dezincification resistant hot-pressed brass (DZR), CW602N
	Stem, spring	Stainless steel
	Presetting element	PTFE, PPO, POM C and ABS
	Regulator	PPS
	Seals	EPDM 281 (O-ring)
Dimensions / weight	Dimensions	Refer to "Dimensions" on page 11
	Threaded connections VPI46...	Rp to ISO 7-1 (internally threaded)
	Actuator connection	M30 x 1.5 mm
	Pressure test points (P/T-ports)	G ¼" (connection valve body) 2 mm x 40 mm (needles)
	Weight	Refer to "Dimensions" on page 11

## Application examples

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

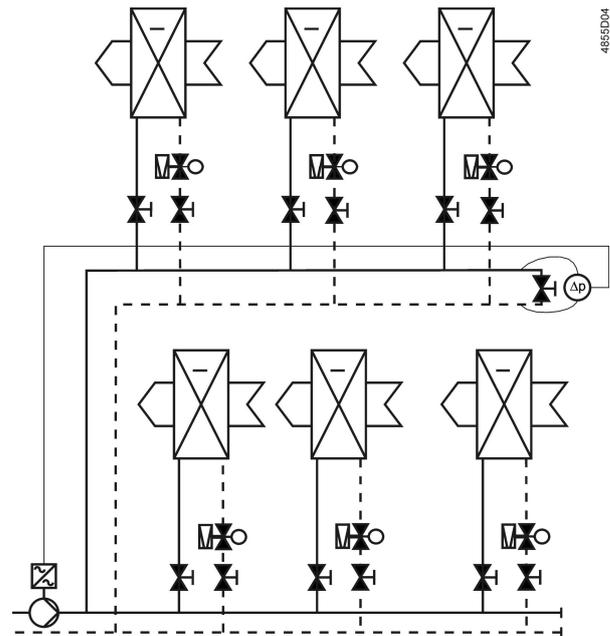
Residential buildings      Residential buildings with for example self-contained flat heating systems:



E = Floor  
 G = Group or zone

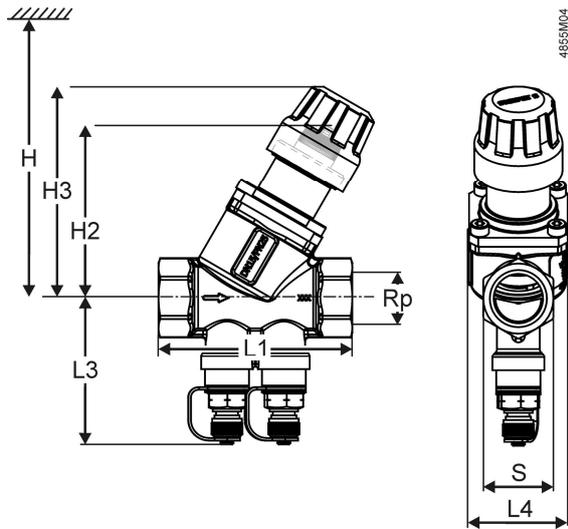
Non-residential buildings

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



## Dimensions

### VPI46..Q



Valves	DN	Rp	S	L1	L3	L4	H2	H3	H <sup>1)</sup>		Weight
									SSA..	STA..3.. STP..3..	
		[inch]	[mm]	[mm]	[kg]						
VPI46.15L0.2QF--53-1362	15	½	27	75	60.2	38	67.3	82.4	170	160	0.504
VPI46.15L0.6QF-53-1364											
VPI46.20F1.4QF-53-1368	20	¾	32	79	62.9		67.5	82.5			0.533
VPI46.25F3.6QF-53-1373	25	1		100	63				195	-	1.140
VPI46.32F4QF-53-1374	32	1 ¼		104	68				195	-	1.270

<sup>1)</sup> Total height including actuator