VPD...
VPE...

Mini-Combi-Valves (MCV)

MiniCombiValves for two-pipe heating systems, fan-coils and chilled ceiling systems

The Mini-Combi-Valve is a radiator valve featuring integrated differential pressure control to ensure optimum flow limitation under all operating conditions.

- **Straightforward design of plant with no need for safety margins**
- **Differential pressure control according to the preadjusted value**
- **No additional line balancing valves required**
- **No hydraulic balancing required**
- **Extremely low noise level**
- **DIN and NF version**

Use

The Mini-Combi-Valves are designed for use in two-pipe heating systems, fan coil and chilled ceiling systems to provide individual room control and limitation. They are used in connection with thermostatic heads or electric actuators. They are basically recommended in all rooms, especially where heat gains occur and where different temperature levels are required.
The Mini-Combi-Valves with integrated differential pressure control ensure that the amount of heat emitted by the radiator is well defined, irrespective of operating conditions. For this reason, line balancing valves normally used for hydraulic balancing are no longer required. Due to their integrated differential pressure control, these valves are extremely well suited for new houses and buildings, or for upgrading plants where hydraulic problems have occurred.

Functions

- Control valve for influencing the volumetric flow and pressure controller for automatic balancing
- Compensation of differential pressure variations with complete hydraulic decoupling of consumers
- Manual adjustment for shutoff and temporary operation of heating plant during the construction phase. A constant flow rate is also ensured in manual operation, independent of the differential pressure

Type summary

Valves *with* „stop-drop“ sealing

DN mm / in.		Type reference DIN versions	Type reference NF versions	Δp_{min} bar	Flow rate [$\dot{V}$] at a stroke of 0.5 mm [l/h]
Straight valves "A" Δp_w = 0.05 bar					
10	3/8"	**VPD110A-45**	**VPD210A-45**	0.06	45
10	3/8"	**VPD110A-90**	**VPD210A-90**	0.08	90
10	3/8"	**VPD110A-145**	**VPD210A-145**	0.1	145
15	1/2"	**VPD115A-45**	**VPD215A-45**	0.06	45
15	1/2"	**VPD115A-90**	**VPD215A-90**	0.08	90
15	1/2"	**VPD115A-145**	**VPD215A-145**	0.1	145
Straight valves "B" Δp_w = 0.1 bar					
10	3/8"	**VPD110B-60**	**VPD210B-60**	0.14	60
10	3/8"	**VPD110B-120**	**VPD210B-120**	0.17	120
10	3/8"	**VPD110B-200**	**VPD210B-200**	0.2	200
15	1/2"	**VPD115B-60**	**VPD215B-60**	0.14	60
15	1/2"	**VPD115B-120**	**VPD215B-120**	0.17	120
15	1/2"	**VPD115B-200**	**VPD215B-200**	0.2	200
Angle valves "A" Δp_w = 0.05 bar					
10	3/8"	**VPE110A-45**	**VPE210A-45**	0.06	45
10	3/8"	**VPE110A-90**	**VPE210A-90**	0.08	90
10	3/8"	**VPE110A-145**	**VPE210A-145**	0.1	145
15	1/2"	**VPE115A-45**	**VPE215A-45**	0.06	45
15	1/2"	**VPE115A-90**	**VPE215A-90**	0.08	90
15	1/2"	**VPE115A-145**	**VPE215A-145**	0.1	145
Angle valves "B" Δp_w = 0.1 bar					
10	3/8"	**VPE110B-60**	**VPE210B-60**	0.14	60
10	3/8"	**VPE110B-120**	**VPE210B-120**	0.17	120
10	3/8"	**VPE110B-200**	**VPE210B-200**	0.2	200
15	1/2"	**VPE115B-60**	**VPE215B-60**	0.14	60
15	1/2"	**VPE115B-120**	**VPE215B-120**	0.17	120
15	1/2"	**VPE115B-200**	**VPE215B-200**	0.2	200

Δp_w = effective pressure (controlled differential pressure) in bar

Δp_{min} = minimum differential pressure required across the valve in bar

Valves *without* „stop-drop“ sealing

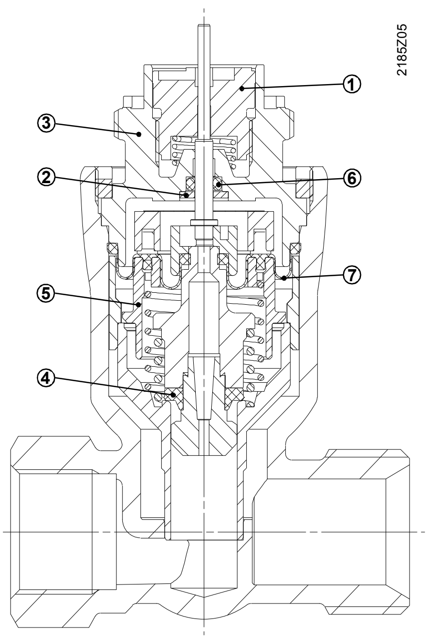
The the type reference for valves *without* „stop drop“ sealing contain an additional „-0“ at the end. VPE110B-60, for example, is a version *without* „stop drop“ sealing. The type reference is thus VPE110B-60**-0.**

Equipment combinations

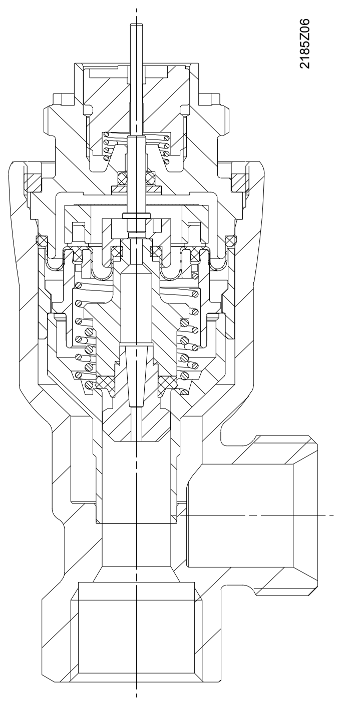
Product	Type reference	Data Sheet CE1N...
Thermostatic valve heads	RT56.../ RT76... RT96…/ RT86...	2143 / 2144 2152 / 2156
Electronic radiator controller with remote adjuster	REH90 / REH92	2131
Product range overview	All types of TRV/MCV	2150
Accessories	Accessories	2179
		Data Sheet CA1N...
Electromotoric actuators	SSA31.../ SSA61.../ SSA81...	4893
Thermic actuators	STA21 / STA71	4877

Mechanical design

Straight valve VPD...



Angle valve VPE...



Major components:

1 Stroke limiter for preadjustment and shutoff

2 Sealing gland with blocking protection

3 Actuator connection

4 Valve plug (made of plastic, soft shutoff)

5 Differential pressure controller (made of plastic, hard shutoff)

6 Sealing elements (made of EPDM)

7 Diaphragm (made of EPDM)

Technical design

The Mini-Combi-Valves allow preadjustment of the required volumetric flow [$\dot{V}$]. This preadjustment or maximum limitation of the volumetric flow is made on the valve insert by limiting the valve's stroke.
If the stem sealing gland leaks, the stroke limiter can be replaced by a new stroke limiter with seals, without impairing the valve's functionality.

Engineering notes

- With the Mini-Combi-Valve, the adjusted $\dot{V}$ value represents the maximum flow rate because the integrated pressure controller maintains the volumetric flow at a constant level, even if the differential pressure varies between 0.1 and 2 bar. For this reason, central precontrol of the pressure is not required, and the valve's authority need no longer be considered
- The water must be free from organic substances

Engineering example

The valve is to be sized based on the volumetric flow $\dot{V}$ resulting from the required radiator output.

Basis of design

1. Ascertain heat demand Q in W.
2. Determine temperature differential Δt in K.
3. the volumetric water flow $\dot{V} = \frac{Q}{c \times \Delta t} \quad \frac{W}{(J/kg \times K) \times K} \times 3600 = \frac{l}{h}$

$\dot{V}$ = volumetric water flow in l/h *C = specific heat capacity in J/kg x K*
Q = heat demand in W *Δt = temperature differential in K*

Example

1. Heat demand $\dot{Q}$ = 2800 W
2. Temperature differential Δt = 20 K
3. Water volume $\dot{V} = \frac{2800}{4187 \times 20} \times 3600 = 120.37 \frac{l}{h}$

Result

With this calculated value, the required type of valve can be determined from the sizing chart or the preadjustment table (page 5).

- In this example, the ideal valve would be VPD / VPE...B-120 with a factory setting of (3)
- Valve type VPD / VPE...A-90 is possible also, but the preadjustment must be appropriately changed
- Valve type VPD/VPE...A-145 is theoretically also possible, but the stroke is very short then. <u>Recommendation therefore</u>: The valves should operate at a preadjustment 3 or over.

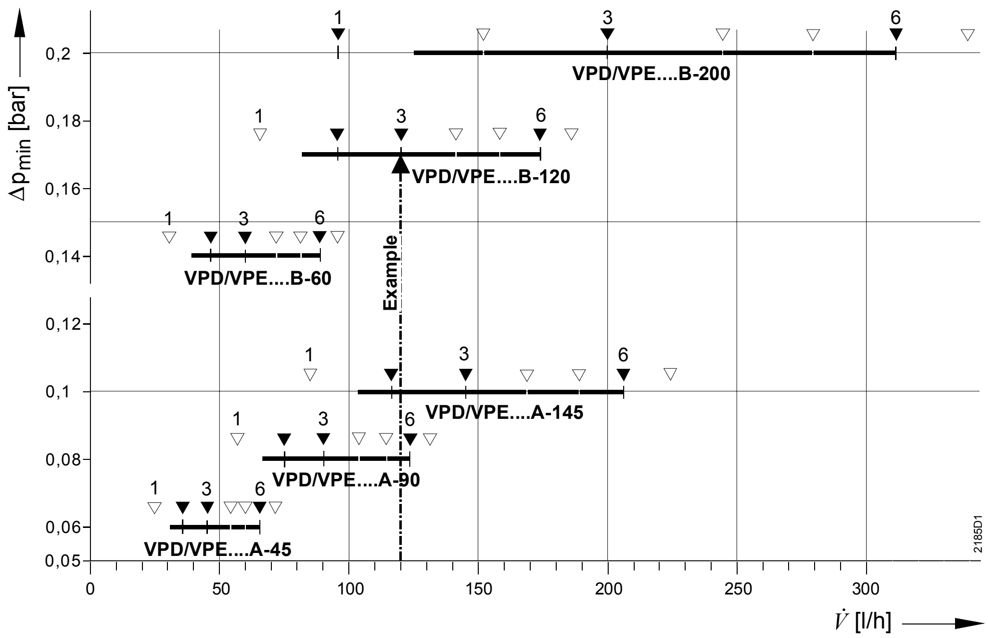
Preadjustment table

Preadjustment (PA) of the volumetric flow through stroke limitation is made on the valve insert. The reference number is determined based on the required volumetric flow [$\dot{V}$ in l/h] according to the following table or the sizing chart.

Suited for use with thermo-static radiator valve heads																		
Suited for use with electro-thermal or electric actuators																		
Stroke in mm	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2
Reference number	1	2	3	4	5	6	7											
Reference number + 360°											1	2	3	4	5	6	7	
Type reference	**Volumetric flow [l/h] in relation to valve travel or reference number of preadjustment**																	
VPD/VPE...A-45	25	36	45	53	60	67	72	77	81	85	88	91	93	96	98	100	102	104
VPD/VPE...B-60	31	47	60	71	81	89	96	102	106	110	114	117	120	122	124	127	129	132
VPD/VPE...A-90	57	75	90	103	114	123	132	139	145	151	156	160	165	169	173	177	181	185
VPD/VPE...B-120	67	96	120	141	158	173	186	197	206	214	221	228	234	240	246	252	257	263
VPD/VPE...A-145	86	117	145	169	189	207	223	236	248	258	267	276	284	291	298	305	311	318
VPD/VPE...B-200	95	151	200	243	280	311	339	362	383	400	415	428	439	450	459	467	475	483

→ *Factory setting*: $\dot{V}_{Nenn}$ = nominal value at a stroke of 0.5 mm or with reference number 3

Sizing chart



Δp_{min} Minimum differential pressure required across the valve in bar

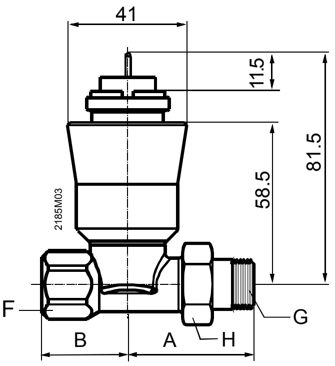
$\dot{V}$ Calculated volumetric flow (design point) in l/h

Technical data

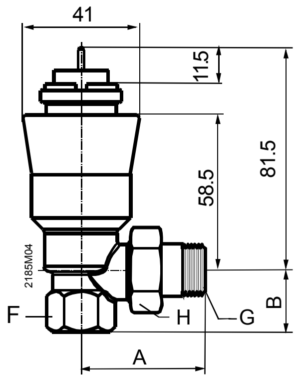
Operating conditions	Flow temperature	+3...+90 °C
	Operating pressure	max. 10 bar (1000 kPa)
	Differential pressure	max. 2 bar (200 kPa)
	Medium	water with max. 45 % ethylene-glycol (propylene-glycol not permitted)
	Water treatment	to VDI 2035
General data	Controlled differential pressure (Δp_w)	
	Type A	0.05 bar (5 kPa)
	Type B	0.1 bar (10 kPa)
	Valve body	brass CuZn40Pb2, mat, nickel-plated
	Spring force at closing point	35 N
	Valve stroke	max. 2.5 mm
	Valve actuator thread	M30 x 1.5
	Closing dimension	11.5 mm
	Protective cover	polypropylene
	Diaphragm and seals	EPDM
	Dimensions	EN215
	Threaded connections	ISO 7 / ISO 228

Dimensions

VPD...



VPE...



		Dimensions to DIN				
Typ	**DN**	**A**	**B**	**F**	**G**	**H**
VPD1...	3/8”	51.5	32	Rp 3/8”	R 3/8”	G 5/8”
VPE1...	3/8”	50.5	22	Rp 3/8”	R 3/8”	G 5/8”
VPD1...	1/2”	61.5	32	Rp 1/2”	R 1/2”	G 3/4”
VPE1...	1/2”	56.5	26	Rp 1/2”	R 1/2”	G 3/4”

		Dimensions to NF				
Typ	**DN**	**A**	**B**	**F**	**G**	**H**
VPD1...	3/8”	49	25	Rp 3/8”	R 3/8”	G 5/8”
VPE1...	3/8”	48	20	Rp 3/8”	R 3/8”	G 5/8”
VPD1...	1/2”	55	27	Rp 1/2”	R 1/2”	G 3/4”
VPE1...	1/2”	53	23	Rp 1/2”	R 1/2”	G 3/4”

A, B = Dimensions in mm
F = Rp-internal thread to ISO 7
G = R-external thread to ISO 7
H = G-thread to ISO 228