

Pressure independent control valves

Datasheet for **HERZ PICV** 1 4406 3X and 1 4206 5X, Issue 1123

☑ General information

This product is only intended for the purpose intended by the manufacturer. This also includes compliance with all associated product regulations. Changes or conversions are not permitted.

Disposal

Local and currently applicable legislation must be observed for disposal. The disposal of HERZ pressure independent control valves must not endanger the health or the environment.

Materials note

Pursuant to Article 33 of the REACH Regulation (EC No. 1907/2006), we are obliged to point out that the material lead is listed on the SVHC list and that all brass components manufactured in our products exceed 0.1% (w / w) lead (CAS: 7439-92-1 / EINECS: 231-100-4). Since lead is a component part of an alloy, actual exposure is not possible and therefore no additional information on safe use is necessary.

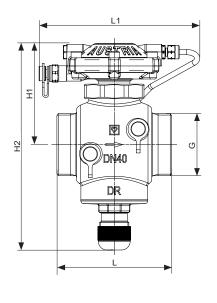
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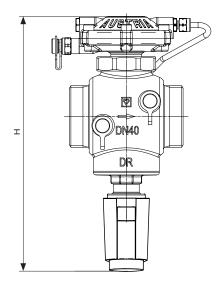


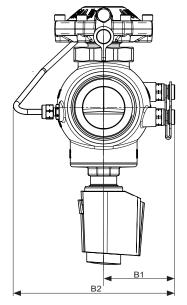
Pressure independent control valves

Datasheet for 1 4406 3X and 1 4206 5X

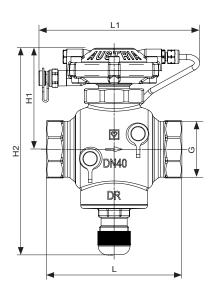
☑ 1 **4406** 3X - AG

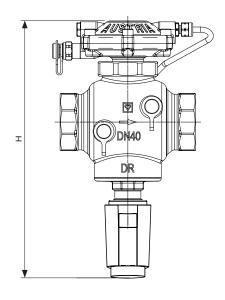


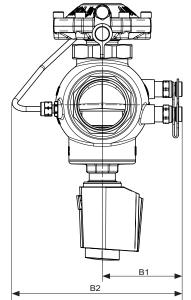




☑ 1 **4206** 5X - AG









☑ Installation dimensions mm

	Model	ls	Order number	DN	Thread G, inch	L, mm	H1, mm	H2, mm	H*, mm	B1, mm	B2, mm	L1, mm
flat		တ္သ	1 4406 33	25	G 1 1/4"	75	80	174	222	61	138	161
ad,	4406	- with test points	1 4406 34	32	G 1 ¾"	100	98	198	246	69	151	162
1	44		1 4406 35	40	G 2"	110	97	198	246	68	154	154
M		Σ	1 4406 36	50	G 2 ½"	130	102	203	251	77	162	154
ad		points	1 4206 53	25	Rp 1"	90	80	174	222	61	138	161
female thread	90	est poi	1 4206 54	32	Rp 1 1/4"	110	98	198	246	69	151	152
		with test	1 4206 55	40	Rp 1 ½"	130	97	198	247	77	163	154
ㅂ		ž	1 4206 56	50	Rp 2"	150	102	203	251	77	165	154

^{*} with 1 **7990** 3X actuator

☑ Technical Data

			4406 / 4206				
			DN25	DN32	DN40	DN50	
	6,5 mn	n actuator*	3300	6000	7500	12000	
Max flow I/h	5 mm a	actuator*	2480	4500	5650	9050	
k _{vs} -	values	,	5.6	10.1	13.7	19.0	
Flow s	etting r	ange		20 -	100%		
Diff. pressure a	Diff. pressure across		35	35	30	40	
valve, kP	а	Δp_{max}	600	600	600	600	
	PN		25 bar				
Min. operatir	ng temp	perature	2 °C (water); - 20 °C (non-freezing)				
Max. operat	ing tem	perature	130 °C 110 °C) °C	
S	troke		6 mm				
Actuator connection			M 28 x 1,5				
Water quality			Water purity in accordance with the ÖNORM H 5195 and VDI 2035 standards Ethylene and propylene glycol can be mixed to a ratio of 25 - 50 vol. [%].				

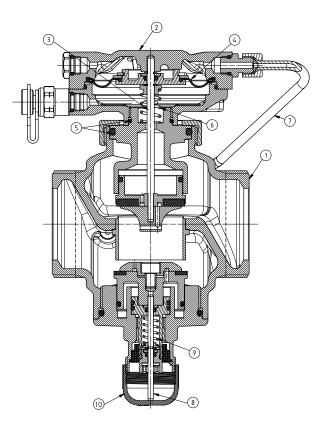
^{*} The integrated control unit together with the actuating drive is responsible for modular control. The max. flow with 6.5 drive is achieved with the 1 **7990** 32 actuating drive or with the 1 **7708** 4X geared motors. When using the 1 **7990** 31 and 1 **7708** 52/53 actuators with a 5 mm stroke, the maximum flow rate is reduced. The 4006 / 4206 SMART valves with a 4 mm stroke can be driven with all linear HERZ drives.



Materials

N	Description	Materials
1	Body	DZR brass
2	Membrane body	brass
3	Pin	stainless steel
4	Membrane	EPDM
5	O-rings	EPDM
6	Spring	stainless steel
7	capillary pipe	copper Cu-DHP
8	Pin	stainless steel
9	Spring	stainless steel
10	Protective cap	plastic

The use of ethylene and propylene glycol in a mixture ratio of 25 - 50% by volume [%] is permitted. No hemp should be used for thread sealing because the ammonia contained in hemp can damage the brass. It is recommended to use sealing strip. EPDM seals are swollen by mineral oils or lubricants containing mineral oil and thus lead to failure of the EPDM seals. For frost and corrosion protection agents based on ethylene and propylene glycol can be found in the manufacturer's documentation.



☑ Field of application

The Pressure Independent Balancing Control Valve (PIBCV) is used in all heating and cooling systems with circulation pumps. The valve automatically maintains flow to the required part of the system constant at the set rate by measuring and immediately adjusting to any variation in pressure.

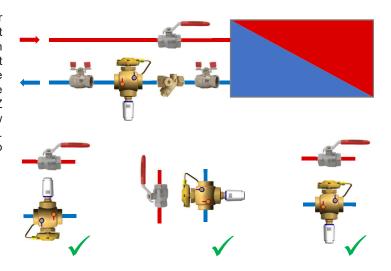
The valve settings directly affect the volumetric flow through the valve. It is thus possible to set the maximum flow rate based on the flow chart when the valve is fitted. This allows for the balancing of heating circuits, cooling water systems, ceiling cooling and heating panels, air heaters, etc. without any need to first assess the pressure variations in the system.

System flushing

If it is necessary to flush the system in the direction opposite to the direction of valve's operation, it is important to take into account the maximum allowed differential pressure on the valve for backflushing, equal to 300 kPa. The volume flow during backflushing should be a maximum of three times the nominal flow rate.

☑ Installation

The installation takes place in the return or the supply, the installation position does not matter. The direction of flow is indicated in the direction of the arrow on the housing. It is recommended to install a shut-off valve before and after the combination valve. The combination valve is shut off with the HERZ setting tool (1 **4006** 02). The desired flow rate is set in % of the maximum flow rate. Shut off by turning to the right to the stop (display < 0% red area).





Application field

It is assumed that a consumer needs a volume flow of 2300 l/h. The setting value is searched for the HERZ combination valve DN 25 (1 4406 33, 1 4206 53). The maximum flow at valve DN 25 is 3300 I / h, that corresponds to the setting 100%:

$$\frac{2300 \, l/h}{3300 \, l/h} \times 100 \% = 70 \%$$

The 2300 l/h is required thus presetting is 70%, which must be set on the valve. A control measurement is then to be carried out. Please note that a minimum differential pressure according to the data sheet must be available for correct operation on the valve.

The HERZ combi valve 4406/4206 is operated with 2-point or continuously acting actuators. However, continuous control is always recommended. The reason for this is that constant and energy-saving control is essential for fast-working systems such as cooling systems or air heaters. Maximum energy savings can only be achieved with regulating valves.

With continuous control, the volume flow is controlled continuously with the slightest fluctuations between minimum and maximum flow. The continuous control also protects all other system-specific components, right down to the pump. The 2-point control is recommended for slow systems such as underfloor heating.

HERZ 4406/4206 PICVs have several advantages over conventional series connection of volume flow controller and differential pressure controller, since the volume flow controller limits the flow depending on the differential pressure of the system, while the differential pressure is variable. If the amount of water is reduced when the room temperature is reached, the differential pressure increases. The resulting operating point is completely different from that of hydraulic balancing. This means that valves connected in series interfere with themselves.

The valve authority for the HERZ combination valve is ideally "1". A valve authority below 0.3 is an ON / OFF control. In order to ensure the efficiency of your system and proper operation, modular control with an authority greater than 0.5 should be aimed for. Since the HERZ valve 4406/4206 compensates for the differential pressures, the volume flow to the consumer is kept constant. An over or under supply of the individual consumers is therefore

Hydraulic balancing is always a relevant topic in building technology. The combination valves 4406 and 4206 enable the construction of a technical building system with reduced planning effort.

For systems with a large number of PICVs installed, the use of differential pressure control valves 4002 is recommended to avoid noise problems, the occurrence of water hammer and an unstable system operation.

☑ Valve selection

Select the valve with the smallest dimension that guarantees the necessary nominal flow with an additional safety surcharge. The setting should be as open as possible.

The flow rate calculation is based on the following formula:

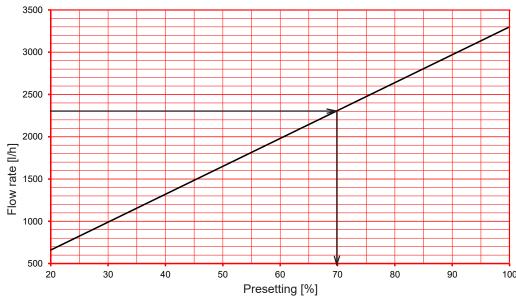
$$V = \frac{3600 \times Q}{c \times \rho \times \Delta T} \times 1000, [l/h]$$
 Q ... heat output [kW] c ... specific heat capacity 4.19 [kJ/kgK]

V ... volume flow [l/h]

 ρ ... density of water [kg/m³]

ΔT ... temperature difference flow and return [K]

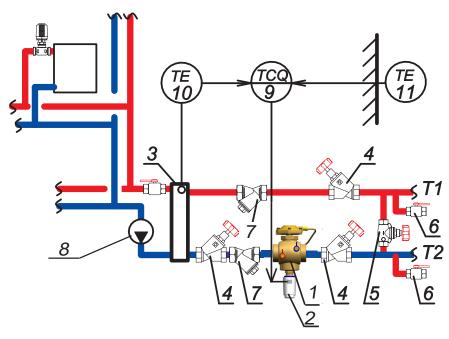
With the help of the kv diagram, the respective minimum differential pressure [kPa] can be determined depending on the flow [I/h] and the default setting [%].





☑ Application example

PICVs in use with a hydraulic distributor

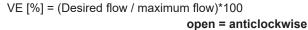


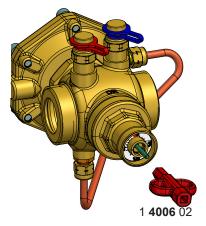
1	4406 PICV
2	7990 actuating drive
3	4513 hydraulic switch
4	4115 shut-off valve STRÖMAX-A
5	4217 commissioning valve STRÖMAX-GM
6	4119 Boiler filling and draining valve THERMOFLEX
7	4111 strainer
8	circulation pump
9	7793 electronic continuous controller
10	7793 heating water temperature sensor
11	Outside temperature sensor



Pressetting

The respective setting of the control unit is clearly shown in percentages. The valve is preset with the HERZ setting key (1 4006 02). The desired flow is set in% of the maximum flow. To shut off, turn to the right to <0% (red area).







close = clockwise



How to perform a flow measurement:

- Connect the measuring computer to the measuring nipple
- Enter the dimensions, valve type and setting -> display flow

☑ Warning notices

The valves must be installed for the correct application using clean fittings. A HERZ strainer (4111) should be fitted to prevent impurities.

☑ Test points

Every PICV has 3 test points.

Measuring across P1-P3 enables the setting of the valve and the minimum differential pressure to be checked. The valve requires a minimum differential pressure in order to operate correctly.

Measuring across P1-P2 determines the differential pressure required to calculate the valve flow volume from the kv values (shown in the table) for each % preset position.



☑ Functional principle of a PICV combination valve

A Pressure Independent Balancing and Control Valve (PIBCV or PICV) combines a regulating and control valve with a differential pressure controller.

Balancing and control valve

The valve has a linear characteristic. The adjustment of the required flow volume is done at the valve spindle, where the maximum stroke is adjusted. Settings between 20 % and 80 % of the nominal flow are recommended. The adjustment of the maximum stroke allows actuators with stroke detection to utilise their full control bandwidth (e.g. 0-10 V).

Differential pressure controller

The differential pressure controller keeps the differential pressure constant across the balancing and control valve. As the valve is independent from the system differential pressure, the preset flow volume will remain constant at all times despite any change in the system conditions.

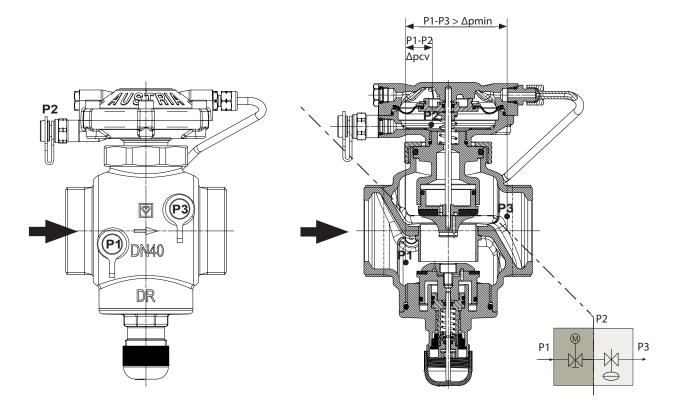
Test points

The dimensions DN25 - DN50 have 3 test points P1, P2 and P3. The valve requires a minimum differential pressure in order to operate correctly.

Measuring across P1-P3 will determine the minimum differential pressure that the valve requires to operate correctly.

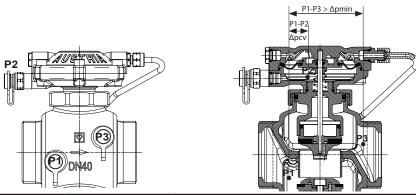
Measuring across P1-P2 determines the differential pressure required to calculate the valve flow volume from the kv values (shown in the table) for each % preset position.

The differential pressure can be checked with the HERZ measuring computer 1 8900 05.





☑ kV - values of the control valve in the flanged PIBCV (quick test point P1 - P2)



Presetting	DN 25	DN 32	DN 40	DN 50
[%]	[m³/h]	[m³/h]	[m³/h]	[m³/h]
10	0.6	1.0	1.3	2.0
20	1.1	2.1	2.5	4.1
30	1.7	3.1	3.9	6.2
40	2.2	4.1	5.1	8.2
50	2.8	5.2	6.6	10.4
60	3.3	6.3	8.0	12.5
70	3.9	7.3	9.4	14.6
80	4.5	8.5	10.8	17.0
90	5.0	9.7	12.3	19.4
100	5.6	10.8	13.7	21.6

☐ Technical data - flow characteristic, test point P1-P3

1 4406 33/	DNOE	min	25 kD=	1 4406 34/	DNIGO	min	35
1 4206 53	DN25	dp	35 kPa	1 4206 54	DN32	dp	kPa
l/h	m³/h	kv	VE	l/h	m³/h	kv	VE
3300	3.3	5.6	100%	6000	6	10.1	100%
2970	2.97	5.0	90%	5400	5.4	9.1	90%
2640	2.64	4.5	80%	4800	4.8	8.1	80%
2310	2.31	3.9	70%	4200	4.2	7.1	70%
1980	1.98	3.3	60%	3600	3.6	6.1	60%
1650	1.65	2.8	50%	3000	3	5.1	50%
1320	1.32	2.2	40%	2400	2.4	4.1	40%
990	0.99	1.7	30%	1800	1.8	3.0	30%
660	0.66	1.1	20%	1200	1.2	2.0	20%
330	0.33	0.6	10%	600	0.6	1.0	10%
1 4406 35/	DN40	min	30 kPa	1 4406 36/	DN50	min	40
1 4206 55	DIN40	dp	30 KFa	1 4206 56	DINOU	dp	kPa
				1 4200 00			
l/h	m³/h	kv	VE	I/h	m³/h	kv	VE
l/h 7500	m³/h 7.5	kv 13.7	VE 100%		m³/h 12		
				l/h		kv	VE
7500	7.5	13.7	100%	l/h 12000	12	kv 19.0	VE 100%
7500 6750	7.5 6.75	13.7 12.3	100%	l/h 12000 10800	12 10.8	kv 19.0 17.1	VE 100% 90%
7500 6750 6000	7.5 6.75 6	13.7 12.3 11.0	100% 90% 80%	l/h 12000 10800 9600	12 10.8 9.6	kv 19.0 17.1 15.2	VE 100% 90% 80%
7500 6750 6000 5250	7.5 6.75 6 5.25	13.7 12.3 11.0 9.6	100% 90% 80% 70%	l/h 12000 10800 9600 8400	12 10.8 9.6 8.4	kv 19.0 17.1 15.2 13.3	VE 100% 90% 80% 70%
7500 6750 6000 5250 4500	7.5 6.75 6 5.25 4.5	13.7 12.3 11.0 9.6 8.2	100% 90% 80% 70% 60%	I/h 12000 10800 9600 8400 7200	12 10.8 9.6 8.4 7.2	kv 19.0 17.1 15.2 13.3 11.4	VE 100% 90% 80% 70% 60%
7500 6750 6000 5250 4500 3750	7.5 6.75 6 5.25 4.5 3.75	13.7 12.3 11.0 9.6 8.2 6.8	100% 90% 80% 70% 60% 50%	I/h 12000 10800 9600 8400 7200 6000	12 10.8 9.6 8.4 7.2 6	kv 19.0 17.1 15.2 13.3 11.4 9.5	VE 100% 90% 80% 70% 60%
7500 6750 6000 5250 4500 3750 3000	7.5 6.75 6 5.25 4.5 3.75	13.7 12.3 11.0 9.6 8.2 6.8 5.5	100% 90% 80% 70% 60% 50% 40%	I/h 12000 10800 9600 8400 7200 6000 4800	12 10.8 9.6 8.4 7.2 6 4.8	kv 19.0 17.1 15.2 13.3 11.4 9.5 7.6	VE 100% 90% 80% 70% 60% 50% 40%



☑ Press fitting screw connection

T 70XX Junction press fitting screw connection for composite pipes PE-RT for valve with male thread, flat-sealing

Order number	Valve dimension	G	Pipe
T 7026 43	DN 25	G 1 ¼"	26 x 3
T 7032 43	DN 25	G 1 ¼"	32 x 3
T 7040 43	DN 25	G 1 ¼"	40 x 3,5
T 7040 45	DN 40	G 2"	40 x 3,5
T 7050 45	DN 40	G 2"	50 x 4

T 70XX Press fitting screw connection for composite pipes PE-RT for valve with female thread, flat-sealing

	Order number	Valve dimension	G	Pipe
The state of the s	T 7026 63	DN 25	R 1	26 x 3
5.0	T 7032 63	DN 25	R 1	32 x 3
	T 7040 64	DN 32	R 1¼	40 x 3,5
	T 7050 65	DN 40	R 1½	50 x 4
	T 7063 66	DN 50	R 2	63 x 4,5

6220 Iron pipe connection flat seal with nut and seal

	Order number	Valve dimension	G	R	L, mm
0	1 6220 63	DN 25	G 1 ¼"	R 1"	35,3
	1 6220 65	DN 32	G 1 ¾"	R 1 1/2"	49
	1 6220 94	DN32	G 1 ¾"	R 1 1/4"	37,7
0 0	1 6220 95	DN40	G 2"	R 1 1/2"	49
L	1 6220 96	DN50	G 2 1/2"	R 2"	56

6236 Solder connection

_	Order number	Valve dimension	G	Ø D, mm	L, mm
0	1 6236 63	DN 25	G 1 ¼"	Ø 28	24
<u> </u>	1 6236 65	DN 32	G 1 ¾"	Ø 42	31
L >	1 6240 74	DN 40	G 2"	Ø 35	27

6240 Welding connection flat seal

	Order number	Valve dimension	G	Ø D, mm	L, mm
Ø	1 6240 63	DN 25	G 1 1/4"	Ø 33,7	51
L	1 6240 65	DN 32	G 1 ¾"	Ø 47,5	57



☑ Accessories

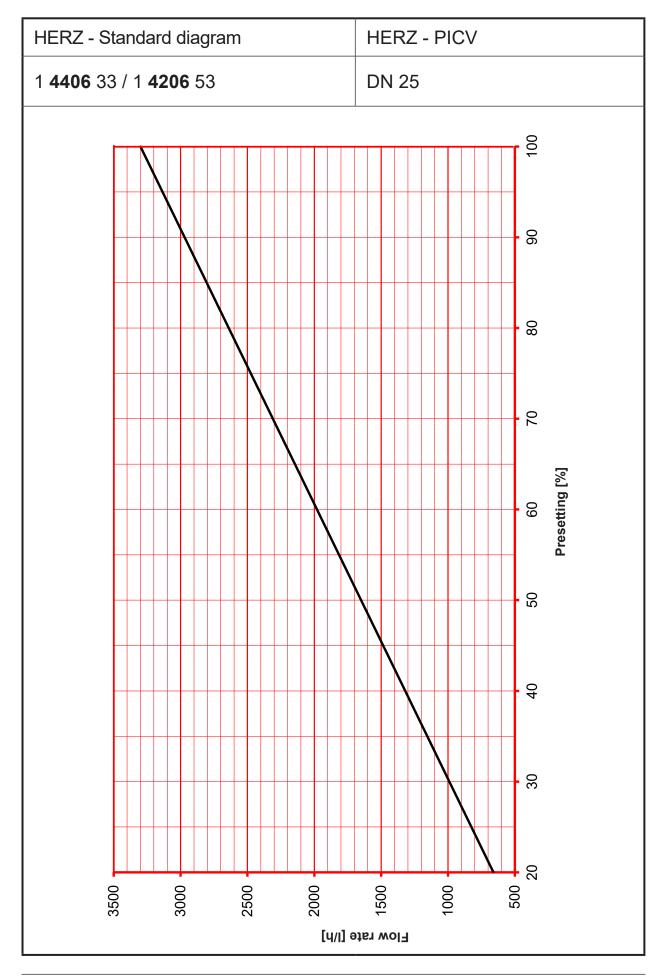
Order number	Description	Image
1 7990 32	HERZ actuating drive for continuous control, NC M 28 x 1.5, 010 V, 6.5 mm stroke, adapter M 28 x 1.5 colour blue integrated, male connector, cable loose, without limit switch. Closing force 125 N, 1.2 watt with valve stroke detection.	SHe/Z
1 7990 31	HERZ actuating drive for continuous control, NC M 28 x 1.5, 010 V, 5 mm stroke, adapter M 28 x 1.5 colour blue integrated, male connector, cable loose, without limit switch. Closing force 100 N, 1.2 watt.	
1 7708 53	HERZ actuating drive for 2-point control forfloor heating circuit distributors and valves, NC, 230 V/AC, M 28 x 1.5, 2-point, also suitable for pulse-pause operation, 5 mm stroke, adapter M 28 x 1.5 colour red integrated, cable fixed, without limit switch. Closing force 100 N. Power consumption 1 watt.	SHEZ
1 7708 52	HERZ actuating drive for 2-point control for floor heating circuit distributors and valves, NC, 24 V/AC/DC, M 28 x 1.5, 2-point, also suitable for pulse-pause operation, 5 mm stroke, adapter M 28 x 1.5 colour red integrated, cable fixed, without limit switch. Closing force 100 N. Power consumption 1 watt	
1 7708 40	HERZ geared motor 3-point, 24V/AC/DC Adapter M 28 x 1.5 colour red integrated, 24 V, stroke distance max. 8.5 mm, max. actuation force 200 N.	
1 7708 41	HERZ geared motor 3-point, 230V/AC Adapter M 28 x 1.5 colour red integrated, 230 V, stroke distance max. 8.5 mm, max. actuation force 200 N.	
1 7708 42	HERZ geared motor DDC 0–10 V Adapter M 28 x 1.5 colour red integrated, 24 V, stroke distance max. 8.5 mm, max. actuation force 200 N. Operating voltage 24V/AC/DC.	
1 7708 46	HERZ geared motor DDC 0–10 V Adapter M 28 x 1.5 colour red integrated, 24 V, stroke distance max. 8.5 mm, max. actuation force 200 N. With valve port detection and feedback channel. Operating voltage 24V/AC/DC.	



☑ Accessories and spare parts

Order number	Dim.	Description	Model
1 0284 01	1/4"	Quick test point for combi valve - pressure- independent control valve, brass version, blue cap (return) for pressure transducer	
1 0284 02	1/4"	Quick test point for combi valve - pressure- independent control valve, brass version, red cap (supply) for pressure transducer	
1 0284 11	1/4"	Quick test point for combi valve - pressure- independent control valve. brass version, blue cap (return) for pressure transducer, extended design for valves with an insulation thickness up to 40 mm	
1 0284 12	1/4"	Quick test point for combi valve - pressure- independent control valve. brass version, red cap (supply) for pressure transducer, extended design for valves with an insulation thickness up to 40 mm	
1 4006 02		Pre-setting key HERZ Combi valve pressure-independent control valve for 4006/4206	







HERZ - Standard diagram	HERZ - PICV			
1 4406 34 / 1 4206 54	DN 32			
1 4406 34 / 1 4206 54	70 80 90 100			
	60 Presetting [%]			
	20			
	40			
	30			
	30000 25000 15000 10000 20			
Flow rate [l/h]				



