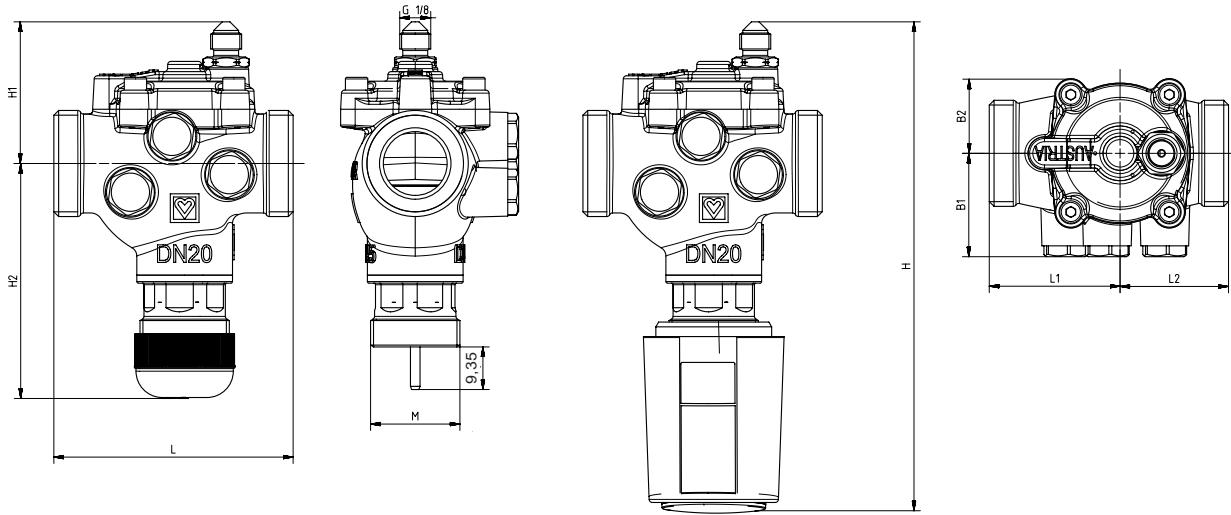


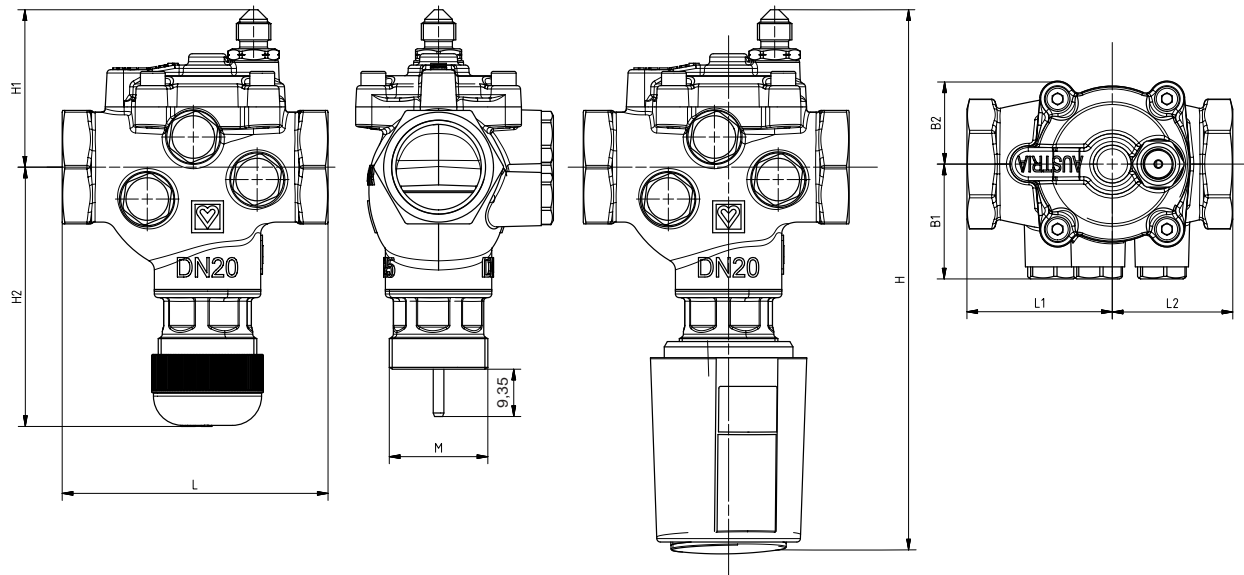
Differential pressure control valve with integrated throttle, shut-off and zone valves

Datasheet 4012 / 4212, Issue 1022

- ☑ Dimensions in mm
- ☑ 1 4012 XX with external threads



- ☑ 1 4212 XX with internal threads



☑ Dimensions in mm

Article Number	DN	Connection thread		L, mm	H1, mm	H2, mm	H*, mm	B1, mm	B2, mm	L1, mm	L2, mm	M, mm
1 4012 30	15 LF	Male	G 3/4" flat sealing	75	45	74	154	33	23	41	34	M28x1.5
1 4012 31	15 LP	Male	G 3/4" flat sealing	75	45	74	154	33	23	41	34	M28x1.5
1 4012 41	15 HP	Male	G 3/4" flat sealing	75	45	74	154	33	23	41	34	M28x1.5
1 4012 32	20 LP	Male	G 1" flat sealing	75	45	74	154	33	23	41	34	M28x1.5
1 4012 42	20 HP	Male	G 1" flat sealing	75	45	74	154	33	23	41	34	M28x1.5
1 4212 30	15 LF	Female	Rp 1/2"	75	45	74	154	33	23	41	34	M28x1.5
1 4212 31	15 LP	Female	Rp 1/2"	75	45	74	154	33	23	41	34	M28x1.5
1 4212 41	15 HP	Female	Rp 1/2"	75	45	74	154	33	23	41	34	M28x1.5
1 4212 32	20 LP	Female	Rp 3/4"	75	45	74	154	33	23	41	34	M28x1.5
1 4212 42	20 HP	Female	Rp 3/4"	75	45	74	154	33	23	41	34	M28x1.5

* with 1 7708 XX actuator

☑ Technical Data

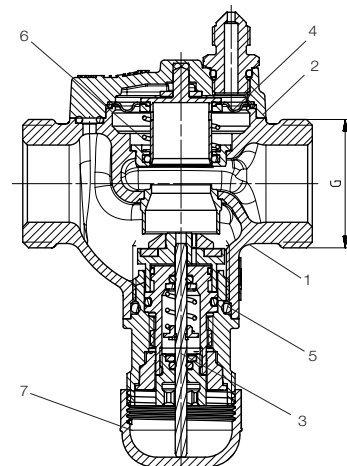
Nominal size	DN 15 LF	DN 15 LP	DN 15 HP	DN 20 LP	DN 20 HP
Controlled Δp_c **	15 kPa	20 kPa	35 kPa	20 kPa	35 kPa
Floe range	30-550 l/h	50-1400 l/h	50-2000 l/h	50-1950 l/h	50-2100 l/h
k_{vs} -value with open pressure regulator	1.6	3.1		3.3	
Max. differential pressure across the valve	200 kPa				
Min. differential pressure, min. Δp_{system}	controlled $\Delta p_c + 5$ kPa				
Maximal system pressure	PN 25				
Throttling valve characteristic	Linear				
Medium temperature, max.	130 °C				
Medium temperature, min.	2 °C (Wasser); - 20 °C (Frostschutz)				
Stroke	4 mm				
Setting range	10 % - 100 %				
Actuator connection	M28x1.5				

**Orientational value, for accurate value of Δp_c at the given design flow, please refer to the chart on Page 12

The integrated throttling valve can be fitted with an actuator. Various actuators can be used. (See Section Accessories and spare parts).

☑ 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	Spring steel
7	Protection cap	Plastic



Water quality in accordance with the ÖNORM H5195 and VDI 2035 standards. Ethylene and propylene glycol can be mixed to a ratio of 25 - 50 vol. [%].

Ammonia contained in hemp can damage brass valve bodies, EPDM gaskets can be affected by Mineral oils lubricants and thus lead to failure of the EPDM seals. Please refer to manufacturers documentation when using ethylene glycol products for frost and corrosion protection.

HERZ compression adapters for copper and steel pipes, allowable temperature and pressure ratings according to EN 1254-2 1998 Table 5. HERZ plastic pipe connections max. operating temperature 95 °C and max. operating pressure 10 bar, if approved by the pipe manufacturer.

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 expected and therefore no additional information on safe use is necessary.

☒ Disposal

Disposal must comply with local and current legislation. Prior to the assembly, maintenance and disassembly, the system must be depressurized, cooled down and emptied. Only authorized, trained and qualified personnel may perform activities of assembly, start-up, operation and disassembly of the equipment. Before disposal the valve must be dismantled into groups of structural components and delivered to authorized waste recycling organizations in order to preserve the environment. Local legislations must be obeyed when disposing of the components.

☒ Installation

HERZ differential control valve VS-TS is to be mounted in the return line in the direction of the arrow on the valve body. The impulse tube attached to the valve bonnet needs to be connected to the supply line before the controlled circuit via a ¼" nipple (included in delivery). It is recommended to use a commissioning valve, such as **4017** or **4217**, for the connection of the impulse tube. Alternatively, the impulse tube can be connected to a **2202** ball valve with sensor port, for which a special nipple 1 **4007** 77 with an M10 thread is required. With respect to the functional requirements on the valve, the valve needs to be fitted in the installation in line with good installer practice. It is recommended to install a HERZ strainer (**4111**) in order to prevent dirt from entering the valve.

☒ Application

The HERZ 4012 VS-TS differential pressure control valve with integrated throttle is designed to be used for dynamic balancing, regulation and control of heating and cooling circuits, in particular such circuits, where flow limiting from outside the circuit is desirable. Examples of such circuits include:

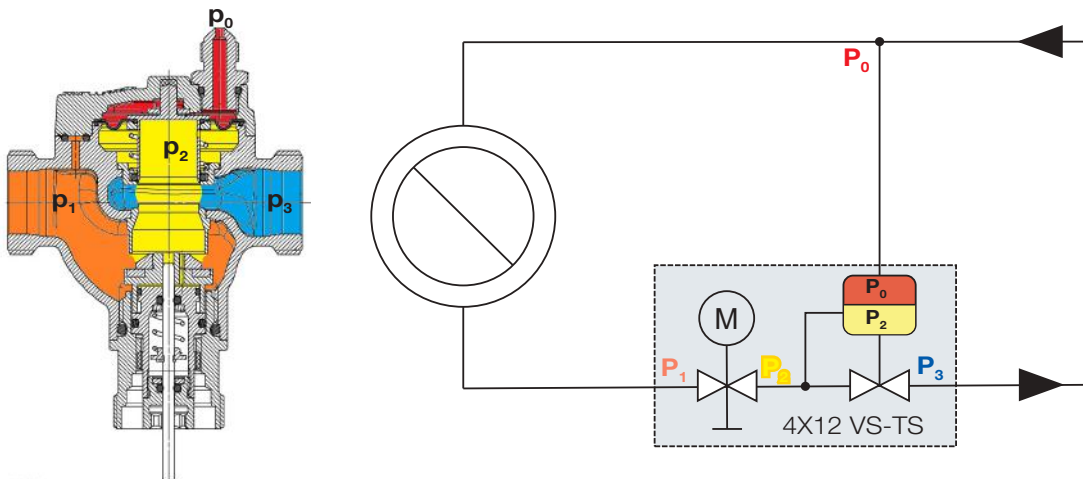
- Underfloor heating manifold. As the pressure is approximately constant inside each of the manifold bars, all loops see the same differential pressure. Just the value of this pressure difference needs to be maintained using the 4012 VS-TS. This is a more cost effective and more dirt resistant solution as compared to fitting pressure independent thermostatic valve inserts at the individual loops.
- When the manifold serves a single zone, the whole zone can be controlled by a single actuator mounted to the HERZ 4012 VS-TS.
- A circuit of radiators within a single zone, where no control device (no thermostatic valves) is fitted to the radiators and the entire zone is controlled by a room thermostat.
- Dynamic regulation of flats, where an external flow limitation is of an advantage.
- A circuit of radiators fitted with radiator valves lacking the presetting functionality.

The HERZ 4012 VS-TS can be regarded as an external presetting for limiting of the maximum flow through all control valves within the circuit. In applications where the flow can be throttled within the circuit, for example by means of pre-settable TRV's, the flow limitation device integrated within the 4012 VS-TS is of little importance and a HERZ 4002/4202 differential pressure control valve may be used instead.

The HERZ 4012 VS-TS can also be fitted with an actuator. The valve can thus be used as a zone valve or to control the flow through the circuit. Alternatively, the valve can be fitted with a shut-off cap to close the valve manually.

It is recommended that the control valves within the circuit, such as the thermostatic valves, be appropriately sized for their respective design flow. Otherwise, these control valves may lose their authority to the throttling valve built into the HERZ VS-TS, if the presetting on the VS-TS is applied..

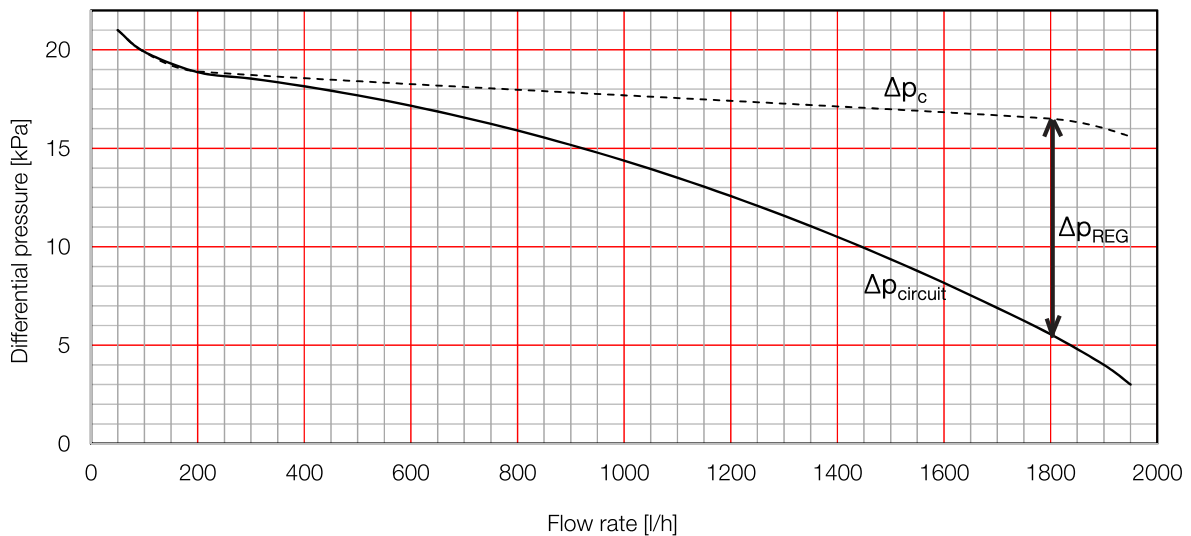
Ventilkonstruktion



The HERZ 4012 VS-TS is constructed as a combination of a differential pressure regulating valve and a pre-settable control valve.

The differential pressure regulator keeps the pressure difference $P_0 - P_2$ constant at the value of the controlled differential pressure Δp_c . Note that the pressure drop $\Delta p_{REG} = P_1 - P_2$ over the integrated throttling valve occurs within the pressure-controlled circuit, so the differential pressure available to the circuit itself equals $\Delta p_c - \Delta p_{REG}$. The additional pressure loss Δp_{REG} over the integrated throttling valve needs to be taken into account in the hydraulic design of the circuit.

This additional pressure loss Δp_{REG} inflicted onto the circuit is a design intention and a feature of the HERZ 4X12 VS-TS valve, enabling the limitation of flow through otherwise unregulated circuits.



Valve Sizing and Setting

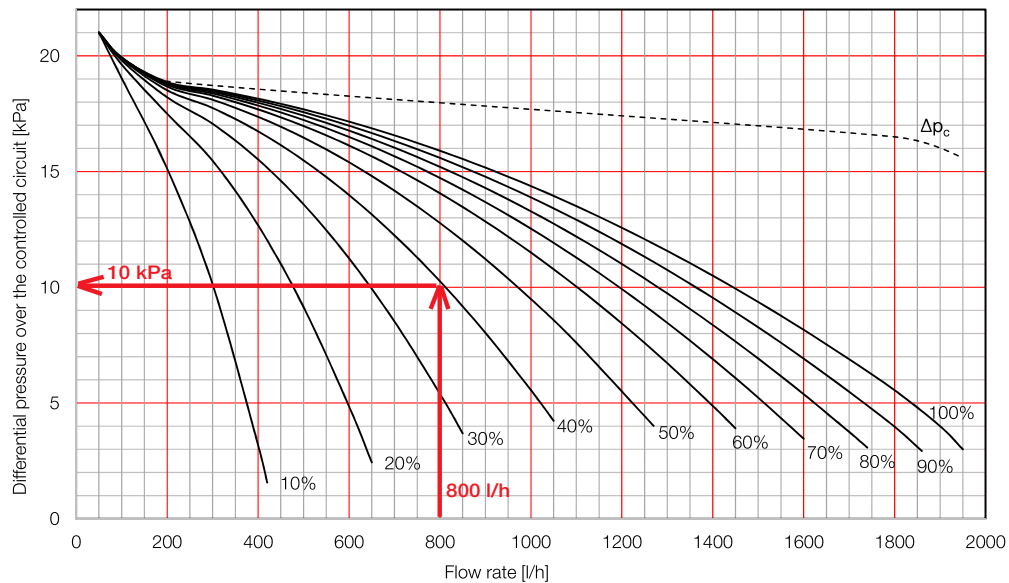
Example:

- An apartment with several radiators connected in parallel (a 2-pipe system), which require a total of 800 l/h of flow under design conditions.
- The HERZ **4X12** VS-TS will be used to regulated the pressure and the maximum flow through the circuit. If the entire apartment is controlled as a single zone, the **4X12** VS-TS can be fitted with an actuator HERZ **7708** to connected to a room thermostat, e.g. the HERZ **F799**.

A) Simple setting for the maximum flow

From the table on page 8, a setting of 30 % on the 4012 DN 20 LP Version will limit the flow at 1050 l/h, which in comparison to the required 800 l/h represents an allowance of 31 % for flow restrictions within the circuit. 25-35% allowance is a good rule of thumb for a rough presetting when there is a control valve in the circuit. It makes sure that the control valve retains an appropriate authority.

B) Sizing for the differential pressure available to the circuit



With a pre-setting of 40 % on the DN 20 LP 4012, valve 10 kPa of differential pressure will remain available to the circuit. The control valves within the circuit need to be sized such that they provide the required flow at this differential pressure (adjusted for pressure losses on piping and fittings). This means that an appropriate kv-value needs to be set at each the control valves:

$$k_v = \frac{q}{\sqrt{\Delta p_{\text{kreis}}}}$$

Let us assume that the pressure loss on pipes and fittings is 2 kPa and that a radiator connected in parallel in the circuit requires 150 l/h of nominal flow. The thermostatic valve for this radiator needs to be sized for the differential pressure of 10-2=8 kPa. The required kv-value is 0.53. The TS-98-V thermostatic valve, set to presetting 5, has a kv value of 0,53 at the proportional deviation of 2K. It is thus perfectly suitable for the application.

C) Calculation of the total kv of the entire pressure controlled circuit

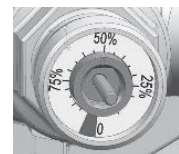
A more accurate calculation can be done by adding the kv values of the selected radiator valves with the kv value of the throttling valve integrated in the 4012 VS-TS, in order to find the kv value of the whole pressure-controlled circuit. The kv values of the integrated throttling valve for its various pre-settings are tabulated on page 11. Resistances in parallel simply add up. Resistances in series add up as inverse values of square values:

$$\frac{1}{(k_{v_{\text{Kreis}}})^2} = \frac{1}{(k_{v_{\text{rad},1}} + k_{v_{\text{rad},2}} + \dots + k_{v_{\text{rad},n}})^2} + \frac{1}{(k_{v_{4012}})^2}$$

The sizing of the radiator valves and the selection of the the pre-setting of the throttling valve integrated in the 4012 VS-TS is iteratively adjusted to arrive at the desired flows at each radiator. while retaining a reasonable authority for the radiator valves.

Setting of the throttling valve of the HERZ 4X12 VS-TS

The valve setting is clearly shown in percentages. The pre-set value can be easily adjusted with the 1 4006 02 setting key.



Dynamic Regulation Sets for Underfloor Heating Manifolds

The dynamic regulation sets are an easy to install, time saving and cost effective solution for a dynamic regulation of underfloor heating or cooling manifolds, with reliable water tightness and a simple choice of pipe connections.

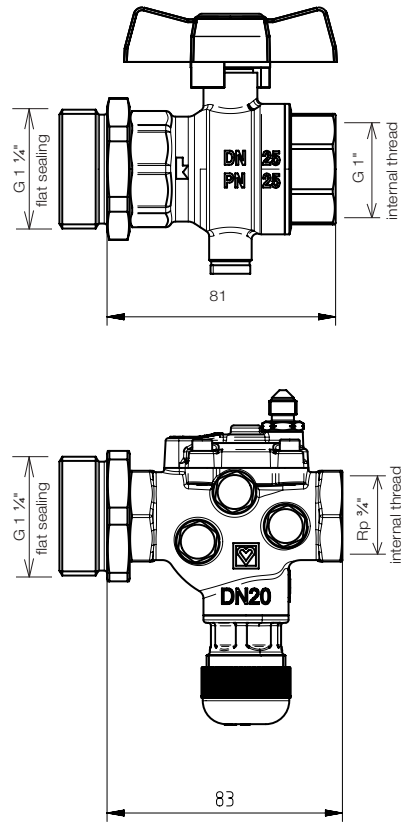
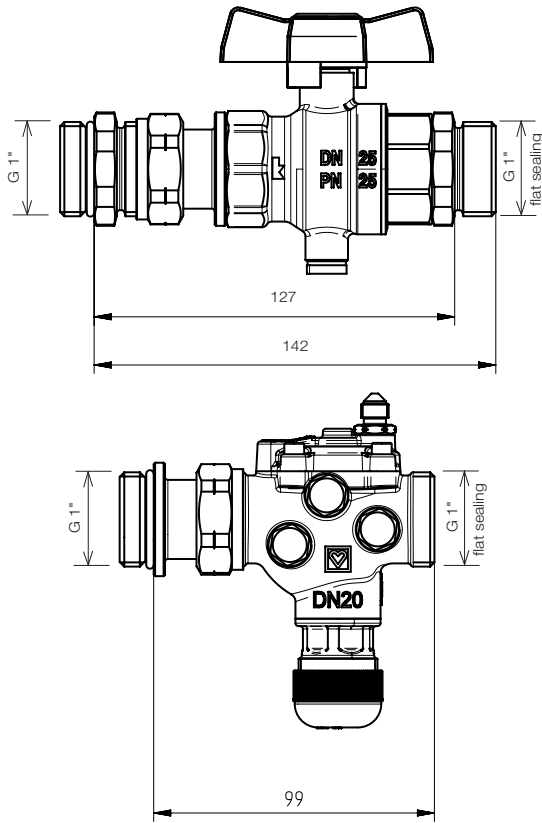
The **8635** regulation sets are suitable for manifolds with G 1" internal threads, e.g. for HERZ **863X** stainless steel manifolds or HERZ **853X** brass manifolds. The sets contain the 4012 VS-TS valve in the LP or HP version, a ball valve with a port for the impulse tube, the impulse tube itself, as well as soft sealing connections to the manifold. On the pipe side, there are G1" external threads to directly mount the suitable HERZ PIPEFIX pipe connections.

The **8735** regulations sets have been created for the HERZ UNI-MINI manifolds. The sets contain the 4012 VS-TS valve in the LP or HP version, a ball valve with a port for the impulse tube, the impulse tube itself, as well as soft sealing connections to the UNI-MINI manifold, which has a G 5/4" coupling nut. On the pipe side, there is an Rp1" or Rp¾" internal thread, respectively, for direct connection of the suitable HERZ PIPEFIX pipe fittings.

☑ Dimensions of the Dynamic Regulation sets

☑ 1 **8635 5X** - for manifolds with 1" internal thread

☑ 1 **8735 5X** - for HERZ UNI-MINI manifolds

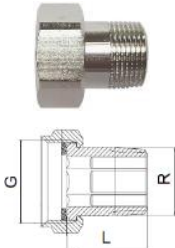


☑ Dynamic Regulation Sets for Underfloor Heating Manifolds

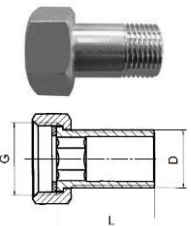
Article Number	Manifold threading	Controlled Δp_c	Description	Picture
1 8635 52	1" internal thread	20 kPa	Consists of: <ul style="list-style-type: none"> • 4012 differential pressure controller with G 1" external thread, flat sealing • 1 2202 83 partner ball valve with a port for the impulse tube, with a G 1" internal thread and an adapter to G 1" external thread, flat sealing • Impulse tube with 1 4007 77 connection nipple for the ball valve • Connection fittings for the manifold with G 1" internal thread 	
1 8635 53		35 kPa		
1 8735 52	G 1 1/4" coupling nut	20 kPa	Consists of: <ul style="list-style-type: none"> • 4212 Differential pressure controller with Rp 3/4" internal thread • 1 2202 83 partner ball valve with a port for the impulse tube, with a G 1" internal thread • Impulse tube with 1 4007 77 connection nipple for the ball valve • Connections to the UNI-MINI manifold 	
1 8735 53		35 kPa		

Connection Fittings

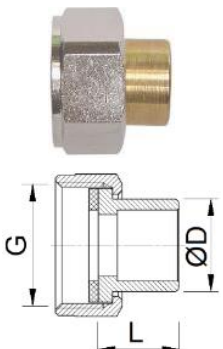
6260 Coupling nut and a flat-faced tailpiece with pipe thread. flat sealing included

	Article No.	Valve Dimension	G	R	L, mm
	1 6220 21	DN 15	G ¾"	R ½"	26.3
	1 6220 12	DN 20	G 1"	R ¾"	31.4


6260 Coupling nut and an extended-length. flat-faced tailpiece with a G-thread. flat sealing included

	Article No.	Valve Dimension	G	D	L, mm
	1 6220 11	DN 15	G ¾"	G ½"	38.0
	1 6220 22	DN 20	G 1"	G ¾"	44.5


6236 Coupling nut and soldering tailpiece with flat sealing

	Article No.	Valve Dimension	G	Ø D, mm	L, mm
	1 6236 01	DN 15	G ¾"	Ø 12	14
	1 6236 11	DN 15	G ¾"	Ø 15	17
	1 6236 21	DN 15	G ¾"	Ø 18	19
	1 6236 02	DN 20	G 1"	Ø 15	18
	1 6236 12	DN 20	G 1"	Ø 18	19
	1 6236 22	DN 20	G 1"	Ø 22	23

T **70XX** Press fittings for multilayer and PEX pipes, with flat sealing, for 4012 valves with external threads






	Article No.	Valve Dimension	G	Pipe
	T 7016 41	DN 15	G ¾"	16 x 2
	T 7020 41	DN 15	G ¾"	20 x 2
	T 7016 42	DN 20	G 1"	16 x 2
	T 7020 42	DN 20	G 1"	20 x 2
	T 7026 42	DN 20	G 1"	26 x 3

T **70XX** Press fittings for multilayer and PEX pipes, for 4212 valves with internal threads and 2202 ball valves

	Article No.	Valve Dimension	R	Pipe
	T 7016 61	DN 15	R ½"	16 x 2
	T 7020 61	DN 15	R ½"	20 x 2
	T 7016 62	DN 20	R ¾"	16 x 2
	T 7020 62	DN 20	R ¾"	20 x 3
	T 7026 62	DN 20	R ¾"	26 x 3
	T 7026 63	DN 25	R 1"	26 x 3

☑ Accessories

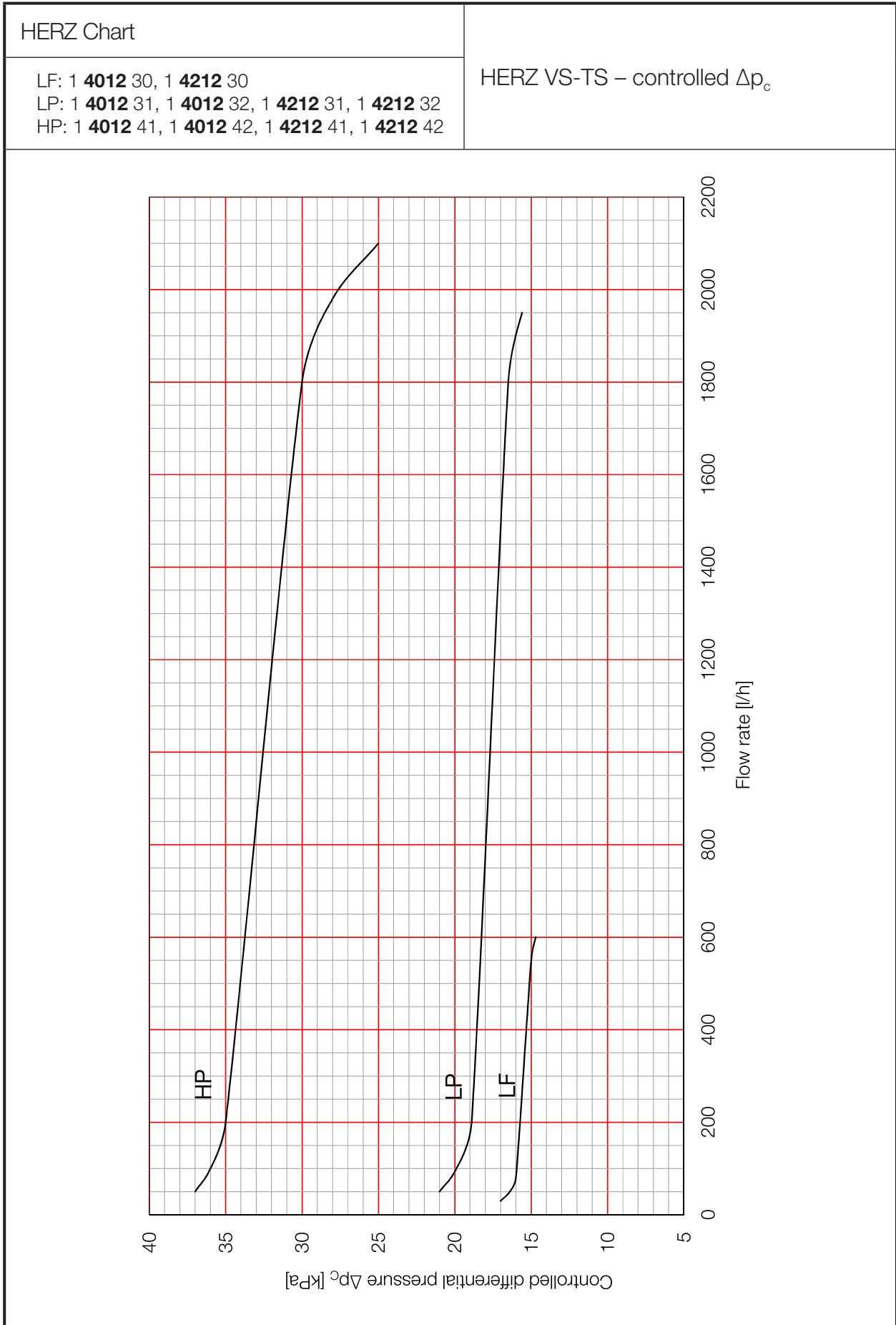
Article No.	Dim.	Description	Picture
1 7990 31	24V / AC control signal 0...10V / DC	HERZ actuating drive for continuous control M28x1.5, 0..10 V, 6.5 mm stroke, adapter M28x1.5 colour blue included, male connector, cable loose, without limit switch. Closing force 125 N, 1.2 watt with valve stroke detection	
1 7711 10	230 V / AC	HERZ actuating drives for 2-point, NC M 28 x 1.5, 115 N, 2-point, PWM, 4.5 mm stroke.	
1 7711 12	24 V / AC / DC	HERZ actuating drives for 2-point, NC M 28 x 1.5, 115 N, 2-point, PWM, 4.5 mm stroke.	
1 7708 53	230V/AC	HERZ actuating drive for 2-point control M28x1.5, 2-point, also suitable for PWM, 5 mm stroke, adapter M28x1.5 colour red included, cable fixed, without limit switch. Closing force 100 N. Power consumption 1 watt., operating voltage 230 V / AC.	
1 7708 52	24V/AC	HERZ actuating drive for 2-point control M28x1.5, 2-point, also suitable for PWM, 5 mm stroke, adapter M28x1.5 colour red included, cable fixed, without limit switch. Closing force 100 N. Power consumption 1 watt., operating voltage 24 V / AC.	
1 7708 40	24V/AC/DC	HERZ geared motor 3-point Adapter M 28 x 1.5 colour blue included, 24 V, stroke max. 8.5 mm, max. actuation force 200 N.	
1 7708 41	230V/AC	HERZ geared motor 3-point Adapter M 28 x 1.5 colour blue included, 230 V, stroke max. 8.5 mm, max. actuation force 200 N.	
1 7708 42	24V/AC/DC Steuersignal 0...10V/DC	HERZ geared motor DDC 0–10 V Adapter M 28 x 1.5 colour blue included, 24 V, stroke max. 8.5 mm, max. actuation force 200 N.	
1 7708 46	24V/AC/DC Steuersignal 0...10V/DC	HERZ geared motor DDC 0–10 V Adapter M 28 x 1.5 colour blue included, 24 V, stroke max. 8.5 mm, max. actuation force 200 N. With valve port detection and feedback channel.	

Article No.	Dim.	Description	Picture
1 2202 81	DN 15 G 1/2" internal thread	HERZ partner ball valve for connection of the impulse tube at the supply, using the G1/8" x M10x1 connection nipple 1 4007 77. Closing of the ball valve closes also the impulse tube port	
1 2202 82	DN 20 G 3/4" internal thread		
1 2202 83	DN 25 G 1" internal thread		
1 4007 77	G1/8" x M10x1	G1/8" capillary connection nipple to be used with the 2202 ball valves with M10x1 sensor port	
1 4007 79	G1/8" x G1/4"	Capillary for differential pressure control valve, 1 m.	
1 0269 19	G1/8" x G1/4"	Connection nipple for capillary to valves with 1/4" boreholes	
1 4006 02		Presetting key for HERZ-PICV 4006/4206 and HERZ VS-TS 4012	

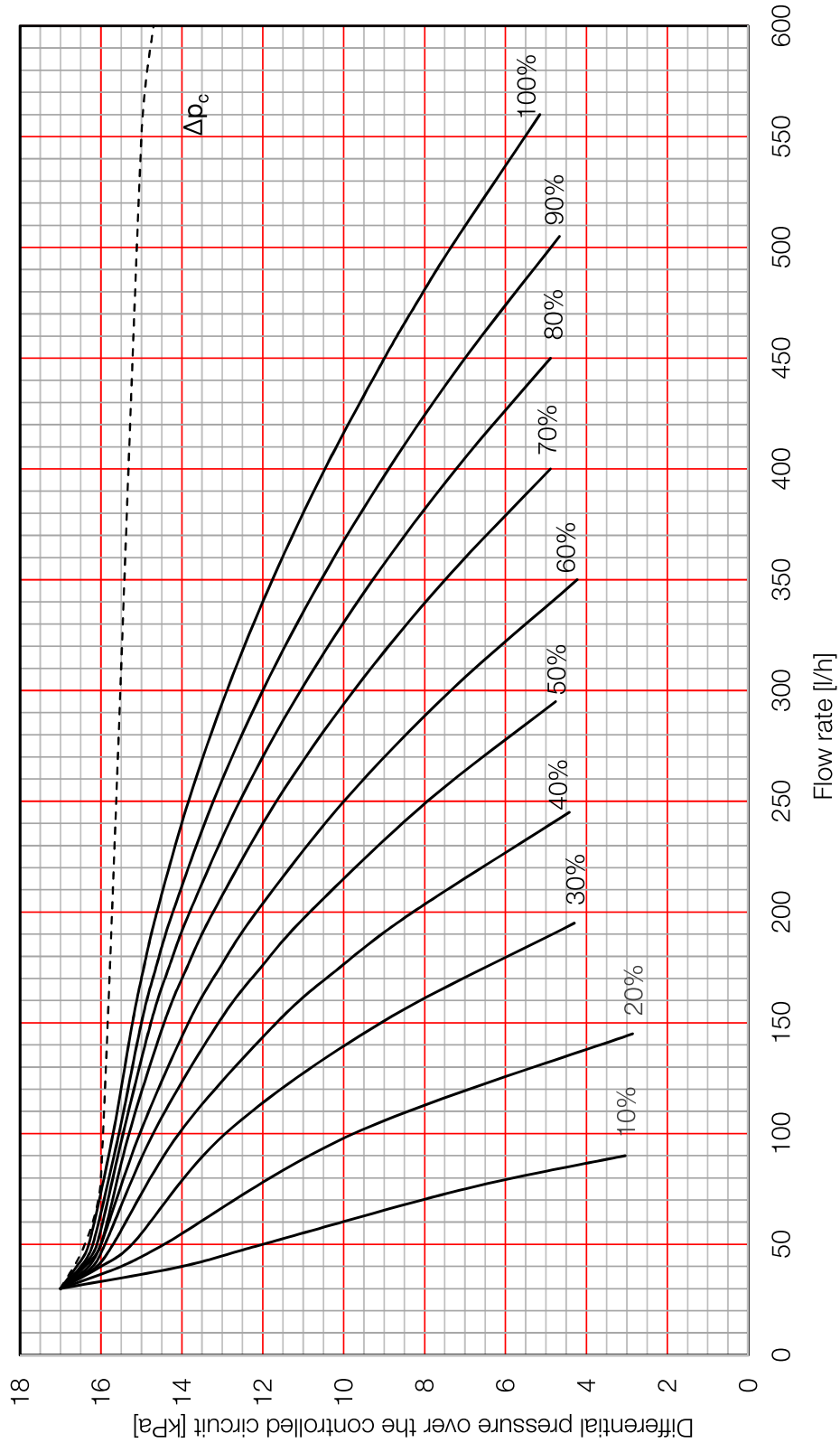
HERZ Table			Flow range in l/h - the flow limitation at Q_{max} applies when the restriction in the circuit is negligible *)		
LF: 1 4012 30, 1 4212 30 LP: 1 4012 31, 1 4012 32, 1 4212 31, 1 4212 32 HP: 1 4012 41, 1 4012 42, 1 4212 41, 1 4212 42					
Pre-setting	DN 15 LF	DN 15 LP	DN 15 HP	DN 20 LP	DN 20 HP
10%	30 - 90 l/h	50 - 420 l/h	50 - 580 l/h	50 - 420 l/h	50 - 580 l/h
15%	30 - 120 l/h	50 - 550 l/h	50 - 750 l/h	50 - 550 l/h	50 - 750 l/h
20%	30 - 145 l/h	50 - 650 l/h	50 - 900 l/h	50 - 650 l/h	50 - 900 l/h
25%	30 - 165 l/h	50 - 765 l/h	50 - 1050 l/h	50 - 765 l/h	50 - 1050 l/h
30%	30 - 195 l/h	50 - 850 l/h	50 - 1200 l/h	50 - 850 l/h	50 - 1200 l/h
35%	30 - 220 l/h	50 - 945 l/h	50 - 1350 l/h	50 - 945 l/h	50 - 1350 l/h
40%	30 - 245 l/h	50 - 1030 l/h	50 - 1465 l/h	50 - 1050 l/h	50 - 1465 l/h
45%	30 - 270 l/h	50 - 1125 l/h	50 - 1560 l/h	50 - 1165 l/h	50 - 1560 l/h
50%	30 - 295 l/h	50 - 1200 l/h	50 - 1650 l/h	50 - 1270 l/h	50 - 1650 l/h
55%	30 - 325 l/h	50 - 1230 l/h	50 - 1705 l/h	50 - 1365 l/h	50 - 1740 l/h
60%	30 - 350 l/h	50 - 1260 l/h	50 - 1765 l/h	50 - 1450 l/h	50 - 1830 l/h
65%	30 - 375 l/h	50 - 1285 l/h	50 - 1815 l/h	50 - 1520 l/h	50 - 1900 l/h
70%	30 - 400 l/h	50 - 1310 l/h	50 - 1860 l/h	50 - 1600 l/h	50 - 1950 l/h
75%	30 - 425 l/h	50 - 1330 l/h	50 - 1895 l/h	50 - 1670 l/h	50 - 2000 l/h
80%	30 - 450 l/h	50 - 1350 l/h	50 - 1925 l/h	50 - 1740 l/h	50 - 2020 l/h
85%	30 - 475 l/h	50 - 1365 l/h	50 - 1950 l/h	50 - 1800 l/h	50 - 2040 l/h
90%	30 - 505 l/h	50 - 1380 l/h	50 - 1970 l/h	50 - 1860 l/h	50 - 2060 l/h
95%	30 - 530 l/h	50 - 1390 l/h	50 - 1985 l/h	50 - 1915 l/h	50 - 2080 l/h
100%	30 - 560 l/h	50 - 1400 l/h	50 - 2000 l/h	50 - 1950 l/h	50 - 2100 l/h

*) additional restriction in the circuit reduces Q_{max}

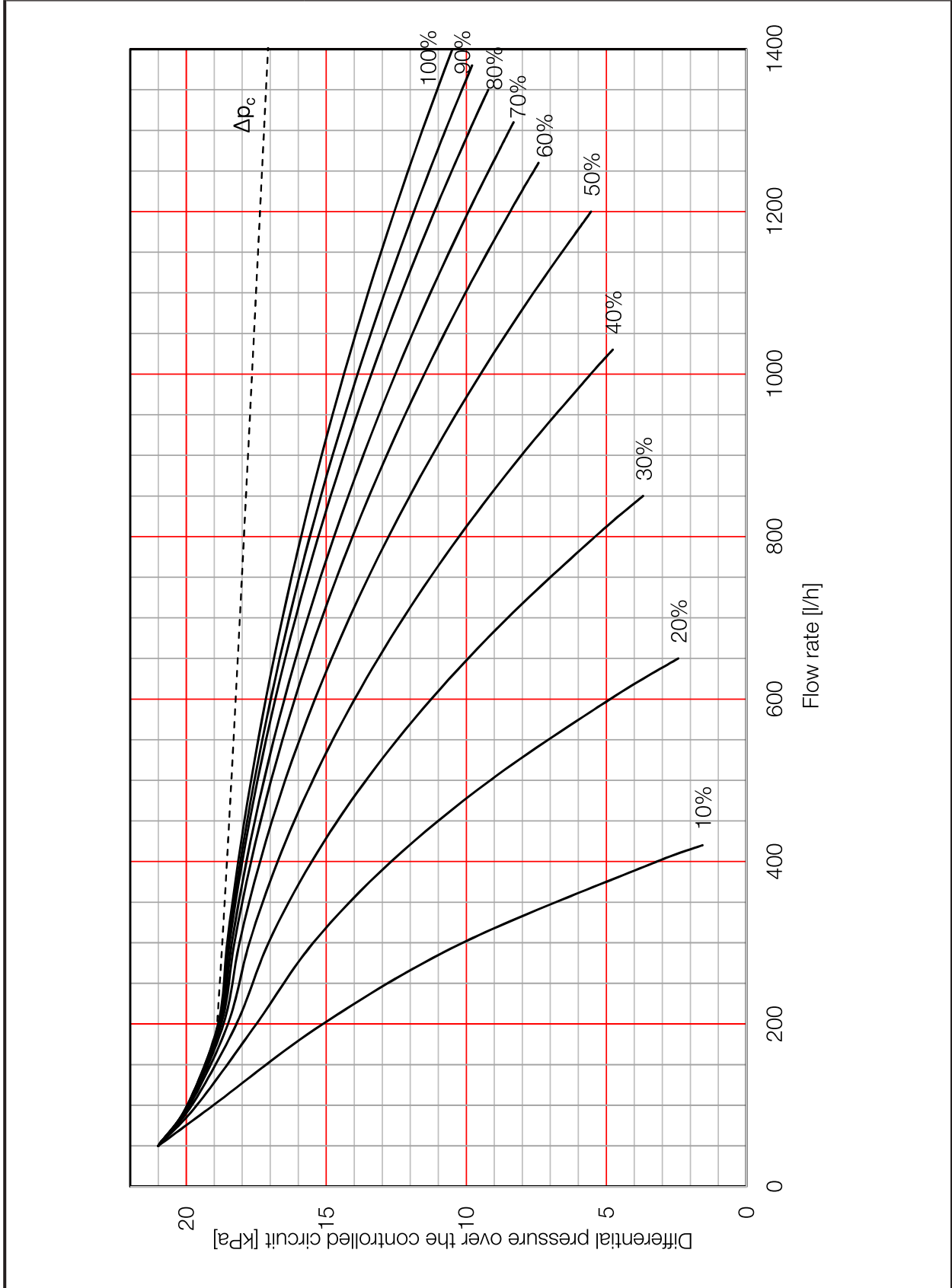
HERZ Table		kv _{REG} -values for the intergated throttling valve only			
LF: 1 4012 30, 1 4212 30 LP: 1 4012 31, 1 4012 32, 1 4212 31, 1 4212 32 HP: 1 4012 41, 1 4012 42, 1 4212 41, 1 4212 42					
Pre-setting	DN 15 LF	DN 15 LP	DN 15 HP	DN 20 LP	DN 20 HP
%	kv [m ³ /h]	kv [m ³ /h]	kv [m ³ /h]	kv [m ³ /h]	kv [m ³ /h]
10%	0.25	1.02		1.02	
15%	0.33	1.32		1.32	
20%	0.40	1.63		1.63	
25%	0.50	1.94		1.94	
30%	0.57	2.25		2.25	
35%	0.65	2.56		2.56	
40%	0.72	2.86		2.86	
45%	0.80	3.17		3.17	
50%	0.88	3.48		3.48	
55%	0.95	3.75		3.80	
60%	1.02	4.00		4.10	
65%	1.10	4.20		4.40	
70%	1.20	4.38		4.71	
75%	1.25	4.56		5.02	
80%	1.35	4.73		5.33	
85%	1.42	4.91		5.64	
90%	1.50	5.09		5.94	
95%	1.60	5.26		6.25	
100%	1.70	5.44		6.56	



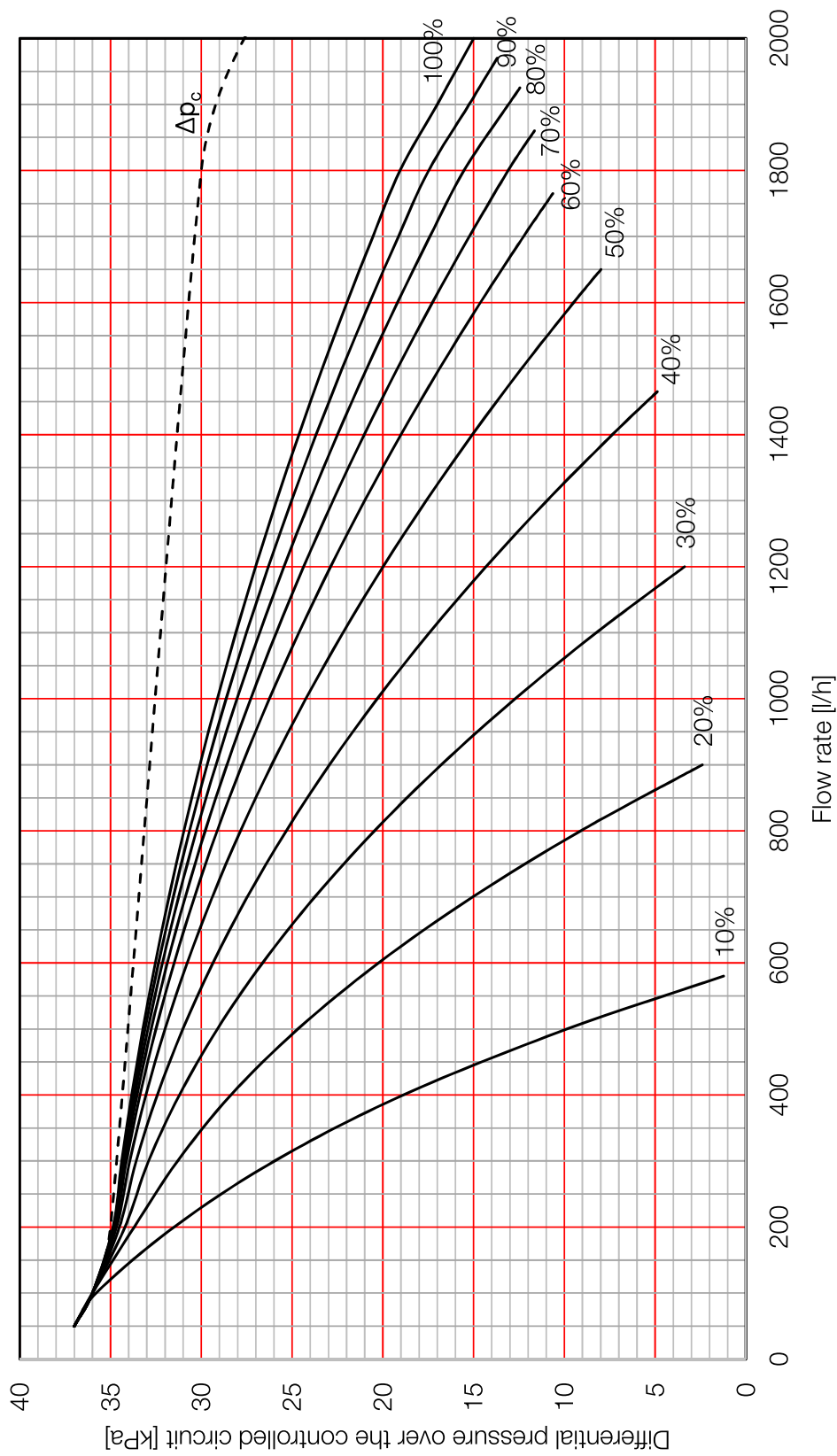
HERZ - Diagramm	HERZ VS-TS – Diagramme des für den geregelten Kreis verfügbaren Differenzdrucks
1 4012 30, 1 4212 30	DN 15 LF



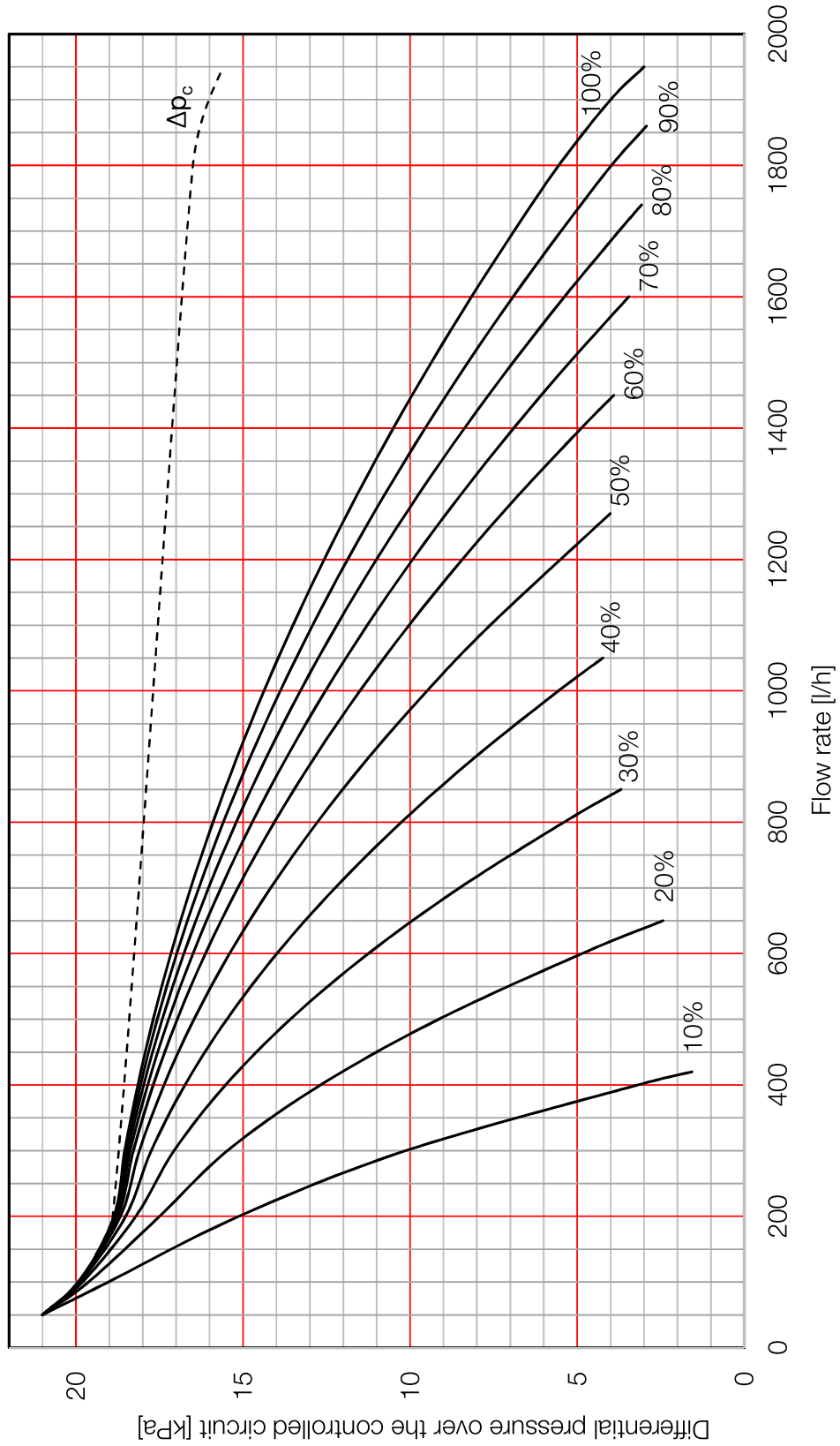
HERZ - Diagramm	HERZ VS-TS – Diagramme des für den geregelten Kreis verfügbaren Differenzdrucks
1 4012 31, 1 4212 31	DN 15 LP



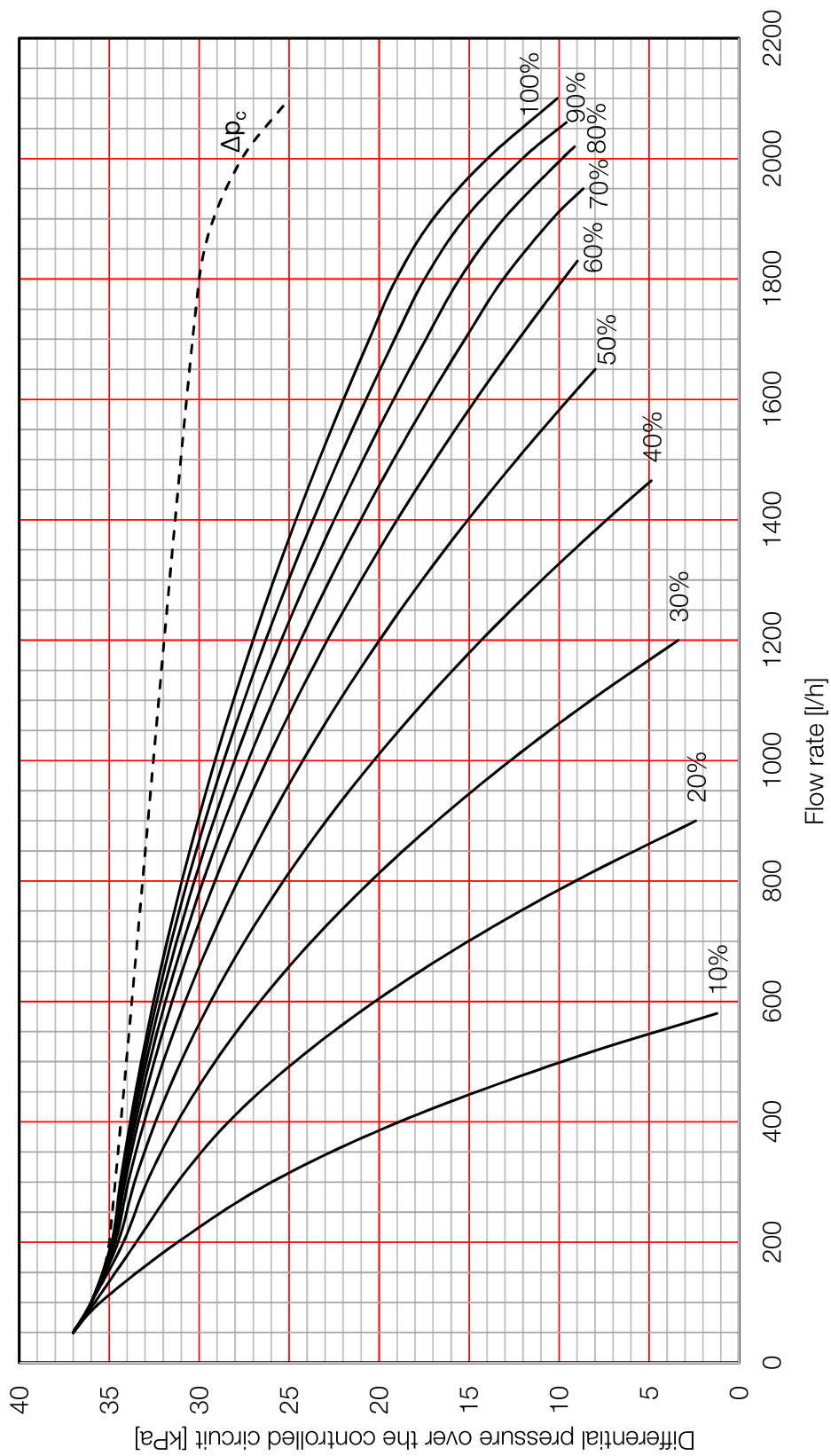
HERZ - Diagramm	HERZ VS-TS – Diagramme des für den geregelten Kreis verfügbaren Differenzdrucks
1 4012 41, 1 4212 41	DN 15 HP



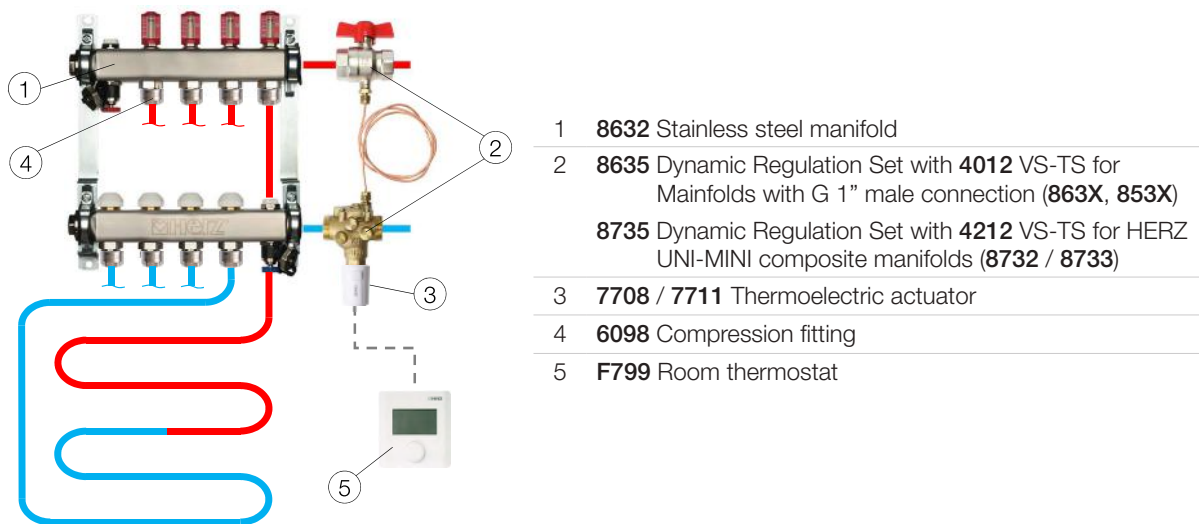
HERZ - Diagramm	HERZ VS-TS – Diagramme des für den geregelten Kreis verfügbaren Differenzdrucks
1 4012 32, 1 4212 32	DN 20 LP



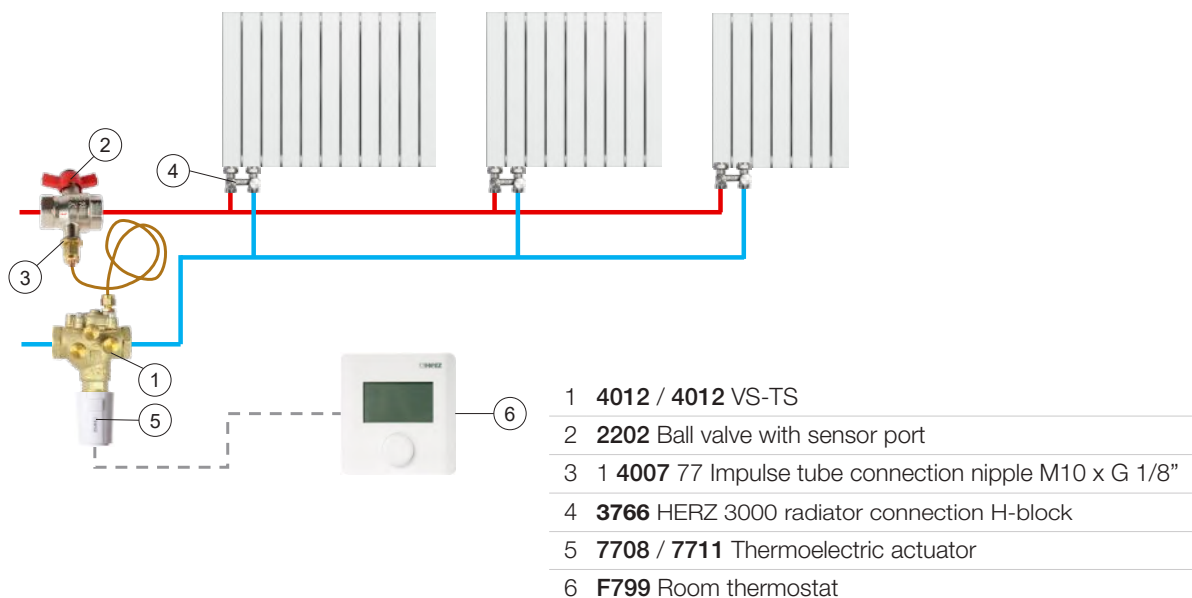
HERZ - Diagramm	HERZ VS-TS – Diagramme des für den geregelten Kreis verfügbaren Differenzdrucks
1 4012 42, 1 4212 42	DN 20 HP



- ☑ Application example of the HERZ 4X12 TV-VS with an underfloor heating manifold serving a single comfort control zone



- ☑ Application example of the HERZ 4X12 TV-VS with multiple radiators within a single comfort control zone



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