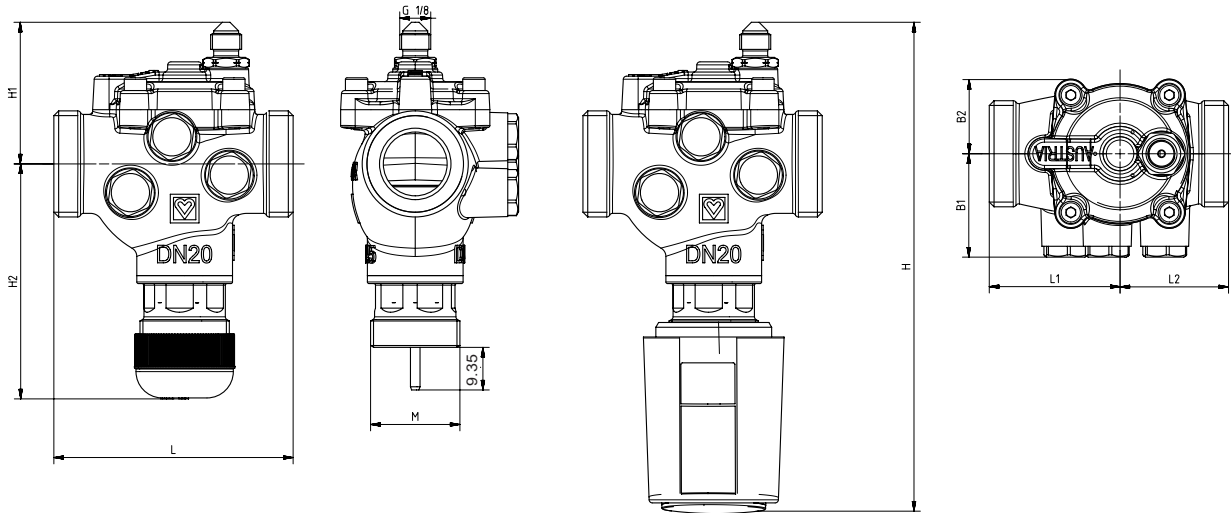


## Differential pressure control valve with integrated throttle, shut-off and zone valves

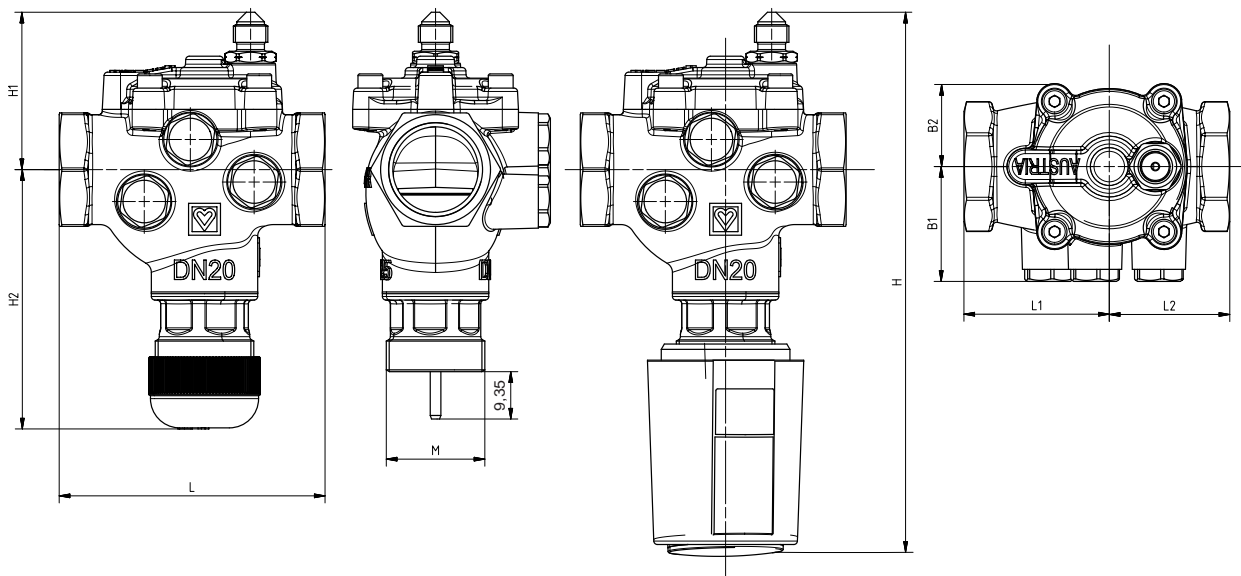
Datasheet 4012 / 4212, Issue 0322

Dimensions in mm

1 4012 XX



1 4212 XX



**☑ Dimensional Values and Ordering Numbers**

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	AG	G 3/4" flat sealing	75	45	74	154	33	23	41	34	28
1 4012 31	15 LP	AG	G 3/4" flat sealing	75	45	74	154	33	23	41	34	28
1 4012 41	15 HP	AG	G 3/4" flat sealing	75	45	74	154	33	23	41	34	28
1 4012 32	20 LP	AG	G 1" flat sealing	75	45	74	154	33	23	41	34	28
1 4012 42	20 HP	AG	G 1" flat sealing	75	45	74	154	33	23	41	34	28
1 4212 30	15 LF	IG	Rp 1/2"	75	45	74	154	33	23	41	34	28
1 4212 31	15 LP	IG	Rp 1/2"	75	45	74	154	33	23	41	34	28
1 4212 41	15 HP	IG	Rp 1/2"	75	45	74	154	33	23	41	34	28
1 4212 32	20 LP	IG	Rp 1/2"	75	45	74	154	33	23	41	34	28
1 4212 42	20 HP	IG	Rp 1/2"	75	45	74	154	33	23	41	34	28

\* with 1 7708 XX thermoelectric drive

**☑ Technical data**

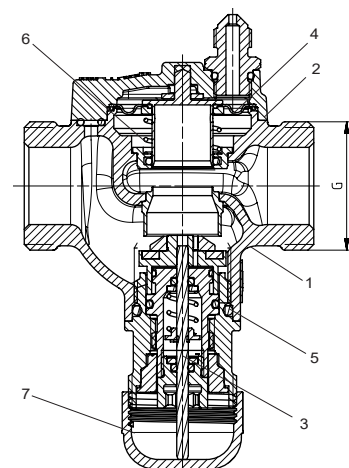
Nominal diameter	DN 15 LF	DN 15 LP	DN 15 HP	DN 20 LP	DN 20 HP
Controlled $\Delta p_c^{**}$	15 kPa	20 kPa	35 kPa	20 kPa	35 kPa
Flow range	30-600 l/h	50-1650 l/h	50-2000 l/h	50-1800 l/h	50-2150 l/h
$k_{vs}$ -Value	1,5	3,2		3,5	
Max. differential pressure	400 kPa				
Min. differential pressure $\Delta p_{System}$	Controlled $\Delta p_c + 5$ kPa				
Nominal maximal pressure	PN16				
Control valves characteristic	Linear				
Medium temperature max	130 °C				
Medium temperature min	2 °C (pure water); - 20 °C (antifreeze)				
Stroke	4 mm				
Setting range	10 % - 100 %				
Actuator Connection	M 28x1.5				

\*\* Orientational value, for accurate controlled  $\Delta p_c$  at the given design flow, please refer to the chart on Page 10.

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 14301
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 1/4-inch nipple (included in delivery). Alternatively, the impulse tube can be connected to a commissioning valve, such as 4017 or 4217. 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:

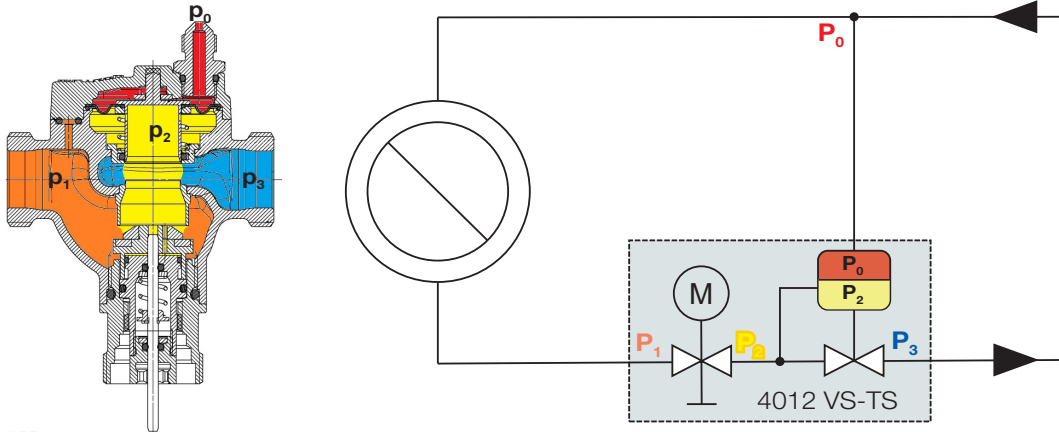
- Underfloor heating manifold. As the pressure is constant inside each of the manifold bars, all loops see the same differential pressure. Just the value of this pressure difference needs to be maintained using the 4012 VS-TS. This is a more cost effective and more dirt resistant solution as compared 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 pre-setting functionality.

The HERZ 4012 VS-TS can be regarded as an external pre-setting 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 pre-setting on the VS-TS is applied.

### Valve construction



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  $\Delta p_c$ . 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  $\Delta p_{REG}$  over the integrated throttling valve needs to be taken into account in the hydraulic design of the circuit.

This additional pressure loss  $\Delta p_{REG}$  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:

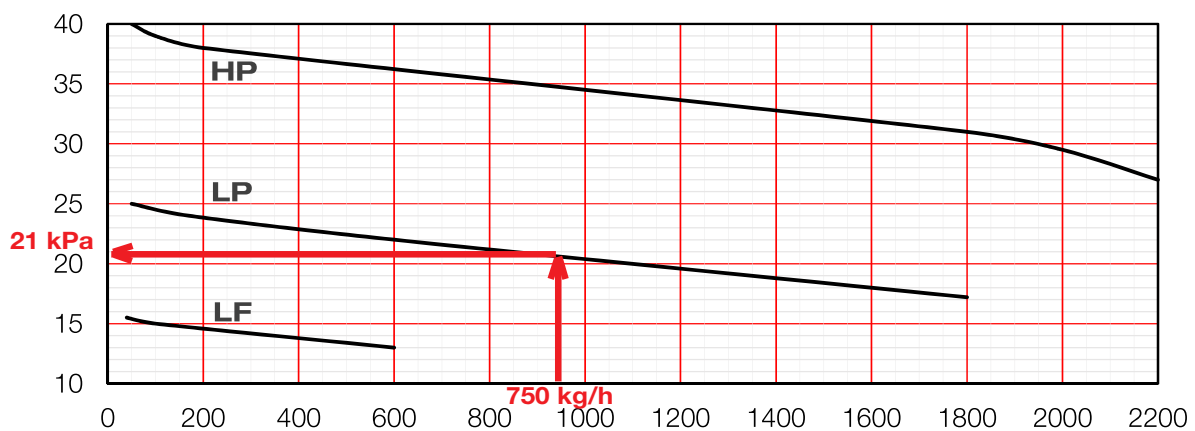
- An apartment with several radiators requiring a total mass flow of 750 kg/h at design conditions.
- HERZ **4X12** TS-VS, will be used to regulate the maximum flow through the circuit. If the apartment was a single comfort control zone and there were no thermostatic heads installed on the thermostatic valves, the 4012 VS-TS valve could also be used to fit the HERZ **7708** actuating drive in order to control the whole zone with a room thermostat, such as the HERZ **F799** electronic room thermostat.

#### A) Simple setting for the maximum flow

From the table on page 8, a setting of 30% will limit the flow at 930 l/h, which gives 25% margin for the flow restrictions within the circuit. A 20-30% margin is a good rule of thumb for the choice of the pre-setting when there is a control valve within the circuit. It ensures that the control valve retains an appropriate authority.

#### B) Calculation of the pressure drop over the throttling valve, and of the pressure available for the circuit valves

For the total mass flow of 750 kg/h, read the controlled  $\Delta p_c$  value from the chart. For the LP versions ->  $\Delta p_c = 21$  kPa.



A DN 15 valve is chosen, matching the pipe dimension. Using the kv values from the table on Page 9, we calculate the pressure loss on the throttling valve integrated in the **4X12** VS-TS, and the remaining differential pressure available to the circuit:

Pre-setting of the <b>4X12</b> valve	kv value of the throttling valve	Pressure loss on throttling valve with 750 l/h flow rate	Remaining diff. pressure available to the circuit
	15 LP	15 LP	15 LP
20 %	1.81	17.2 kPa	3.8 kPa
30 %	2.34	10.3 kPa	10.7 kPa
40 %	2.73	7.5 kPa	13.5 kPa
50 %	3.05	6.0 kPa	15.0 kPa
60 %	3.35	5.0 kPa	16.0 kPa
70 %	3.67	4.2 kPa	16.8 kPa
80 %	3.87	3.8 kPa	17.2 kPa
90 %	4.33	3.0 kPa	18.0 kPa
100 %	4.87	2.4 kPa	18.6 kPa

With 30% pre-setting, there will be 10.7 kPa of differential pressure available to the circuit. We can now size the thermostatic valves on the radiators for this differential pressure.

### C) Finding of the total kv of the whole pressure regulated circuit

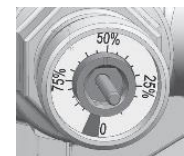
A more accurate calculation can be done by adding the kv values of the selected radiator valves with the kv value of the throttling valve integrated in the 4012 VS-TS, in order to find the kv value of the whole pressure-controlled circuit. Resistances in parallel simply add up, resistances in series add up as inverse values of square values:

$$\frac{1}{(kv_{\text{circuit}})^2} = \frac{1}{(kv_{\text{rad},1} + kv_{\text{rad},2} + \dots + kv_{\text{rad},n})^2} + \frac{1}{(kv_{4012})^2}$$

The sizing of the radiator valves and the selection of 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.

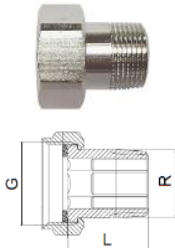
### ☑ Pre-setting of the HERZ 4X12 VS-TS valves

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

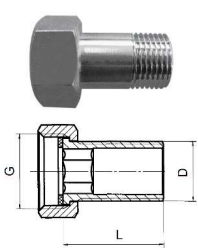


### ☑ Connection Fittings

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

	Article No.	Valve dim.	G	R	L
	1 <b>6220</b> 21	DN 15	G 3/4"	R 1/2"	26.3 mm
1 <b>6220</b> 12	DN 20	G 1"	R 3/4"	31.4 mm	

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

	Article No.	Valve dim.	G	D	L
	1 <b>6220</b> 11	DN 15	G 3/4"	G 1/2"	38.0 mm
1 <b>6220</b> 22	DN 20	G 1"	G 3/4"	44.5 mm	

**6236** Coupling nut and soldering tailpiece with flat sealing




	Article No.	Valve dim.	G	Ø D	L
	1 <b>6236 01</b>	DN 15	G ¾"	Ø 12 mm	14 mm
	1 <b>6236 11</b>	DN 15	G ¾"	Ø 15 mm	17 mm
	1 <b>6236 21</b>	DN 15	G ¾"	Ø 18 mm	19 mm
	1 <b>6236 02</b>	DN 20	G 1"	Ø 15 mm	18 mm
	1 <b>6236 12</b>	DN 20	G 1"	Ø 18 mm	19 mm
	1 <b>6236 22</b>	DN 20	G 1"	Ø 22 mm	23 mm

 T **70XX** Press fittings for multilayer and PEX pipes, with flat sealing

	Article No.	Valve dim.	G	Pipe
	T <b>7016 41</b>	DN 15	G ¾"	16 x 2
	T <b>7020 41</b>	DN 15	G ¾"	20 x 2
	T <b>7016 42</b>	DN 20	G 1"	16 x 2
	T <b>7020 42</b>	DN 20	G 1"	20 x 2
	T <b>7026 42</b>	DN 20	G 1"	26 x 3

 **Accessories**

Article no.	Dim.	Description	Image
1 <b>7711 10</b>	230 V / AC	HERZ actuating drives for 2-point, NC M 28 x 1.5, 115 N, 2-point, 4.5 mm stroke.	
1 <b>7711 12</b>	24 V / AC / DC	HERZ actuating drives for 2-point, NC M 28 x 1.5, 115 N, 2-point, 4.5 mm stroke.	
1 <b>7990 31</b>	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 integrated, male connector, cable loose, without limit switch. Closing force 125 N, 1.2 watt with valve stroke detection.	
1 <b>7708 53</b>	230V/AC	HERZ actuating drive for 2-point control for floor heating circuit distributors and valves M28x1.5, 2-point, also suitable for pulse-pause operation, 5 mm stroke, adapter M28x1.5 colour red integrated, cable fixed, without limit switch. Closing force 100 N. Power consumption 1 watt.	
1 <b>7708 52</b>	24V/AC	HERZ actuating drive for 2-point control for floor heating circuit distributors and valves M28x1.5, 2-point, also suitable for pulse-pause operation, 5 mm stroke, adapter M28x1.5 colour red integrated, cable fixed, without limit switch. Closing force 100 N. Power consumption 1 watt.	

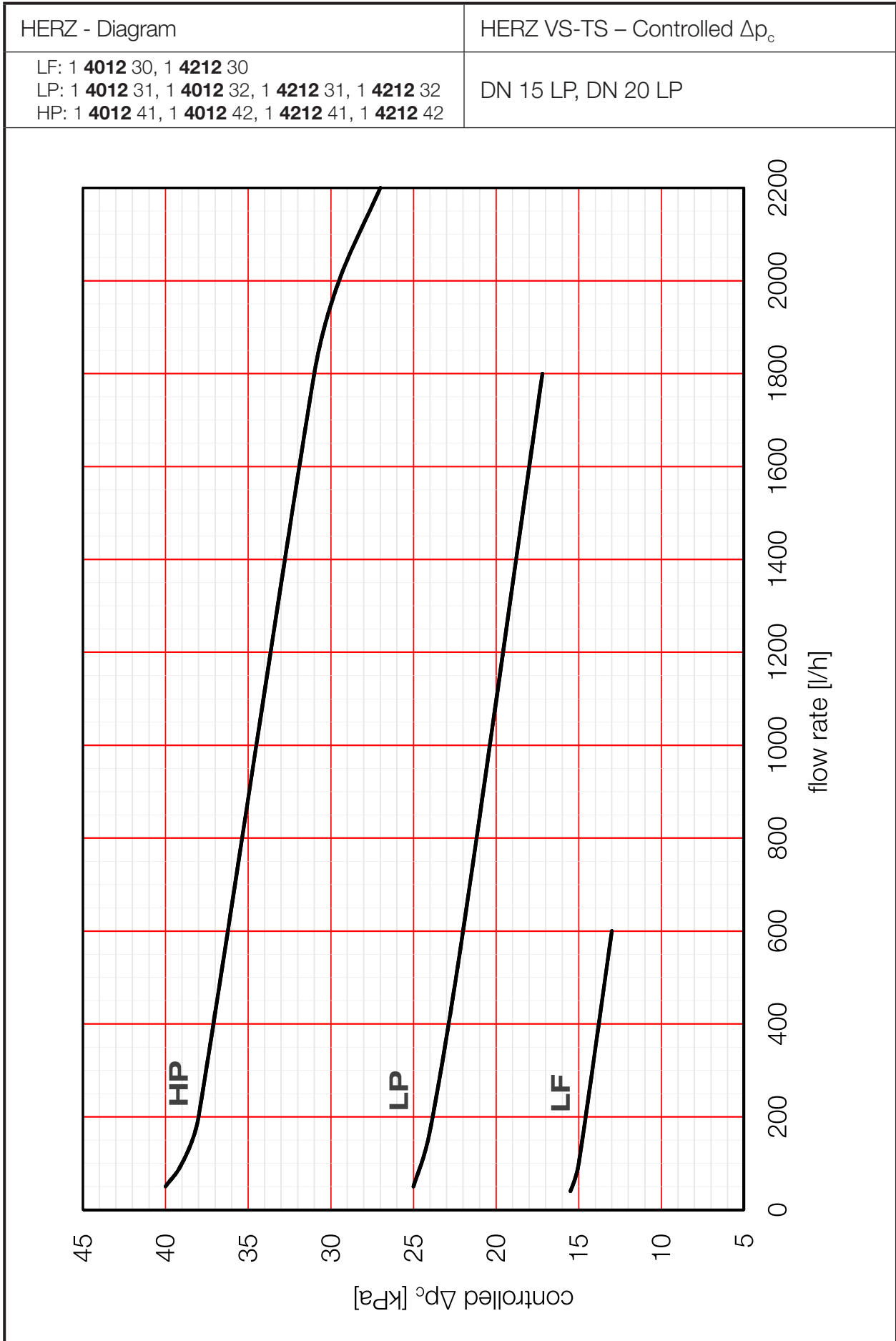
Article no.	Dim.	Description	Image
1 7708 40	24V/AC/DC	HERZ geared motor 3-point Adapter M 28 x 1.5 colour blue integrated, 24 V, stroke distance max. 8.5 mm, max. actuation force 200 N.	
1 7708 41	230V/AC	HERZ geared motor 3-point Adapter M 28 x 1.5 colour blue integrated, 230 V, stroke distance max. 8.5 mm, max. actuation force 200 N.	
1 7708 42	24V/AC/DC control signal 0...10V/DC	HERZ geared motor DDC 0–10 V Adapter M 28 x 1.5 colour blue integrated, 24 V, stroke distance max. 8.5 mm, max. actuation force 200 N.	
1 7708 46	24V/AC/DC control signal 0...10V/DC	HERZ geared motor DDC 0–10 V Adapter M 28 x 1.5 colour blue integrated, 24 V, stroke distance max. 8.5 mm, max. actuation force 200 N. With valve port detection and feedback channel.	
1 2202 81	DN 15 G 1/2" Gewindemuffe	HERZ Partnerkugelhahn für Impulsleitungsanschluss im Vorlauf mittels der G1/8" x M10x1 Anschlussnippel 1 4007 77. Schließen des Kugelhahns schließt auch den Impulsleitungsabgang	
1 2202 82	DN 20 G 3/4" Gewindemuffe		
1 2202 83	DN 20 G 1" Gewindemuffe		
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" bore-holes	
1 4006 02		Pre-setting key for HERZ-PICV 4006/4206 and HERZ VS-TS 4012	

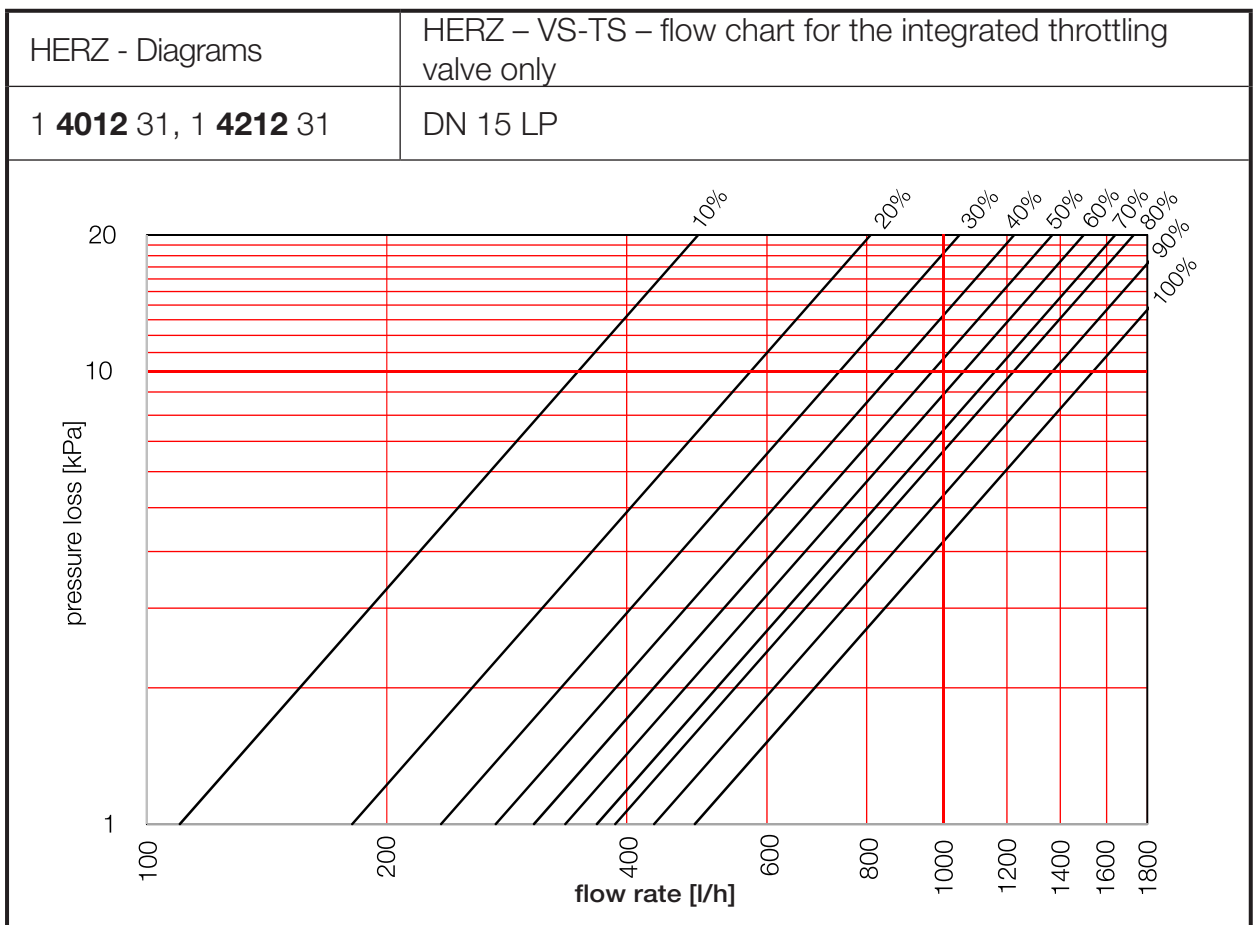
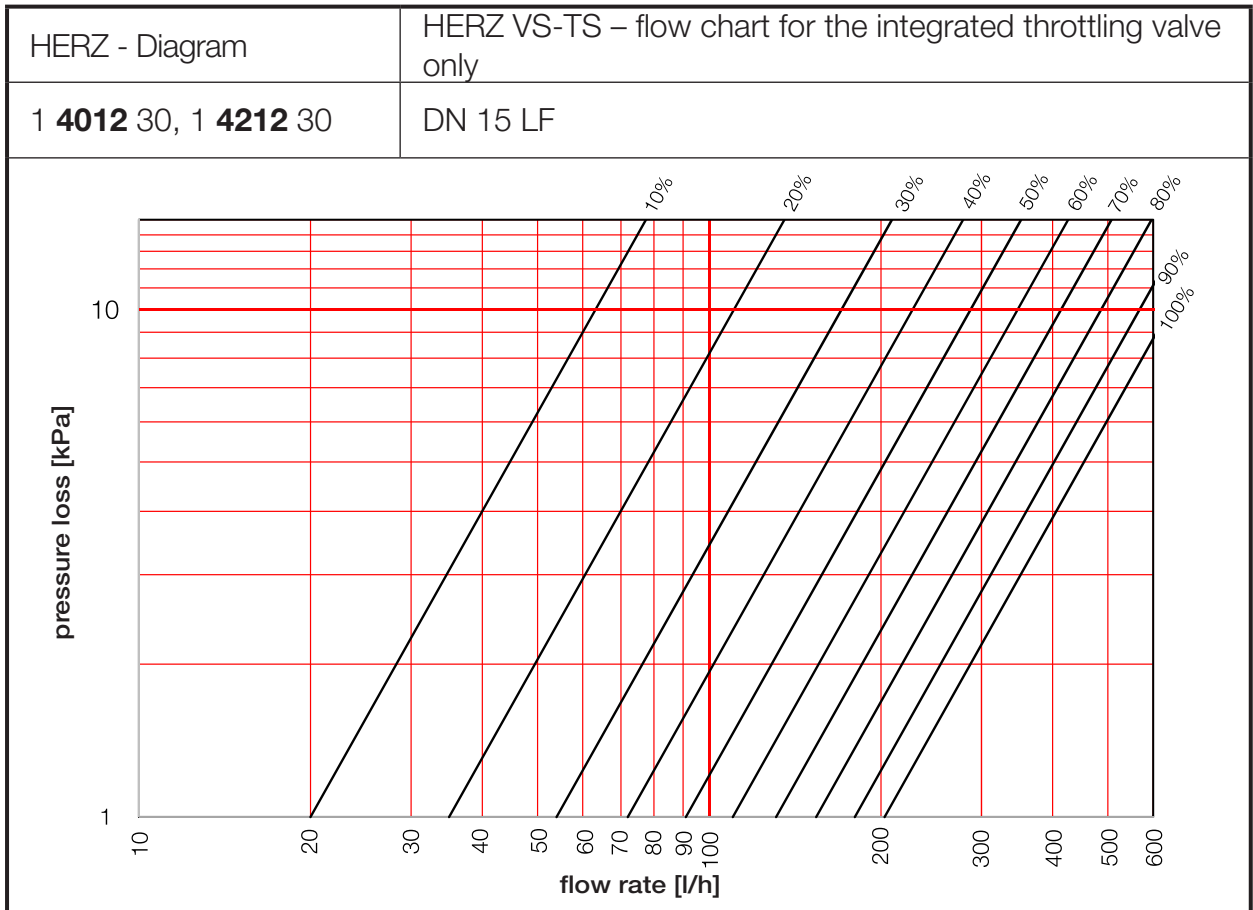
HERZ Table			Flow range - the flow limitation at $Q_{max}$ applies when the restriction in the circuit is negligible*)		
LF: 1 <b>4012</b> 30, 1 <b>4212</b> 30 LP: 1 <b>4012</b> 31, 1 <b>4012</b> 32, 1 <b>4212</b> 31, 1 <b>4212</b> 32 HP: 1 <b>4012</b> 41, 1 <b>4012</b> 42, 1 <b>4212</b> 41, 1 <b>4212</b> 42					
Voreinstellung	DN 15 LF	DN 15 LP	DN 15 HP	DN 20 LP	DN 20 HP
10%	30 - 110 l/h	50 - 450 l/h	50 - 550 l/h	50 - 450 l/h	50 - 550 l/h
15%	30 - 135 l/h	50 - 650 l/h	50 - 750 l/h	50 - 650 l/h	50 - 750 l/h
20%	30 - 160 l/h	50 - 800 l/h	50 - 950 l/h	50 - 800 l/h	50 - 950 l/h
25%	30 - 185 l/h	50 - 870 l/h	50 - 1150 l/h	50 - 870 l/h	50 - 1150 l/h
30%	30 - 210 l/h	50 - 930 l/h	50 - 1300 l/h	50 - 930 l/h	50 - 1300 l/h
35%	30 - 235 l/h	50 - 1020 l/h	50 - 1400 l/h	50 - 1020 l/h	50 - 1400 l/h
40%	30 - 260 l/h	50 - 1100 l/h	50 - 1500 l/h	50 - 1100 l/h	50 - 1500 l/h
45%	30 - 280 l/h	50 - 1150 l/h	50 - 1575 l/h	50 - 1150 l/h	50 - 1575 l/h
50%	30 - 300 l/h	50 - 1200 l/h	50 - 1650 l/h	50 - 1200 l/h	50 - 1650 l/h
55%	30 - 320 l/h	50 - 1290 l/h	50 - 1700 l/h	50 - 1290 l/h	50 - 1725 l/h
60%	30 - 340 l/h	50 - 1340 l/h	50 - 1750 l/h	50 - 1340 l/h	50 - 1800 l/h
65%	30 - 360 l/h	50 - 1380 l/h	50 - 1800 l/h	50 - 1380 l/h	50 - 1850 l/h
70%	30 - 380 l/h	50 - 1430 l/h	50 - 1850 l/h	50 - 1430 l/h	50 - 1900 l/h
75%	30 - 405 l/h	50 - 1480 l/h	50 - 1875 l/h	50 - 1520 l/h	50 - 1950 l/h
80%	30 - 430 l/h	50 - 1520 l/h	50 - 1900 l/h	50 - 1600 l/h	50 - 2000 l/h
85%	30 - 475 l/h	50 - 1560 l/h	50 - 1925 l/h	50 - 1650 l/h	50 - 2050 l/h
90%	30 - 520 l/h	50 - 1600 l/h	50 - 1950 l/h	50 - 1700 l/h	50 - 2100 l/h
95%	30 - 560 l/h	50 - 1630 l/h	50 - 1975 l/h	50 - 1750 l/h	50 - 2125 l/h
100%	30 - 600 l/h	50 - 1650 l/h	50 - 2000 l/h	50 - 1800 l/h	50 - 2150 l/h

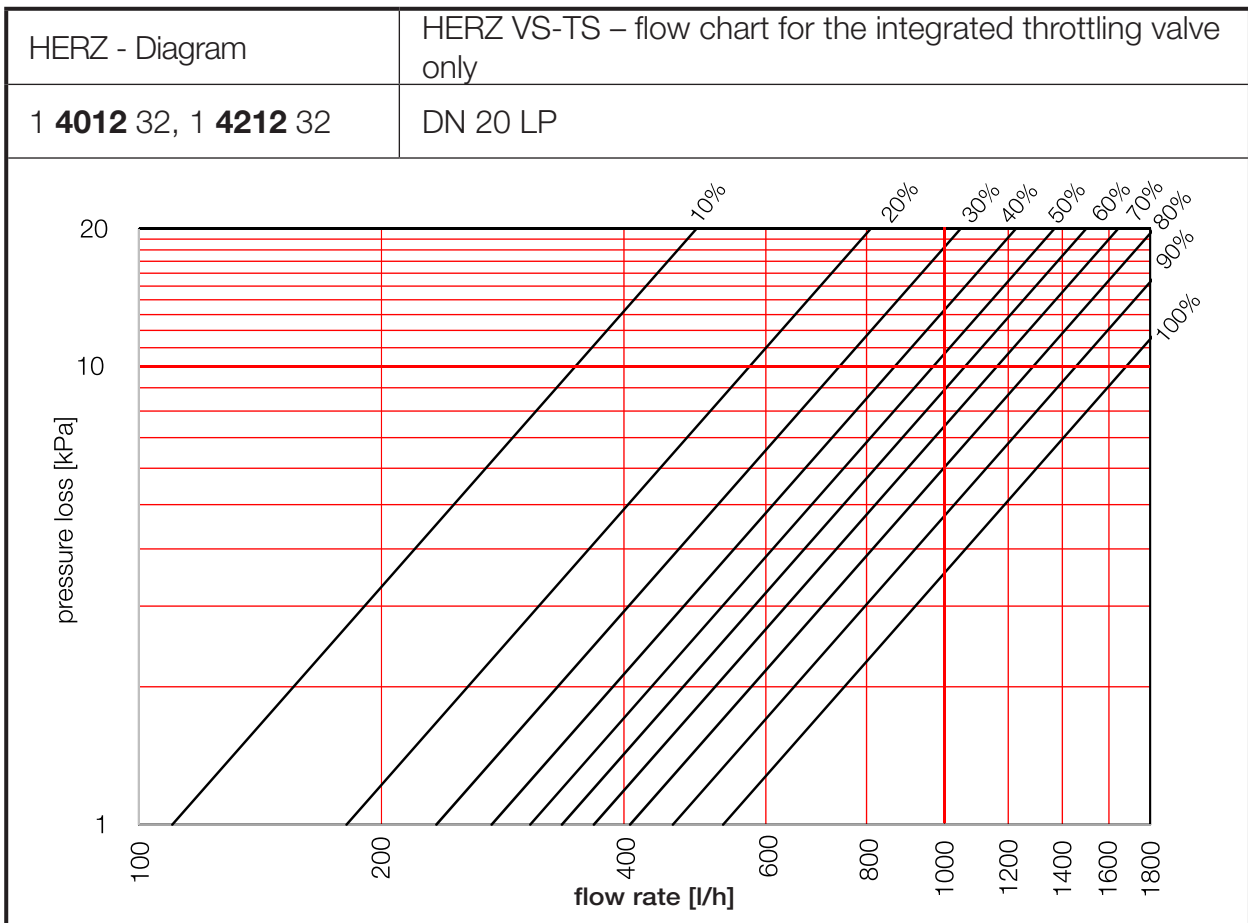
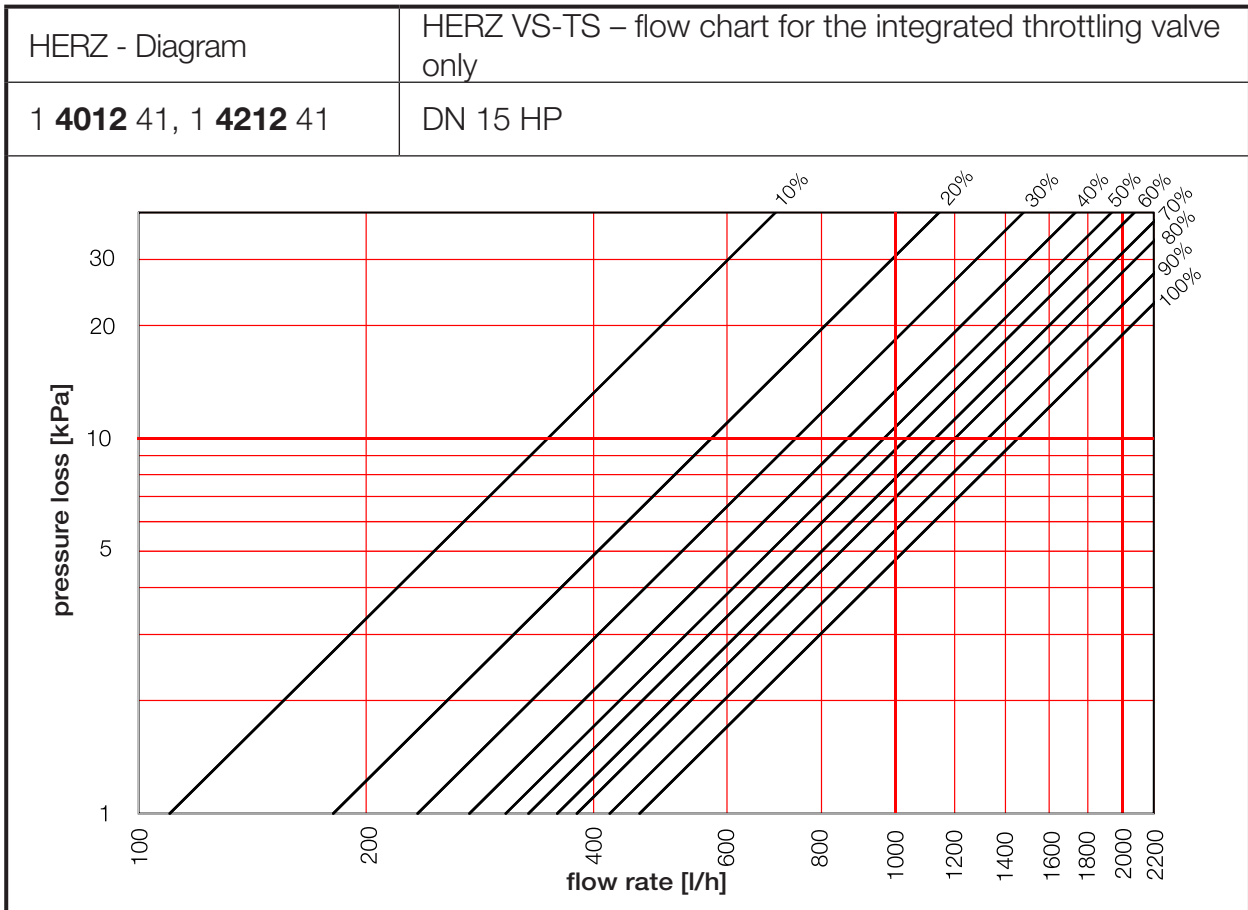
\*) additional restriction in the circuit reduces  $Q_{max}$

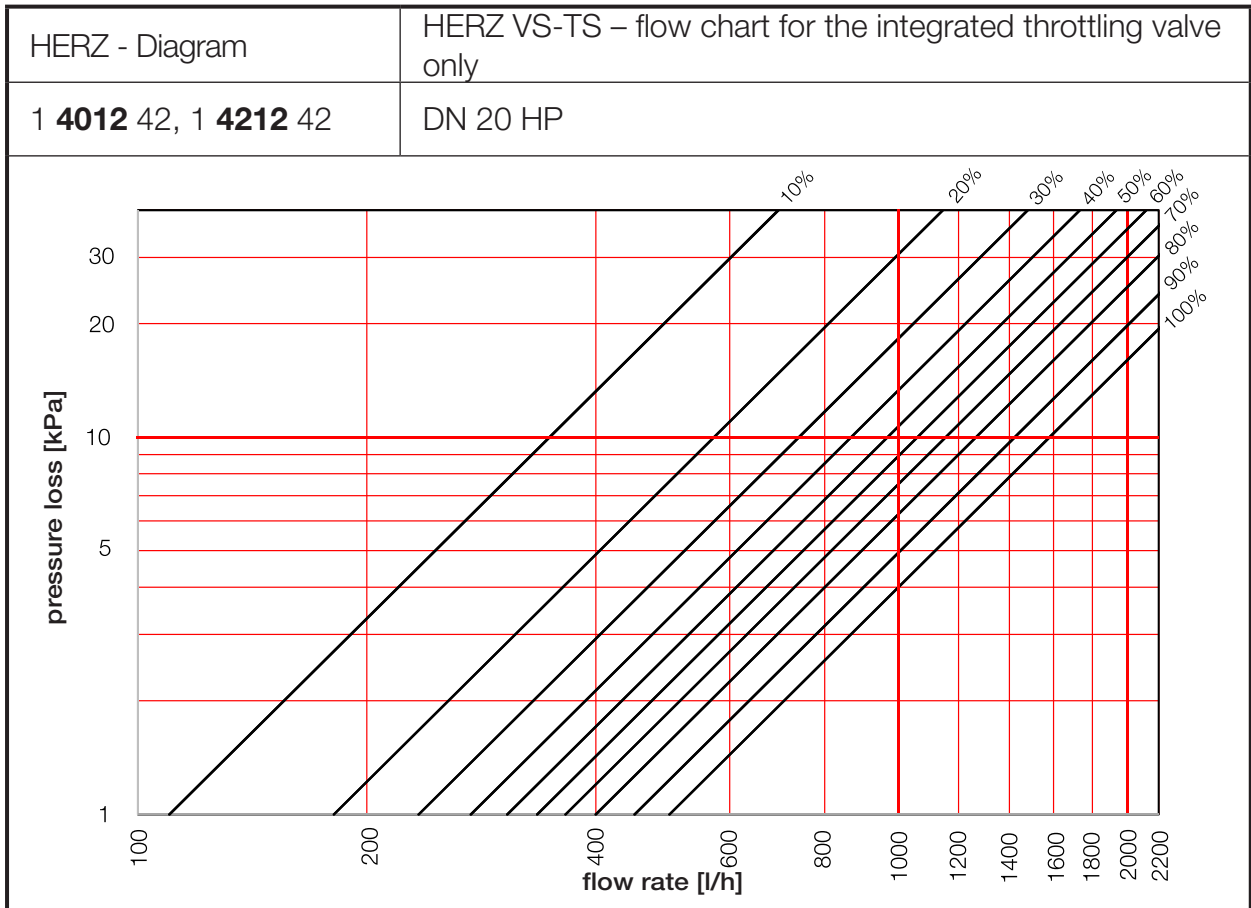


HERZ Table			kv <sub>REG</sub> -values for the intergated throttling valve and valve body only		
LF: 1 <b>4012</b> 30. 1 <b>4212</b> 30 LP: 1 <b>4012</b> 31. 1 <b>4012</b> 32. 1 <b>4212</b> 31. 1 <b>4212</b> 32 HP: 1 <b>4012</b> 41. 1 <b>4012</b> 42. 1 <b>4212</b> 41. 1 <b>4212</b> 42					
Pre-setting	DN 15 LF	DN 15 LP	DN 15 HP	DN 20 LP	DN 20 HP
%	kv [m <sup>3</sup> /h]	kv [m <sup>3</sup> /h]	kv [m <sup>3</sup> /h]	kv [m <sup>3</sup> /h]	kv [m <sup>3</sup> /h]
10%	0.20	1.10	1.10	1.10	1.10
15%	0.28	1.48	1.48	1.48	1.48
20%	0.35	1.81	1.81	1.81	1.81
25%	0.44	2.10	2.10	2.10	2.10
30%	0.54	2.34	2.34	2.34	2.34
35%	0.63	2.55	2.55	2.55	2.55
40%	0.72	2.74	2.74	2.74	2.74
45%	0.81	2.91	2.91	2.91	2.91
50%	0.91	3.06	3.06	3.06	3.06
55%	1.00	3.20	3.17	3.20	3.20
60%	1.10	3.35	3.28	3.35	3.35
65%	1.20	3.50	3.43	3.50	3.50
70%	1.31	3.67	3.58	3.67	3.65
75%	1.43	3.76	3.70	3.86	3.80
80%	1.54	3.87	3.80	4.07	4.00
85%	1.67	4.08	4.00	4.31	4.25
90%	1.80	4.33	4.20	4.60	4.50
95%	1.92	4.59	4.40	4.93	4.75
100%	2.03	4.87	4.60	5.31	5.00

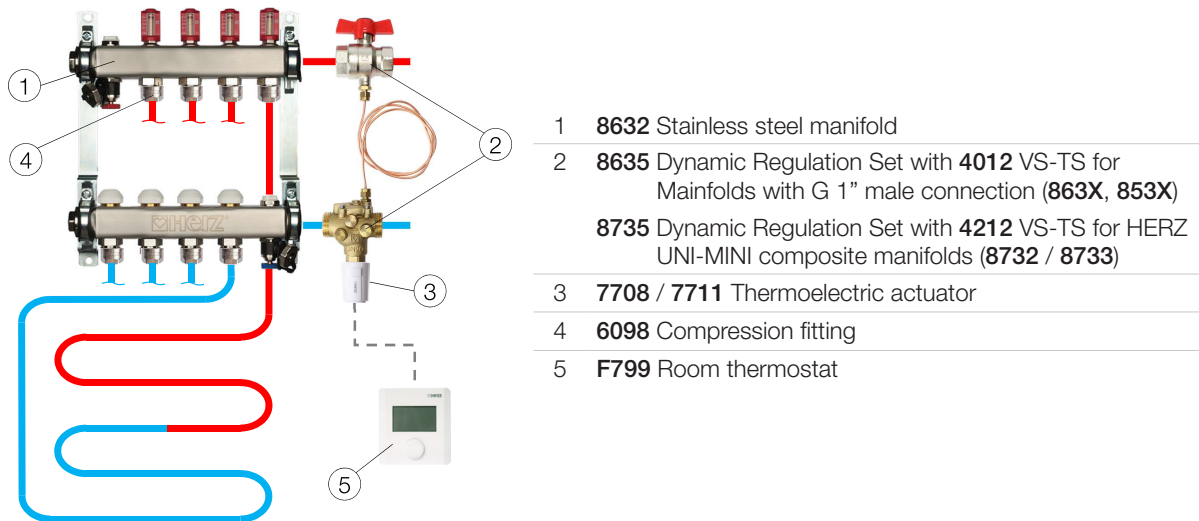




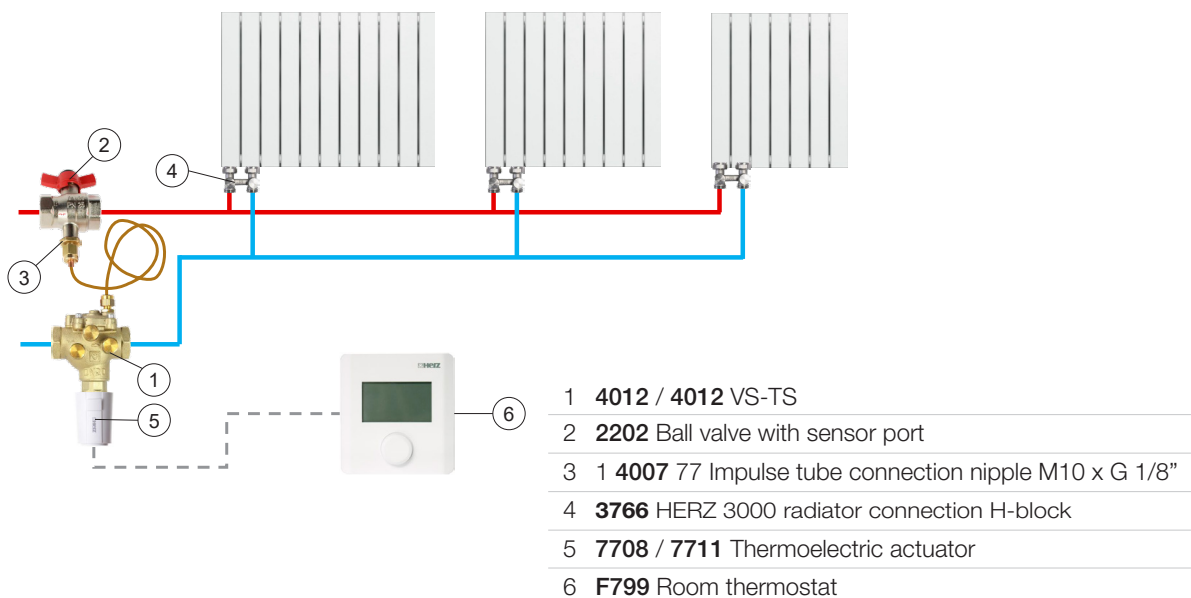




- ☑ Application example of the HERZ 4X12 TV-VS with an underfloor heating manifold serving a single comfort control zone



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



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