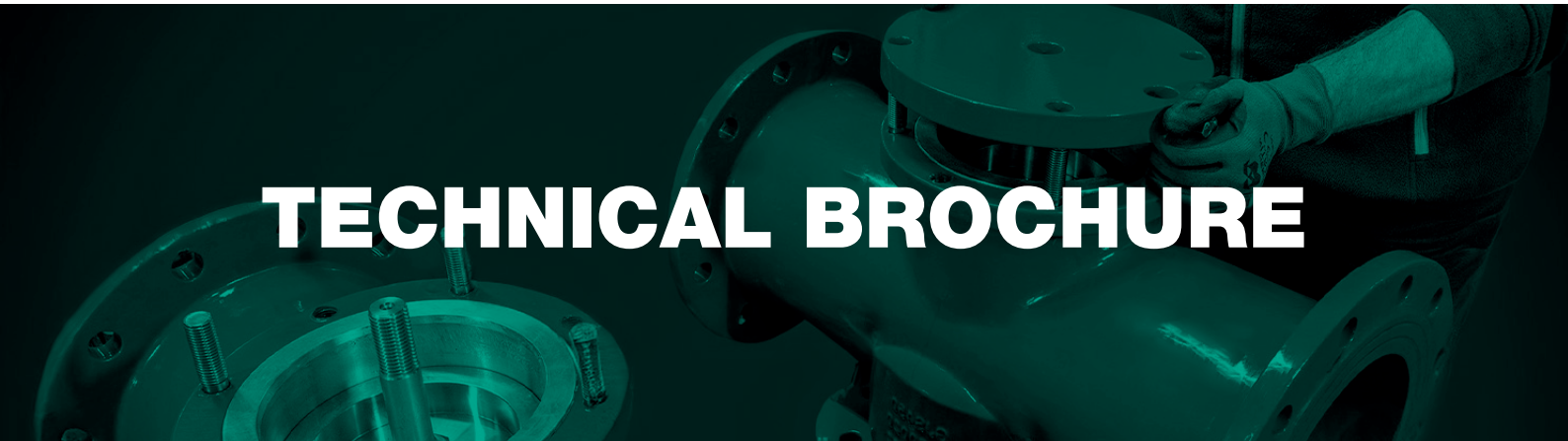
Pietro Fiorentini

H-PVS

Safety valves



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H-PVS_technicalbrochure_ENG_revB

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Anti-water hammer quick-acting safety valve

H-PVS

The **H-PVS** safety valve is designed to prevent the effects of water hammer on pipelines. When the pressure reaches a preset maximum threshold, the valve acts immediately, discharging the necessary amount of water outside to avoid overpressure.

Constructive features and advantages

- Innovative design and reliable construction with directional cone and deflector. Class PN 25; PN 40 on request.
- Negligible inertia and sliding friction thanks to floating plug technology.
- Perfectly watertight even at low pressures.
- High-frequency springs specially treated to avoid hysteresis effects; available in various calibration values.

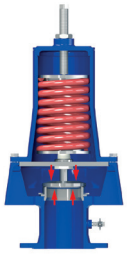
Main applications

- Downstream of lifting stations to absorb the overpressure shock generated by the second variable motion phase, following the sudden stop of the pump or its uncontrolled start-up.
- Downstream and upstream of delivery lines and pipeline sections that cannot tolerate pressure surges.
- Downstream of reduction units, as a safety device.
- Upstream of shut-off devices whose abrupt or uncontrolled closure could generate sudden pressure increases.
- In general, where pressure increases may occur.

Operating principle

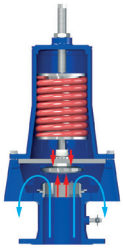
In order to open when the pressure exceeds the maximum threshold considered critical for the system, the valve must be pre-tuned by adjusting the spring compression.
To facilitate this operation even when in range, the valve is supplied with a pressure gauge and a drain ball valve. The separating plate protects the top from water jets when draining.

Performance graph



Valve closed

If the pressure remains below the set value, the valve remains perfectly closed, thanks to the force of the spring acting on the plug.



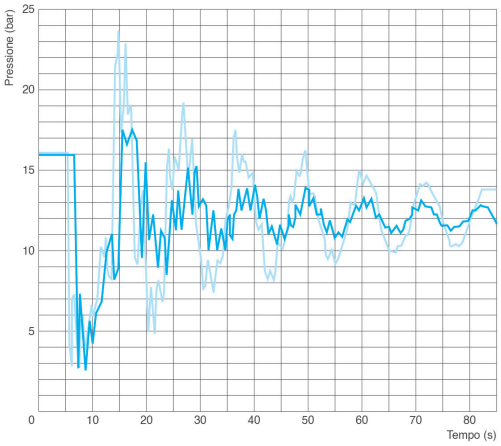
Valve open

When the pressure reaches the maximum permissible threshold, the valve opens, discharging enough water to avoid overpressure.

The graph on the right shows the pressure development during the opening phase of the H-PVS valve under variable motion conditions. In this particular case, actual values measured in a lifting station subject to frequent shutdowns due to power failures are reported.

Note how, without protective parts and due to the high disturbance frequency, the pressure first drops, and then rises until it reaches values that are harmful to the system (sky blue line). The equipment's response to these variations is rapid and optimal, even in managing the phenomenon of the propagation of the helix wave (blue line).

The picture opposite shows how the vertical deflector is able to contain the spray in the surrounding environment during the valve discharge phase.



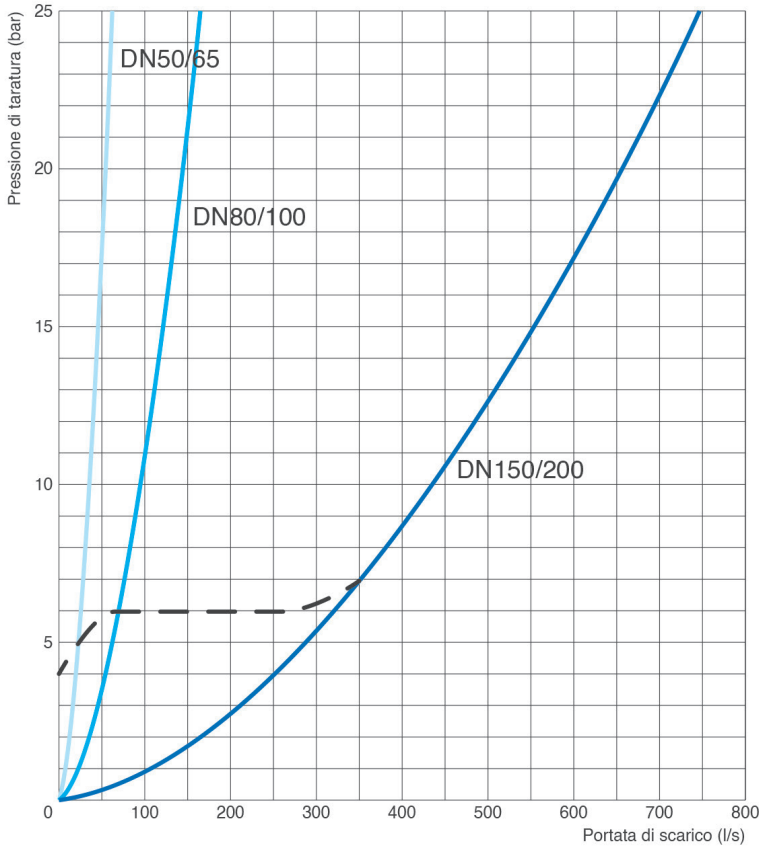
Technical data

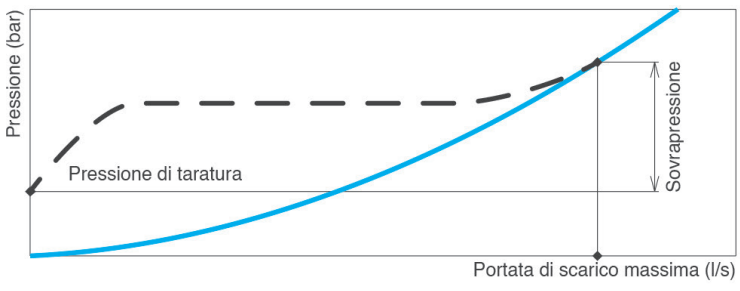
Discharge curves during opening

The graph below shows the valve's discharge capacity when opening considering the fully open plug.

To ensure effective protection of the pipeline, it is recommended that the valve be sized so that it can handle at least 35% of the nominal flow rate of the pipeline.

Overpressure during the discharge phase is another fundamental parameter to take into account in dimensioning. The behaviour of the equipment under dynamic conditions is illustrated below by the opening curve and the corresponding pressure difference.





Flow rate and overpressure table

The table shows the valve discharge rates according to the setting and the corresponding pressure variations. H-PVS valves are supplied with three different springs covering the pressure ranges:

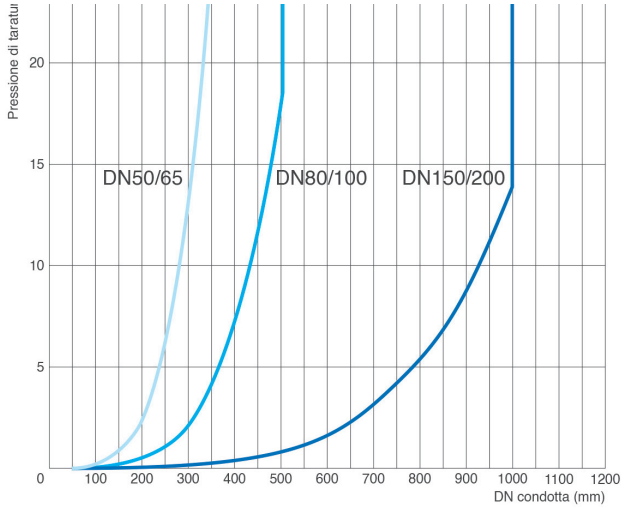
- 1-8 bar
- 16 bar
- 16-25 bar
- Higher values are possible on request for DN 50/65 and DN 80/100

DN mm	PN bar	Spring bar	Maximum capacity l/s	Overpressure bar
50/65	10	1-8	36	0.8
50/65	16	8-16	47	1.5
50/65	25	16-25	62	2.2
80/100	10	1-8	95	1
80/100	16	8-16	126	2
80/100	25	16-25	165	2.5
150/200	10	1-8	435	2
150/200	16	8-16	577	2.5
150/200	25	16-25	745	3.5

Preliminary dimensioning

The primary function of the valve is to protect pipeline systems, tanks and any other equipment from exceeding the design pressure conditions.

The sizing and selection of the valve should only be carried out by specialised technicians who understand its operation and the effects on the variable motion of the fluid. At this stage, it is crucial to consider parameters such as overpressure and blow-down effect.
For guidance purposes only, and for a preliminary evaluation only, see the sizing chart below to identify the most suitable size of the H-PVS valve depending on the nominal diameter (DN) of the pipeline and the set pressure.



Operating conditions

Treated water	70°C
Maximum pressure	25 bar
Spring calibration range:	1 to 8 bar, 8 to 16 bar, 16 to 25 bar (higher pressure values on request)

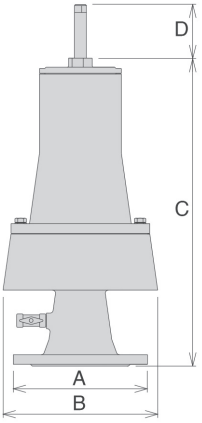
Standard

- Certification and testing according to EN 1074/5
- Flanges with drilling according to EN 1092-2
- RAL 5005 blue epoxy paint applied with fluid bed technique

Modifications to flanges and painting on request.

Dimensions and weights

DN mm	A mm	B mm	C mm	D mm	DN seat mm	Weight Kg
50/65	185	185	417	40	40	14
80/100	235	242	540	50	62	28
150	300	404	720	220	137	75
200	360	404	720	220	137	79



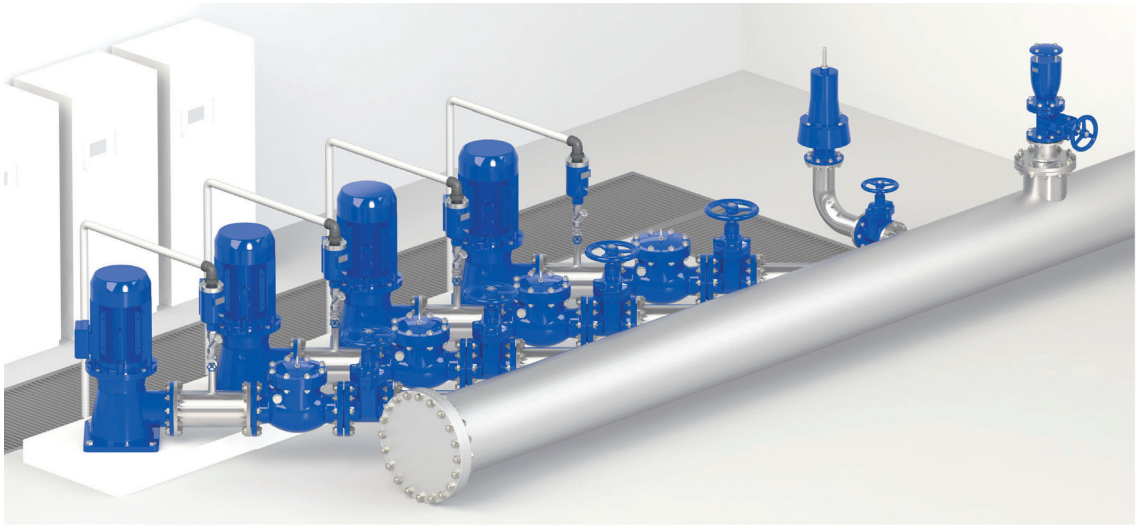
Installation

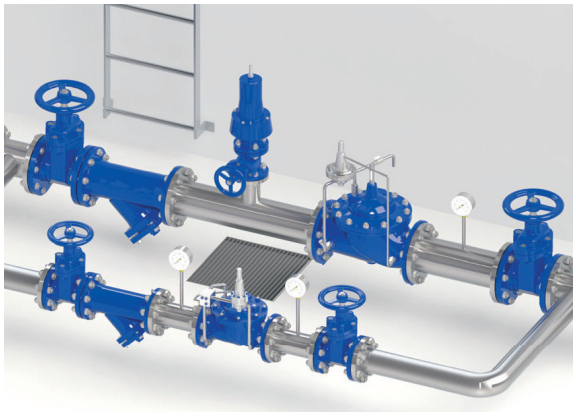
The valve must be installed in a vertical position, with a disconnecting device to allow maintenance and, when required, on-site calibration. The installation chamber, if located in a confined space or underground, must be equipped with a suitable drain to prevent flooding during evacuation.

If a single valve is not sufficient, it is recommended to install two units in parallel, connected via a manifold to be sized according to design requirements. If required, additional valves can be added on separate discharges, also in series configuration.

Examples of installations

Lifting stations. The H-PVS valve should be placed downstream of the check valves and, if possible, at the side of the main pipe above the drain grate, so as to facilitate the outflow of water when opening. To avoid negative pressures when stopping the pumps, it is recommended to also install anti-water hammer vents of the WAVE or WAVE LITE 3S AWH model.

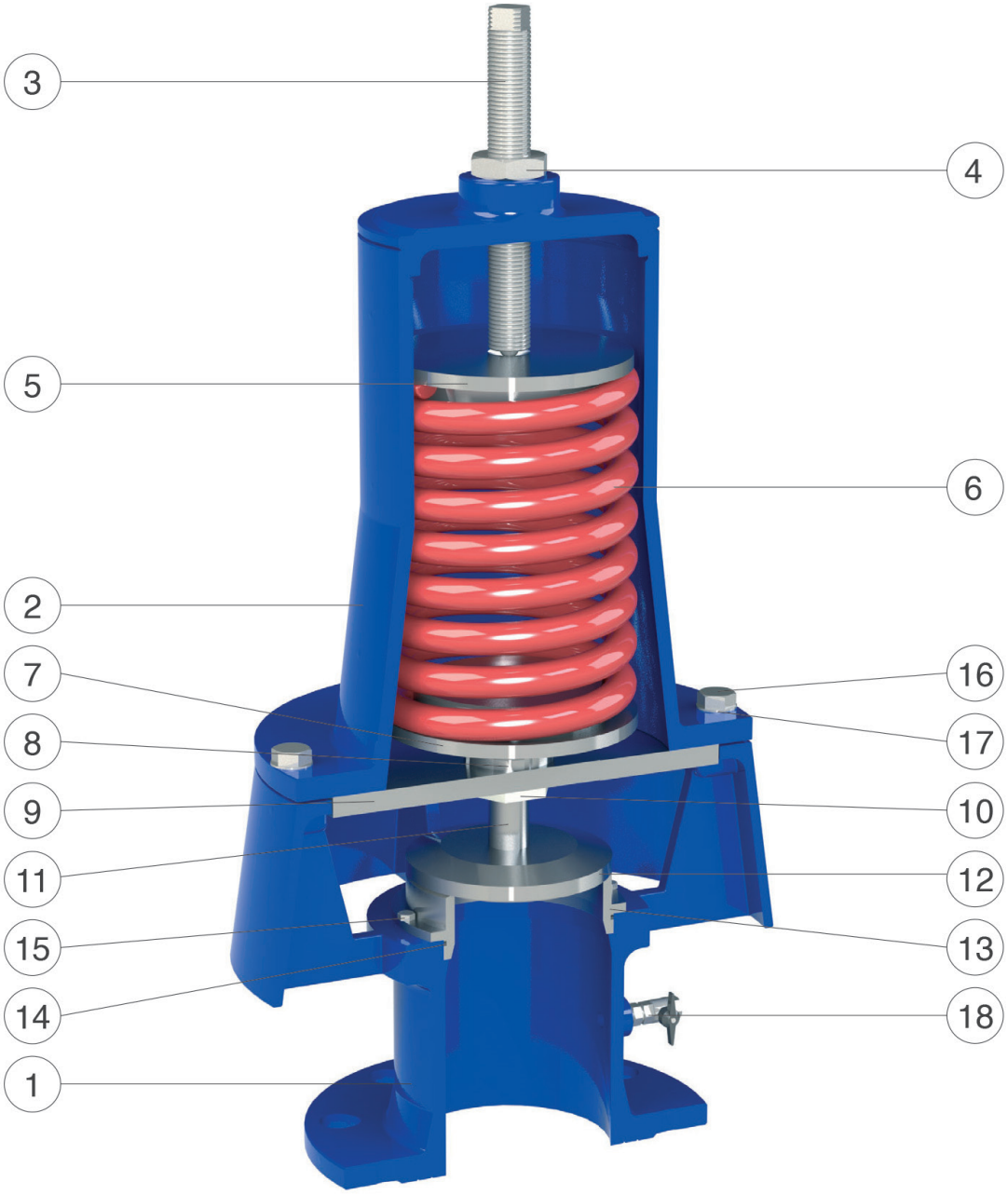




Quick disconnecting devices. Positioned upstream of quick disconnecting devices, such as H-VAL hydro valves, the valve prevents pressure build-up following a sudden stop of the fluid column. In these installations, it is recommended to also introduce downstream and upstream triple-acting anti-water hammer vents of the WAVE or WAVE LITE 3S AWH model.

Level control. In installations with automatic tank level control valves, particularly when managing minimum and maximum levels, there is a significant risk of overpressure during the closing phase of the valve.
To prevent this problem, it is recommended to install the H-PVS valve upstream of the control valve in order to effectively protect the system from unwanted pressure peaks.

Construction details



No.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 450-10	
2	Cap	ductile cast iron GJS 450-10 and painted steel	
3	Control screw	AISI 304 stainless steel	AISI 316 stainless steel
4	Locking nut	AISI 304 stainless steel	AISI 316 stainless steel
5	Upper spring plate	AISI 303 stainless steel (304 for DN 150-200)	AISI 316 stainless steel
6	Spring	coated spring steel 52SiCrNi5	
7	Lower spring plate	AISI 303 stainless steel (304 for DN 150-200)	AISI 316 stainless steel
8	Clamping ring nut	AISI 304 stainless steel	AISI 316 stainless steel
9	Separation plate	stainless steel AISI 304 (painted steel for DN 150-200)	AISI 316 stainless steel
10	Sliding bushing	Delrin (AISI 304 stainless steel for DN 150-200)	
11	Shaft	AISI 304 stainless steel	AISI 316 stainless steel
12	Plug	AISI 303 stainless steel (304 for DN 150-200)	AISI 316 stainless steel
13	Plug seal seat	AISI 304 stainless steel (303 for DN 50/65)	AISI 316 stainless steel
14	O-ring	NBR	EPDM/Viton
15	HH screws	AISI 304 stainless steel	AISI 316 stainless steel
16	HH screws	AISI 304 stainless steel	AISI 316 stainless steel
17	Washers	AISI 304 stainless steel	AISI 316 stainless steel
18	Ball valve 1/4"	nickel-plated brass	AISI 316 stainless steel

The table of materials and components is subject to change without notice.

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