Planning Fundamentals
Pressure retaining valve type 586

Overview

Pressure retaining valve type 586

1. Product description

The pressure retaining valve type 586 maintains the line pressure to a set value on the valve inlet.

Function

The inlet pressure is in direct relation to the flow. Inlet pressure above the set-pressure causes the piston to rise against the spring force, opening the valve. At an inlet pressure lower than the set-pressure, the diaphragm is pressed down by the spring force closing the valve. Thus, independent of pressure fluctuations the system pressure stays constant. In order to increase set-pressure the spindle on top of the valve has to be turned clockwise, while counter-clockwise turning reduces set-pressure. Molded arrows indicating flow direction and handling facilitate operation. Pressure retaining valves are often used at the inlet of storage tanks to ensure a stable pressure in the return line.

In combination with a T-fitting the pressure retaining valve can fulfill the same function as a relief valve.

Product features

- No re-torquing necessary thanks to central housing nut
- Tightness resistant with temperature cycles
- Pressure regulation even during operation possible
- Various connection options due to true union or spigot version
- Easy on spare parts due to modular design, one part might fit more than one valve

2. Technical Basics

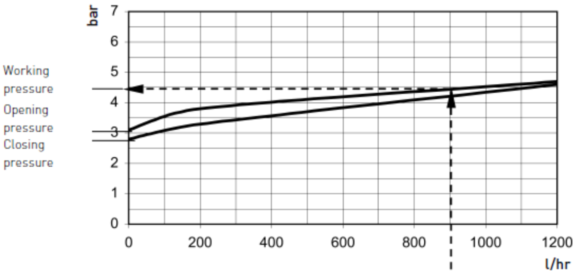
What is hysteresis?

Hysteresis is the difference between opening and closing pressure for a pressure regulating valve at a given flow rate Q. It is the result of frictional force on the cartridge, flow and spring forces. A small hysteresis will lead to increased accuracy in pressure regulation.

Hysteresis type 586

Difference between opening and closing pressure: Approx. 0.1 - 0.4 bar (1.5 – 5.8 psi)

How to measure hysteresis?



The valve characteristics diagram shows the primary or working pressure p_A in bar in relation to the flow rate Q in l/hr. The parameter is the set pressure p_E at Q = 0 l/hr. The curve indicates the opening pressure progression. The characteristics apply to water at +20 °C.

Hysteresis curves obtained for a set-pressure (at the inlet) of 7, 5, 3 and 1 bar (both springs) as well as 3 and 1 bar (small spring only. Pump pressure is steadily increased until the maximum is reached and decreased again. To determine hysteresis inlet as well as flow rate are measured.

For the detailed characteristics please refer to Characteristics Valve type 586

What is pressure drop?

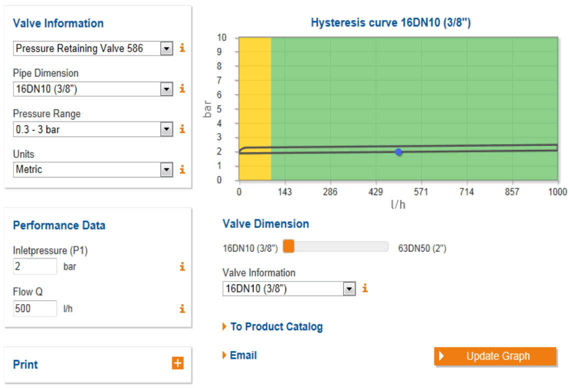
Every piping system produces a pressure drop due to frictional forces acting on the pipe walls, fittings, valves, etc. This pressure drop is unwanted since it essentially is an energy loss for the system. The most important parameters when calculating pressure drop is the flow velocity and the fluid viscosity, although elements like valves can also increase energy loss. Therefore drag coefficients ζ have to be taken into consideration, when planning a piping system.

3. Finding the Right Valve

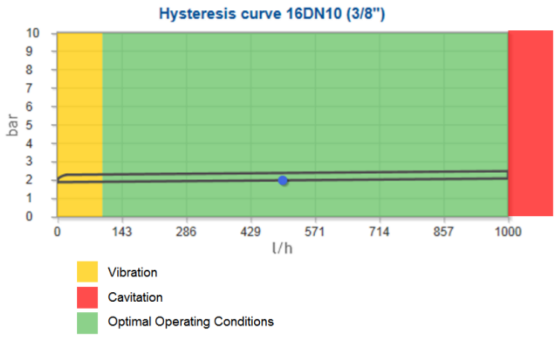
The ideal valve size, which is detrimental for system performance, can be easily determined by entering a set of parameters (pipe size, desired outlet pressure, etc.) into the online tool. The valve sizing tool can be accessed under:

www.gfps.com/prv

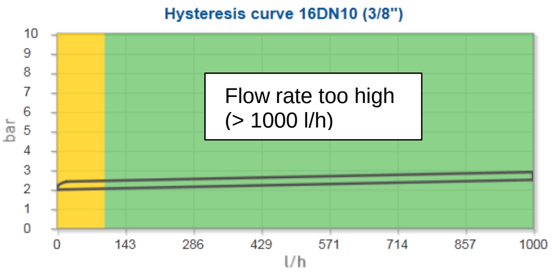
or by following the QR code:



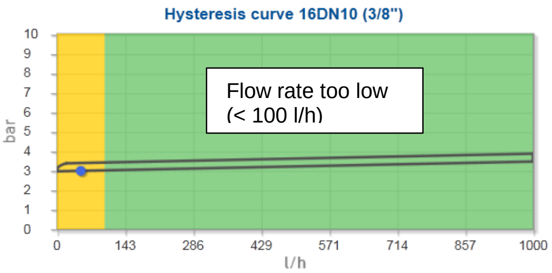
In case the online tool is not at hand, the right valve dimension can also be determined with the hysteresis curves. Diagrams are shown for a velocity up to 2m/s. In general a valve dimension equal to the pipe dimension is a good start point. Depending on pressure and flow rate, you will have the operating point somewhere on the curve. If this is not the case your operating conditions might be out of the valve size flow range (flow rate too high). Also if the operating point is at the first 10% of the chart this condition is not ideal since vibrations may occur. In these cases different valve dimension have to be chosen for the application.



In case the flow rate is exceeding the maximum value (see graphic below) of the diagram the valve dimension is too small and the next larger valve should be taken into consideration, since the valve would most likely lead to cavitation.



In case the flow rate is too low (see graphic below) the valve is too large and therefore a smaller valve should be chosen for the application. Valves too small lead to vibrations and consequently reduce valve lifetime.



4. Valve Handling

Instructions for installation

- Make sure pressure and flow rate are not exceeding valve specifications
- Check for damage before installation, do not install damaged valves
- Ensure a tension-free installation of the valve
- For an optimal flow rate the valve should be installed in an undisturbed area of the pipe and with a 10 x DN distance to manifolds, throttle, valves, etc.
- Please pay attention to the flow direction indicated by the arrow on the valve body

Instructions for maintenance

Pressure retaining valves of type 586 require very little maintenance after installation. Although, depending on flow medium sometimes cleaning is required.

GF suggest using an isolating valve for that purpose. GF piping systems offer a wide range of different isolating valves depending on your operating parameters.

5. Technical Details

Dimensions

DN 10 - DN 50 (3/8" – 2")

Pressure Rating

PN 10 @ +20°C (150 psi @ 68°F)

Set-range

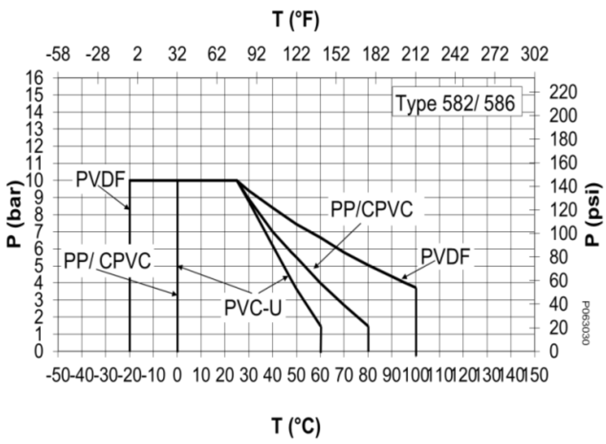
Standard: 0.5 - 9.0 bar (7 – 130 psi)
Optional: 0.3 - 3 bar (4 – 44 psi)

Connection

Spigot version can be cemented or welded, while true Union version is compatible with all standard GF unions and inserts.
On request, various inserts from the GF range, e.g. transition to metal or PE, are available

Pressure-/Temperature diagram

Below diagram is based on an entire life cycle of 25 years with water or similar media.



P *permitted pressure in bar, psi*
T *temperature in °C, °F*

Kv Values

KV100 @ Δp = 1 bar
CV100 @ Δp = 1 psi

DN [mm]	inch	d [mm]	K_{V100} [l/min]	[l/h]	C_{V100} [gpm]
10	3/8	16	50	3'020	3.5
15	1/2	20	53	3'150	3.6
20	3/4	25	114	6'840	7.9
25	1	32	125	7'500	8.6
32	1 1/4	40	263	15'760	18.1
40	1 1/2	50	286	17'140	19.7
50	2	63	293	17'610	20.2

Standards

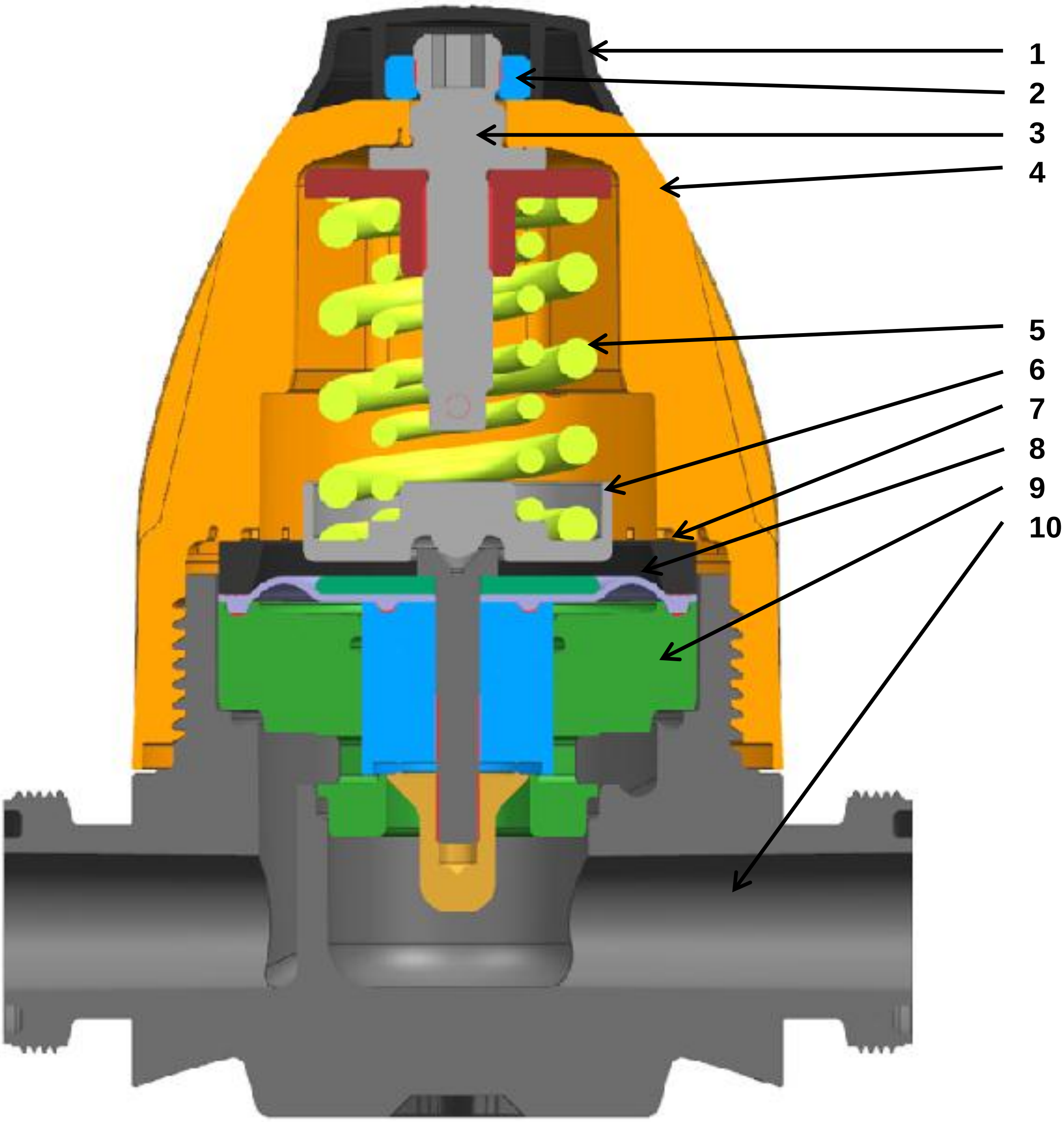
Tightness according to ISO 9393
Leak rate according to EN 12266

Further information / Tips & Tricks

PRV type 586 can also be used in combination with check valves, which are a simple and effective way to prevent backflow.

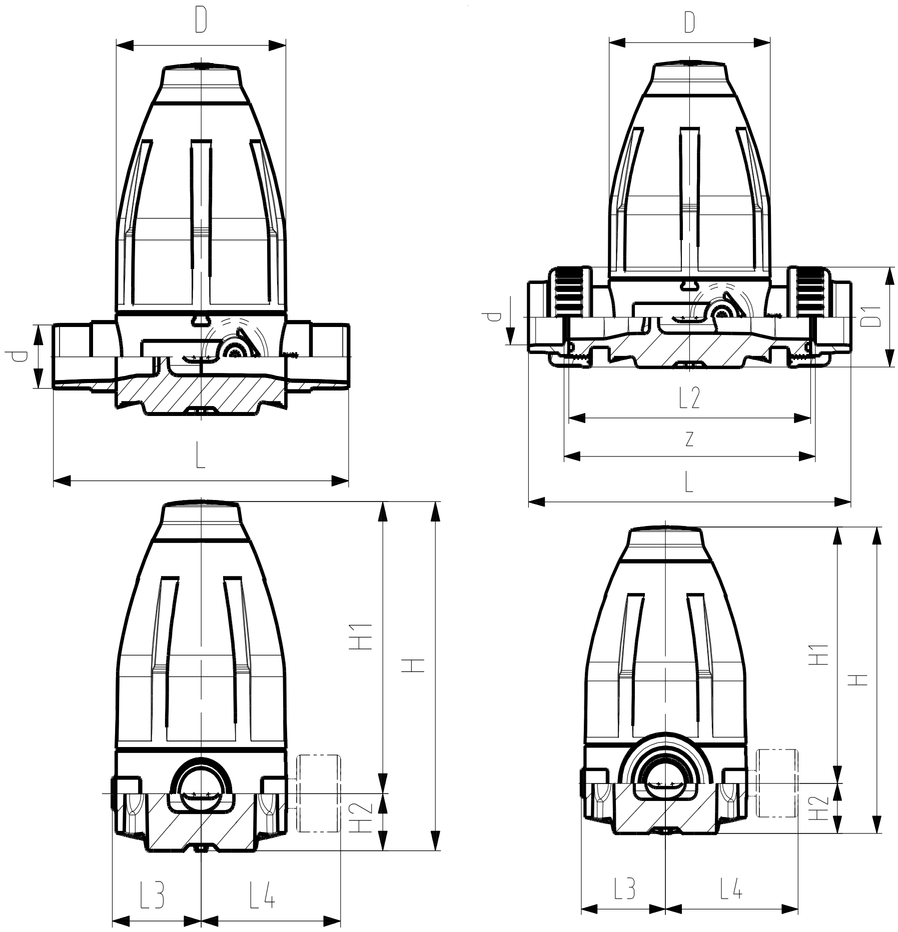
Please refer to www.gfps.com for more information

Cross-sectional view



No.	Description	Material
1	Cover Cap	PE
2	Locking Nut	1.4301 (304 Stainless Steel)
3	Spindle	1.4305 (X8CrNiS18-9M; AISI 303)
4	Housing Top	PP-GF
5	Springs	Spring steel EN 10270-1 SH (C)
6	Pressure piece	1.4305 (X8CrNiS18-9M; AISI 303)
7	O-ring	EPDM or FPM
8	Membrane	EPDM coated with PTFE
9	Cartridge with Diaphragm	PVC-U, PVC-C, PP-H or PVDF
10	Body	PVC-U, PP, PVDF

Dimensions



	d (mm)	DN (mm)	DN (inch)	D	H	H1	H2
All Materials	16 | 20	10 | 15	3/8 | ½	79	132	111	21
	25 | 32	20 | 25	¾ | 1	100	177	148	29
	40 | 50	32 | 40	1 ¼ | 1 ½	147	251	207	44
	63	50	2	147	251	207	44

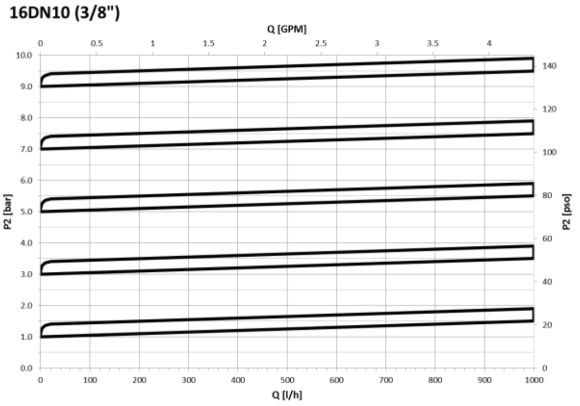
	d (mm)	DN (mm)	DN (inch)	L* PVC/ PP	L* PVDF	L2	L3	L4	z PVC/ PP	z PVDF
All Materials if not indicated	16 | 20	10 | 15	3/8 | ½	134	150	120	42	77	126	130
	25 | 32	20 | 25	¾ | 1	174	190	150	53	88	156	160
	40 | 50	32 | 40	1 ¼ | 1 ½	224	240	205	76	111	211	215
	63	50	2	244	260	205	76	111	211	215

* L for Spigot Version only

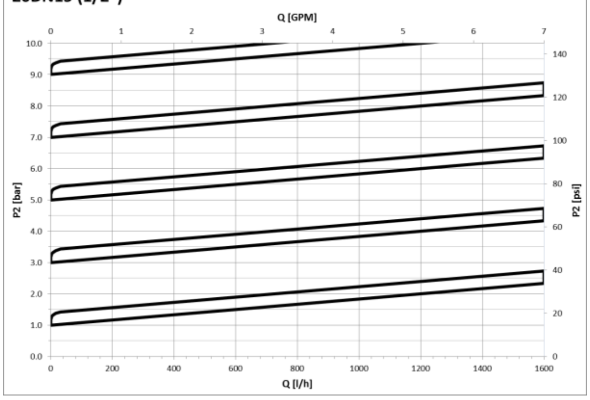
Characteristics Valve type 586

The curves below are valid for the set range 0.5 - 9.0 bar (7 – 130 psi) and show the secondary or outlet pressure P2 over the flow Q in l/h. Parameter is the set pressure pE at Q = 0 l/h. The curves are valid for water at +20 °C for a flow velocity of 2 m/s. Special version set range 0.3 - 3 bar (4 – 44 psi) available on request.

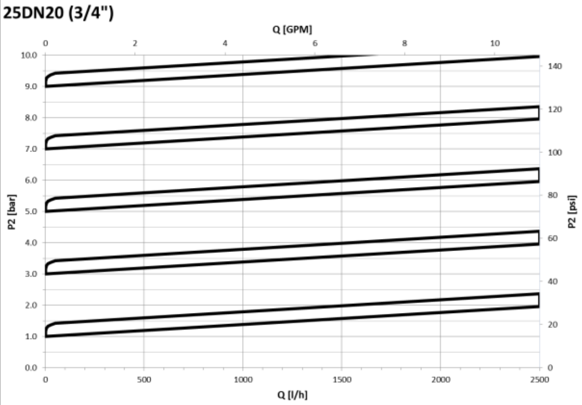
16DN10 (3/8")



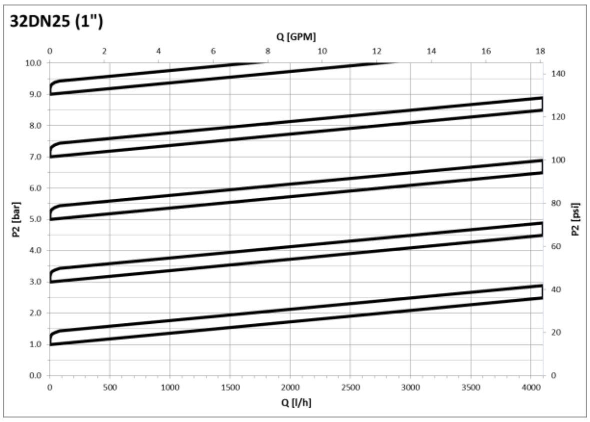
20DN15 (1/2")



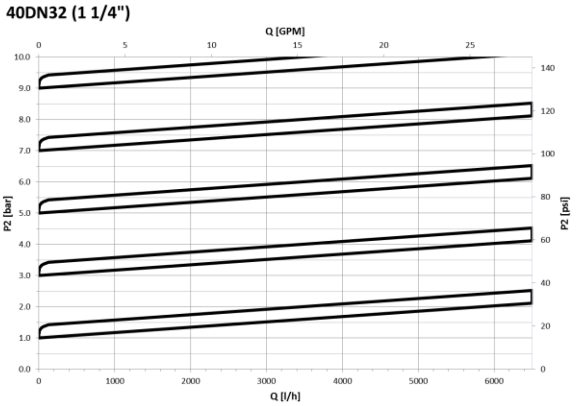
25DN20 (3/4")



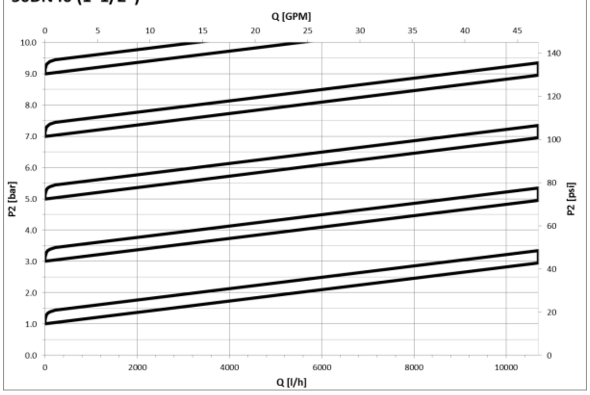
32DN25 (1")



40DN32 (1 1/4")



50DN40 (1 1/2")



63DN50 (2")