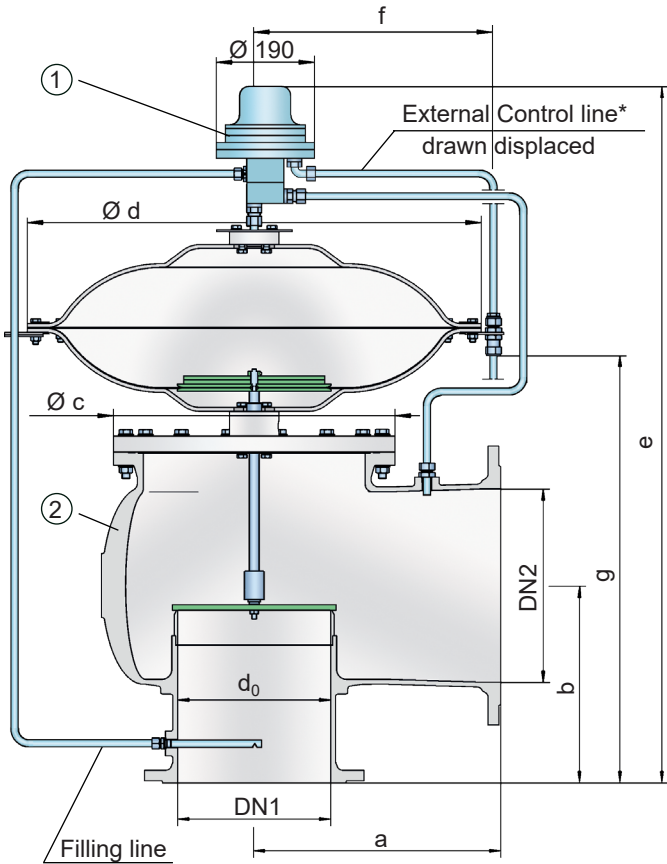


Pressure/Vacuum Relief Valve

Pilot-operated diaphragm valve

PROTEGO® VN-A-PCPM



As the operating pressure increases, the closing force at the main valve also increases; i.e., the valve tightness increases until the set pressure is reached to prevent leakage. After the valve responds, it immediately opens completely without any significant increase in pressure (pop-open characteristic), and the nominal volumetric flow is released through a fully open valve. If this is exceeded, the pressure increase follows the volume flow ($\Delta p/\dot{V}$ curve). From set pressure to full capacity (fully open valve), the pressure increase is 100% in case of vacuum venting/in-breathing function.

The tank pressure is maintained up to the set pressure with a tightness that is above the normal standards due to our state-of-the-art manufacturing. This feature is ensured by valve seats made of high quality stainless steel with precisely lapped valve pallets. After the overpressure is released or the vacuum is balanced, the valve re-seats and provides a tight seal.

Special Features and Advantages

- controlled by corrosion-resistant, low-temperature-resistant permanent magnet
- no continuous flow of the tank substance through the pilot valve
- pop-open characteristic from the lowest pressure increase up to full lift
- max. 10% pressure increase up to full lift
- extreme tightness, resulting in lowest possible product losses and reduced environmental pollution
- set pressure close to opening pressure for optimum pressure maintenance in the system
- high flow capacity
- protection of the main valve control diaphragm from low temperatures – high durability
- can be used in explosion hazardous areas
- designed for use at low temperatures
- automatic condensate drain
- Field test connection possible upon request
- Field test kit upon request

Design Types and Specifications

Basic design of pressure/vacuum relief valve with **VN-A-PCPM** a pilot valve

Additional special devices available upon request.

* It is recommended that an external control line is to be provided with direct connection to the tank.

Settings:

Pressure:

+20 mbar up to +1034 mbar
+8 inch W.C. up to +415.1 inch W.C.

Vacuum:

-2 mbar up to -7 mbar
-0.8 inch W.C. up to -2.8 inch W.C.

Higher or lower settings upon request.

Function and Description

The PROTEGO® VN-A-PCPM pilot-operated diaphragm valve is a highly developed valve for pressure and vacuum relief. It is primarily used as a safety device for out-breathing in tanks, containers, and process equipment. It provides protection against unallowable overpressure and prevents the intake of air and unallowable product vapor loss up to the set pressure.

The valve can also be used as an in-breathing valve where the main valve is directly controlled when it is exposed to a vacuum, i.e., it functions as a weight-loaded diaphragm valve. It is ideally suitable for both atmospheric conditions and for use in low temperatures.

The main valve (2) is controlled by a pilot valve (1). The pilot valve is controlled by the tank pressure. The tank substance does not continuously flow through the pilot. The set pressure is adjusted on the pilot valve by a corrosion-resistant and low-temperature-resistant permanent magnet.

Table 1: Dimensions

Dimensions in mm / inches

To select the nominal size (DN), use the flow capacity charts on the following pages

| DN1 | DN2 | a | b | c | d | e | f | g |
|-----------|-----------|-------------|-------------|-------------|-------------|--------------|-------------|-------------|
| 50 / 2" | 50 / 2" | 175 / 6.89 | 175 / 6.89 | 170 / 6.69 | 360 / 14.17 | 838 / 32.99 | 205 / 8.07 | 371 / 14.61 |
| 50 / 2" | 80 / 3" | 175 / 6.89 | 175 / 6.89 | 170 / 6.69 | 360 / 14.17 | 853 / 33.58 | 205 / 8.07 | 386 / 15.20 |
| 80 / 3" | 80 / 3" | 200 / 7.87 | 200 / 7.87 | 205 / 8.07 | 360 / 14.17 | 878 / 34.57 | 205 / 8.07 | 411 / 16.18 |
| 80 / 3" | 100 / 4" | 200 / 7.87 | 200 / 7.87 | 205 / 8.07 | 360 / 14.17 | 888 / 34.96 | 205 / 8.07 | 421 / 16.57 |
| 100 / 4" | 100 / 4" | 225 / 8.86 | 225 / 8.86 | 250 / 9.84 | 360 / 14.17 | 913 / 35.94 | 205 / 8.07 | 446 / 17.56 |
| 100 / 4" | 150 / 6" | 225 / 8.86 | 225 / 8.86 | 250 / 9.84 | 360 / 14.17 | 923 / 36.34 | 205 / 8.07 | 456 / 17.95 |
| 150 / 6" | 150 / 6" | 300 / 11,81 | 250 / 9.84 | 335 / 13.19 | 500 / 19.69 | 1025 / 40.35 | 275 / 10.83 | 531 / 20.91 |
| 150 / 6" | 200 / 8" | 300 / 11,81 | 250 / 9.84 | 335 / 13.19 | 500 / 19.69 | 1045 / 41.14 | 275 / 10.83 | 551 / 21.69 |
| 200 / 8" | 200 / 8" | 375 / 14.77 | 300 / 11,81 | 410 / 16.14 | 630 / 24.80 | 1237 / 48.70 | 340 / 13.39 | 638 / 25.12 |
| 200 / 8" | 250 / 10" | 375 / 14.77 | 300 / 11,81 | 410 / 16.14 | 630 / 24.80 | 1188 / 46.77 | 340 / 13.39 | 668 / 26.30 |
| 250 / 10" | 250 / 10" | 425 / 16.73 | 350 / 13.78 | 500 / 19.69 | 790 / 31.10 | 1278 / 50.31 | 420 / 16.54 | 738 / 29.05 |
| 250 / 10" | 300 / 12" | 425 / 16.73 | 350 / 13.78 | 500 / 19.69 | 790 / 31.10 | 1298 / 51.10 | 420 / 16.54 | 758 / 29.84 |
| 300 / 12" | 300 / 12" | 500 / 19.69 | 400 / 15.75 | 570 / 22.44 | 920 / 36.22 | 1389 / 54.58 | 485 / 19.09 | 831 / 32.72 |
| 300 / 12" | 350 / 14" | 500 / 19.69 | 400 / 15.75 | 570 / 22.44 | 920 / 36.22 | 1409 / 55.47 | 485 / 19.09 | 851 / 33.50 |
| 300 / 12" | 400 / 16" | 500 / 19.69 | 400 / 15.75 | 570 / 22.44 | 920 / 36.22 | 1429 / 56.26 | 485 / 19.09 | 871 / 34.29 |

Table 2: Material selection for housing

| Design | A | B | C |
|-------------------|-----------------|----------------------------|---------------------------------------|
| Housing | Aluminum | Stainless Steel | LTCS * (Low Temperature Carbon Steel) |
| Valve seat | Stainless Steel | Stainless Steel | Stainless Steel |
| Sealing | PTFE | PTFE | PTFE |
| Housing diaphragm | Stainless Steel | Stainless Steel | Stainless Steel |
| Pilot lines | Stainless Steel | Stainless Steel | Stainless Steel |
| Pilot housing | Aluminum | Aluminum / Stainless Steel | Aluminum / Stainless Steel |
| Pilot diaphragm | FEP | FEP | FEP |

* Special materials upon request.

Table 3: Flange connection type

| | |
|------------------------|--------------------------|
| EN 1092-1; Form B1 | Other types upon request |
| ASME B16.5 CL 150 R.F. | |

Table 4: Coefficient of Discharge

| DN1 | DN2 | d ₀ | K | DN1 | DN2 | d ₀ | K |
|----------|----------|----------------|------|-----------|-----------|----------------|-------|
| 50 / 2" | 50 / 2" | 54/2.13 | 0,57 | 200 / 8" | 200 / 8" | 208/8.19 | 0.063 |
| 50 / 2" | 80 / 3" | 54/2.13 | 0,75 | 200 / 8" | 250 / 10" | 208/8.19 | 0.76 |
| 80 / 3" | 80 / 3" | 83/3.27 | 0,63 | 250 / 10" | 250 / 10" | 262/10.31 | 0.62 |
| 80 / 3" | 100 / 4" | 83/3.27 | 0,71 | 250 / 10" | 300 / 12" | 262/10.31 | 0.73 |
| 100 / 4" | 100 / 4" | 108/4.25 | 0.60 | 300 / 12" | 300 / 12" | 310/12.2 | 0.63 |
| 100 / 4" | 150 / 6" | 108/4.25 | 0.75 | 300 / 12" | 350 / 14" | 310/12.2 | 0.68 |
| 150 / 6" | 150 / 6" | 160/6.30 | 0.64 | 300 / 12" | 400 / 16" | 310/12.2 | 0.74 |
| 150 / 6" | 200 / 8" | 160/6.30 | 0.78 | | | | |

DN1 = size inlet

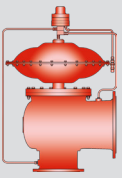
DN2 = size outlet

d₀ = orifice diameter (mm/inches)

K = coefficient of discharge



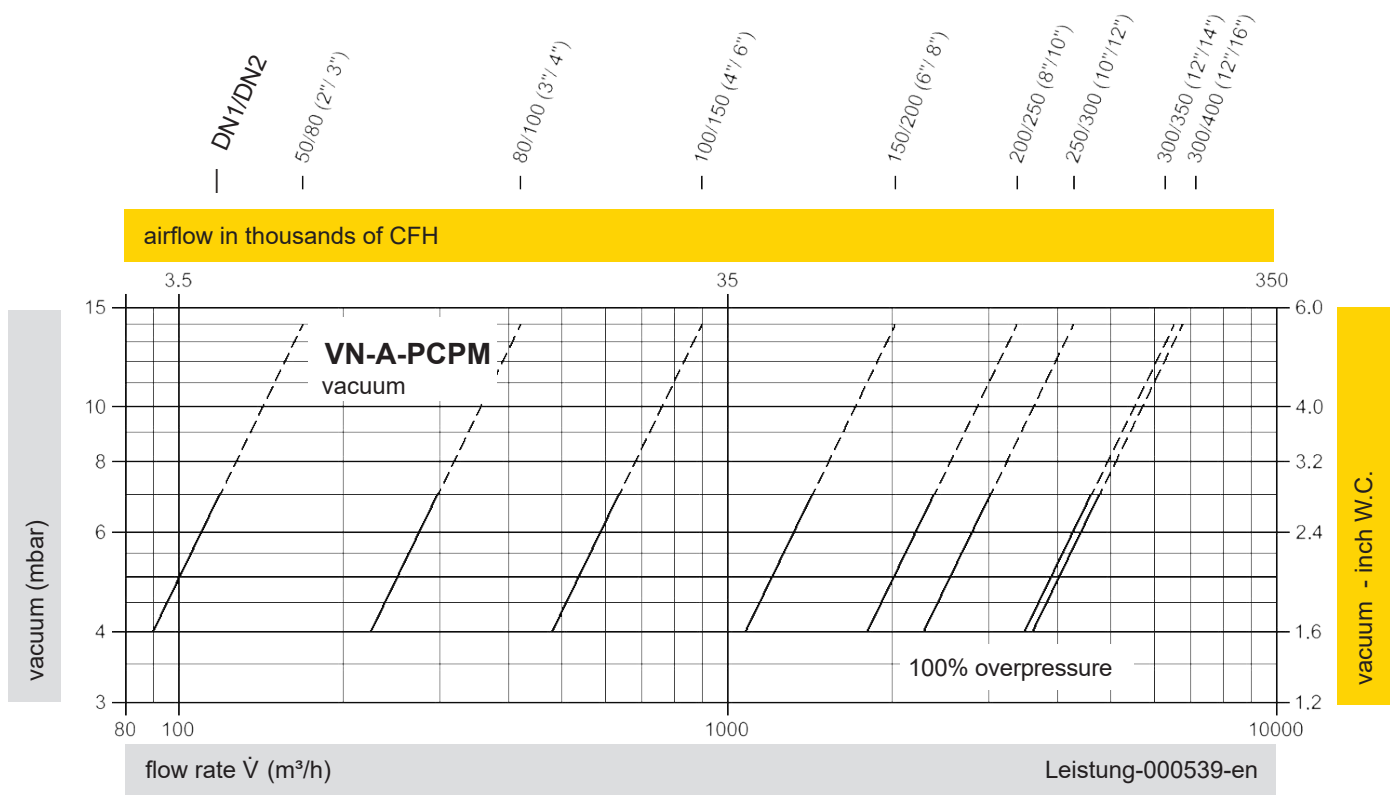
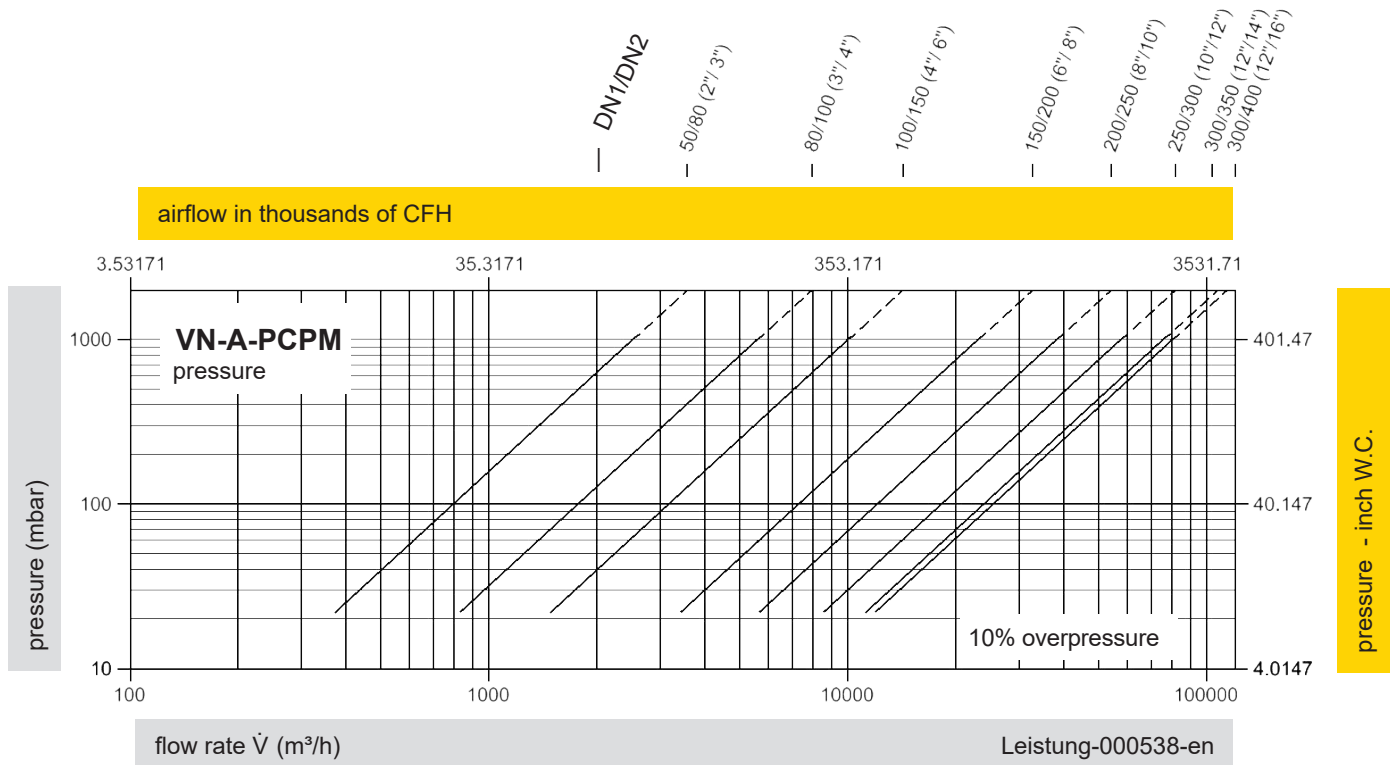
for safety and environment



Pressure/Vacuum relief valve

Flow Capacity Charts

PROTEGO® VN-A-PCPM



The flow capacity charts have been determined with a calibrated and TÜV certified flow capacity test rig. Volume flow \dot{V} in (m³/h) and CFH refer to the standard reference conditions of air ISO 6358 (20°C, 1bar). For conversion to other densities and temperatures, refer to Sec. 1: "Technical Fundamentals".

