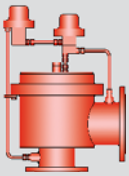
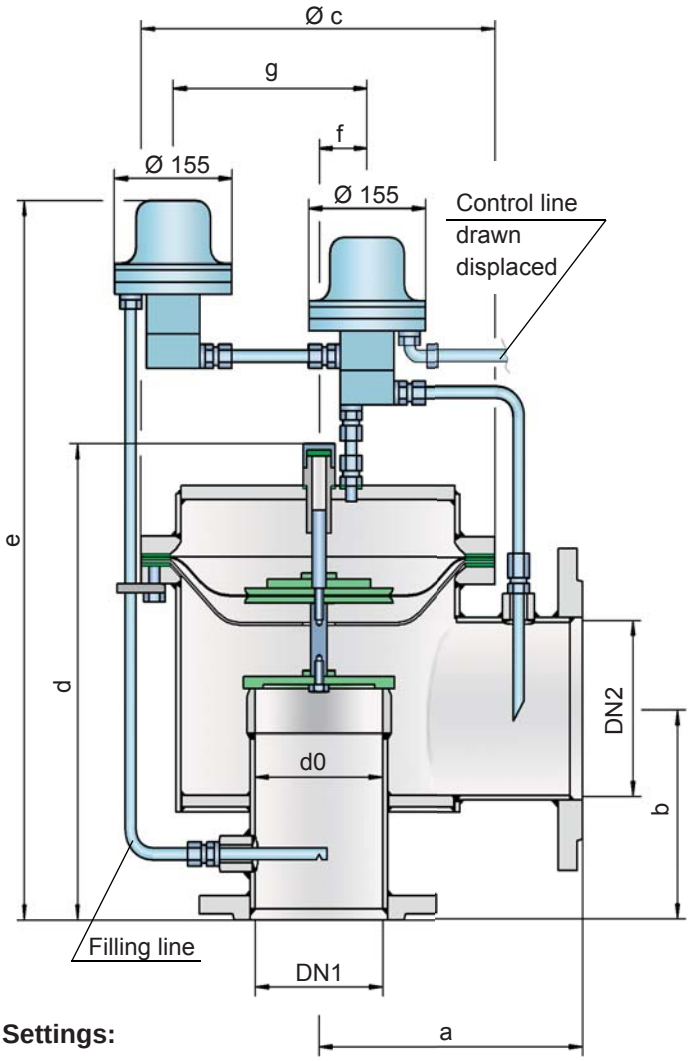


Pressure/Vacuum Relief Valve

Pilot-operated diaphragm valve

PROTEGO® PM/(D)S



Settings:

Pressure: +10 mbar up to +300 mbar
+4 inch W.C. up to +120 inch W.C.

Vacuum: -3.0 mbar up to -7 mbar
-1.2 inch W.C. up to -2.8 inch W.C.

Higher or lower settings upon request.

Function and Description

The PM/(D)S type pilot-controlled PROTEGO® diaphragm valve is a highly developed valve for pressure and vacuum relief. It is primarily used as a safety device for outbreathing in tanks, containers, and process engineering equipment and it also offers reliable protection from vacuum and overpessure. It prevents the intake of air and unacceptable product vapor loss up to the set point. The valve can also be used as inbreathing valve. The main valve is directly controlled when it is exposed to a vacuum; e.g., it functions as a weight-loaded diaphragm valve. This valve is highly suitable under atmospheric conditions and for use in cryogenic service.

The main valve is controlled by a pilot valve. The pilot valve is controlled by the tank pressure. The tank medium does not continuously flow through the pilot. The set pressure is adjusted at the pilot valve by a corrosion-resistant and low-temperature-resistant permanent magnet.

As the operating pressure increases, the closing force acting on the main valve also rises; e.g. the valve tightness increases to prevent leakage until the set pressure is reached. After the valve responds, it immediately opens completely without any significant increase in pressure (pop open characteristic), and the nominal volumetric flow is discharged through a fully open valve. If this level is exceeded, the pressure increase follows the flow performance curve ($\Delta p/\dot{V}$ curve). Up to the set pressure, the tank pressure is maintained with a tightness that is far superior to the conventional standard due to the superior manufacturing technology. This feature is achieved by valve seats made of high-grade stainless steel with precisely ground valve pallets. After the excess pressure is discharged or the vacuum is compensated, the valve reseats and provides a tight seal.

Special Features and Advantages

- high degree of safety due to double pilot
- controlled by corrosion-resistant, low-temperature-resistant permanent magnet
- the tank medium does not continuously flow through the pilot valve
- pop-open characteristic from a minimum pressure rise to full lift
- extreme tightness and hence least possible product losses and reduced environmental pollution
- set pressure is close to full lift pressure, which results in high level of design freedom and product savings
- high flow capacity
- the control diaphragm of the main valve is shielded from low temperatures - high-level durability
- can be used in areas subject to an explosion hazard
- designed for use at low temperatures
- self draining

Design Types and Specifications

The valve is equipped with either a control pilot valve or with one control and emergency pilot valve to ensure optimum operating safety in case of malfunctions or damage.

Two different designs are therefore available:

Basic design of pressure/vacuum relief valve with a control pilot valve **PM/S-**

Basic pressure/vacuum relief valve with a control pilot valve and additional emergency pilot valve **PM/DS-**

Additional special devices available upon request.

Table 1: Dimensions

Dimensions in mm / inches

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

DN1	80 / 3"	100 / 4"	150 / 6"	200 / 8"	250 / 10"	300 / 12"	300 / 12"
DN2	100 / 4"	150 / 6"	200 / 8"	250 / 10"	300 / 12"	350 / 14"	400 / 16"
a	225 / 8.86	250 / 9.87	325 / 12.80	375 / 14.76	450 / 17.72	500 / 19.69	500 / 19.69
b	150 / 5.91	175 / 6.89	225 / 8.86	250 / 9.84	270 / 10.63	300 / 11.81	325 / 12.79
c	275 / 10.83	330 / 12.99	445 / 17.52	550 / 21.65	665 / 26.18	785 / 30.91	785 / 30.91
d	370 / 14.57	425 / 16.73	530 / 20.87	605 / 23.82	675 / 26.57	785 / 30.91	835 / 32.87
e	615 / 24.21	685 / 26.97	770 / 30.31	825 / 32.48	935 / 36.81	1005 / 39.57	1055 / 41.53
f	35 / 1.38	40 / 1.57	40 / 1.57	50 / 1.97	50 /1.97	50 / 1.97	50 / 1.97
g	160 / 6.30	195 / 7.68	250 / 9.84	315 / 12.40	370 / 14.57	425 / 16.73	425 / 16.73

Table 2: Material selection for housing

Design	A	B	Special materials upon request
Housing	Aluminium	Stainless Steel	
Valve seat	Stainless Steel	Stainless Steel	
Sealing	KL-C-4106	KL-C-4106	
Main diaphragm protection	Stainless Steel	Stainless Steel	
Pilot lines	Stainless Steel	Stainless Steel	
Pilot housing	Stainless Steel	Stainless Steel	
Pilot diaphragm	FEP	FEP	

Table 3: Material selection for valve pallet

Design	A	B	C	Special materials upon request
Pressure range (mbar) (inch W.C.)	-3.0 up to -4.0* -1.2 up to -1.6*	-4.0 up to -5.0* -1.6 up to -2.0*	-5.0 up to -7.0* -2.0 up to -2.8*	
Valve pallet	Aluminium	Stainless Steel	Stainless Steel	
Diaphragm	FEP	FEP	FEP	
Diaphragm pallet	Aluminium	Aluminium	Stainless Steel	

* The indicated vacuum ranges depend on the nominal sizes and can differ.
The pressure setting can be combined with any vacuum setting

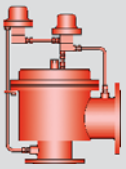
Table 4: Coefficient of Discharge

DN1	80 / 3"	100 / 4"	150 / 6"	200 / 8"	250 / 10"	300 / 12"	300 / 12"
DN2	100 / 4"	150 / 6"	200 / 8"	250 / 10"	300 / 12"	350 / 14"	400 / 16"
do	81 / 3.19	107 / 4.21	160 / 6.30	208 / 8.19	260 / 10.24	310 / 12.20	310 / 12.20
K	0.68	0.68	0.63	0.59	0.58	0.54	0.61

DN1 = Size Inlet
DN2 = Size Outlet
d0 = Orifice Diameter (mm / inches)
K = Coefficient of Discharge

Table 5: Flange connection type

EN 1092-1; Form B1	other types upon request
ASME B16.5; 150 lbs RFSF	

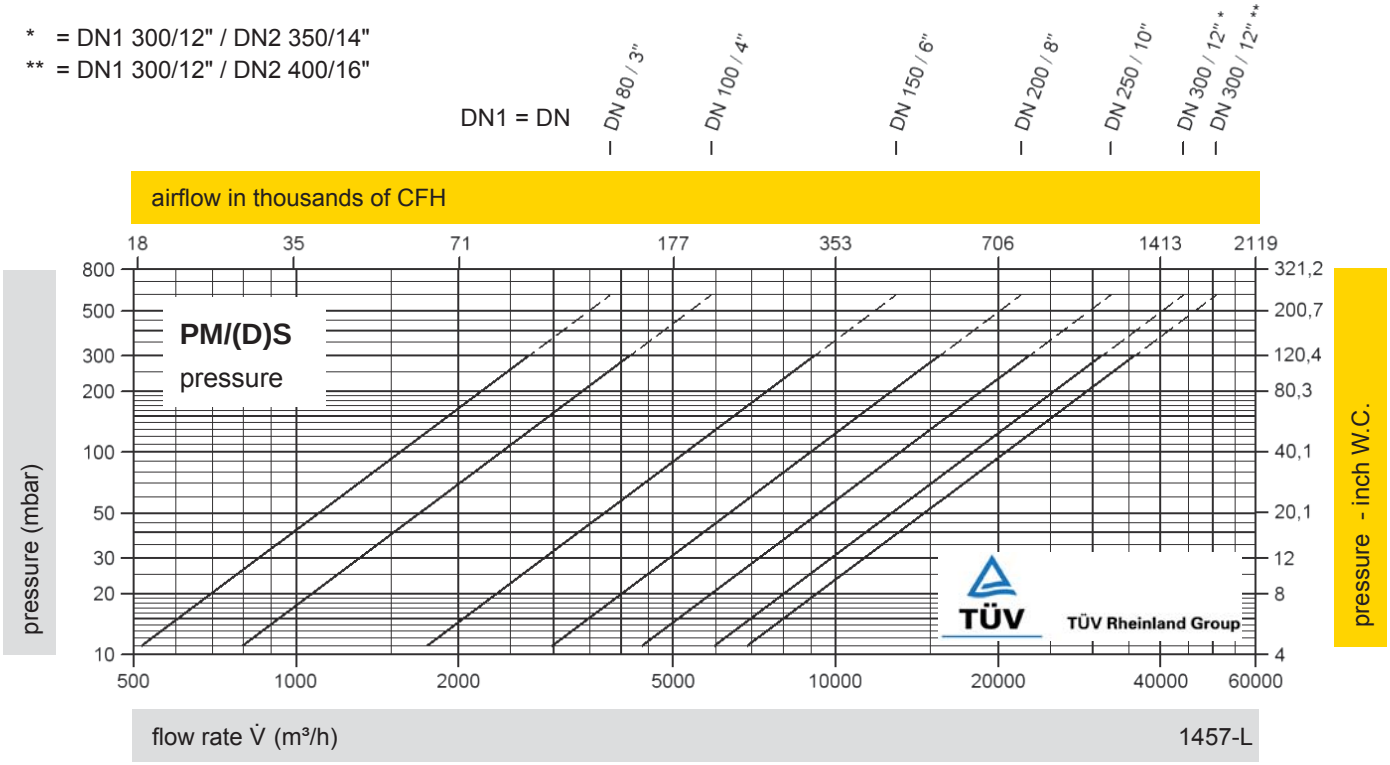


Pressure/Vacuum relief valve

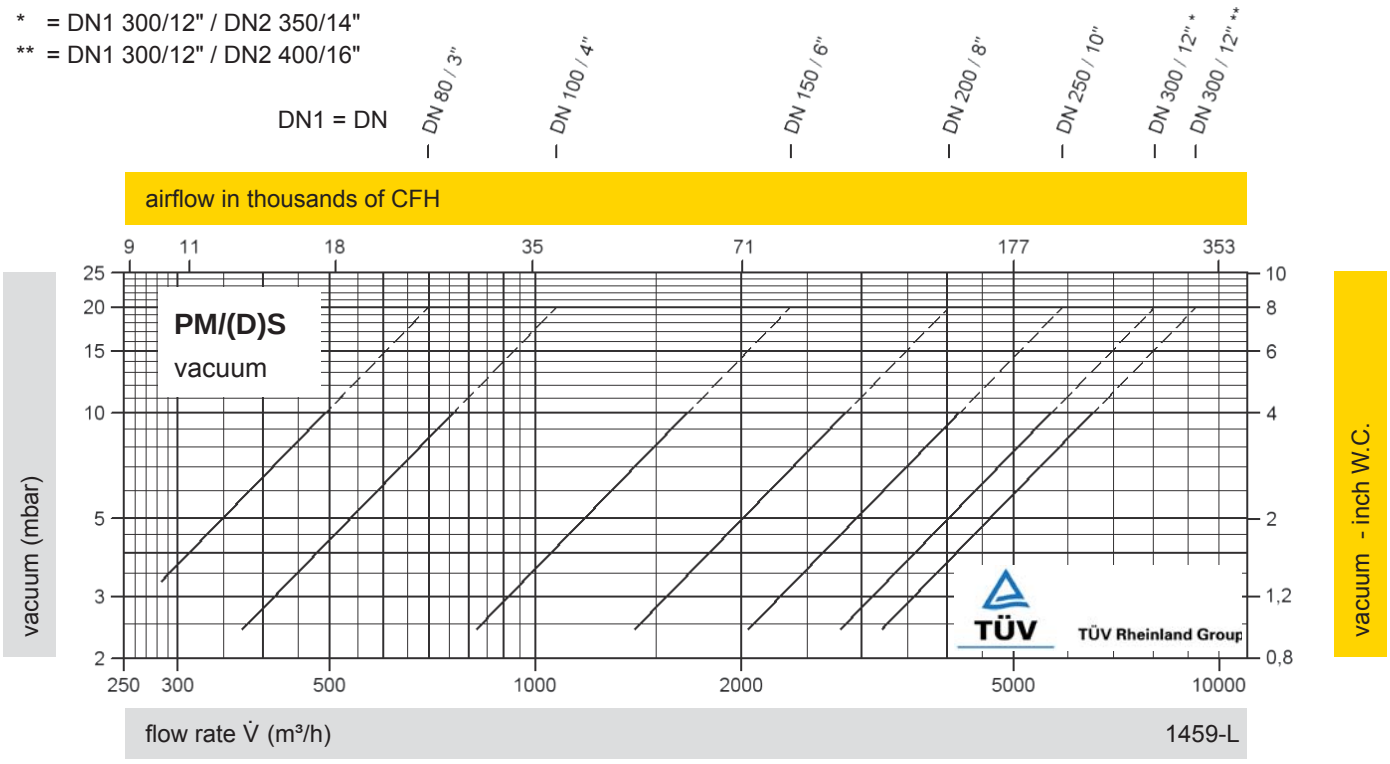
Flow Capacity Charts

PROTEGO® PM/(D)S

* = DN1 300/12" / DN2 350/14"
** = DN1 300/12" / DN2 400/16"



* = DN1 300/12" / DN2 350/14"
** = DN1 300/12" / DN2 400/16"



The flow capacity charts have been determined with a calibrated and TÜV certified flow capacity test rig.

Volume flow V̇ in (m³/h) and CFH refer to the standard reference conditions of air ISO 6358 (20°C, 1bar).
Conversion to other densities and temperatures refer to Vol. 1: “Technical Fundamentals”.

Project Data Sheet

Project:	
Engineering:	
End-user:	

relief type:	pressure only	☐					
	pressure and vacuum	☐					
medium:							
boiling point:			°C				
molar mass:			g/mol				
total backpressure:			mbar or inch W.C.				
dynamic backpressure:			mbar or inch W.C.				
static (superimposed) backpressure:			mbar or inch W.C.				
inlet pressure drop:			mbar or inch W.C.				
set pressure:			mbar or inch W.C.				
set vacuum:			mbar or inch W.C.				
material:							
required discharge per valve:			kg/h or lb/hr				
required vacuum capacity per valve at +20°C:			m³/h or SCFH				
flange connection:		ASME	☐	EN 1092-1	☐	JIS	☐

Fill in and ☐ tick off, if applicable, delete unit, if not applicable.

signed:	date: