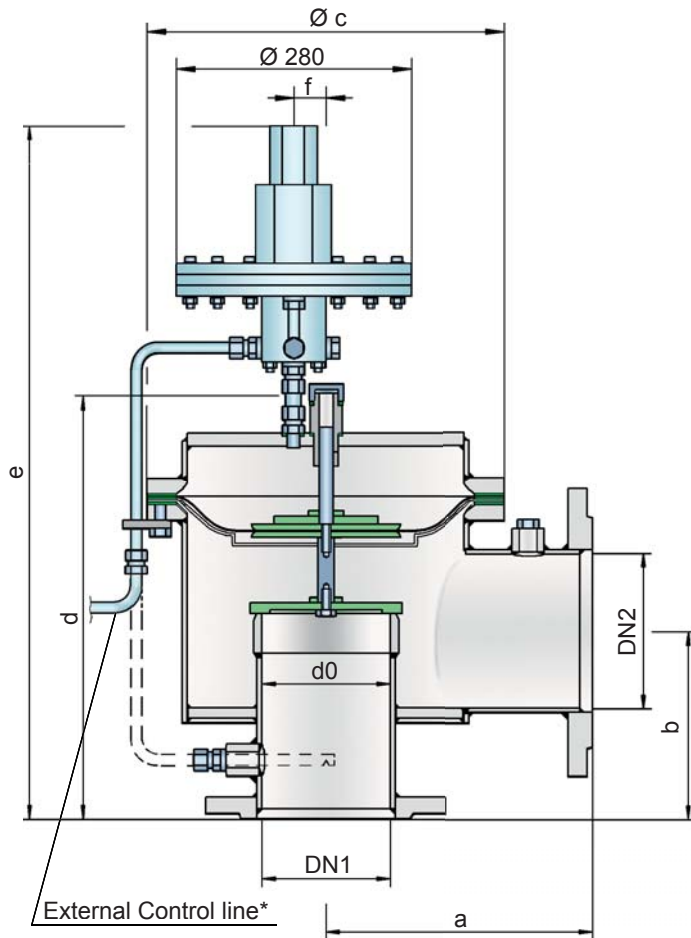


Pressure/Vacuum Relief Valve

Pilot-operated diaphragm valve

PROTEGO® PM-HF



The main valve is controlled by a pilot valve. The latter in turn is controlled by the tank pressure. A small amount fluid stored in the tank released into the atmosphere by the pilot when the valve opens. The set-to-operate pressure is adjusted on the pilot valve by increasing or decreasing (as appropriate) the tension of a spring.

As the working pressure rises, the closing force acting on the main valve increases, i.e. the valve's tight-sealing is enhanced until the set-to-operate pressure is reached, thus preventing leakage. Once the valve has commenced to lift it opens fully within a 10% pressure rise or the opening pressure difference and the nominal volumetric flow is discharged through a fully open valve. If and when this level is exceeded the pressure increase will follow the performance curve ($\Delta p/V$ curve). From set pressure to full capacity (fully open valve) the pressure increase is 100% in case of vacuum venting/inbreathing function.

Due to the sophisticated manufacturing technology, the tank pressure is maintained up to the set-to-operate pressure, with seal-tight requirements far above common standards being met. This feature is achieved through valve seats made of high-grade stainless steel with precisely ground valve pallets. Once the excess pressure is relieved or pressure below atmospheric balanced out, the valve reseats and seals tight again.

Special Features and Advantages

- controlled by corrosion-resistant pilot valve
- small amount fluid stored in the tank released into the atmosphere by the pilot when the valve opens
- max. 10% Technology for minimum pressure increase until full lift
- seals extremely tight; hence, least possible product losses and reduced impact on the environment
- set-to-operate pressure close to the opening pressure; hence, best possible pressure management of the system.
- control diaphragm of the main valve shielded from low temperatures - Long service life
- high flow capacity
- suited for use in hazardous areas
- Field-Test-Connection on request
- Field-Test-Kit on request

Design Types and Specifications

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

Additional special devices available upon request.

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

Settings:

Pressure:

+10 mbar up to +1034 mbar
 +4 inch W.C. up to +413.6 inch W.C.

Vacuum:

-3 mbar up to -7 mbar (DN 80/3")
 -1.2 inch W.C. up to -2.8 inch W.C.
 -2.2 mbar up to -7 mbar (DN100/4" - DN 300/12")
 -0.88 inch W.C. up to -2.8 inch W.C.

Higher or lower settings upon request.

Function and Description

The PROTEGO® Type PM-HF pilot-controlled diaphragm valve is a highly developed valve for pressure and vacuum relief. Primarily used as a safety device for outbreathing in tanks, vessels, and process engineering equipment it also offers reliable protection from vacuum and overpressure. It prevents intake of air and unacceptable product vapor loss up to and until the set-to-operate pressure is reached. The valve can be used as an inbreathing device as well. In such an application, the main valve is directly controlled when exposed to a vacuum, i.e. it functions as a weight-loaded diaphragm valve.

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 / 12.81	325 / 12.80
c	275 / 10.83	330 / 12.99	445 / 17.52	550 / 21.65	665 / 26.18	785 / 30.91	785 / 30.91
d	376 / 14.80	429 / 16.89	536 / 21.10	607 / 23.90	678 / 26.69	796 / 31.34	846 / 33.31
e	763 / 30.04	770 / 30.31	923 / 36.34	977 / 38.46	1052 / 41.42	1173 / 46.18	1223 / 48.15
f	35 / 1.38	40 / 1.57	40 / 1.57	50 / 1.97	50 / 1.97	50 / 1.97	50 / 1.97

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	Aluminium	Aluminium / Stainless Steel	
Pilot diaphragm	FEP	FEP	

Table 3: 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"
d0	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)

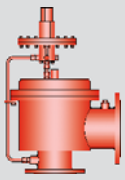
K = Coefficient of Discharge

Table 4: Flange connection type

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



for safety and environment



Pressure/Vacuum relief valve

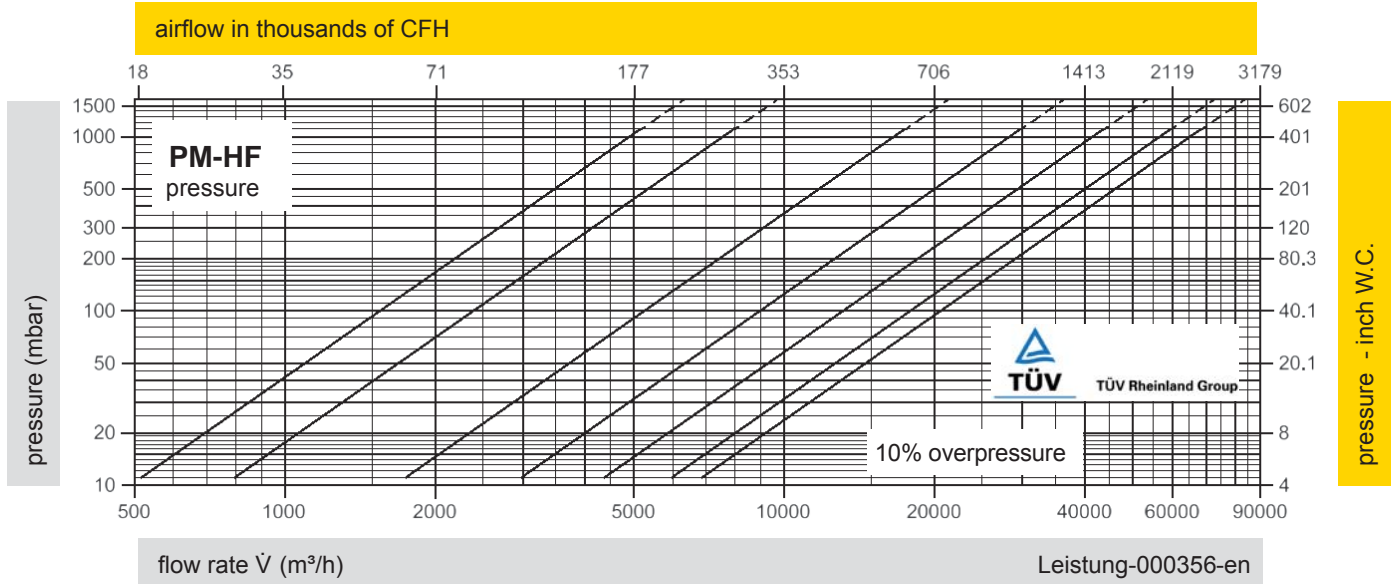
Flow Capacity Charts

PROTEGO® PM-HF

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

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

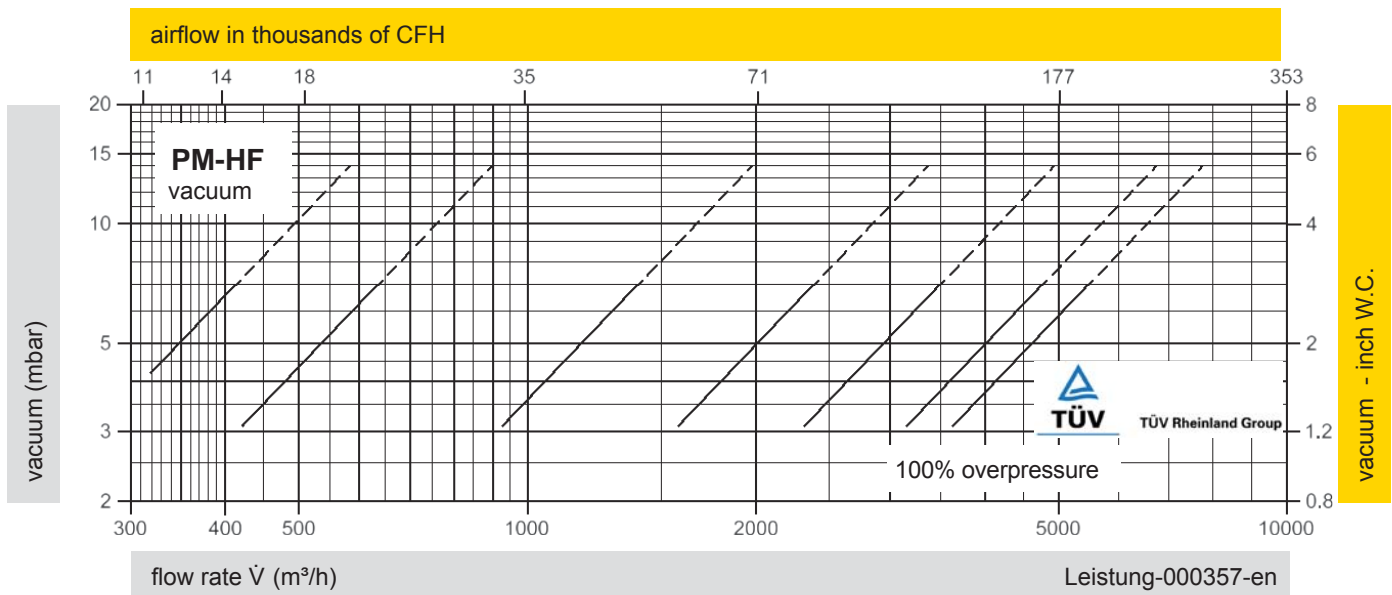
DN1 = DN DN 80 / 3" DN 100 / 4" DN 150 / 6" DN 200 / 8" DN 250 / 10" DN 300 / 12" * DN 300 / 12" **



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

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

DN1 = DN DN 80 / 3" DN 100 / 4" DN 150 / 6" DN 200 / 8" DN 250 / 10" DN 300 / 12" * DN 300 / 12" **



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). Conversion to other densities and temperatures refer to Vol. 1: "Technical Fundamentals".

Project Data Sheet

Project:

Engineering:

End-user:

relief type:	pressure only	<input type="checkbox"/>			
	pressure and vacuum	<input type="checkbox"/>			
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	<input type="checkbox"/>	EN 1092-1	<input type="checkbox"/>	JIS <input type="checkbox"/>

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

signed:	date:
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