HENRY GROUP®

Henry Pressure Relief Valves

CE, ASME-UV & NB certified Standard Range

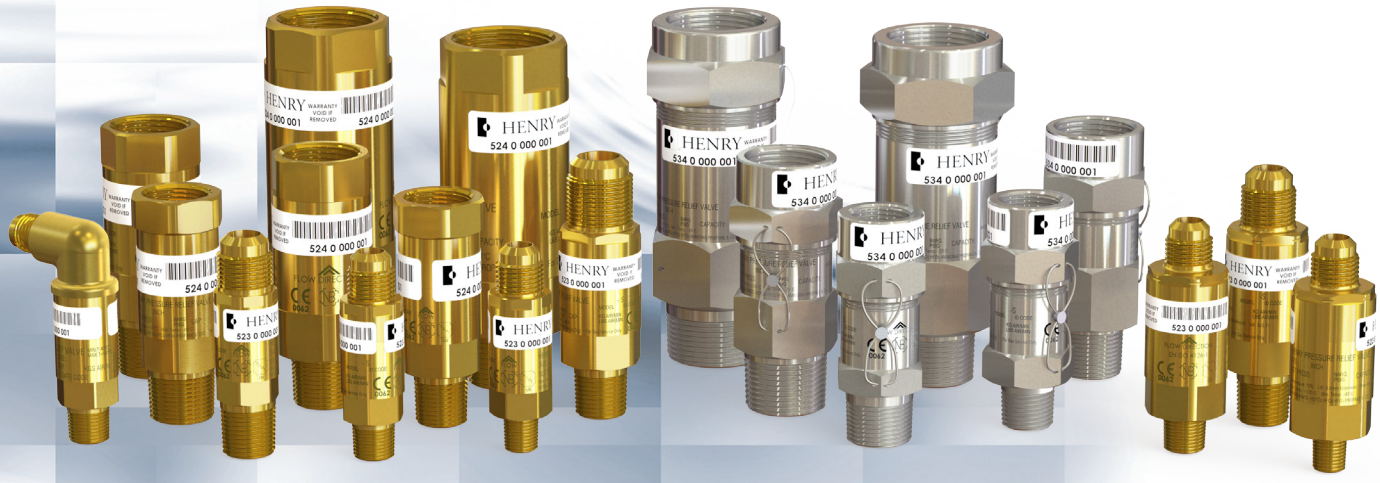
CE, ASME-UV, NB and EN ISO 4126-1 certificated X-Series

Wide range of flow capacity coverage

CE 0062 NB ASME UV EN ISO 4126-1 COMPLIANT

Stainless Steel models for ammonia systems

FEATURES



Metric or Imperial marking available

Serialised Test Certification available

Suitable for use with HCFC, HFC, HFO, CO2 & R290 refrigerants

All common connection sizes catered for

AC&R COMPONENTS

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INTELLIGENT MANUFACTURING. INTELLIGENT PRODUCTS.

PRESSURE RELIEF VALVES

The function of a Pressure Relief Valve is to protect against overpressure. For safety reasons, excessive overpressure in any part of the refrigeration system must be avoided.

Applications

Henry Technologies Pressure Relief Valves (PRVs) are designed to protect system components such as receivers, heat exchangers and vessels from dangerous overpressure. Uncontrolled pressure increase inside a system can occur due to refrigerant expansion as a result of a fire, other heat sources or compressor overrun. In these scenarios, the PRV will discharge, lowering the system pressure back to safe levels, before closing again.

Henry Technologies PRVs are designed to discharge vapour and should not be used to vent liquid refrigerant. The valves are 'back-pressure dependent' and are therefore required to discharge to atmospheric pressure.

All models are suitable for use with HCFC, HFC, HFO, CO_2 and R290 refrigerants along with their associated oils. Stainless steel (53--) models are also suitable for ammonia.

It is recommended to have a relief valve pressure setting at least 25% higher than the maximum system operating pressure. The PRV set pressure should not be higher than the design pressure (MWP) of the vessel.

Main features

- Category IV PED Certified (CE mark)
- ASME Certified (ASME-UV & NB Stamps)
- Set Pressure Tolerance = +/-3%
- Maximum Overpressure = 10%
- Proven safe design
- Precision machined parts for maximum reliability
- Compact design
- Blow-out proof seal design
- Tamper proof

Maintenance & Service Life

Henry Technologies PRVs are designed to be maintenance-free and are secured with a tamper-proof security seal once set at the factory. Removal of this seal, or any attempt to service or replace components of the PRV, will void the product warranty.

In-line with the Institute of Refrigeration Guidelines (UK), Henry Technologies recommend that a PRV should be replaced at least every 5 years. These intervals may have to be reduced if other regulations apply.

Once a PRV has discharged, replacement is recommended as the set pressure can no longer be guaranteed. This is due to the likely presence of system debris and particles embedding into the valve seat during discharge, as well as the force of the reclosing action itself.

Customisation

Henry Technologies PRVs can be customised to meet individual system or regulatory requirements in the following ways:

- A number of common valve and pressure setting combinations are produced as standard models. If a system requires an uncommon pressure setting, non-standard pressures are available on all valve models upon request. See pages 4 and 5 for standard valve tables.
- All PRVs are supplied with an EU Declaration of Conformity as standard. If local regulations or insurance providers require a bespoke test certificate, these can be provided and linked via serial number to a specific valve.
- All models except the 526E can be ordered and marked with either metric (barg and kg Air/min) or imperial (PSIg and lbs Air/min) units as required.
- Due to industry conventions, a number of valve models and settings are readily available as standard 'off the shelf' parts. See pages 4 and 5 for reference.

Installation Notes

1. Connect the PRV at a location above the liquid refrigerant level in the vapour space.
2. Stop valves should not be located between the vessel and the PRV, except the three-way dual shut-off type.
3. Do not discharge the PRV prior to installation or when pressure testing the system. The EN 378 Standard advises that PRVs should be removed or isolated during the system pressure test.
4. PRVs should be mounted as close to vertical as possible to avoid the possibility of liquid refrigerant or oil pooling at the valve inlet.
5. The pipe work must not impose loads on the PRV. Loads can occur due to misalignment, thermal expansion, discharge gas thrust etc.
6. Henry PRVs are 'back pressure dependant', meaning that they are designed to discharge to atmospheric pressure. Any built-up back pressure due to outlet piping should be limited to a maximum of 10% as stipulated in the European Standard EN 13136.
7. It is recommended to implement measures discouraging liquid (including rain) from entering the outlet of the valve and pooling inside it. For external installations, attaching a short elbow fitting to the outlet is common practice – noting point 6 above on back pressure.

PRESSURE RELIEF VALVES STANDARD RANGE

How it works

A conventional PRV will start to lift within +/-3% of the stamped set pressure. This set point is defined by a minimum of one bubble per second when testing to API Standard 527. Following this initial lift the valve will then 'pop' fully open within a further 10%. This is achieved through the design of the valve internals, which utilise local static pressure increases and fluid flow phenomenon to achieve the characteristic pop action. Once pressure in the system decreases to a safe level, the spring in the PRV will force the valve to reclose again, ensuring some system charge is maintained. A PRV is a safety device and should only be open under abnormal system operating conditions.

Materials of construction

- For all 52-- models, the main pressure shell of the valve (body & outlet) is made from brass. Valve internal components are made from brass, plated steel, or stainless steel.
- For all 53-- models, the main pressure shell of the valve (body & outlet) is made from stainless steel. Valve internal components are made from plated steel or stainless steel.
- All models use a non-stick and chemically-inert bespoke PTFE seal.

CE 0062 NB ASME UV

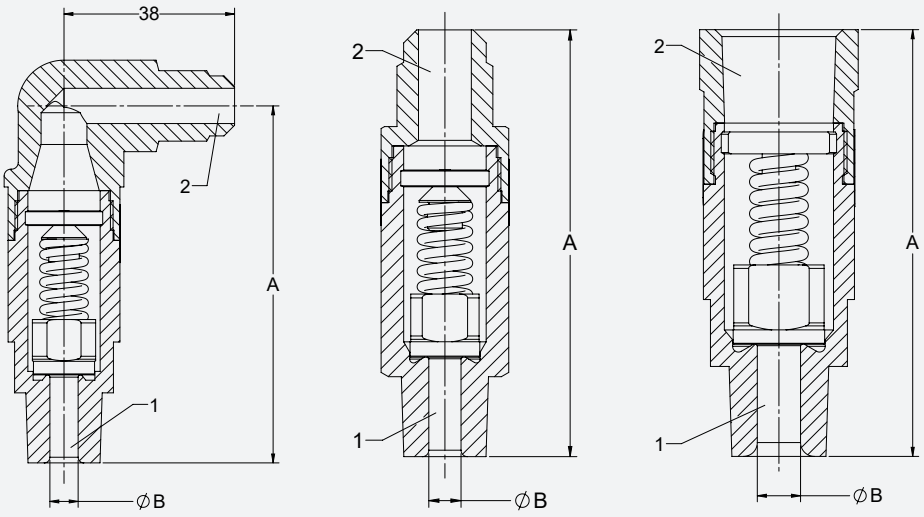
Technical Specification

All models are fully designed and certified to ASME VIII Division 1, with the exception of the 526E, which is designed to intent of the same code.

Set Pressure Range:	10.3 barg to 31.0 barg*
	150 PSIg to 450 PSIg*
52-- Temperature Range:	-40°C to +107°C
	-40°F to +225°F
53-- Temperature Range:	-29°C to + 135°C
	-20°F to + 275°F

*526E, 5230A, 5231A & 5231B minimum pressure setting is 14.0 barg (203 PSIg)

5244, 5244A, 5344 & 5344A maximum pressure setting is 27.6 barg (400 PSIg)



Relief Valves - Brass									
Model	Connection Type		Dimensions (mm)		Flow Area (mm^2)	K_{dr}	Weight (kg)	ASME UV	CE Cat
	Inlet	Outlet	A	ØB					
526E	3/8" NPTF	3/8" SAE Flare	80	6.35	31.67	0.41	0.3	No	Cat IV
5230A	1/4" NPTF	1/2" SAE Flare	84	6.35	31.67	0.69	0.2	Yes	
5231A	3/8" NPTF	1/2" SAE Flare	84	6.35	31.67	0.69	0.2		
5231B	1/2" NPTF	5/8" SAE Flare	90	6.35	31.67	0.69	0.2		
5232A	1/2" NPTF	3/4" SAE Flare	108	9.53	71.26	0.67	0.4		
5240	1/2" NPTF	3/4" NPTF (Female)	94	9.53	71.26	0.67	0.4		
5242	3/4" NPTF	3/4" NPTF (female)	94	9.53	71.26	0.67	0.5		
5244A	3/4" NPTF	1" NPTF (female)	105	12.70	126.68	0.70	0.7		
5244	1" NPTF	1" NPTF (female)	105	12.70	126.68	0.70	0.7		
5245	1" NPTF	1 1/4" NPTF (female)	146	17.86	250.41	0.76	1.5		
5246	1 1/4" NPTF	1 1/4" NPTF (female)	145	17.86	250.41	0.76	1.6		

Relief Valves - Stainless Steel									
Model	Connection Type		Dimensions (mm)		Flow Area (mm^2)	K_{dr}	Weight (kg)	ASME UV	CE Cat
	Inlet	Outlet	A	ØB					
5340	1/2" NPTF	3/4" NPTF (Female)	94	9.53	71.26	0.67	0.4	Yes	Cat IV
5342	3/4" NPTF	3/4" NPTF (Female)	94	9.53	71.26	0.67	0.4		
5344A	3/4" NPTF	1" NPTF (Female)	105	12.70	126.68	0.70	0.6		
5344	1" NPTF	1" NPTF (Female)	105	12.70	126.68	0.70	0.6		
5345	1" NPTF	1 1/4" NPTF (Female)	146	17.86	250.41	0.76	1.3		
5346	1 1/4" NPTF	1 1/4" NPTF (Female)	145	17.86	250.41	0.76	1.4		

Valve Model / Setting Combinations										
Setting (barg)	526E	5230A	5231A	5231B	5232A	5240	5242	5244	5340	5342
10.3	N/A	N/A	N/A	N/A						
14.0										
16.2										
17.2										
20.7										
24.1										
24.8										
25.0										
25.9										
27.6										
29.3								N/A		
31.0								N/A		

Note: Blue indicates build to stock models.

PRESSURE RELIEF VALVES X-SERIES

How It Works

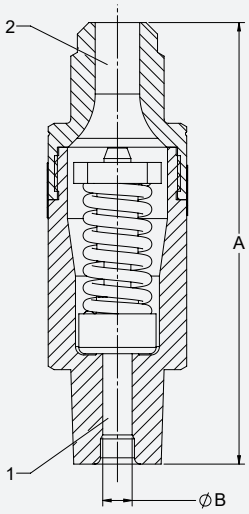
An X-Series PRV from Henry Technologies works in exactly the same way as a conventional PRV. The significant difference is that the 'X' signifies these models have been additionally certified to the EN ISO 4126-1 standard. The main benefit of this is that the PRV will close within 15% of the set pressure following a discharge, meaning that a reduced amount of system charge is lost in an overpressure event.

Material of Construction

The main pressure shell of the valve (body & outlet) is made from brass. All internal components are made from brass except for the spring, which is plated steel, and the seal, which is made from a highly-resilient and robust fluoroelastomer material.

Additional Features

- Certified to EN ISO 4126-1
- High Flow Capacity
- Enhanced seat tightness from Fluoroelastomer soft seal.



1 Inlet
2 Outlet

EN ISO 4126-1 COMPLIANT

Technical Specification

All models are fully designed and certified to ASME VIII Division 1 and EN ISO 4126-1.

Set Pressure Range: 10.3 barg to 46.0 barg
150 PSIg to 667 PSIg

Temperature Range: -40°C to +120°C
-40°F to +248°F

Valve Model / Setting Combinations			
Setting (barg)	5230AX	5231AX	5231BX
20.7			
24.1			
24.8			
25.0			
27.6			
31.0			
40.0			
42.0			
45.0			
46.0			

Note: Blue indicates build to stock models

Relief Valves - X-Series									
Part No	Connection Type		Dimensions (mm)		Flow Area (mm^2)	K_{dr}	Weight (kg)	ASME UV	CE Cat
	Inlet	Outlet	A	ØB					
5230AX	1/4" NPTF	1/2" SAE Flare	94	7.00	38.48	0.77	0.4	Yes	Cat IV
5231AX	3/8" NPTF	1/2" SAE Flare	94	7.00	38.48	0.77	0.4		
5231BX	1/2" NPTF	5/8" SAE Flare	105	7.00	38.48	0.77	0.4		

PRV Air Capacity Reference Table (kg Air/min) @ 20°C.											
Part No	Pressure Setting (barg/*PSIg*)										
	10.3 *150*	14.0 *203*	17.2 *250*	20.7 *300*	24.1 *350*	27.6 *400*	31.0 *450*	40.0 *580*	42.0 *609*	45.0 *653*	46.0 *667*
526E	N/A	3.0	3.7	4.4	5.1	5.8	6.5	N/A			
5230A	N/A	5.1	6.2	7.4	8.5	9.7	10.9	N/A			
5231A											
5231B											
5230AX	5.2	6.9	8.4	10.0	11.5	13.2	14.7	18.9	19.8	21.2	21.7
5231AX											
5231BX											
5232A	8.3	11.1	13.5	16.1	18.6	21.2	23.7	N/A			
5240											
5242											
5340											
5342											
5244A	15.5	20.6	25.0	29.9	34.6	39.4	N/A				
5244											
5344A											
5344											
5245	33.3	44.2	53.7	64.1	74.2	84.5	94.6	N/A			
5246											
5345											
5346											

Selection Guidelines

For safety reasons, PRV selection should only be carried out by suitably qualified engineers. The European Standards EN 378 and EN 13136 are recommended.

Selection Guidelines example as per EN 13136

A liquid receiver containing R407F refrigerant is to be protected from overpressure due to fire. The receiver is 2.1m long (L_1) and 0.84m in diameter (d_1). The set pressure of the PRV is to be 27.6barg.

Calculate actual relieving pressure, p_0:

$$p_o = 1.1p_{set} + p_{atm} = 31.4 \text{ bara}$$

Calculate vessel external surface area, A_{surf}:

$$A_{surf} = 2 \times \left(\frac{\pi}{4} \times d_1^2\right) + (\pi \times d_1 \times L_1)$$

$$A_{surf} = 6.65m^2$$

Calculate the minimum required discharge capacity, Q_{md} using the heat of vaporization, h_{vap} from refrigerant data tables at p_0:

$$Q_{md} = \frac{3600 \times \varphi \times A_{surf}}{h_{vap}}$$

$$Q_{md} = \frac{3600 \times 10 \times 6.65}{107.21} = 2{,}233 \text{ kg/h}$$

Select an appropriate PRV to exceed Q_{md}. For this example, a 5232A has been used.

Calculate the discharge capacity of the PRV, Q_m using the specific volume of vapour, v_0 from refrigerant data at p_0, the function of the isentropic exponent, C for the specific refrigerant and PRV parameters from the tables here (flow area, A and de-rated coefficient of discharge, k_{dr}). The correction factor, K_b is 1 for critical flow:

$$Q_m = 0.2883 \times C \times A \times K_{dr} \times K_b \times \sqrt{\frac{p_0}{v_0}}$$

$$Q_m = 0.2883 \times 2.52 \times 71.26 \times 0.67 \times 1 \times \sqrt{\frac{31.4}{0.00521}}$$

$$Q_m = 2{,}692 \text{ kg/h}$$

$Q_m > Q_{md}$, so the 5232A would be a suitable PRV for the application.

Important Selection Notes:

1. It is important not to grossly oversize a PRV so that Q_{md} is less than 20% of Q_m as this can adversely affect PRV performance.
2. Henry Technologies recommends that all inlet and outlet piping for PRVs is sized in accordance with EN 13136 to avoid excessive pressure losses.
3. If Henry Technologies Rupture Disc is used in conjunction with a Henry Technologies PRV, the discharge capacity, Q_m should be de-rated by 10%.

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