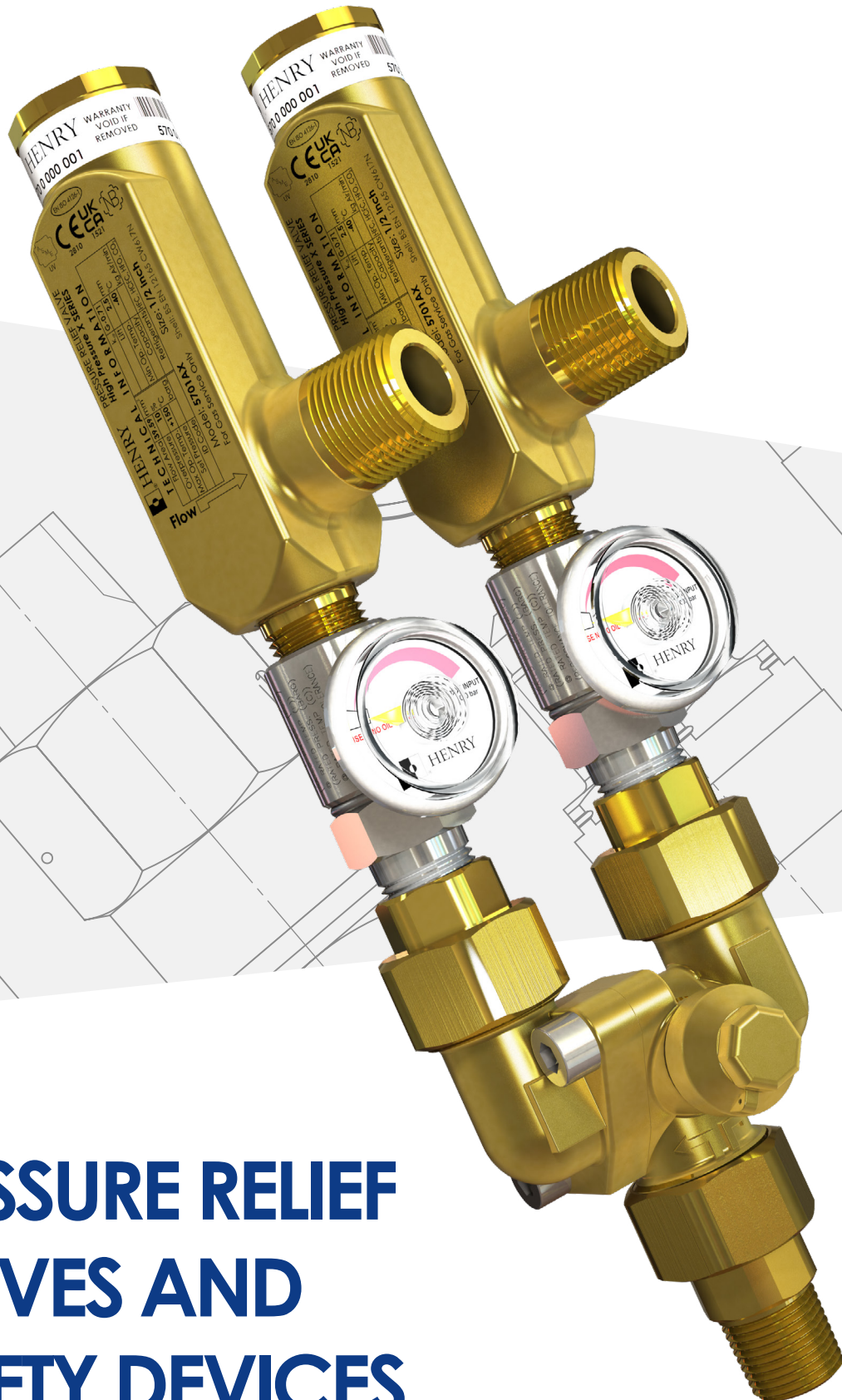




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HENRY GROUP



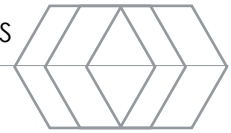
PRESSURE RELIEF VALVES AND SAFETY DEVICES

INTELLIGENT MANUFACTURING. INTELLIGENT PRODUCTS.



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PRESSURE RELIEF VALVES

How It Works

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

All models are suitable for use with HCFC, HFC, HFO, CO₂ and R290 refrigerants along with their associated oils where materially compatible. Stainless steel models in the Standard range as well as in our dedicated Ammonia range models, are suitable for use with R717 & associated oils, where materially compatible

It is recommended to have a relief 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 & PE(S)R Certified (CE & UKCA) marks
- 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 PRVs are designed to be maintenance free and are secured with a tamper proof security seal once set at the factory. Removal of the 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 Group recommends that a PRV should be replaced at least every five years. These intervals may have to be reduced if other regulations are applied. Once a PRV has discharged, replacement is recommended as set pressure can no longer be guaranteed. This is due to the likely presence of system debris & particles embedding into the valve seat during discharge, as well as the force of the re-closing action itself.

Certification

All of Henry Group's PRVs are supplied with an electronic instruction sheet, which can be accessed directly via the QR code or web address that is printed on the box. The Instruction Sheets contain a guide explaining how to access and download the electronic EU/UK DoC for a specific valve.



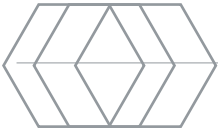
Customisation

Henry Group 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 - built to stock. If a system requires an uncommon pressure setting, non-standard pressures are available on all valve models on request.
- 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.

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.
8. On transcritical CO₂ systems, any discharge piping should be sized with the shortest length and largest bore diameter practical to avoid solids forming downstream of the PRV during a discharge.



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 phenomena 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 re-close 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.

Technical Specification

All models are fully designed and certifies to ASME BPV XIII, with the exception of the 526E, which is designed the intent of the same code.

Set pressure range:

10.3 barg to 31.0 barg*
150 PSig to 450 PSig*

52 Temperature range:

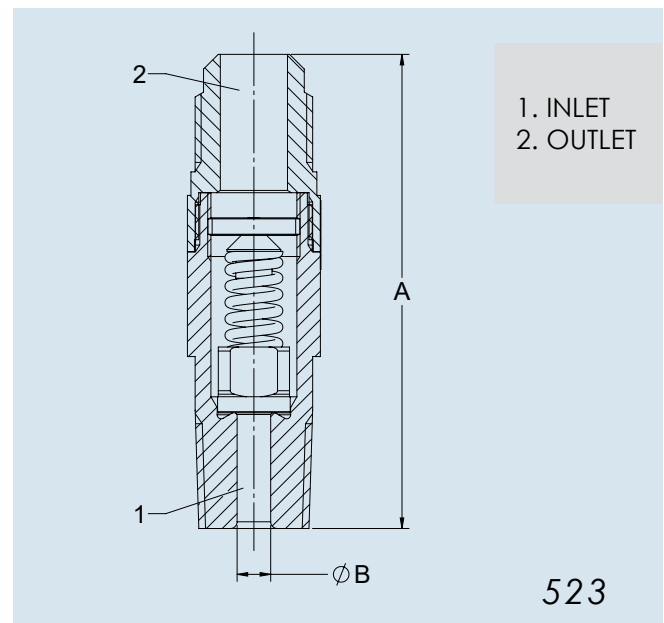
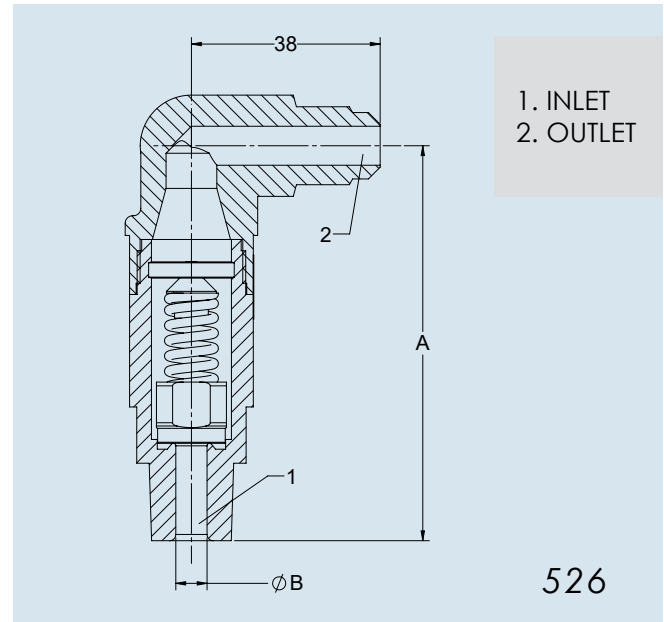
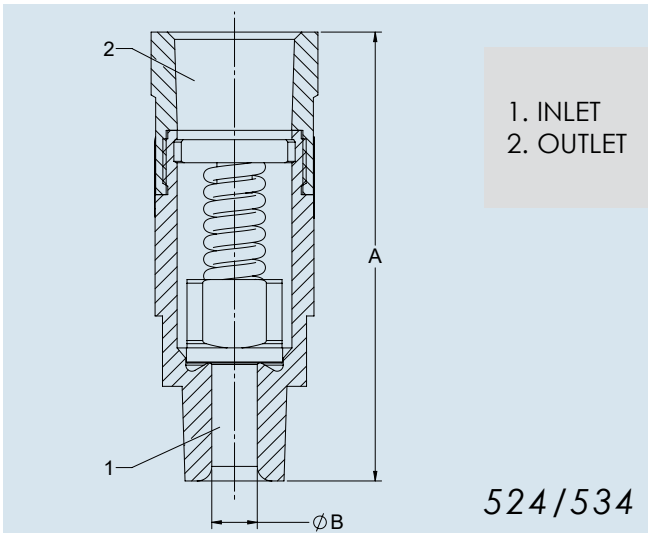
-40°C to +107°C
-40°F to +225°F

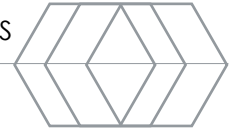
53 Temperature range:

-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, 5244P, 5344 & 5344A maximum pressure setting is 27.6 barg (400 PSig)





Relief Valves - Brass									
Model	Connection Type		Dimensions (mm)		Flow Area (mm ²)	K _{cr}	Weight (kg)	ASME UV	CE/UKCA 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	Yes	
5231B	1/2" NPTF	5/8" SAE Flare	90	6.35	31.67	0.69	0.2	Yes	
5232A	1/2" NPTF	3/4" SAE Flare	108	9.53	71.26	0.67	0.4	Yes	
5240	1/2" NPTF	3/4" NPTF (Female)	94	9.53	71.26	0.67	0.4	Yes	
5242	3/4" NPTF	3/4" NPTF (Female)	94	9.53	71.26	0.67	0.5	Yes	
5244A	3/4" NPTF	1" NPTF (Female)	105	12.70	126.68	0.70	0.7	Yes	
5244	1" NPTF	1" NPTF (Female)	105	12.70	126.68	0.70	0.7	Yes	
5245	1" NPTF	1 1/4" NPTF (Female)	146	17.86	250.41	0.76	1.5	Yes	
5246	1 1/4" NPTF	1 1/4" NPTF (Female)	145	17.86	250.41	0.76	1.6	Yes	

Relief Valves - Stainless Steel									
Model	Connection Type		Dimensions (mm)		Flow Area (mm ²)	K _{cr}	Weight (kg)	ASME UV	CE/UKCA 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	Yes	
5344A	3/4" NPTF	1" NPTF (Female)	105	12.70	126.68	0.70	0.6	Yes	
5344	1" NPTF	1" NPTF (Female)	105	12.70	126.68	0.70	0.6	Yes	
5345	1" NPTF	1 1/4" NPTF (Female)	146	17.86	250.41	0.76	1.3	Yes	
5346	1 1/4" NPTF	1 1/4" NPTF (Female)	145	17.86	250.41	0.76	1.4	Yes	

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



X SERIES

How It Works

An X-Series PRV from Henry Group 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 change is lost in an overpressure event.

Material of Construction

The main pressure shell of the valve (body & outlet) is made from brass.

Most internal components are made from brass. However the spring is made from plated steel and the seal 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

Technical Specifications

All models are fully designed and certified to ASME BPVC XIII and EN ISO 4126-1.

Set Pressure Range:

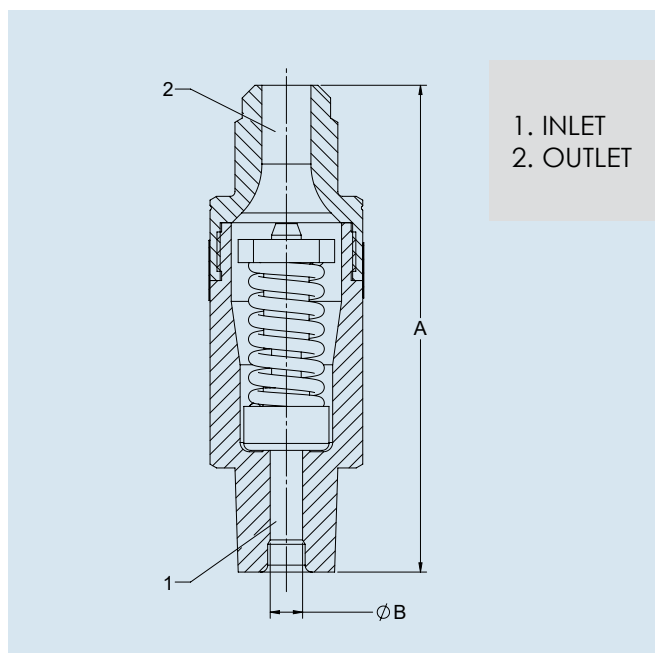
10.3 barg to 46.0 barg

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/UKCA 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		



AMMONIA RANGE

How It Works

The Ammonia Range of PRVs takes the proven technology employed in the standard range and encases it in a robust forged steel body, suitable for the demands of an Ammonia refrigeration system. The female NPTF connections allow for maximum sealing against leaks, whilst the angled layout gives more flexibility when routing the discharge piping required in Ammonia systems.

The main pressure shell of the valve is made from steel. All internal components are manufactured from plated or stainless steel. The seal is a bespoke non-stick and chemically-inert PTFE design.

Materials of Construction

The main pressure shelf of the valve is made from steel. All internal components are manufactured from plated or stainless steel. The seal is a bespoke non-stick and chemically-inert PTFE design.

Additional Features

- Suitable for HFC, HCFC, HFO, Ammonia and CO₂ refrigerant gases
- Supplied with an installation date sticker
- Dedicated hole for attachment of additional third party tags.
- Available marked in either metric (barg and kg Air/min) or imperial (PSig and lbs Air/min) units

Technical Specifications

Set Pressure Range:

10.3 barg to 31.0 barg*
150 PSig to 450 PSig*

*Maximum setting on 5604 model is 24.1 barg (350 PSig)

Operating Temperature Range:

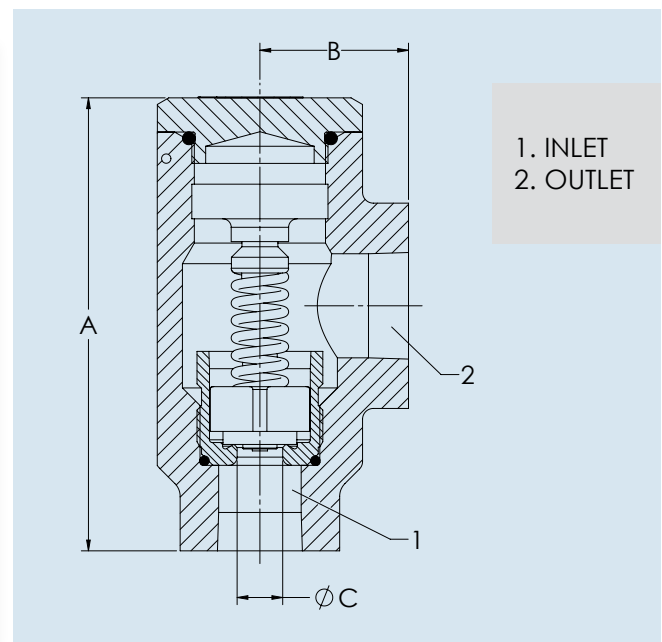
-29°C to +107°C

Relief Valves Ammonia Range										
Part No.	Connection Type		Dimensions (mm)			Flow Area (mm ²)	kdr	Weight (kg)	ASME (lv)	CE/UKCA Cat
	Inlet	Outlet	A	B	ØC					
5600	1/2" NPTF (Female)	3/4" NPTF (Female)	127	40.6	12.7	126.68	0.63	1.8		
5601	1/2" NPTF (Female)	1" NPTF (Female)	127	40.6	12.7	126.68	0.73	1.8		
5602	3/4" NPTF (Female)	1" NPTF (Female)	127	40.6	12.7	126.68	0.73	1.7	Yes	Cat IV
5603	1" NPTF (Female)	1.1/4" NPTF (Female)	140	50.8	12.7	126.68	0.77	1.8		
5604	1.1/4" NPTF (Female)	1.1/2" NPTF (Female)	188	58.4	17.9	250.41	0.74	3.1		



Valve Model / Setting Combinations						
Setting (PSig)	Setting (barg)	5600	5601	5602	5603	5604
150	10.3					
225	15.5					
250	17.2					
275	19.0					
300	20.7					

Note: Blue indicates build to stock models





HIGH PRESSURE

How It Works

The high pressure relief valve range is specifically designed for high pressure applications up to 130 barg and in particular, transcritical CO₂ systems. This range has been developed from the ground up, utilising the latest computational, simulation and experimental methods. The valves are manufactured from Brass.

The 5701AX & 5701GX models have been developed to suit the majority of applications and carry the added benefit of EN ISO 4126-1 certification. The 5700 is intended specifically for protection of pipework and small vessels whilst the 5702 models are sized to deal with large vessels or multiple compressor discharges.

Main Features

- Maximum pressure setting of 130 barg
- Set pressure tolerance = +/-3%
- Maximum overpressure = 10%
- In accordance with EN ISO 4126-1, the 5701AX valve reseats within 15% of set pressure following a discharge
- TFM second generation PTFE seal
- Suitable for HFC, HCFC, HFO and CO₂ refrigerant gases

Technical Specifications

Allowable Operating Temperature:

-40°C to +150°C

Standard pressure settings (barg):

31*, 40*, 42*, 45*, 46, 50, 60, 70, 80, 90, 100, 110, 120, 130

*Not available on 5701AX or 5701GX models



Valve Capacity Ratings (kg Air/min) @ 20°C										
Part No.	Standard Pressure Setting (barg)									
	31.0	40.0	42.0	45.0	46.0	60.0	80.0	100.0	120.0	130.0
5700	3.9	5.0	5.2	5.6	5.7	7.4	9.8	12.2	14.7	15.9
5701AX / 5701GX	N/A*	N/A*	N/A*	N/A*	20.5	26.7	35.4	44.2	52.9	57.3
5702 (A/B/C)	34.9	44.7	46.9	50.2	51.3	66.5	88.4	110.2	132.1	143.0

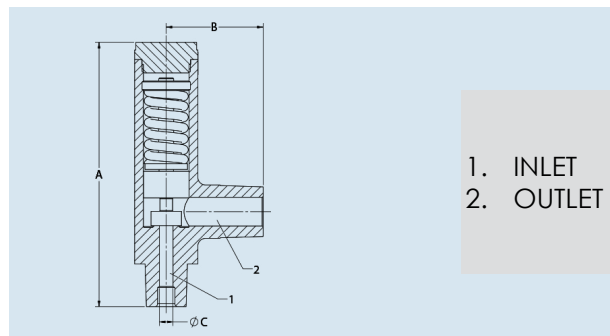
* Minimum pressure setting is 46.0 barg.

High Pressure Relief Valve Range										
Part No.	Conn Size (inch)		Dimensions (mm)			Flow Area (mm ²)	k _{tr}	Weight (kg)	ASME UV	CE/UKCA Cat
	Inlet	Outlet	A	B	ØC					
5700	3/8 NPTF	3/8 NPTF	87.0	30.7	3.5	9.62	0.81	0.27	Yes	Cat IV
5701AX	1/2 NPTF	3/4 NPTF	132.5	50.6	7.1	39.59	0.71	0.86	Yes	
5701GX	G-1/2	3/4 NPTF	132.5	50.6	7.1	39.59	0.71	0.86	Yes	
5702	1/2 NPTF	1 NPTF	179.5	61.4	10.5	86.59	0.81	2.15	Yes	
5702A	3/4 NPTF							2.18	Yes	
5702B	1 NPTF							2.21	Yes	
5702C	1 1/4 NPTF							2.29	Yes	

Installation Instructions



Scan or click the QR Code to download the full product installation and application instructions from our website.





FLOW CAPACITIES & SECTION GUIDELINES

Range		Model		PRV Air Capacity Reference Table (kg Air/min) @ 20°C.																	
				Pressure Setting (bar/PSig)																	
		10.3 150	14.0 203	16.2 235	17.2 250	20.7 300	24.1 350	24.8 360	25.9 375	27.6 400	31.0 450	40.0 560	42.0 609	46.0 667	60.0 870	80.0 1160	100.0 1450	120.0 1740	130.0 1885		
High Pressure	5700	N/A																			
Standard	526E	3.0	3.5	3.7	4.4	5.1	5.2	5.4	5.8	6.5	N/A										
	5230A 5231A 5231B	N/A	5.1	5.8	6.2	7.4	8.5	8.8	9.1	9.7	10.9	N/A									
	5701AX 5701GX	N/A																			
X-Series	5230AX 5231AX 5231BX	5.2	6.9	7.9	8.4	10.0	11.5	11.9	12.4	13.2	14.7	18.9	19.8	21.7	N/A						
Standard	5232A 52/5340 52/5342	8.3	11.1	12.7	13.5	16.1	18.6	19.1	19.9	21.2	23.7	N/A									
High Pressure	5702 5702A 5702B 5702C	N/A																			
Ammonia	5600	13.9	18.5	21.3	22.5	26.9	31.1	32.0	33.3	35.5	39.7	N/A									
Standard	52/5344 52/5344A/P	15.5	20.6	23.6	25.0	29.9	34.6	35.5	37.0	39.4	N/A										
Ammonia	5601 5602	16.2	21.5	24.7	26.1	31.1	36.0	37.0	38.6	41.1	46.0	N/A									
	5603	17	22.7	26	27.5	32.8	38.0	39.1	40.7	43.3	48.5	N/A									
Standard	5604	32.4	43.1	49.4	52.3	62.4	72.2	N/A													
	52/5345 52/5346	33.3	44.2	50.7	53.7	64.1	74.2	76.2	79.5	84.5	94.6	N/A									



EXAMPLE PRV SIZING CALCULATIONS

Section Example Conventional

For safety reasons, PRV selection should only be carried out by suitably qualified engineers. The European Standards EN 378 and EN 13136 are recommended and are used as a reference for all below calculations.

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 (P_{set}) of the PRV is to be 27.6barg.

Calculate actual relieving pressure, p_0 :

$$p_0 = (p_{set} \times 1.1) + p_{atmos}$$

p_{atmos} = atmospheric pressure

$$p_0 = (27.6 \times 1.1) + 1.013 = \mathbf{31.4 \text{ bara}}$$

Calculate vessel external surface area, (A_{surf}):

$$A_{surf} = (\pi \times D \times L) + 2(D^2 \times \pi / 4)$$
$$A_{surf} = (\pi \times 0.84 \times 2.1) + 2(0.84^2 \times \pi / 4) = \mathbf{6.65m^2}$$

Calculate the minimum required discharge capacity (Q_{md}):

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

φ = Density of heat flow rate (kW/m²). The standards assume a value to 10 kW/m² but state that a higher value can be used if necessary. This figure relates to an un-lagged vessel.

h_{vap} = Heat of vaporisation calculated at 1.1 times the set pressure, in bar a, of the pressure relief valve (kJ/kg)

$$Q_{md} = \frac{3600 \times \varphi \times A_{surf}}{h_{vap}} = \frac{3600 \times 10 \times 6.65}{107.21} = \mathbf{2,223kg/hr}$$

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):

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

C = Function of the isentropic exponent

A = Flow area of PRV (mm²)

K_{dr} = De-rated coefficient of discharge of PRV

K_b = Theoretical capacity correction factor for sub-critical flow. A value of 1 is used for critical flow.

v_0 = Specific volume of saturated vapour at p_0 (m³/kg)

$$Q_m = 0.2883 \times 2.52 \times 71.26 \times 0.67 \times 1 \times \sqrt{\frac{31.4}{0.00521}} = \mathbf{2,629kg/hr}$$

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

See the Important Selection Notes section for further guidance on selecting the most appropriate PRV.

Section Example - Above Refrigerant Critical Point

For safety reasons, relief valve selection should only be carried out by suitably qualified engineers. The European Standard; EN 378 and EN 13136 are recommended and are used as a reference for all below calculations.

A liquid receiver containing R744 (CO₂) refrigerant is to be protected from overpressure due to fire. The receiver is 2.0m long (L) and 1.3m in diameter (d). The set pressure (P_{set}) of the PRV is to be 120barg.

Calculate actual relieving pressure (p_0):

$$p_0 = (p_{set} \times 1.1) + p_{atmos}$$

p_{atmos} = atmospheric pressure

$$p_0 = (120 \times 1.1) + 1.013 = \mathbf{133 \text{ bara}}$$

Calculate vessel external surface area, (A_{surf}):

$$A_{surf} = (\pi \times D \times L) + 2(D^2 \times \pi / 4)$$
$$A_{surf} = (\pi \times 1.3 \times 2.0) + 2(1.13^2 \times \pi / 4) = \mathbf{10.8m^2}$$

For Transcritical and Supercritical CO₂ selections, the following excerpt from EN 13136 applies:

If the set pressure of the pressure relief valve times 1,1, is higher than the saturated pressure of the refrigerant at (critical temperature minus 5 [K]) then h_{vap} and v_0 shall be taken at critical temperature minus 5 [K].

Calculate the minimum required discharge capacity (Q_{md}):

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

φ = Density of heat flow rate (kW/m²). The standards assume a value to 10 kW/m² but state that a higher value can be used if necessary. This figure relates to an un-lagged vessel.

h_{vap} = Heat of vaporisation calculated at 1.1 times the set pressure, in bar a, of the pressure relief valve (kJ/kg) Note EN 13136 extract

$$Q_{md} = \frac{3600 \times \varphi \times A_{surf}}{h_{vap}} = \frac{3600 \times 10 \times 10.8}{112.28} = \mathbf{3,463 \text{ kg/hr}}$$

Select an appropriate PRV to exceed Q_{md} . For this example, a 5701AX has been used.

Calculate the discharge capacity of the PRV (Q_m):

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

C = Function of the isentropic exponent

A = Flow area of PRV (mm²)

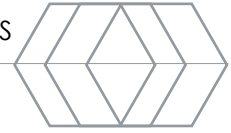
K_{dr} = De-rated coefficient of discharge of PRV

K_b = Theoretical capacity correction factor for sub-critical flow. A value of 1 is used for critical flow.

v_0 = Specific volume of saturated vapour at p_0 (m³/kg) Note EN 13136 extract

$$Q_m = 0.2883 \times 2.63 \times 39.59 \times 0.71 \times 1 \times \sqrt{\frac{133}{0.00393}} = \mathbf{3,921kg/hr}$$

See the Important Selection Notes section for further guidance on selecting the most appropriate PRV.



PRV Selection & Sizing

It is essential that PRVs are sized correctly for the application and system they are designed to protect. Whilst a common misconception is to select a PRV with an appropriate threaded connection to that supplied on the vessel or unit, it is the flow capacity rating of the valve which should always be used to determine the correct model.

Henry Group recommends following the selection methodology outlined in the EN 13136 Standard. This gives a comprehensive guide to not only ensuring that the flow capacity of the PRV is suitable to protect the system, but also provides a means to ensure that upstream and downstream piping/components do not compromise the operation of the valve by ensuring pressure drops are below acceptable limits.

Over-sizing of a PRV is also an important consideration, as a valve that has too high a rated capacity for a given system will often 'chatter' (vibrate rapidly between open and closed) during discharge. This can damage, or in extreme cases destroy, the seal altogether. As a general rule when using EN 13136 to select a PRV; always ensure that the actual relieving capacity of the valve (Q_m) is larger, or at least equal to the required relieving capacity for the system (Q_{md}), but it should never be more than five times the figure to avoid oversizing ($Q_m \leq 5 \times Q_{md}$).

Henry PRV Selector

Henry Group offers a free online PRV selector tool, which carries out the full selection process to the EN 13136 Standard. The most appropriate three-way valve and rupture disc add-ons can also be identified using the tool, allowing you to quickly and easily find the ideal safety device assembly for your application.

You can access the selection tool via the link below or by scanning the QR code opposite:

<https://portal.henry-group.net/product/selector/prv.xhtml>

Operating Parameters & Tolerances

Pressure

The maximum and minimum set pressure available on a Henry PRV varies by model. All PRVs are factory-set at the marked set pressure and cannot be adjusted to alter this setting; any such action by a third party will void the product warranty.

Pressure Tolerances

All PRVs are subject to the same operational tolerances on pressure, namely;

- Set point* +/-3% of stamped set pressure
- Full lift** (pop) before or at 110% of the set point

* The PRV set point is defined by Henry as the pressure at which a minimum of one bubble per second is observed on a Henry Technologies Ltd PRV test rig.

** The point at which the PRV reaches its full rated discharge capacity.

The closing (reseat) point of PRVs varies by certification, but will typically be between 50% and 70% of the set point for most models. Valves certified to EN ISO 4126-1 (X-series) are guaranteed to reseal at or above 85% of the set point.

Adequate seat tightness of a PRV is determined by Henry to be zero bubbles from the outlet of the valve (connected to a container of test fluid) when pressurised to 90% of the stamped set pressure following the final valve set during production. This is closely aligned with the API 527 Standard.

Due to the inherent sensitivity of a PRV and the tolerances detailed above, it is recommended to select a pressure setting which is at least 25% higher than the normal system operating pressure (but no higher than the MWP of system components) to avoid accidental discharge of the valve during service.

Product Selector

PRV

Pressure Relief Valves

Parameters Discharge Method Optional Components Selection

Parameters

Refrigerant *

Pressure * barg

psig

kpa

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RUPTURE DISCS

How It Works

The function of a rupture disc is to protect against over-pressure. A foil disc is clamped in a holder. The disc is designed to burst at a pre-determined pressure - the set pressure. A reverse acting disc is used.

This means the disc is domed against the direction of the fluid pressure and designed to buckle due to compression forces, prior to bursting. Advantages of a reverse acting disc include being less sensitive to temperature, high operating pressures and improved fatigue life.

Each disc is manufactured with a precision score mark. This score mark in combination with the buckling action causes the disc to burst. At burst, the disc is designed to hinge resulting in a large available flow area. The disc is designed to be non-fragmenting after rupturing.

Applications

A rupture disc protects against any leakage or weeping of refrigerant through a relief valve. A rupture disc can also be used in combination with a pressure gauge and or pressure switch to detect if a relief valve has discharged. Henry Group rupture discs are designed to operate with gases and should not be used to prevent liquid over-pressure. The brass 55 series models are suitable for use with HCFC, HFC, A2L, CO₂ and HC refrigerants & associated oils where materially compatible. The stainless steel 56 series models are also suitable for ammonia and HFO refrigerants as well as their associated oils where materially compatible.

In line with the Institute of Refrigeration Guidelines (UK), it is recommended that at least every 5 years all low and high side bursting discs should be replaced. These intervals may have to be reduced if other regulations apply.

Main Features

- Proven safe design
- CE marked
- High Flow Capacity
- Compact
- Reverse acting, non-fragmenting disc
- 2 x 1/8" NPT pressure ports
- Helium leak tested
- Pressure settings up to 130 barg available on request
- EN ISO 4126-2 Compliant

Technical Specifications

Set Pressure Range:

10.3 to 60 barg (55 series)

10.3 to 130 barg (56 series)

Allowable Operating Pressure:

-40°C to +121°C (55 series)

-40°C to +427°C (56 series)

Note: Rupture discs burst pressures are rated at a specific temperature (e.g. 20°C). Whilst the unit can operate within the temperature limits stated, large deviations in temperature will affect the burst pressure. Refer to the "Selection Guidelines" section for more information.

Materials of Construction

For 55 series and 56 series, the main bodies are made from brass and stainless steel respectively. The foil disc is made from nickel alloy.



Tolerance Guidelines

As per industry standards, rupture disc rated burst pressures are subject to a performance tolerance.

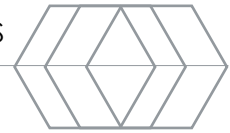
When specifying a disc, the nominal pressure setting should be quoted as part of a part number. The rupture disc will be provided with a rated burst pressure stamped on the body, which is the average of all burst tests carried out on the batch of the discs. As a result, the rated burst pressure may differ slightly from the nominal setting depending on the manufacturing tolerance for the specific batch of discs. The manufacturing tolerance will never be greater than +/-5% and in the majority of cases is significantly less.

The rated burst pressure is subject to a performance tolerance of +/-5%. Examples of actual burst pressure ranges are shown in the table below for a selection of typical rated pressure settings.

Performance Tolerance Examples	
Rated burst pressure (barg)	Burst pressure range (barg)
10.3	9.8 - 10.8
14	13.3 - 14.7
16.2	15.4 - 17.0
17.2	16.3 - 18.0
20.7	19.7 - 21.7
24.1	22.9 - 25.3
24.8	23.6 - 26.0
25.9	24.6 - 27.2
27.6	26.2 - 29.0
31	29.5 - 32.6
40	38 - 42

Accessories

The 2 x 1/8" NPT pressure ports can be used for after-market accessories. If unused, the ports may be closed using a 1/8" NPT plug. If this is required, the Henry Group part number is A0624.



Part No	Conn Size (inch)		Dimensions (mm)					Maximum Setting pressure (barg)	Weight (kg)	CE/UKCA Cat
	Inlet	Outlet	A	B	ØC	D	MNFA, mm ² (note 1)			
5525	3/8 NPT	3/8 FPT	65	31.8 A/F	9.7	20	64.5	60	0.28	Cat IV
5526	1/2 NPT	1/2 FPT	73	31.8 A/F	12.7	23	109.7	60	0.30	Cat IV
5625	3/8 NPT	3/8 FPT	65	Ø28.6	9.7	20	64.5	130	0.20	Cat IV
5626	1/2 NPT	1/2 FPT	73	Ø28.6	12.7	23	109.7	130	0.20	Cat IV
5627	3/4 NPT	3/4 FPT	81	Ø38.1	19	29	187.1	130	0.34	Cat IV
5628	1 NPT	1FPT	93	Ø44.5	25.5	32	335.5	130	0.56	Cat IV
5629	1 1/4 NPT	1 1/4 FPT	95	50.8 A/F	33.3	33	683.9	130	0.76	Cat IV

Note 1: MNFA = Minimum net flow area. The MNFA is the net area after a complete disc burst, taking into account any structural members which reduce the nominal flow area. MNFA should be used as the flow area, A, in flow capacity calculations

Nominal standard rupture disc settings at 22 °C (barg)

Bold denotes typical stock models

5525 series: 16.2, 20.7, 24.1, 25.9, 27.6, 31.0, 40.0

5526 series: **14.0, 16.2, 20.7, 24.1, 24.8, 25.9, 27.6, 31.0, 40.0, 42.0**

5626 series: 10.3, 17.2, 20.7

5627 series: 10.3, 17.2, 20.7

5628 series: 10.3, 17.2, 20.7

5629 series: 10.3, 17.2, 20.7

Selection Guidelines

1. The rupture disc pressure setting should be the same as the Henry Technologies pressure relief valve setting.
2. The rated burst pressure is subject to a performance tolerance of +/-5 %. This tolerance should be taken into account when specifying a rupture disc setting (refer to table).
3. The burst pressure is affected by operating fluid temperature. Refer to table for temperature adjustment factors. At higher operating temperatures the disc burst pressure is reduced while at sub-zero temperatures it is increased. This factor should be taken into account when specifying a rupture disc setting.

Temperature Range °C	Temperature Adjustment Factor
-40 to -18	1.05
-17 to -1	1.04
0 to +45	1
+46 to +80	0.98
+81 to +107	0.97
+108 to +150	0.95

4. It is recommended that the maximum operating pressure of the system is no more than 80% of the rated burst pressure, in order to minimise the risk of premature fatigue failure of the disc. If operating pressures exceed 90% of the rated burst pressure, the disc should be replaced immediately.
5. The design fatigue strength of each disc is 100,000 pressure cycles. Fatigue life will be reduced by excessive pressures or temperatures, corrosion, damage, etc. A de-rating factor of 0.8 is recommended to account for the effects of fatigue during the recommended system operating pressure calculation (see the following example).

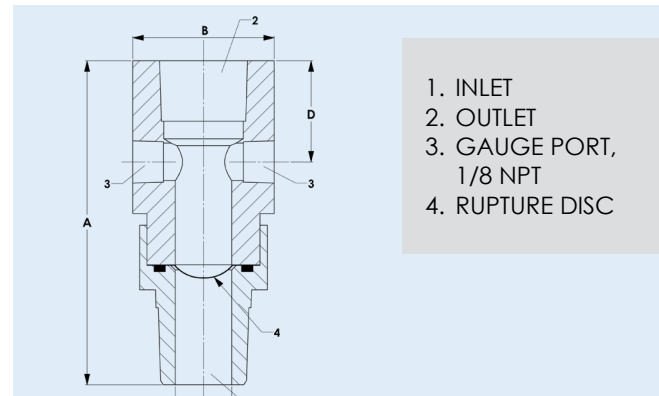
Example

Rupture disc rated burst pressure = 90 barg @ 22 °C

Minimum actual burst pressure, using performance tolerance = 0.95 x 90 = 85.5 barg

Maximum actual burst pressure, using performance tolerance = 1.05 x 90 = 94.5 barg

Maximum operating fluid temperature = 100 °C



1. INLET
2. OUTLET
3. GAUGE PORT, 1/8 NPT
4. RUPTURE DISC

To determine the recommended maximum operating pressure, the user should consider the -5% performance tolerance and the de-rate factors for both temperature and fatigue life.

Therefore:-

Minimum actual burst pressure = 85.5 barg

Temperature de-rate factor = 0.97

Fatigue life de-rate factor = 0.8

Recommended maximum operating pressure for rupture disc = 85.5 x 0.97 x 0.8 = 66.3 barg.

Installation – Main issues

1. Connect the rupture disc either directly to the pressure vessel or to a three-way valve above the liquid refrigerant level in the vapour space.
2. The rupture disc comprises of a two-piece body design. To avoid damage during assembly or removal, the product's Installation Instructions must be followed.
3. The pipework must not impose loads on the rupture disc. Loads can occur due to misalignment, thermal expansion, discharge gas thrust, etc.



THREE-WAY SHUT-OFF VALVES: 92 & 802 SERIES

How It Works

The function of a three-way valve is to permit replacement of the pressure relief devices, while the other is protecting the pressure vessel. In this way, a vessel is protected from over-pressure during servicing. It also allows a pressure relief device to be replaced in-situ without removing the system refrigerant charge.

Applications

All three-way valves are suitable for HCFC, HFC, CO₂, A2L & HC refrigerants & associated oils where materially compatible.

Refrigeration standard, EN378, specifies that a three-way valve is required on vessels of CE Category II, III and IV. EN378 or an equivalent National Standard should be consulted for further guidance. It should be recognised however that a three-way valve can be fitted to a vessel of any size, to enable safe, easy and economical replacement of pressure relief devices.

Main Features

- Proven Robust Design
- Compact

Technical Specification

Allowable Operating Pressure:

0 to 46 barg (92 series)

0 to 130 barg (802 series)

Allowable Operating Temperature

-29°C to +150°C

Installation - Main Issues

1. Assemble the three-way valve to a vessel using a high strength pipe nipple, suitable for the maximum operating pressure. See table below for part numbers.
2. The pipework must not impose loads onto the relief assembly. The relief valve, rupture disc and three-way valve assembly should be isolated from piping stresses through proper support, anchoring, or flexibility of the discharge piping. Mechanical piping stresses can be caused by discharge gas forces, misalignment and equipment dead weight. Thermal induced stresses should also be avoided. Appropriate standards such as API 520 Part II should be referenced.
3. The three-way valve should only be used with a single outlet port fully engaged. Do not leave the valve with both outlet ports partially open as this will impair the flow and can result in insufficient discharge capacity through the PRVs.

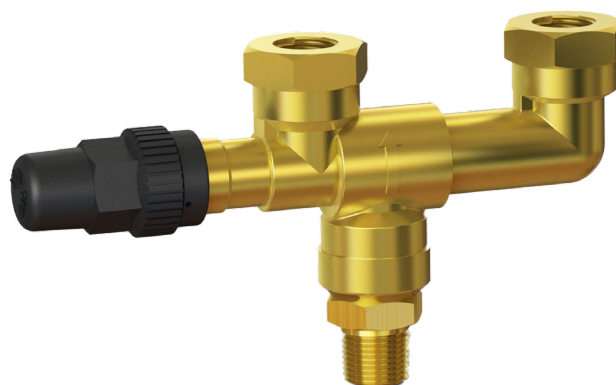
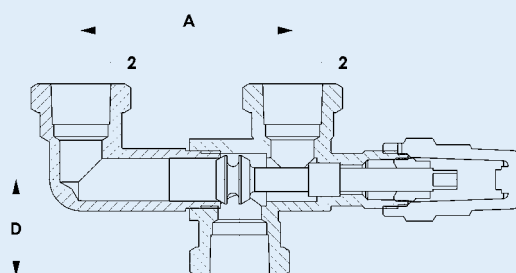
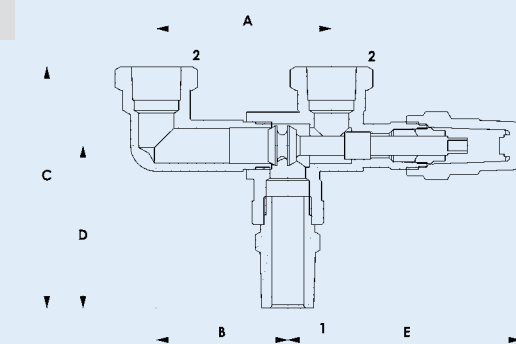


FIG. 1

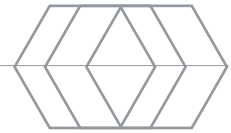


- 1. INLET
- 2. OUTLET

FIG. 2



Type	Part No	Inlet Conn Size (inch)	Outlet Conn Size (inch)	Dimensions (mm)					Drawing reference	Optional Male Inlet Pipe Nipple	Weight (kg)	Kv (m ³ /hr)	Pipe Nipple Part No.	CE/UKCA Cat
				A	B	C	D	E						
92	923	3/8 FPT	3/8 FPT	70	52	64	32	93	Fig.1	N/A (Use 923M)	0.51	2.80	N/A	SEP
92	923M	3/8 MPT	3/8 FPT	70	52	90	57	93	Fig.2	N/A	0.57	2.80	N/A	SEP
92	925	1/2 FPT	1/2 FPT	70	52	64	32	93	Fig.1	N/A(Use 925M)	0.47	2.83	N/A	SEP
92	925M	1/2 MPT	1/2 FPT	70	52	97	65	93	Fig.2	N/A	0.57	2.83	N/A	SEP
802	8021TH	1/2 FPT	1/2 FPT	92	59	86	44	148	Fig.1	A4465	1.62	4.78	A4465	SEP
802	8022TH	3/4 FPT	3/4 FPT	92	59	86	44	148	Fig.1	2-009-5003	1.45	7.60	2-009-5003	SEP
802	8024TH	1 FPT	1 FPT	148	94	99	51	196	Fig.1	PP55-4	3.86	10.07	PP55-4	Cat II
802	8025TH	1 1/4 FPT	1 1/4 FPT	148	94	99	51	196	Fig.1	PP55-18	3.44	14.36	PP55-18	Cat II



THREE-WAY DUAL SHUT-OFF VALVES: 93 SERIES

How It Works

The function of a three-way valve is to permit replacement of one of the pressure relief devices, whilst the other continues to be active on the system. In this way, a vessel is protected from over-pressure during servicing. It also allows a pressure relief device to be replaced in-situ, without removing the system refrigerant charge.

Applications

Refrigeration standard, EN 378, specifies that a three-way valve is required on vessels of CE Category II, III and IV. EN 378 or an equivalent National Standard should be consulted for further guidance. It should be recognised however that a three-way valve can be fitted to a vessel of any size to enable safe, easy and economical replacement of pressure relief devices.

All 93 series three-way valves are suitable for use with HCFC, HFC, HFO, CO₂, A2L & HC refrigerants & associated oils where materially compatible.

The 93 series of three-way valves have been designed to optimise flow efficiency for a given connection size. Designs are fine-tuned using the latest computational analysis and simulation techniques to ensure that the pressure drop upstream of the relief device is minimised. Minimal pressure drop upstream of a PRV in particular is essential to maintain safe and reliable behaviour during a discharge situation. The design utilises a rotatable ball to guide flow and this has the added advantage of allowing both outlet ports access to a full-bore flow area.

Main Features

- Very high flow capacity (Kvs) for a given connection size
- Maximum full-bore flow on both outlet ports
- Compact geometry minimises required installation space
- “M”, “R” and “MR” models offer Rotalock-style connections on the inlet and/or outlets for optimum angle PRV positioning
- Premium quality PTFE and HNBR sealing materials
- Double O-Ring system seal design
- Blow-out proof design

Technical Specifications

Allowable operating pressure: 0 to 130 barg

Allowable operating temperature: -40°C to +150°C

Materials of Construction

The valve bodies and balls are made from brass. The stem is made from plated steel

Installation - Main Issues

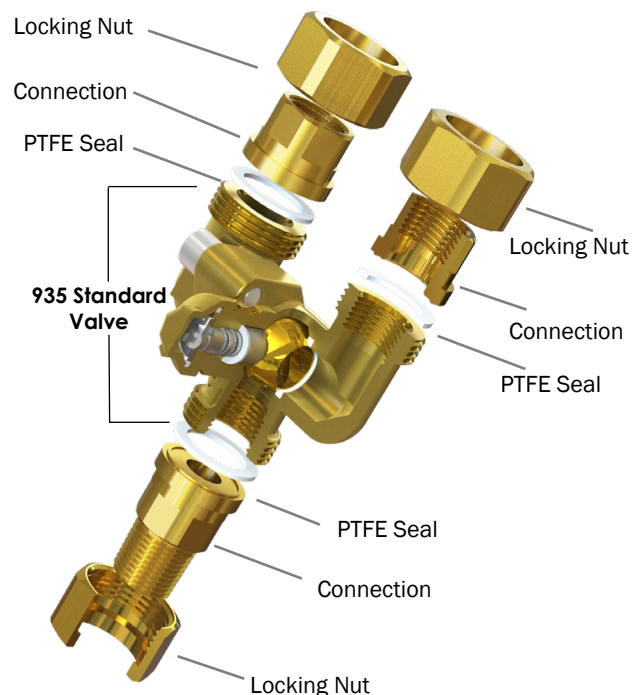
1. If using a female inlet connection model, assemble the three-way valve to a vessel using a high strength pipe nipple, suitable for the maximum operating pressure.
2. The pipework must not impose loads onto the relief assembly. The relief valve, rupture disc and three-way valve assembly should be isolated from piping stresses through proper support, anchoring, or flexibility of the discharge piping. Mechanical piping stresses can be caused by discharge gas forces, misalignment and equipment dead weight. Thermal induced stresses should also be avoided. Appropriate standards such as API 520 Part II should be referenced.
3. Should only be used with a single outlet port fully engaged. Do not leave the valve with both outlet ports partially open as this will impair the flow and can result in insufficient discharge capacity throughout the PRVs.



Rotalock-Style Adaptors

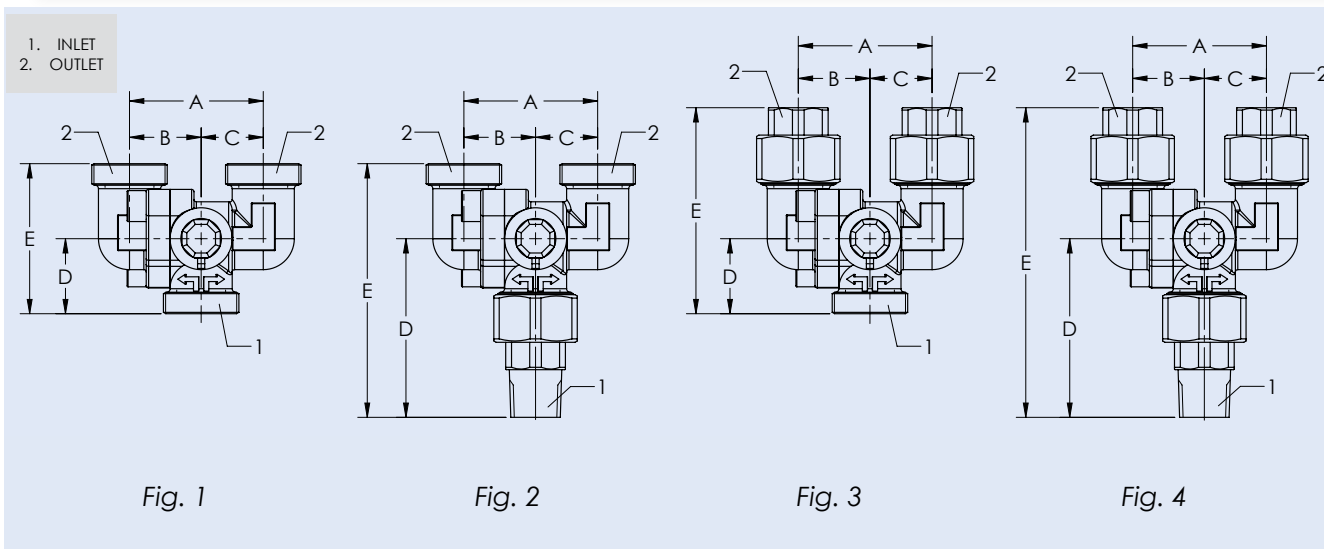
Inlet and outlet Rotalock-style adaptors can be supplied individually. Each adaptor includes the connection, locking nut and PTFE seal. As standard, the 93-series models have female NPT inlet and outlet connections. The addition of a Rotalock-style adaptor expands on the functionality & adaptability of the valve; for example to fit into a small space envelope, or to accurately align the outlet connection of angled PRVs. The adaptors also allow the possibility of a male NPT inlet connection option. Models can be supplied with connections included as shown in the table and figures that follow. The “M” suffix indicates inclusion of the male inlet adaptor, whereas the “R” suffix signifies inclusion of two female outlet adaptors.

Adaptor Description	Part No.
3/8" NPT Female (For 933)	933-ORK
3/8" NPT Male (For 933)	933-IRK
1/2" NPT Female (For 935)	935-ORK
1/2" NPT Male (For 935)	935-IRK





Part No	Inlet Conn (inch)	Outlet Conn (inch)	Adjustment		Dimensions (mm)					Drawing Reference	Weight (kg)	Kvs Value (m ³ /hr)	CE/UKCA Cat	
			Inlet	Outlet	A	B	C	D	E					
933	3/8 NPT (Female)	3/8 NPT (Female)	Fixed	Fixed	56	30	26	31.5	63.0	Fig. 1	0.69	3.68	SEP	
933M	3/8 NPT		Rotalock					Fig. 2	0.82					
933R	3/8 NPT (Female)		Fixed	Rotalock				31.5	85.0	Fig. 3	0.89			
933MR	3/8 NPT		Rotalock					69.5	123.0	Fig. 4	1.02			
935	1/2 NPT (Female)	1/2 NPT (Female)	Fixed	Fixed				31.5	63.0	Fig. 1	0.67	4.82		SEP
935M	1/2 NPT		Rotalock					75.0	106.5	Fig. 2	0.85			
935R	1/2 NPT (Female)	Fixed	Rotalock	31.5				86.5	Fig. 3	0.91				
935MR	1/2 NPT	Rotalock		75.0				130.0	Fig. 4	1.09				





PRESSURE INDICATOR

How It Works

The function of the Pressure Indicator is to provide visual indication in the event of a rupture disc bursting. If the disc has ruptured, the pressure relief valve will have discharged and must be replaced.

Applications

The units are suitable for use with HCFC, HFC, HFO, CO₂, A2L & HC refrigerants & associated oils where materially compatible.

Main Features

- Easy to read large indicator dial
- Stainless steel movement

Technical Specification

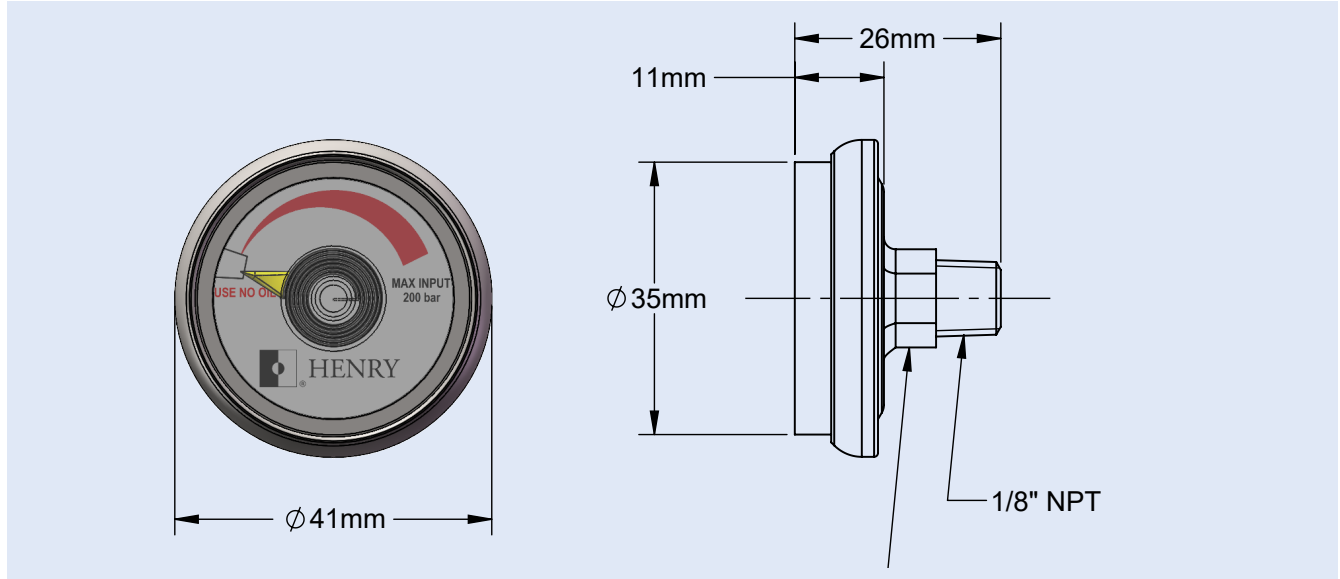
Allowable operating temperature: -40°C to +65°C

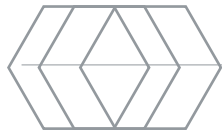
Materials of Construction

Stainless steel case and movement. Plexiglass dial window.



Part No	MWP (barg)	Weight (g)	CE/UKCA Cat
G16	55	27	SEP
G20	200	27	SEP





SAFETY DEVICE KITS

How It Works

The function of a Safety Device Kit is to protect against over-pressure. For safety reasons, excessive over-pressure in any part of the refrigeration system must be avoided.

Two standard kits are available: SDK1 and SDK2

The SDK1 kit is a single safety device assembly. It comprises of a PRV, rupture disc, pressure indicator gauge and a 1/8" NPT rupture disc blanking plug.

The SDK2 is a Dual Safety Device Assembly. It includes two PRVs, two rupture discs, two pressure indicator gauges, two blanking plugs, a three-way valve and a 1/2" NPT pipe nipple.

The High Pressure SDK2X is also available at the lower pressure settings listed below. The kit contains X-Series PRVs and the award-winning 93-Series three-way valve. See the High Pressure Safety Device Kits page for more details.

Applications

A typical application for a Henry Group Safety Device kit is to protect a liquid receiver from being over-pressured. Refer to the catalogue pages for a description on the function of each individual component. The kits are designed for use with HCFC, HFC, HFO, CO₂, A2L & HC refrigerants & associated oils where materially compatible.

Main Features

- All in one sentry kits for total system protection
- CE and UKCA marked
- X models fully ASME UV/UD and EN ISO 4126 certified

Technical Specification

Refer to the individual product catalogue pages for detailed technical specifications of each item

SDK1, SDK2 and SDK2X available in the following pressure settings (barg): 14.0, 16.2, 17.2, 20.7, 24.1, 24.8, 25.9, 27.6, 31.0



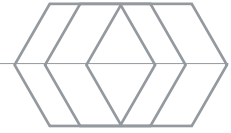
Materials of Construction

The main components for the SDK kits are made from brass and steel. Refer to individual catalogue pages for details on each component.

Selection Data

Selection of relief devices should be as outlined in respective catalogue pages. Ensure that relief valve selection guidance is followed prior to ordering of kits. For further information refer to the online PRV selection tool.

Part No	Relief Valve		Rupture Disc		Indicator Gauge/Plug		Three-Way Valve		MWP	Temp (°C)
	Part No	Qty	Part No	Qty	Part No	Qty	Part No	Qty		
SDK1-xx.x BAR	5231B	1	5526	1	G16/A0624	1	N/A	-	31 barg	-40° to +107°C
SDK2-xx.x BAR	5231B	2	5526	2	G16/A0624	2	925	1	31 barg	-40° to +107°C
SDK2X-xx.x BAR	5231BX	2	5526	2	G16/A0624	2	925	1	46 barg	-40° to +120°C



HIGH PRESSURE SAFETY DEVICE KITS

How It Works

Introducing Henry's innovative High Pressure Safety Device kits, specially crafted to safeguard high pressure systems from over-pressure. With a range of three variations to choose from, namely SDK2X, SDK2H0, and SDK2H1, you can select the kit that best suits your specific needs and requirements. Each kit includes 2x High Pressure range PRVs, 2x high pressure rupture discs, 1x 93-Series three-way dual shut-off valve as well as pressure gauges and rotalock-style adaptors.

Applications

The High Pressure and X-Series Henry Group Safety Device kits are designed to protect a liquid receiver from being over-pressured. The kits include components specifically designed for the higher operating pressures and unique demands of transcritical and supercritical refrigerants, especially CO₂. Refer to the catalogue pages for a description on the function of each individual component. The kits are suitable for use with HCFC, HFC, HFO, CO₂ and A2L refrigerants, along with their associated oils where materially compatible.

Main Features

- All in one sentry kits for total system protection
- CE and UKCA marked
- Award-winning 93-Series valve
- Compact design with customisable installation options
- X and H1 models EN ISO 4126 certified
- X models fully ASME UV/UD certified
- ASME UV certification available for H1 models on request

Technical Specification

Refer to the individual product catalogue pages for detailed technical specifications of each item



Materials of Construction

The main components for the SDK kits are made from brass and stainless steel. Refer to individual catalogue pages for details on each component.

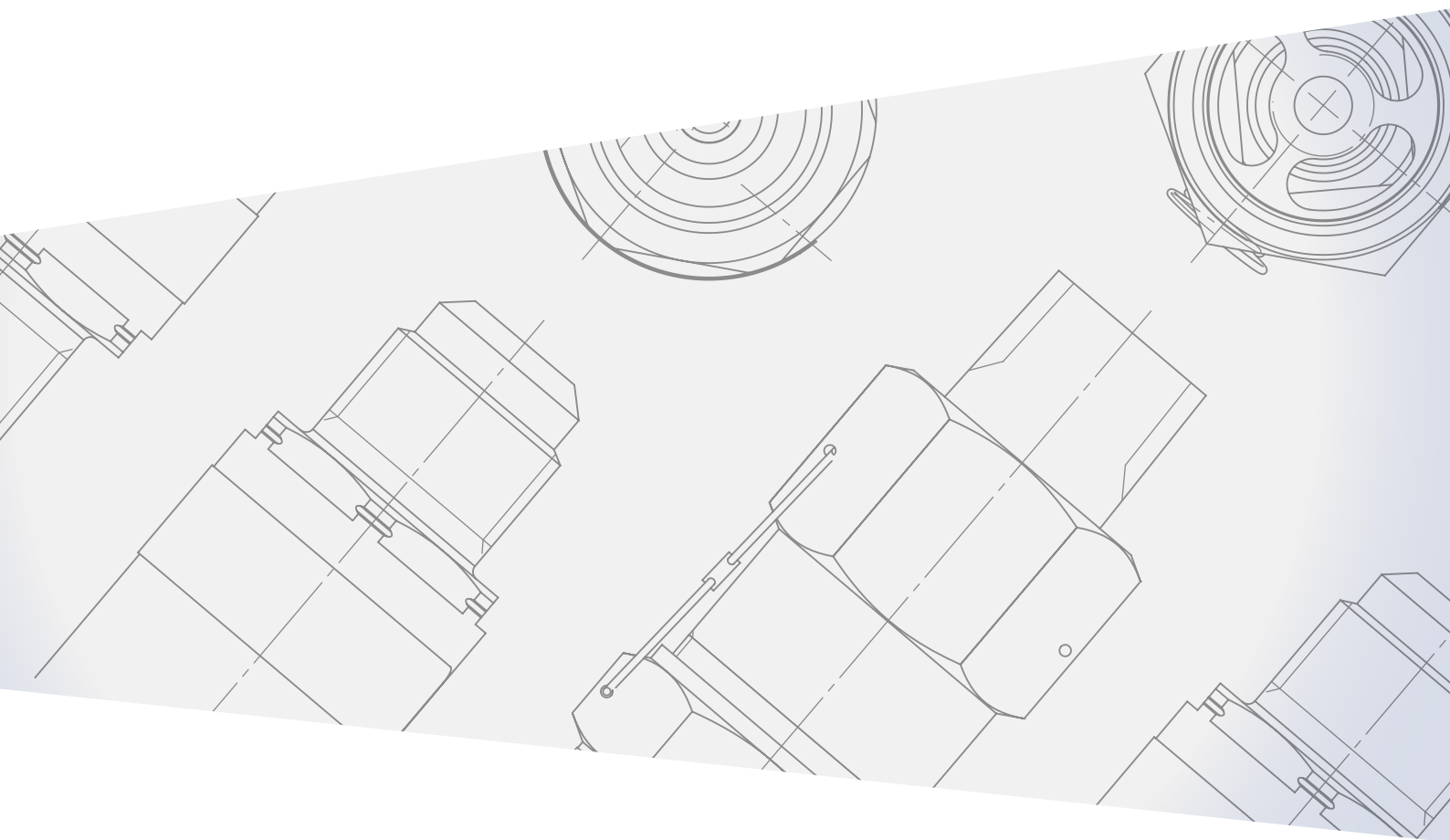
Selection Data

Selection of relief devices should be as outlined in respective catalogue pages. Ensure that relief valve selection guidance is followed prior to ordering of kits. For more information refer to the online PRV selection tool.

Part No	Relief Valve		Rupture Disc		Indicator Gauge/Plug		Three-Way Valve		MWP	Temp (°C)
	Part No	Qty	Part No	Qty	Part No	Qty	Part No	Qty		
SDK2X-xx.x BAR	5231BX	2	5526	2	G16/A0624	2	935M	1	46 barg	-40°C to +120°C
SDK2H0-xx BAR	5700	2	5625	2	G20/A0624	2	933MR	1	130 barg	-40°C to +150°C
SDK2H1-xx BAR	5701AX	2	5626	2	G20/A0624	2	935MR	1	130 barg	-40°C to +150°C

Pressure Setting	Part No.		
barg	SDK2X	SDK2H0	SDK2H1
40			
42			
60			
80			
120			

Note: Blue indicates available models.



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