



Specifications, Applications, Service Instructions & Parts

REFRIGERANT PRESSURE-RELIEF VALVE with POP-EYE™ + ACT®

For Ammonia and
Halocarbon Gas Service
Safety Relief to Atmosphere

INTRODUCTION

Designed to provide emergency relief from excessive pressure in refrigerant-containing vessels, they are built in strict conformance with ASME Boiler and Pressure Vessel Code requirements for safety relief devices. **Each valve bears the ASME code symbol of certification (UV).** Their capacities are rated by the National Board of Boiler and Pressure Vessel Inspectors. These tamper-resistant valves are accurately set and sealed by qualified technicians at the factory. POP-EYE lift detection is standard on all H56xx series valves and includes an on board, 360° bright LED to indicate when a relief valve has lifted.

POP-EYE INSIGHT is an optional upgrade to the POP-EYE relief valve line which outputs a signal to a plant PLC. In addition to on board LED indicator, Signal can be used to log a release event start time, end time, and calculate refrigerant loss at the PLC.

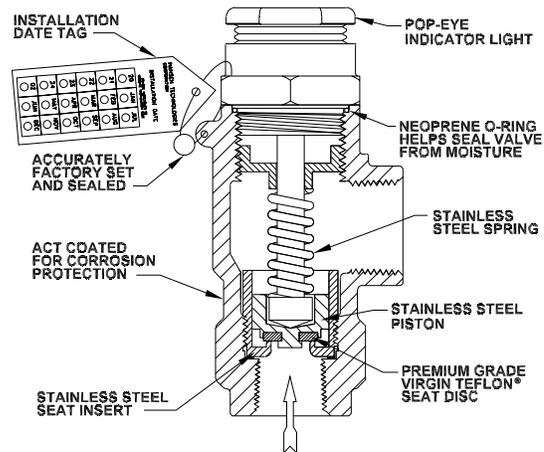
APPLICATIONS

Hansen pressure-relief valves help meet the requirements of ANSI/ASHRAE 15 Safety Standard for Refrigeration Systems as well as other worldwide codes. This standard requires pressure vessels of all refrigeration systems to be protected by a pressure-relief device or other approved means to safely relieve pressure in the event of fire or other abnormal conditions. Once installed, a properly selected Hansen pressure-relief valve is ready to vent to atmosphere any temporary excessive overpressure inside of a vessel. After discharge, these valves will attempt to reseal to minimize loss of refrigerant. However, once any relief valve has discharged, it must be replaced as soon as possible because debris may have settled on the seat during discharge.

Hansen pressure-relief valves should be connected to the **vapor space** of refrigerant vessels, heat exchangers, oil pots, oil stills, pilot receivers, and elsewhere as may be required by various codes.

Hansen H5600 series pressure-relief valves come equipped with Hansen's patented POP-EYE technology as standard. POP-EYE detects when a relief valve lifts and indicates at the valve via flashing red LED. H5600 series pressure-relief valves are now available with POP-EYE INSIGHT technology as an option. INSIGHT, in addition to local LED indication, outputs a signal to a plant computer or PLC which can be used to log release event start time, duration, and calculate refrigerant loss in real time. Where dual pressure-relief valves are required, Hansen offers the three-way valves and other components necessary for assembly. Rupture disc assemblies are required when using Hansen pressure-relief valves for

KEY FEATURES



ORDERING INFORMATION

CAT NO	THREADED CONNECTIONS - NPT	
	BOTTOM INLET (DN)	SIDE OUTLET (DN)
H5600R H5600A	1/2" FPT (15)	3/4" FPT (20)
H5601	1/2" FPT (15)	1" FPT (25)
H5602 H5602R H5632R	3/4" FPT (20)	1" FPT (25)
H5613 H5633R	1" FPT (25)	1 1/4" FPT (32)
H5604 H5634R	1 1/4" FPT (32)	1 1/2" FPT (40)

halocarbon applications because the high cost of such refrigerants demands extreme tightness, see bulletin K209.

Also, see Bulletin K129 for information on the EZ-SRV Relief Valves. These pressure-relief valves offer a cartridge style design for ease of replacement without disturbing the piping. EZ-SRV pressure-relief valves are available in pressure ratings to 600 psi (matching the H5600 "R" series capacities through 400 psi). Liquid relief valves are also available in the EZ-SRV series. EZLQ relief valves are designed and rated for liquid applications.

Specify catalog number, inlet/outlet connection size, and pressure setting. For halocarbon applications, a rupture

disc assembly is required. See Rupture Disc Assembly section of this bulletin. Standard pressure settings: 150*, 175, 200, 225, 250*, 275, 300*, 325, and 350 psig. (*Stock pressure settings.) Custom pressure settings available; may require extra delivery time. The H5600 "R" series valves have reduced capacities, see page 2. CE marked valves are available, add the letter "E" suffix to catalog number (example: H5601/250E). For POP-EYE INSIGHT valves, add the letter "PI" suffix to catalog number (example: H5601/250-PI).

VALVE SIZING AND SELECTION

Step 1: Use the formula below, per ANSI/ASHRAE 15 Safety Standard for Refrigeration Systems to calculate the minimum required discharge capacity in pounds of air per minute. When selecting a dual pressure-relief valve system, be aware that each individual valve must have sufficient capacity to protect the vessel.

$$C = fDL$$

- C** = minimum required discharge capacity of the relief device in pounds of air per minute.
- f** = factor for ammonia refrigerant is 0.5**, for R-22 and R-134a refrigerants is 1.6**, for other refrigerants see ANSI/ASHRAE 15 or contact factory.
- D** = outside diameter of vessel in feet.
- L** = length of vessel in feet.

** This factor is not suitable when combustible materials are within 20 feet (6.1 m) of the pressure vessel; refer to relevant codes for corrected sizing method.

Example: To determine the minimum required capacity of a relief valve for a vessel containing ammonia that measures 16 feet in length and 6 feet in outside diameter, the equation would be as follows: $0.5 \times 6 \times 16 = 48 \text{ lb/min}$.

PRESSURE-RELIEF VALVE CAPACITY RATINGS (NATIONAL BOARD CERTIFIED)

CAT NO	AIR CAPACITY	STANDARD PRESSURE SETTINGS (psig)									
		150	175	200	225	250	275	300	325	350	400
H5600R H5602R	lb/min	10.5	12.2	13.8	15.4	17.0	18.6	20.2	21.8	23.5	26.7
	scfm	140	162	183	205	226	248	269	290	312	355
H5632R	lb/min	22	25	29	32	36	39	42	46	49	56
	scfm	292	337	382	427	472	517	561	606	651	741
H5633R	lb/min	28	33	37	41	46	50	54	59	63	72
	scfm	377	435	492	550	608	665	723	781	839	954
H5634R	lb/min	34	39	44	49	54	60	65	70	75	85
	scfm	449	518	586	655	724	793	861	930	999	1136
H5600A	lb/min	31.3	36.1	40.9	45.7	50.5	55.3	60.1	64.9	69.7	79.3
	scfm	417	480	544	608	672	736	799	863	927	1055
H5601 H5602	lb/min	35.8	41.3	46.8	52.2	57.7	63.2	68.6	74.1	79.6	
	scfm	476	549	622	695	768	841	913	986	1059	
H5613	lb/min	53.0	61.1	69.2	77.3	85.4	93.5	101.6	109.7	117.8	134
	scfm	704	812	920	1028	1136	1243	1351	1459	1567	1782
H5604	lb/min	72.0	83.0	94.0	105.1	116.1	127.1	138.1	149.1	160.2	182
	scfm	958	1104	1251	1397	1544	1691	1837	1984	2130	2423

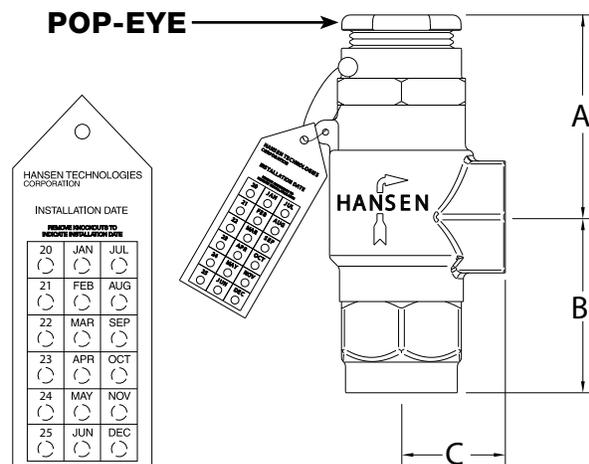
Important Note: These are atmospheric relief valves. Settings equal pressure above atmosphere when outlet is connected via proper piping to the atmosphere (outside). (scfm = Standard Cubic Feet per Minute)

INSTALLATION DIMENSIONS

CAT NO	THREADED CONNECTIONS NPT		A* (MM)	B (MM)	C (MM)
	BOTTOM INLET (DN)	SIDE OUTLET (DN)			
H5600A H5600R	1/2" FPT (15)	3/4" FPT (20)	3.23" (82)	2.75" (70)	1.63" (41)
H5601		1" FPT (25)			
H5602 H5602R H5632R	3/4" FPT (20)	1" FPT (25)			
H5613 H5633R	1" FPT (25)	1 1/4" FPT (32)	4.75" (120)	4.13" (105)	2.25" (57)
H5604 H5634R	1 1/4" FPT (32)	1 1/2" FPT (40)			

*For POP-EYE INSIGHT add 1.33" (34) to dimension A.

H5600 "R" Series capacity valves have green installation date tags, while all others are blue.



Step 2: Determine the pressure setting needed. This should be at or below the design pressure of the vessel. The relief setting should also be at least 25% above the maximum expected operating pressure to avoid “weeping” of relief valves. The setting may be below (never above) the design pressure of the vessel, but it is sometimes best to match vessel design pressure and relief setting to minimize the likelihood of a discharge.

Step 3: Refer to the Valve Capacity Ratings below and select the valve with the required capacity (C) at the desired pressure setting.

MATERIAL SPECIFICATIONS

- Body: Ductile iron, ASTM A395 (with ACT® Coating)
- Piston: Stainless steel
- Spring: Stainless steel
- Seat Insert: Stainless steel
- Seat Discs: Premium grade virgin Teflon® (PTFE)
- Cap: Steel (with ACT® Coating), polycarbonate lens cap
- O-ring: Neoprene
- Electrical: Nema 4 rating, red LED light.
 POP-EYE 3.3VDC battery
 INSIGHT: 24VDC, 2 meter cable included
- Maximum Temperature Rating: 240°F (115°C)
- Safe Working Pressure: 400 psig (28 bar)
- Setting Range: 150 to 400 psig (10.4 to 28 bar)

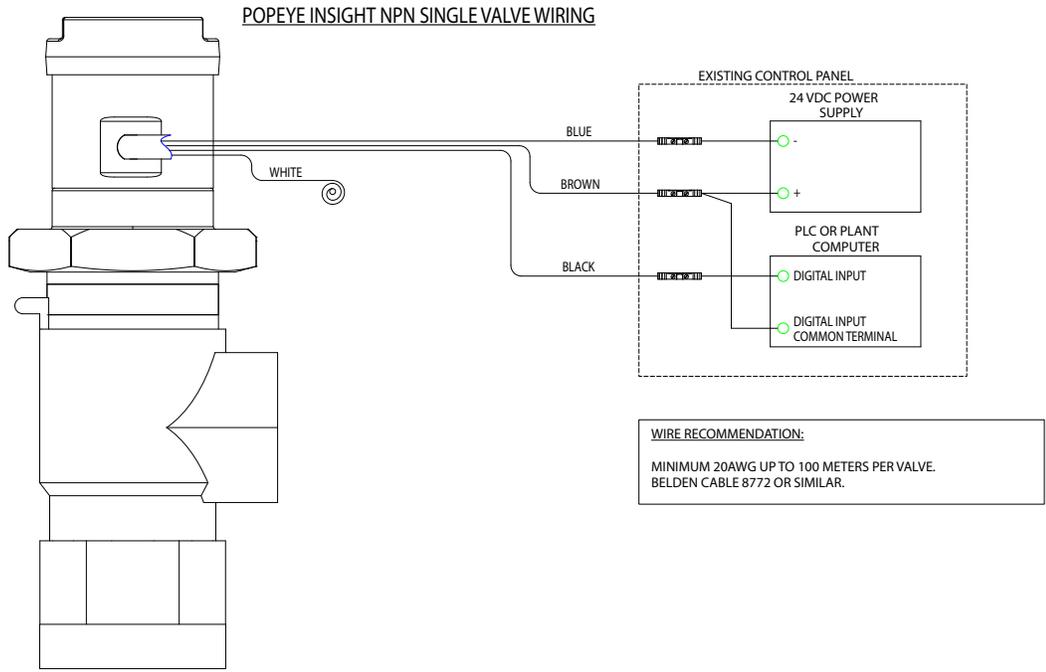
INSTALLATION

Installation should be performed by trained and qualified personnel only. Hansen pressure-relief valves come with an installation date tag to identify the number of years the valve has been in service. The H5600 “R” series capacity valves have green installation date tags, while all others are blue. When installing the pressure-relief valve, remove the knockouts corresponding to the current year and month. Use a pen to push the knockout partially through the tag and tear-away from other side.

Pressure-relief valves for ammonia refrigeration are subject to preventative inspection and maintenance or periodic replacement Risk Management Program (RMP). **Relief valves must be replaced after 5 years of service in application.** However, once a valve discharges it **must** be replaced as soon as possible. Self-seating is not dependable because of dirt.

Protect pressure-relief valves from dirt and moisture. Match capacity on valve nameplate to system document as specified by system designer and based upon protected vessel volume. Mount valve directly at the vapor space of pressure vessel or on connecting non-valved vapor piping as close to the vessel as possible. Pressure-relief valves should be installed upright, although horizontal installation is possible.

Remove plastic shipping cap from outlet of pressure-relief valve. Connect to vent line piping to protect outlet of valve from water and debris. Plastic shipping cap will not protect outlet of valve from falling water or debris. Vent line piping must have drain line at low point to drain condensate from line per ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

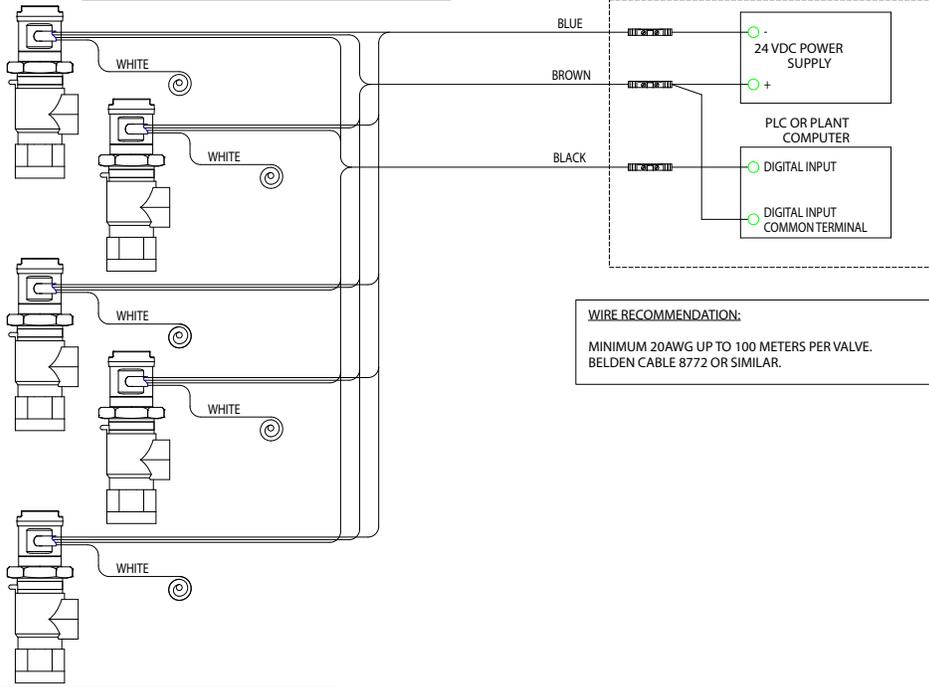


*Note: Only one signal output can be used at a time. Select PNP or NPN based on inputs available at plant PLC. Consult a controls specialist or PLC manufacturer to determine which input is available.

WARNING DO NOT SHORT WHITE PNP AND BLACK NPN WIRES WHILE POWERED. DAMAGE TO THE CIRCUIT BOARD WILL OCCUR. When stripping wire ends, only strip the needed output. Leave the remaining output insulated or trim at the cable jacket.

WIRE RECOMMENDATION:
 MINIMUM 20AWG UP TO 100 METERS PER VALVE.
 BELDEN CABLE 8772 OR SIMILAR.

POPEYE INSIGHT NPN MULTIPLE VALVE WIRING

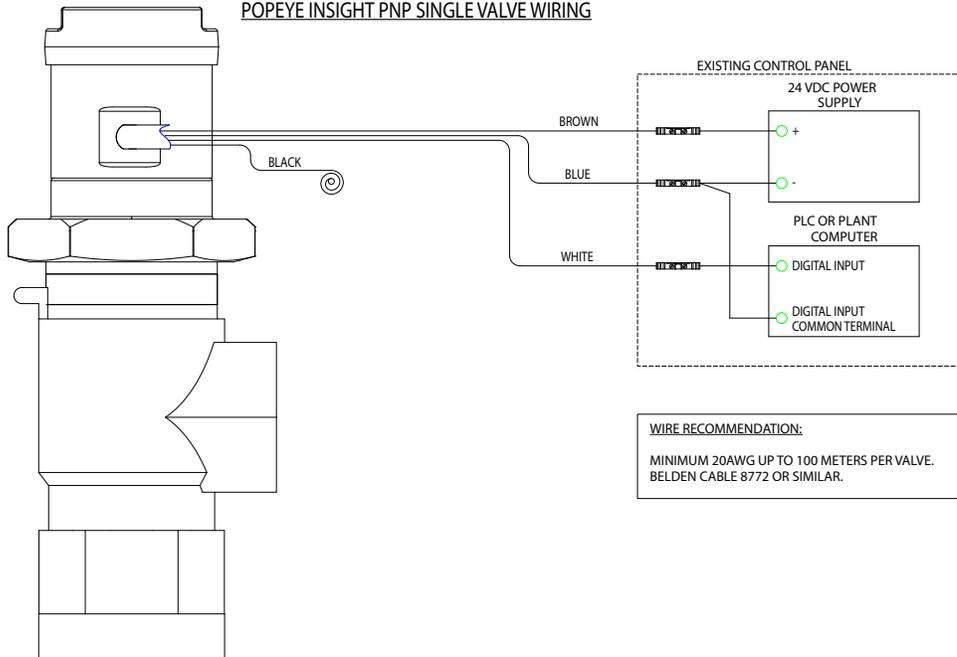


WIRE RECOMMENDATION:
 MINIMUM 20AWG UP TO 100 METERS PER VALVE.
 BELDEN CABLE 8772 OR SIMILAR.

*Note: Only one signal output can be used at a time. Select PNP or NPN based on inputs available at plant PLC. Consult a controls specialist or PLC manufacturer to determine which input is available.

WARNING DO NOT SHORT WHITE PNP AND BLACK NPN WIRES WHILE POWERED. DAMAGE TO THE CIRCUIT BOARD WILL OCCUR. When stripping wire ends, only strip the needed output. Leave the remaining output insulated or trim at the cable jacket.

POPEYE INSIGHT PNP SINGLE VALVE WIRING

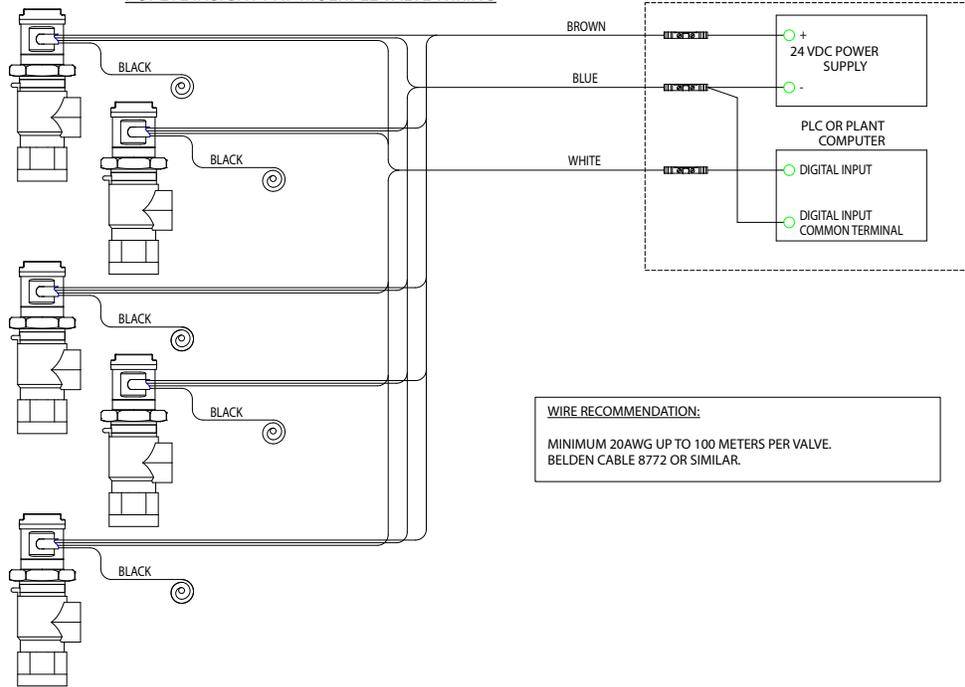


WIRE RECOMMENDATION:
 MINIMUM 20AWG UP TO 100 METERS PER VALVE.
 BELDEN CABLE 8772 OR SIMILAR.

*Note: Only one signal output can be used at a time. Select PNP or NPN based on inputs available at plant PLC. Consult a controls specialist or PLC manufacturer to determine which input is available.

WARNING DO NOT SHORT WHITE PNP AND BLACK NPN WIRES WHILE POWERED. DAMAGE TO THE CIRCUIT BOARD WILL OCCUR. When stripping wire ends, only strip the needed output. Leave the remaining output insulated or trim at the cable jacket.

POPEYE INSIGHT PNP MULTIPLE VALVE WIRING



WIRE RECOMMENDATION:
 MINIMUM 20AWG UP TO 100 METERS PER VALVE.
 BELDEN CABLE 8772 OR SIMILAR.

*Note: Only one signal output can be used at a time. Select PNP or NPN based on inputs available at plant PLC. Consult a controls specialist or PLC manufacturer to determine which input is available.
 WARNING DO NOT SHORT WHITE PNP AND BLACK NPN WIRES WHILE POWERED. DAMAGE TO THE CIRCUIT BOARD WILL OCCUR. When stripping wire ends, only strip the needed output. Leave the remaining output insulated or trim at the cable jacket.

*Note: Only one signal output can be used at a time. Select PNP or NPN based on inputs available at the plant PLC. Consult a controls specialist or PLC manufacturer to determine which input is available.

*Note: POP-EYE INSIGHT does not have an onboard battery. An INSIGHT valve that is not connected to 24VDC power will still be a functional ASME stamped relief valve, but will not provide indication LED. An INSIGHT valve connected to power but not signal will have an onboard LED indication but will not output a signal. INSIGHT does not store lift data internally and must be connected to a plant computer or PLC for this functionality.

WARNING DO NOT SHORT WHITE PNP AND BLACK NPN WIRES WHILE POWERED. DAMAGE TO THE CIRCUIT BOARD WILL OCCUR. When stripping wire ends, only strip the needed output. Leave the remaining output insulated or trim at the cable jacket.

POP-EYE INSIGHT PLC Guidance

When pressure-relief valve opens, the output signal will change.

1. Log the time of signal change (valve open).
2. Start a cumulative timer to log event duration. Stop timer when valve closes. A pressure relief event may consist of multiple valve opening and closing cycles. Multiple openings of a single valve should be recorded additively on the same timer.

3. Use valve open time to calculate refrigerant loss per the capacity rating on the valves nameplate or the Capacity Ratings table in this bulletin.

$$\text{lbs/min(air)} \times .766 \times \text{duration(min)} = \text{lbs NH}_3$$

$$\text{SCFM(air)} \times .059 \times \text{duration(min)} = \text{lbs NH}_3$$

4. Use valve open signal or refrigerant loss amount to trigger an alarm.

GENERAL PRECAUTIONS

Never expose your face or body to a connected relief valve exit or piping.

Make sure the valve setting and capacity (see Nameplate Information Section) meet the requirements per system design in accordance with local and national regulations. Be sure to isolate the valve and related piping from the refrigeration system and pump out pressure to zero before attempting to install or replace any pressure-relief valve. Avoid residual refrigerant when doing so.

Remove the shipping caps from both the inlet and outlet before installation. Install the pressure-relief valve to the pressure vessel at a location above the liquid refrigerant level. These valves are for gas relief only. Do not install shut-off valves in line with pressure-relief valves. Install valves in locations where they will not be damaged by moving equipment such as lift trucks, etc. Install valves in a manner that enables them to be replaced.

When a dual pressure-relief system is being put into service, the three-way valve stem should be positioned so that only one valve is exposed to pressure. While the valve can be either frontseated (front port is closed) or backseated (back port is closed), the backseated position is recommended because it takes pressure off the packing and reduces the possibility of packing leaks.

DUAL PRESSURE-RELIEF VALVES

Vent the relief valve exit to a safe outdoor location in an approved manner away from people and building openings. Do not install valves in a refrigerated space unless precautions are taken to prevent moisture migration into the valve body or the relief vent line. Avoid trapped ice build-up between valves and other equipment.

Only apply thread sealing compound to external pipe threads and use a modest amount to avoid getting compound inside the valve. Use brackets or hangers to support the pipe and prevent the valve from being overly stressed. Do not put undue stress on the valve by using it to stretch or align pipe.

Pressure test all valves and related piping for leaks. When testing a dual pressure-relief system, the three-way valve stem should be in the mid position (only during testing), ensuring that all valves are properly leak tested. Do not discharge valves prior to installation or when pressure testing. Never attempt to reset or change the valve setting. **Always replace pressure-relief valves once they have discharged.** Although catalog numbers and capacities remain the same with POP-EYE, follow facility Management of Change (MOC) procedures and documentation requirements.

SERVICE AND MAINTENANCE

These tamper-resistant pressure-relief valves are accurately factory set and do not require any field adjustments whatsoever. They are intended for one time over-pressure operation and must be replaced immediately after discharging because setting or seat tightness may be altered. Annually, relief valves must be visually inspected for corrosion or accumulation of scale and for leaks. Pressure-relief valves must be removed and replaced with new valves at least every five years. Even when simply replacing an existing valve, a review of requirements per current local and national code is advisable. To test POP-EYE: Use a strong magnet (not included, but one is available from Hansen, part #40-1011) placed on the polycarbonate lens to check that the POP-EYE circuit is still active. Red LED light will illuminate to confirm. It may be advisable that this check is performed at least annually. Also see POP-EYE videos on our website. For POP-EYE INSIGHT: Place the magnet on the side of the cap, under the cable connection. The red LED will illuminate and the valve output signal will change. This allows testing of the valve and PLC logic.

NAMEPLATE INFORMATION

The nameplate, located on the side of Hansen pressure-relief valves, contains important information about the valve pressure setting, capacity and date of manufacture. The date code traces the month and year the valve was built. This is a helpful guide in establishing an approximate date of service. Example: A valve with Date Code 0418001 13B, indicates that it was valve number 001 built on April 18 of 2013 to revision level B. See nameplate below for location of data.

- ① CATALOG NUMBER
- ② AIR CAPACITY ACCORDING TO THE SET PRESSURE
- ③ SET PRESSURE
- ④ INLET AND OUTLET SIZE
- ⑤ MONTH AND DAY OF MANUFACTURE AND VALVE NUMBER
- ⑥ YEAR OF MANUFACTURE AND CURRENT REVISION LETTER

Pressure-Relief Valve					
Cat. No. : ①					
Capacity : ②					
Set Pressure : ③					
Inlet		Outlet			
Size : ④		④			
Date Code: ⑤		⑥			
MHANSEN U.S.A.					

Relief valve setting certificates are available; visit our website at certs.hantech.com

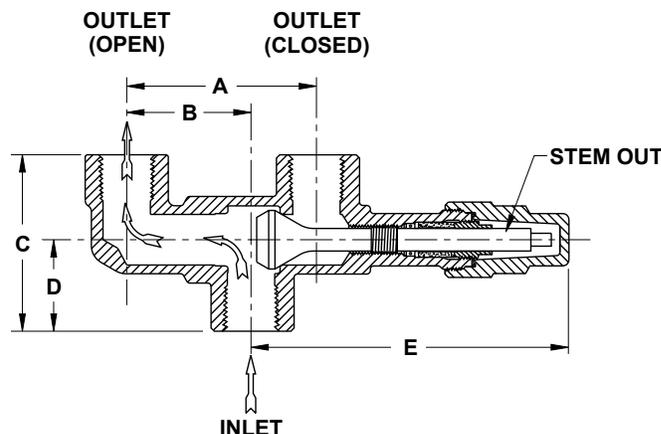
In accordance with ANSI/ASHRAE 15 Safety Standard for Refrigeration Systems, pressure vessels having 10 cubic feet or more of internal gross volume, shall be fitted with dual pressure-relief valves. This is typically accomplished using a pair of pressure-relief valves interconnected via a three-way dual shut-off valve. Even on smaller vessels this arrangement is often preferred because one valve remains operational, while the other is being replaced; thereby eliminating the need to remove refrigerant from the vessel.

THREE-WAY DUAL SHUT-OFF VALVES

These rugged, forged steel bodied valves facilitate the parallel installation of pressure-relief valves. Because three-way valves will not isolate both pressure-relief valves simultaneously, they are considered the only acceptable type of shut-off valve for use with refrigerant relief piping. Their durable metal-to-metal seating and patented non-leak packing plus O-ring stem seal design combine for long, trouble-free service. Inlet and outlet connections are threaded female NPT all the same size.

Shown below is a three-way dual shut-off valve in the stem out position (backseated). The valve stem should be positioned so that only one pressure-relief valve is activated. While the valve can be either frontseated (front port is closed) or backseated (back port is closed), the backseated position (shown) is recommended for normal use because it takes pressure off the packing and reduces the possibility of packing leaks.

THREE-WAY DUAL SHUT-OFF VALVE (SHOWN BACKSEATED)



CAT NO	CONNECTION SIZE (DN)	DIMENSIONS (MM)				
		A	B	C	D	E
H8021	1/2" FPT (15)	3.63" (92)	2.38" (60)	3.38" (86)	1.75" (44)	6.00" (152)
H8022	3/4" FPT (20)					
H8024	1" FPT (25)	5.88" (149)	3.75" (95)	4.00" (102)	2.00" (51)	8.00" (203)
H8025	1 1/4" FPT (32)					

Material: ASTM A105 Steel
Safe Working Pressure: 600 PSIG (41 Bar)

TO ORDER: DUAL RELIEF KITS ARE NO LONGER AVAILABLE

Please specify three-way dual shut-off valve catalog number and connection size. Add "S" suffix (socket weld) or "W" suffix (butt weld) to catalog number, ie H8021S, H8022W. See spare parts list for fittings.

DUAL RELIEF WITH THREE-WAY SHUT-OFF



**DUAL
ASSEMBLY**



**RUPTURE DISC SHOWN
WITH PRESSURE GAUGE**

CAUTION

Hansen pressure-relief valves and three-way dual shut-off valves are only for refrigerant gas relief and cannot be used for liquid relief. These instructions and related safety precautions must be read and completely understood before selecting, using, or servicing these valves. Only knowledgeable, trained refrigeration mechanics should install, operate, or service valves. Stated temperature and pressure limits should not be exceeded. Valves should not be removed unless evacuated to zero pressure. See also safety precautions in current List Price Bulletin and Safety Precautions Sheet supplied with product. Escaping refrigerant might cause personal injury, particularly to eyes and lungs.

WARRANTY

Hansen valves are warranted against defective materials and workmanship for one year Ex Works our factory. No labor is included. Terms and conditions of sale apply.

RUPTURE DISC ASSEMBLIES

Hansen rupture disc assemblies (RDAs) are used to indicate which pressure-relief valve has discharged. Rupture disc assemblies are required when using Hansen pressure-relief valves in halocarbon applications because the high cost of such refrigerants demands extreme tightness. For more detailed information, including ordering and ASME capacity requirements, see Hansen Bulletin K209.

Relief Valve Spare Parts

Fittings for Dual Assemblies

P/N	Description	Used on Model
20-1236ACT	1/2" NPT X 2" NIPPLE,ACT	H5600A, H5600R, H5601 DUAL ASSEMBLIES
20-1802ACT	NIPPLE, 3/4" X 2-1/2" SCH 80,ACT	H5602, H5602R, H5632R DUAL ASSEMBLIES
50-0720ACT	NIPPLE,1"SCH 80 X 2-1/2" LONG,ACT	H5613, H5633R DUAL ASSEMBLIES
50-0721ACT	NIPPLE 1-1/4" SCHEDULE 80 X 2-1/2",ACT	H5604, H5634R DUAL ASSEMBLIES
20-1236ACT	1/2" NPT X 2" NIPPLE,ACT	H8021
20-1802ACT	NIPPLE, 3/4" X 2-1/2" SCH 80,ACT	H8022
50-0720ACT	NIPPLE,1"SCH 80 X 2-1/2" LONG,ACT	H8024
50-0721ACT	NIPPLE 1-1/4" SCHEDULE 80 X 2-1/2",ACT	H8025
20-1236	1/2" NPT X 2" NIPPLE	H5600A, H5600R, H5601 DUAL ASSEMBLIES
20-1802	NIPPLE, 3/4" X 2-1/2" SCH 80.	H5602, H5602R, H5632R DUAL ASSEMBLIES
50-0720	NIPPLE,1"SCH 80 X 2-1/2" LONG	H5613, H5633R DUAL ASSEMBLIES
50-0721	(50-2173) NIPPLE 1-1/4" SCHEDULE 80 X 2-1/2"	H5604, H5634R DUAL ASSEMBLIES
20-1236	1/2" NPT X 2" NIPPLE	H8021
20-1802	NIPPLE, 3/4" X 2-1/2" SCH 80.	H8022
50-0720	NIPPLE,1"SCH 80 X 2-1/2" LONG	H8024
50-0721	(50-2173) NIPPLE 1-1/4" SCHEDULE 80 X 2-1/2"	H8025

Other

40-1011	TEST MAGNET, POP-EYE	ALL POP-EYE AND POP-EYE INSIGHT
40-1003	BLUE INSTALLATION DATE TAG	H5600A, H5601, H5602, H5613, H5604
40-1004	GREEN (REDUCED CAPACITY) INSTALLATION DATE TAG	H5600R, H5602R, H5632R, H5633R, H5634R, AND EZ-SRV MODEL RELIEF VALVES



Hansen Technologies Corporation

681 Commerce Street

Burr Ridge, Illinois 60527 USA

Tel: 630.325.1565 Fax: 630.325.1572 Toll: 866.4HANSEN

Email: sales@hantech.com Web: www.hantech.com

© 2019 Hansen Technologies Corporation