



HA2B: Back Pressure Regulator

## INTRODUCTION

These small pressure regulators are rugged, compact, and designed for use with refrigerant liquid or vapor. They are suitable for ammonia, R22, R134a, CO2 to 600 psig and other approved refrigerants. These regulators are commonly-used in small capacity applications or as a pilot valve to operate larger main valve and a non-atmospheric relief to low side (HA2BK).

These regulators are furnished with flanges for FPT (Female Pipe Thread, American National Standard, tapered), socket weld or weld neck (to match American Pipe Schedule 40), or ODS (Outside Diameter Sweat) for copper tubing size connections. They have an inlet pressure gauge port. These regulators can be furnished with close-coupled strainers in the inlet. The HA2BQ and HA2BT are different construction, using the same screw-in control modules (pilots) found on the Hansen HA4AQ and HA4AT pressure regulators.

## ADVANTAGES

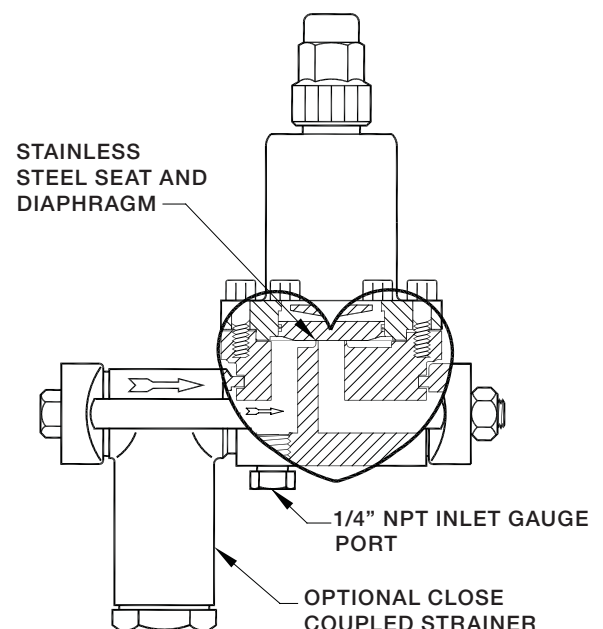
These small regulators offer strong, compact, ductile iron bodies (steel on the HA2BQ and HA2BT), inlet pressure gauge port, and are flange-to-flange replacements for the Parker R/S A2A and A2B series of compact regulators. They can be easily set to accurately maintain a desired pressure or temperature and require practically no service or maintenance. They can be used for remote control where easier access and frequent pressure adjustments are required. The HA2A regulator features a higher flow rate for temperature control or defrost relief of small evaporators. It can also be an economical choice in place of 3/4" (20 mm), reduced-port, pilot-operated regulators.

## Specifications, Applications, Service Instructions & Parts

### HA2A & HA2B SERIES SMALL PRESSURE REGULATORS

Flanged  
1/4" thru 3/4"  
FPT, SW, WN, ODS  
for Refrigerants

## KEY FEATURES



## ADDITIONAL FEATURES

Ideal for Pilot Duty or Small Capacity Applications

Wide Selection of Control Functions and Ranges

Body: Ductile Iron (except HA2BQ and HA2BT: Steel, ASTM A108)

Safe Working Pressure: 400 psig (27 bar), 600 psig for CO2

Operating Temperature: -60°F to +240°F (-50°C to +115°C)

Flow Coefficient at (10 psi pressure offset):

HA2A: 1.25 Cv (1.08 Kv)

HA2B: 0.64 Cv (0.55 Kv)

## OPERATION

Typical operation for this back pressure regulator is as follows. Inlet pressure acts under the diaphragm inside the bonnet. When the force created by the pressure exceeds the force of the range spring, the diaphragm is lifted off the seat and flow occurs between the diaphragm and the seat, from the regulator inlet to the outlet. Increased inlet pressure lifts the diaphragm further, allowing increased flow. Decrease in inlet pressure causes the diaphragm to move closer to the seat reducing the flow. Thus, the regulator acts to maintain a constant pressure. If the inlet pressure drops below the regulator setting, the diaphragm closes off the flow to keep the inlet pressure from going below the set point, subject to limits of seat leakage tolerance or leakage due to dirt particles on the seat surfaces.

## INSTALLATION

Do not remove the protective caps from the inlet and outlet of the regulator until the regulator is ready to be installed. When welded or brazed flange connections are used, all slag, scale, and loose particles should be removed from the flange interior before the regulator is installed between the flanges. A close-coupled strainer is available for installation at the inlet of the regulator to help protect it from foreign material in the system.

The regulator should be installed in horizontal or vertical piping at a location where it is easily accessible for adjustment and maintenance. The location should be such that the regulator cannot be easily damaged

by material handling equipment. Match the arrow on the body with the direction of system flow. These regulators will not prevent reverse flow. To prevent reverse flow, check valves should be installed where necessary. Never install a check valve at the inlet of an outlet pressure regulator (HA2BO). Tighten flange bolts and nuts evenly to provide proper seating of the flange gasket and to avoid damage to the gasket or flanges. A proper indicating pressure gauge should be installed so that it is easily visible by the operator adjusting the regulator.

## SUCTION VAPOR CAPACITIES (TONS)

(1 Ton= 12,000 Btu/hr= 3.517 kW= 3042 kcal/hr)

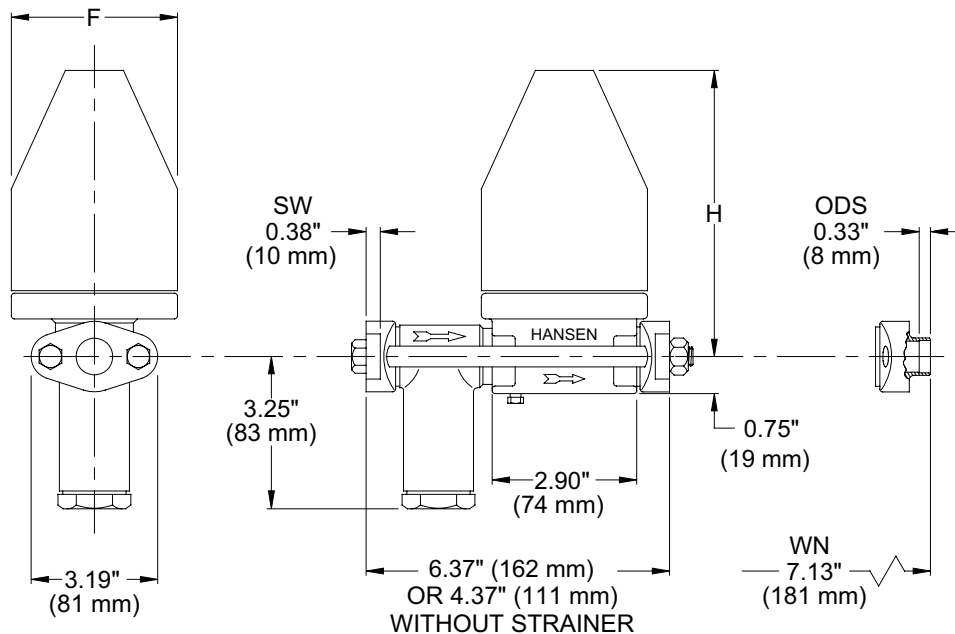
REF	PRES DROP	VALVE TYPE	-40°F† -40°C	-20°F† -28.9°C	OF -17.8°C	+20°F -6.7°C	+40°F 4.4°C
R717	5 psi	HA2A HA2B	1.31 0.67	1.89 0.97	1.70 0.87	2.88 1.47	3.63 1.86
	10 psi	HA2A HA2B	- -	2.45 1.25	3.00 1.54	3.95 2.02	5.05 2.60
R22	5 psi	HA2A HA2B	0.62 0.32	0.84 0.43	0.86 0.44	1.08 0.55	1.35 0.69
	10 psi	HA2A HA2B	- -	1.12 0.58	1.17 0.60	1.50 0.77	1.88 0.96

5 psi= 0.35 bar    10 psi= 0.69 bar

Conditions: Capacities based on evaporator temperatures shown and 86F (30°C) liquid and 10 psi setting offset.

† -40F (-40°C) and -20F (-28.9°C) capacities are based on a two stage system.

## INSTALLATION DIMENSIONS



DIMENSION	HA2A	HA2B	HA2BK	HA2BO	HA2BL	HA2BT	HA2BP	HA2BQ
H	7.25" (184 mm)	7.25" (184 mm)	7.25" (184 mm)	8.50" (216 mm)	7.25" (184 mm)	5.81" (148mm)	7.25" (184 mm)	13.5" (?? mm)
F	3.38" (86 mm)	3.38" (86 mm)	3.38" (86 mm)	3.38" (86 mm)	3.38" (86 mm)	2.00" (51 mm)	5.5" (140 mm)	5.7" (?? mm)

Strainer screen removal requires 3" (76 mm) clearance.

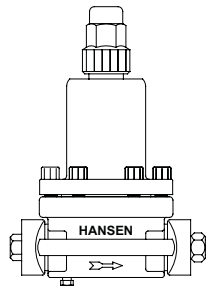
= The HA2BO and HA2BL regulators have an external sensing tube which adds 3" (76 mm) to the regulator width on one side.

## BACK PRESSURE REGULATOR

This most common of pilot pressure regulators modulates to control inlet pressure. As inlet pressure increases, the diaphragm lifts further off the seat to maintain the selected inlet pressure. When inlet pressure decreases below the pressure setting, the seat throttles closed.

The HA2A Back (inlet) Pressure Regulator features high flow and is available in Range A, 0 to 150 psig (0 to 10 bar); or Range B, 30 to 300 psig (2 to 21 bar).

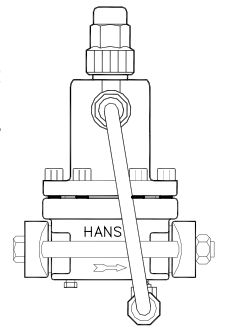
The HA2B Back (inlet) Pressure Regulator is ideal for use as a pilot valve and is available in Range A, 0 to 150 psig (0 to 10 bar); or Range B, 30 to 300 psig (2 to 21 bar). A vacuum Range V, 20" to 130 psig (-0.67 to +9 bar) is also available.



HA2A  
HA2B

## HA2BL DIFFERENTIAL PRESSURE REGULATOR

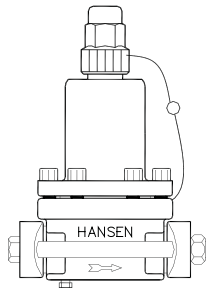
This control modulates to maintain the set-for difference between the inlet and outlet pressures. Inlet pressure is sensed under the bonnet diaphragm and outlet pressure (or other) is introduced to the space on top of the diaphragm via an external sensing tube. A range spring on the top of the bonnet diaphragm allows the control of the differential between inlet and outlet pressures. Increased range spring force increases the differential setting. The system must be capable of generating the desired differential for the regulator to open. Range A, 0 to 150 psi (0 to 10 bar) differential.



HABL

## HA2BK RESEATING RELIEF REGULATOR

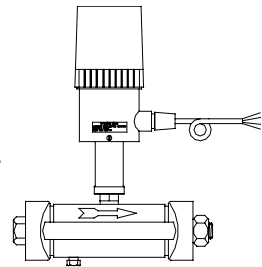
This control opens when system upstream pressure is above the tagged and sealed set point pressure, and repeatedly reseats after operation. The valve is nonadjustable, factory set and sealed. The standard setting is 70 psig (4.8 bar). Ranges available: A, 0 to 150 psig (0 to 10 bar); or B, 30 to 300 psig (2 to 21 bar). Specify desired setting when ordering. Ideal also for high-to-low-side relief to avoid main pressure relief valve "popping." The setting is not affected by low side pressure changes.



HA2BK

## HA2BQ ELECTRONICALLY CONTROLLED REGULATOR

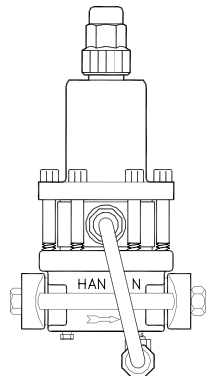
Used primarily as a pilot for a main valve, provides very precise temperature control of various cooled media even under fluctuating load conditions. An increase in sensor temperature lowers the signal to the electronic control module (pilot), opening the regulator to increase flow. A decrease in sensor temperature increases the signal, closing the valve to reduce flow. Detailed in the Hansen HA4A Modular Pressure Regulators Bulletin (R429). Range A, 0 to 87 psig (0 to 6 bar).



HABQ

## HA2BO OUTLET PRESSURE REGULATOR

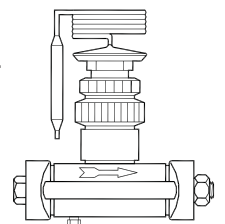
Controls outlet pressure by opening as downstream pressure falls below the setting. As outlet pressure rises, the valve reduces the seat opening. Ranges available: B, 30 to 300 psig (2 to 21 bar); or vacuum range V, 20" to 130 psig (-0.67 to +9 bar).



HA2BO

## HA2BT TEMPERATURE OPERATED REGULATOR

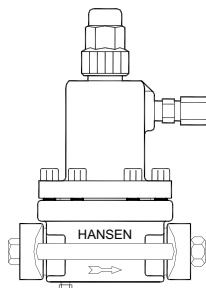
Used primarily as a pilot for a main valve, provides temperature control of various cooled media. Vapor pressure capillary tubing and bulb system modulates the regulator open as temperature increases to control air or liquid temperature. Temperature changes are detected by the thermal bulb. A rise in temperature above the set-for temperature opens the valve to regulate flow. A decrease in temperature begins to close the valve seat. Capillary tubing is 16 feet (5 m) long. Ranges: -40F to +30F (-40°C to 0°C); or +15°F to +75°F (-10°C to +25°C).



HA2BT

## HA2BP PNEUMATICALLY COMPENSATED REGULATOR

Commonly used for precise air or liquid temperature control via a pneumatic controller. An air, vapor, or liquid pressure signal to the bonnet increases the inlet pressure from the set-for pressure values at a 1:1 ratio. The differential between inlet pressure and pressure to the bonnet must not exceed 45 psi (3.1 bar). Range A, 0 to 150 psig (0 to 10 bar).



HA2BP

## ADJUSTMENT

Carefully remove the seal cap by barely cracking it open to allow any confined refrigerant to escape gradually through the safety vent holes in the cap. After adjusting the regulator, it is advisable to observe the maintained pressure while the system is operating normally and to make any minor adjustments required at that time. Replace the seal cap after the desired set point is reached.

**HA2A/HA2B:** Connect a pressure gauge via a gauge valve at the gauge port on regulator body. Turn the adjustment stem clockwise until a slight increase in inlet pressure is detected by the gauge. The inlet pressure setting may now be increased by turning the adjustment stem clockwise or decreased by turning it counterclockwise.

**HA2BK:** This regulator is nonadjustable, factory set and sealed; popular for small capacity relief.

**HA2BO:** Connect a pressure gauge via a gauge valve to the outlet gauge port located on the outlet pressure bonnet or the downstream pipe after the regulator. With the range spring at minimum force (adjusting stem turned counterclockwise), operate the refrigeration compressor. Turn the adjusting stem clockwise until desired outlet pressure is achieved.

**HA2BL:** Connect a pressure gauge via a gauge valve at the gauge port on the regulator body for the inlet pressure reading. A pressure gauge downstream is also required. With the range spring force at the minimum (adjusting stem turned fully counterclockwise, at this point pressure differential is at minimum), slowly turn the adjusting stem clockwise until desired pressure difference between the two gauges is achieved.

**HA2BQ:** No adjustments to the electronic control motor are required. See instructions in Hansen HA4A Modular Pressure Regulators Bulletin R429 for proper controller setting.

**HA2BT:** Place a thermometer in the cooled medium. With the system operating, set this regulator control module to the desired temperature by turning the adjustment ring clockwise to lower opening temperature or counterclockwise to increase opening temperature. Listen for main regulator flow noise. One turn is equivalent to a change of approximately 11F (6.1°C). Tighten the locking ring after adjustment. Wait ten minutes before readjusting.

**HA2BP:** Disconnect the air line to bonnet and follow adjustment procedures for the HA2A/HA2B Regulator. This will set the low inlet pressure setting for the regulator. Connect the air line back to the bonnet. For every 1 psi (0.069 bar) increase in air pressure, the inlet refrigerant pressure setting will increase 1 psi (0.069 bar). Adjust the controller as specified by the manufacturer.

## SERVICE AND MAINTENANCE

If necessary, the diaphragm can be replaced (except HA2BQ and HA2BT); Diaphragm/Gasket Kit: 75-1107. For the HA2BO, use Diaphragm/Gasket Kit: 75-1108. For HA2BQ and HA2BT, see HA4A Modular Pressure Regulator Bulletin R429 for replacement control modules.

## CAUTION

Hansen small pressure regulators are for refrigeration systems only. 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 these valves. Stated temperature and pressure limits should not be exceeded. Adapters, gauge port plugs, bonnets, etc., should not be removed from valves unless the system has been evacuated to zero pressure. See also the safety precautions in the current List Price Bulletin and the Safety Precautions sheet supplied with the product. Escaping refrigerant can cause injury, particularly to the eyes and lungs.

## WARRANTY

All Hansen products, except electronics, are guaranteed against defective materials or workmanship for one year F.O.B. factory. Electronics are guaranteed against defective materials or workmanship for 90 days F.O.B. factory. No consequential damages or field labor is included.

## ORDERING INFORMATION

TYPE	FUNCTION	RANGE
HA2A	Back Pressure 1.25cV (1.08 Kv)	A: 0 to 150 psig (0 to 10 bar) B: 30 to 300 psig (2 to 21 bar)
HA2B	Back Pressure 0.64 Cv (0.55 Kv)	A: 0 to 150 psig (0 to 10 bar) B: 30 to 300 psig (2 to 21 bar) V: 20" to 130 psig (-.67 to 9 bar)
HA2BK	Relief	A: 0 to 150 psig (0 to 10 bar) B: 30 to 300 psig (2 to 21 bar)
HA2BO	Outlet	B: 30 to 300 psig (2 to 21 bar) V: 20" to 130 psig (-.67 to 9 bar)
HA2BL	Differential	A: 0 to 150 psig (0 to 10 bar)
HA2BQ	Electronic Control Motor (Transformer included) (Pilot)	A: 0 to 87 psig (0 to 6 bar)
HA2BT	Temperature (Pilot)	-40°F to 30°F (-40°C to 0°C) 15°F to 75°F (-10°C to 25°C)
HA2BP	Pneumatic (Pilot)	A: 0 to 150 psig (0 to 10 bar)

Flanged Connections (Hansen flange size 050): 1/2" FPT standard; 1/4", 3/8", 1/2", 3/4" FPT, SW, or 3/8", 1/2", 3/4" WN or 5/8" ODS are also available.

**TO ORDER:** Specify type, setting, connection style and size, and strainer if required.

## TYPICAL SPECIFICATIONS

"Small pressure regulators shall be flanged, adjustable, have inlet gauge ports, stainless steel trim, and be suitable for a safe working pressure of 400 psig (27 bar), as manufactured by Hansen Technologies Corporation or approved equal."

# HANSEN

Hansen Technologies Corporation

6827 High Grove Boulevard

Burr Ridge, Illinois 60527 USA

Tel: 630.325.1565 Fax: 630.325.1572 Toll: 800.426.7368

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

USA • Asia • Europe • India • Latin America • Middle East

© 2006 Hansen Technologies Corporation