HANSEN TECHNOLOGIES CORPORATION

INSTRUCTIONS R429d
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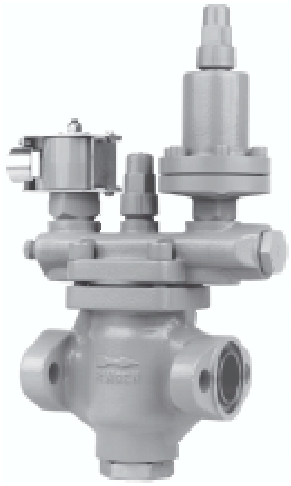


Specifications, Applications, Service Instructions & Parts

HA4A MODULAR PRESSURE REGULATORS ¾" THROUGH 6" PORT (20 MM THROUGH 150 MM)

Various Connection Styles and Sizes for Refrigerants

MATERIAL SPECIFICATIONS

Body:
¾" through 4": Ductile iron, ASTM A536
5" & 6": Cast steel, ASTM A352 LCB
Adapter: Ductile iron, ASTM A536
Piston: Steel, disc type, Teflon piston seal
V-Port/Seat: ductile iron, with Teflon seat
Main Seat: ¾" through 1¼": integral ductile iron
1½" through 6": stainless steel, removable
Gaskets: Nonasbestos, graphite composite
Manual Opening Stem: Steel, plated
Pilots: Stainless steel trim
Pilot Orifice: Stainless steel
Flanges: Forged steel, ASTM A105
Safe Working Pressure: 400 psig (27 bar)
Operating Temperature: –60F to +240F (–50°C to +115°C), lower temperatures possible at pressure downratings

INTRODUCTION

These advanced-design, strong-bodied, precision-manufactured MODULAR regulators are superior in their ability to overcome dirt and sticky oil during opening and tight closing. Models are available for nearly every control function requirement of industrial ammonia and commercial halocarbon refrigeration. These regulators are ideal for cold storage plants, poultry plants, meat packing, fish processing, freezers, ice plants, breweries, bottling plants, heat recovery units, petrochemical plants, pharmaceutical plants, supermarkets, and many others.

APPLICATIONS

Evaporator Pressure Control

Defrost Pressure Control

Condensing Pressure Regulation

Receiver Pressure Control

Hot Gas Bypass Capacity Regulation

Suction Pressure Control

Air or Liquid Temperature Regulation

Internal System Pressure Relief

ADDITIONAL FEATURES

Tolerant of Dry Systems
For Ammonia, R22, R134a and other Hansen-Approved Refrigerants
Wide Range of Options
Inlet, Outlet, or Differential Pressure
Wide Pressure Ranges
Electric Shut-Off, Dual, or Wide-Opening Available
Safe Working Pressure: 400 psig (27 bar)
CSA Certified, CRN for Canada

INSTALLATION

Regulators should be protected from dirt and moisture during storage. The arrow on the body should be in the normal direction of refrigerant flow. *These valves will not prevent reverse flow;* use check valves where necessary. Regulators are normally in horizontal pipe lines with pilots and manual-opening stems on top. Do not rotate the position of the valve adapter or the valve will not operate.

The system should be free of dirt, weld slag, and rust particles. Regulators can be equipped with separate, close-coupled inlet strainers. No small, hidden, internal screens are used. Gauges and gauge valves should be installed on the inlet and outlet to help in system diagnosis. Because of the many regulator pilot combinations, during installation of a large job, the regulator nameplates should be checked against piping drawings to guarantee proper function for each location. Where pilot solenoid control modules are used, the nameplate coil voltage should be checked before wiring. Pipe sizing, anchoring, valve rating, system design, and other precautionary factors should be taken into consideration to ensure “liquid hammer” will not occur when the valve opens or closes.

The 5" and 6" valves are type HA4W with integral butt weld end only. These steel-bodied regulators are directly welded into the pipe line. During welding, the manual-opening stem should be opened downward several turns to protect the Teflon seat from weld heat.

Welds should be annealed as necessary in accordance with good practice. Painting of valves and welds is recommended for corrosion protection. Pipe covering, where applied, should have proper moisture barrier. Before putting valves into service, all pipe connections, valve seats, cover seals, and stem seals should be tested for leaks at pressure levels called for in appropriate codes.

ELECTRICAL

When the electric shut-off, wide-opening, or dual feature is supplied, a Hansen low-wattage, molded electrical coil is included. Standard coil voltages are 115V, 208/230V, or 24V at 50/60Hz. Other voltages available. The coil properly operates between 85% and 110% of the rated voltage. Coils should only be energized while on the pilot solenoid tube. Unless otherwise specified, the standard coil with a ½" fitting for conduit is supplied with valves.

A watertight solenoid coil with 18" (450 mm) long wire pigtail leads and a steel frame housing with a ½" conduit fitting is standard.

Optional DIN Plug Coils are for grounded cord connections and include the necessary DIN plug socket with gasket.

Coils with Junction Boxes are optional. Integral, steel junction box for connection of the 18" (450 mm) long wire pigtail leads.

Vibration-resistant, bright, long-life, neon pilot lights are available. These pilot lights operate on primary voltage; a special coil with secondary winding is not necessary. Optional watertight pilot light assembly is also available.

SERVICE AND MAINTENANCE

Failure to open:

Wrong coil or control module pilot; low line voltage; controlling switch or thermostat not contacting; coil is burned-out; adjacent shut-off valve closed; adapter gasket hole not aligned with hole in body and adapter; dirt packed under Teflon seal ring enabling excessive blow by; large quantity of dirt particles in solenoid module passages; dirt blocking internal pilot passages; main valve seat is dirt jammed.

Failure to close:

Controlling switch or thermostat not opening contacts; manual-opening stem is turned in; valve installed in wrong direction; damage or dirt at main valve seat or pilot seat; piston bleed hole plugged. Under extreme conditions of liquid or oil “slugging” or pressure drops exceeding 45 psi (3.1 bar), special construction may be required. Contact the factory.

Before opening the regulator or disassembling the pilot for service, be sure it is isolated from the system and all refrigerant is removed (pumped out to zero pressure). Follow usual refrigeration system safe servicing procedures. Read the CAUTION section of this bulletin on page 20.

To check solenoid pilot section of valve, disconnect the electrical coil. Unscrew the coil nut and remove washer. Lift coil housing away from valve. Remove the four solenoid tube screws and remove solenoid tube from valve. Inspect for dirt and damage to Teflon seat and stainless steel pilot orifice. Clean, polish or replace parts as necessary, then reassemble.

¾" THROUGH 1¼" (20 MM THROUGH 32 MM)

Use a 3/8" male hexagon wrench to loosen the four adapter bolts, proceeding slowly to avoid refrigerant which may still remain in the valve. If piston parts are stuck, remove the 2" hex bottom cap in order to separate the valve V-port/seat from the disc piston. Inspect disc and piston bore for burrs, nicks, and other damage. Remove burrs and nicks, clean or replace disc piston and Teflon seal ring as necessary. Long-life seal on disc piston need only be replaced when damaged or severely worn. If replacing the disc piston seal, make sure the seal is properly installed, with the edge up, and does not “twist” during installation. Inspect V-port/seat and main valve seat for nicks, marks, etc. The main valve seat may be lapped by hand or power drill to remove marks. Clean, polish or replace parts as necessary. If necessary, the V-port tapered seat may be reconditioned by removing up to 0.04" (1 mm) of Teflon from it on a lathe. Lightly lubricate all parts and gaskets with soft rag containing refrigerant oil. Align hole in valve body, adapter gasket, and adapter to assure proper operation. Reassemble valve. Carefully check valve for leaks before returning it to service.

1½" THROUGH 6" (40 MM THROUGH 150 MM)

Loosen adapter bolts using a 12" adjustable wrench (15" wrench for 5" and 6" valves), being careful to avoid any refrigerant which may still remain in the valve. If disc piston is difficult to remove, insert a ¼"-20 threaded screw (3/8"-16 for 5"& 6" valves) into center of piston and lift straight-up. Inspect piston and piston bore for burrs, nicks and other damage. Remove burrs and nicks, clean or replace piston as necessary. Long-life seal on disc piston need only be replaced when damaged or severely worn. If replacing the disc piston seal, make sure the seal is properly installed, with the edge up, and does not “twist” during installation. These valves also have a removable stainless steel main valve seat. To remove seat ring for inspection, first remove small hex head seat screw. Turn the seat ring counterclockwise by turning it out with a wrench and a steel bar tool positioned horizontally or by carefully tapping the seat ring notch with a punch and a hammer. Inspect the V-port/seat and main valve seat for nicks, marks, and divots. The main valve seat may be lapped by hand or power drill to remove marks. Grease and replace the seat sealO-ring. Clean and polish, or replace the parts as necessary. If necessary, the V-port tapered seat may be reconditioned by removing up to 0.04" (1 mm) of Teflon from it on a lathe. Lightly lubricate all parts and gaskets with a soft rag containing refrigerant oil. Align the hole in the valve body, adapter gasket, and adapter to assure proper operation. Reassemble the valve. Carefully check the entire valve for leaks before restoring it to service

MAIN REGULATORS ONLY (AR1, AR3)

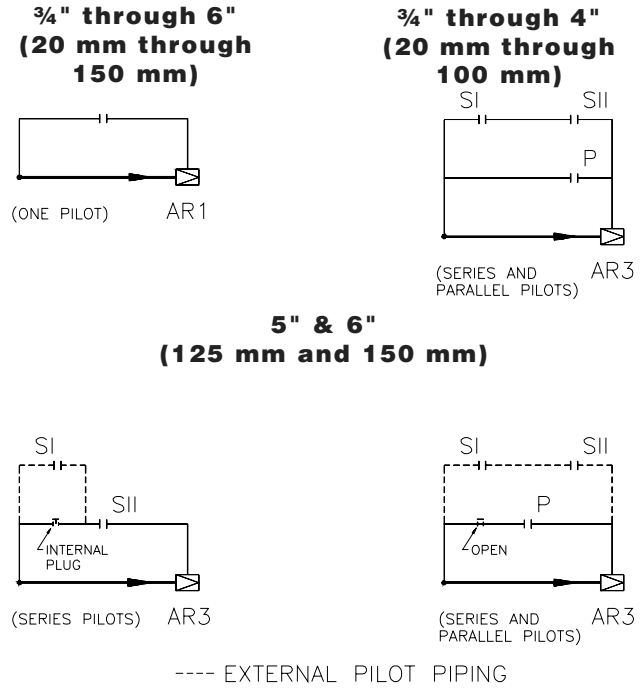
Hansen regulators are normally furnished with control modules (pilots) installed and tested (see page 3). However, modular regulators less pilots and flanges are available on order from ¾" to 6" (20 mm to 150 mm). Each AR1 and AR3 includes flange gaskets, nuts and bolts, and a plugged ¼" FPT outlet pressure access port. The access port is for connecting outlet or differential control module sensing lines or gauges.

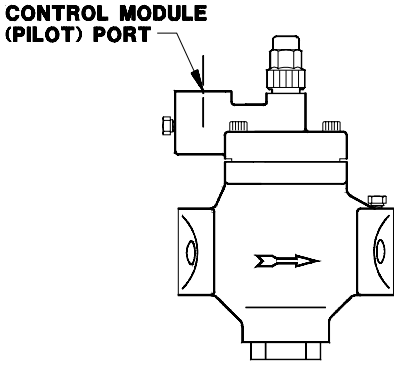
AR1 is the main regulator body with ONE control module (pilot) port, control module not included.

AR3 is the main regulator body with THREE control module (pilot) ports, for a maximum of three control modules, not included. The 5" and 6" (125 mm and 150 mm) AR3 regulators have a single control module port with connection points for up to three total ports via mounted pilot piping.

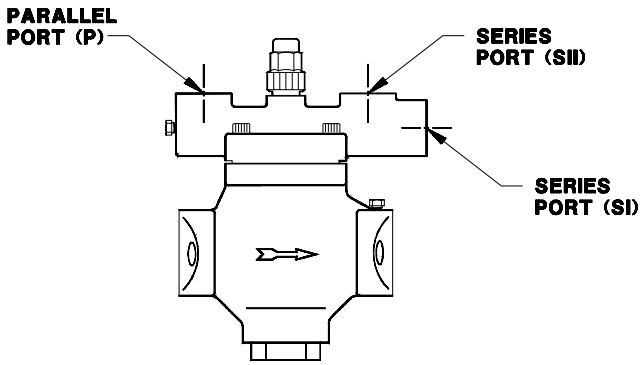
TO ORDER

(Main Regulators only) Specify port size and catalog number (AR1 or AR3).





AR1

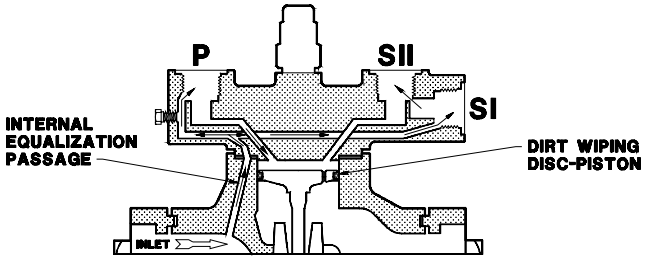


AR3

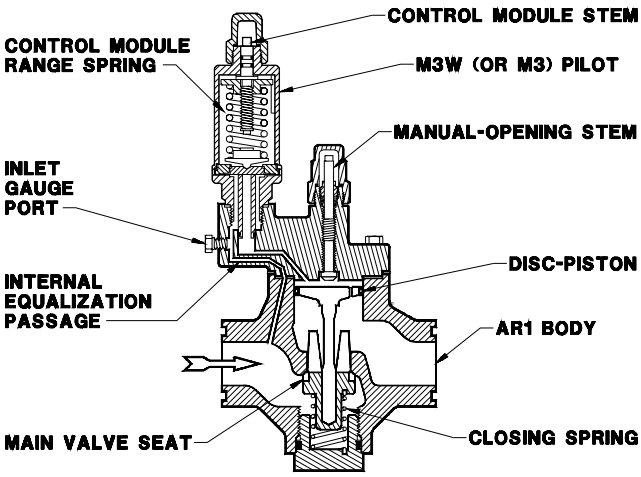
OPERATION OF REGULATORS

The regulator adapter (top cover) is available with one control module port or three control module ports. One control module port is often used for a solenoid valve or a single pressure regulator. Three control module ports are often used for a dual regulator and other multiple function variations.

When the modular regulator has three control module ports, two are in series (SI and SII) and one is in parallel (P). Inlet pressure enters the internal equalization passage and goes to both the P port and the SI port. Inlet pressure enters the SII when the control module SI port is open. When the control module in the SI and SII port or the P port is open, pressure enters the space above the piston which forces the main valve seat to open and regulate flow.



HA4A STANDARD REGULATOR



OPERATION

Inlet pressure is channeled through the internal equalization passage to the inlet pressure control module. The valve modulates open when inlet pressure exceeds the pressure setting on the control module. The gas or liquid passes through the inlet pressure control module to enter the space on top of the piston, which forces the main valve seat to open and regulate flow. As inlet pressure increases, the main valve seat opens further to maintain the selected inlet pressure. A minimum pressure difference of 2 psi (0.14 bar) is adequate to fully open the main valve. When inlet pressure decreases below the pressure setting on the control module, the closing spring will cause the main valve seat to throttle closed.

ADJUSTMENT

Connect a pressure gauge via a gauge valve at the gauge port on the regulator adapter. Set the control module range spring at minimum force (control module stem turned counterclockwise). Operate the refrigeration compressor system and achieve approximate desired suction pressure. Turn the control module stem clockwise until a slight increase in inlet pressure is detected by the gauge. The inlet pressure setting can now be increased by turning the control module stem clockwise or decreased by turning it counterclockwise. The system should be allowed to operate for a period of time before the final adjustment is made. The inlet pressure control module 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.

HA4AK RESEATING RELIEF REGULATOR

OPERATION

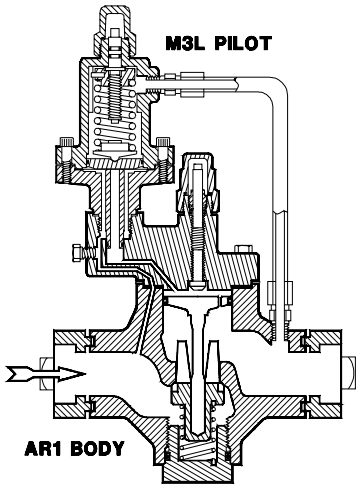
(Same as HA4A) Inlet pressure is channeled through the internal equalization passage to the reseating relief control module. When inlet pressure exceeds the relief setting, the control module opens wide to allow pressure to enter the space on top of the piston. This causes the main valve seat to open and relieve the inlet pressure, provided the outlet pressure is at least 2 psi (0.14 bar) lower. A 5 psid (.35 bar) closing spring is standard on ¾" through 1¼" valves. See page 6 for M3K pilot details.

When used for defrost relief from low side to an intermediate pressure, a check valve on the outlet is required to prevent back flow during refrigeration.

ADJUSTMENT

The control module is nonadjustable, factory-set and sealed. Available in Range A, 0 to 150 psig (0 to 10 bar); or Range B, 30 to 300 psig (2 to 21 bar).

HA4AL DIFFERENTIAL PRESSURE REGULATOR



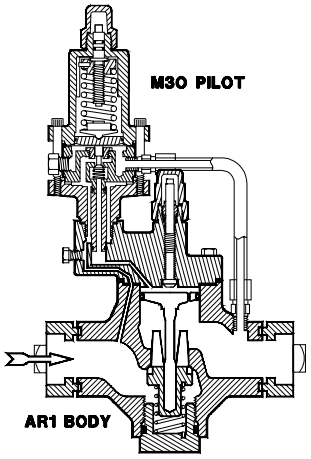
OPERATION

Inlet pressure is channeled through the internal equalization passage to the differential pressure control module. Outlet pressure (or other) is introduced to the space on top of the differential pressure control module diaphragm via an external sensing tube. A range spring on the top of the control module diaphragm allows the control of the differential between inlet and outlet pressure. Increased range spring force increases the differential setting. Inlet pressure, counteracted by the range spring plus outlet pressure, enters the space on top of the piston which forces the main valve seat to open and regulate flow. The external sensing tube on the 5" & 6" valves must be customer supplied and field installed.

ADJUSTMENT

Connect a pressure gauge via a gauge valve at the gauge port on the regulator adapter for the inlet pressure reading. A pressure gauge downstream is also required. With the control module range spring force at the minimum (control module stem turned fully counterclockwise, at this point pressure differential is at minimum), slowly turn the control module stem clockwise until the desired pressure difference between the two gauges is achieved. A final adjustment should be made after system has operated for a period of time. The system must be capable of generating the desired pressure difference for the regulator to open. Range A, 0 to 150 psig (0 to 10 bar).

HA4AO OUTLET PRESSURE REGULATOR



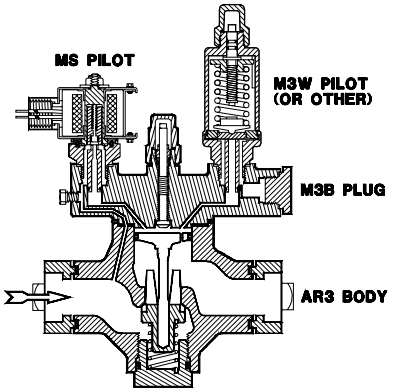
OPERATION

Outlet pressure is channeled through an external sensing tube to the outlet pressure control module. The outlet pressure is introduced to the space under the control module diaphragm. When outlet pressure decreases below the outlet pressure setting the range spring forces the control module to open further. As the control module opens, more inlet pressure enters the space on top of the piston forcing the main valve seat to open further and regulate flow. As outlet pressure rises the control module reduces the inlet pressure to the piston and the main valve seat starts closing. The external sensing tube on the 5" & 6" valves must be customer supplied and field installed. A 5 psid (.35 bar) closing spring is standard on ¾" through 1¼" valves. A lighter spring is available for applications where a low pressure drop is required, such as holdback or crankcase pressure regulators.

ADJUSTMENT

Connect a pressure gauge via a gauge valve to the outlet gauge port located on the outlet pressure control module or the pipe after the regulator. With the control module range spring at minimum force (control module stem turned counterclockwise) operate the refrigeration compressor. Turn the control module stem clockwise until the desired outlet pressure is achieved. Ranges available: B, 30 to 300 psig (2 to 21 bar); or vacuum range V, 20" to 130 psig (–0.67 to +9 bar).

HA4AB REGULATOR WITH ELECTRIC WIDE OPENING



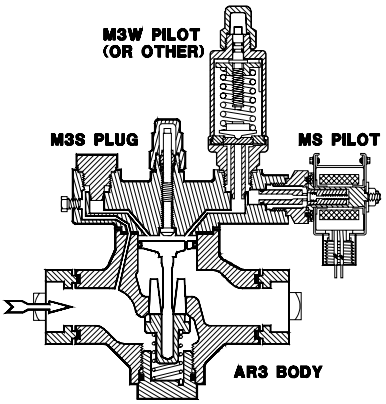
OPERATION

When the solenoid control module is de-energized, this control operates in the same manner as the HA4A Standard Regulator or other pilot functions. When energized, inlet pressure bypasses the constant pressure control module and enters the space on top of the piston which forces the main valve seat to open wide to permit flow in the direction of arrow.

ADJUSTMENT

With solenoid control module de-energized, follow adjustment procedures for the HA4A Standard Regulator. See page 10.

HA4AS REGULATOR WITH ELECTRIC SHUT-OFF



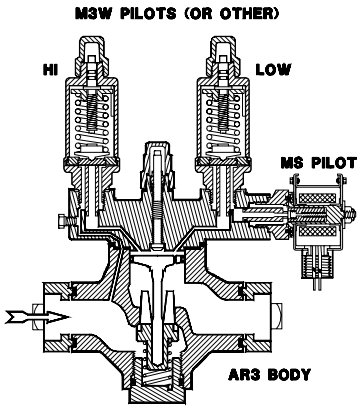
OPERATION

When the solenoid control module is energized, this control operates in the same manner as the HA4A Standard Regulator or other pilot functions. When de-energized, valve closes tight to stop flow in direction of arrow regardless of pressure setting on the control module.

ADJUSTMENT

Energize the solenoid control module and follow the control module adjustment procedures for the HA4A Standard Regulator. See page 10.

HA4AD DUAL PRESSURE REGULATOR



OPERATION

When the solenoid control module is energized, this valve operates in the same manner as the HA4A Standard Regulator or other pilot functions. When the solenoid control module is de-energized, the inlet pressure is channeled to the higher-setting inlet pressure control module and operates in the same manner as the HA4A regulator. When inlet pressure rises above the higher setting, the control module opens to allow inlet pressure to enter the space on top of the piston which forces the main valve seat to open and regulate flow. Typically used as a combined evaporator pressure regulator and defrost internal relief valve.

ADJUSTMENT

Connect a pressure gauge via a gauge valve at the gauge port on the regulator adapter. With the solenoid control module de-energized, adjust the constant pressure control module in the P port for the high-pressure setting. This may require a warm room or hot gas supply to the evaporator. Then, energize the solenoid control module located on the series SI port and adjust the constant pressure module in the series SII port for the low-pressure setting. For control module adjustment, follow the adjustment procedures for the HA4A Standard Regulator. See page 10.

HA4AM ELECTRIC MOTOR COMPENSATED REGULATOR

OPERATION

The regulator pressure setting is altered as the motor receives a signal from a suitable temperature controller. The motor responds to maintain the balance in the electrical circuit. The rotation of the motor is transmitted through a cam, valve stem, and range spring to the top of the control module diaphragm. An increase in temperature decreases the range spring force on top of the control module diaphragm. This decrease in force on the diaphragm allows inlet pressure to pass through the control module to enter the space on top of the piston which forces the main valve seat open to reduce the evaporator pressure. A decrease in temperature causes an increase in the range spring force. This restricts the flow of inlet pressure to the piston causing a reduction in the opening of the main valve seat, reducing regulator flow by raising the pressure setting.

APPLICATIONS

This motor compensated regulator is popular for fruit storage, precision air temperature control, and liquid chiller control.

ADJUSTMENT

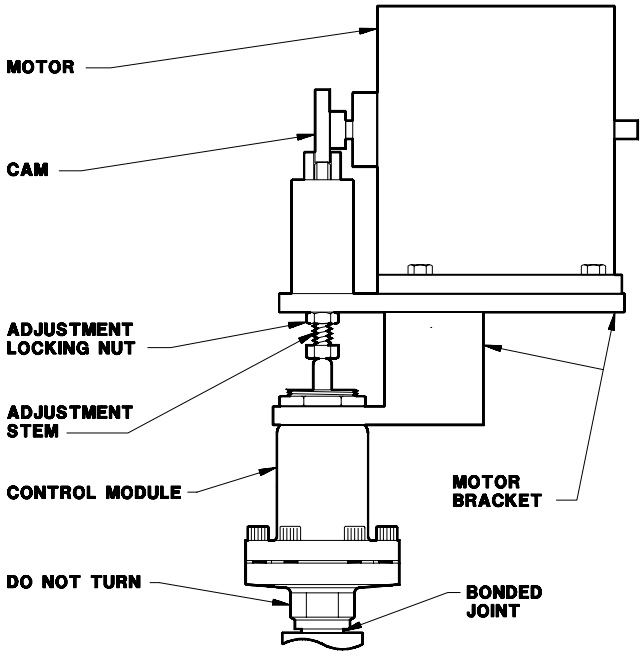
Adjust the temperature controller as specified by the manufacturer. Fully open the regulator manually by turning in (clockwise) the manual-opening stem to cool the product or room. Once the temperature at the sensing device is approximately as desired, adjust the controller output so that the cam is rotated to the center position. Put regulator back in automatic operation by turning the manual-opening stem out (counterclockwise). Loosen the adjustment locking nut. See the diagram to the right. Turn the adjustment stem clockwise to raise the inlet pressure setting or counterclockwise to lower the inlet pressure setting. When the desired refrigerant pressure setting is achieved, tighten the adjustment locking nut. A final adjustment should be made after the system has operated for a period of time.

Using a potentiometer slide wire type of controller (typically 135 ohm), depending on product heat load, a deviation from desired temperature of about +2F to +5F (+1.1°C to +2.8°C) is normal to rotate the regulator cam for maximum load satisfaction. As the load is reduced or as the temperature becomes lower, the cam rotates to create a higher evaporator pressure just adequate to balance the load and maintain the desired temperature, usually with ±1°F (0.5°C). Other controllers are available to operate the motor/cam rotation.

The basic Electric Motor Compensated Regulator consists of a nonremovable control module with a motor bracket and cam. The control module is available in either Range A, 0 to 150 psig (0 to +10 bar); or Range V, 20" to 130 psig (–0.67 to +9 bar). The motor bracket comes mounted on the control module and is suitable for use with either PENN (standard) or HONEYWELL motors. Two cams are available: Low Rise (standard) and High Rise. The table below indicates the pressure change possible for each cam and motor combination.

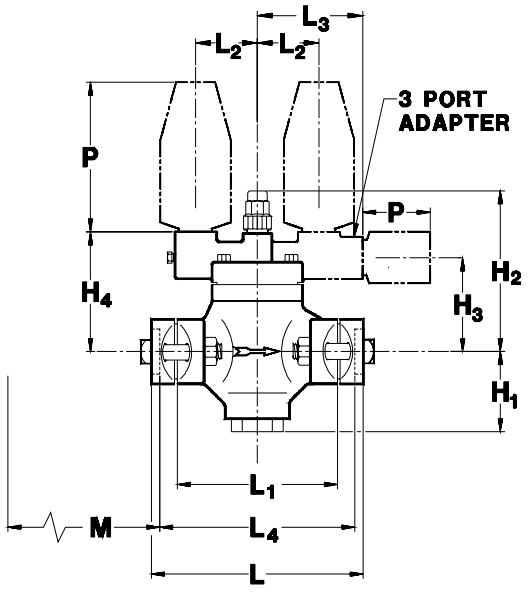
The PENN motor (standard) has 270° of rotation travel and the HONEYWELL motor has 160° of rotation travel. Motors are available for either 135 ohm or 4–20 mA control signal input and require 24 VAC power input. Electric proportional thermostat controllers (135 ohm output), electronic PID controllers (4–20 mA output) with sensor, and 24V transformers are available accessories.

RANGE	CAM	PRESSURE CHANGE	
		PENN	HONEYWELL
A or V	LOW RISE	45 psig (3.1 bar)	30 psig (2.1 bar)
	HIGH RISE	90 psig (6.2 bar)	60 psig (4.1 bar)

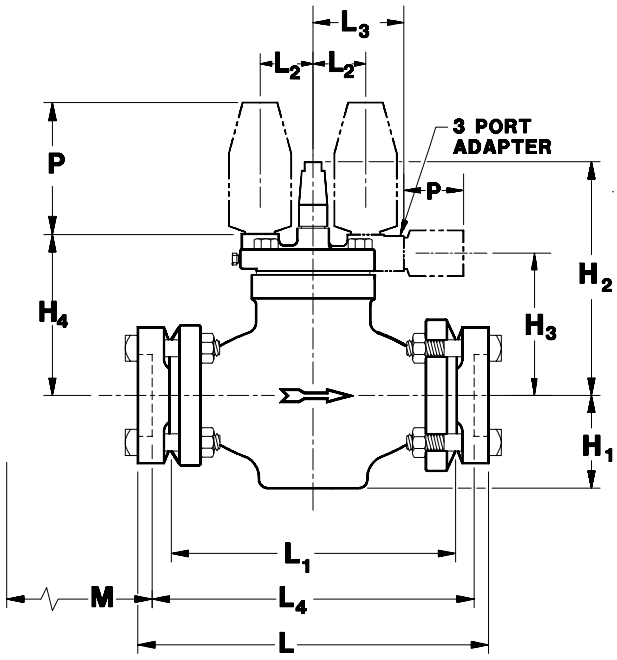


INSTALLATION DIMENSIONS (MM)

¾" THROUGH 1¼" REGULATORS



1½" THROUGH 4" REGULATORS



M = Additional length for close-coupled strainer

PORT SIZE (mm)	H_1	H_2	H_3	H_4	L		L_1	L_2	L_3	L_4	M	W*
					FPT,SW	WN,ODS						
¾", 1", 1¼" (20, 25, 32)	3.09" (78)	6.77" (172)	3.75" (95)	4.63" (117)	8.20" (208)	8.94" (227)	6.19" (157)	2.38" (60)	4.07" (103)	7.20" (183)	3.70" (94)	4.50" (114)
1½", 2" (40, 50)	2.87" (73)	8.84" (225)	4.90" (124)	5.72" (145)	12.39" (315)	13.39" (340)	9.88" (251)	2.35" (60)	4.04" (103)	10.89" (277)	9.83" (250)	4.50" (114)
2½" (65)	3.62" (92)	9.69" (246)	5.57" (141)	6.53" (166)	13.01" (330)	14.03" (356)	9.88" (251)	2.35" (60)	4.04" (103)	11.01" (280)	9.83" (250)	5.62" (143)
3" (80)	4.06" (103)	10.00" (254)	6.03" (153)	6.88" (175)	15.38" (391)	16.40" (417)	12.25" (311)	2.35" (60)	4.04" (103)	13.38" (340)	12.20" (310)	6.50" (165)
4" (100)	4.69" (119)	10.56" (268)	6.58" (167)	7.46" (189)	17.01" (432)	20.51" (521)	14.12" (359)	2.69" (68)	4.38" (111)	15.01" (381)	14.07" (357)	8.06" (205)

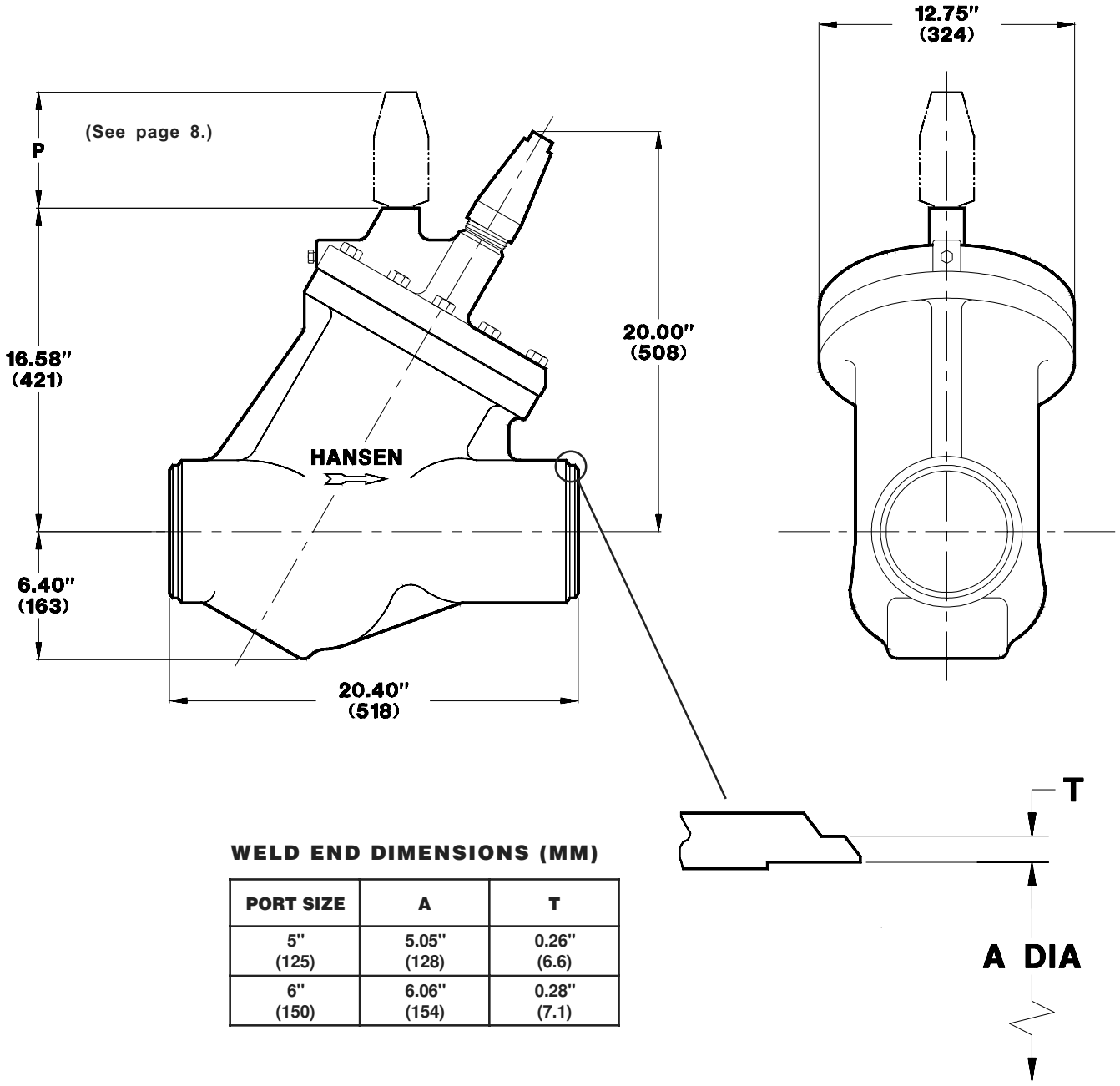
*Maximum width of valve.
For ¾", 1", 1¼" valves add 3" (80 mm) to one side of the valve for external piping as found on HA4AO and HA4AL.
An alternate 4-bolt version of the 1¼" valve is available with face-to-face dimension (L_1) same as R/S 1¼" for replacements.

"P" DIMENSION FOR CONTROL MODULES (MM)

CATALOG	M3	M3W	MS	M3O	M3K	M3KW	M3L	M3P	M3J	M3T	M3E25	M3M
Size (mm)	6.5" (165)	5.12" (130)	3.25" (83)	7.75" (197)	6.5" (165)	5.12" (130)	6.5" (165)	6.5" (165)	4.63" (118)	4.5" (114)	1" (25)	14.9" (378)

The above dimensions do not include seal cap and solenoid coil removal height, or motor-access clearance. M3E25 = Less 4" (100 mm) long weld nipple. M3M = Electric motor compensated control module with motor.

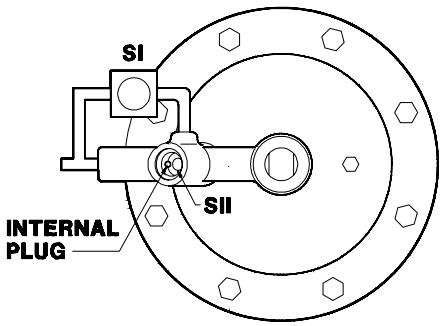
INSTALLATION DIMENSIONS (MM)
5" AND 6" REGULATORS



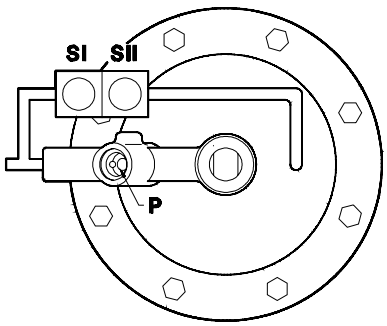
WELD END DIMENSIONS (MM)

PORT SIZE	A	T
5" (125)	5.05" (128)	0.26" (6.6)
6" (150)	6.06" (154)	0.28" (7.1)

5" AND 6" PILOT PIPING (TOP VIEW)



FOR SERIES ARRANGEMENT (AS)
SI, solenoid; SII pressure pilot



FOR SERIES AND PARALLEL ARRANGEMENT (AD)
SI, solenoid; SII & P pressure pilots

HA4AP PNEUMATICALLY COMPENSATED REGULATOR

OPERATION

A pneumatic controller regulates the amount of air pressure applied to the top of the M3P control module diaphragm. A rise in temperature sensed by the pneumatic controller reduces the air pressure to the control module, allowing inlet pressure to enter the space on top of the piston which forces the main valve seat to open and regulate flow. A decrease in sensed temperature increases the pressure of air to the M3P control module. This increase in air pressure reduces the opening at the M3P control module and restricts the flow of inlet pressure to the piston, thus reducing the opening at the valve main seat. See page 6 for M3P pilot details.

ADJUSTMENT

Disconnect the air line to the M3P control module and follow the adjustment procedures for the HA4A Standard Regulator. See page 10. This sets the low inlet pressure setting for the regulator. Connect the air line back to the M3P control module. For every 1 psi (0.069 bar) of increase in air pressure, the inlet refrigerant pressure setting increases 1 psi (0.069 bar). Adjust the controller as specified by the manufacturer. In lieu of air, low-pressure refrigerant or other fluid can be used for compensation. The differential between inlet pressure and pressure to the M3P control module must not exceed 45 psi (3.1 bar). Range A, 0 to 150 psig (0 to 10 bar).

HA4AT TEMPERATURE OPERATED REGULATOR

OPERATION

Temperature changes are detected by the thermal bulb. The expansion or contraction of the charge inside the bulb and capillary tube is transferred across the diaphragm in the M3T control module. A rise in temperature above the set-for temperature opens the M3T control module and allows inlet pressure to enter the space on top of the piston which forces the main valve seat to open and regulate flow. A decrease in temperature closes the M3T control module which allows the piston to rise and close the main valve seat. A reverse acting model is also available: rising temperature closes the regulator, as for reheat. See page 6 for M3T pilot details.

ADJUSTMENT

Connect a pressure gauge via a gauge valve at the gauge port on the regulator adapter. Place a thermometer in the cooled medium. With the system operating, set the M3T regulator control module to the desired temperature by turning the adjustment ring clockwise to lower opening temperature or counterclockwise to increase opening temperature. One turn is equivalent to a change of approximately 11F (6.1°C). Tighten the locking ring after the final adjustment has been made. Range –40F to +30F (–40°C to 0°C); or +15F to +75F (–10°C to +25°C).

MANUAL OPENING

The manual-opening stem is designed to open the valve, allowing upstream and downstream pressures to equalize when needed for servicing, but not necessarily to create a full-flow condition. The stem is located on the top of the adapter cover. Slowly remove the seal cap from the manual-opening stem, being cautious to avoid any refrigerant which may have collected under the cap. Using an appropriate wrench, turn the stem in (clockwise) to open the valve manually; counterclockwise to return the valve to automatic operation. Do not leave the stem partially open because it may be dynamically damaged.

CAUTION

Hansen pressure regulators are only for refrigeration systems. These instructions and related safety precautions must be read completely and understood before selecting, using, or servicing these valves. Only knowledgeable, trained refrigeration technicians should install, operate, or service these valves. Stated temperature and pressure limits should not be exceeded. Adapters, bottom cap, control modules, etc., should not be removed from valves unless system has been evacuated to zero pressure. See also 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 Technologies products, except electric motors and electronic items, are warranted against defects in workmanship and materials for a period of one year F.O.B. our plant. Electric motors and electronic items are warranted against defects for 90 days. No consequential damages or field labor is included.

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