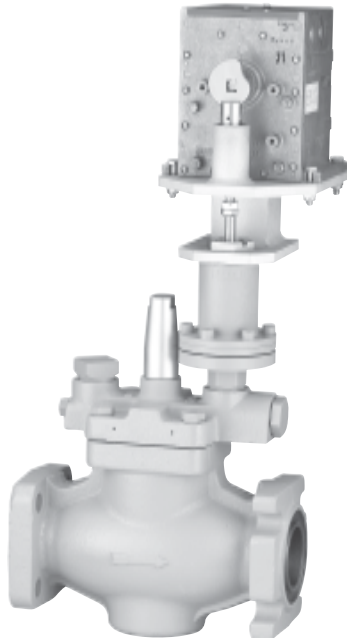


# HANSEN TECHNOLOGIES CORPORATION



## Specifications, Applications, Service Instructions & Parts

### HA4AM Electric Motor Compensated Regulator

For Ammonia, R22, R134a,  
and Other Approved  
Refrigerants

ISO 9002

### INTRODUCTION

This motor/cam compensated regulator is a configuration of the Hansen HA4A modular pressure regulator. The motor varies the pressure setting of the regulator when it receives a signal from an appropriate controller, such as a thermostat or PLC. This regulator is commonly used for situations requiring precision air temperature control, such as fruit cold storage, or precision liquid chiller control. It is also commonly used where the refrigeration load varies abruptly, such as meat packing process areas.

### ADVANTAGES

- Adjusts for varying load conditions.
- Welded bracket motor mount provides secure, stable mounting.
- Quad ring seal prevents moisture leakage into the stem area, eliminating the possibility of freezing.
- Quad ring eliminates the packing nut, preventing the possibility of over-tightening the nut.
- Interchangeable and direct replacement for Parker R/S A4AM Modutrol valves.

### ADDITIONAL FEATURES

- Available in two control ranges—Range A 0 psig/0 bar to 150 psig/10 bar and Range V 20"/-0.7 bar to 130 psig/9 bar.
- Two motors to choose from—PENN\* (standard) and HONEYWELL (optional).
- Both low-rise (standard) and high-rise (optional) cams are available.
- Supplied with a dual-pilot-ready bonnet.

#### Available accessories:

- Electric proportional thermostat controllers.
- Electronic PID controllers with sensor.
- 24V transformers.

\*Johnson Controls

### CONSTRUCTION

The motor mount on the Hansen electric motor compensated regulator is of superior design. Unlike designs with "legs," the HA4AM has a solid, welded bracket motor mount. This design provides a sturdy and stable base that will not flex or warp with motor torque or temperature changes.

The control module stem is a quad-ring-seal design. The quad ring is more flexible and durable over time than stem packing or O-rings, which means continuous protection against condensation inside the control module. If present, this condensation may freeze, making the regulator inoperative. In addition, the stainless steel nut holding the motor bracket to the control module is machined in a way to help direct any condensation away from the control module stem, preventing possible freezing problems. The control module shaft also has a roller bearing that rides on the cam, allowing smooth operation with little wear over time.

### OPERATION

The regulator inlet pressure setting changes as the motor receives a signal from a controller, such as a thermostat or PLC. The rotation of the motor is transmitted through a cam to the control module stem, and then to the control module range spring connected to the top of the control module diaphragm.

With an increase in room temperature, for example, the motor moves the valve stem farther out of the control module, decreasing the pressure on the control module diaphragm. This, in turn, increases the opening of the main valve seat, decreasing the temperature by lowering the pressure setting. With a decrease in room temperature, the action is reversed, increasing the temperature by increasing the pressure setting.

## SPECIFICATIONS

The HA4AM can be ordered “less motor,” which includes control module, cam, and motor-mounting bracket. A three port bonnet with blanking plugs is standard on the HA4AM (up to 4"/100 mm port) so that other pilots can be field installed if required. The “M” feature can also be ordered with other valve combinations, most commonly the HA4ADM Dual Pressure Regulator with motorized pilot. See Hansen Bulletin R429. All material specifications for the HA4A modular pressure regulator apply to the HA4AM. The following additional specifications apply to the HA4AM.

### RANGE (CONTROL MODULE)

Two pressure ranges are available for the HA4AM. Range A is 0 psig/0 bar to 150 psig/10 bar. Range V is 20"/-0.7 bar to 130 psig/9 bar. The standard factory setting is 40 psig/2.8 bar for Range A and 20 psig/1.4 bar for Range V.

### CAM

The following chart indicates the total pressure change possible for each cam and motor combination. These pressure changes apply for both Range A and Range V control modules.

CAM	PRESSURE CHANGE	
	PENN	HONEYWELL
LOW RISE	45 psid/3.1 bar	30 psid/2.1 bar
HIGH RISE	90 psid/6.2 bar	60 psid/4.1 bar

### TRANSFORMERS

A 115VAC/230VAC:24VAC motor transformer (TR40) is available. The 4–20 mA HONEYWELL motor accepts 115V line voltage input. If needed, a 230V/115V transformer is available for this motor. Contact Hansen for details.

## MOTORS

### PENN motor:

NEMA 2/IP 52, NEMA 3/IP 64 with optional weather-resistant cover.  
24VAC power input.  
4–20 mA or 135 ohm control signal input (specify).  
270° of rotation, factory-set at midpoint.  
Ambient temperature range: -40°F/-40°C to +125°F/+50°C.

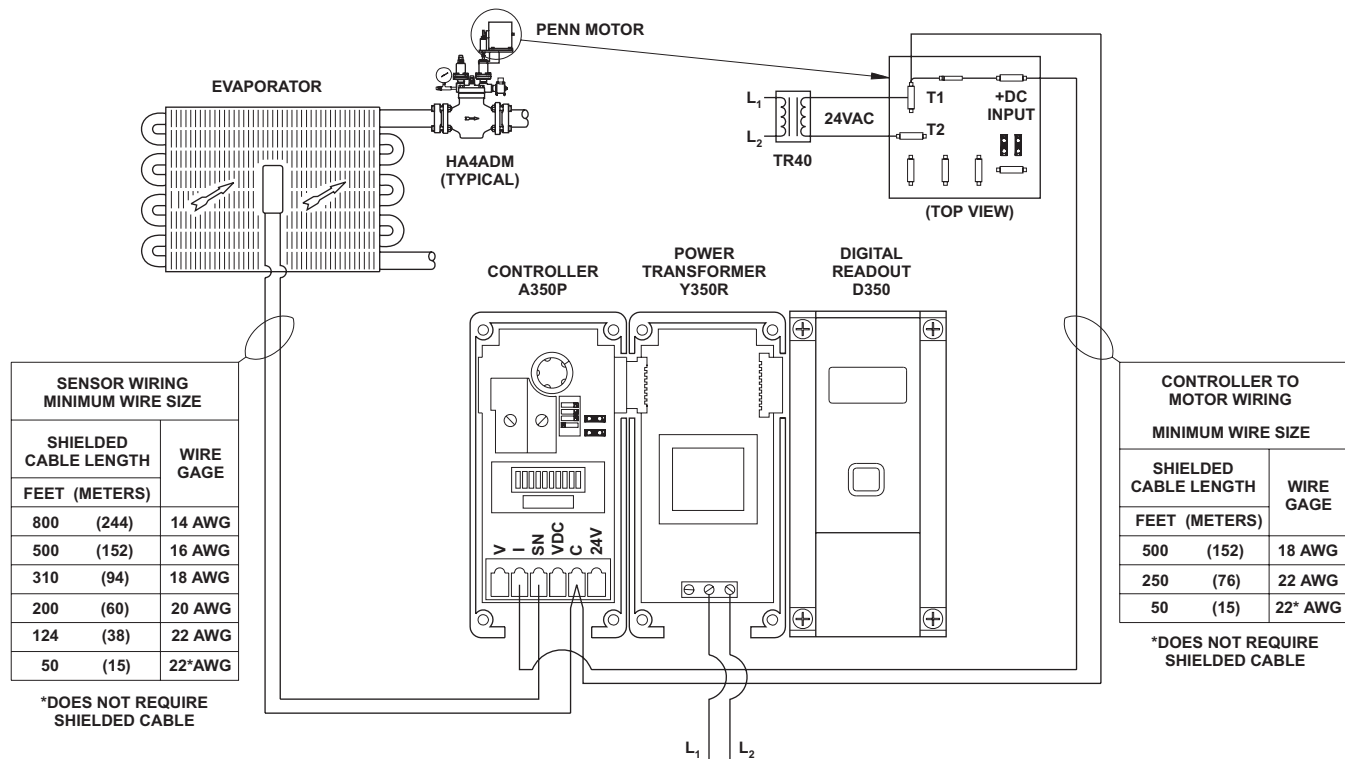
### HONEYWELL motor:

NEMA 3/IP 64, NEMA 4/IP 65 with optional weatherproofing kit.  
4–20 mA control signal input, 120VAC or 230VAC power input. (This motor includes a transformer, the controller transformer must be supplied.)  
135 ohm control signal input, 24VAC power input.  
160° of rotation, factory set at midpoint.  
Ambient temperature range: -40°F/-40°C to +150°F/+65°C.

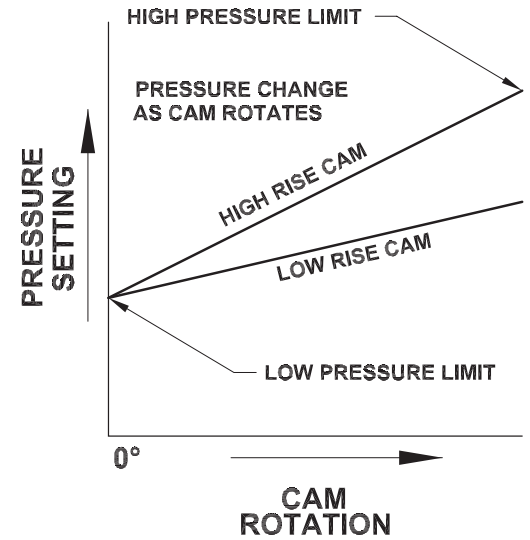
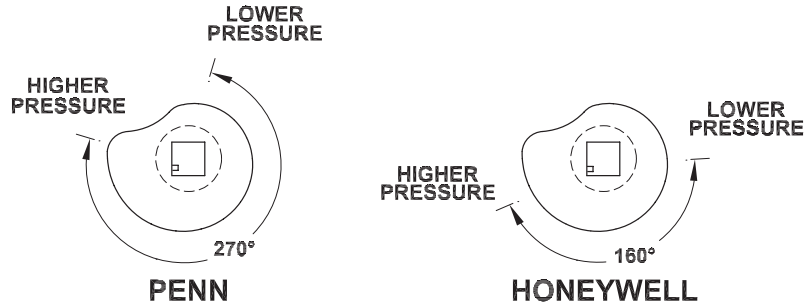
## CONTROLLER

The PENN A350P temperature controller is an available option with the HA4AM. It can be used with either the PENN or HONEYWELL motor. In 4–20 mA applications using the PENN A350P controller, separate transformers are recommended for the controller and motor. See the Typical Application drawing below. The optional Y350R Power Module can be used as the transformer for the PENN A350P controller. The D350 Digital Readout is also an available option for use with the PENN A350P controller.

## TYPICAL APPLICATION—PENN MOTOR, 4–20mA CONTROL SIGNAL INPUT



## CAM ROTATION



## PARTS LIST

These parts are specific to the HA4AM pressure regulator. For other parts common to all of the HA4A series regulators, refer to the HA4A Modular Pressure Regulators Bulletin R429.

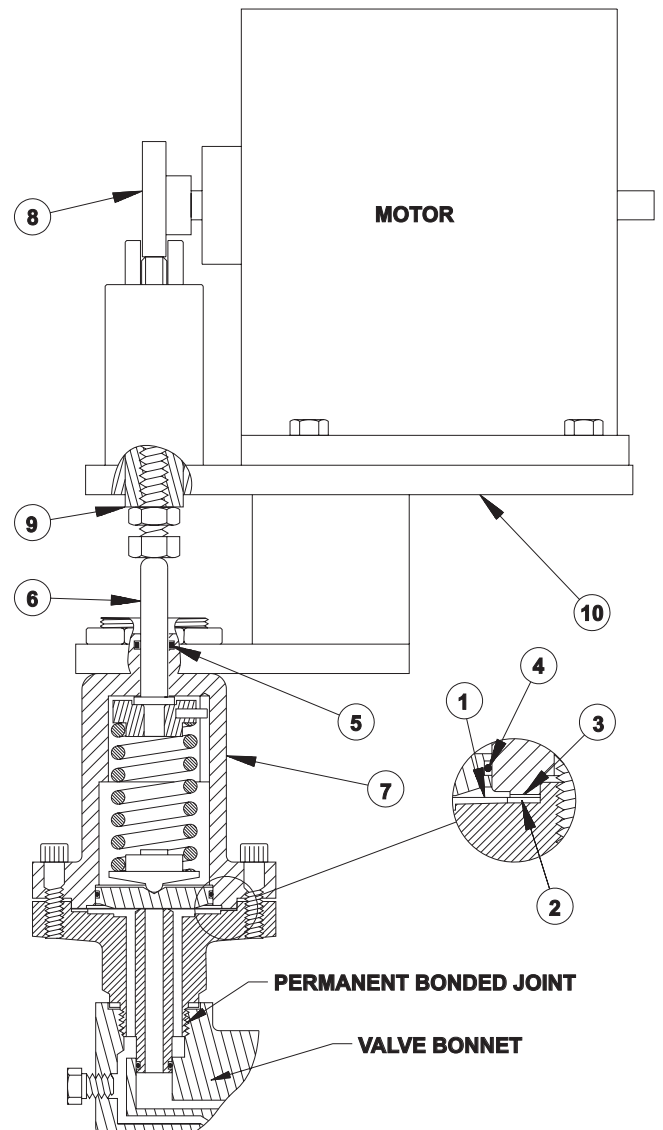
Item	Description	Qty.	Part No.
	<b>Diaphragm/Gasket Kit</b>		75-1140
	The above kit consists of:		
1	Diaphragm	1	75-0716
2	Lower Gasket (thick)	1	75-0426
3	Upper Gasket (thin)	1	75-0636
4	Follower O-Ring	1	75-0337
5	Stem Quad Ring	1	75-0675
6	Stem	1	75-0657
7	Pilot Bonnet	1	75-0670
8	Cam	1	75-0710 75-0709
9	Pressure Adjustment Ass'y.	1	75-0708
10	Motor Mount Assembly	1	75-0656

Transformer for HA4AM		
Motor	Voltage	Cat. No.
For PENN or HONEYWELL Motors	115VAC/230VAC:24VDC	TR40

Motors for HA4AM				
Motor	Supply Voltage	Type		
		135 Ohm	4-20 mA	Floating
HONEYWELL*	24 VAC	75-0699	—	75-0701
	120 VAC	—	75-0700	—
PENN**	24 VAC	75-0696	75-0697	75-0698

\*NEMA 3/IP 64 rating, NEMA 4/IP 65 with optional weatherproofing kit. Contact Hansen for details.

\*\*NEMA 2/IP 52 rating, NEMA 3/IP 64 with optional weather-resistant cover. Contact Hansen for details.



## ADJUSTMENT

Adjust the controller as specified by its manufacturer. Then, adjust the controller output so that the cam is rotated to the center cam position. Alternately, the cam can be rotated to the low end of the cam profile to act as a low pressure limit or to the high end of the profile to act as a high pressure limit. Disconnect the power from the motor while adjusting the pressure setting. Loosen the adjustment locking nut. Turn the adjustment stem out (clockwise looking down on the valve) to raise the inlet pressure or in to lower the inlet pressure. When the desired refrigerant pressure setting is achieved, tighten the adjustment locking nut. Reconnect power to the motor and adjust the controller to check the rotation of the cam. A final adjustment should be made after the system has operated for a few cycles of normal operation.

Using a potentiometer slide-wire-type of controller (typically 135 ohm), a deviation from the desired temperature of about 2°F/1.1°C to 5°F/2.8°C is normal to rotate the regulator cam for a maximum-load requirement, depending on the product temperature. 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. Other types of controllers are available to operate the motor/cam rotation.

## SERVICE AND MAINTENANCE

**Failure to open:** The wrong transformer is being used; low line voltage; the controlling PLC or thermostat is not functioning properly; the motor is burned-out; an adjacent shut-off valve is closed; dirt is packed under the Teflon® seal ring allowing excessive blow-by; a large quantity of dirt particles is in the solenoid module passages; dirt is blocking the internal pilot passages; the main valve seat is jammed with dirt.

**Failure to close:** The controlling PLC or thermostat is not operating properly; the manual-opening stem is turned in; the valve is installed in the wrong direction; there is damage or dirt at the main valve seat or pilot seat; the piston bleed hole is plugged.

**Before opening or disassembling the pilot or valve for servicing, 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. Also, read the Caution section of this bulletin.

## CAUTION

Hansen pressure regulators are for refrigeration systems only. These instructions and related safety precautions must be read completely and understood before selecting, using, or servicing these regulators. Only knowledgeable, trained refrigeration technicians should install, operate, or service these regulators. Stated temperature and pressure limits should not be exceeded. Adapters, bottom cap, control modules, etc., should not be removed unless the 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, especially 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 or field labor cost is included.

## ORDERING INFORMATION

**To Order:** Specify range A or V and pressure setting, cam type, motor manufacturer and control signal input, transformer type, valve port size, and flange style and size. Refer to Hansen Bulletin R429 Modular Pressure Regulators for valve sizing and selection.

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