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

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

KEY FEATURES
MODULAR PILOTS HERE
MANUAL-OPENING STEM
1/4" NPT GAUGE PORT
DIRT WIPING DISC-PISTON
STRONG DUCTILE IRON BODY
V-PORT MODULATION
RELIABLE TEFLON SEAT
STAINLESS STEEL SPRING

NOW YOU HAVE A CHOICE
...A BETTER CHOICE!

HA4AB
Regulator With Electric Wide Opening

ISO 9002

HANSEN TECHNOLOGIES CORPORATION

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Capacities 4–5
Control Modules (Pilots) 6
Main Regulators Only (AR1, AR3) 7
Operation and Adjustment 8–11
Installation Dimensions 12–13
Parts List 14–18
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Ordering Information, Conversions 20
**SIZING**

Proper regulator valve sizing is important for smooth operation and long, trouble-free life of the valve. Therefore, capacity of the regulator at both the maximum and minimum flow and pressure drop should be analyzed. Pressure regulators will operate satisfactorily to approximately 15% of the maximum capacity of valve based on the corresponding pressure drop. In extreme cases, downsizing or two smaller regulators in parallel are necessary. For pressure drops exceeding 45 psi (3.1 bar), special construction may be required. Contact the factory.
REGULATOR VARIATIONS

HA4A STANDARD REGULATOR
This most common pressure regulator modulates to control evaporator pressure, condensing pressure, pressure in a vessel, or pressure in a portion of a system. It is frequently called an evaporator pressure regulator (EPR) or back pressure regulator. Opens on rising inlet pressure. See page 10. Shown with M3W pilot.

HA4AS REGULATOR WITH ELECTRIC SHUT-OFF
This control is commonly used for temperature control or defrost. Regulates at the set-for pressure when energized. When de-energized, the valve closes tight regardless of the pressure setting. See page 11.

HA4AB REGULATOR WITH ELECTRIC WIDE OPENING
Commonly regulates for defrost or temperature, but opens wide for maximum cooling. Regulating at the set-for pressure when de-energized; regulator opens when energized. See page 11.

HA4AD DUAL PRESSURE REGULATOR
Regulates (evaporator) pressure at a setting when energized, and at a higher setting for defrost, temperature control, or pressure relief when de-energized. See page 11.

HA4AL DIFFERENTIAL PRESSURE REGULATOR
Commonly used as liquid pump relief, condenser-receiver pressure difference control, discharge pressure boosting for defrosting or heat recovery, and other similar applications. This control modulates to maintain the set-for difference between inlet and outlet pressure. See page 10.

HA4AK RESEATING RELIEF REGULATOR
Used for defrost, high-to-low side relief, or nonatmosphere relief to other parts of the system. This control opens when system upstream pressure is above the tagged and sealed set point pressure, and repeatedly reseats after operation. See page 10.

HA4AO OUTLET PRESSURE REGULATOR
Controls outlet pressure by opening as downstream pressure falls below the set point. Used for hot gas to provide artificial refrigeration loading, for condenser and receiver pressure control by means of gas bypass, limiting hot gas pressure supply in defrosting evaporator in conjunction with liquid drain traps, or for compressor suction pressure limitation. Can be combined with electric shut-off, temperature-operated, dual, or wide-opening features. See page 11.

HA4AP PNEUMATICALLY COMPENSATED REGULATOR
Commonly used for precise air or liquid temperature control via pneumatic controller. An air, vapor, or liquid pressure signal to the control module bonnet increases inlet pressure from the set-for pressure value at a 1:1 ratio. See page 12.

HA4AT TEMPERATURE OPERATED REGULATOR
The vapor pressure capillary tubing and bulb system modulates the regulator open as temperature increases to control air or liquid temperature. See page 12.

HA4AJ ELECTRONICALLY CONTROLLED REGULATOR
Electronic pilot and controller provides very precise temperature control of various cooled media under fluctuating load conditions. See page 12.

HA4AM ELECTRIC MOTOR COMPENSATED REGULATOR
Commonly used for precise room temperature control or liquid chiller control. The controlling motor changes regulator pressure setting in accordance with a temperature controller. See page 13.

NOTE: Many other control functions can be achieved by combining the control modules in different arrangements. For example: a dual regulator with electronic pilot and secondary relief pilot; i.e. HA4ADJ.
SUCTION VAPOR CAPACITIES (TONS)
(1 Ton = 12,000 Btu/hr = 3.517 kW = 3042 kcal/hr)

<table>
<thead>
<tr>
<th>PORT SIZE (mm)</th>
<th>Cv (Kv)</th>
<th>PRESSURE DROP ACROSS VALVE‡</th>
<th>R717</th>
<th>R22</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>EVAPORATING TEMPERATURE</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-40°F (−40°C)</td>
<td>-20°F (−28.9°C)</td>
<td>0°F (−17.8°C)</td>
</tr>
<tr>
<td>¾” (20)</td>
<td>6.4</td>
<td>5 psi 6.7 9.7 8.7 15 19 3.2 4.3 4.4 5.5 6.9</td>
<td>10 psi 13 15 20 26 — 5.8 6.0 7.7 9.6</td>
<td>20 psi — — 19 27 35 — — 7.8 10 13</td>
</tr>
<tr>
<td>1” (25)</td>
<td>11.7</td>
<td>2 psi 8.5 12 13 17 22 3.9 5.2 5.2 6.5 8.0</td>
<td>5 psi 12 18 16 27 34 5.8 7.9 8.0 10 13</td>
<td>10 psi — 23 28 37 47 — 11 11 14 18</td>
</tr>
<tr>
<td>1½” (32)</td>
<td>16.4</td>
<td>2 psi 12 16 19 24 31 5.4 7.2 7.2 9.1 11.3</td>
<td>5 psi 17 25 22 38 48 8.1 11 11 14 18</td>
<td>10 psi — — 36 49 64 — — 14 19 24</td>
</tr>
<tr>
<td>2” (50)</td>
<td>35</td>
<td>2 psi 12 16 19 24 31 5.4 7.2 7.2 9.1 11.3</td>
<td>5 psi 17 25 22 38 48 8.1 11 11 14 18</td>
<td>10 psi — — 36 49 64 — — 14 19 24</td>
</tr>
<tr>
<td>2½” (65)</td>
<td>47</td>
<td>2 psi 12 16 19 24 31 5.4 7.2 7.2 9.1 11.3</td>
<td>5 psi 17 25 22 38 48 8.1 11 11 14 18</td>
<td>10 psi — — 36 49 64 — — 14 19 24</td>
</tr>
<tr>
<td>3” (80)</td>
<td>77</td>
<td>5 psi 81 116 105 177 224 38 52 53 67 83</td>
<td>10 psi — 151 185 243 311 — 69 72 92 116</td>
<td>20 psi — — 106 147 193 — — 43 56 72</td>
</tr>
<tr>
<td>4” (100)</td>
<td>104</td>
<td>5 psi 81 116 105 177 224 38 52 53 67 83</td>
<td>10 psi — 151 185 243 311 — 69 72 92 116</td>
<td>20 psi — — 106 147 193 — — 43 56 72</td>
</tr>
<tr>
<td>5” (125)</td>
<td>166</td>
<td>5 psi 254 365 329 557 704 120 163 166 210 261</td>
<td>10 psi — 474 581 785 978 — 218 226 290 363</td>
<td>20 psi — — 316 438 572 — — 127 167 213</td>
</tr>
<tr>
<td>6” (150)</td>
<td>413</td>
<td>5 psi 434 624 562 950 1202 204 278 282 358 446</td>
<td>10 psi — 809 991 1305 1669 — 371 386 496 620</td>
<td>20 psi — — 1256 1739 2272 — — 504 665 847</td>
</tr>
</tbody>
</table>

‡ 2 psi = 0.14 bar 5 psi = 0.35 bar 10 psi = 0.69 bar 20 psi = 1.38 bar

*Optional 25% or 50% reduced capacity ¾” (20 mm) plugs are available for unusually low loads if requested.

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

For liquid overfeed evaporator suction between normal 2:1 to 5:1 rate, add 20% to the evaporator load or use the next larger port size to accommodate liquid volume accompanying the suction gas and to reduce impact velocity.

**Conditions:** Capacities are based on the evaporator temperatures shown and +86°F (+30°C) liquid. R717: For each 10°F (5.6°C) lower liquid temperature, increase the above table capacity by 3%. R22: For each 10°F (5.6°C) lower liquid temperature, increase the above table capacity by 5%. To convert for R134a, multiply the R22 table values by 0.73 (accuracy within 8%). For other refrigerant capacities and suitability, contact the factory.
LIQUID CAPACITIES (U.S. GPM)
APPLICATION: REFRIGERANT PUMP RELIEF REGULATOR (HA4AL)

<table>
<thead>
<tr>
<th>PORT SIZE (mm)</th>
<th>R717 △P= 30 psi (2 bar)</th>
<th>R22 △P= 30 psi (2 bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4” (20)</td>
<td>45</td>
<td>30</td>
</tr>
<tr>
<td>1” (25)</td>
<td>82</td>
<td>56</td>
</tr>
<tr>
<td>1⅛” (32)</td>
<td>114</td>
<td>78</td>
</tr>
<tr>
<td>1⅜” (40)</td>
<td>256</td>
<td>168</td>
</tr>
<tr>
<td>2” (50)</td>
<td>324</td>
<td>230</td>
</tr>
<tr>
<td>2⅛” (65)</td>
<td>553</td>
<td>377</td>
</tr>
<tr>
<td>3” (80)</td>
<td>733</td>
<td>505</td>
</tr>
</tbody>
</table>

Capacities assume no gas flashing. No capacity correction required for temperatures between –40°F (–40°C) and +40°F (+4.4°C).

OIL CAPACITIES (U.S. GPM)
APPLICATION: SCREW COMPRESSOR OIL PUMP RELIEF REGULATOR (HA4AL)

<table>
<thead>
<tr>
<th>PORT SIZE (mm)</th>
<th>OIL △P= 30 psi (2 bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4” (20)</td>
<td>48</td>
</tr>
<tr>
<td>1” (25)</td>
<td>58</td>
</tr>
<tr>
<td>1⅛” (32)</td>
<td>122</td>
</tr>
<tr>
<td>1⅜” (40)</td>
<td>260</td>
</tr>
<tr>
<td>2” (50)</td>
<td>350</td>
</tr>
<tr>
<td>2⅛” (65)</td>
<td>574</td>
</tr>
<tr>
<td>3” (80)</td>
<td>775</td>
</tr>
</tbody>
</table>

Capacities based on oil with less than 300 SSU viscosity.

HOT GAS DEFROST NOMINAL VALVE SIZING CAPACITIES
(DEFROSTING EVAPORATOR SIZE TONS)

<table>
<thead>
<tr>
<th>REFRIG.</th>
<th>APPLICATION</th>
<th>PORT SIZE (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R717</td>
<td>Hot Gas Solenoid *</td>
<td>⅛” (20)</td>
</tr>
<tr>
<td></td>
<td>Defrost Relief Regulator</td>
<td>1” (25)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1⅛” (32)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1⅜” (40)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2” (50)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2⅛” (65)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3” (80)</td>
</tr>
<tr>
<td>R22</td>
<td>Hot Gas Solenoid *</td>
<td>⅛” (20)</td>
</tr>
<tr>
<td></td>
<td>Defrost Relief Regulator</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>1⅛” (32)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1⅜” (40)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2” (50)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2⅛” (65)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3” (80)</td>
</tr>
</tbody>
</table>

*Or an outlet pressure regulator with electric shut-off (HA4AOS).
Evaporator tons at 10°F (5.6°C) TD (temperature differential), valve capacities are conservative. These capacities can be modified up or down depending on type of evaporator, temperature, mass, frost thickness, defrosting time, etc. Typical for –20°F (–28.9°C) evaporator.

GAS CAPACITIES (TONS)*
(1 Ton= 12,000 Btu/hr= 3.517 kW= 3042 kcal/hr)

<table>
<thead>
<tr>
<th>SIZE (mm)</th>
<th>DISCHARGE GAS REGULATOR</th>
<th>HOT GAS BY-PASS TO SUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R717 △P= 30 psi (2 bar)</td>
<td>R22 △P= 30 psi (2 bar)</td>
</tr>
<tr>
<td>⅛” (20)</td>
<td>+86°F (+30°C) Condensing</td>
<td>+86°F (+30°C) Condensing</td>
</tr>
<tr>
<td></td>
<td>+140°F (+60°C) Discharge</td>
<td>+140°F (+60°C) Discharge</td>
</tr>
<tr>
<td>1” (25)</td>
<td>+86°F (+30°C) Condensing</td>
<td>+15°F (+9.4°C) Condensing</td>
</tr>
<tr>
<td></td>
<td>+140°F (+60°C) Discharge</td>
<td>+140°F (+60°C) Discharge</td>
</tr>
<tr>
<td>1⅛” (32)</td>
<td>+15°F (+9.4°C) Condensing</td>
<td>+15°F (+9.4°C) Condensing</td>
</tr>
<tr>
<td>1⅜” (40)</td>
<td>+15°F (+9.4°C) Condensing</td>
<td>+15°F (+9.4°C) Condensing</td>
</tr>
<tr>
<td>2” (50)</td>
<td>+15°F (+9.4°C) Condensing</td>
<td>+15°F (+9.4°C) Condensing</td>
</tr>
<tr>
<td>2⅛” (65)</td>
<td>+15°F (+9.4°C) Condensing</td>
<td>+15°F (+9.4°C) Condensing</td>
</tr>
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<td>+15°F (+9.4°C) Condensing</td>
</tr>
<tr>
<td>4” (100)</td>
<td>+15°F (+9.4°C) Condensing</td>
<td>+15°F (+9.4°C) Condensing</td>
</tr>
<tr>
<td>5” (125)</td>
<td>+15°F (+9.4°C) Condensing</td>
<td>+15°F (+9.4°C) Condensing</td>
</tr>
<tr>
<td>6” (150)</td>
<td>+15°F (+9.4°C) Condensing</td>
<td>+15°F (+9.4°C) Condensing</td>
</tr>
</tbody>
</table>

Hot gas bypass capacities are based on above given temperatures. Liquid temperature is the same as condensing temperature. Evaporator temperature +40°F (+4.4°C) or less for +86°F (+30°C) condensing; –22°F (–30°C) evaporator for +15°F (+9.4°C) condensing.

† Bypass from intermediate pressure at saturation temperature to booster suction.
*These capacities are not for hot gas defrost relief. See the chart in the middle of this page.
**Optional 25% and 50% reduced capacity ⅛” (20 mm) plugs are available.
Discharge gas capacities are based on +15°F (+10°C) evaporator temperature.
When installed, these control modules (pilots) enable the main regulator to perform different control functions (see page 3, Regulator Variations). Pilots are normally factory installed, but can be retrofitted or interchanged in the field. The nonrising stem can be adjusted by using a $\frac{1}{4}''$ wrench. Catalog numbers are for the screw-on pilot module. Interchangeable with Danfoss PM Series, size permitting.

**INLET PRESSURE**

Opens as inlet pressure rises. Range: A, 0 to 150 psig (0 to 10 bar), Part 75-1097; or B, 30 to 300 psig (2 to 21 bar), Part 75-1098. Also, Range V, 20'' to 130 psig ($-0.67$ to +9 bar), Part 75-1099. Catalog M3.

Compact welded pressure pilot. Range A, 0 to 150 psig (0 to 10 bar), Part 75-1126. Standard only on valve sizes ¾'' to 1¼''. Catalog M3W.

**OUTLET PRESSURE**

Opens as outlet pressure drops. For hot gas bypass to suction or for controlled supply pressure of defrost hot gas. Also used for compressor suction pressure limiting (crankcase pressure regulator). $\frac{1}{4}''$ NPT connections for outlet pressure gauge and sensing line (tubing not included). Range B, 30 to 300 psig (2 to 21 bar), Part 75-1101; or Range V, 20'' to 130 psig ($-0.67$ to +9 bar), Part 75-1100. Catalog M3O, specify range.

**DIFFERENTIAL PRESSURE**

Maintains set-for differential between inlet and outlet or other pressure source. For pump relief or any differential control. $\frac{1}{4}''$ NPT connection for pressure sensing line (tubing not included), Range A, 0 to 150 psi (0 to 10 bar) difference, Part 75-1081, Catalog M3L.

**PNEUMATICALLY COMPENSATED**

Air or other pressure in the bonnet raises inlet pressure on a 1:1 ratio. $\frac{1}{4}''$ NPT connection. Range A, 0 to 150 psig (0 to 10 bar), Part 75-1081, Catalog M3P.

**RESEATING RELIEF**

Opens wide when pressure exceeds pressure setting and repeatedly reseats after operation. Defrost relief or high-to-low system relief. Set and tagged. The standard setting for ammonia defrost is 70 psig (4.8 bar). Range A, 0 to 150 psig (0 to 10 bar), Part 75-1103; or Range B, 30 to 300 psig (+2 to 21 bar), Part Number 75-1104. Catalog M3K.

Compact welded pressure pilot. Range A, 0 to 150 psig (0 to 10 bar), Part 75-1127. Standard on valve sizes ¾'' to 1¼''. Catalog M3KW.

**SOLENOID**


**ELECTRONICALLY CONTROLLED**

Mounted electronic actuator changes the pressure set point in conjunction with a controller and temperature sensor for either air or liquid. Very precise. See page 12 for the control package which includes the necessary controller and sensor. Range: J1, 0 to 85 psig (0 to 6 bar), Part 27B1140; or J2, 25 to 115 psig (1.7 to 8 bar), Part 27B1141. Catalog M3J.

**TEMPERATURE OPERATED**

Bulb opens the control module on temperature rise to maintain a constant temperature. Part 27B1110 with a range of $-40^\circ$F to $+30^\circ$F ($-40^\circ$C to $0^\circ$C) or Part 27B1111 with a range of $+15^\circ$F to $+75^\circ$F ($-10$ to $+25^\circ$C). Catalog M3T.

**EXTERNAL CONNECTION**

Enables a remote pressure source to be introduced to the control via a pilot line (replaces a pilot). $\frac{1}{4}''$ NPT with separate 4'' (100 mm) long weld nipple, Part 35-1015, Catalog M3E25.

**BLANKING PLUGS**

To be used in a control module port when the port is not utilized. Stopping plugs have square head and are marked with “0” (75-1063). Straight through flow plugs have a hex head and are marked with “1” (75-1064). Catalog M3S (stopping) or M3B (straight through).
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).

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).

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).

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.

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.

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.
**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 action 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 11°F (6.1°C). Tighten the locking ring after the final adjustment has been made. Range —40°F to +30°F (−40°C to 0°C); or +15°F to +75°F (−10°C to +25°C).

**HA4AJ ELECTRONICALLY CONTROLLED REGULATOR**

**OPERATION**
The controller receives signals from an air or liquid sensor and transmits an electrical voltage to the M3J electronic actuator control module. An increase in temperature lowers the voltage to actuator, opening the regulator to increase flow. A decrease in sensor temperature increases the voltage from the controller to the M3J electronic actuator control module closing the valve to reduce flow. This precision control can maintain temperatures within 1°F (0.5°C) of setting. The M3J electronic actuator control module must be operated by one of the control packages below. See page 6 for M3J pilot details.

**CONTROL PACKAGES**

**ECP**
This standard electronic control package consists of a controller, controller base, sensor, and transformer.

**DDS**
This control package includes the standard ECP components plus a digital temperature readout, set-for/actual temperature switch to easily check temperature, assembled and mounted on a metal back plate. To display the set-for temperature, simply depress and hold the set-for/actual temperature switch. When released, the digital readout will again display the actual temperature at the sensor.

**DDL**
Same as the DDS with a minimum evaporator pressure adjustment. This adjustment sets an evaporator pressure “floor” independent of temperature. This is ideal to prevent too cold of an evaporator surface in flooded evaporators or during loading of critical, temperature-sensitive products.

**WTE2**
Watertight controller enclosure for the above “DD” series control packages. This industrial-grade enclosure is polycarbonate with clear gasketed cover.

**EKA46**
This computer interface is available for direct connection of the electronic actuator control module to a plant computer, PLC, or other controlling device. Input to interface is a regulated 4–20 mA or 0 to 10 volt signal from an intelligent control device. The EKA46 package includes interface module and transformer.

**ADJUSTMENT**
Set the desired temperature (REF) using both coarse and fine adjustments. Set the alarm limits (LIM) on deviation from the desired temperature, +1°C to +5°C. Adjust the alarm delay timer (DEL) to delay alarm release from 10 to 60 minutes. Both Proportional amplification (Kp) and Integration time (Tn) are factory set to 4. Consult the instruction manual or contact the factory if adjustment is necessary. See the instructions supplied with the EKA46 for its adjustment recommendations. M3J electronic actuator control module ranges: J1, 0 to 85 psig (0 to 6 bar); or J2, 25 to 115 psig (1.7 to 8 bar).
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 ±2°F to ±5°F (+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.

<table>
<thead>
<tr>
<th>RANGE</th>
<th>CAM</th>
<th>PRESSURE CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PENN</td>
<td>HONEYWELL</td>
</tr>
<tr>
<td>A or V</td>
<td>LOW RISE</td>
<td>45 psig (3.1 bar)</td>
</tr>
<tr>
<td></td>
<td>HIGH RISE</td>
<td>90 psig (6.2 bar)</td>
</tr>
</tbody>
</table>

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.
INSTALLATION DIMENSIONS (MM)

¾" THROUGH 1¼" REGULATORS

1½" THROUGH 4" REGULATORS

M = Additional length for close-coupled strainer

PORT SIZE (mm) | H₁ | H₂ | H₃ | H₄ | L FPT,SW | WN,ODS | L₁ | L₂ | L₃ | L₄ | M | W* (mm)
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---
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) | 9.63" (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" (266) | 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 (L₁) same as R/S 1¼" for replacements.

“P” DIMENSION FOR CONTROL MODULES (MM)

<table>
<thead>
<tr>
<th>CATALOG</th>
<th>M3</th>
<th>M3W</th>
<th>MS</th>
<th>M3O</th>
<th>M3K</th>
<th>M3KW</th>
<th>M3L</th>
<th>M3P</th>
<th>M3J</th>
<th>M3T</th>
<th>M3E25</th>
<th>M3M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size (mm)</td>
<td>6.5&quot; (165)</td>
<td>5.12&quot; (130)</td>
<td>3.25&quot; (83)</td>
<td>7.75&quot; (197)</td>
<td>6.5&quot; (165)</td>
<td>5.12&quot; (130)</td>
<td>6.5&quot; (165)</td>
<td>6.5&quot; (165)</td>
<td>4.63&quot; (118)</td>
<td>4.5&quot; (114)</td>
<td>1&quot; (25)</td>
<td>14.9&quot; (378)</td>
</tr>
</tbody>
</table>

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

(See page 8.)

5" AND 6" PILOT PIPING (TOP VIEW)

WELD END DIMENSIONS (MM)

<table>
<thead>
<tr>
<th>PORT SIZE</th>
<th>A (MM)</th>
<th>T (MM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5&quot; (125)</td>
<td>5.05&quot;</td>
<td>0.26&quot;</td>
</tr>
<tr>
<td>6&quot; (150)</td>
<td>6.06&quot;</td>
<td>0.28&quot;</td>
</tr>
</tbody>
</table>

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

FOR SERIES AND PARALLEL ARRANGEMENT (AD)
SI, solenoid; SII & P pressure pilots
* M3W and M3KW control modules are hermetically sealed, welded assemblies having no replaceable internal parts. See page 6 for replacement part numbers. Standard on \( \frac{3}{4}^" - 1\frac{1}{4}" \) (20–32 mm) valves.
PARTS LIST ¾" THROUGH 1¼" (20 MM THROUGH 32 MM)

**Above kits contain V-Port/Seat, bottom cap O-ring, and a 5 psid (.35 bar) closing spring (Part 75-0622). A lighter spring is available (Part 75-0287).**

### Parts List

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QTY</th>
<th>PART NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Piston</td>
<td>1</td>
<td>75-0191</td>
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<tr>
<td>2</td>
<td>Piston Seal</td>
<td>1</td>
<td>75-0353</td>
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<td>4</td>
<td>Adapter Gasket</td>
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<tr>
<td>20</td>
<td>Flange Gasket</td>
<td>2</td>
<td>70-0132</td>
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<tr>
<td></td>
<td>V-Port/Seat Kit ¾&quot;**</td>
<td></td>
<td>75-1020</td>
</tr>
<tr>
<td></td>
<td>V-Port/Seat Kit 1½&quot;**</td>
<td></td>
<td>75-1021</td>
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<td></td>
<td>V-Port/Seat Kit 1¼&quot;**</td>
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<td>75-1022</td>
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<tr>
<td>3a</td>
<td>⅛&quot; V-Port/Seat</td>
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<td>3b</td>
<td>1&quot; V-Port/Seat</td>
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<td>75-0193</td>
</tr>
<tr>
<td>3c</td>
<td>1¼&quot; V-Port/Seat</td>
<td>1</td>
<td>75-0192</td>
</tr>
<tr>
<td>5</td>
<td>Closing Spring</td>
<td>1</td>
<td>75-0287</td>
</tr>
<tr>
<td>6</td>
<td>Bottom Cap O-ring</td>
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<td>75-0183</td>
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<tr>
<td></td>
<td>Gasket Kit consists of:</td>
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<td></td>
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<tr>
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<td>Adapter Gasket</td>
<td>1</td>
<td>75-0489</td>
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<tr>
<td>6</td>
<td>Bottom Cap O-ring</td>
<td>1</td>
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<tr>
<td>7</td>
<td>Stem O-ring</td>
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<td>70-0010</td>
</tr>
<tr>
<td>8</td>
<td>Stem Washer</td>
<td>1</td>
<td>70-0026</td>
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<td>9</td>
<td>Stem Packing</td>
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<tr>
<td>10</td>
<td>Packing Nut</td>
<td>1</td>
<td>70-0019</td>
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<td>13</td>
<td>Seal Cap O-ring</td>
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<tr>
<td>20</td>
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<td>Solenoid Tube Gasket</td>
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<td>Port Gasket &amp; O-ring</td>
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<tr>
<td>11</td>
<td>Manual-Opening Stem</td>
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<tr>
<td>12</td>
<td>Seal Cap</td>
<td>1</td>
<td>50-0411</td>
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<td>14</td>
<td>Gauge Port Plug (¾&quot; NPT)</td>
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<tr>
<td>15a</td>
<td>Adapter, 1 Port</td>
<td>1</td>
<td>75-0163</td>
</tr>
<tr>
<td>15b</td>
<td>Adapter, 3 Port</td>
<td>1</td>
<td>75-0162</td>
</tr>
<tr>
<td>16</td>
<td>Adapter Bolts, socket cap</td>
<td>4</td>
<td>75-0190</td>
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<tr>
<td>17</td>
<td>Bottom Cap</td>
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<tr>
<td>18a</td>
<td>Body ¾&quot;, 1&quot;</td>
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<td>75-0156</td>
</tr>
<tr>
<td>18b</td>
<td>Body 1¼&quot;, 2-Bolt</td>
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<td>75-0154</td>
</tr>
<tr>
<td>19</td>
<td>Flange (Various)</td>
<td>2</td>
<td>FACTORY</td>
</tr>
<tr>
<td>21</td>
<td>Flange Bolt (¾&quot;-11x2.75&quot;)</td>
<td>4</td>
<td>70-0339</td>
</tr>
<tr>
<td></td>
<td>Flange Nut (¾&quot;-11)</td>
<td>4</td>
<td>70-0136</td>
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### HA4AK AND HA4AO V-Port/Seat Kits

<table>
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<tr>
<th>DESCRIPTION</th>
<th>PART NO</th>
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<tbody>
<tr>
<td>V-Port/Seat Kit ¼&quot;</td>
<td>75-1129</td>
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<tr>
<td>V-Port/Seat Kit 1&quot;</td>
<td>75-1130</td>
</tr>
<tr>
<td>V-Port/Seat Kit 1¼&quot;</td>
<td>75-1131</td>
</tr>
</tbody>
</table>

*HA4AK AND HA4AO V-PORT/SEAT KITS*
### PARTS LIST 1½" THROUGH 4" (40 MM THROUGH 100 MM)

#### METIN OITPIRCSED, YTQO NTRAP

- **Piston Kit 1½", 2"**
  - QTY: 75-1025
- **Piston Kit 2½"**
  - QTY: 75-1026
- **Piston Kit 3"**
  - QTY: 75-1027
- **Piston Kit 4"**
  - QTY: 75-1028

Above kits consist of:

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<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QTY.</th>
<th>PART NO</th>
</tr>
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<tr>
<td>1a</td>
<td>Piston 1½&quot;, 2&quot;</td>
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<tr>
<td>1b</td>
<td>Piston 2½&quot;</td>
<td>1</td>
<td>75-0169</td>
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<tr>
<td>1c</td>
<td>Piston 3&quot;</td>
<td>1</td>
<td>75-0159</td>
</tr>
<tr>
<td>1d</td>
<td>Piston 4&quot;</td>
<td>1</td>
<td>75-0278</td>
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- **Piston Seal 1½", 2"**
  - QTY: 75-0292
- **Piston Seal 2½", 3"**
  - QTY: 75-0293
- **Piston Seal 4"**
  - QTY: 75-0236

Above kits consist of:

<table>
<thead>
<tr>
<th>ITEM</th>
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<tr>
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<td>Flange Gasket 1½&quot;, 2&quot;</td>
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<td>2c</td>
<td>Flange Gasket 4&quot;</td>
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- **V-Port/Seat Kit 1½"**
  - QTY: 75-1029
- **V-Port/Seat Kit 2"**
  - QTY: 75-1030
- **V-Port/Seat Kit 2½"**
  - QTY: 75-1031
- **V-Port/Seat Kit 3"**
  - QTY: 75-1032
- **V-Port/Seat Kit 4"**
  - QTY: 75-1033

Above kits consist of:

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<td>4a</td>
<td>V-Port/Seat 1½&quot;</td>
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<tr>
<td>4b</td>
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<td>75-0177</td>
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<tr>
<td>4c</td>
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<tr>
<td>4d</td>
<td>V-Port/Seat 3&quot;</td>
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<tr>
<td>4e</td>
<td>V-Port/Seat 4&quot;</td>
<td>1</td>
<td>75-0313</td>
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- **Adapter Gasket 1½", 2"**
  - QTY: 75-0113
- **Adapter Gasket 2½", 3"**
  - QTY: 75-0093
- **Adapter Gasket 4"**
  - QTY: 75-0233

- **Seat Seal O-ring 1½", 2"**
  - QTY: 75-0274
- **Seat Seal O-ring 2½", 3"**
  - QTY: 75-0275
- **Seat Seal O-ring 3", 4"**
  - QTY: 75-0276
- **Seat Screw**
  - QTY: 75-0220

- **Closing Spring 1½", 2"**
  - QTY: 75-0171
- **Closing Spring 2½"**
  - QTY: 75-0201
- **Closing Spring 3"**
  - QTY: 75-0248
- **Closing Spring 4"**
  - QTY: 75-0235

- **Seal Ring 1½", 2"**
  - QTY: 75-0084
- **Seal Ring 2½"**
  - QTY: 75-0170
- **Seal Ring 3"**
  - QTY: 75-0071
- **Seal Ring 4"**
  - QTY: 75-0231

- **Manual-Opening Stem 1½" through 3"**
  - QTY: 75-0079
- **Manual-Opening Stem 4"**
  - QTY: 75-0427
- **Seal Cap 1½" through 3"**
  - QTY: 75-0139
- **Seal Cap 4"**
  - QTY: 50-0260

#### Gasket Kit 1½", 2"

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QTY.</th>
<th>PART NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>3a</td>
<td>Adapter Gasket 1½&quot;, 2&quot;</td>
<td>1</td>
<td>75-0113</td>
</tr>
<tr>
<td>3b</td>
<td>Adapter Gasket 2½&quot;, 3&quot;</td>
<td>1</td>
<td>75-0093</td>
</tr>
<tr>
<td>3c</td>
<td>Adapter Gasket 4&quot;</td>
<td>1</td>
<td>75-0233</td>
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</table>

Above kits consist of:

- **Seat Seal O-ring 1½", 2"**
  - QTY: 75-0274
- **Seat Seal O-ring 2½", 3"**
  - QTY: 75-0275
- **Seat Seal O-ring 3", 4"**
  - QTY: 75-0276

- **Back-Up Washer 1½" through 3"**
  - QTY: 75-0245
- **Back-Up Washer 4"**
  - QTY: 50-0351

- **Stem O-ring 1½" through 3"**
  - QTY: 50-0179
- **Stem O-ring 4"**
  - QTY: 50-0253

- **Stem Washer 1½" through 3"**
  - QTY: 50-0046
- **Stem Washer 4"**
  - QTY: 50-0247

- **Stem Packing 1½" through 3"**
  - QTY: 50-0045
- **Stem Packing 4"**
  - QTY: 50-0248

- **Packing Nut 1½" through 3"**
  - QTY: 50-0013
- **Packing Nut 4"**
  - QTY: 50-0251

- **Seal Cap O-ring**
  - QTY: 50-0432
- **Seal Cap Gasket**
  - QTY: 50-0270

- **Stem Pin 1½" through 3"**
  - QTY: 75-0173
- **Stem Pin 4"**
  - QTY: 75-0434

- **Flange Gasket 1½", 2"**
  - QTY: 75-0138
- **Flange Gasket 2½", 3"**
  - QTY: 75-0125
- **Flange Gasket 4"**
  - QTY: 75-0137

- **Solenoid Tube Gasket**
  - QTY: 70-0301
- **Port O-ring and Gasket**
  - QTY: 75-1071

- **Adapter, 1 Port 1½", 2"**
  - QTY: 75-0060
- **Adapter, 3 Port 1½", 2"**
  - QTY: 75-0384
- **Adapter, 1 Port 2½", 3"**
  - QTY: 75-0056
- **Adapter, 3 Port 2½", 3"**
  - QTY: 75-0493

- **Adapter, 1 Port 4"**
  - QTY: 75-0334
- **Adapter, 3 Port 4"**
  - QTY: 75-0801

- **Gauge Port Plug (¼" NPT)**
  - QTY: 75-0189

- **Adapter Bolts 1½", 2"**
  - QTY: 75-0175
- **Adapter Bolts 2½", 3"**
  - QTY: 65-0057
- **Adapter Bolts 4"**
  - QTY: 75-0291

- **Body 1½", 2"**
  - QTY: 75-0016
- **Body 2½"**
  - QTY: 75-0018
- **Body 3"**
  - QTY: 75-0019
- **Body 4"**
  - QTY: 75-0215

- **Flange (Various)**
  - QTY: 2 FACTORY

- **Flange Bolt 1½", 2"**
  - QTY: 70-0135
- **Flange Bolt 2½", 3"**
  - QTY: 75-0202
- **Flange Bolt 4"**
  - QTY: 75-0279

- **Flange Nut 1½", 2" (¾"-11)**
  - QTY: 70-0136
- **Flange Nut 2½", 3" (¼"-10)**
  - QTY: 75-0210
- **Flange Nut 4" (¼"-9)**
  - QTY: 75-0280
### Parts List 5" AND 6" (125 MM AND 150 MM)

#### Plug Here
For Series Connection (Part #75-0694)

**Inlet Gauge Port**

**Port for Series Connection (A/B)**

**Port for Parallel Connection (AD, AB)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Qty</th>
<th>Part No</th>
</tr>
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<tr>
<td>1</td>
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<tr>
<td></td>
<td>Above Kit consists of:</td>
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<tr>
<td>2</td>
<td>Piston</td>
<td>1</td>
<td>75-0570</td>
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<tr>
<td>3</td>
<td>Piston Seal</td>
<td>1</td>
<td>75-0602</td>
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<td>4</td>
<td>Adapter O-ring, Inner</td>
<td>1</td>
<td>75-0605</td>
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<tr>
<td>5</td>
<td>Adapter O-ring, Outer</td>
<td>1</td>
<td>75-0606</td>
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<td>6</td>
<td>Adapter O-ring, Inner Gasket Kit</td>
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<td>Above Kit consists of:</td>
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<tr>
<td>7</td>
<td>Adapter O-ring, Inner</td>
<td>1</td>
<td>75-0605</td>
</tr>
<tr>
<td>8</td>
<td>Adapter O-ring, Outer</td>
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<td>75-0606</td>
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<tr>
<td>9</td>
<td>Seat Seal O-ring</td>
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<tr>
<td>10</td>
<td>Back-up Washer</td>
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<td>50-0324</td>
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<tr>
<td>11</td>
<td>Stem O-ring</td>
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<tr>
<td>12</td>
<td>Stem Washer</td>
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<td>13</td>
<td>Stem Packing</td>
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<td>14</td>
<td>Packing Nut</td>
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<td>15</td>
<td>Seal Cap Gasket</td>
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<td>16</td>
<td>Manual-Opening Stem Pin</td>
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<td>17</td>
<td>Solenoid Tube Gasket</td>
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<td>Port O-ring and Gasket</td>
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<table>
<thead>
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<th>Item</th>
<th>Description</th>
<th>Qty</th>
<th>Part No</th>
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<tr>
<td></td>
<td>V-Port/Seat Kit 5&quot;</td>
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<td>V-Port/Seat Kit 6&quot;</td>
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<td>Above Kits consist of:</td>
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<td>6</td>
<td>Seat Ring</td>
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<td>19a</td>
<td>Adapter, 1 Port</td>
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<td>19b</td>
<td>Adapter (1 Port) with Plugged</td>
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<td>Access Holes for Multiple Pilots</td>
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<td>Gauge Port Plug</td>
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<td>21</td>
<td>Adapter Bolts</td>
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<td>22a</td>
<td>Body, 5&quot;</td>
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<tr>
<td>22b</td>
<td>Body, 6&quot;</td>
<td>1</td>
<td>75-0541</td>
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</table>
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.

3/4" through 1 1/4" (20 mm through 32 mm): Use a 3/4" 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, and divots. The main valve seat may be lapped by hand or power drill to remove marks. Grease and replace the seal seat O-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.

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.

ABBREVIATIONS
BW: Butt Weld end to match American Pipe Schedule 40
CRN: Canadian Registration Number
CSA: Canadian Standards Association
Cv: Valve capacity factor GPM (U.S.) of water at 1 psi differential
FPT: Female Pipe Thread, American National Standard
Kv: Valve capacity factor m³/hr of water at 1 bar differential
mA: milliampere
MPT: Male Pipe Thread, American National Standard
NEMA: National Electrical Manufacturers Association: Class 4, watertight, approximate equivalent to IP65; Class 1, general purpose, approximate equivalent to IP20
NPT: National Pipe Thread
ODS: Outside Diameter Sweat, for copper tubing
PLC: Programmable Logic Controller
psig: Pounds per square inch, gauge
R/S: Refrigerating Specialties Division, Parker Hannifin Corp.
SPDT: Single Pole Double Throw
SW: Socket Weld to accommodate American and API pipe
WN or Weld: Weld Neck to match American Pipe Schedule 40
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.

REGULATOR ACCESSORIES
STRAINERS
Generous capacity, separate, close-coupled, 60 mesh (233 Micron Rating), accessible.

GAUGES
Pressure gauges have 3½” (90 mm) diameter faces, safe plastic lenses, ¼” NPT connection, and recalibration features. Available for ammonia and halocarbon.

GAUGE VALVES
HGV1 “Long Neck” Gauge Valve, Seal Cap, ¼” MPT x FPT.

PILOT LIGHTS
(specify voltage)
Pilot Light with NEMA 1 Box
(green, red, or amber light)
Watertight Pilot Light assembly with NEMA 4 box.
(green, red, or amber light)

CONVERSIONS
1” (inch) = 25.4 mm
\[ \triangle 1^\circ F = \triangle \frac{9}{5}^\circ C \]
Temperature in °F = 1.8°C + 32
Temperature in °C = \( \frac{5}{9} (°F - 32) \)
1 psi = 0.06895 bar = 6.895 kPa
Cv (U.S. GPM) = Kv multiplied by 1.156
1 U.S. Gallon = 0.8327 Imperial Gallons = 3.7854 liters
1 U.S. GPM (gallons per minute) = 0.06309 dm³/s
(or L/s) = 0.227124 m³/hr
1 American Standard Commercial Ton of Refrigeration = 12000 Btu/h = 3024 kcal/h = 3.517 kW

ORDERING INFORMATION, HA4A MODULAR PRESSURE REGULATORS

<table>
<thead>
<tr>
<th>PORT SIZE (mm)</th>
<th>FLANGE CONNECTION STYLES &amp; SIZES</th>
<th>ODS</th>
</tr>
</thead>
<tbody>
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<td></td>
<td>FPT, SW, WN</td>
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</tr>
<tr>
<td>STD</td>
<td>ALSO</td>
<td>STD</td>
</tr>
<tr>
<td>¾”† (20)</td>
<td>⅜”</td>
<td>⅞”</td>
</tr>
<tr>
<td>1” (25)</td>
<td>1”</td>
<td>¾”, ⅛”, ⅝”</td>
</tr>
<tr>
<td>1⅜” (32)</td>
<td>1⅜”</td>
<td>⅔”, ⅛”</td>
</tr>
<tr>
<td>1½” (40)</td>
<td>1½”</td>
<td>2”</td>
</tr>
<tr>
<td>2” (50)</td>
<td>2”</td>
<td>1⅛”</td>
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<tr>
<td>2½” (65)</td>
<td>2½”</td>
<td>3”</td>
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<tr>
<td>3” (80)</td>
<td>3”</td>
<td>—</td>
</tr>
<tr>
<td>4” (100)</td>
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</tr>
<tr>
<td>5” (125)</td>
<td>5” BW</td>
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</tr>
<tr>
<td>6” (150)</td>
<td>6” BW</td>
<td>—</td>
</tr>
</tbody>
</table>

5” & 6” are type HA4W with integral butt weld end only. ⅛” is standard 2-bolt flange design; 4-bolt flange style available upon request to field replace ⅛” R/S.
†25% and 50% Reduced Capacity Plugs are also available.

TO ORDER: Specify type, connection style and size, range, voltage for coil, and close-coupled strainer if required. The strainer is a separate stainless steel 60 mesh unit which usually connects directly to the regulator inlet. Optional pilot lights are available in green, red, and amber. Please specify color and voltage when ordering the valve.

TYPICAL SPECIFICATIONS
“Refrigerant pressure regulators shall be pilot-operated, with disc-type pistons having Teflon seals, manual-opening stems, equipped with removable pilot modules, Teflon main seats and stainless steel pilot trim and optional, close-coupled inlet strainers, as manufactured by Hansen Technologies Corporation or approved equal.”

OTHER PRODUCTS
Small Pressure Regulators and Reliefs
Gauge, Purge, and Needle Valves
Shut-Off Valves
Hand Expansion Valves (Regulators)
Refrigerant Solenoid Valves
Refrigerant Check Valves
Gas-Powered Valves
Refrigerant Float Switches
Float Drain Regulators
Refrigerant Liquid Pumps
AUTO-PURGER®s
Vari-Level® Adjustable Level Controls
Techni-Level® Transducer Probes
Frost Master® Defrost Controllers
Pressure-Relief Valves

HANSEN TECHNOLOGIES CORPORATION
6827 High Grove Boulevard
Burr Ridge, Illinois 60521 U.S.A.
Telephone: (630) 325-1565
Toll-free: 1-800-426-7368
FAX: (630) 325-1572

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