ICM325HNV
High Voltage Head Pressure Control with Optional Heat Pump Override
Temperature sensitive control regulates head pressure

Installation, Operation & Application Guide
For more information on our complete range of American-made products – plus wiring diagrams, troubleshooting tips and more, visit us at: www.icmcontrols.com

Caution!
Installation of the ICM325HNV shall be performed by trained technicians only. Adhere to all local and national electric codes.
Disconnect all power to the system before making any connections.

Specifications
- Line voltage: 120-600 VAC
- Control voltage: 18-30 VAC
- Frequency: 50-60 Hz
- Operating temperature: -40°F to +176°F (-40°C to +75°C)
- Heat pump override: 24 VAC N.C. or N.O.
- Weight: 12 ounces (341 grams)
- Sensors: 10K ohms at 77°F (25°C)

Note: A maximum of three sensors can be connected to the control.
Note: The ICM325HNV should be applied to motors and equipment that have been designated by their respective manufacturers as capable of being speed controlled.

Connections for ICM325HNV at 120/208/240 VAC
1. Remove power from system.
2. Field install a wire from Line 1 wire to Line 1 terminal.
3. Cut Line 2 wire; affix motor side to Motor 2 terminal and line side to Line 2 terminal.
4. Make 24 VAC, probe and HP connections.
5. Verify wiring is correct.
6. Power up system and check operation.

Connections for ICM325HNV at 480/600 VAC
1. Remove power from system.
2. Field install a wire from Line 1 wire to Line 1 terminal.
3. Cut Line 2 wire; affix motor side to Motor 2 terminal and line side to Line 2 terminal.
4. Make 24 VAC, probe and HP connections.
5. Verify wiring is correct.
6. Power up system and check operation.

Connecting the Probe
1. Install the temperature probe several bends into the condenser. It can be attached to the U-bend or placed between the fins in the upper 1/3 of the condenser.
   ▶ Note: The response of the system can be fine tuned by repositioning the probe. Place the probe on the condenser where it is 100°F when pressures are correct for best response.
2. Connect the two wires from the sensor to the terminal block where it is marked PROBE S1. If additional probes are necessary for multiple refrigerant circuits, they may be attached to terminals marked PROBE S2 and PROBE S3.
   ▶ Note: The control will respond to the probe that senses the highest temperature.

Connections for Air Conditioning Only
1. For non-heat pump applications, the heat pump select jumper must be in the Default (N.O.) position, and the HP terminals must be left unconnected.
2. Set the Cutout Speed and the Hard Start Time to the appropriate positions for the type of motor you have.
1. The Heat Pump terminals accept the 24 VAC signal from the reversing valve holding coil. Make a parallel connection from the reversing valve to the HP terminals. 

**Note:** Do not apply a voltage higher than 30 VAC to the HP terminals.

2. If the Heat Pump is in the Heating mode and the reversing valve is energized, then the Heat Pump Select jumper must be in the Default (N.O.) position.

3. If the Heat Pump is in the Heating mode and the reversing valve is not energized, then the Heat Pump Select jumper must be in the N.C. position.

### Mode of Operations

#### Normal Function

With probe temperatures above 100°F, the control applies full voltage to the motor. The green light is illuminated (full speed LED).

With probe temperatures between 70°F and 100°F, the motor speed is proportional to the probe temperature. The yellow light is illuminated (variable speed LED).

When the motor starts at temperatures between 70°F and 100°F, it will hard start for the length of time dictated by the hard start dial setting. After the hard start time has elapsed, the motor speed is controlled by the probe temperature.

As the temperature being sensed decreases, the output voltage decreases. The output voltage may decrease to the determined cutout speed dictated by the cutout speed dial. Upon reaching the cutout speed setting, the output voltage goes to zero volts.

System restart will occur when the temperature exceeds 70°F. With probe temperatures below 70°F, the motor remains off. The green light and the yellow light are off.

### Setting the Cutout Speed

The cutout speed dial adjusts the motor voltage range. Set the cutout voltage dial according to the type of motor you have.

**Sleeve Bearing Motors:** Set the cutout speed dial to the middle of the sleeve bearing range. In this range, the motor can run down approximately 40-50% of the full line voltage, which allows sufficient RPMs for cooling and lubrication.

**Ball Bearing Motors:** Set the cutout speed dial to the MIN position in the ball bearing range. This position offers the greatest range of speed control. At the MIN setting, the motor can run down to approximately 20-30% of the full voltage.

#### Hard Start

After you begin at the recommended setting for either sleeve or ball bearing motors, you can fine tune the hard start time within the recommended range for the type of motor you have.

**Hard Start Dial:** To the middle of the sleeve bearing range. This position offers the greatest range of speed control. At the MIN setting, the motor can run down to approximately 20-30% of the full voltage.

**CAUTION!** With sleeve bearing motors, it is important not to adjust outside the sleeve bearing range or bearing failure may result.

**Sleeve Bearing Motors:** Set the hard start dial to the MIN position in the sleeve bearing range. This position offers the greatest range of speed control. At the MIN setting, the motor can run down to approximately 20-30% of the full voltage.

**Ball Bearing Motors:** Set the hard start dial to the MIN position in the ball bearing range. This position offers the greatest range of speed control. At the MIN setting, the motor can run down to approximately 20-30% of the full voltage.

**NOTE:** After starting at the recommended settings for either sleeve or ball bearing motors, you can fine tune the cutout speed to achieve the desired results.

### Setting the Hard Start Speed

During the **Hard Start** mode, full voltage is applied to the motor during startup to overcome windmilling and to lubricate the bearings.

The position of the hard start dial determines the time period of the hard start mode. The dial can be adjusted between 0.1 second and approximately 5 seconds.

Set the hard start dial according to the type of motor you have. If you have a **ball bearing motor**, set the hard start dial to the MIN position. If you have a **sleeve bearing motor**, set the hard start dial to the middle of the sleeve bearing range.

After you begin at the recommended setting, you can fine tune the hard start time within the range recommended for the type of motor you have.

It is recommended that you use the minimum possible hard start time to avoid blowing too much cold air over the condenser.

**Hard Start Mode:** Activated when 24 VAC is applied to the motor (disconnected or re-applied) or the probe temperatures increase to above 70°F. The hard start mode applies full voltage to the motor for the set time period. Afterwards, the motor speed is dictated by the temperature sensor(s).

### Troubleshooting

#### Symptoms

- **Unit fails to start:** The sensor may not be connected or it is defective.
- **Fuse and/or circuit blown:** The unit has been miswired and may be permanently damaged.
- **The fan cycles from full ON to full OFF with little or no modulation:** The unit has been miswired and may be permanently damaged.
- **The fan does not come on at all:** Using an AC volt meter, measure the voltage between the 24 VAC terminals. It should read approximately 24 volts.
- **The high pressure switch trips off:** Move the probe further into the condenser where the temperature is higher. This will produce a higher fan RPM and will decrease the head pressure.
- **Green and Yellow LEDs alternate:** Verify 24 VAC is available at the 24 VAC terminals.

#### Problem

- **The sensor may not be connected or it is defective.**
- **The unit has been miswired and may be permanently damaged.**
- **Excessive hard starting causes large pressure drops by running too much cold air over the condenser.**
- **Should the cycling persist, move the probe several inches into the condenser to increase the sensitivity to condensing temperature.**
- **The line voltage between LINE 1 and LINE 2 to confirm that the line voltage is present.**
- **Measure the line voltage between LINE 1 and LINE 2 to confirm that the line voltage is present.**
- **Move the probe further into the condenser where the temperature is higher. This will produce a higher fan RPM and will decrease the head pressure.**

### Appendix A

#### Mounting a sensor into the condenser vs. mounting it on the liquid line

When a sensor is mounted into the condenser, the control responds more rapidly to changes in head pressure than when it is mounted on the liquid line. This is especially true for high efficiency condensers.

When the sensor is mounted on the liquid line, the control responds more slowly and the results can be a fan that cycles on and off.

Whenever possible, it is preferable to mount the sensor in the upper 1/3 of the condenser instead of mounting it on the liquid line (see illustration below). A spot on the condenser that is 100°F when the pressures are correct is ideal.

### Appendix B

#### Temperature vs. Probe Resistance

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Resistance (KΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°C</td>
<td>27°C</td>
</tr>
<tr>
<td>5°C</td>
<td>22°C</td>
</tr>
<tr>
<td>10°C</td>
<td>19.9</td>
</tr>
<tr>
<td>15°C</td>
<td>17.1</td>
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<tr>
<td>20°C</td>
<td>12.5</td>
</tr>
<tr>
<td>25°C</td>
<td>10.0</td>
</tr>
<tr>
<td>30°C</td>
<td>8.1</td>
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<tr>
<td>35°C</td>
<td>6.5</td>
</tr>
<tr>
<td>40°C</td>
<td>4.4</td>
</tr>
<tr>
<td>50°C</td>
<td>3.6</td>
</tr>
</tbody>
</table>

### ONE-YEAR LIMITED WARRANTY

The Seller warrants its products against defects in material or workmanship for a period of one (1) year from the date of manufacture. The liability of the Seller is limited, at its option, to repair, replace or return a non-case credit for the purchase price of the goods which are provided to be defective. The warranty and remedies set forth herein do not apply to any goods or parts thereof which have been subject to misuse including any use or application in violation of the Seller’s instructions and precautions, neglect, tampering, improper storage, incorrect installation or servicing not performed by the Seller. In order to permit the Seller to properly administer the warranty, the Buyer shall: 1) Notify the Seller promptly of any claim, submitting date code information or any other pertinent data as requested by the Seller; 2) Permit the Seller to inspect and test the product claimed to be defective. Items claimed to be defective and are determined by Seller to be non-defective are subject to a $30.00 per hour inspection fee. This warranty constitutes the Seller’s sole liability hereunder and is in lieu of any other warranty expressed, implied or statutory. Unless otherwise stated in writing, Seller makes no warranty that the goods depicted or described herein are fit for any particular purpose.