



# ICM 326HN/327HN

## Line Voltage Head Pressure Control

With built-in transformer Optional heat pump override

ICM326HN



ICM327HN



## 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](http://www.icmcontrols.com)



## Table of Contents

Specifications .....	1
Connections for ICM326HN at 120 VAC .....	2
Connections for ICM326HN at 208/240 VAC .....	3
Connections for ICM327HN at 480 VAC .....	4
Connecting the Probe .....	5
Connections for Air Conditioning Only .....	5
Connections for Heat Pump Systems .....	6
Mode of Operation .....	6
Setting the Cutout Speed .....	7
Setting the Hard Start Time .....	8
Troubleshooting .....	9
Appendix A .....	10
Appendix B .....	10
ICM326HN Typical Installation .....	11
ICM327HN Typical Installation .....	12

## Specifications

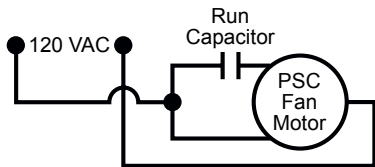
- **Line voltage:** 120, 208/240, and 480 VAC
  - **Frequency:** 50-60 Hz
  - **Output:** 10 amp maximum, 100 mA minimum
  - **Operating temperature:** -40°F to +176°F (-40°C to +75°C)
  - **Sensors:** 10K ohms at 25°C
  - **Heat pump override:** N.C. or N.O.
    - **Note:** *A maximum of three sensors can be connected to the control*
  - **Weight:** 12 ounces (341 grams)
    - **Note:** *The ICM326HN and ICM327HN should be applied to motors and equipment that have been designated by their respective manufacturers as capable of being speed controlled*
  - **Mounting:**
    - Surface mount using (4) #8 screws
    - The ICM326HN and ICM327HN should be surface mounted to a clean metal or other thermally-conductive surface for maximum heat dissipation
    - It is recommended that the ICM326HN and 327HN be mounted away from the condenser exhaust air to maintain lower operating temperatures
- ELECTRICAL SHOCK HAZARD** – *Installation of the ICM326HN and ICM327HN shall be performed by trained technicians only. Adhere to all local and national electric codes. Disconnect all power to the system before making connections.*



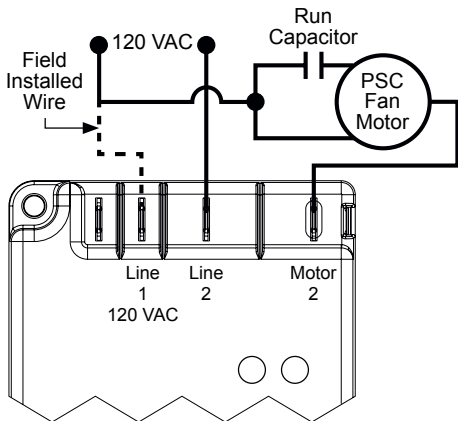
## Connections for ICM326HN at 120 VAC

1. Remove power from system.
2. Add 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 probe (see Page 5) and heat pump (see Page 6) connections.
5. Verify wiring is correct.
6. Power up system and check operation.

Typical condenser fan



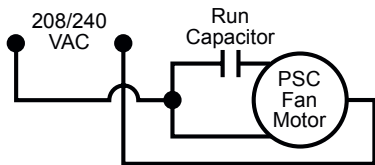
Typical condenser fan with ICM326HN installed



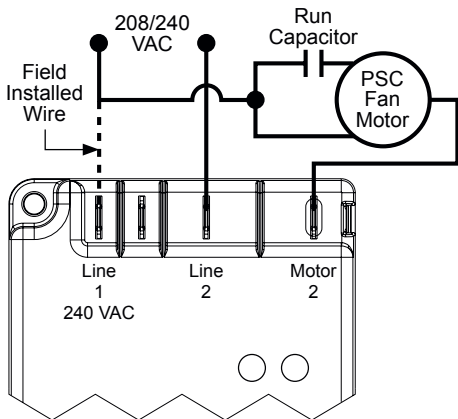
## Connections for ICM326HN at 208/240 VAC

1. Remove power from system.
2. Add 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 probe (see Page 5) and heat pump (see Page 6) connections.
5. Verify wiring is correct.
6. Power up system and check operation.

Typical condenser fan



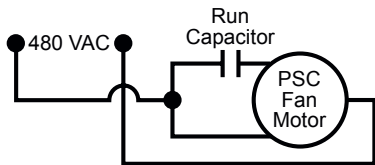
Typical condenser fan with ICM326HN installed



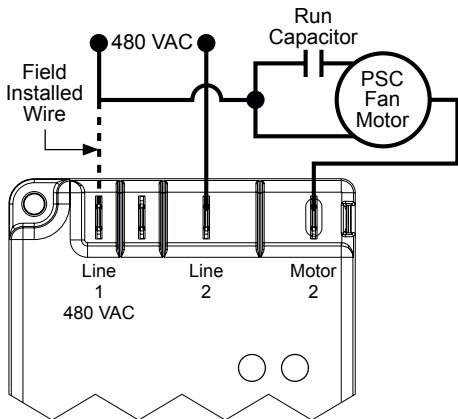
## Connections for ICM327HN at 480 VAC

1. Remove power from system.
2. Add 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 probe (see Page 5) and heat pump (see Page 6) connections.
5. Verify wiring is correct.
6. Power up system and check operation.

Typical condenser fan



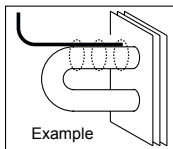
Typical condenser fan with ICM327HN installed



## 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 (see Pages 10-12 for more information).

**\*\* Note:** *The response of the system can be fine tuned by repositioning the probe.*

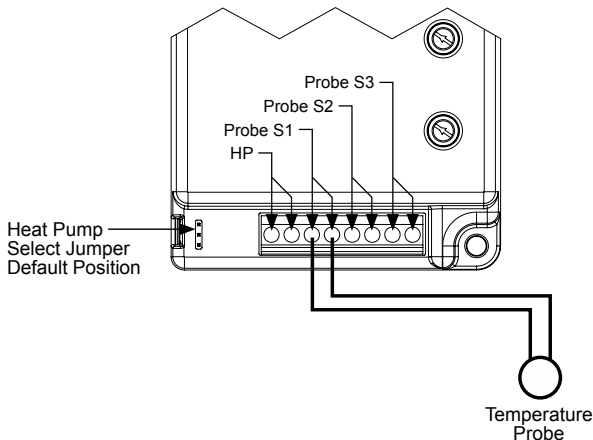


2. Connect the two wires from the sensor to the terminal block where it is marked **PROBE S1**. If additional probes are necessary for multiple refrigerant circuits, they may be attached to terminals marked **PROBE S2** and **PROBE S3**.

**\*\* 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.



## Connections for Heat Pump Systems

**\*\* Note:** HP terminals will not recognize 24 VAC. Line voltage must be applied (120 or 208/240 VAC).

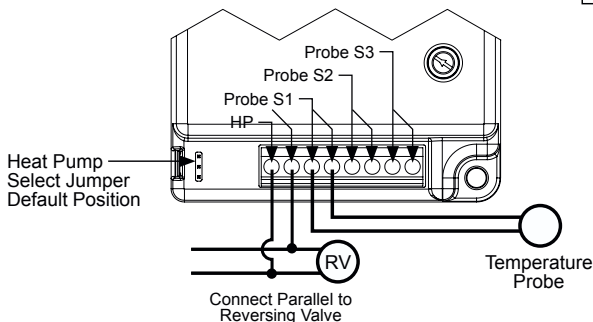
1. The heat pump terminals accept the line voltage signal from the reversing valve holding coil. Make a parallel connection from the reversing valve to HP terminals.
2. If the heat pump is in the **Heating** mode and the reversing valve is energized, then the **Heat Pump Select** jumper must be in the **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.

☐ N.O.

☐

☐

☐ N.C.



## Mode of Operation

### 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 setting of the **Hard Start** dial. 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. Upon reaching the **Cutout**



**Speed** dial setting, the output voltage will go to zero volts.

System restart occurs 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.

### Heat Pump Bypass Operation

**Heat Pump Bypass** mode runs the fan at full speed when the system is operating in **Heat** mode. This moves as much air across the condenser coil as possible.

If the **Heat Pump Select** jumper is in the **N.O.** position and line voltage is **present** at the HP terminals, the motor will be brought to full speed.

If the **Heat Pump Select** jumper is in the **N.C.** position and line voltage is **not present** at the HP terminals, the motor will be brought to full speed.

A separate relay is not needed.

## Setting the Cutout Speed

The **Cutout Speed** dial adjusts the motor voltage range that determines the RPM level of the condenser fan. Set the **Cutout Speed** dial according to the type of motor you have.

### Sleeve Bearing Motors:

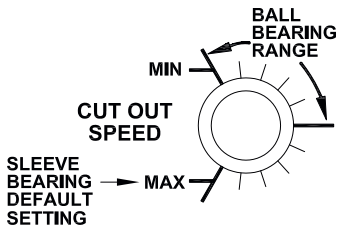
Set the **Cutout Speed** dial to the middle of the sleeve bearing range. In this range, the motor can run down approximately 40-50% of the full line voltage, which allows sufficient RPMs for cooling and lubrication.

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

### 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 line voltage.

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



## Setting the Hard Start Time

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

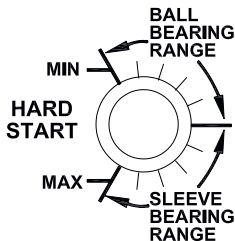
The position of the **Hard Start** dial determines the time period of the **Hard Start** mode. The dial can be adjusted between 0.1 second and approximately 5 seconds.

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 recommended range 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 is activated when line voltage is applied (or disconnected and reapplied). 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

Symptom	Problem
Unit fails to start	<p>The sensor may not be connected or it is defective.</p> <p>With the probe disconnected, use an ohmmeter to measure the resistance between the probe wires. It should match the chart in Appendix B. If you read an <b>OPEN</b> or <b>SHORT</b>, replace the sensor.</p>
Fuse and/or circuit blows	<p>The unit has been mis-wired and may be permanently damaged.</p>
The fan cycles from full <b>ON</b> to full <b>OFF</b> with little or no modulation	<p>First turn <b>OFF</b> the power. Reapply power and confirm hard start operation. Reduce the hard start period to the minimum setting required to accelerate the fan. Excessive hard starting causes large pressure drops by moving too much cold air over the condenser.</p> <p>Check position of heat pump select jumper (see Pages 6-7).</p> <p>Should the cycling persist, move the probe up several bends into the condenser to increase the sensitivity to condensing temperature.</p> <p>Fine tune cutout adjustment.</p>
The fan does not come on at all	<p>Measure the line voltage between <b>LINE 1</b> and <b>LINE 2</b> to confirm that the line voltage is present.</p> <p>Remove the thermistor probe from the terminal block and measure its resistance at ambient temperature. Compare your reading at the appropriate temperature in Appendix B to see if the actual resistance approximates the listed value. Next, hold the probe in your hand and confirm that the resistance decreases.</p> <p>Place a temporary jumper across the <b>S2</b> or <b>S3</b> terminals. Fan should run at full speed. If it does, recheck probe connection and verify probe is operating correctly.</p>
The high pressure switch trips off	<p>Move the probe farther into the condenser where the temperature is higher. This will produce a higher fan RPM and decrease the head pressure.</p> <p>Fine adjust the cutout and hard start settings.</p>

## 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 result can be a fan that cycles on and off.

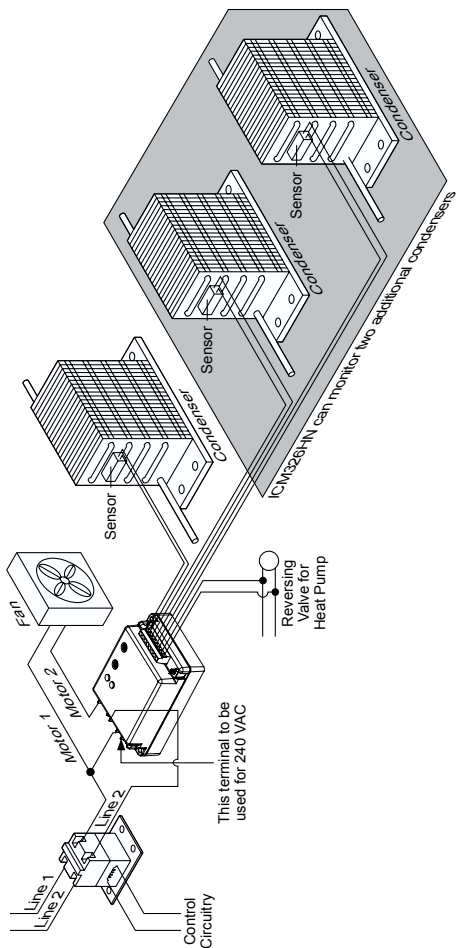
Therefore, whenever possible, it is preferable to mount the sensor in the upper 1/3 of the condenser instead of mounting it on the liquid line (see illustrations on Pages 11 and 12).

## Appendix B

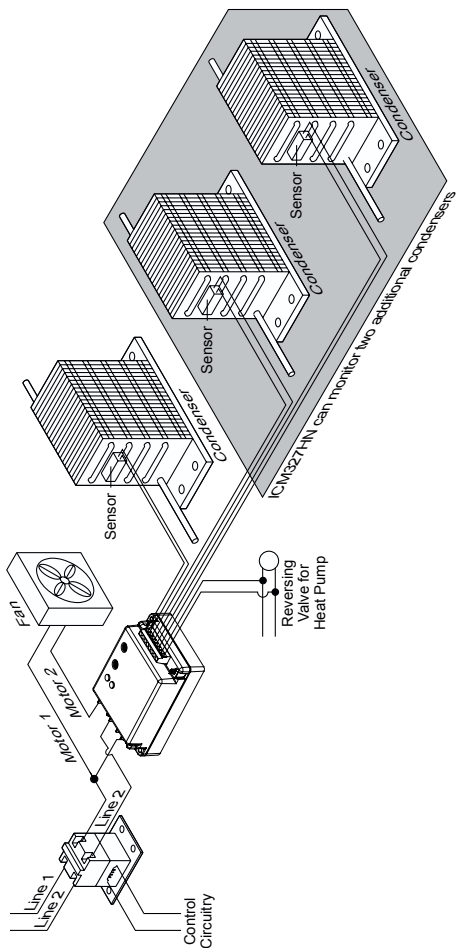
### Temperature vs. Probe Resistance

°C	°F	RESISTANCE (KΩ)
0°	32°	32.7
5°	41°	25.4
10°	50°	19.9
15°	59°	15.7
20°	68°	12.5
25°	77°	10.0
30°	86°	8.1
35°	95°	6.5
40°	104°	5.3
45°	113°	4.4
50°	122°	3.6

## ICM326HN Typical Installation



## ICM327HN Typical Installation



This page left intentionally blank.

## **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 issue a non-case credit for the purchase prices 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 subjected to misuse including any use or application in violation of the Seller's instructions, 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.



**7313 William Barry Blvd., North Syracuse, NY 13212**

**(Toll Free) 800-365-5525    (Phone) 315-233-5266    (Fax) 315-233-5276**

[www.icmcontrols.com](http://www.icmcontrols.com)

LIA249