ICM325A

Single Phase Universal Head Pressure Control

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**

MADE IN AMERICA

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FEATURES

- Near field communication using the **ICM OMNI** App
- Inputs for two temperature sensors or two pressure sensors
- Heat pump bypass for full speed operation in heating mode
- Jumper selectable control voltage enabling
- Universal input voltage 120-600 VAC
- Universal Control voltage 24-240 VAC (jumper enabled)

CAUTION!

Installation of the ICM325A 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.

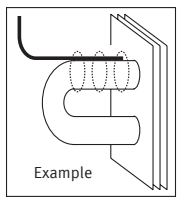
SPECIFICATIONS

- **Line voltage:** 120 - 600 VAC
- **Control voltage:** 24-240 VAC (Jumper enabled)
- **Motor 2 Output:** 10A maximum
- **Frequency:** 50-60 Hz
- **Operating temperature:** -40ºF to +167ºF (-40°C to +75°C)
- **Temperature sensor:** ICM386
- **Pressure sensor:** ICM380
- **Heat pump reversing valve input:** 24-240 VAC (Heat active default / jumper enabled cool active option)
- **Mounting:**
  - Surface mount using (4) #8 screws
  - The **ICM325A** should be surface mounted to a clean metal or other thermally conductive surface for maximum heat dissipation
- **Motor:**
  - The **ICM325A** is intended to be used with single phase permanent split capacitor motors which are capable of having the input voltage varied.

MOUNTING 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 other side for more information).

   ⁂ **Note:** *The response of the system can be fine tuned by repositioning the probe to a location which satisfies the desired pressure or by adjusting the set point.*



2. Connect the two wires from the sensor to the terminal block where it is marked **T1/P1**. If additional probes are necessary for multiple refrigerant circuits, they may be attached to terminals marked **T2/P2**.

   ⁂ **Note:** *The control will respond to the probe that senses the highest temperature or pressure.*

CONTROL VOLTAGE SETTING

The optional Control Voltage Enable Jumper activates a universal control voltage input which allows a control voltage to determine when the ICM325A becomes active. The control voltage is defaulted off from the factory and is not required for operation.

HEAT PUMP OPERATION

During heating mode on a heat pump, varying the fan speed is not desirable so the ICM325A has a bypass mode which adjusts the outdoor fan to full speed during heating mode. This is accomplished by reading the voltage of the reversing valve at the HP RV terminals to indicate whether the unit is in heat mode or cool mode. The ICM325A is factory set for air conditioning / heat active reversing valves. A jumper setting (HP O RV) is provided to accommodate cool active reversing valves.

MODE OF OPERATION

The ICM325A is designed to control the head pressure on a heat pump or HVAC unit by controlling the condenser fan speed thus allowing the heat pump or air conditioner to operate even when the temperature outdoors is too low for normal operation.

Temperature vs. Output Voltage %

- **Full Speed:** Temperature sensed above 100°F [Green LED on]
- **Variable Speed:** Temperature sensed between 100°F and 70°F [Orange LED on]
- **Off:** Temperature sensed below 70°F

⁂ **Note:** *Stated temperatures are based on default settings.*

Pressure vs. Output Voltage %

- **Full Speed:** Pressure sensed above 350 PSI [Green LED on]
- **Variable Speed:** Pressure sensed between 310 PSI and 350 PSI [Orange LED on]
- **Off:** Pressure sensed below 310 PSI

ICM OMNI APP ADJUSTABLE SETTINGS

PROBE TYPE
Probe Type allows the user to select a Direct Pressure Input or a Indirect Temperature Input for monitoring head pressure.

SET POINT
Allows the end user to adjust the set point temperature or pressure the user wishes to maintain.

HARD START SETTING
Adjusts the condenser fan to full speed during startup, allowing lubrication of a sleeve bearing motor during startup.

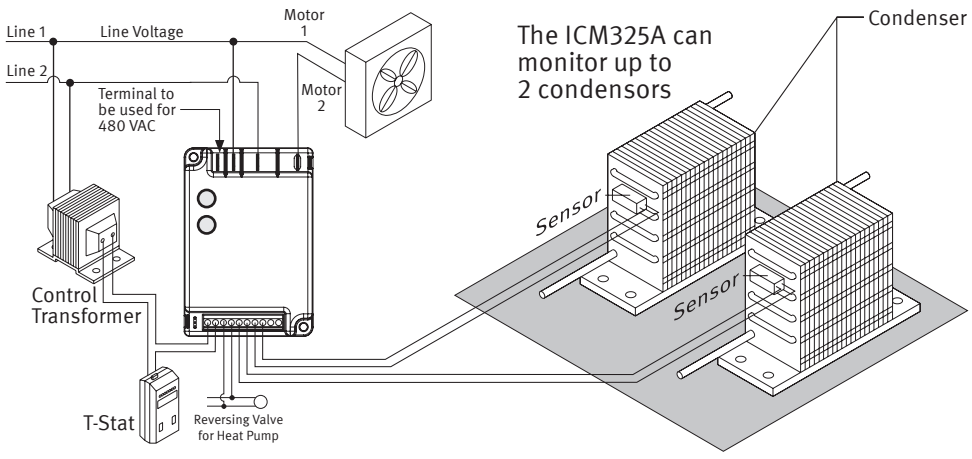
MINIMUM OUTPUT VOLTAGE SETTING
Adjusts the range which the control operates in variable speed. The MAX setting of 48% allows the least amount of variable speed over the range whereas the MIN setting of 17% allows for the most amount of variable speed over the range.

NOTE: ALL adjustments are made using the ICM Controls OMNI App.

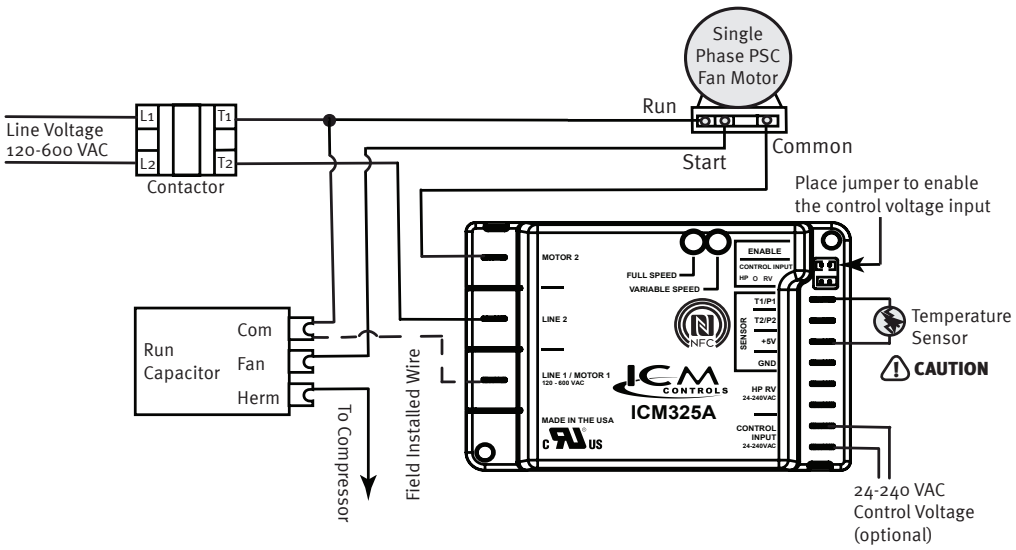
SENSOR REPLACEMENTS

- **Temperature Sensor:** ICM386
- **Pressure Sensor:** ICM380

MULTIPLE CONDENSORS UP TO 10 AMPS



AIR CONDITIONING SYSTEM WIRING

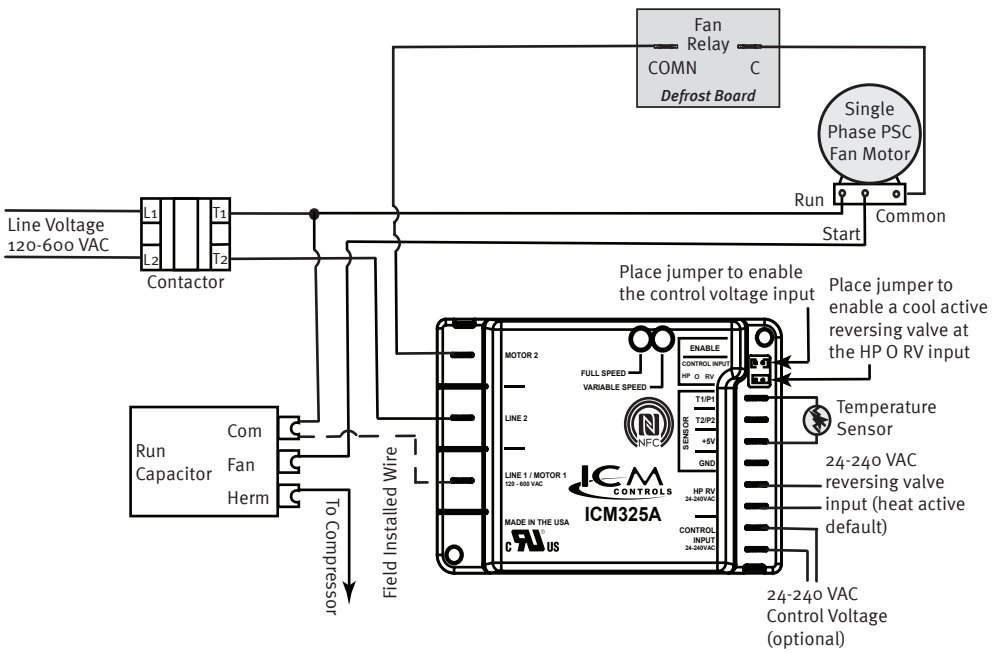


CAUTION!

Do not ground the temperature sensor to earth ground. GND is for the sensors black ground wire only.

Connect the wires from the contactor (load side), run capacitor, and the condenser fan as shown in diagram above. If control voltage is desired, ensure the jumper is placed on the control voltage enable input and the proper voltage (24-240 VAC) is applied to the control voltage input. Place the temperature probe at T1/P1 and 5V and mount the probe on a U-bend in the upper third of the condenser. If two temperature probes are needed, wire the additional temperature probe to T2/P2 & 5V. If a pressure transducer is used, mount the transducer on the discharge line at the service fitting. Connect the red wire to +5V, the black wire to GND and the BWG (blue/white/green) wire to T1/P1 input. If two pressure sensors are used, connect the black and red wires of the additional pressure sensor to the same points as previously mentioned and connect the BWG (blue/white/green) wire to TP2/P2. **NOTE: Line one of the ICM325A must share the same leg of power that is feeding the common of the run capacitor.**

HEAT PUMP SYSTEM WIRING



Wiring of the ICM325A to a heat pump is the same as for air conditioning with the exception of the Motor 2 output and the reversing valve input. For a heat pump, the ICM325A Motor 2 terminal is connected to the outdoor fan relay input power terminal (com) on the defrost board. The condenser fan common remains connected to the normally closed terminal of the fan relay on the defrost board. Apply the reversing valve voltage to the HP RV input in parallel with the existing reversing valve; for cool active reversing valves a jumper will have to be placed at the HP O RV jumper position. **NOTE: Line one of the ICM325A must share the same leg of power that is feeding the common of the run capacitor.**

TROUBLESHOOTING

Symptom	Problem
Fan overheats, over amps or runs very rough	Check with the motor manufacturer to see if the motor is able to be speed controlled by reducing the input voltage. Verify the motor is a single phase PSC motor.
The fan cycles from full ON to full OFF with little or no modulation	Check the Hard start setting in the App. Too much hard start can drop pressure too quick causing a fan cycling effect. Lower the hard start in the App. Should the fan cycling persist, move the probe up several bends into the condenser to increase the sensitivity to the condensing temperature. Adjust the minimum output voltage in the App while fine tuning the probe placement on the condenser.
The fan does not come on at all	Using an AC voltmeter, measure the voltage between the 24 VAC terminals. It should read approximately 24 volts. Measure the line voltage between LINE 1 and LINE 2 to confirm that line voltage is present. Check Line 1 of the ICM325A and confirm it is connected to the same leg of power as the common of the Run capacitor. 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. If a pressure sensor is used, measure the DC voltage between GND and the sensor output at BWG and compare your reading to the expected pressure in Appendix A.
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. Fine adjust the cutout and hard start settings in the App.

LED DIAGNOSTIC INDICATORS

GREEN	AMBER	Condition
OFF	OFF	• No voltage at L1 or L2 • No control voltage when jumper is placed • Output is off
ON	OFF	Full Speed Operation
OFF	ON	Variable Speed Operation
OFF	2 Flashes	Shorted Sensor (Temperature or Pressure)
OFF	3 Flashes	Open Sensor (Temperature or Pressure)

APPENDIX A

PRESSURE VS. VOLTAGE

Pressure (PSIG)	Voltage (VDC)
15	0.5
50	0.8
100	1.2
150	1.6
200	2.0
250	2.4
300	2.8
350	3.2
400	3.6
450	4.0
515	4.5

APPENDIX B

TEMPERATURE VS. PROBE RESISTANCE

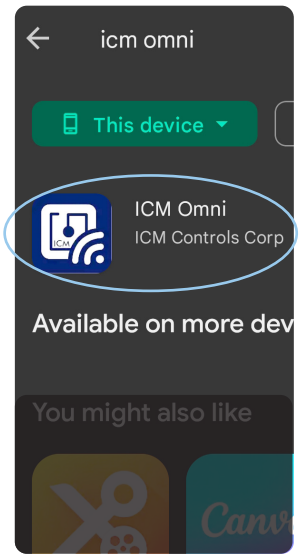
°C	°F	Resistance (KΩ)
0°	32°	32.7
5°	41°	25.4
10°	50°	19.9
15°	59°	15.7
20°	68°	12.5
25°	77°	10.0
30°	86°	8.1
35°	95°	6.5
40°	104°	5.3
45°	113°	4.4
50°	122°	3.6

USING THE NFC TECHNOLOGY

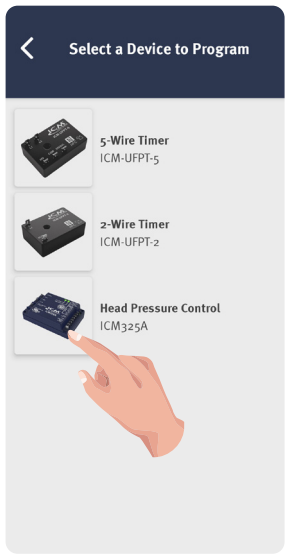
Download the app

Locate and download the "ICM Omni" app from the Google Play Store or Apple Store.

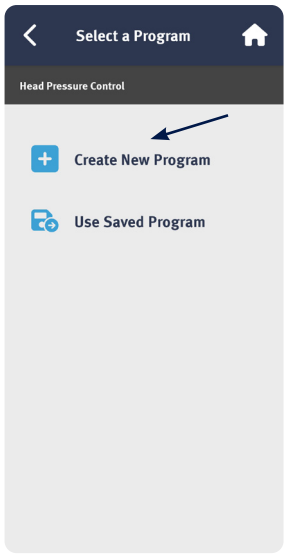
Available on the App Store | Available on Google play



STEP 1 - Open the app and select Program Device

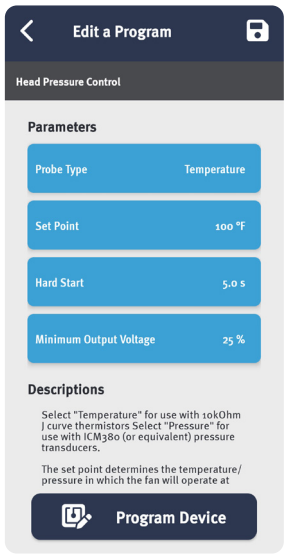


STEP 2 - Select a Device to Program



STEP 3 - Select a Program

Choose the option to create a new program or select a saved program.

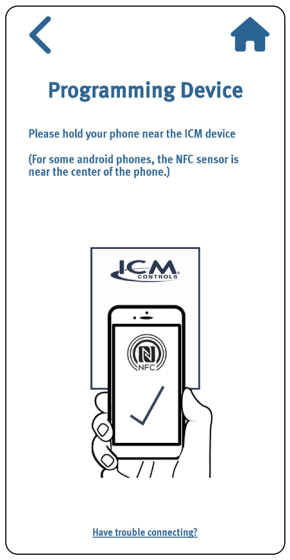


STEP 4

Select each Parameter and Program while following the app.

- Select either Temperature or Pressure Sensor from **Probe Type** menu and set the value, then press SET to bring you back to Parameters.
- Select **Set Point** and set to desired pressure or temperature you wish to maintain and press SET.
- Select the **Hard Start** setting and set a Hard Start value from .1 - 5 seconds, then press SET. **NOTE:** Hard Start will run the fan at full speed for the set time period to allow lubrication of sleeve bearings.
- Select **Minimum Output Voltage** and choose the % of variable speed range desired between 17% (most amount) – 48% (least amount).

  NOTE: For motors which have difficulty with modulation, set the minimum output voltage to 48%.



STEP 5 - Programming Your Device

Hold your phone near your ICM device. The check mark shows complete.

Reading Your Device

From the Home Screen, tap on Read Device.

Read Device Program

Hold your phone near your ICM device. The check mark shows complete.

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