Hoffman|Controls

Installation & Operating Instructions

815-10D

Electronic Head Pressure Control

General

CAUTION

Failure to read and understand the accompanying instructions and diagrams or failure to complete the "Checkout Procedure" prior to energizing the Control may result in permanent damage to the Control.

The 815-10D Head Pressure Control is a low ambient temperature based head pressure control that monitors the compressor's liquid line temperature. When the liquid line temperature rises to 53F the 815-10D Control will start the condenser fan motor at full speed, for a about one second, and then slow the motor to the selected minimum speed. As the liquid line temperature continues to climb the condenser motor will continue to increase speed. When the liquid line reaches 80F, and above, the 815-10D Control will operate the condenser fan at full speed. When the liquid line temperature falls to 78F the 815-10D Control will begin slowing the condenser motor's speed. As the liquid line temperature continues to decrease the condenser motor will continue to slow down. When the liquid line reaches 50F, or below, the 815-10D Control will turn off the condenser fan motor

Pre-Installation Information/ Instructions

1. HCC recommends use of the Adjustable Sensor Simulator, Part Number 510-0027-000 for installation and troubleshooting.
2. The 815-10D Control is for use with Single Phase, direct drive, open frame, permanent split capacitor, or shaded pole motors. Motors are to be selected or designed for continuous variable speed drive applications.
3. Line Voltage Range: 115 VAC and 208-230 VAC.
4. Wiring must comply with Local and National Electrical Codes.
5. One 815-10D Control may operate more than one motor.
   a. Max. running amps under all conditions not to exceed 10 Amps.
   b. Locked Rotor Amps (LRA) not to exceed 30 Amps for 1 second.
6. Do not mount the Controller in an airtight cabinet/compartment or on/near a heat generating surface.
7. ***Application Limitation:*** Speed regulation and performance characteristics will vary with motor design and motor ventilating capability. Motors used should be designed for continuous variable speed operation and should be evaluated for suitability and acceptability. TEC (totally enclosed types) are not recommended or not generally suitable.

Installation

IMPORTANT

- **Do not install the Controller in an airtight cabinet/ compartment, or on/near heat generating sources.**
- **Do not attempt to set Minimum Speed Adjust to obtain a desired head pressure. This adjustment is only provided to compensate for fan bearing type and must not be used otherwise. Improper operation will result.**
- **Sensor must be installed. (Motor will not run if sensor is not connected).**

WARNING

Disconnect power from the unit and electrically disable the compressor prior to installation.

- Install the Controller in a weatherproof control panel or use HCC's **NEMA 3R Weatherproof Kit (Part Number 545-0202-007)**. **Note:** Controller must be protected from moisture and condensation.
- Select the appropriate line voltage wiring diagram for either a single capacitor (Figure 2) or dual capacitor (Figure 3) configuration.
- Insure that all power has been removed from the compressor and the condenser fan motor
- NOTE: the 815-10D is installed in series with the condenser fan motor.

Transformer Phasing (SEE FIGURE 2 or 3)

NOTE: The model 815-10D Head Pressure Control requires an external 24 VAC source. THIS 24 VAC SOURCE MUST BE IN PHASE WITH THE LINE VOLTAGE BEING SUPPLIED TO THE CONDENSER FAN MOTOR. THE 24 VAC TRANSFORMER'S PRIMARY WIRES MUST BE CONNECTED TO THE SAME

CONTACTOR TERMINALS THAT THE CONDENSER FAN MOTOR'S WIRES ARE CONNECTED TO.

Motor Line Voltage Wiring (See Figure 2 or 3)

- Disconnect the condenser motor's common wire from the **unpowered** line terminal. Remember which line terminal the common wire was connected to. It will be used below.
- Connect the condenser fan motor's common wire to the 815-10D Control's "LOAD" terminal
- Connect a new wire, from the contactor terminal that was previously wired to the condenser motor's common wire, to the 815-10D Control's "LINE" terminal.
- Verify the wire from the contactor's **unpowered** "T1" or Neutral terminal to the condenser motor's run wire and run capapitor is still present.

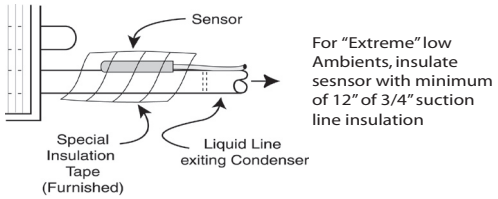
24 VAC Wiring (See Figure 2 or 3)

IMPORTANT: Verify the primary side of the 24 VAC transformer is wired to the same T1 & T2 or Neutral contactor termonals that the condenser fan motor wires go to. (See Transformer Phasing (above) & Figure 2 or 3)

Connect the 24 VAC transformer's secondary leads to the 815-10D Control's "24VAC" and adjacent "COM" terminals. The "COM" terminal allows for a grounded secondary of the 24 VAC transformer, if required. ***Do not share this AC GND with DC signal sources, use a separate wire for the DC signal GND.***

Liquid Line Sensor

- Install Sensor to the top of liquid line where the line exits the condenser coil (refer to Figure 1).
- Use the special tape provided to secure the sensor to the liquid line. Stretch the tape slightly, as you wrap sensor around the liquid line. Use all the tape, lapping the sensor. Firm contact is required between the metal tab of the sensor and the liquid line.
- Insert the sensor's connectors into the 815-10D Control's "SENSOR" terminals.
- Additional insulation of the taped sensor and adjacent refrigerant line back to condenser header may be required in extremely cold ambients (+20º F).



Sensor Diagram Figure 1

Checkout Procedure

Step 1

With power disconnected and the Controller wired:

1. Measure the resistance (ohms) across the **unpowered** contactor's "T2" terminal and the 815-10D Control's "LOAD" terminal using an ohm meter.
2. If you read 1 ohm or less (115 VAC operating voltage), or 5 ohms or less (208-230 VAC voltage), the Controller is improperly wired.

CAUTION

Correct wiring error(s). Do not apply power if incorrect values were measured during checkout. (The load is shorted; applying power will destroy the Controller.)

Step 2

Setting Minimum Speed Adjust: An adjustment is provided to accomodate the slowest allowable speed for ball bearing or sleeve bearing motors.

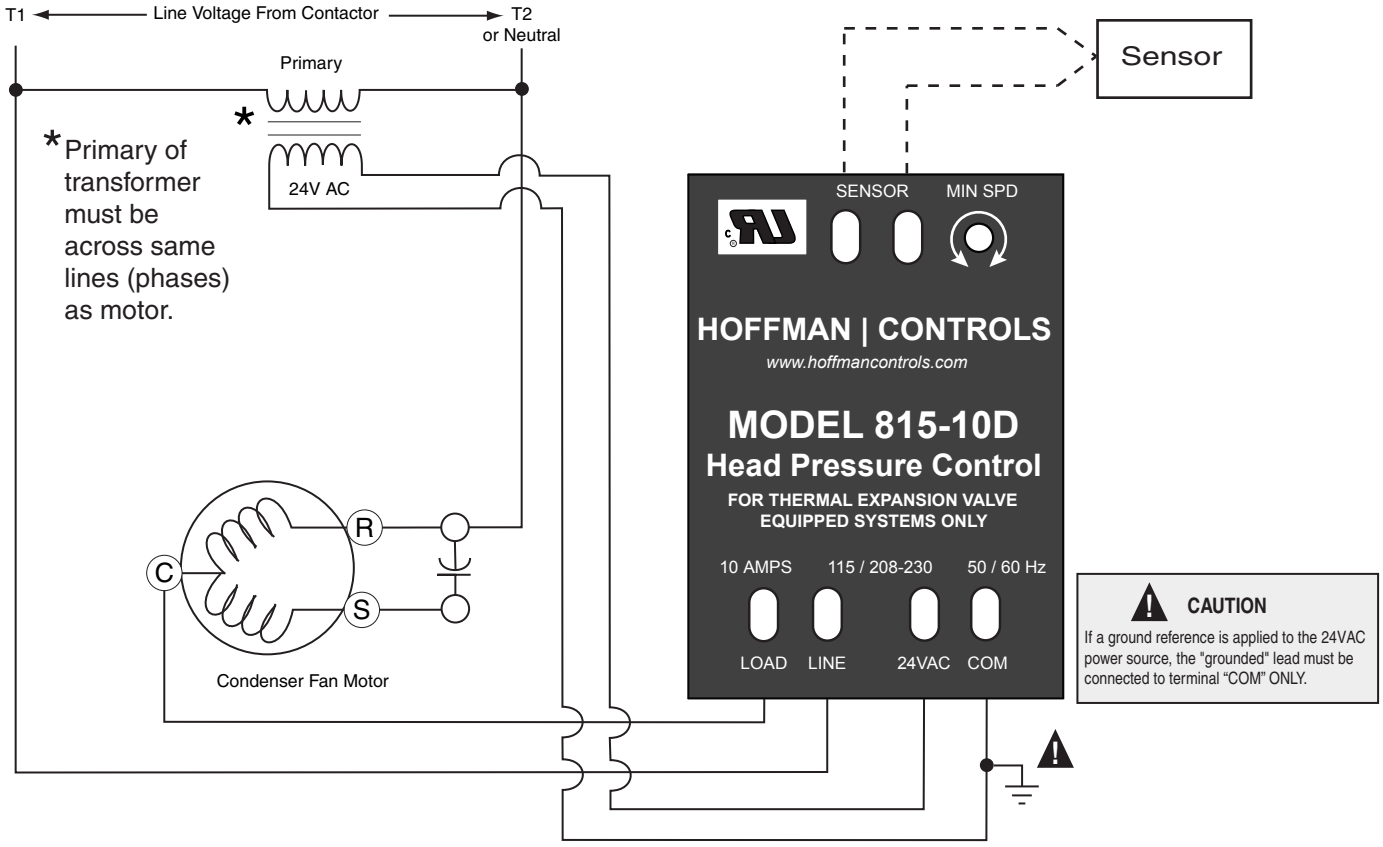
Recommended Minimum Speed

Ball Bearing Motors	200 RPM
Sleeve Bearing Motors	400 RPM

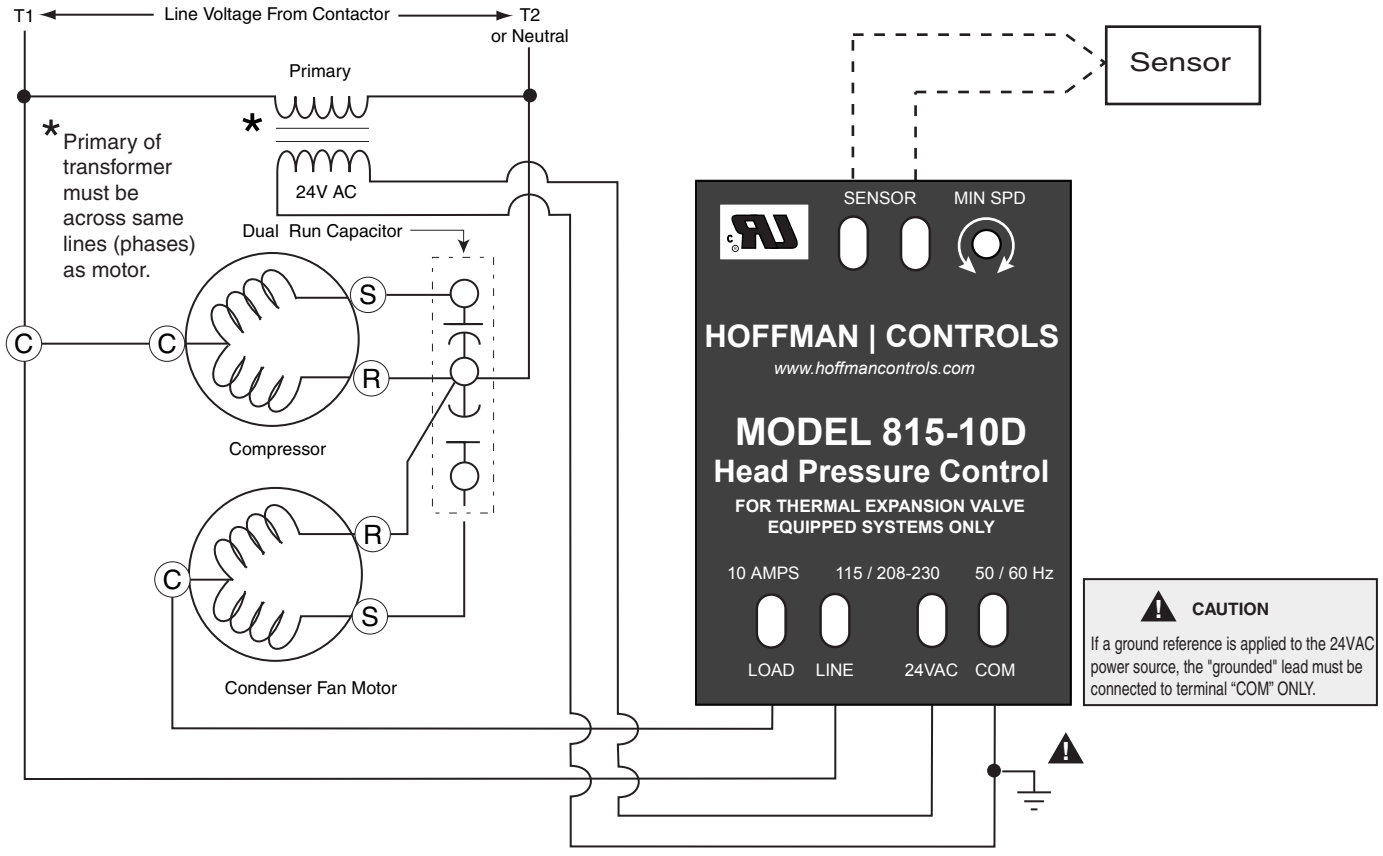
The 815-10D Control leaves the factory with the Minimum Speed set to approximately 400 RPM for a typical 1075 RPM motor.

Step 3

1. Turn on power to the compressor and condenser fan motor.
2. Monitor liquid line temperature (°F) and condenser motor voltage and current. The voltage and current can be read on an RMS meter as a varying value.
3. Verify that the motor is operating properly for the temperature sensed. When the liquid line temperature is at 55º F the motor will be running at low speed. When the liquid line temperature is at 65º F the motor will be running at moderate speed. When the liquid line temperature is at 75º F the motor will be running at high speed.



Single Run Capacitor Condensor Fan Motor Wiring Diagram for the 815-10D
Figure 2



Dual Run Capacitor (Compressor & Condensor) Fan Motor Wiring Diagram for the 815-10D
Figure 3

Troubleshooting Guide

Condition	Cause	Solution
Motor Will Not Run	**1.** Improper installation, Motor not wired correctly.	**1.** Check wiring, review instructions.
	2. 24 VAC not in phase with motor line.	**2.** Verify 24 VAC supply phasing is same as motor phase.
	3. Sensor below 50°F.	**3.** Normal operation.
	4. Motor "OFF" on internal overload.	**4.** Motor protected.
	5. Sensor opened. (Verify Ohms vs. Temp.)	**5.** Replace Sensor.
Motor Runs at Full Speed Only	**1.** Motor not wired correctly.	**1.** Check wiring, review instructions.
	2. Motor not wired correctly. Control damaged.	**2.** Replace control.
	3. Low refrigerant. (Hot gas in liquid line.)	**3.** Charge system so that there is 4°F to 6°F Subcooling at 95°F Ambient.
	4. Sensor above 80°F.	**4.** Normal operation
Motor Overheats	**1.** Minimum speed set too low.	**1.** Raise Min. RPM speed.
	2. Motor design not applicable for continuous variable speed operation.	**2.** Replace motor.
	3. 24 VAC not in phase with motor line.	**3.** Verify 24 VAC supply phasing is same as motor phase.
Motor Will Not Modulate Properly	**1.** 24 VAC not in phase with motor line.	**1.** Verify 24 VAC supply phasing is same as motor phase.
	2. Sensor not properly located or attached to liquid line.	**2.** Relocate per instructions.
	3. Fan blade does not load motor at full RPM (speed).	**3.** Compare FLA rating to measured FLA.
	4. Sensor Ohms vs. Temperature measured not in compliance with values in Table 1 (below) .	**4.** Replace Sensor.
	5. Motor design not applicable for proper phase proportioning speed regulation.	**5.** Replace Motor.
	6. System not properly charged. 4°F to 6°F Subcooling at 95°F Ambient.	**6.** Recharge system. Add or remove refrigerant. (Liquid line must not indicate vapor/gas).
	7. Expansion valve is not properly metering refrigerant.	**7.** Adjust or replace expansion valve.

Temp °F	Sensor (Ohms)	Temp °F	Sensor (Ohms)	Temp °F	Sensor (Ohms)
40.0	26,109	64.0	13,823	88.0	7,685
42.0	24,712	66.0	13,139	90.0	7,332
44.0	23,398	68.0	12,492	92.0	6,997
46.0	22,160	70.0	11,881	94.0	6,679
48.0	20,996	72.0	11,3033	96.0	6,378
50.0	19,899	74.0	10,8509	98.0	6,092
52.0	18,872	76.0	10,2095	100.0	5,820
54.0	17,903	78.0	9,750	102.0	5,561
56.0	16,990	80.0	9,287	104.0	5,316
58.0	16,128	82.0	8,848	106.0	5,094
60.0	15,315	84.0	8,433	108.0	4,873
62.0	14,547	86.0	8,056	110.0	4,662

Temperature to Resistance Table - Key Point Values
Table 1