Hoffman Controls

Installation & Operating Instructions

816-10DH

Electronic Head Pressure Controller

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 816-10DH Controller requires an external 24VAC power source. The primary of the 24VAC transformer must be powered by the same phases that supply the motor.

HCC recommends use of the **Adjustable Sensor Simulator**, Part Number 510-0027-001 for installation and troubleshooting.

Pre-Installation Information / Instruction

1. For use with Single Phase, permanent split capacitor, or shaded pole motors.
2. Line Voltage Range: Available from 120VAC through 600VAC.
3. Wiring must comply with Local and National Electrical Codes.
4. One Controller may control 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.
5. The 816-10DH will require a 24VAC external power source. **Important: The primary of the 24VAC power source must be powered by the same lines (phases) serving the motor.**
6. Do not mount the Controller in an airtight cabinet or compartment
7. ***Application Limitation:*** Speed regulation and performance characteristics will vary with motor design and motor ventilating capability. Motors used should be designed for Phase Proportioning and should be evaluated for suitability and acceptability. TEC (totally enclosed types) are not recommended or not generally suitable.

Installation

- Refer to Figures 2 and 3 for appropriate wiring diagram.

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 545-0202-006)**. **Note:** Controller must be protected from moisture and condensation.
- Disconnect all factory wiring connecting the motor to the line.
- Select the appropriate line voltage wiring diagram for the "LOAD" and "LINE" input terminals.
- Verify that the primary of the 24VAC transformer is the same phase as that furnished to the motor. (The primary side of a 120VAC transformer must be the same line (phase) as supplied to the motor.)
- Setting Minimum Speed Adjust: An adjustment is provided to accommodate the slowest allowable speed for ball bearing or sleeve bearing type motors.

Recommended Minimum Speed

Ball Bearing Motors	200 RPM	9 – 11 o'clock
Sleeve Bearing Motors	400 RPM	1 – 2 o'clock

IMPORTANT

- **If a ground reference is applied to the 24VAC power source, the "grounded" lead must be connected to terminal #4 ONLY.**
- **Do not install the Controller in an airtight compartment, or 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.**

Heat Pump Mode Jumper

Jumper position "A" is used when the Heat Pump reversing (changeover) valve is activated (Heat Mode) by the absence of 24VAC which is removed from the Heat Pump input of the Control.

Jumper position "B" is used when the Heat Pump reversing (changeover) valve is activated (Heat Mode) by the presence of 24VAC which is applied to the Heat Pump input of the Control.

Either circumstance allows the controlled fan motor to run at full speed. The applicable method of operation varies by manufacturer and must be verified by the installer/service technician.

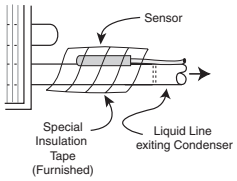
Range Adjust Pot

The Range Adjust potentiometer allows selection of a 30° span modulating temperature range of 50°F – 80°F up to 70°F – 100°F. Other intermediate ranges typically of 55°F – 85°F, 60°F – 90°F and 65°F – 95°F are available. The lower ranges are recommended in applications where TXV (thermal expansion valves) are used and provide the lowest ambient control possible. The upper ranges are more applicable where capillary tubes/orifice systems are used resulting in a higher ambient control. The higher the value selected for the span range results in a higher ambient control. Conversely, the lower value selected provides a lower control of ambients. Always select the lowest range to assure the maximum lowest ambient control.

Sensor Installation

Liquid Line Sensor

- Install Sensor(s) to the top of liquid line where the line exits the condenser coil (refer to Figure 1). If two compressors (circuits) are used, a second Sensor is required for the second refrigerant circuit. (Part Number 100-0017-001.)
- 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.
- Connect the Sensor(s) to the "Sensor" input terminals.
- Additional insulation of the taped sensor and adjacent refrigerant line may be required in extremely cold ambients.



Sensor Diagram Figure 1

Checkout Procedure

Step 1

With power disconnected and the Controller wired:

1. Measure the ohms across the "MOTOR" terminals 1 and 2 using an ohm meter.
2. If you read 1 ohm or less (120VAC operating voltage), or 5 ohms or less (208VAC or greater operating 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

With the compressor disabled, set thermostat for cooling demand and apply voltage to the unit. Condenser fan will start if ambient/liquid line is above 53°F up to 73°F.

1. Monitor liquid line temperature (°F) and condenser motor voltage and current.
2. Verify that the motor is operating properly for temperature sensed. **Depending on the Range Adjust position,** when the sensor temperature at "start up" is:
   a. **Below (less than) 50°F up to 70°F –** the motor(s) will not start.
   b. **Between 53°F up to 73°F and 80°F up to 100°F –** the motor(s) will start at full speed for a few seconds and immediately modulate to a reduced speed proportional to the temperature sensed.
   c. **Above 80°F up to 100°F –** the motor(s) will start and remain at full speed.
   d. **Simple Tests:** Shorting the sensor terminals will cause the motor(s) to run at full speed. Removing the Sensor lead, or both Sensor leads when used, will cause the motor(s) to stop. **Important:** Always remove short from Sensor terminals or re-connect the Sensor(s) to restore normal operation.

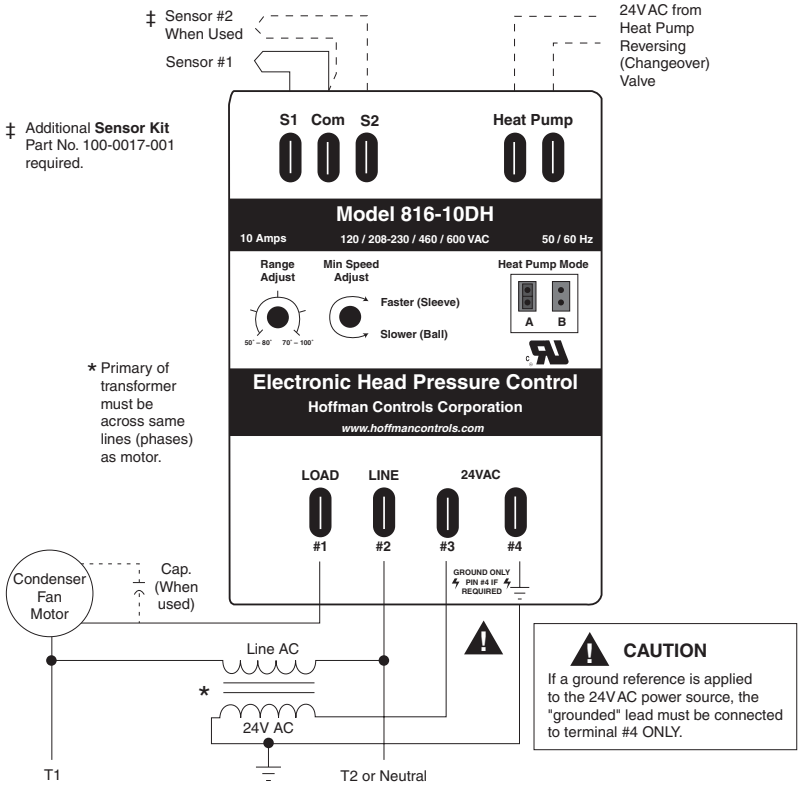
Step 3

Making unit ready for normal operation.

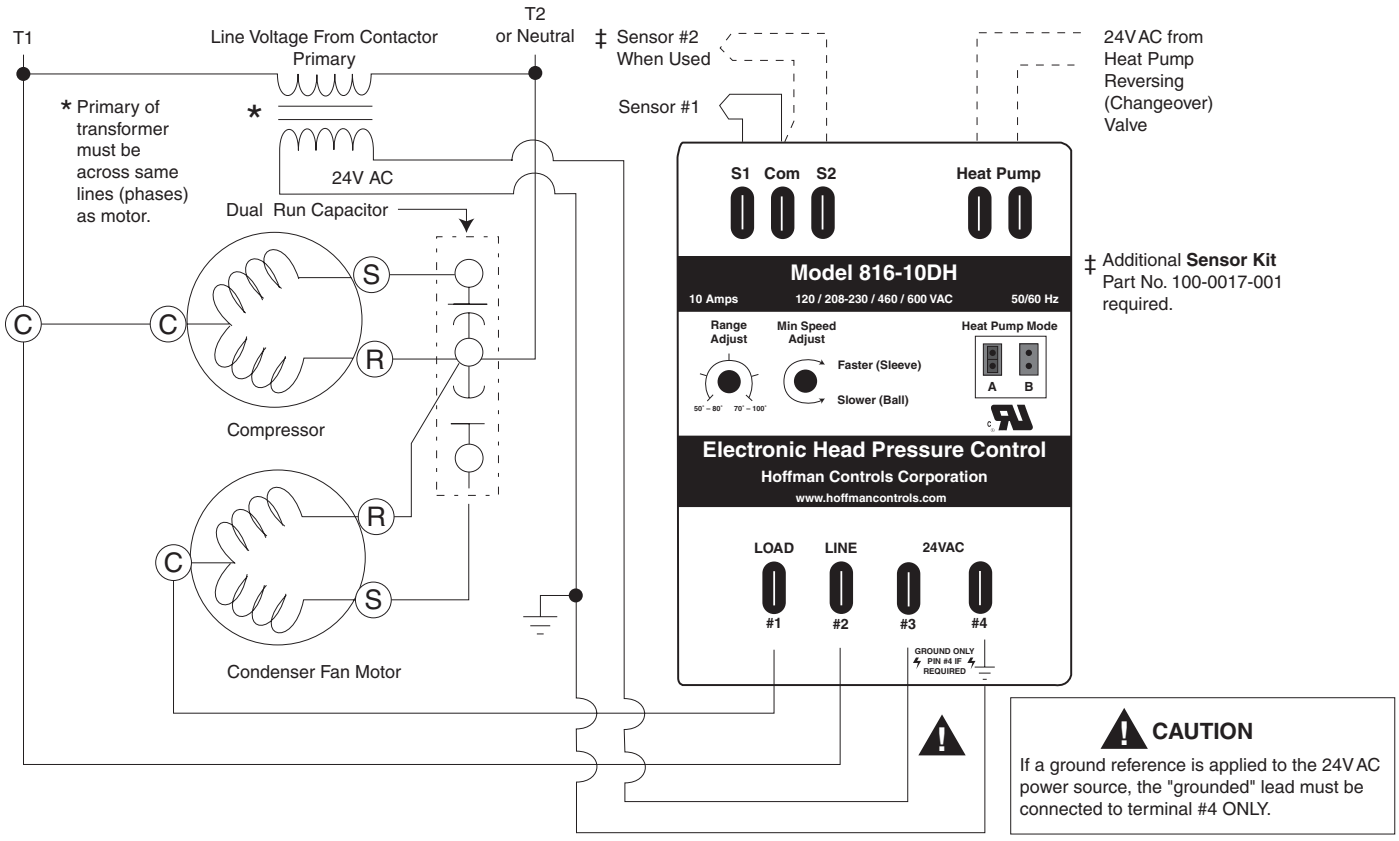
1. Disconnect power to the unit & reconnect the disabled compressor.
2. Reconnect power to the unit & observe operation.
3. Verify operation as described above by monitoring liquid line temperature and observing motor speed.

Temp. °F	Resistance (Ohms)	Temp. °F	Resistance (Ohms)
40.0	26,109	76.0	10,209
42.0	24,712	78.0	9,750
44.0	23,398	80.0	9,287
46.0	22,160	82.0	8,848
48.0	20,996	84.0	8,433
50.0	19,899	86.0	8,039
52.0	18,872	88.0	7,685
54.0	17,903	90.0	7,332
56.0	16,990	92.0	6,997
58.0	16,128	94.0	6,679
60.0	15,315	96.0	6,378
62.0	14,547	98.0	6,092
64.0	13,823	100.0	5,820
66.0	13,139	102.0	5,561
68.0	12,492	104.0	5,316
70.0	11,881	106.0	5,094
72.0	11,303	108.0	4,873
74.0	10,850	110.0	4,662

Temperature to Resistance Table
Key Point Values
Table 1



Wiring Diagram for the 816-10DH
Figure 2



Dual Run Capacitor Wiring Diagram for the 816-10DH
Figure 3

Troubleshooting Guide

Condition	Cause	Solution
Motor Will Not Run	**1.** Improper installation, Motor not wired correctly. **2.** Sensor open. **3.** Sensor below 50°F up to 70°F. **4.** Motor "OFF" on internal overload. **5.** Heat Pump applications; control not providing full speed during defrost cycle.	**1.** Check wiring, review instructions. **2.** Replace Sensor. **3.** Normal operation. **4.** Motor protected. **5.** Check Heat Pump Mode Jumpers "A" and "B".
Motor Runs at Full Speed Only	**1.** Motor not wired correctly. **2.** Motor not wired correctly. Control damaged. **3.** Low refrigerant. (Hot gas in liquid line.) **4.** Sensor shorted. (Verify Ohms vs. Temp.) **5.** Sensor above 80°F up to 100°F. **6.** Heat Pump Mode improperly programmed.	**1.** Check wiring, review instructions. **2.** Replace control. **3.** Charge system. **4.** Replace Sensor. **5.** Normal operation. **6.** Switch or remove jumper.
Motor Overheats	**1.** Minimum speed set too low. **2.** Motor design not applicable for phase proportioning speed regulation.	**1.** Raise Min. RPM speed. **2.** Replace motor.
Motor Will Not Modulate Properly	**1.** Sensor not properly located or attached to liquid line. **2.** Fan blade does not load motor at full RPM (speed). **3.** Sensor Ohms vs. Temperature measured not in compliance with values in Table 1. **4.** Motor design not applicable for proper phase proportioning speed regulation. **5.** System not properly charged. **6.** Expansion valve is not properly metering refrigerant; cap tube or orifice not properly sized for low ambient operation. **7.** Low evaporation and head pressure.	**1.** Relocate per instructions. **2.** Compare FLA rating to measured FLA. **3.** Replace Sensor. **4.** Replace Motor. **5.** Recharge system. Add or remove refrigerant. (Liquid line must not indicate vapor/gas.) **6.** Adjust or replace expansion valve, cap tube or orifice to provide proper control of lowside. **7.** Reset Range Adjust up (CW) to provide evaporator temperature above 32°F.