

Hoffman Controls

Product Data - Preliminary

880-ECM Interface

Head Pressure Control for ECM Motors



880-ECM Head Pressure Controller
Patent Pending

Description

The NEW 880-ECM Series Low Ambient Head Pressure Controller directly modulates ECM Condenser Motor(s) via pulse width modulated signal in low ambient temperatures, varying the volume of air through the condenser, to regulate Head Pressure. The controller monitors the liquid line temperature and degrees of excessive sub-cooling which are directly proportional to the condensing temperature and resulting head pressure.

Fan(s) Modulation from full speed occurs at 60°F ± Ambient (102°F Condensing, 80°F Liquid Line), and reaches Minimum Speed at 30°F ± Ambient (100°F Condensing, 55°F Liquid Line). The ECM Motor Cycles "OFF" for all Liquid Line °F temperatures of 55°F or below, and cycles "ON" at 58°F liquid line. This differential represents approximately 3°F Condensing Temperature variation (6 psi for R-22 refrigerant).

Assuming a 250 RPM Minimum Speed, and 1050 RPM Full Speed Motor, the motor cycles "OFF" at 250 RPM and back "ON" at 350 RPM and then modulates back to 250 RPM before cycling off. The motor remains "OFF" for longer and longer periods of time as the ambient continues to fall below 30°F ±. Eventually the motor remains "OFF" and ambient control ends.

The described ambient conditions above can be effected by the natural forced ambient air, unabated through the condenser coil. For extremely low ambient conditions, approaching 0°F ambient or below, see Engineering Bulletin 81XEB02 REV A, for additional precautions or requirements.

Application

Model	Ref. Circuits	PWM Output
880-ECM(20)DSHP	1 or 2	20 mA Max.
880-ECM(40)DS	2 to 4*	40 mA Max.
880-ECM(80)DS	4 to 6*	80 mA Max.
880-ECM(20)DCHP	1 or 2	20 mA Max.
880-ECM(40)DC	2 to 4	40 mA Max.
880-ECM(80)DC	4 to 6	80 mA Max.

* Requires an 851-MS Series Multi Sensor Interface control for more than 2 refrigerant circuit applications.

- The Controller is typically utilized on air-cooled condenser fan motors found in AC&R systems.
- The 880-ECM Series controls are available in a number of configurations to accommodate all equipment variations of multiple compressor circuits or multiple condensing fan motors.

Features and Benefits

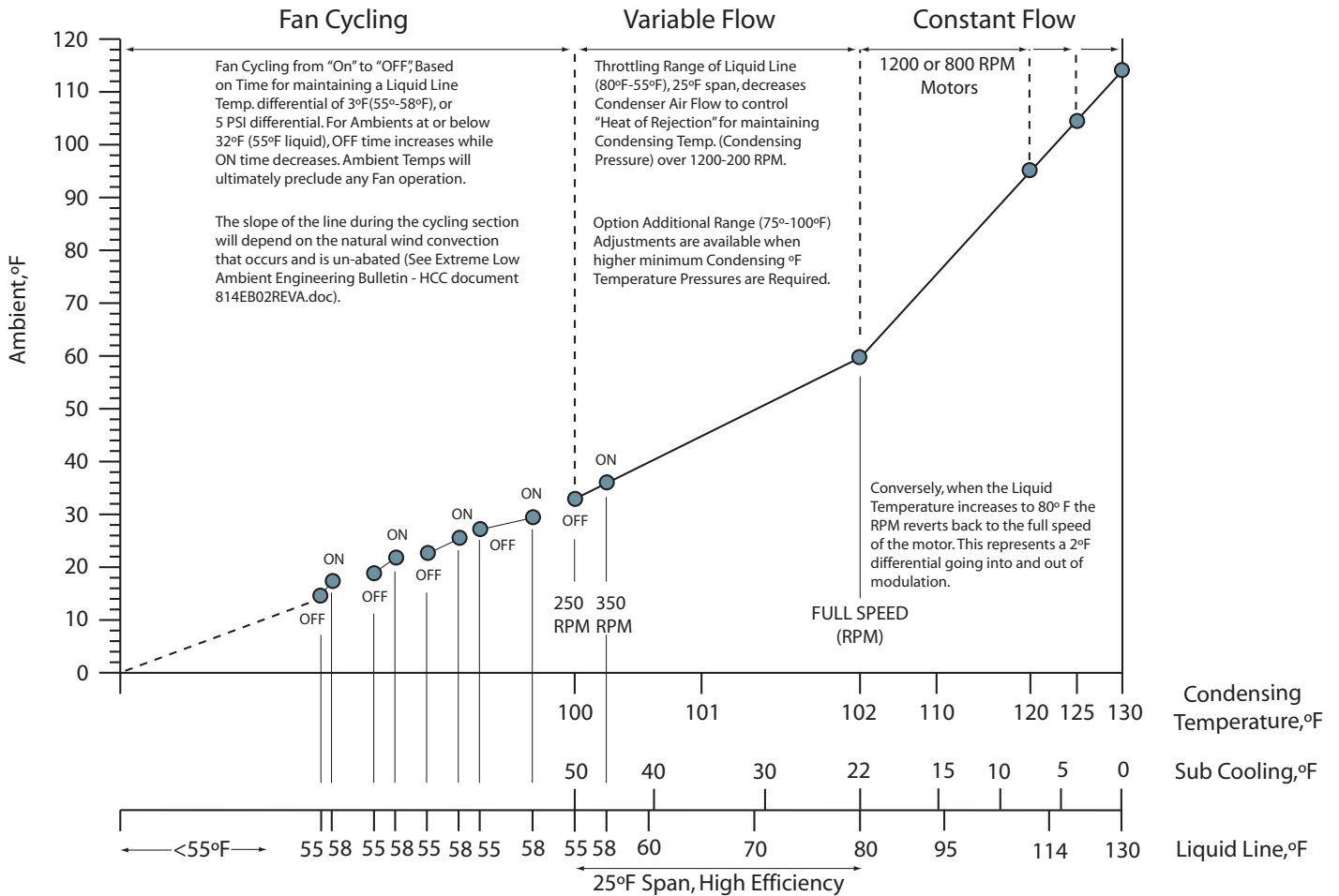
Many of the features for the Digital (Microprocessor Based) 814 and 816 Series Controller for PSC Motors, are available in the 880-ECM Controller. These features are inclusive of:

- One control for all applications for any refrigerant.
- Any line voltage available from the motor manufacturer.
- Range Adjust – optimizes Head Pressure for TX Valves, Orifice or CapTube Expansion Devices, or adjusts head pressure span.
- 25° F liquid line Modulating Span, minimizing pressure variations.
- Heat Pump Defrost Cycle Over-ride. Direct or Reverse Acting Function (eliminates external relay).
- Fan modulates from Full Speed to Minimum Speed between 80° F and 55° F liquid line.
- Fan modulates +/-100 RPM between 58° F and 55° F liquid line for a 3° F hysteresis (condensing temperature).
- Low ambient control occurs between 102° F and 95° F condensing temperatures (varies with unit EER).
- Fan remains off for all liquid line temperatures below 55° F.
- Class II Controller, conformally coated.
- ECM Interface features allow optional Ambient Control function only when required.
- Available in track package (as shown) or with circuit board stand off mounting.

Specifications

Voltage, Input (nominal)	24V AC
ECM Motor Voltages	As available by motor manufacturer
Input Signals	
DS - Liquid Line Sensor(s)	10K Thermistor
DC - Control Signal	2 - 10 VDC
Output PWM Signal	
880-ECM(20)	10%-100%, 13 VDC, 20 mA max.
880-ECM(40)	10%-100%, 13 VDC, 40 mA max.
880-ECM(80)	10%-100%, 13 VDC, 80 mA max.
Operating Ambient	-30°F to +160°F
Humidity	95%, Non-condensing
Conformal Coating	Yes
Dimensions (L x W x H)	(OEM) 5.0" x 5.0" x 1.5" (WHSL) 5.0" x 6.0" x 1.5"
NEMA 2, 3, or 3R Enclosure	Required

Low Ambient, Condensing, Sub Cooling, and Liquid Line Values for Constant, Variable, and Fan Cycling Operations Utilizing ECM Type V AC Motor



Typical Fan Operation with Ambient, Condensing, and Liquid Line Temperatures

IMPROVED HEAD PRESSURE REGULATION WITH ECM MOTORS

Multiple condenser fan equipment typically cycles condenser fan motors to accomplish low ambient control of head pressure. This function results in integral steps of air flow with a dis-proportionate control of air flow resulting in "reverse airflow" through non-operating fans as more and more motors are "cycled off".

The new 880-ECM Series controls all motors simultaneously resulting in a smooth, regulated air flow from full speed to minimum speed. This method precludes a sudden reduction of flow (heat rejection), there by eliminating sudden changes in head pressure and / or regulation of TXV super heat.