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Phase Detect Module Diagnosing on the ER 230 and ER 460

The phase detect module performs 2 functions in the ER unit. Primarily, it detects the rotation of the compressor and stops operation if it is going backwards. Second, it stops operation if the compressor is running too high internal temperature. If either fault situation occurs, terminals M1 and M2 (which are normally closed, connected) will be opened on the module. This breaks the “comp” circuit to the compressor contactor, stopping compressor operation.

Rotation logic- The module has a high voltage input that comes off two legs of the main line. (230 vac) [Note; The phase detect module is only available in 230 vac. The unit/ compressor may be 460 vac. On 460 vac units, the 230 volts needed for the module is sourced at the primary side of the transformer. One leg is connected into the primary windings on the 230/240 tap.] The module compares line phasing to the phasing at the compressor. If rotation is incorrect, the module opens M1 to M2. Operation stops and the phase fault light comes on. This is only an issue when line voltage has been serviced or the unit was just connected to a power source. If a phase fault has occurred, two main line legs must be reversed. It may be necessary to wait up to 30 minutes for the module to reset itself. Note; the compressor is synchronized to the fan motor. It is critical to keep this correct. Phase correction should be done only at the main line coming in. With the fan synchronized to the compressor, it is easy to visually see phase error on the fan rotation.

Overheat logic- The compressor has 5 thermistors that are internal and not replaceable. They are wired in series and connect to the S1 and S2 terminals on the module (blue wires). If compressor temperature gets too high, the resistance increases and the module opens M1 to M2. Normal resistance on the blue wire circuit is 300 ohms. Because thermistors are not replaceable, it is possible to eliminate them if they fail, remove blue wires and connect a 300 ohm resistor across the terminals. If this is done, the protection feature is eliminated and any warranty on compressor is forfeited (one year warranty). The two most common causes for compressor overheat are loss of refrigerant and or flow and low line voltage to the unit.

The phase detect module is part of the compressor assembly but is available separately for replacement.

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