

10/17/2008

YCC Single Phase Submersible Motor Basics

There are specific differences in the installation and operation of YCC single phase submersible motors as compared to the more common three phase designs.

Three phase motors have fairly straightforward electrical connections. Typically there are three 'hot' leads and a 'ground wire'. With the ground wire properly connected, the three hot leads are connected to the motor starter device and the unit is energized. Once energized, rotation is verified and if needed rotation is changed by reversing any two of the three leads.

Single phase motors have a slightly more involved procedure.

Definitions

capacitor	An electrical device that stores energy and releases it when needed. A capacitor gives a single-phase motor more torque but has a limited life.
capacitor motor	A single-phase motor with a running winding, starting winding, and a capacitor. Capacitor motors have more torque than other single-phase motors.
capacitor start-and-run motor	A type of capacitor motor that uses two capacitors, one for starting the motor, and one that remains in the circuit while the motor is running.
capacitor-start motor	A single-phase motor with a capacitor. The capacitor gives the motor more starting torque.
running winding	Heavy, insulated copper wire in a single-phase motor that receives the current for running the motor. The running winding remains connected when the starting winding is disconnected.
starting winding	Fine, insulated copper wire in a single-phase motor that receives current in the motor at startup. When the motor reaches 60-80% of the full load, the starting winding is disconnected and the running winding remains in the circuit.

Definitions provided from Tooling University, 15700 S. Waterloo Rd. Cleveland, Website: <http://www.toolingu.com/definition-460240-34017-capacitor-run-motor.html>

Single phase motors lack sufficient torque to start without some form of assistance. YCC single phase motors use a start capacitor for this function. The purpose of the capacitors is to accumulate enough energy thus providing the extra 'kick' the motor requires to start. The capacitor accomplishes two things: they store electrons and energize the start windings. At a predetermined current as sensed by the start relay, the start windings drop out of the circuit and the motor continues operation thru the run windings only. Every new pump or motor shipped by YCC leaves the plant with a new capacitor(s) and a starting relay.

At any time you replace or install a new YCC single phase motor, new capacitor(s) and a new start relay must be installed. Never reuse existing capacitors or start relay with a new or

replacement motor, this may cause immediate or premature damage to the motor. Failure to use new and matched components will void the Warranty.

It is common that worn out or used components are the cause of most single phase motor failures. It is also possible that damaged or worn out motors may stress an existing capacitor or start relay to the point of failure.

The life cycle of both capacitors and start relays is finite. If they should require replacement during the life cycle of the motor, it is important to match the replacement components with the specifications of the original components.

For example, if you are replacing an existing "Reliance Electric" motor with a new YCC single phase motor, you MUST replace the capacitor and start relay with the new matched components that come with the new motor.

Unlike consumer single phase motors, YCC submersible motors (and most other submersible motors of similar ratings) require independent starting device(s) both to energize the motor and to provide circuit protection as the motors do not contain resettable overloads. With submersible motors, both the capacitor(s) and starting relay are mounted at control panel.

As these motors require start devices, there are alternatives. Single to three phase power converters are commonly available at reasonable costs. Use of such a device would allow use of a 'standard' three phase motor. Many VFD's are also capable of converting single phase to three phase and also function as the motor starter again allowing the use of standard three phase motors and in the process reduce the total number of components required for installation.

YCC single phase motors are non-reversible, RH rotation is the only rotation available.

Troubleshooting Tips

WARNING:

Avoid contact with live components. Disconnect all power including power to the moisture control system. Follow lockout procedures.

WARNING:

Electrical shock hazard exists when the panel door is opened. Even with power disconnected, capacitors retain a charge. Make sure the capacitor is fully discharged before handling. Follow approved electrical safety procedures when working with capacitors.

WARNING:

Surface temperature of the motor enclosure may reach temperatures that can cause discomfort or injury to personnel making accidental contact. The user should provide protection against accidental contact with hot surfaces.

WARNING:

Motor may contain gas under pressure due to high temperatures from abnormal operation. Disassembly may cause bodily injury. Care must be taken in disassembly.

As there are additional components involved, there are additional areas to be reviewed when trouble shooting. Some examples of those are:

Hi amp draw:

- May be due to site problems such as high or low voltage, excessive load causing motor overload.
- May be due to the motor not getting up to speed due to faulty or mis-wired relays or capacitors.
- A combination of the two above. Running the motor in an 'overloaded' condition may cause a start relay to misread the current and hold the start windings in circuit

Motor doesn't start:

- May be due to site problems or may be due to a failed start capacitor. Symptoms may include a humming noise at the panel when energized.

Capacitors may be inspected with either dedicated a Capacitor Check Meter or a digital multimeter possessing a capacitance setting.

Prepared by Steve Keane, Sales Manager – Parts & Service

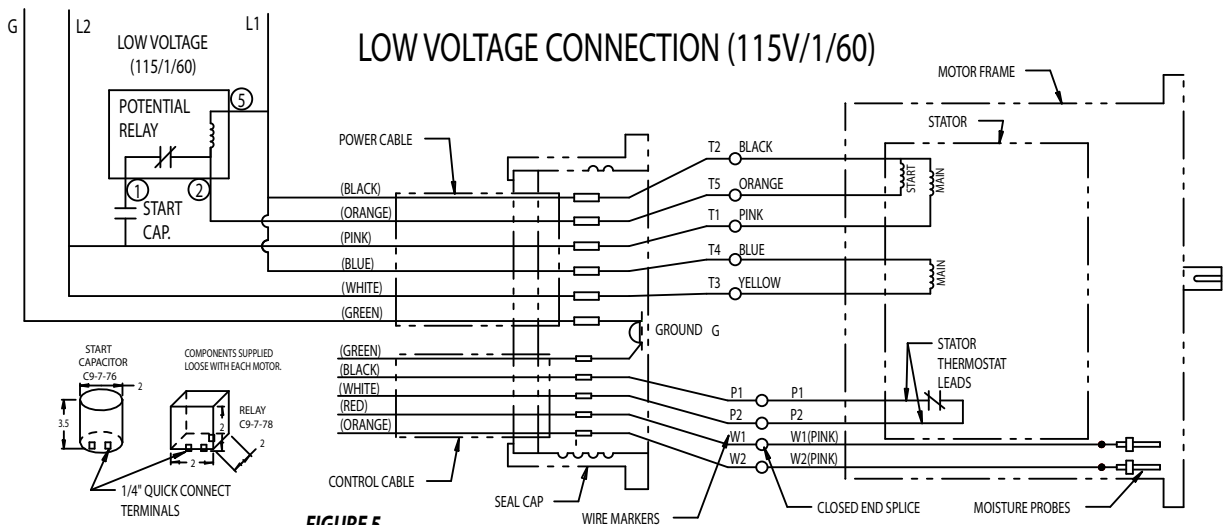
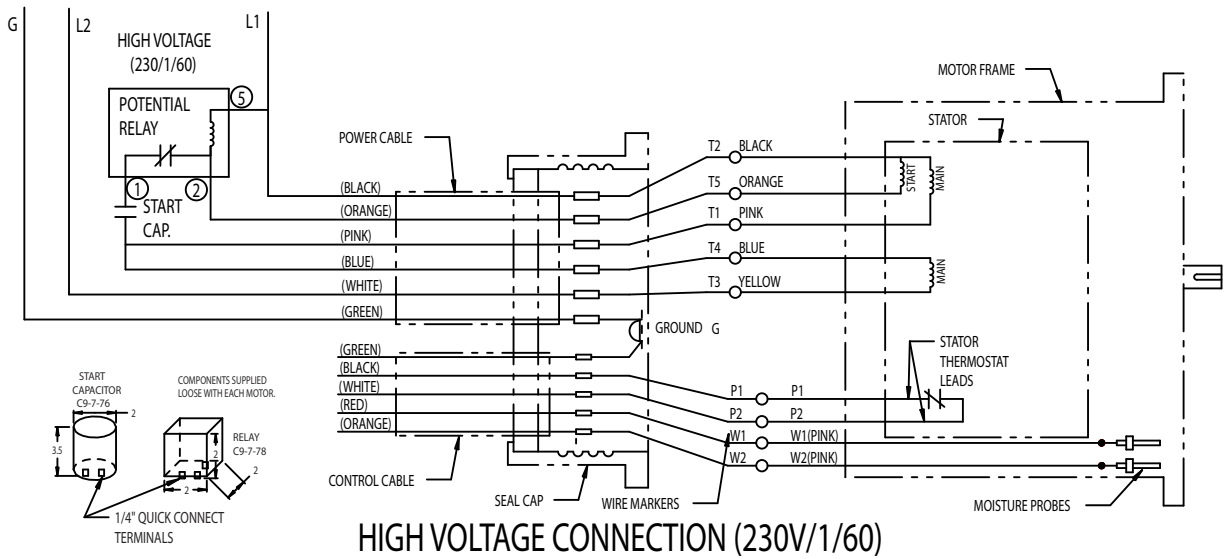


FIGURE 5

140 SEAL CAP AND MOTOR WIRING DIAGRAM 1/2HP THROUGH 2HP SINGLE PHASE INCLUDING EXTERNAL COMPONENT CONNECTIONS (CAPACITOR START/INDUCTION RUN)

FILE NAME 110256

10/24/02

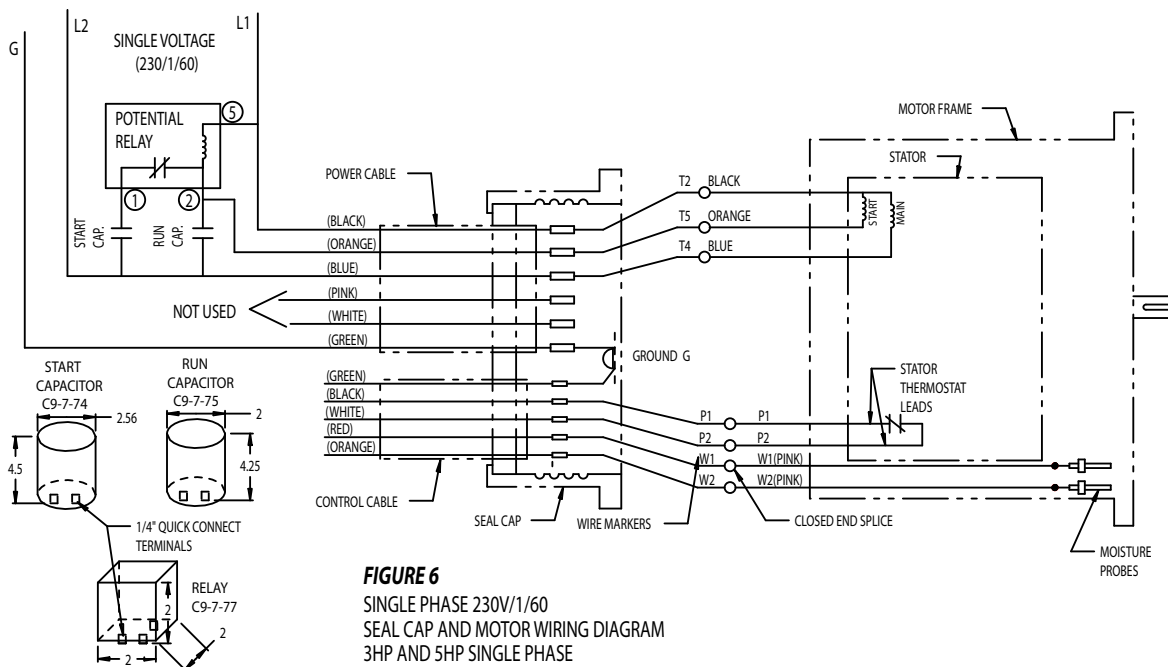


FIGURE 6

SINGLE PHASE 230V/1/60
 SEAL CAP AND MOTOR WIRING DIAGRAM
 3HP AND 5HP SINGLE PHASE
 INCLUDING EXTERNAL COMPONENT CONNECTIONS
 (CAPACITOR START/CAPACITOR RUN)

FILE NAME 110269

10/24/02