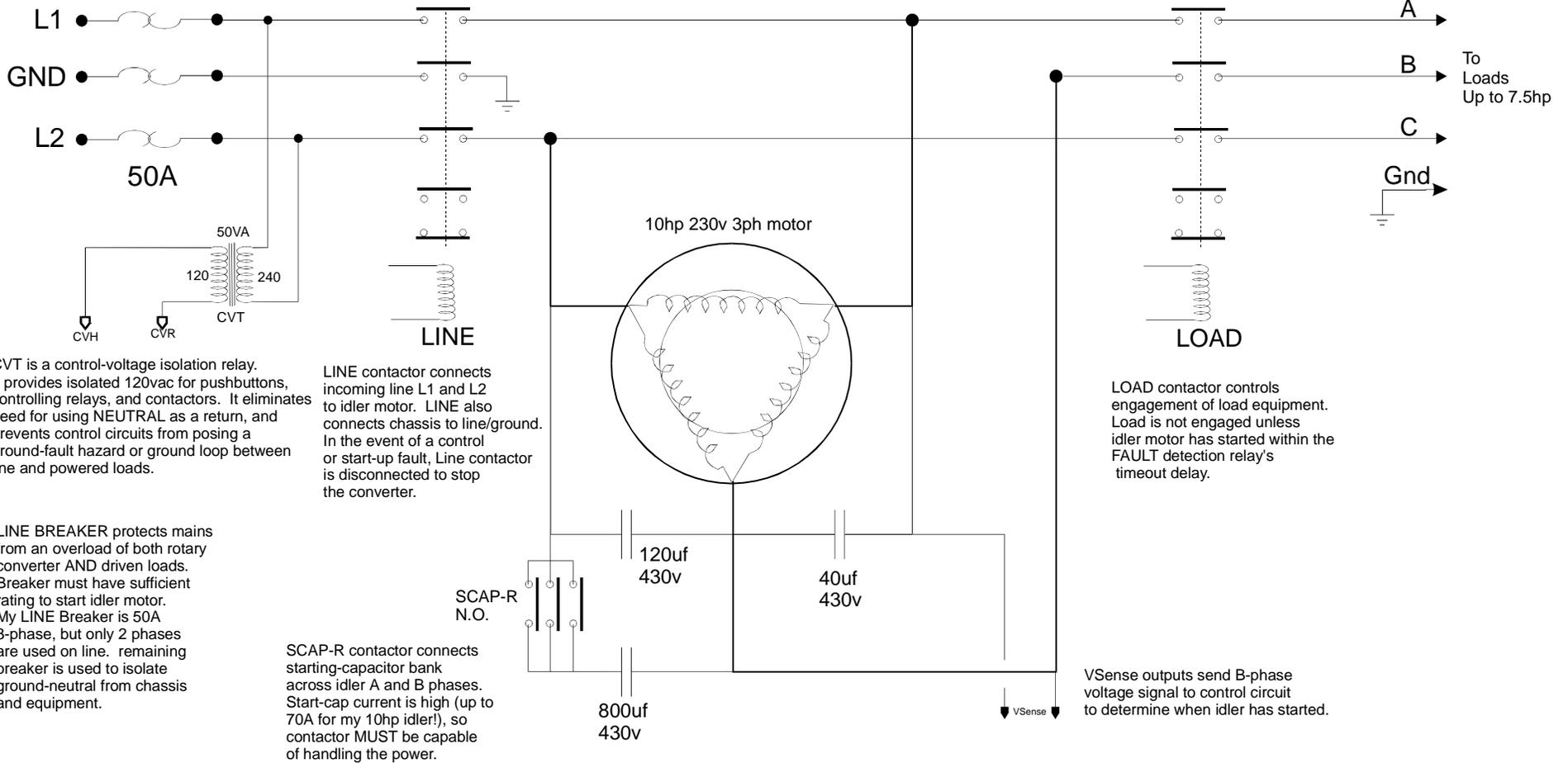


240vac
single-phase
mains in



CVT is a control-voltage isolation relay. It provides isolated 120vac for pushbuttons, controlling relays, and contactors. It eliminates need for using NEUTRAL as a return, and prevents control circuits from posing a ground-fault hazard or ground loop between line and powered loads.

LINE contactor connects incoming line L1 and L2 to idler motor. LINE also connects chassis to line/ground. In the event of a control or start-up fault, Line contactor is disconnected to stop the converter.

LOAD contactor controls engagement of load equipment. Load is not engaged unless idler motor has started within the FAULT detection relay's timeout delay.

LINE BREAKER protects mains from an overload of both rotary converter AND driven loads. Breaker must have sufficient rating to start idler motor. My LINE Breaker is 50A 3-phase, but only 2 phases are used on line. remaining breaker is used to isolate ground-neutral from chassis and equipment.

SCAP-R contactor connects starting-capacitor bank across idler A and B phases. Start-cap current is high (up to 70A for my 10hp idler!), so contactor MUST be capable of handling the power.

V_Sense outputs send B-phase voltage signal to control circuit to determine when idler has started.

Idler motor can be ANY 3-phase motor suitable for 230-250v operation. Idler motor serves as a 'rotary inductor', or rotating transformer. When coupled with run capacitors, the undriven phase ("B") becomes a 'secondary' winding, providing a 'manufactured' 3rd phase to power 3-phase equipment.

Motor Start capacitors provide additional phase-shift and phase current to START the idler motor in the proper direction.

Motor Run capacitors provide necessary phase shift to run a 3-phase (120-degree) idler motor on single-phase (180-degree) power.

Capacitors must be sized to fit YOUR motor. Use approximately 80 Microfarads per motor HP.

Motor Run capacitors MUST be properly sized for YOUR motor. General starting point: Use 15 microfarads per HP for A-B, and 5microfarads per hp for B-C, where B is 'manufactured phase'.

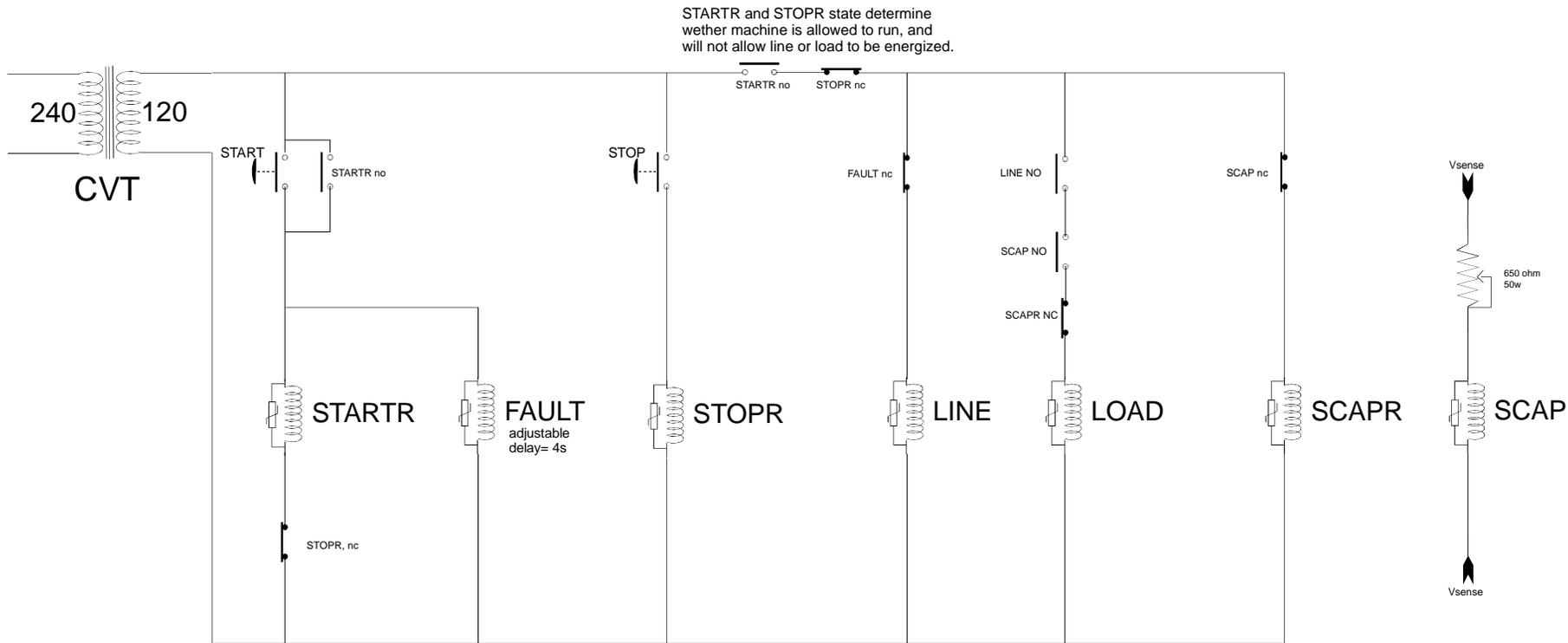
Note that the rotary-converter motor must be approximately 25% larger than the load you intend to drive. Mine has a 10hp motor, and the finished converter is suitable for a 7.5hp load.

Excessive, or insufficient capacitance will prevent motor from starting.

Once motor run has been established, measure A-B and B-C voltage, and adjust capacitance to make voltages closest to match. Getting under 10% is good.

Rotary Phase Converter with Self-Starting Relay Control and Fault Protection

Dave Kamp 12/2004



START pushbutton energizes STARTR. STARTR NO contact closes, holding STARTR in 'latched on' state.

STOP relay NC contact opens to release the 'latched-on' state.

FAULT detection relay is an adjustable timer. When energized, relay contacts close 4 seconds later.

STOP pushbutton energizes STOPR, which opens NC contact to break STARTR latch circuit.

LINE relay is only energized when machine is in ON state and no FAULT is detected

LOAD contactor does not allow LOAD to be connected unless idler has successfully started (SCAP) and starting contactors (SCAP-R) have been disengaged, and after FAULT detection time has been passed.

SCAP-R is energized on initial startup, connecting start capacitors. Once SCAP detects a running idler motor, SCAP-R drops out.

SCAP detects presence of manufactured-phase voltage across phases B-C. When sufficient voltage and current appears, SCAP closes to disengage SCAP-R.

Variable resistor is installed to limit current through the coil of SCAP. I used an ordinary contactor with 120v coil. Pull-in occurs at 75v, drop out is at 30v. B-C voltage of running idler is around 245v. 650 ohms limits coil current to prevent burnout, and making coil pull in at around 225v.

Rotary Phase Converter with Self-Starting Relay Control and Fault Protection

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