



Electrical Trouble Shooting Using the Six Light Panel

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Safety and Tools

Safety



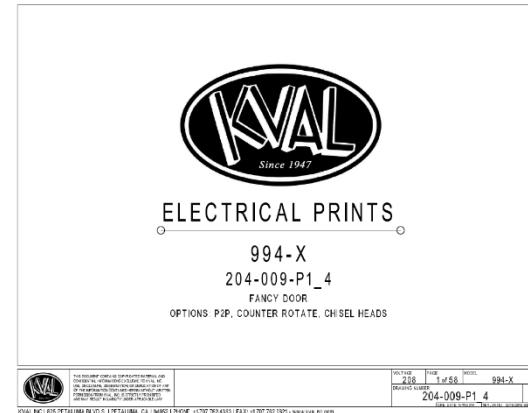
High Voltage may cause personnel injury or death. Troubleshooting checks must be performed by a Qualified Electrical Technician.

**Always be Aware
and Don't Take Risks**

Tools

Tools needed are:

- An Electrical Drawing packet
- A Digital Multi-Meter (DMM)
- Set of Screw Drivers





Six Light Description

The Status Light Panel is normally located on the Electrical Panel.

All six lights are illuminated when the system is in proper working order.

The lights turn on in a sequence and will stop at the point where a fault is first detected.

The sequence that the lights turn on are as follows:

Control Power (Amber)

Overload Relay (Amber)

E-Stop (Amber)

Stop (Amber)

Start (Amber)

24VDC (Green)





Control Power Issue: No Lights Active

No control power is present:

1. Check that switches are turned on : Control Circuit Button and the Disconnect Switch



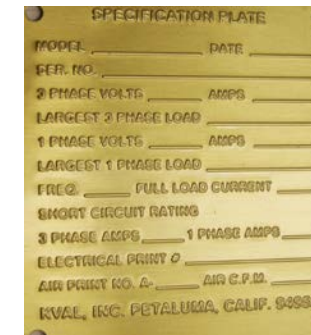
If switches are activated, start by measuring voltages in the Control Circuit.

Prep work:

Check the Machine's Brass Plate for Voltage Requirements

Get the Machine's Electrical Drawings

Get DMM



MAIN PANEL - 208 VAC

208VAC
 BRANCH CIRCUIT PROTECTION MAX. 27.2 AMPS
 FUSED DISCONNECT, PROVIDED BY OTHERS.

NOTE:
 USE COPPER CONDUCTORS ONLY.
 14-1 AWG, 60-75 DEGREES C
 TERMINAL TORQUE: 18 IN. LBS.



Control Power Issue: Check 3 Phase

First order of business is to check if source voltage from the plant is getting to the machine.

1. Open the Main Electrical Cabinet and find the Quick Disconnect.
2. Set DMM to ACV ~
3. At the **bottom** of the Quick Disconnect, measure each leg to each other. (1 to 2, 1 to 3, 2 to 3). Each leg should have the input voltage.
4. **No voltage at the bottom of the Disconnect ?**
Repeat the measurement of each leg at the **top of the Disconnect**.
 - a) No Voltage -----Check Plant Fuse Box
 - b) IF Voltage is **present**----.Replace the Quick Disconnect.

Note: After change, handle Rod may need to adjusted to turn on Disconnect.
5. **Voltage is at the bottom of the Disconnect?**
Continue: [Check Voltage at Transformer](#). See the next page.



Set DMM to ACV



Measure Leg 1 To 2



Measure Leg 1 To 3



Measure Leg 2 To 3



Measure Source Voltage at Bottom



Control Power Issue: Check Transformer Output

The Control Transformer (C.T.) has source voltage at the input and is “transformed” to 120 Vac to supply power supplies and other assemblies.

1. Locate the C.T. in E-Panel. Measure the output first. Voltage should be 120 Vac after fuse.

a) If 120 Vac **is measured** after fuse check control terminal for a loose wire.

b) If 120 Vac **is not measured**, Check the voltage before the fuse.

YES to voltage = Bad Fuse.

NO voltage = [Check Input to Transformer](#). See next page.



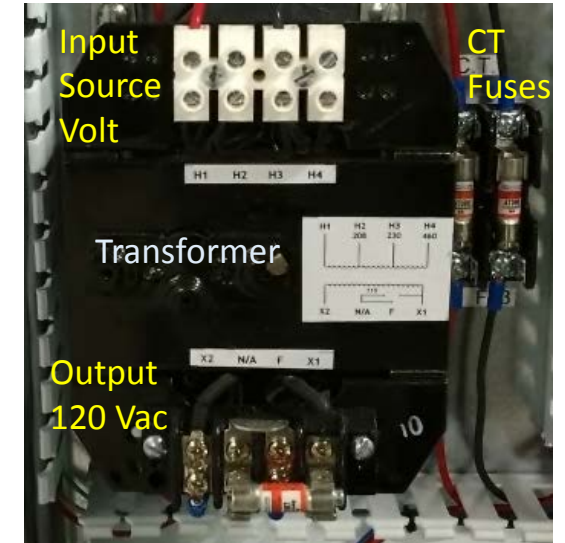
a) Measure Output After Fuse



b) Measure Output Before Fuse



Set DMM to ACV





Control Power Issue: Check Transformer Input

If no voltage is measured before the output fuse, check the Input to the Control Transformer.

1. Measure source voltage at Input
 - a) IF no source voltage is present, check CT Fuses
 - b) If voltage is present, it could be an open wire in the transformer windings.

To verify an open transformer:

- a) Lockout/Tagout
- b) Disconnect wires from Transformer
- c) Set DMM to Ohms (Ω)
- d) Measure primary and secondary with DMM
- e) If meter reads "OL" replace the C.T.

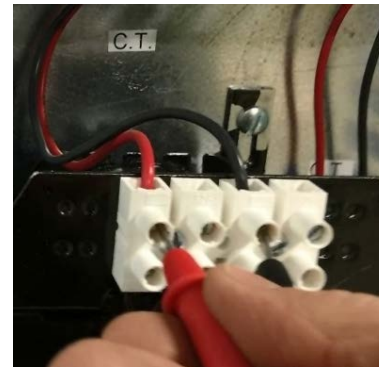


Set DMM to ACV

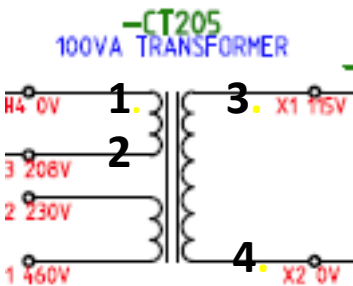


1. Measure Input to C.T.

a) Measure Voltage to C.T.



Verify Source Voltage
Measure 1 to 2
Measure 2 to 3
Measure 4 to 1



Set DMM to Ω

Set DMM to Ω



Measure Resistance of C.T.

1 to 2 should be 0 Ω

3 to 4 should be 0 Ω



Overload Relay Issue

The Thermal Overload Circuit **opens** the motor circuit when current draw causes the motor to run too hot.

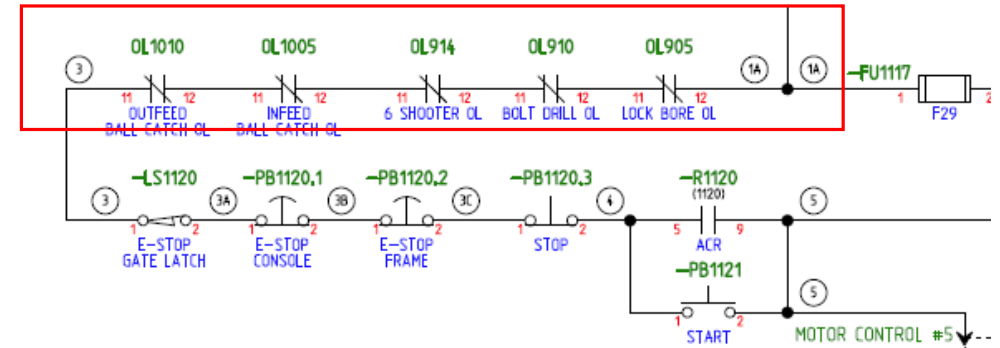
Note: The overload limits are set at the factory, do not adjust the limits.

As seen in the drawing the overloads are in series, therefore if one trips, all on that circuit stop working. If this light does not turn on:

1. Open the Electrical Cabinet to find the Contactor /Thermal Overload Assembly
2. Press each 'Green' Reset button on the Thermal Overload. An audible click will be heard on the tripped circuit
3. Rerun the machine and verify that motor runs without tripping the circuit.



Overload Circuit Schematic



Press Green Reset button to reset the Overload circuit

Contactor

Thermal Overload





E-Stop

E-Stops are an emergency stop switch located around the machine. If this light does not turn on:

1. Verify that all E-Stops are not pushed in and verify that all safety gates are closed.
2. If step 1 is verified, Lockout/Tagout the machine.
3. Find E-Stop circuitry on drawings and locate the circuit terminals in the Electrical Cabinet.
4. Since the E-Stop buttons are normally closed, measure the resistance each point on the schematic. (in this case 3, 3A, 3B, and 3C)
5. A zero resistance should be indicated with the machine at rest
6. Push the buttons a couple times to verify it is not intermittent.

Set DMM to Ω



Stop Issue

If the Stop Light indicator is not lit, check the Stop circuitry located on the Operators Station.

1. Verify that the Stop Button on the Operator's Station is not stuck.
2. If step 1 is verified, Lockout/Tagout the machine.
3. Find Stop circuitry on drawings and locate the terminals in the Electrical Cabinet.
4. Since the Stop Button is normally closed, measure the resistance of the two points on the schematic. (in this case 3C and 4).
5. A zero resistance should be indicated with the machine at rest.
6. If a partner is available, have him/her push the Stop button, an open (OL) will be indicated.
7. Push the Stop Button a couple times to verify it is not intermittent.

Set DMM to Ω



Start Issue

The Start Button is in parallel with an ACR (Automatic Circuit Recloser). The ACR will open the circuit if voltage is interrupted (i.e. push the Stop button) and will reclose if voltage is applied (i.e. push the Start Button). If this light does not turn on:

1. Locate the ACR in the Main Electrical Cabinet.
2. Verify the Green LED on the ACR is ON.
3. If LED is OFF with Start Button pushed in, verify the ACR is working or the Contacts on the Start Button are working.
4. If ACR drops out, Check the voltage between #2 and #4.
 - a) If the voltage is less than 105 Vac, there may be a power issue in the system

Note: the ACR will drop out when voltage is below the 105 Vac range.

Set DMM to ACV

ACR LEDs are OFF

ACR LEDs are ON



24 VDC Issue

The 24 VDC indicates issues with the 24 VDC power supply and it's assemblies.

1. First isolate the power supply. Check between DC+ and DC- for 24 VDC.
2. If no DC voltage, disconnect the output (V+) wire from the 24 VDC power supply
 - a) IF no voltage: Check the input side for 120 Vac
 - b) If no 120 VAC, check the fuse.
 - c) If there is 120 VAC and no 24VDC, replace the 24VDC Power Supply
3. If there is 24VDC after V+ wire is disconnected, there is probably a short pulling down the supply
 - a) Reconnect the output wires to the 24VDC power supply
 - b) Trace the output wire to the DC terminal block
 - c) Disconnect all (+ 24V positive) wires except the output wire from the + 24VDC
 - d) Reinstall the (+ 24V positive) wires one by one, checking for +24VDC after installing each. (or if Indicator Light turns off on power supply)
 - e) If at any point no voltage is found trace the last reinstalled wire and check for shorts



Check for 120 Vac

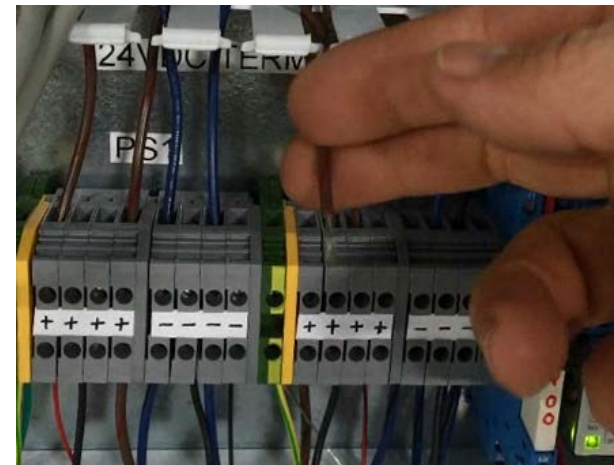
Set DMM to ACV



Indicator Green = Good

Set DMM to DCV

Check for 24 VDC



Output wires