Control Panel Troubleshooting

Orenco Control Panels

Our Presenter

Jeff Julian

Jeff Julian is a Technical Sales Representative with Orenco Systems, a company based in Sutherlin, Oregon, that engineers and manufactures innovative infrastructure solutions. In this role, he handles residential sales and technical support for the midwestern United States.

Jeff holds a degree in mechanical engineering from California State University (Chico) and has held many positions with Orenco over the years. He has 25+ years of experience both in the field and in the office working with other engineers, assisting with design reviews, troubleshooting electrical and mechanical issues, and generating quotes for customers. When he's not on the job, he and his wife enjoy traveling in their motor home and visiting waterfalls and covered bridges.

How is this troubleshooting guide different

Control panels are made up of many logic circuits

- We are going to walk through how each circuit is designed to respond to an input in a specific way.
- We will work from the source voltage to neutral
- We will gain understanding of the goal of each circuit

Introduction

You receive a call from someone wanting to know how to fix an S1PTRO electro-mechanical panel.

- What is the problem?
- What are the tools at hand to test the system?
- Is the the problem reproduceable?
- What is the system doing and is it working as designed?

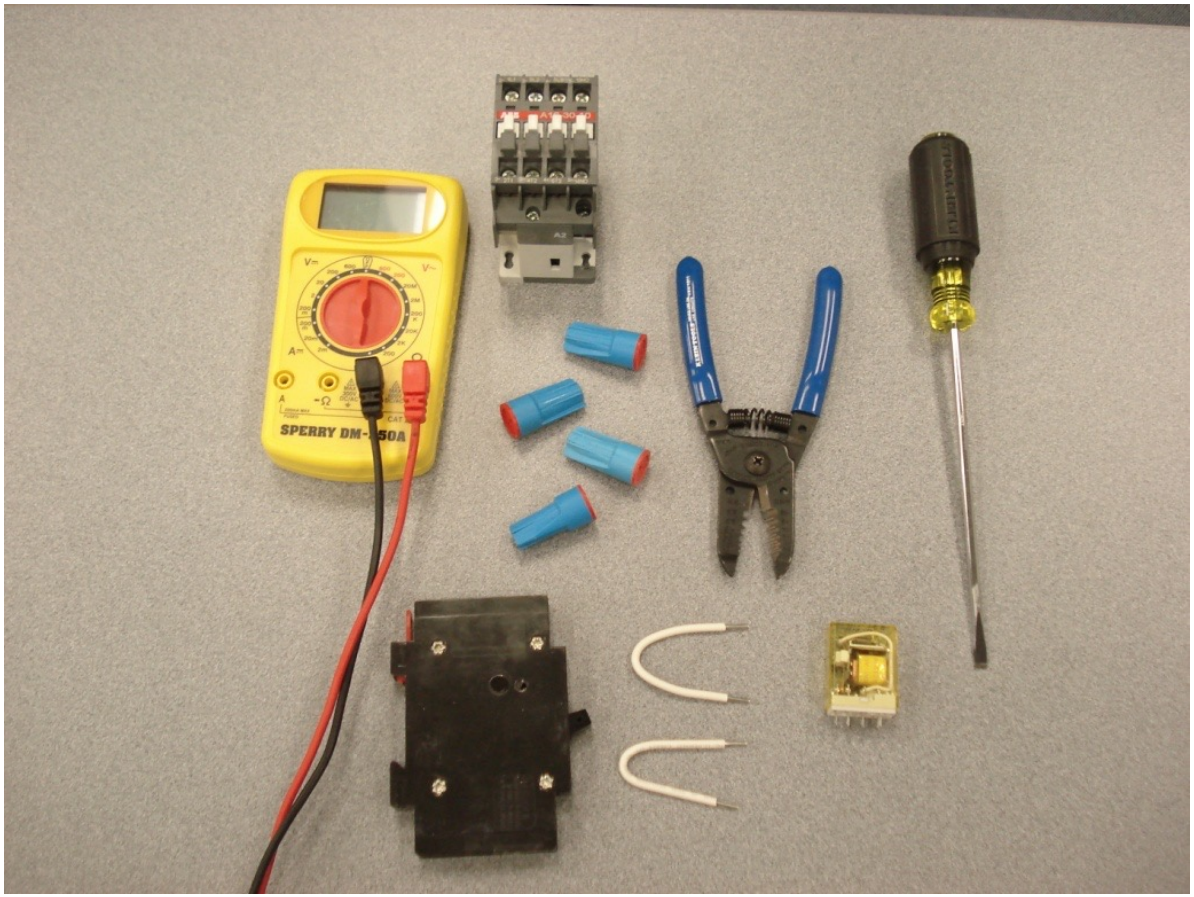
Grab Your Tools

Needed at minimum

- Wiring Diagram
- Multimeter
- Jumper Wires 6”-9”
- Small Screwdriver

Useful to have

- Amp Meter
- Wire Strippers
- Waterproof Wire Nuts



Before You Start… Check for Shorts

A system can't be tested if it can't be turned on.

- Hints:

  (relays, fuses, motor contactors and heaters) and splice box for scorch /burn marks, missing or failed components.

Incoming Power Inspection

Multimeters are used to test for voltage/resistance between 2 points.

L1 to N

Checks voltmeter settings and power issues

N to ground

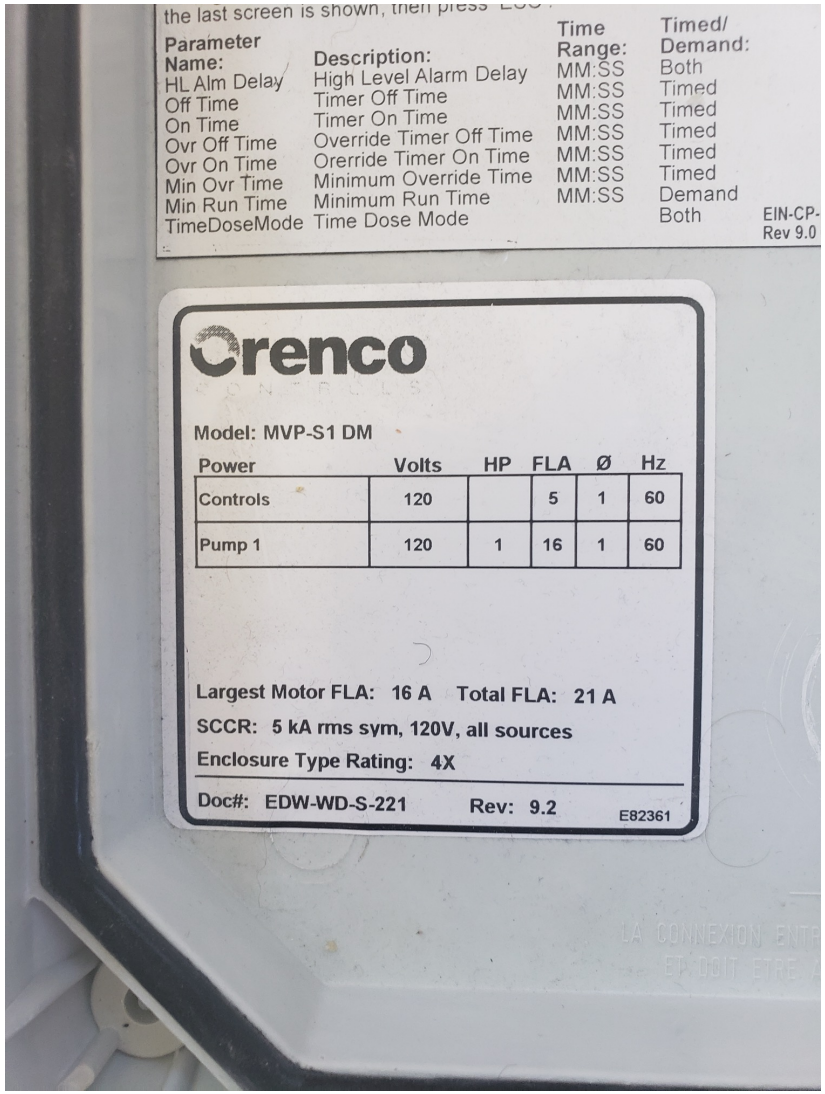
Checks for wire terminations and grounding issues

L1 to L2

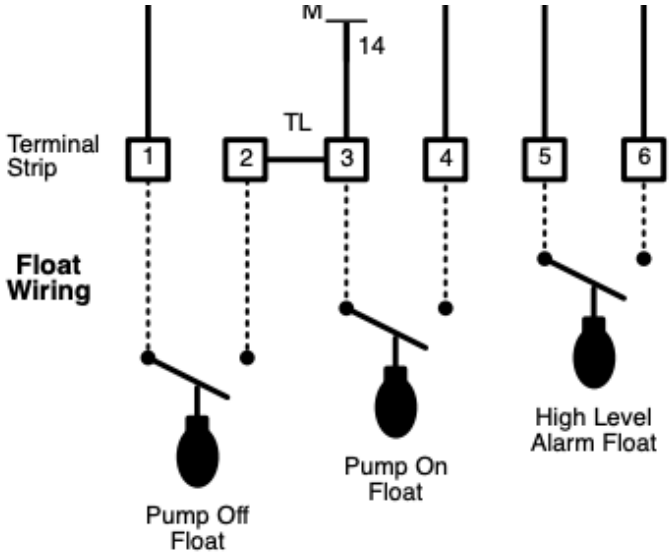
Checks for phase or miswiring

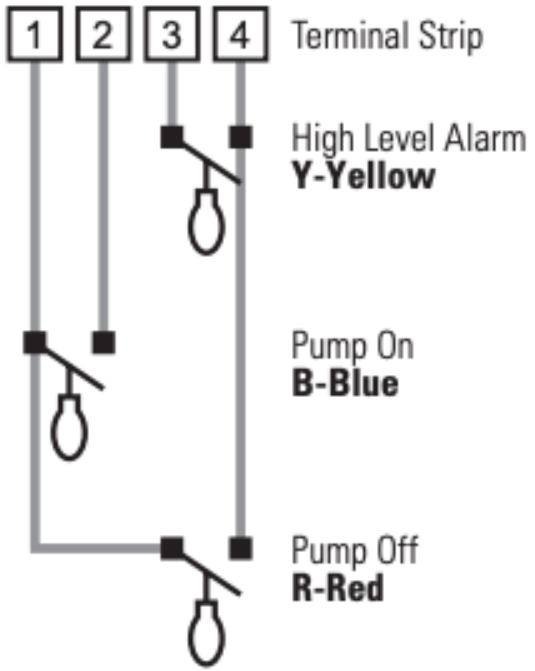
Select and Verify the Correct Diagram

Panel Document number can be found on the inside of the panel door.



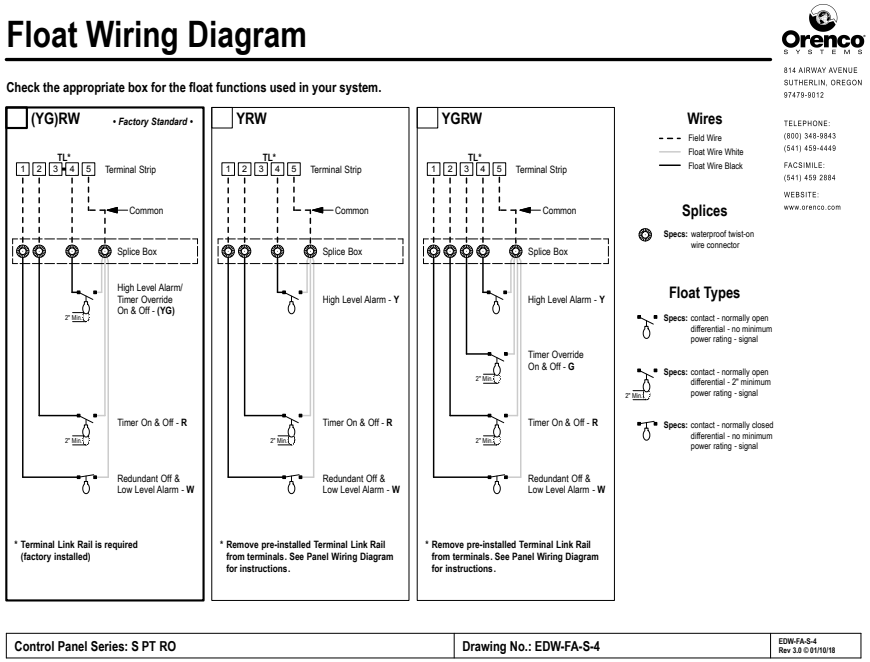
Why Diagrams Are Important?

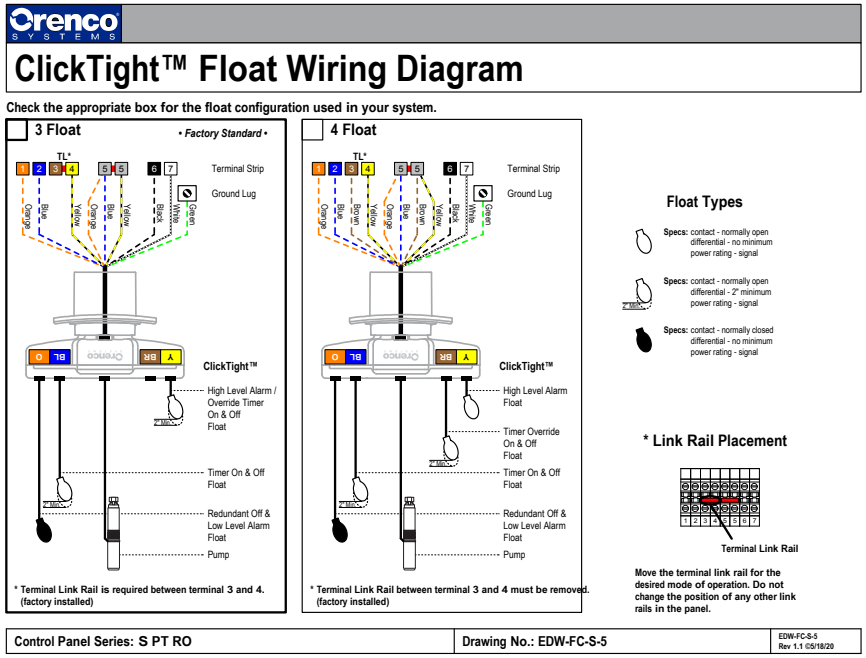




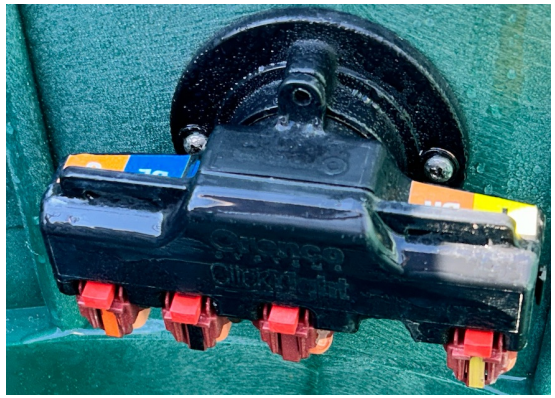
The bottom float powers the middle float on both of the S1 Float diagrams above. They functionally work the same to turn on the pump.

Verify Float Arrangement Diagram





- Is it ClickTight?
- How many floats are being used?
- Are the jumpers installed per the diagram?



Where to Focus

1) Control Circuit for the pump

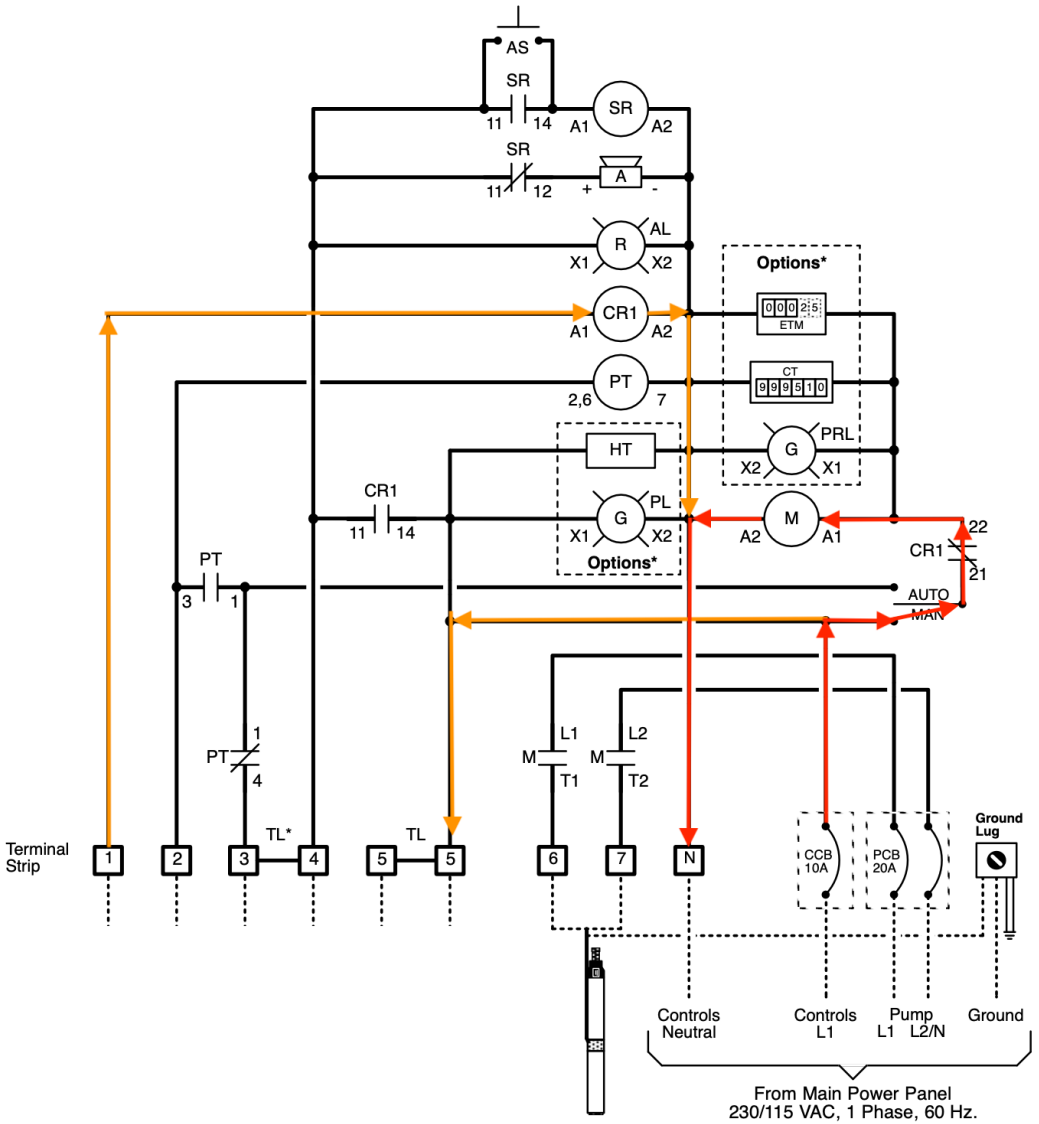
2) Pump Power Circuit

3) Low Level Alarm (LLA)

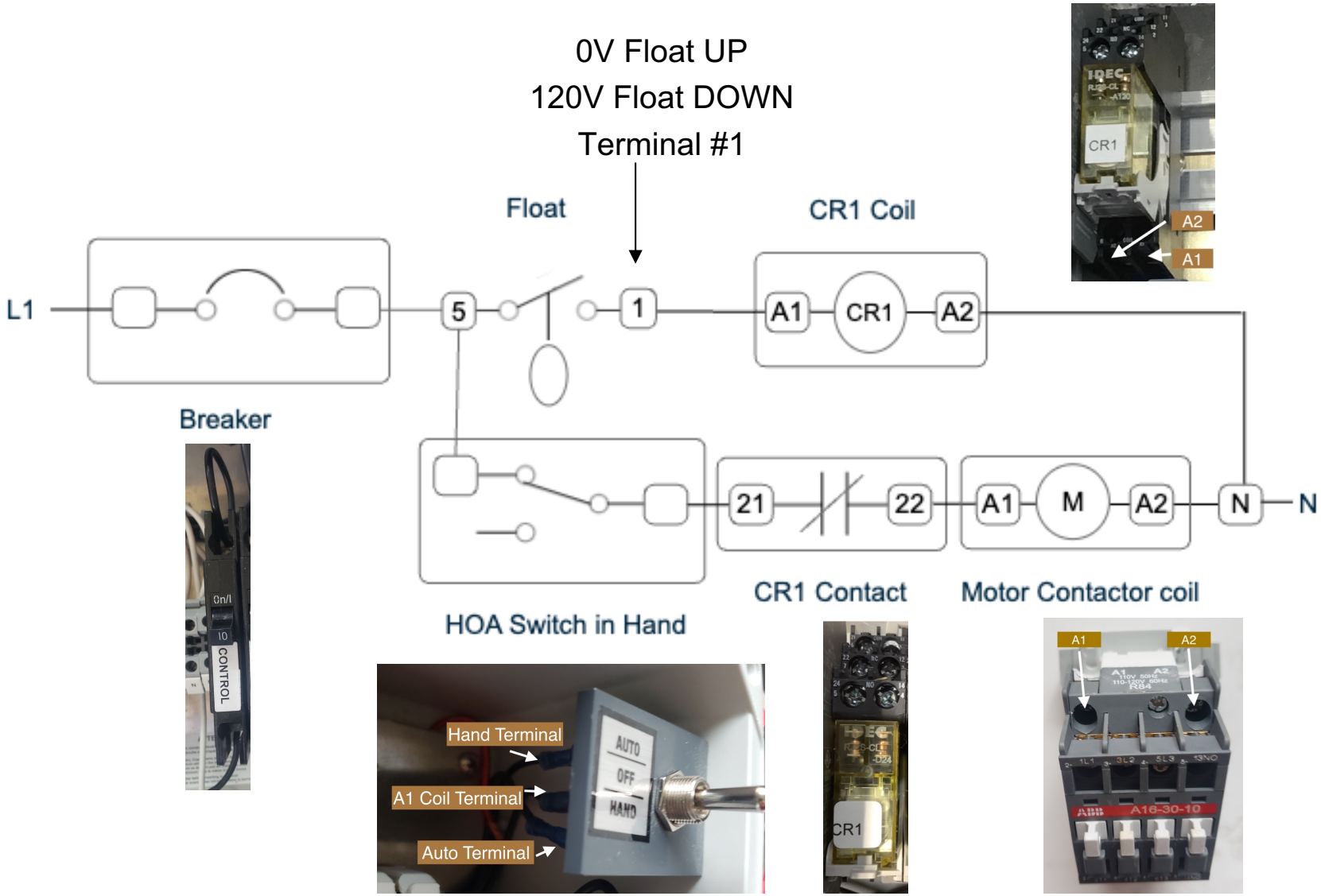
4) High Level Alarm (HLA)

5) Timer/Override Timer On/Off Circuit

Control Circuit For the Pump



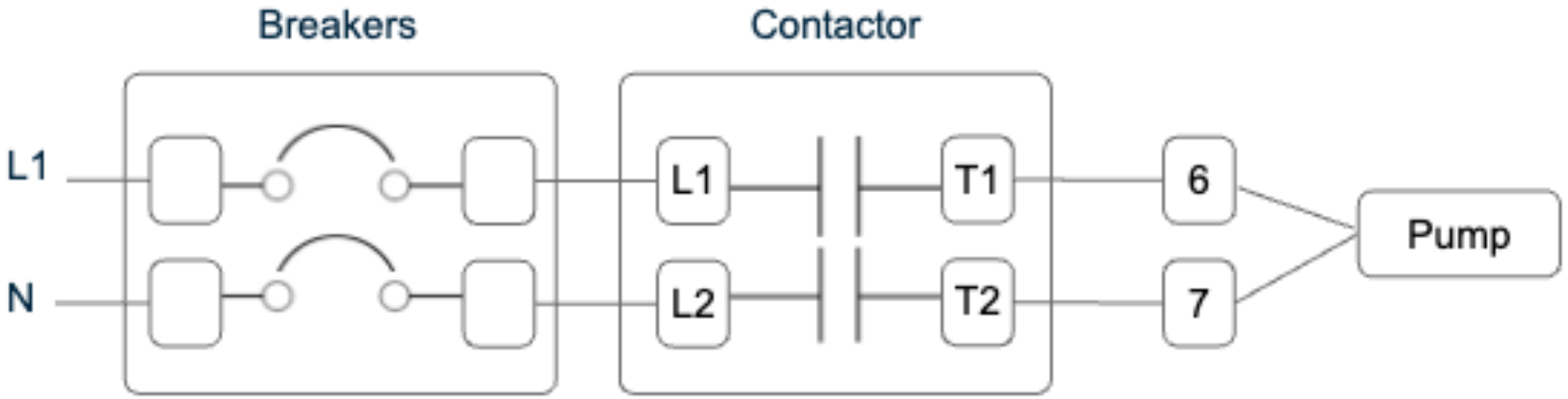
Control Circuit For the Pump – Components



Control Circuit For the Pump – Testing

- Turn off power to the pump breaker
- Turn on the control circuit breaker
- With RO float up, Place pump in hand – Motor contactor should engage
- If not check terminal voltage between Terminal #1 to Neutral.
- If there is voltage work towards the breaker finding the source of the voltage
- If there is no voltage check the CR1 relay.
- If the CR1 relay is working, check the leg from Terminal 5, HOA, CR1 Contact and coil until the source of the problem has been found.

Pump Power Circuit

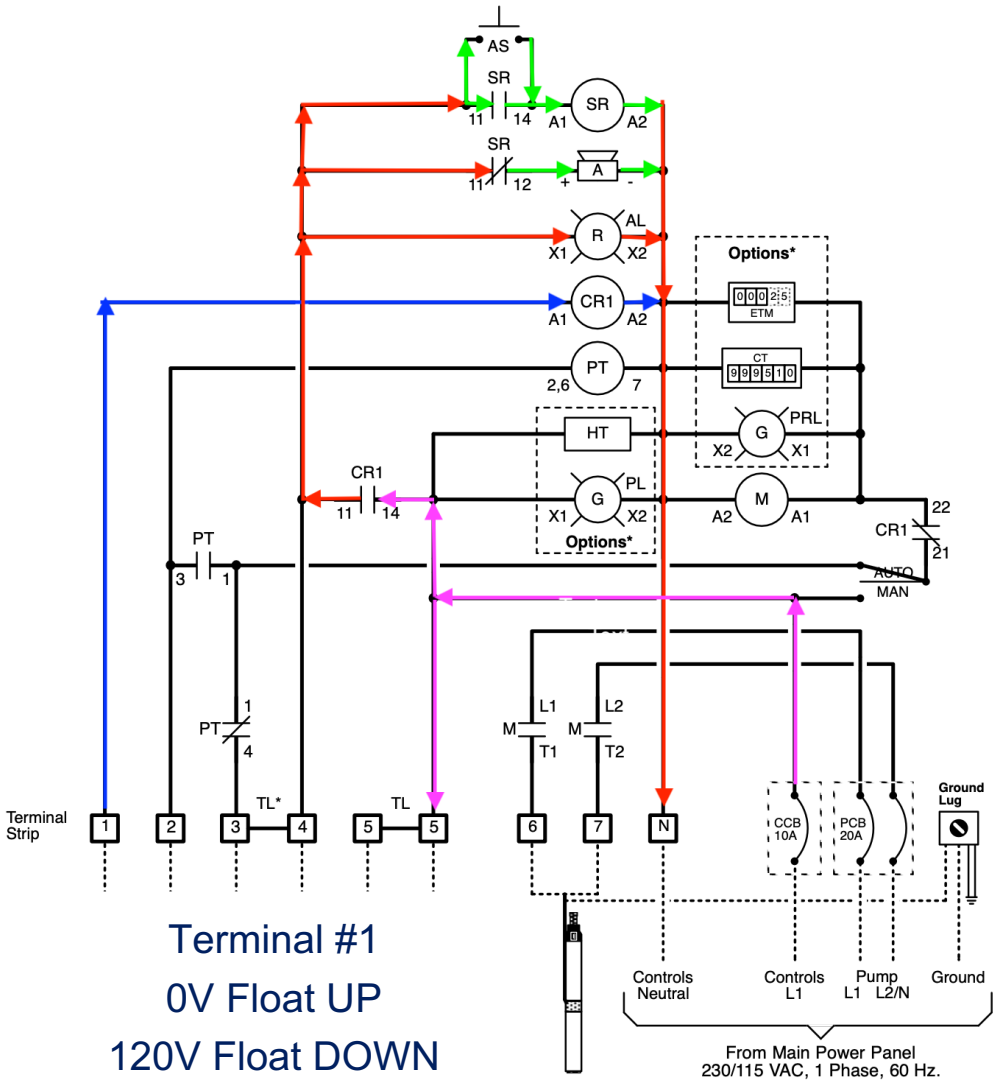


The pump circuit is physically isolated from the rest of the panel.

Pump Power Circuit - Testing

- Place in manual
- Contactor need to be engaged
- Measure voltage at #6 and #7
- If voltage is 120V, refer to the pump troubleshooting guide
- If 0 volts, check #7 to ground for 120 volts. This indicates a problem with the neutral leg
- If 0 volts, check #7 to ground for 0 volts. This indicates a problem with the hot leg
- Check voltage T1 and T2 on the motor contactor
- Check voltage L1 and L2 on the motor contactor
- Check voltage at the top of the breakers
- Check the voltage at the bottom of the breakers

Control Circuits - LLA

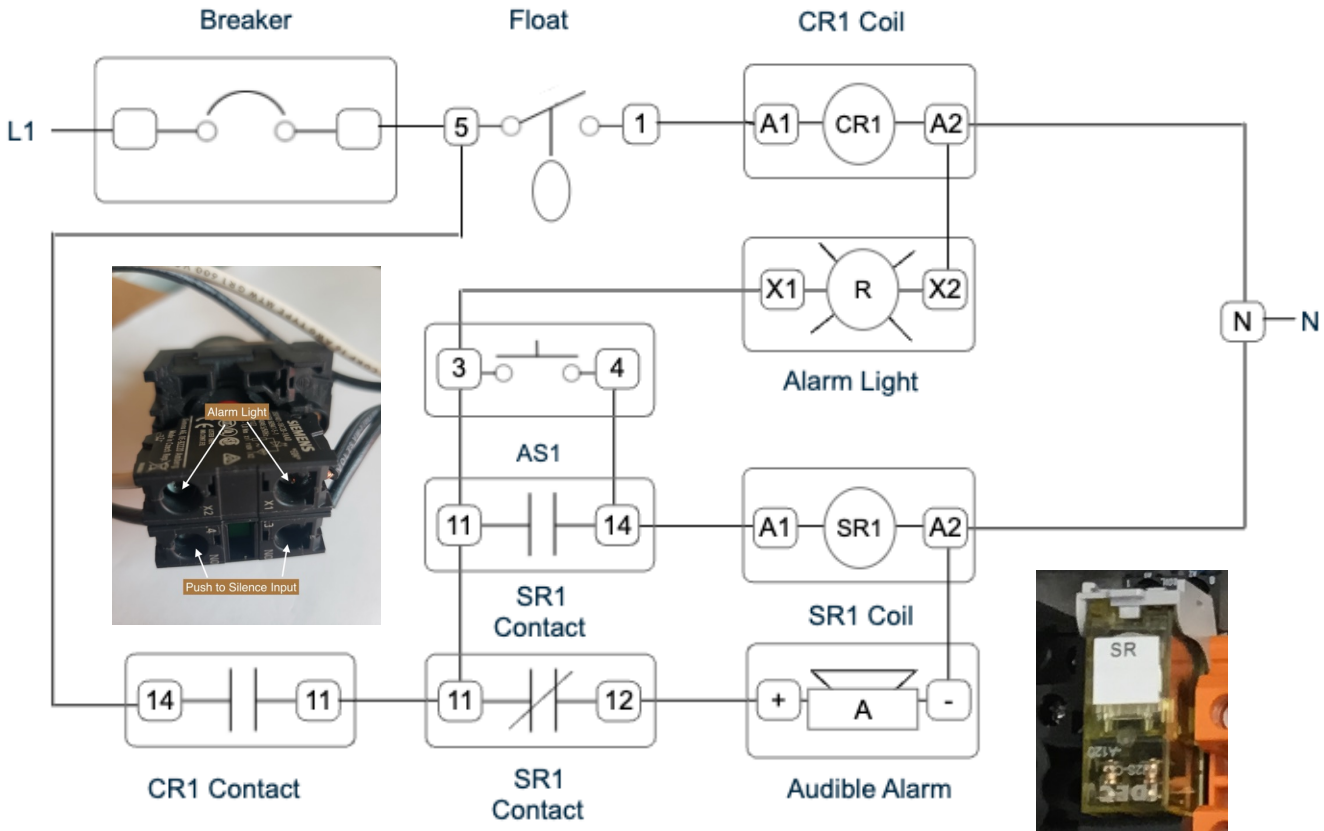


Terminal #1

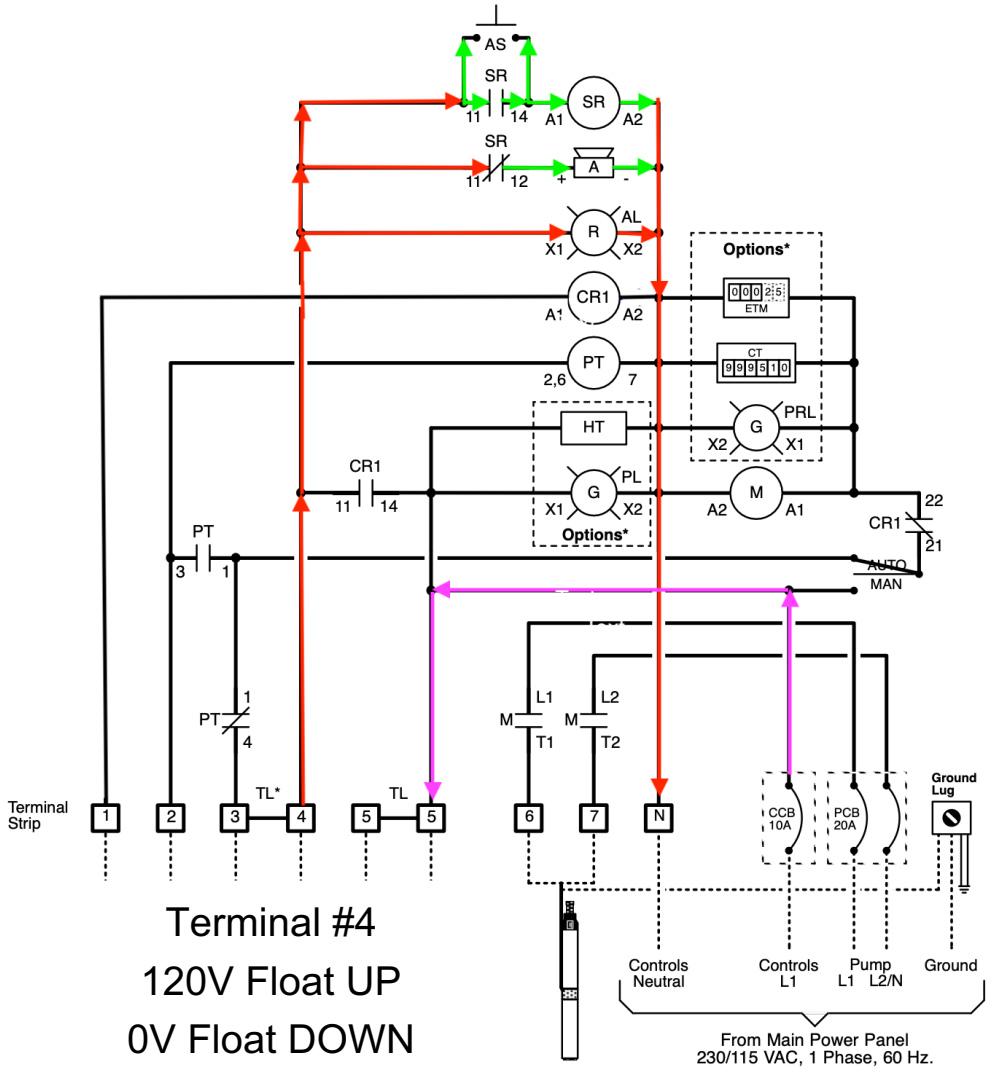
0V Float UP

120V Float DOWN

Audible Alarm Circuit – (LLA) Components



Audible Alarm Circuit – (HLA)

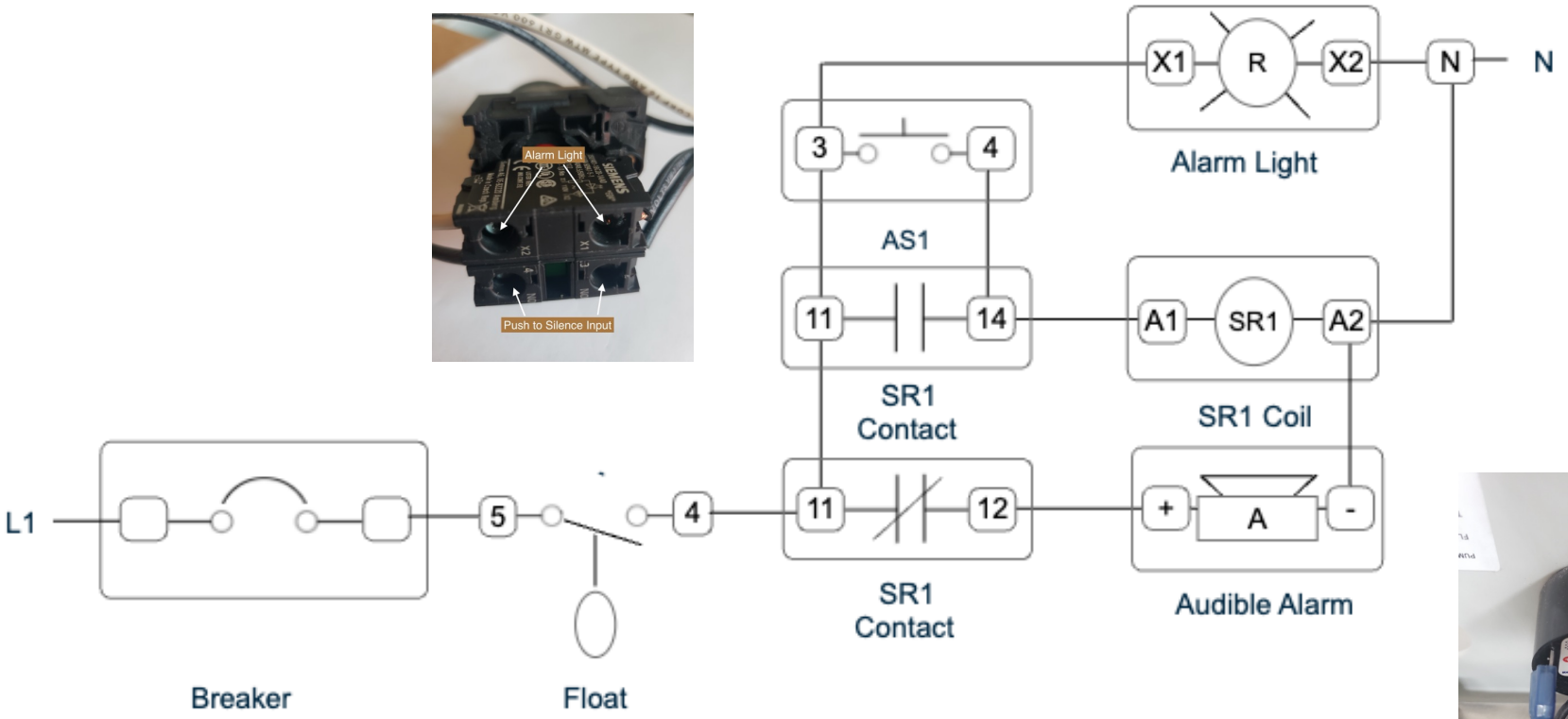


Terminal #4

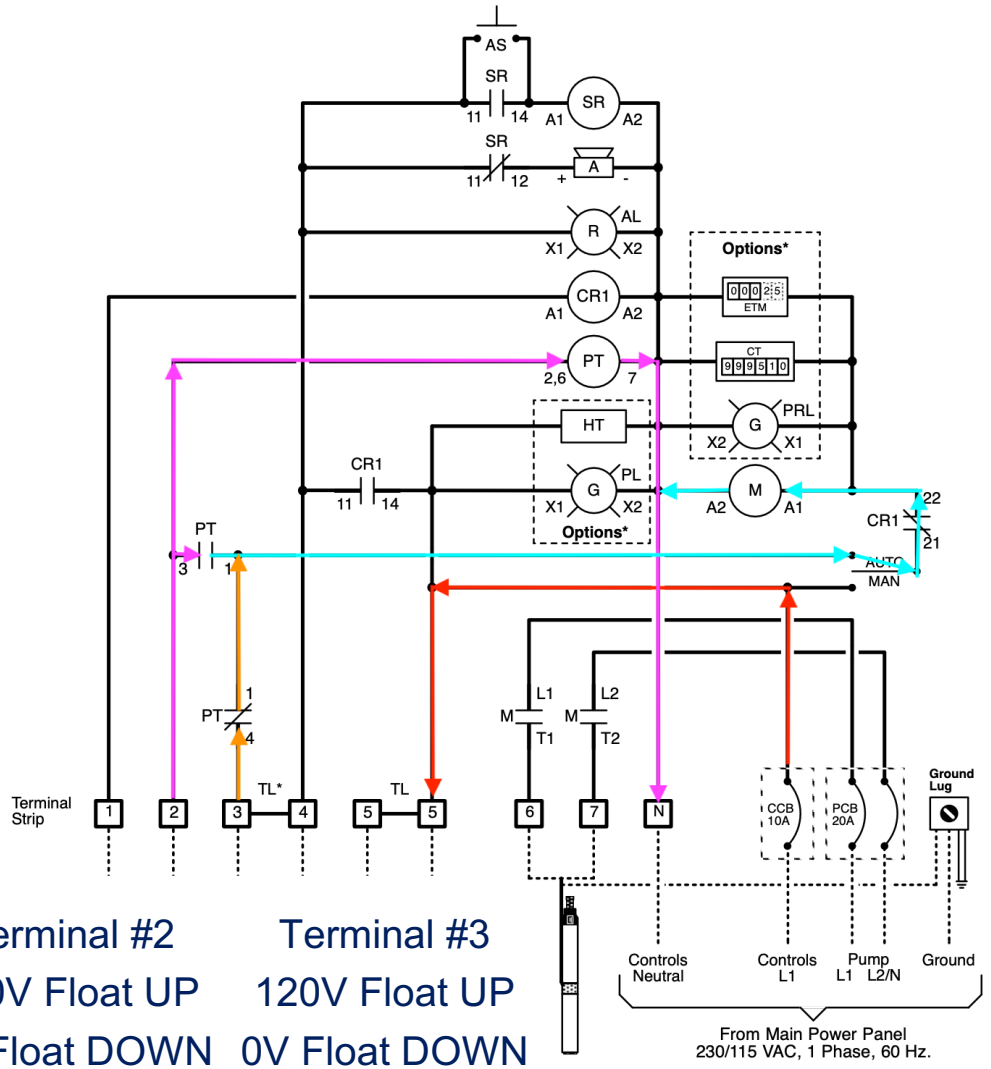
120V Float UP

0V Float DOWN

Audible Alarm Circuit – (HLA) Components



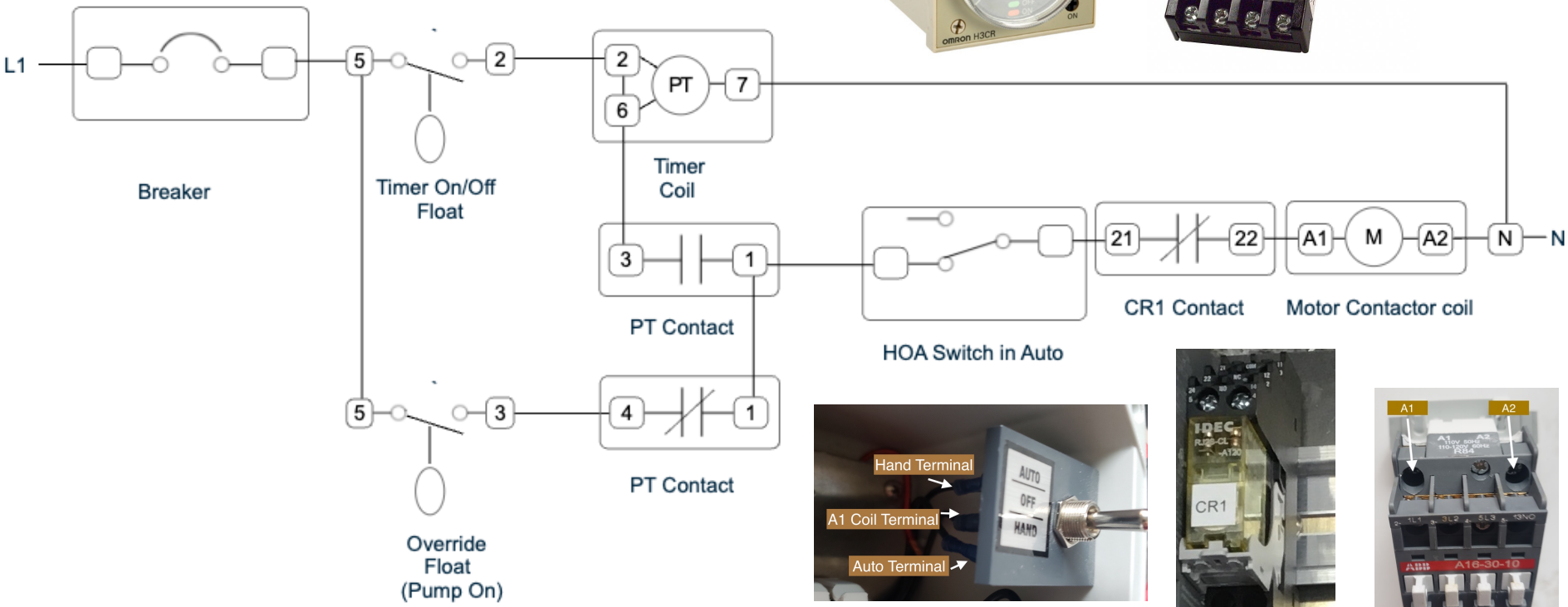
Timer/Override Timer On/Off Circuit



Terminal #2
120V Float UP
0V Float DOWN

Terminal #3
120V Float UP
0V Float DOWN

Timer/Ovr Timer On/Off Circuit - Components



Timer/Ovr Timer On/Off Circuit – Testing

Timer

- With the power off to the control and pump breakers, reduce off time on the timer by reducing the off time into the minutes range.
- Turn the panel on.
- Place the panel in Auto.
- Lift the RO and timer on/off float.
- The timer should cycle and the Off light on the timer should be on. The Off and On lights should alternate if working

Override Timer

- Lift the override timer float and if the timer is not in the on cycle it will still be on

Where to Focus

1) Control Circuit for the pump - Redundant Off (RO) for Pump

2) Pump Power Circuit (same as above)

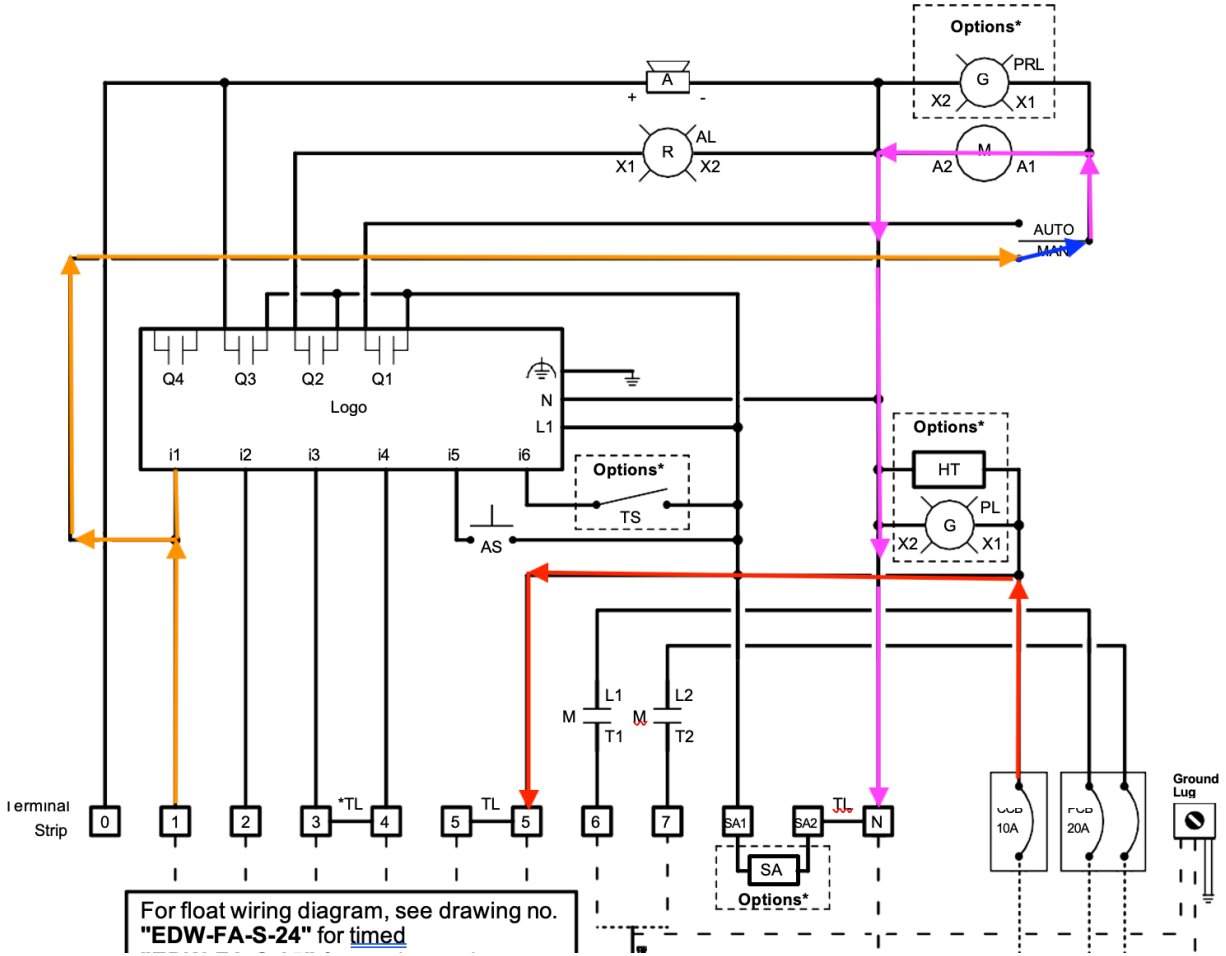
3) Logo Controller inputs

4) Low Level Alarm (LLA)

5) High Level Alarm (HLA)

6) Timer/Override Timer On/Off Circuit

Control Circuit For the Pump - Redundant Off

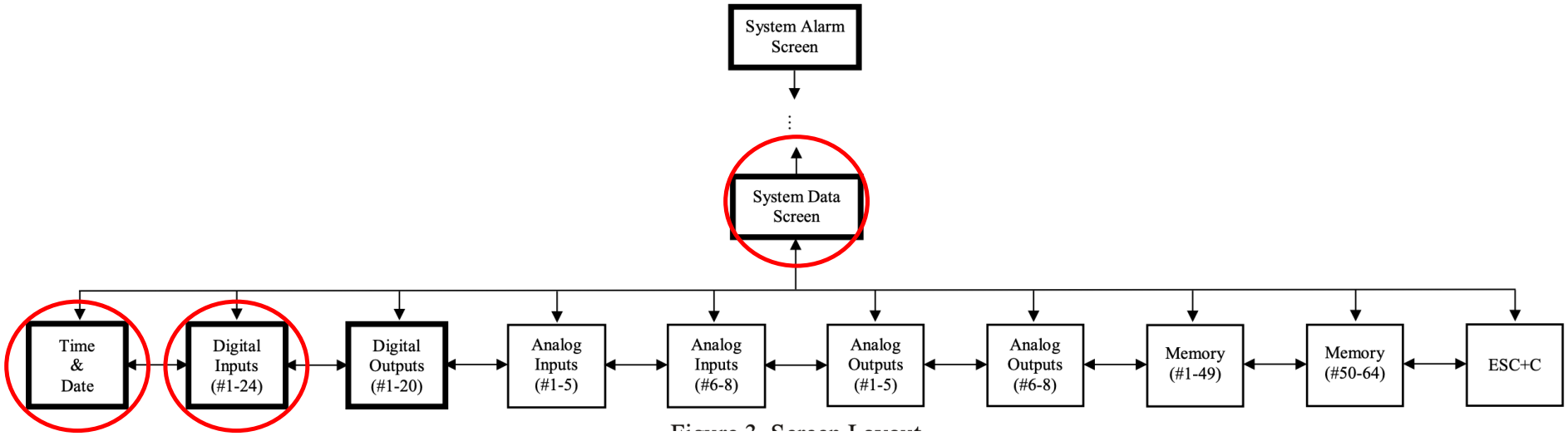


Voltage on Terminal #1 provides source voltage for the coil

Digital Inputs - Data Screens

Screen Navigation:

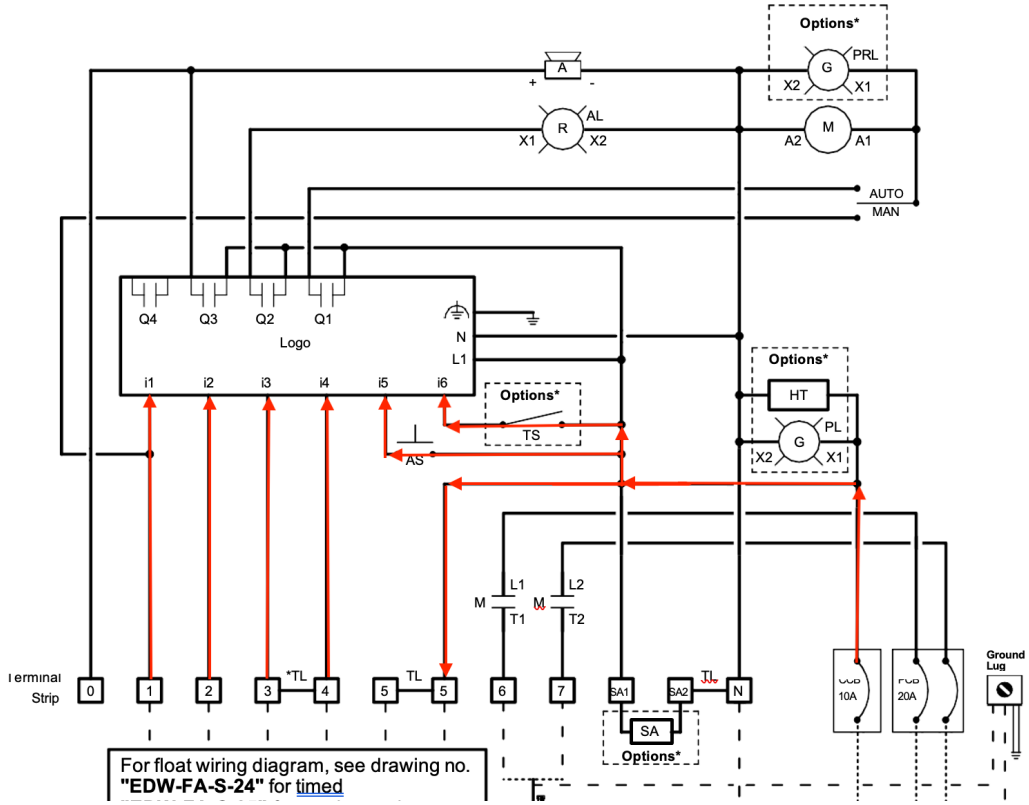
The screens are arranged in the order shown in Figure 3 below. To move between screens, use the four arrow keys. The screens of interest are shown in bold. Additional built-in screens will be present, but do not contain useful information.



Critical Logic Settings do's and don'ts

- Do not set timer to 00:00 S/M/H
- Set Timer off for both Timer Off and Timer Override Off
- Set Timer on for both Timer On and Timer Override On
- Time Dose Mode needs to be set correctly
- Minimum pump run time is applied after the Off Float drops.
- The off timer runs first (if 3 hours, you will wait 3 hours)

Control Inputs



I1 - Audible Alarm Circuit – Low Level Alarm (LLA)

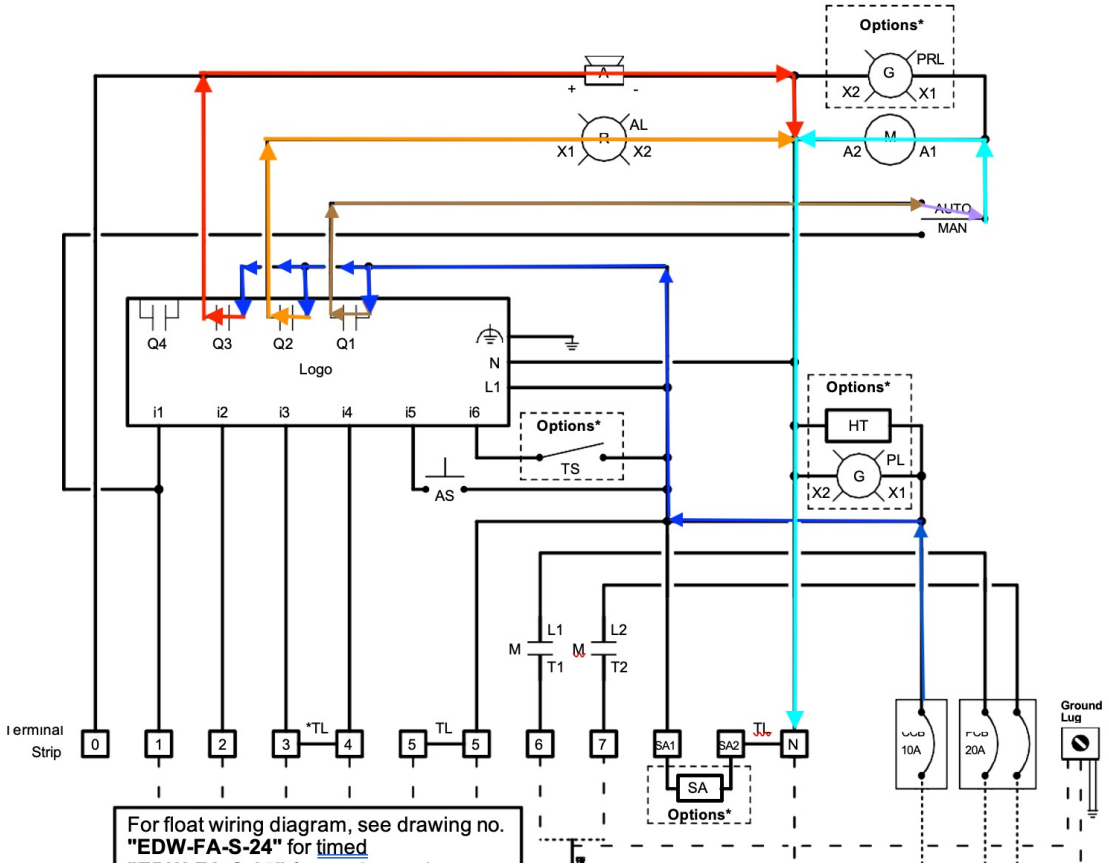
I2 - Timer On/Off Circuit

I3 - Timer/Override Timer On/Off Circuit

I4 - Audible Alarm Circuit – High Level Alarm (HLA)

I5 – Push to Silence

Outputs



Q1 – Pump On/Off

Q2 – Alarm Light On/Off

Q3 – Audible Alarm On/Off

Testing

Q1 – Pump On/Off

Shorten off time by adjusting timer units

Q2 – Alarm Light On/Off

Initiate alarm

Q3 – Audible Alarm On/Off

Initiate alarm, then push the “Push to Silence” on the panel door.

Solutions for Decentralized Wastewater Treatment

Questions?

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