

READ THE MANUAL ! UNDERSTAND ALL SAFETY CONCERNS !



WATER VAPOR CRYO-CHILLER
INSTRUCTION MANUAL

Part No 19-0001-00

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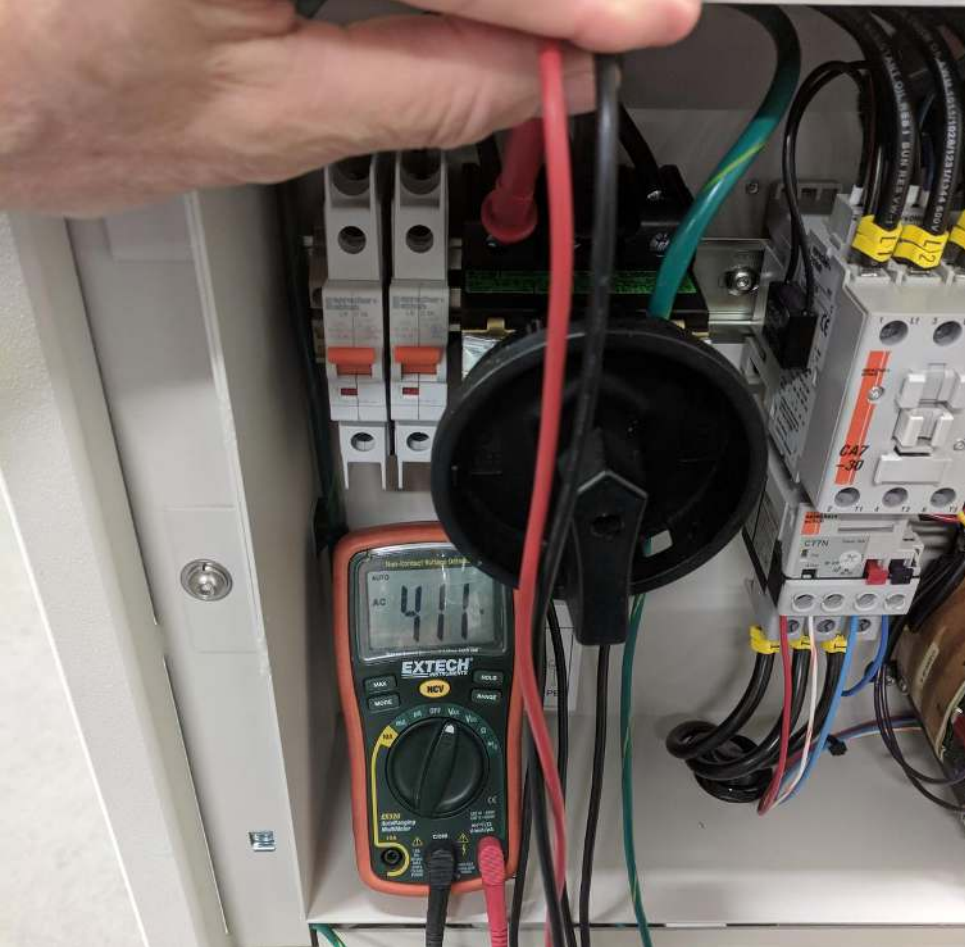
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of their respective companies.

What do these letters mean???

- DP Discharge Pressure reading from the compressor.
- SP Suction Pressure reading from the compressor.
- CI Coil In. The cold gas going into the coil at the chamber. Coming out of the Cryochiller connections.
- CO Coil Out. The cold gas coming back from the coil in the chamber. Going back into the Cryochiller connection.
- LL Liquid Line temperature. This will shut unit off if above set point of 40C. This is temperature of the gas after cooled by the water going to the coaxial coil.
- CT Coldest Temperature. This is the internal coldest point inside the foamed stack.
- DT Discharge Temperature. This is temperature of the hot gas at the compressor
- BP Balance Pressure.

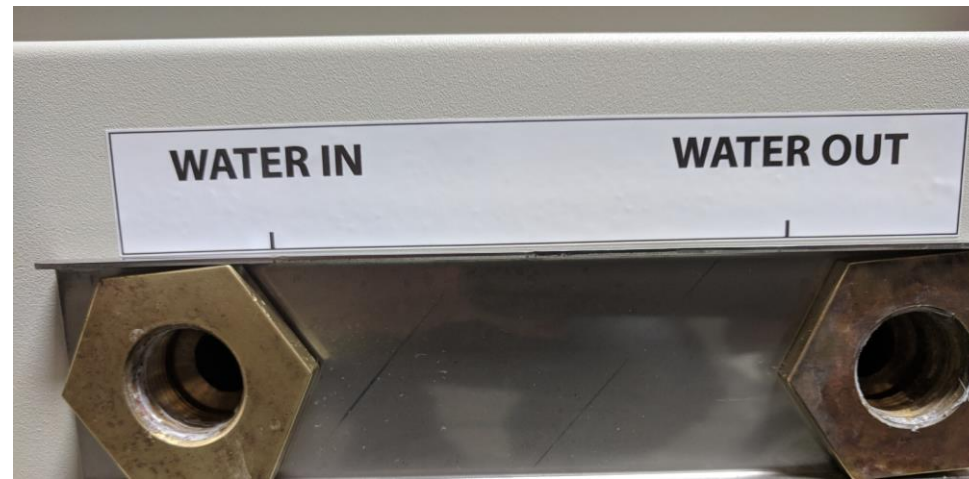
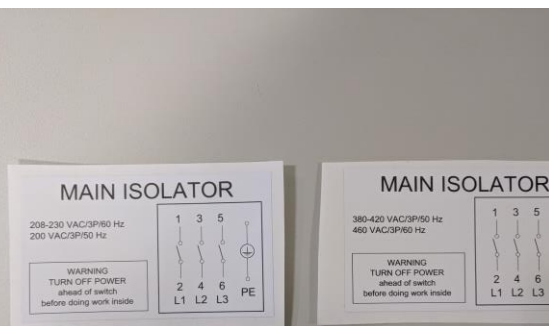
This the reading of the DP when system has been turned off for 24 to 48 hours. This is important number to know to see if system has a leak. The DP reading should be recorded and left at any unit when first starting up system. This is some of the most valuable information you can have for trouble shooting the Cryochiller.

- For error codes on LCD display screen, see page 48 in manual.



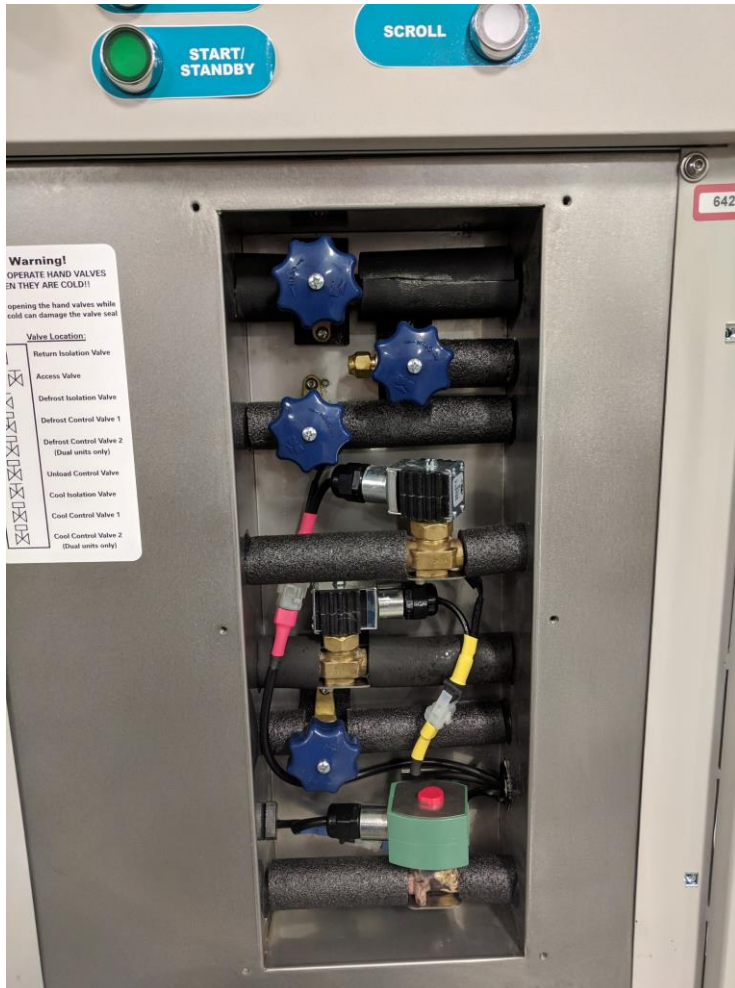
Are all your connections installed and do you have the proper incoming line voltage?

- Have the cooling lines to the chamber been hooked up, leak checked and evacuated for at least 2 hours?
- Are your water lines connected with $\frac{3}{4}$ inch water line/19 mm and flow direction correct?
- Is your incoming power correct?
- Remote interface wired correctly if being used?

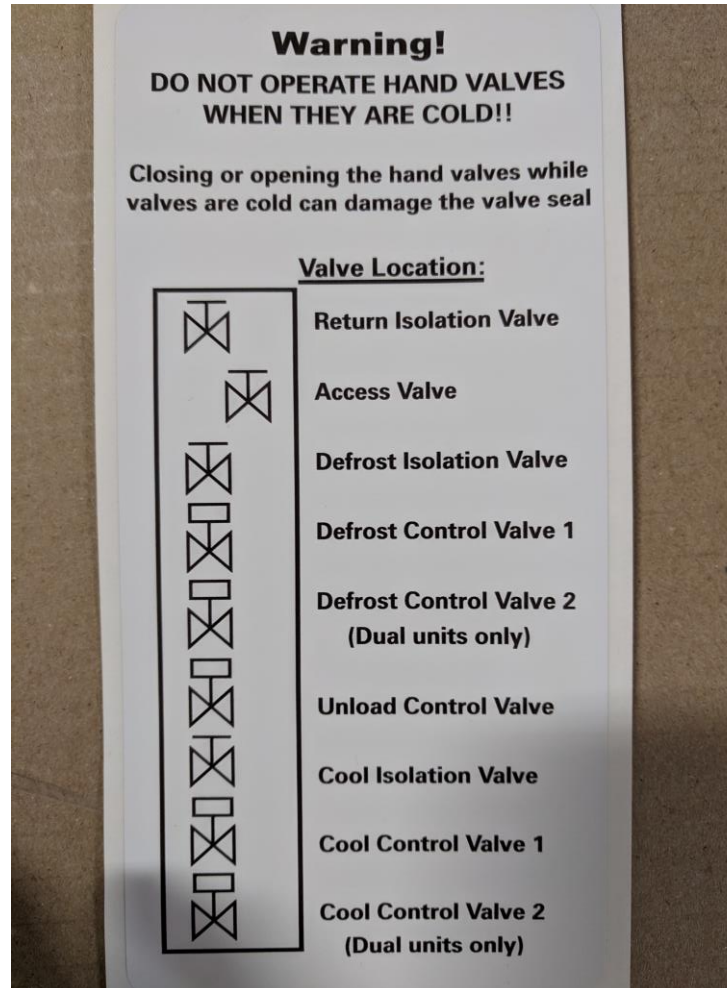


Valve box

Small frame valve box



Large frame valve box

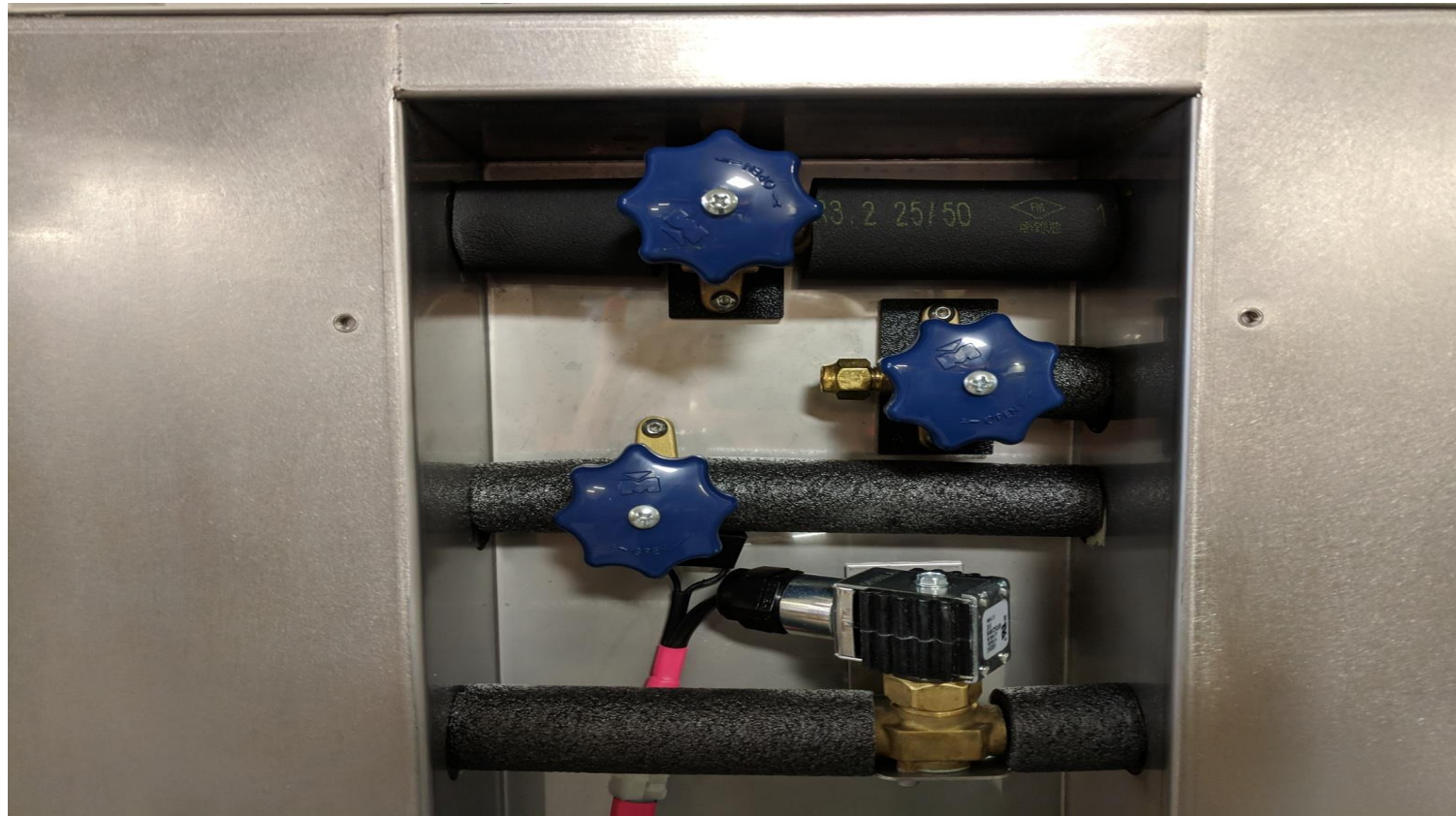


Top valve, common return (CO line)

Second from top Access valve. This is used to leak check the coil, line set, evacuate lines and coil after no leakage is confirmed.

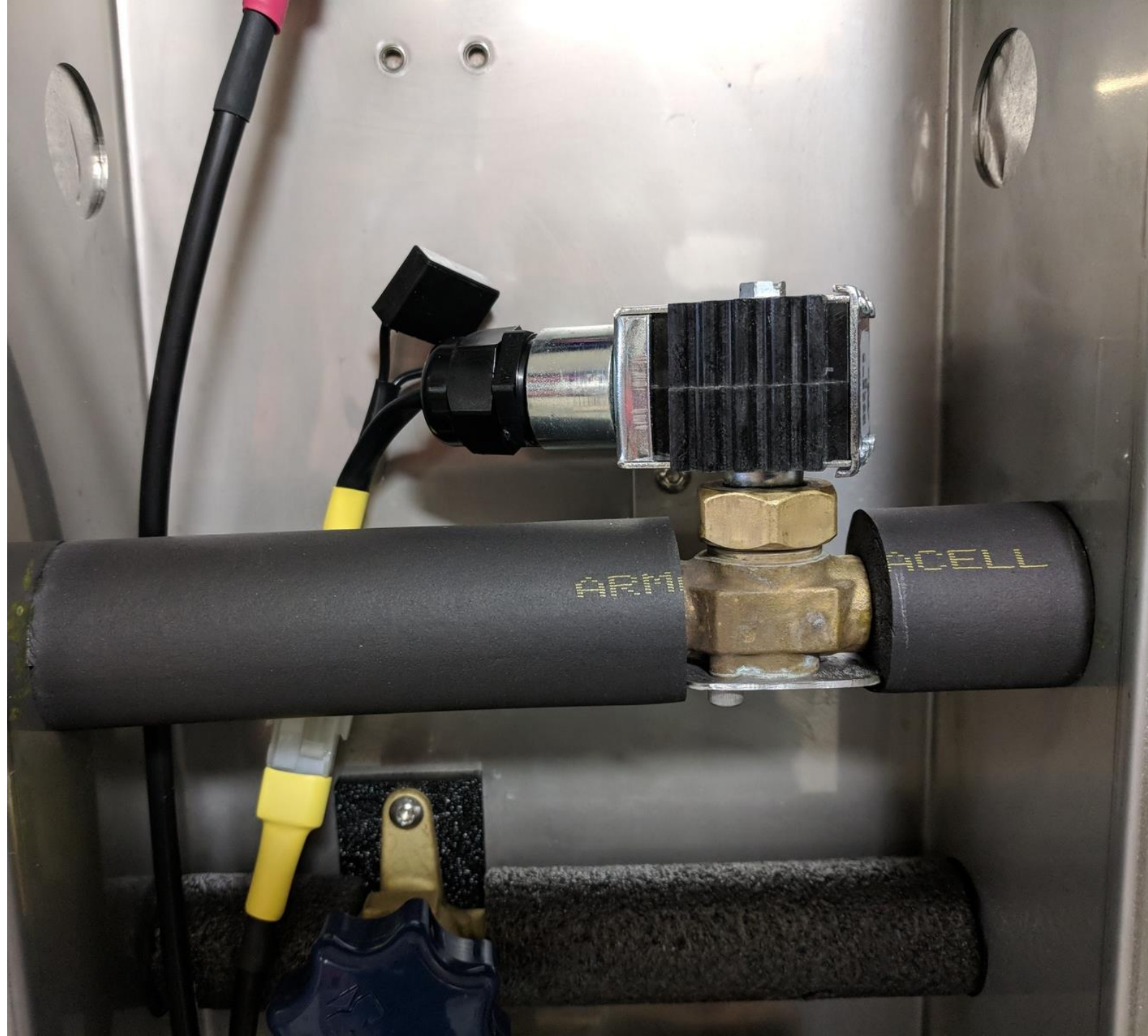
Third down Defrost hand valve isolates refrigerant gas from defrost solenoid.

Fourth down ,defrost solenoid valve.



Bypass Solenoid valve. (YELLOW TAPE)

- When active there is 24 VAC at the connector.



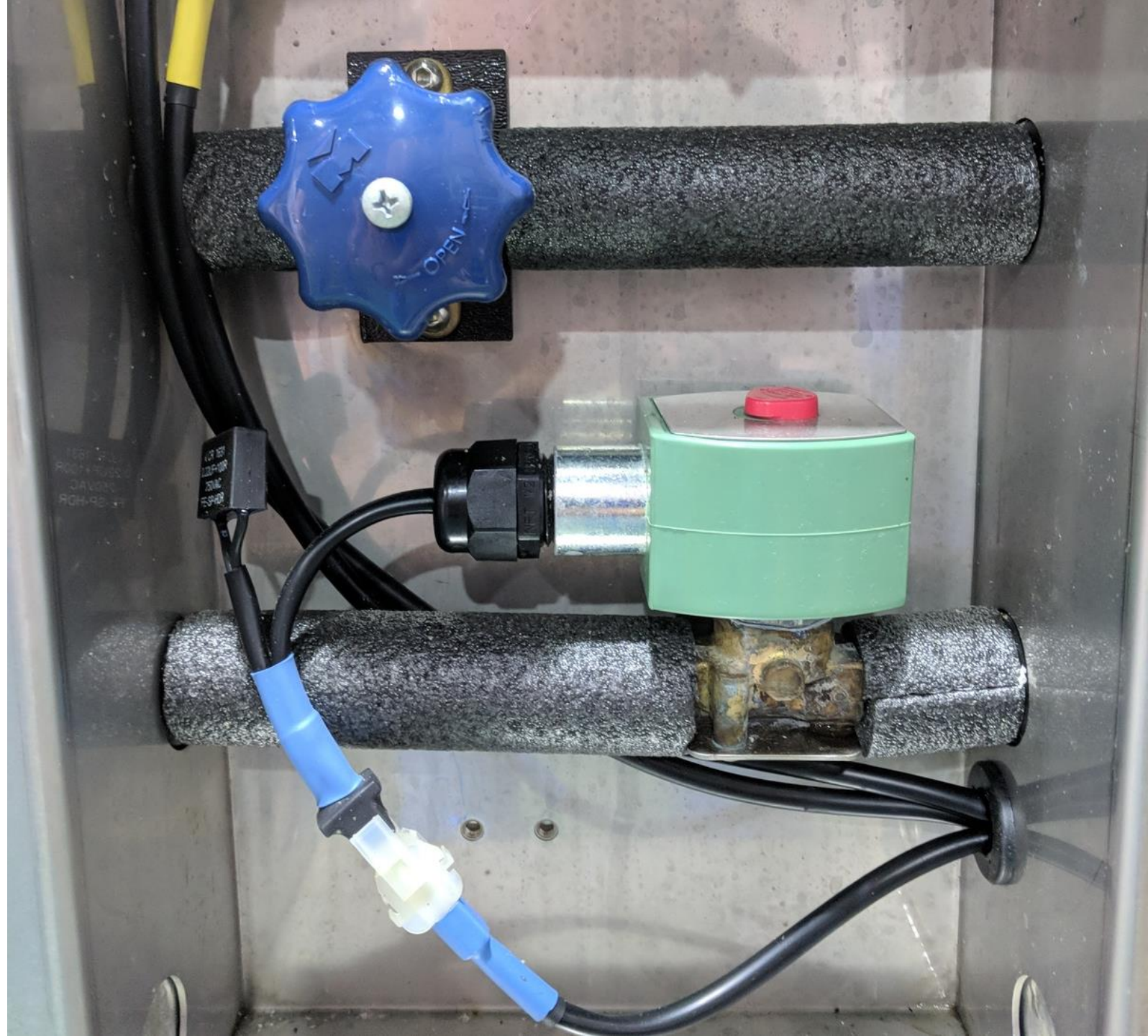
Defrost isolation hand valve
and defrost solenoid valve.
(RED TAPE)

- When active there is 24 VAC at the connector



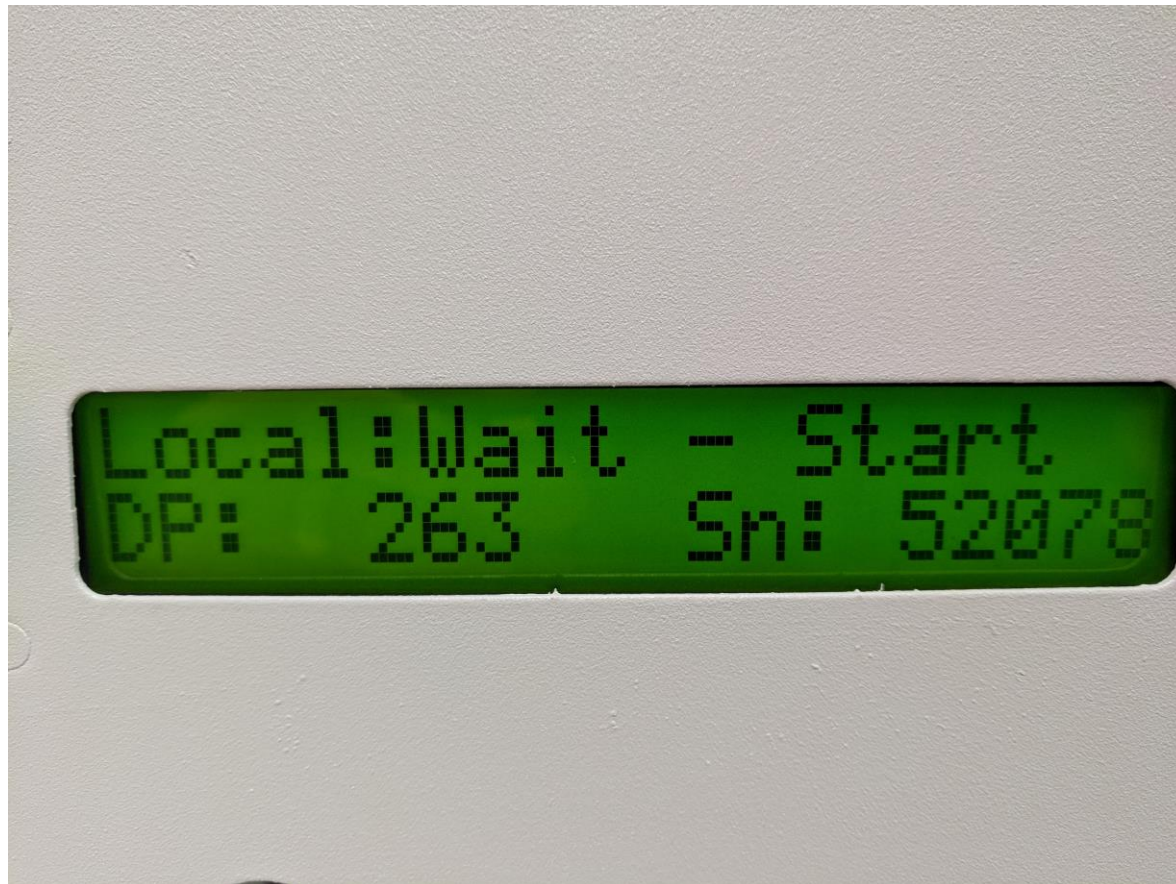
Cool isolation hand valve
and Cool Solenoid valve.
(BLUE TAPE)

- When active there is 24 VAC at the connector.

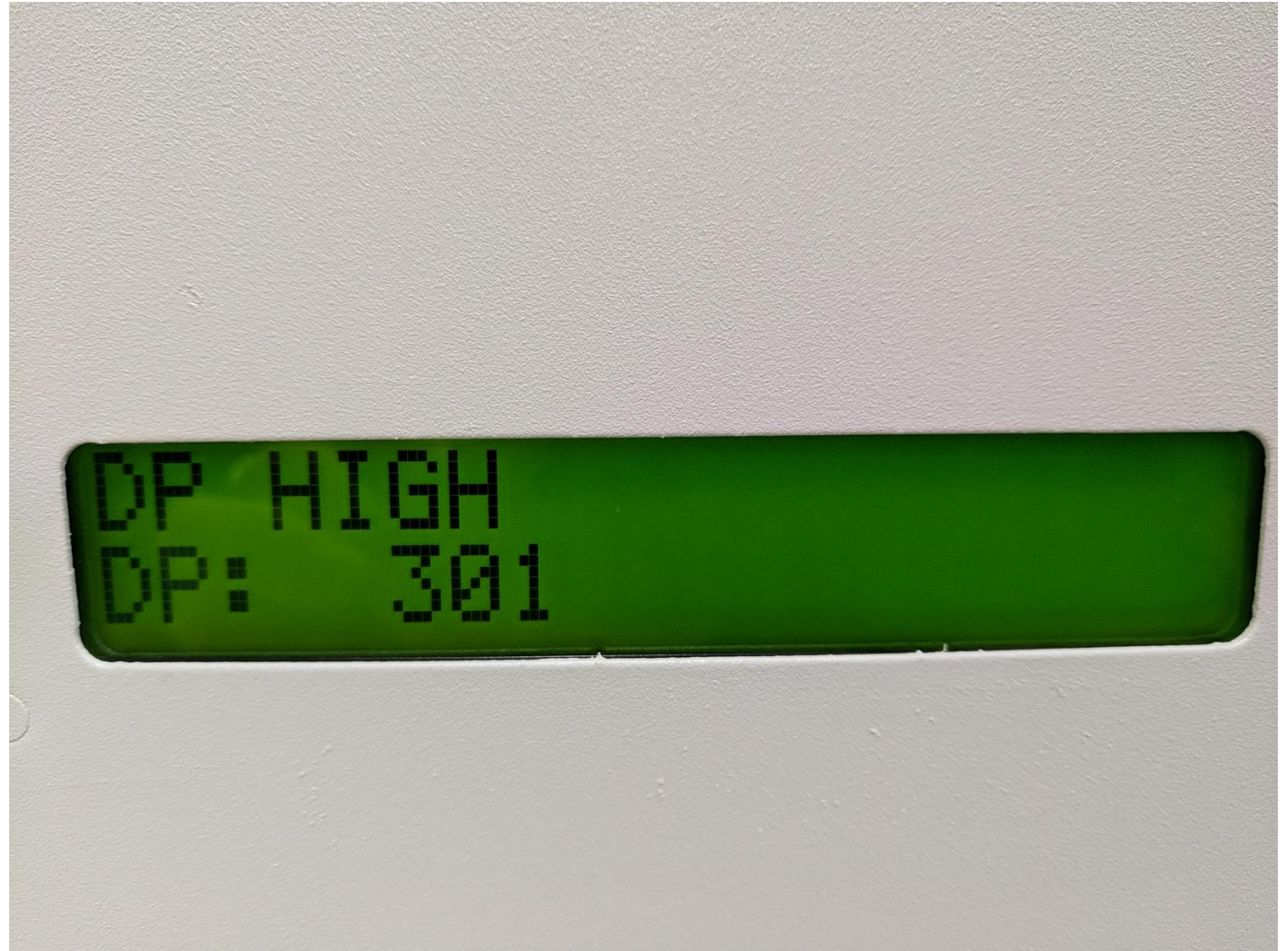


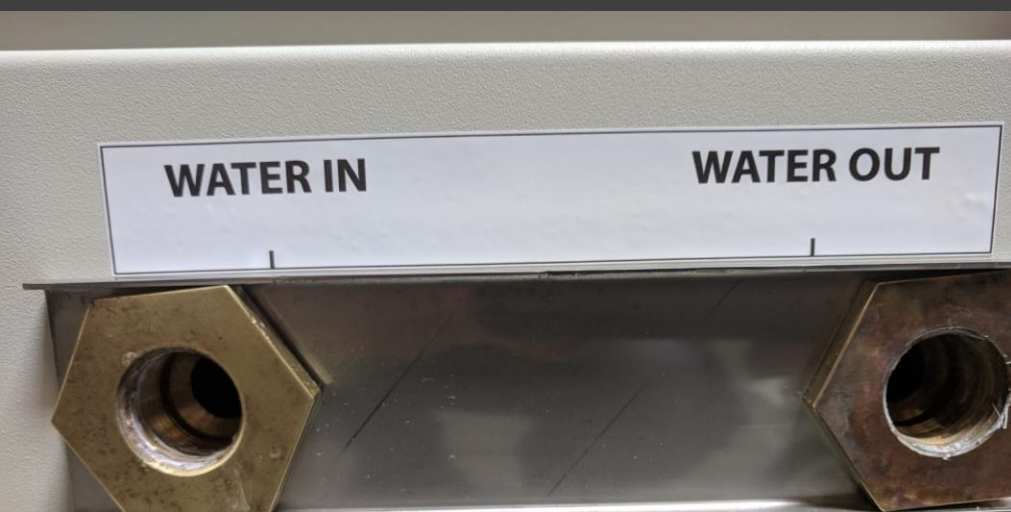
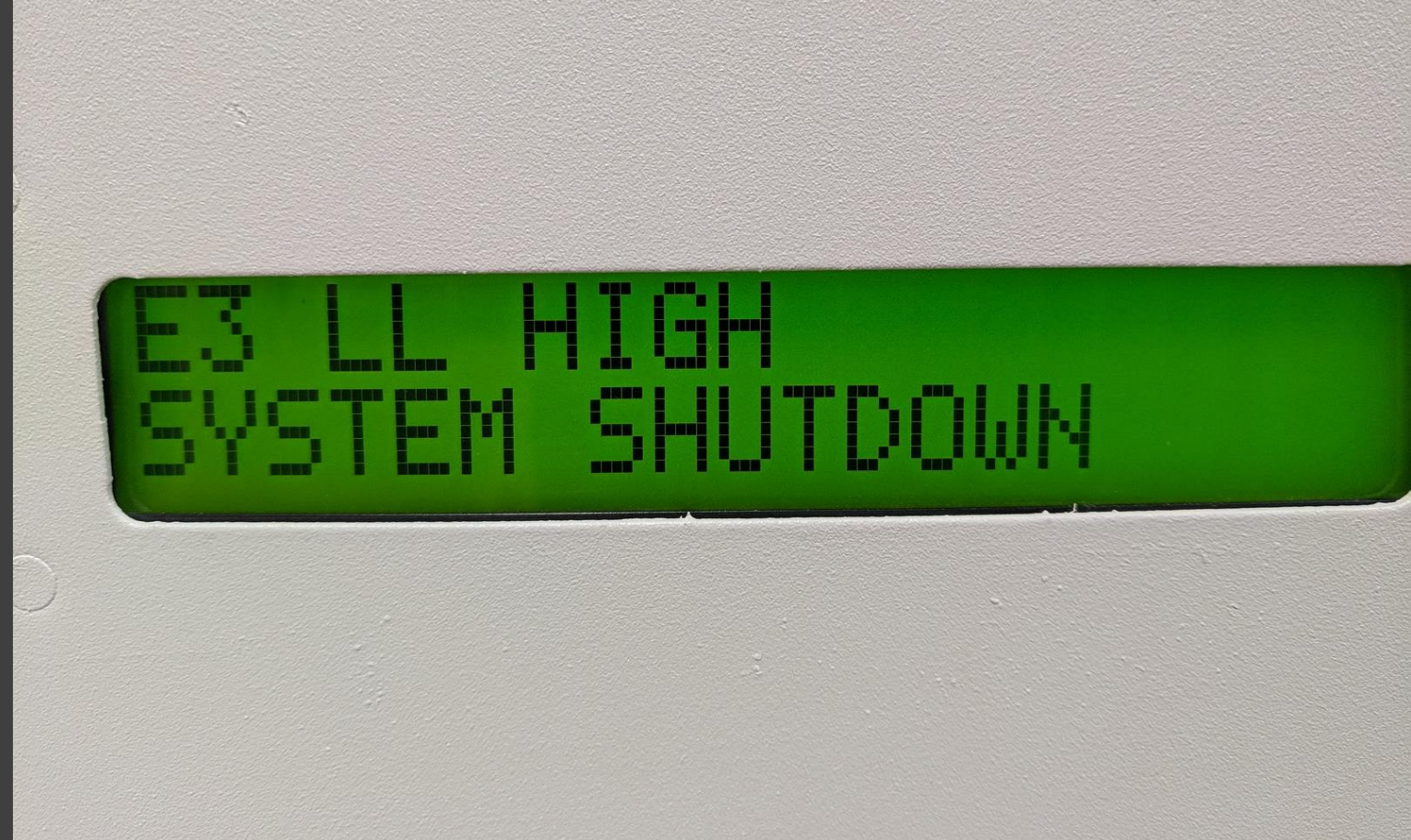
Unit waiting to start in Local Mode.

To start, press and hold Start/Standby button for 3 to 6 seconds



Balance pressure when hand valves are open and above 300psi will not start and give a “DP HIGH” Error. Gas will need to be removed so reading is under 300psi. This can be done easily at Access hand valve “Stop/Reset” button will need to be cycled.



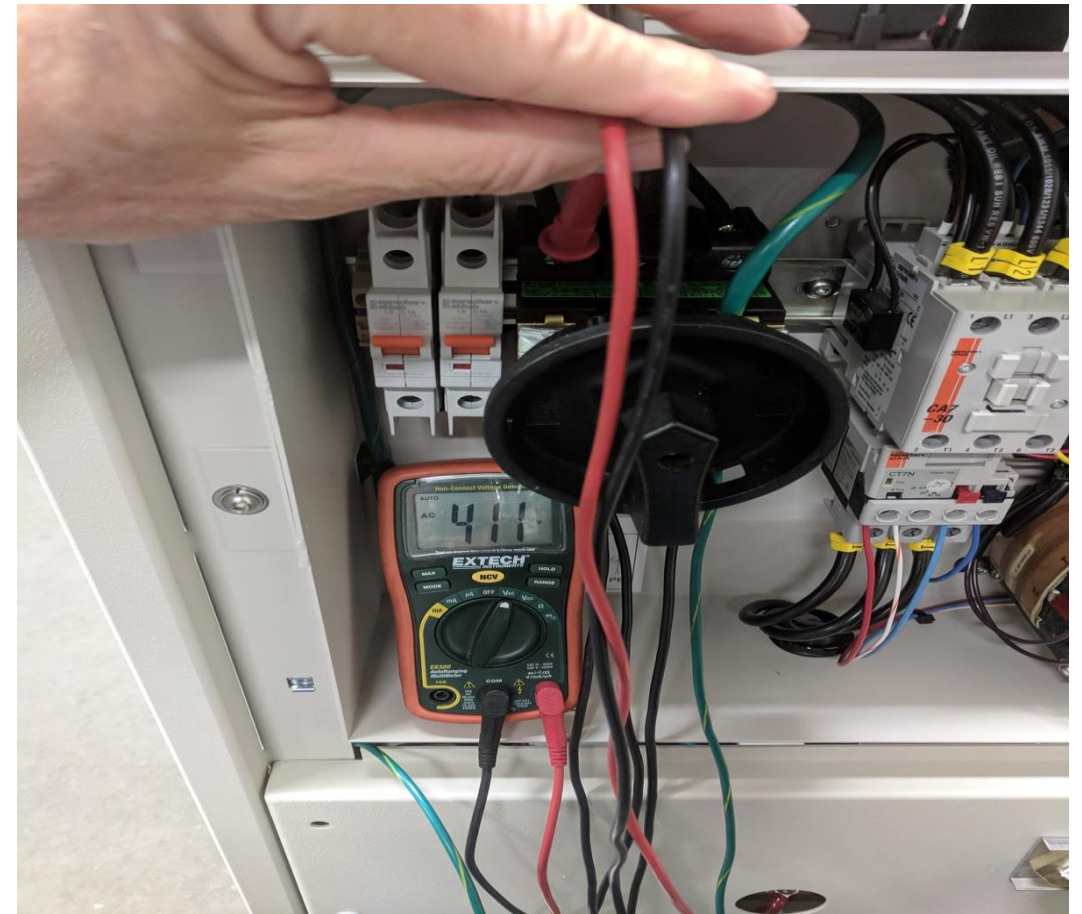
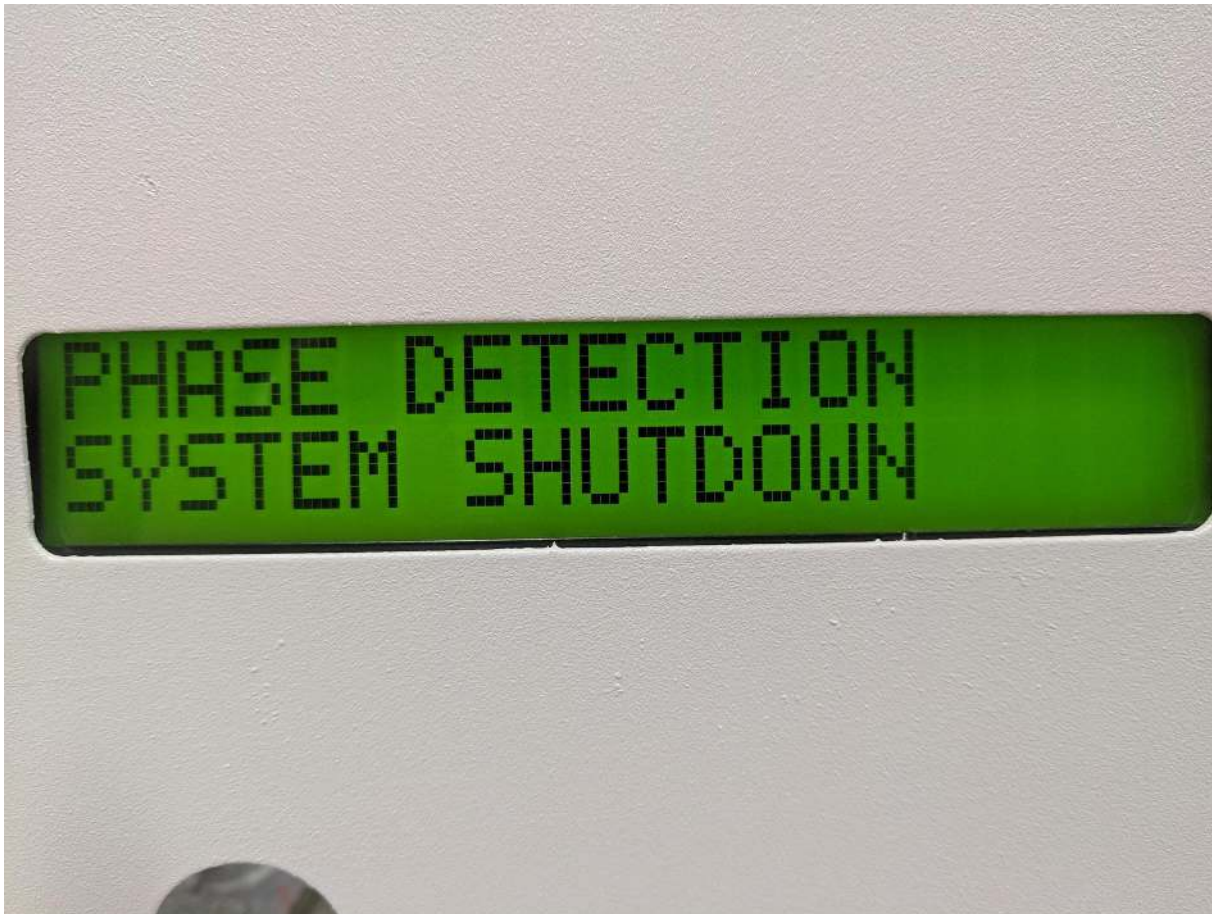


If supply water temperature is too high, too low or no water flow or installed with backwards flow direction, "LL HIGH "Error could be displayed.

Fix cause of water flow problem and cycle "Stop/Reset" button

Unit is Phase sensitive. Depending on compressor it will detect phase error two different ways. If phase is incorrect the compressor will be loud and have a ratcheting sound.

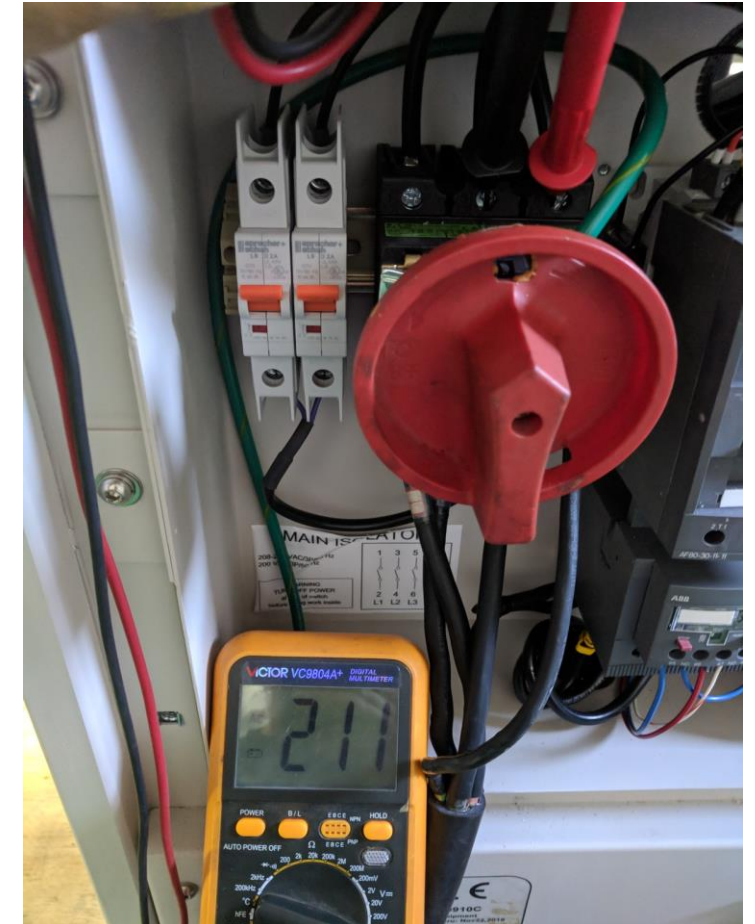
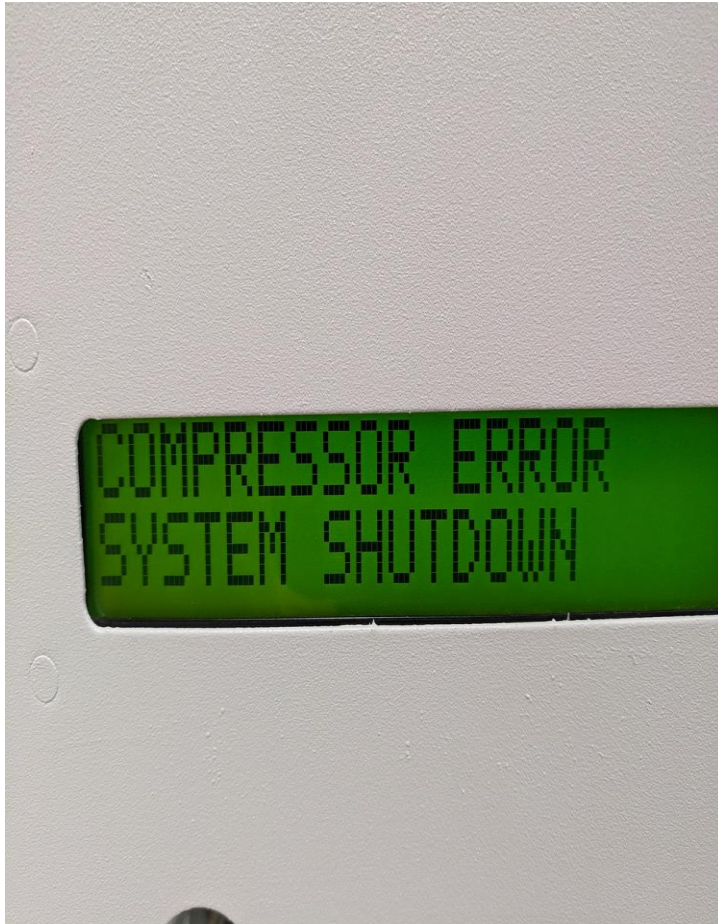
Cryochillers built with Bitzer compressors will have "Phase detection" error on LCD. Change over two of the incoming phase wires at main power input to change phase rotation.



For Cryochillers built with Emerson compressors, it has a “Core Sense Module” This will detect many compressor problems and report back on LCD screen as “Compressor error.” Read flashing display for what the problem is.

Reverse phase flashes 7 times

Change two main input phase wires to reverse phase



“COMPRESSOR ERROR”

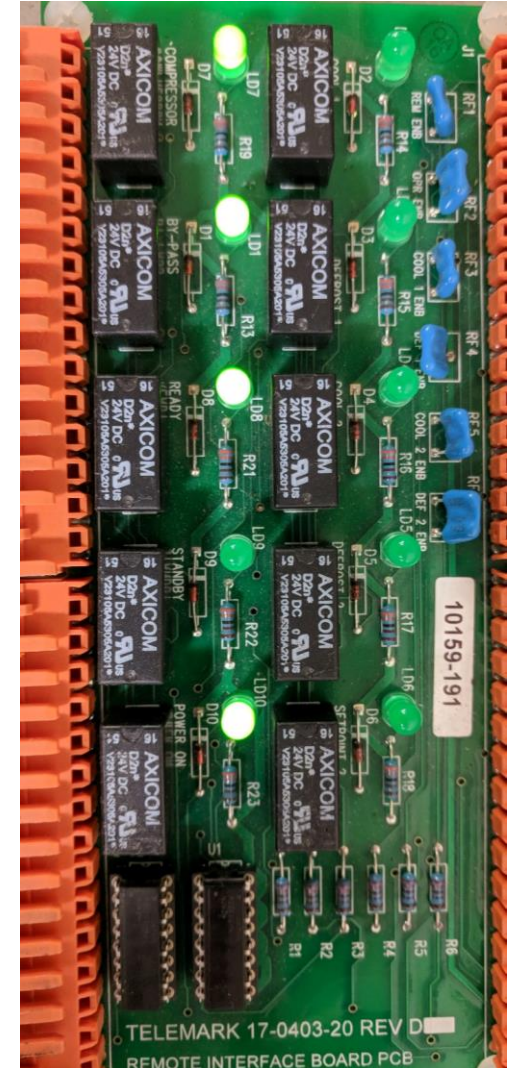
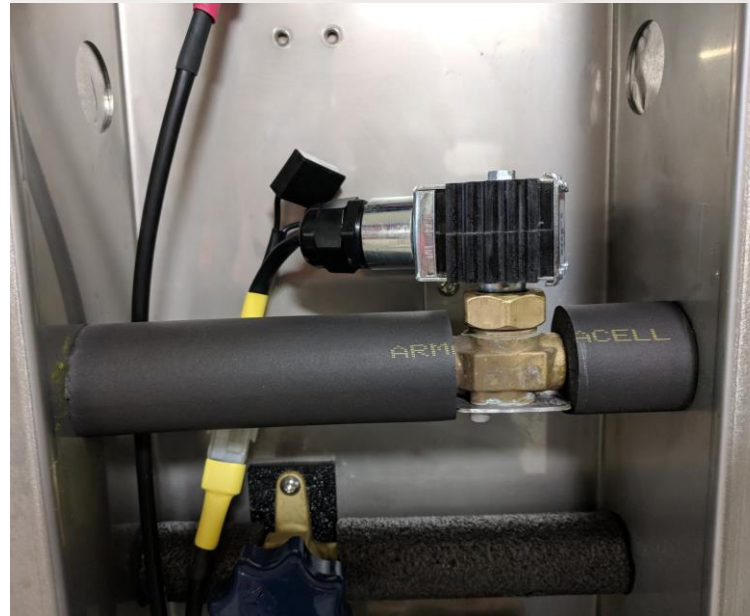
Caused by DT too high

- On units with a Bitzer compressor or an Emerson compressors without a Core Sense module there is a resettable switch mounted to the discharge line of the compressor. This will trip out if the compressor discharge temperature goes above 150C. Rest the switch and cycle the “STOP/REST” switch.
- Cause of this can be low or no water flow
- Gas charge leak, gas is too low or mix has been topped off too many times and charge mix is not correct now. Unit needs a recharge.
- Units with a Core Sense Module when the DT is too high will display “Compressor error”. The light on Core Sense will flash 1 time.

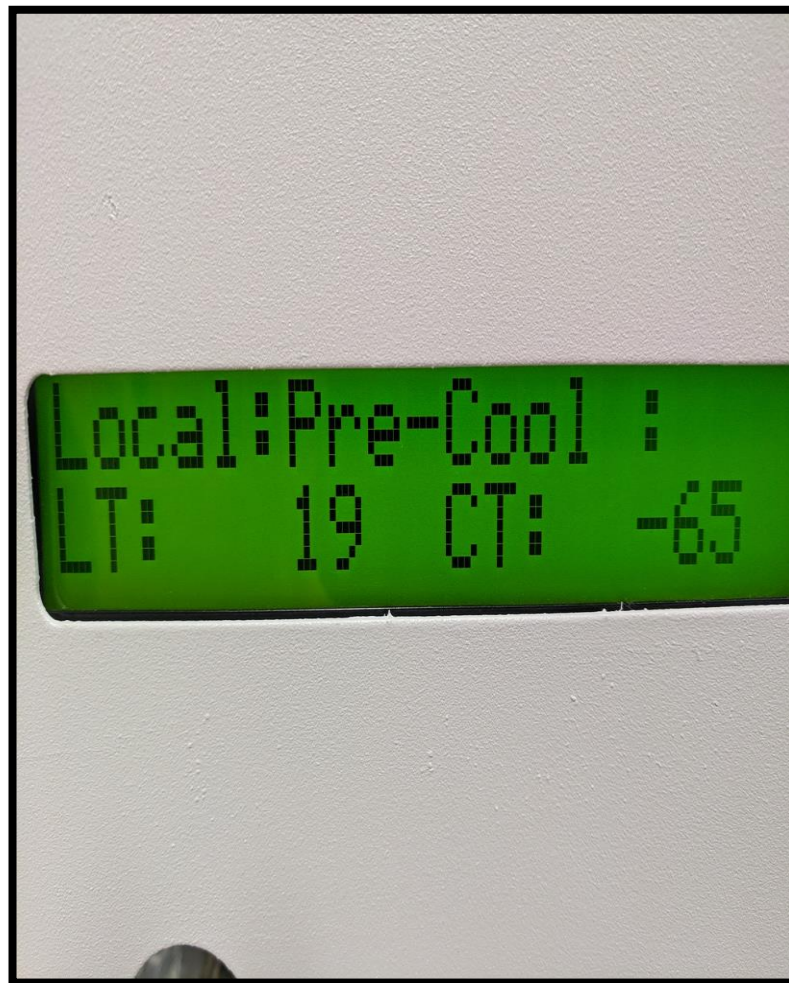
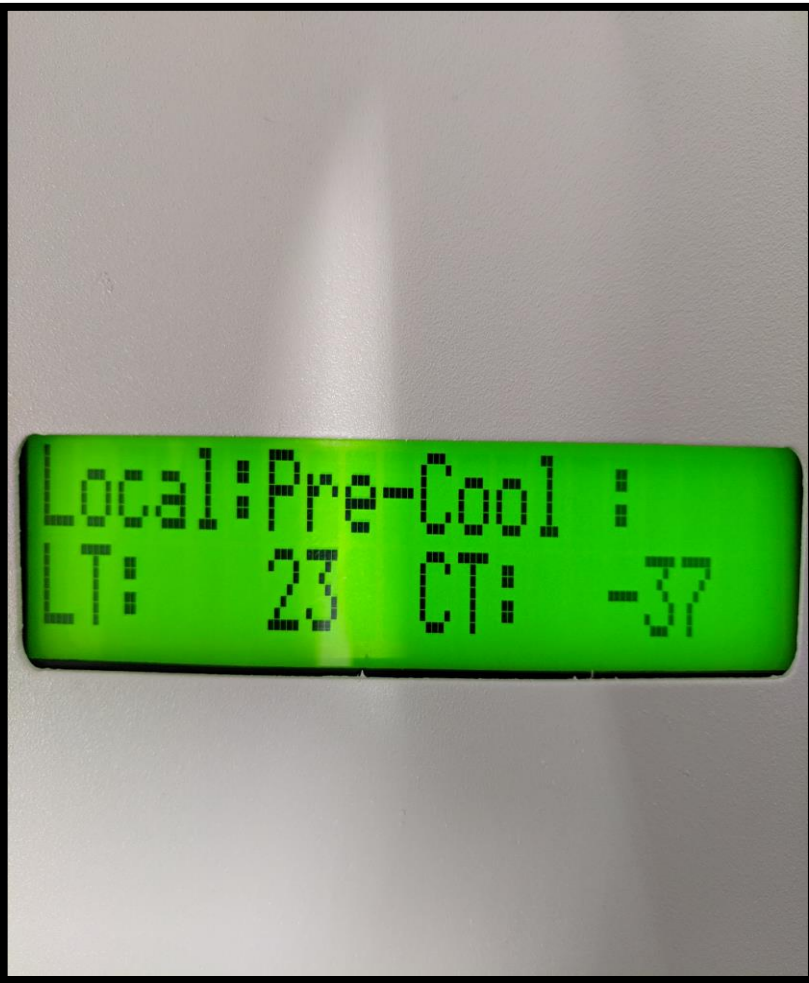


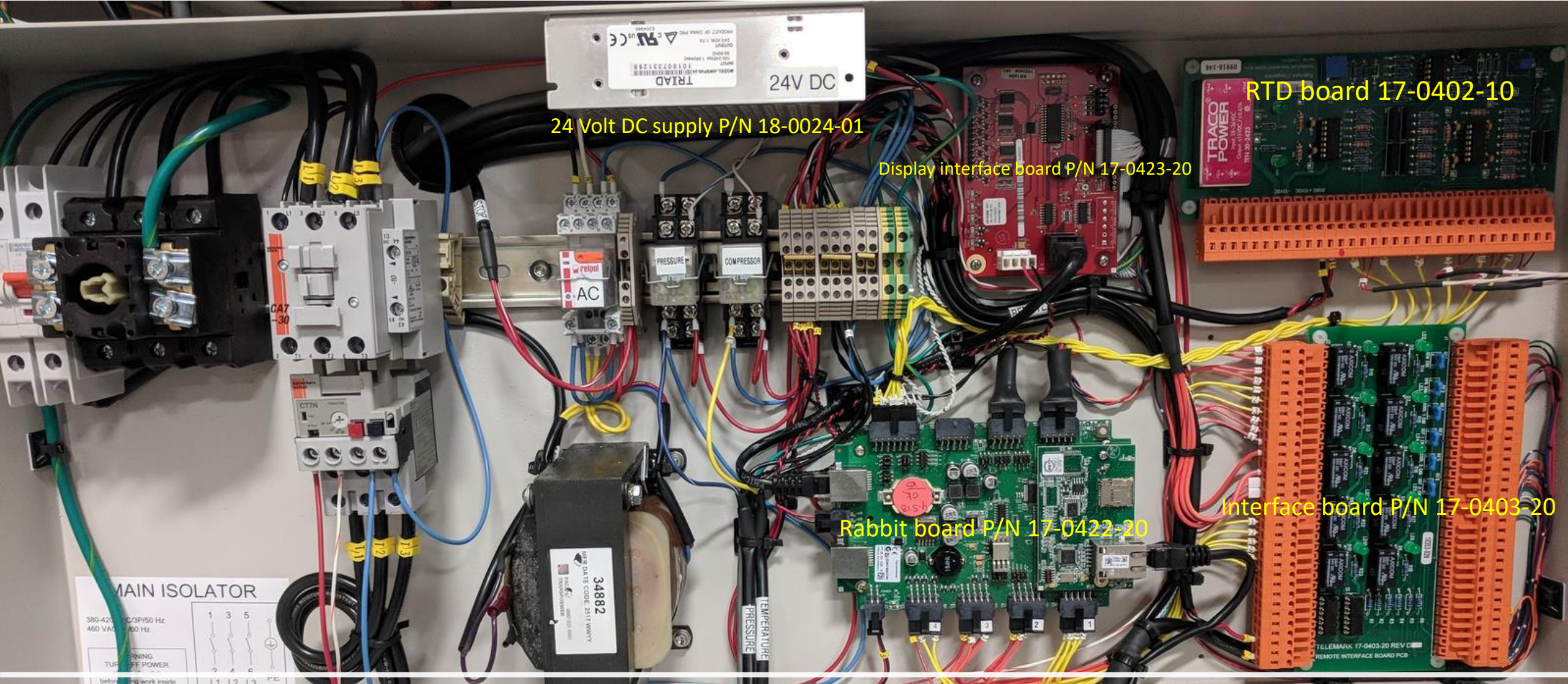
Pre-Cool

- After unit is started, first step, unit is in pre-cool mode.
- Bypass valve opens (yellow tape on electrical wire connection)
- You will see green LED labeled bypass is on at interface board.
- SP reading will be 80 to 110 psi.
- DP reading will be 420 to 500 psi.
- Bypass Valve closes when CT is at -65C or 4 minutes after unit is started.
- Green bypass LED will go off.
- When the bypass valve closes SP will drop to about 60 psi and continue to drop.
- Pre-cool is done when CT reaches -130C, This takes about 10 to 15 minutes.
- Unit will now be in Stand by and ready to operate.
- Voltage at electrical connection will be around 24 vac when bypass valve is operating.



Stages of pre-cool





24 Volt DC supply P/N 18-0024-01

Display interface board P/N 17-0423-20

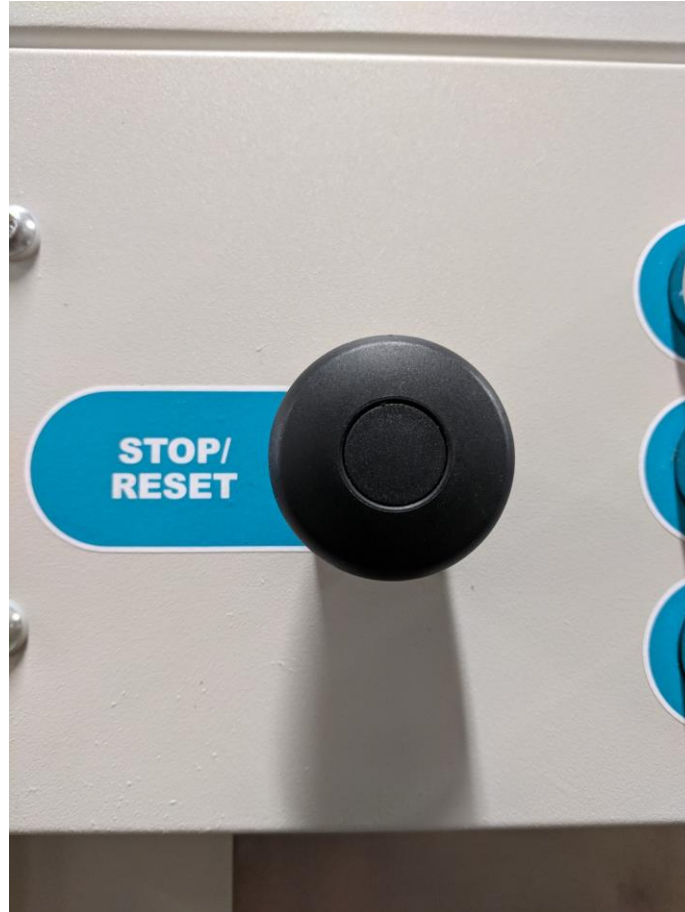
RTD board 17-0402-10

Rabbit board P/N 17-0422-20

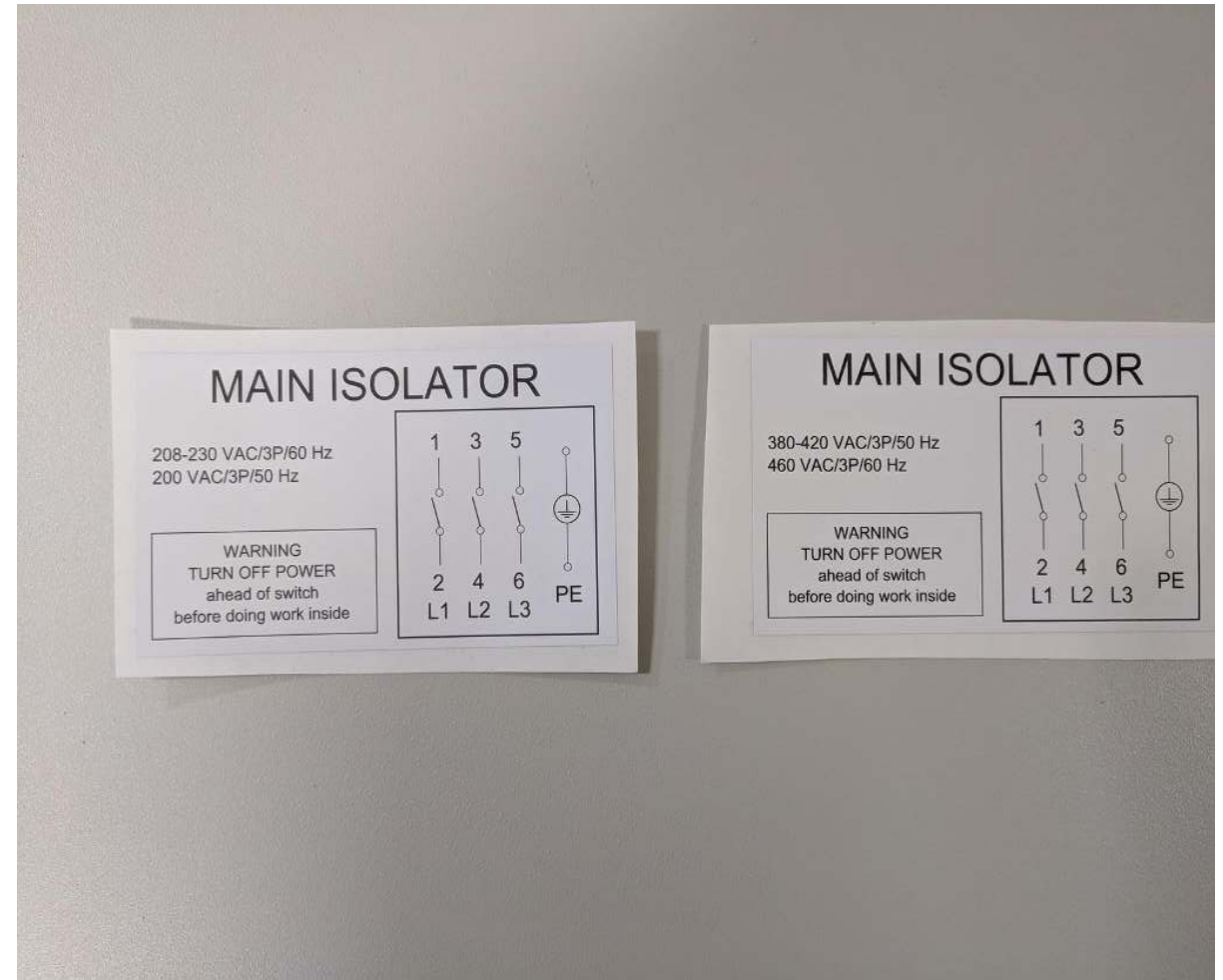
Interface board P/N 17-0403-20

Know your components

“Stop/Reset” button, this will turn off control power to the Cryochiller.
Used to shut unit off, and reset error messages on LCD display



Main power disconnect and circuit breakers for power to the 24 VAC transformer. Customer main input power is connected here. Confirm you supply the proper input voltage. Make sure wire terminals are secured tightly, this will avoid wire and terminal connections from over heating.



AC Transformer

- This transformer has input voltage of either 200/230VAC or 380/440VAC , depending on operating mains voltage input. Refer to the Serial number sticker

200/230 volt transformer P/N 17-0360-20

380/440 volt transformer P/N 17-0360-38

- This can be tapped to adjust for your input voltage

- Tap 1 is “0”

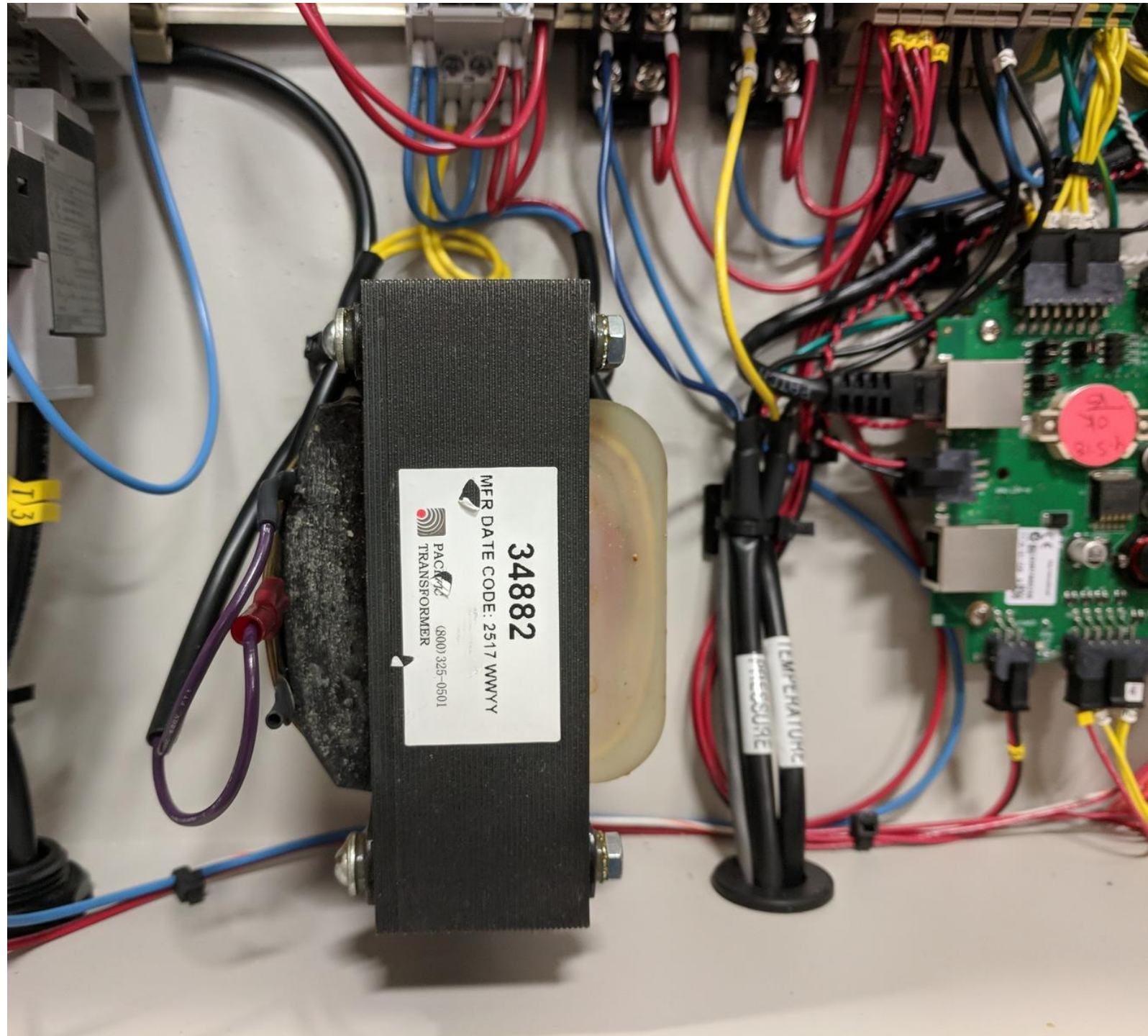
- Tap 2 is 200 /380VAC

- Tap 3 is 230 /440VAC

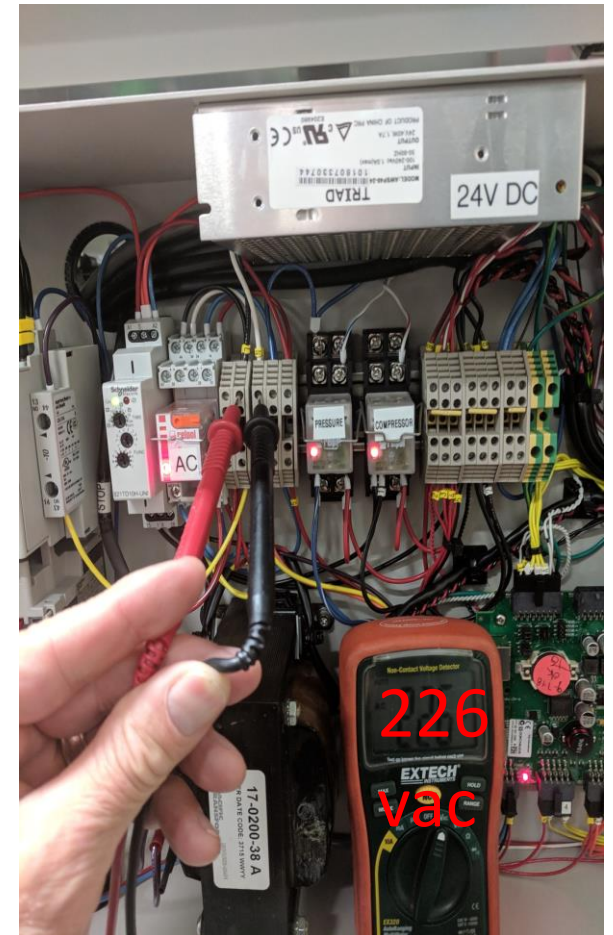
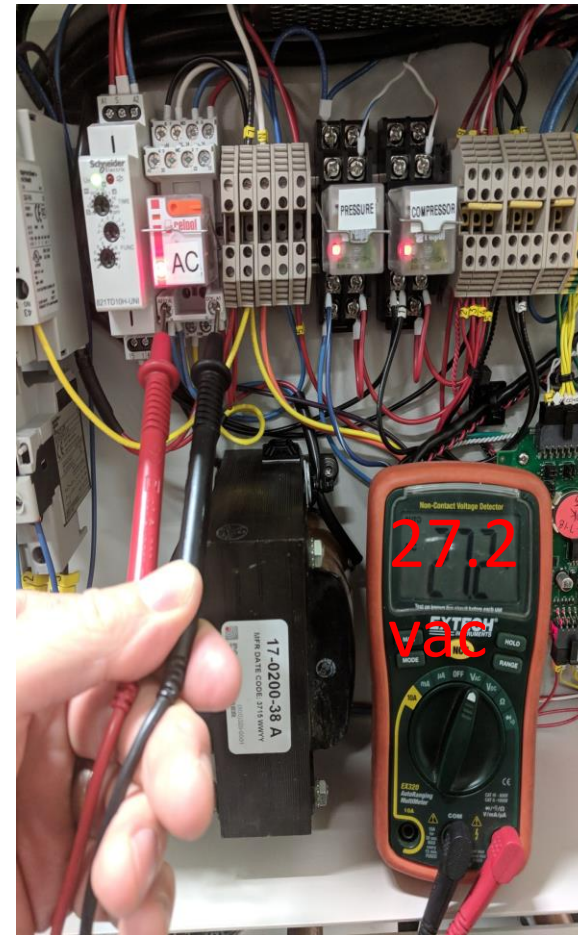
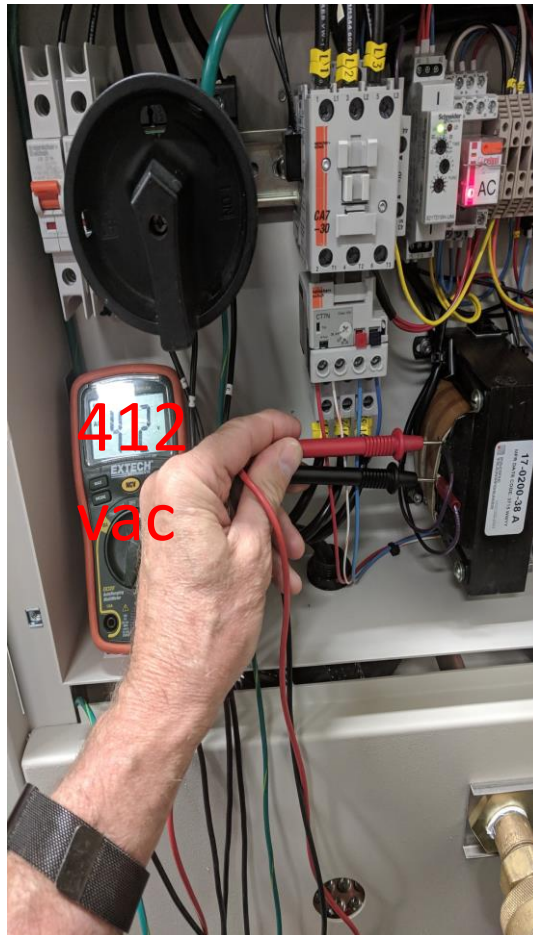
Refer to page 27 in manual.

- Output voltage on secondary side terminal 4 and 5 provides 24VAC output

- Output voltage on secondary side Terminals 6 and 7 provides 220VAC output

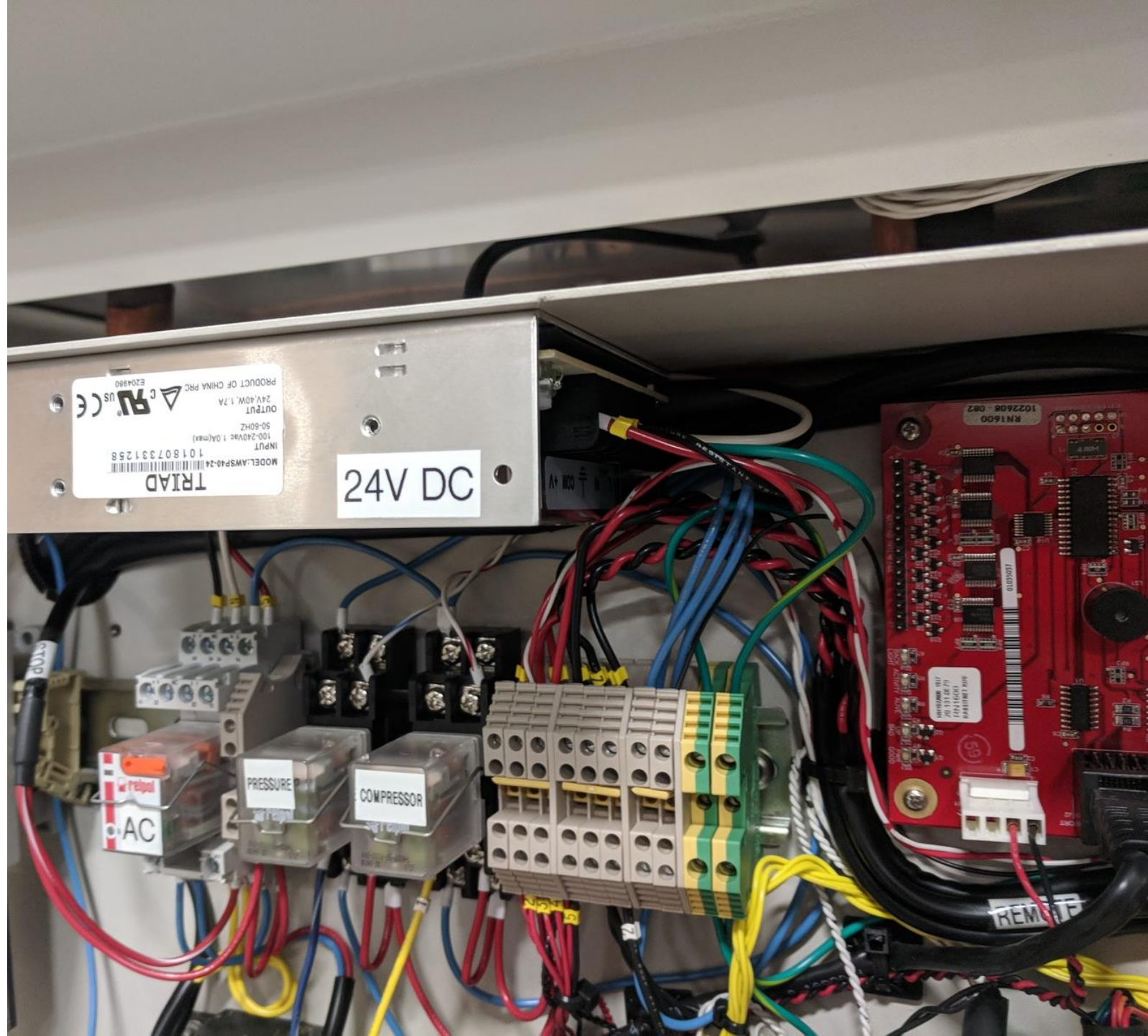


This is example of a 380/440 vac input transformer. LV units will have 208/230 vac input.
Secondary voltages will be the same for the different transformers



24 volt DC supply

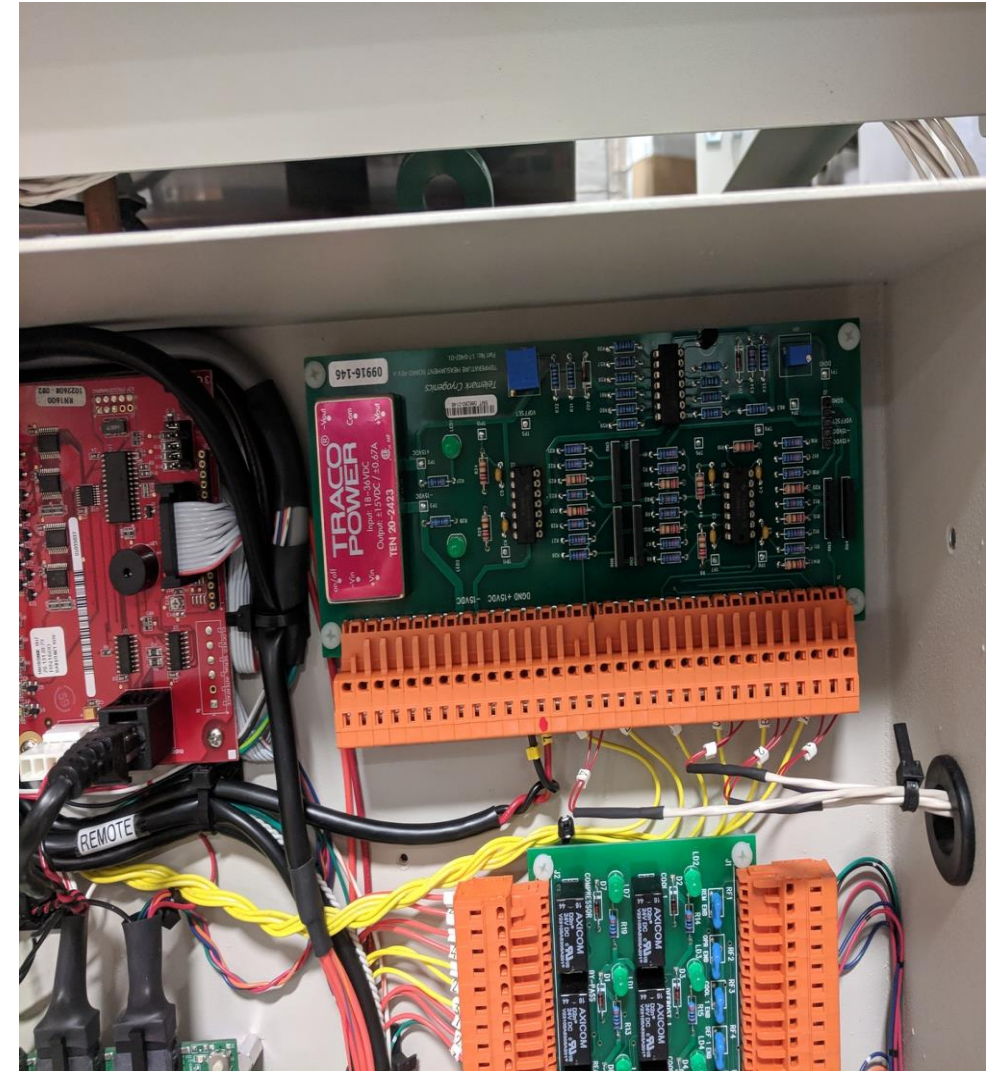
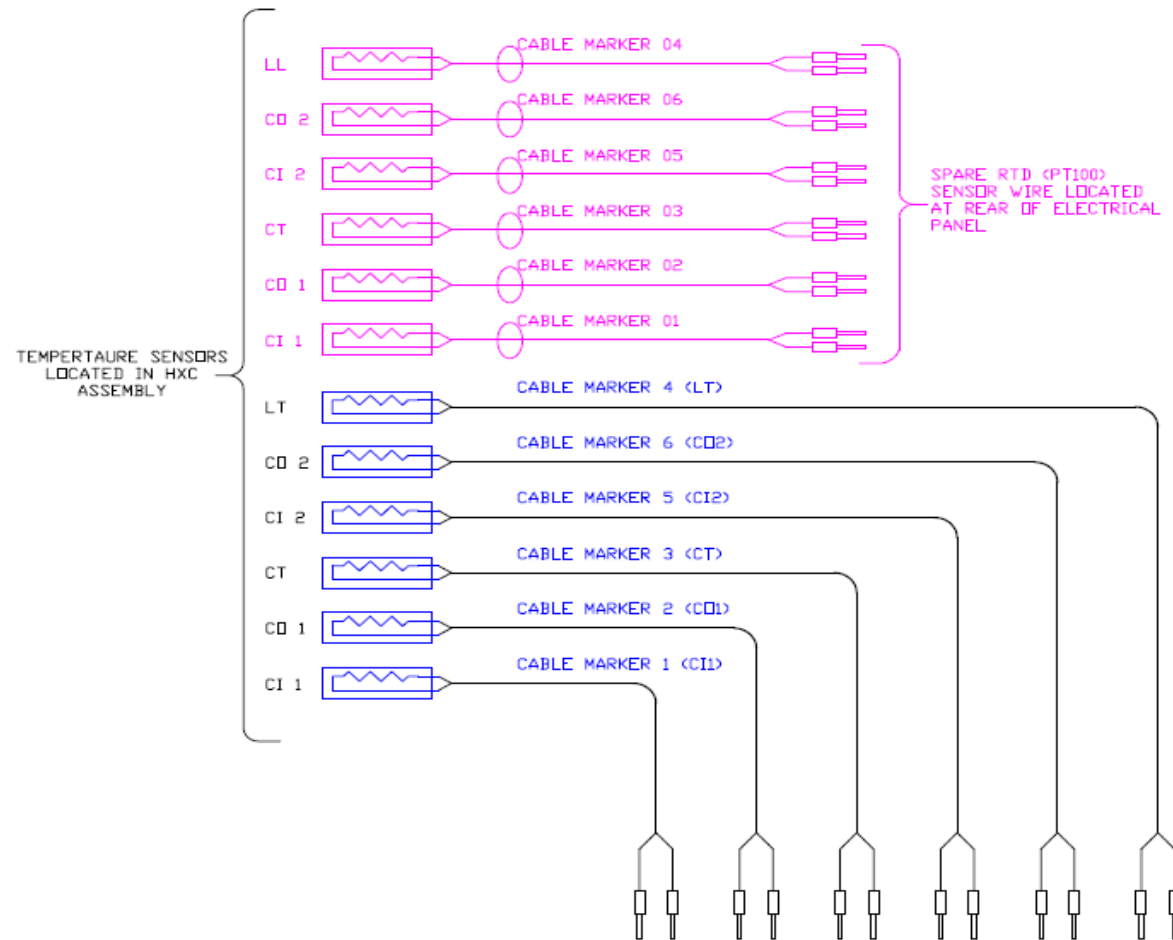
- This provides the 24 Volt DC control voltage.
- Input power on all units is 220 vac. This voltage comes from the AC transformer.



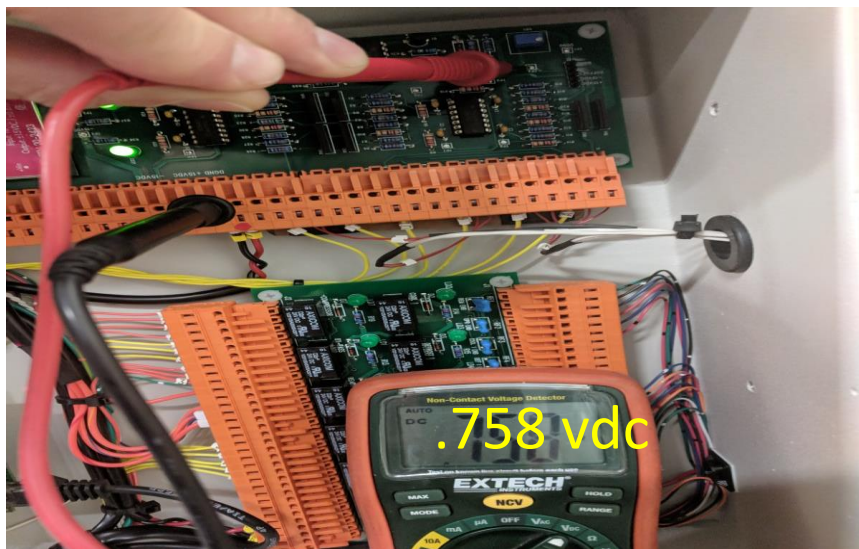
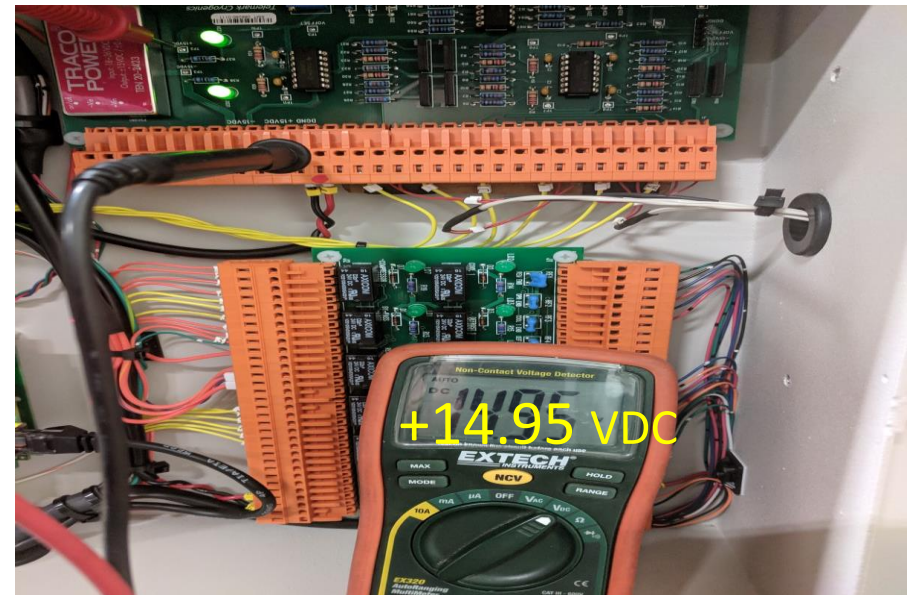
RTD board , this and the 100 ohm RTD sensors installed in the unit read temperatures for display. The output of RTD board (Yellow wires) go to inputs on “Rabbit board”.

The RTD sensor should read about 100 ohms at room temperature.

There are back up sensors installed on all systems in event of an RTD failure

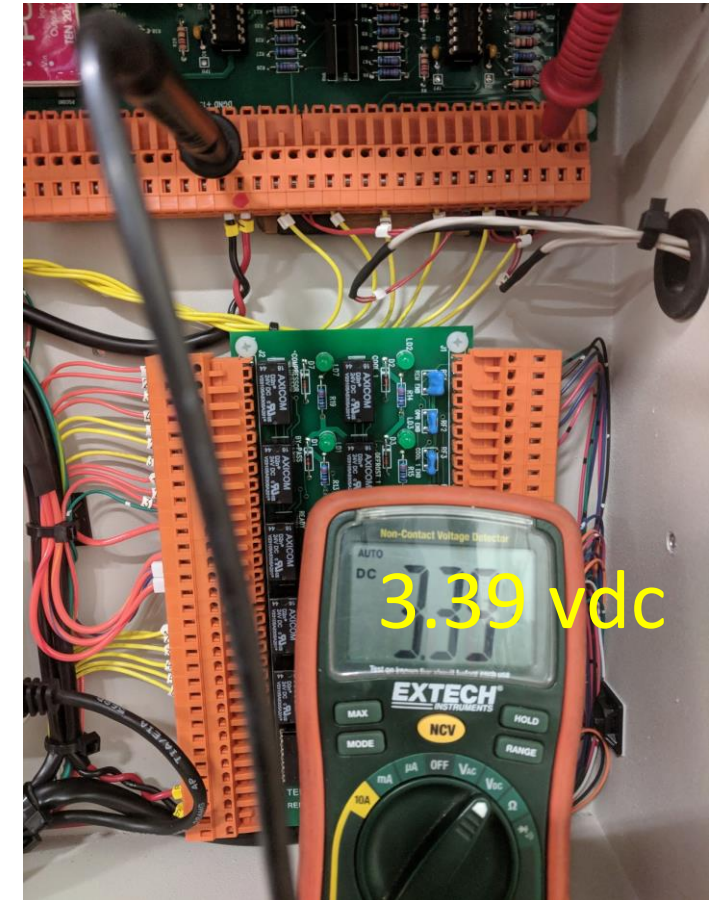
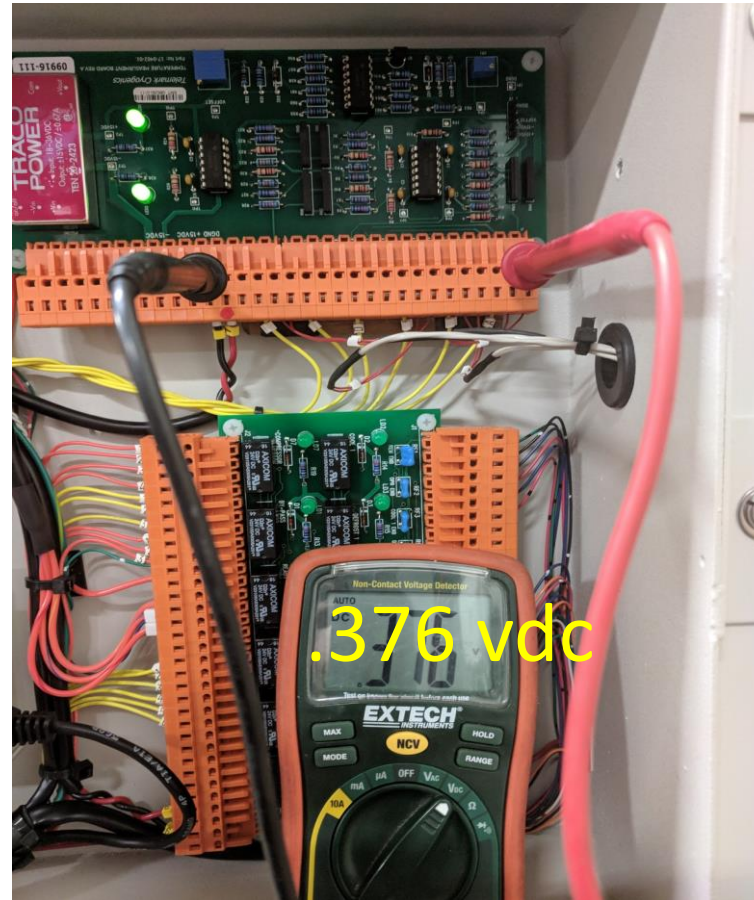


Check your voltages and Calibration



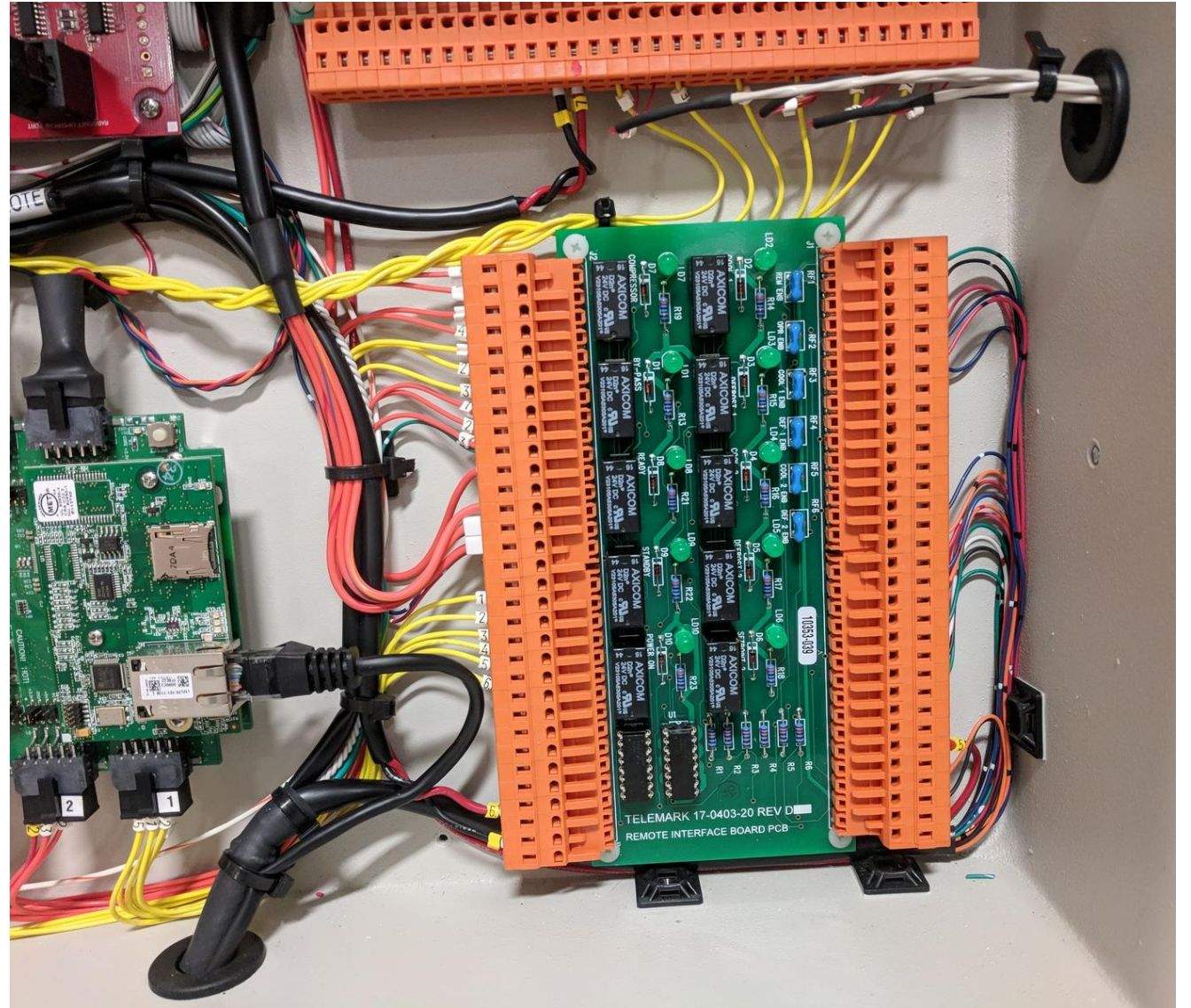
Examples of voltage readings at RTD connections at the RTD board.
These are approximately what you should see.

The .376 vdc and the 3.39 vdc shown in example photos will vary as the temperature goes up and down. The .757 vdc shown should remain stable as temperature changes.

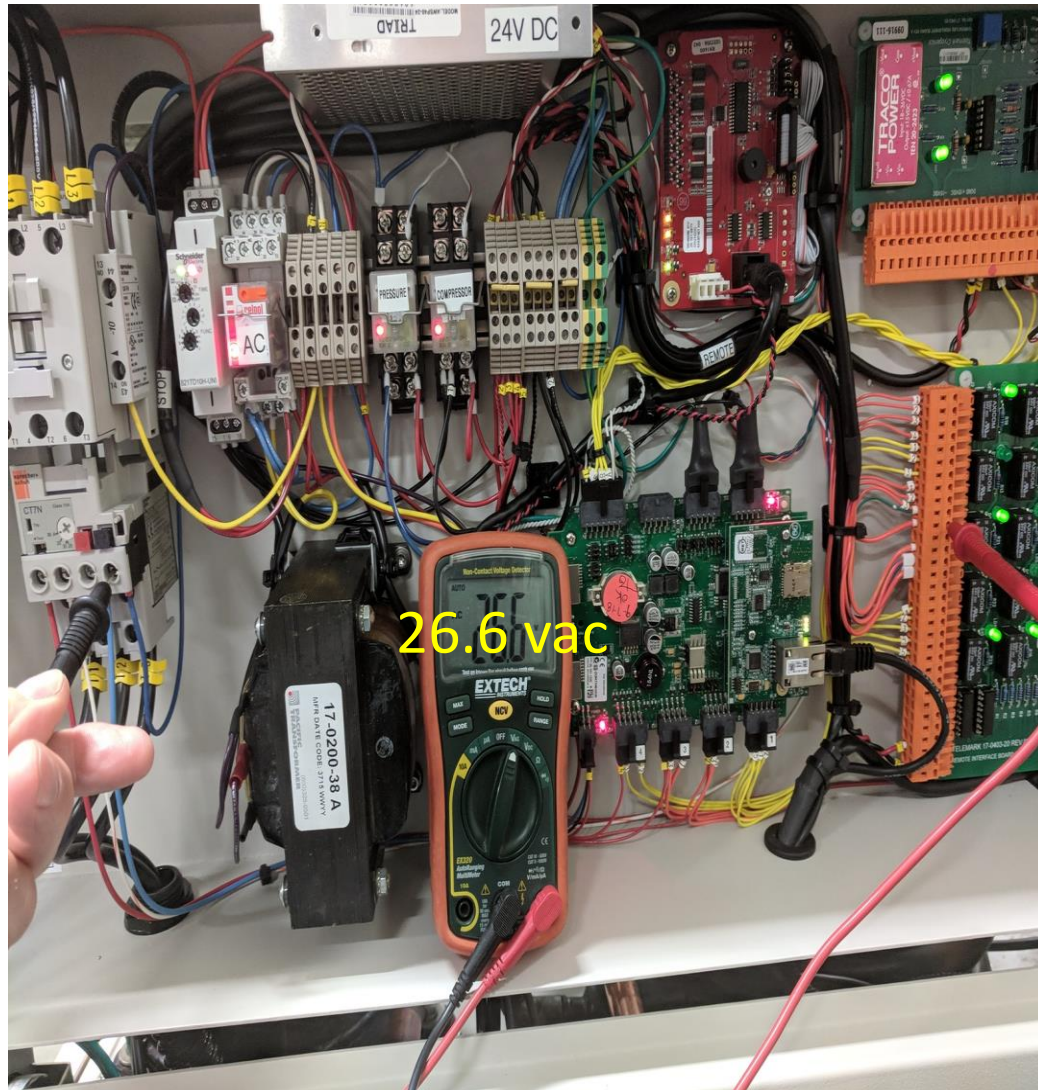


Interface board

- Optically isolates remote input signals.
- RF filters for outside noise protection.
- 24vdc relays on the PCB, operate contactors and solenoid valves and the indicate remote output signals to the 37 pin connector.

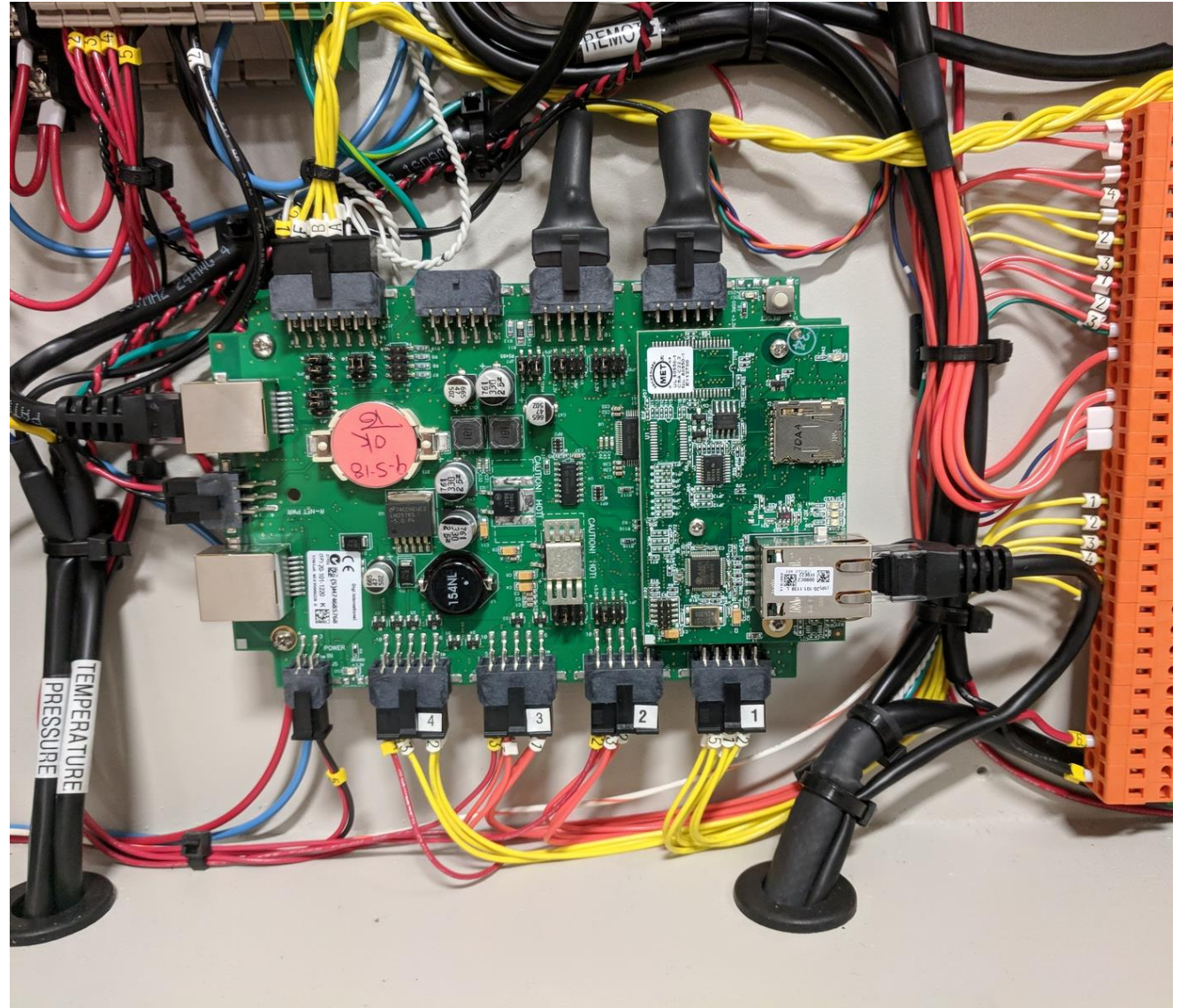


Example of Interface board sending
“compressor on” output.

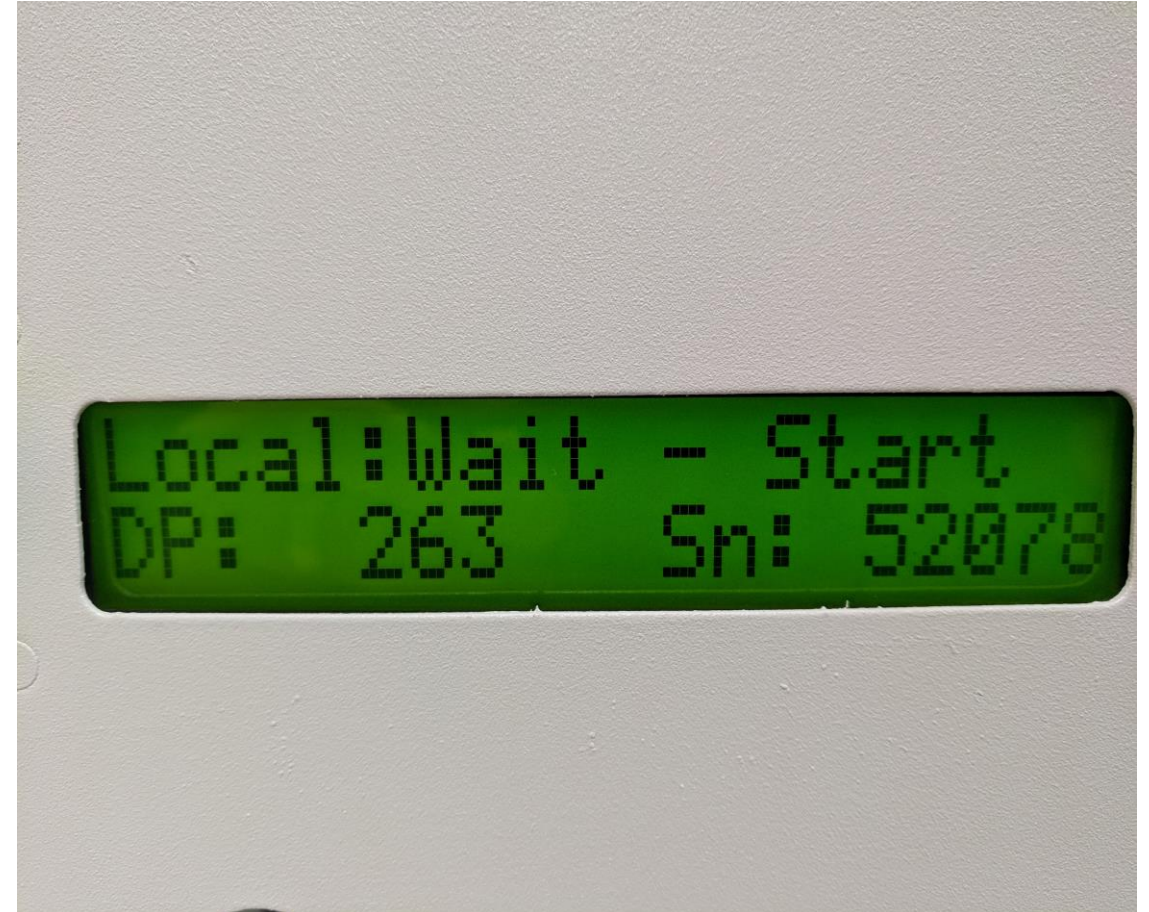
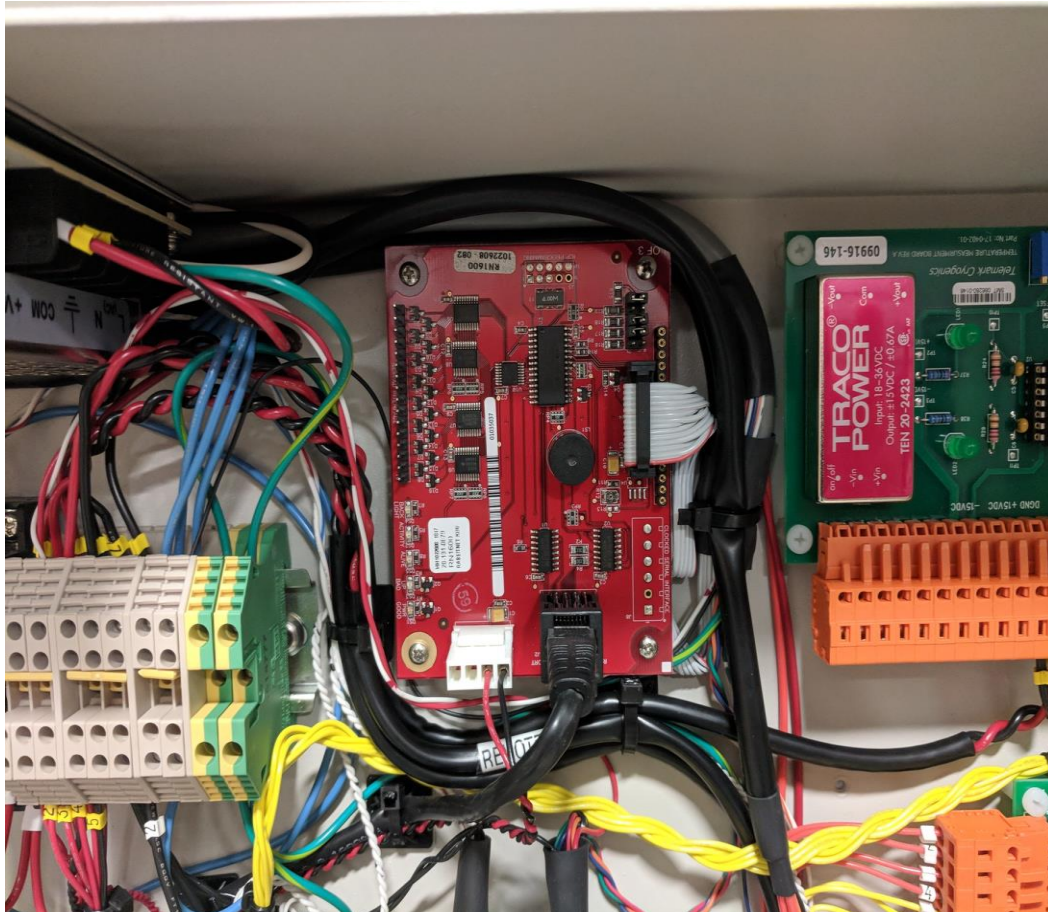


“Rabbit board”, is a microprocessor board

- This is preprogrammed at factory with operating parameters and safety interlocks.
- Has some settable input/ outputs refer to page 36 in manual
- On first start up of units, you may see loose connections at the mini connectors with loose connection from shipping. If you have problems at start up, make sure all wires are pushed firmly into the mini connectors.



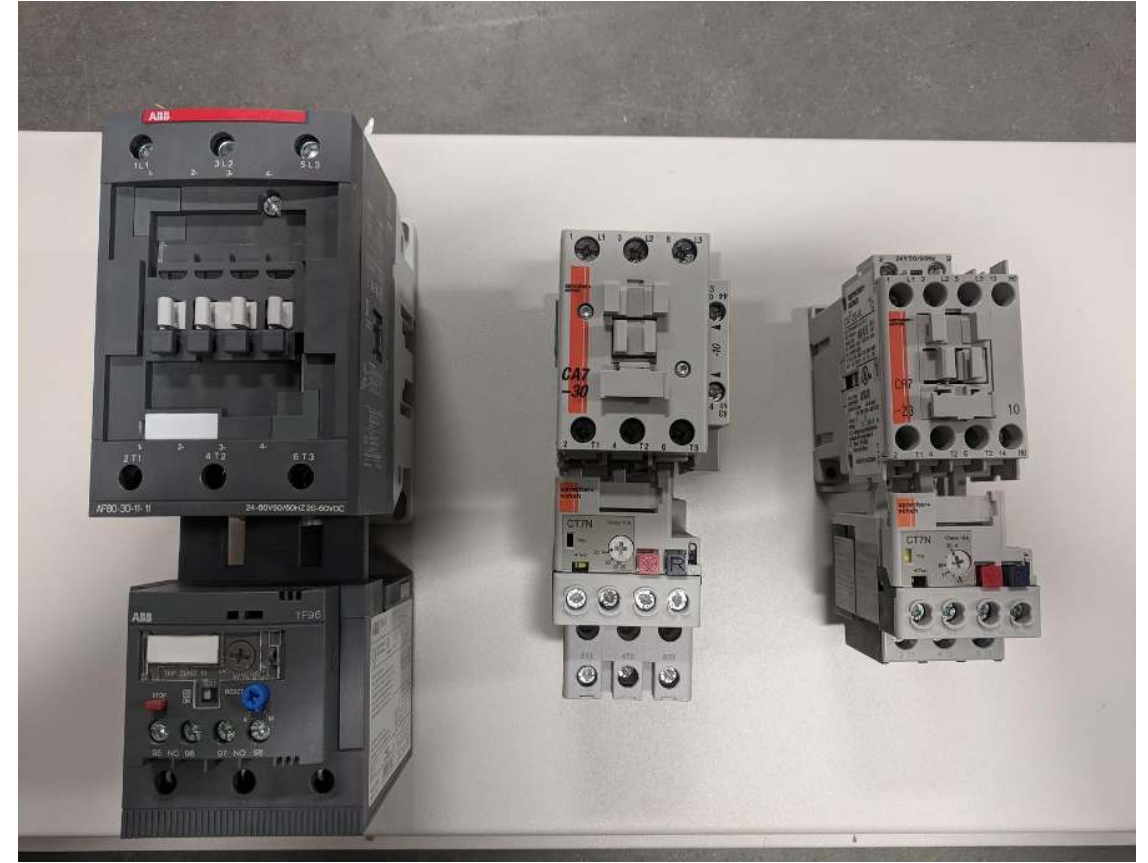
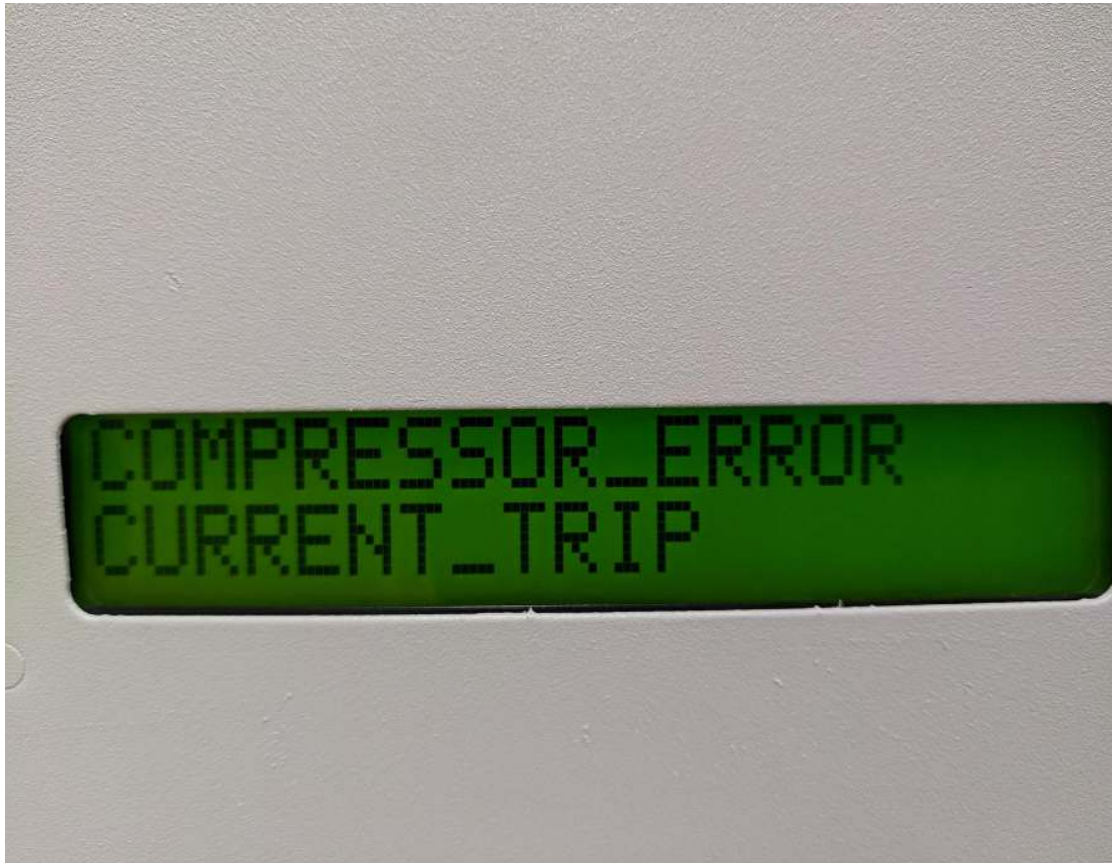
Display interface board and LCD display.
This connects to the “rabbit board” and the LCD , connecting the two
together to bring readouts to the display.



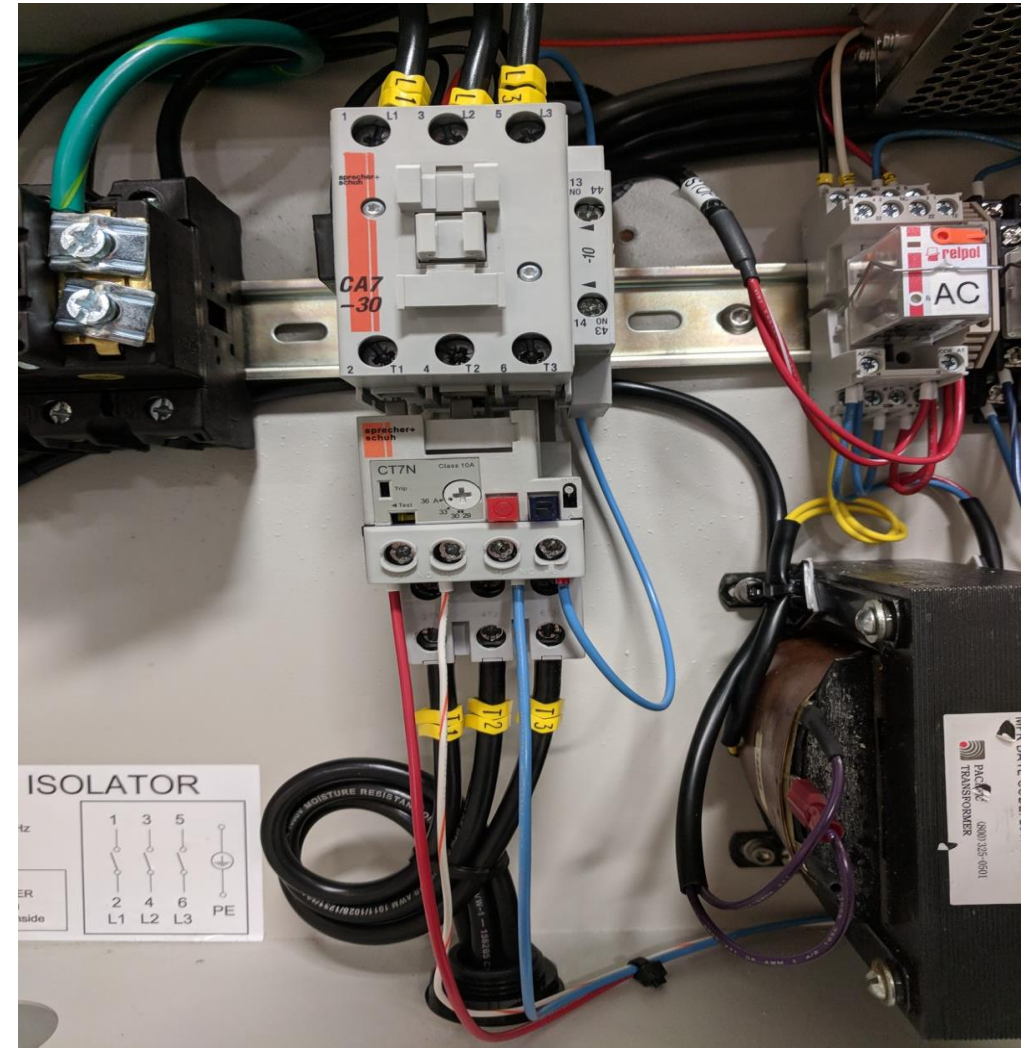
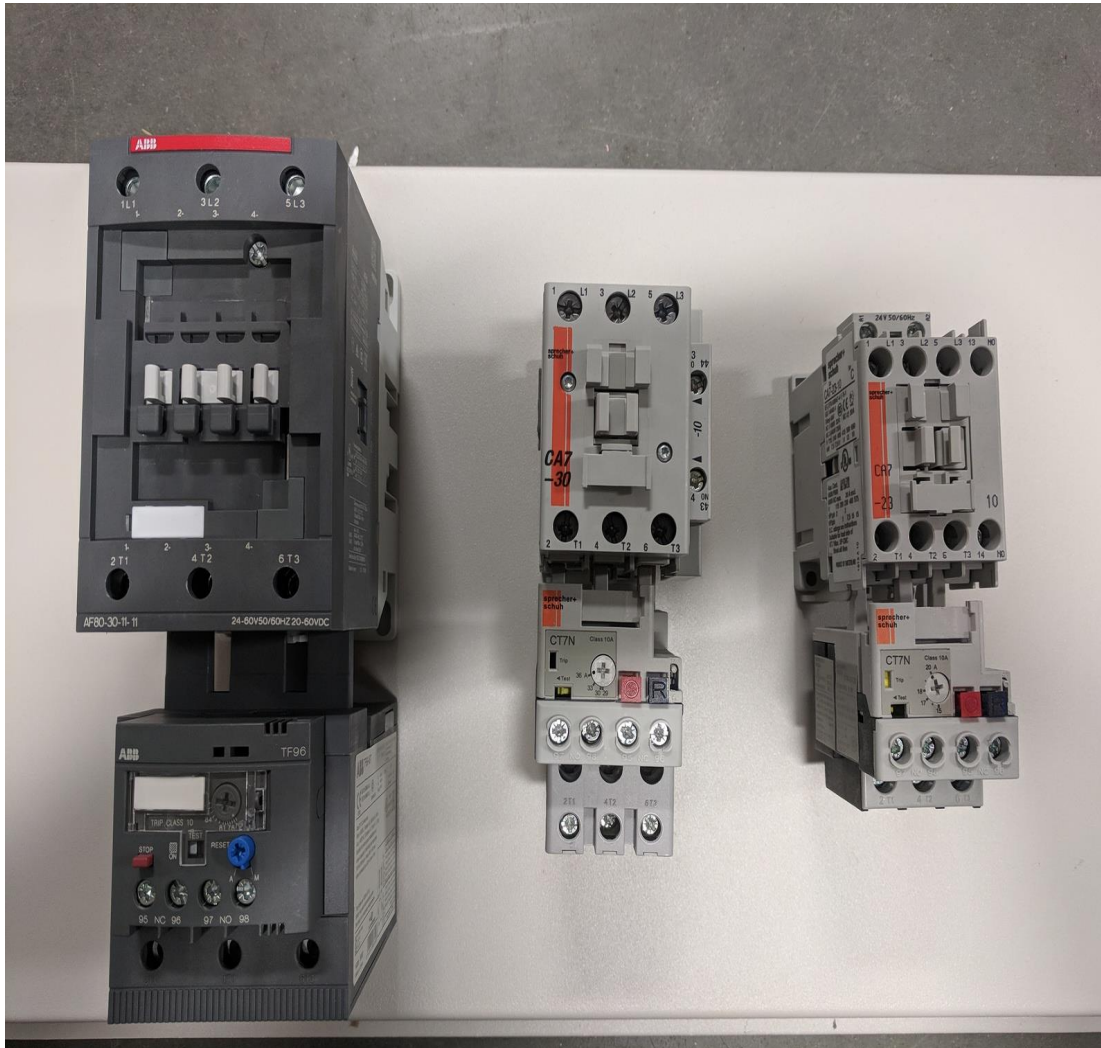
If compressor draws current above the set point on the current sense module mounted below compressor contactor, it will trip and send error to LCD screen.

The contactor and current sensor varies depending on compressor size and incoming main power. Refer to Serial number tag for amperage rating of your unit.

Rest set overload button on current sense module, cycle power using “stop rest” switch



Example of different contactors and over loads.



“AC” relay wired to “Stop/Reset” switch on front top panel.

“Pressure” relay wired to Mechanical over pressure switch. Sends signal to Rabbit board to indicate “over pressure” error. Also opens interlock chain for shutting off compressor. (blue wire)

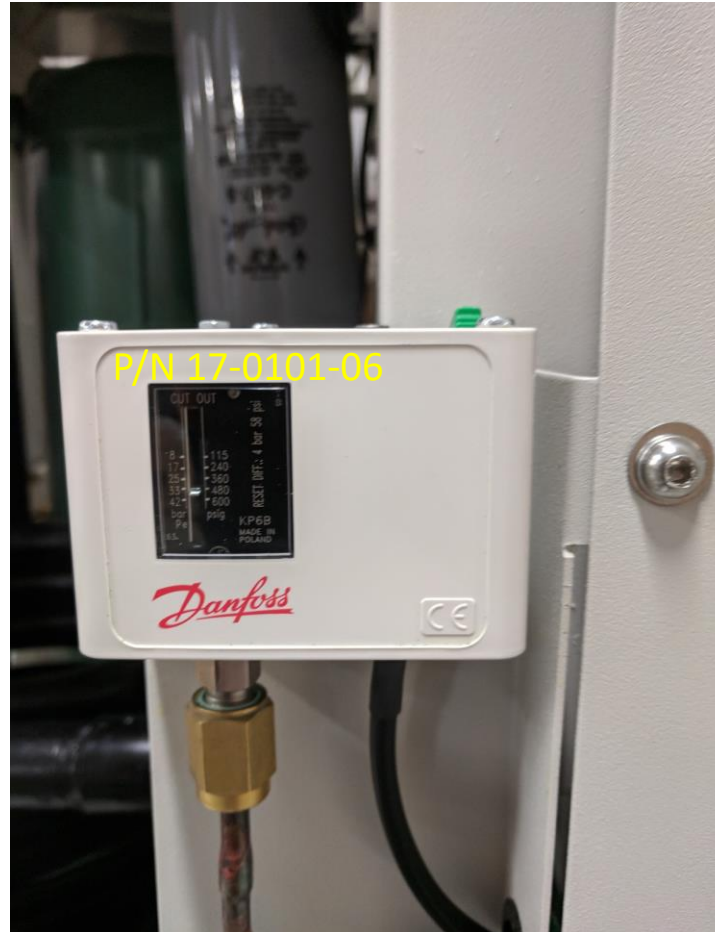
“Compressor” relay wired to Emerson core sense module, or on Bitzer compressor units, wired to the thermal switch on discharge line of compressor. Sends the signal to Rabbit board to indicate “compressor error system shutdown” Also opens interlock chain for shutting compressor off (blue wire)



Over pressure error on LCD screen , This, occasionally, can happen at start up of the unit.

Over pressure mechanical switch is set for 500psi. Push the green “Green Reset” button on the top. After resetting, cycle the “Stop Reset” button.

Unit also has over pressure protection programmed in the software.



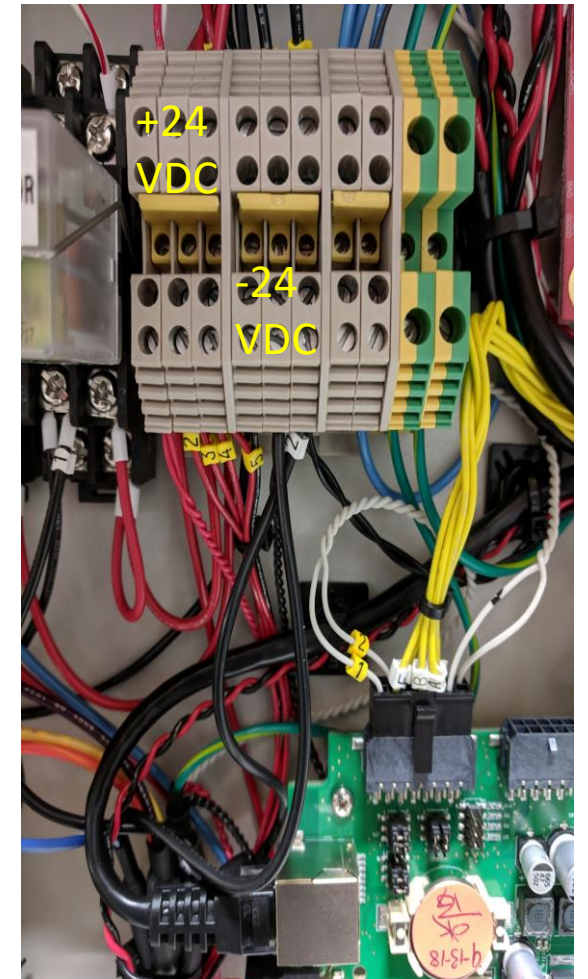
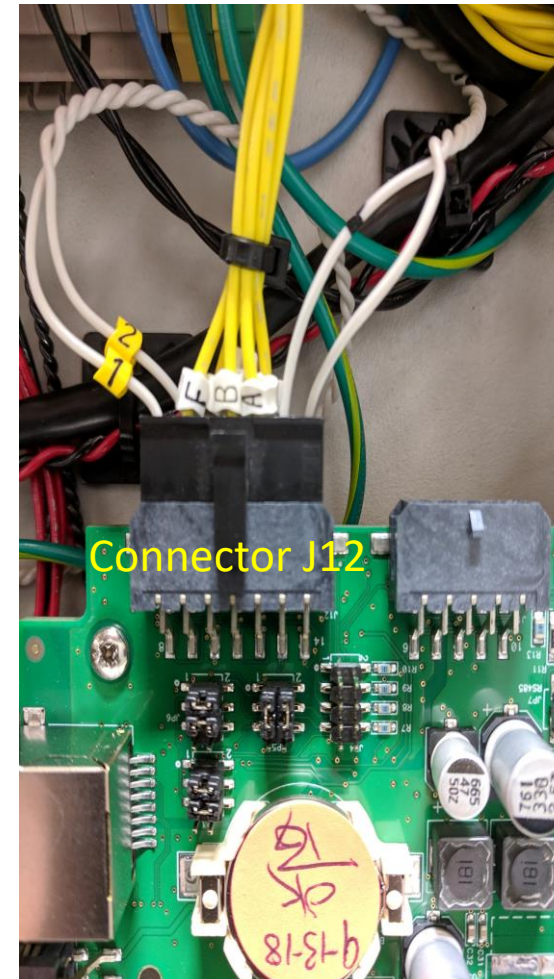
Suction transducer on left side.

Discharge transducer on right side

Analog pressure gauge , this is connected to suction line side of the compressor.



The transducer has a 24 VDC input voltage , this then, based on pressure, will send a voltage back to the Rabbit board connector J12 pin 8 for DP pin 2 for SP to be displayed on the LCD .
To replace a bad transducer use a pinch off tool on the copper line near the bad transducer, remove wire from transducer, remove bad transducer, install new copper gasket and install new transducer. Remove pinch off tool and check for leaks using soapy water solution.



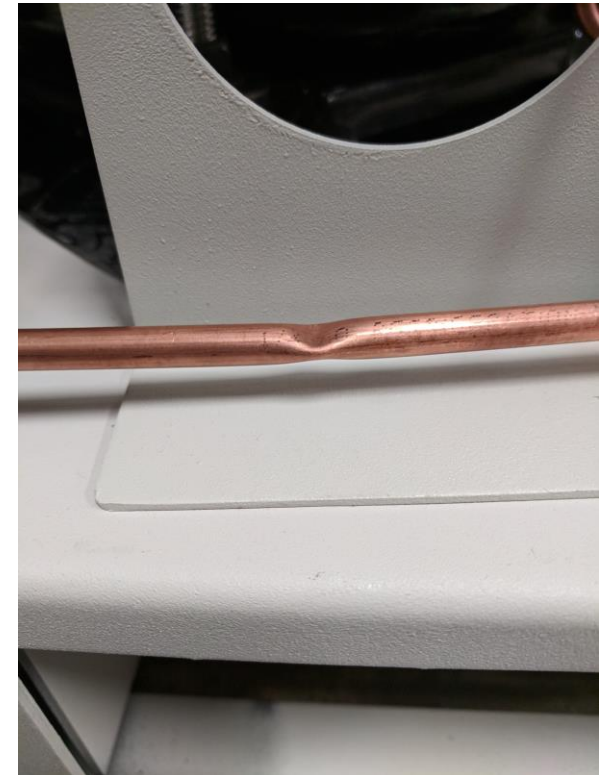
How to change transducer without removing gas charge.

Once you confirm transducer is bad, use special made pinch off tool to pinch the copper line in an area easy to get at for the defective transducer. Pinch line leaving pinch tool on, so gas flow is stopped or reduced to a very small amount when transducer is removed.

Remove the transducer and the copper gasket, replace both these components with a new a one.

Tighten new transducer using two wrenches, remove pinch off tool. Check connection for leak using soapy water, or Snoop leak detect solution or a refrigerant leak check device.

Connect back the electrical connection to the transducer.



SP low Error on LCD is if SP goes below 8 psi.

Reset system to clear Error.

If this continues to happen, shut unit off for 24 hours to warm up and note what the “balance pressure reading” is. Refer to noted balance pressure when system was first installed. You can consult the manual for range of Balance pressure readings.

