SoLID Solenoid
Liquid Level Controls and Monitoring

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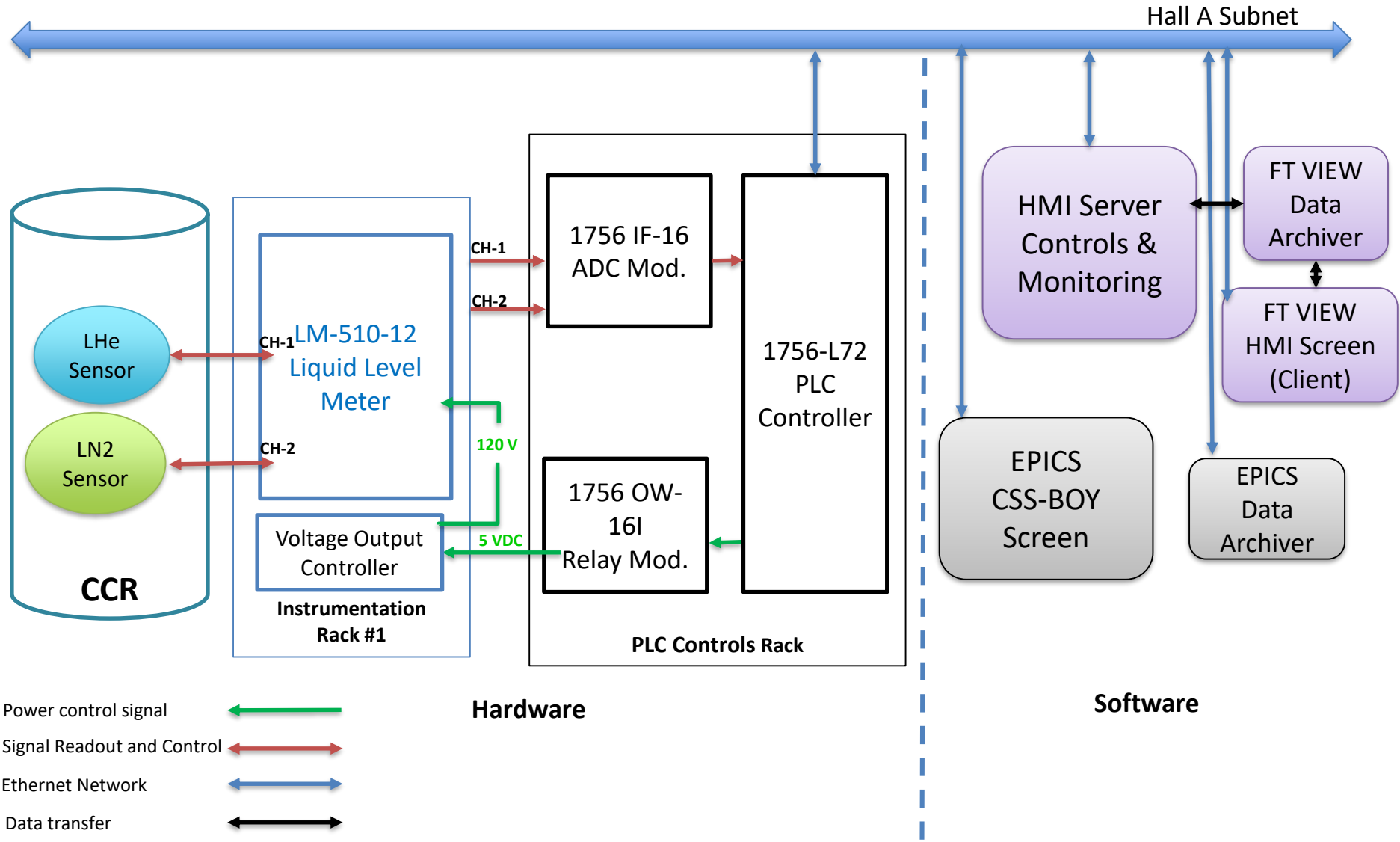
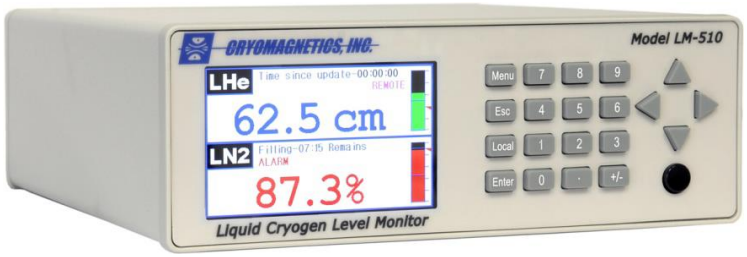
LHe and LN2 Level Controls Overview



Instrumentation Specifications

- Sensors
  - LHe Level Probe: 3DA-038-105-CF
    - 15.25” active sensing length
  - LN_2 Level Probe:NL-053-111-CF
    - 21” active sensing length
- Liquid Level Meter
  - Model: Cryomagnetics LM-510-12
    - Dual Sensor readout option
    - Two analog outputs (10 V and 4–20 mA options)
    - Two relay outputs to control auto filling
    - Local control and monitoring
- Line Voltage Controller Module
  - Two output channels to control 120–220 VAC power
- PLC System
  - Controller: 1756-L72
  - ADC Module: 1756-IF16
  - Relay Module: 1756-OW16I

LN_2 sensor with interface cable



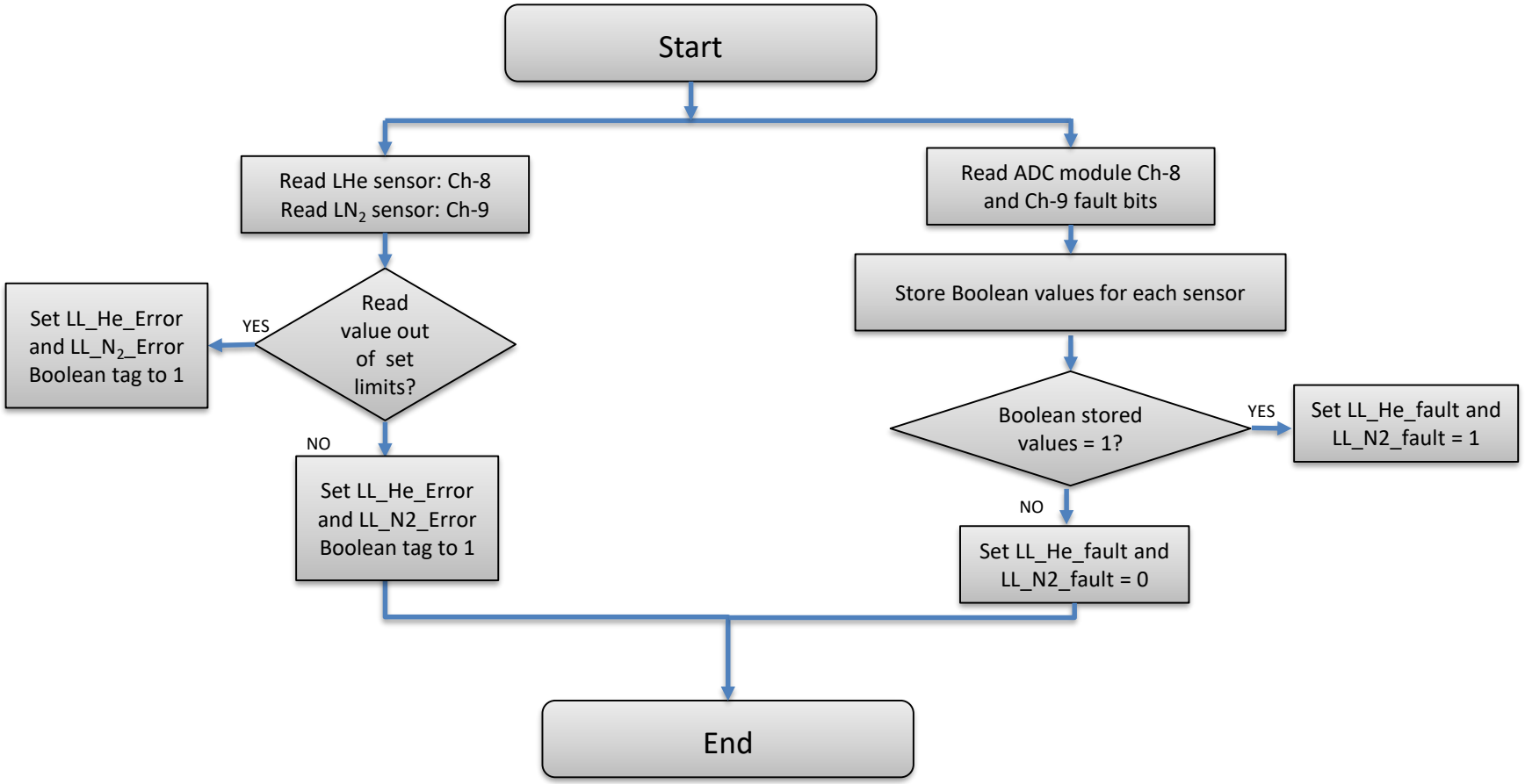
Liquid Cryogen Level Monitor LM-510-12

Controls - PLC programming

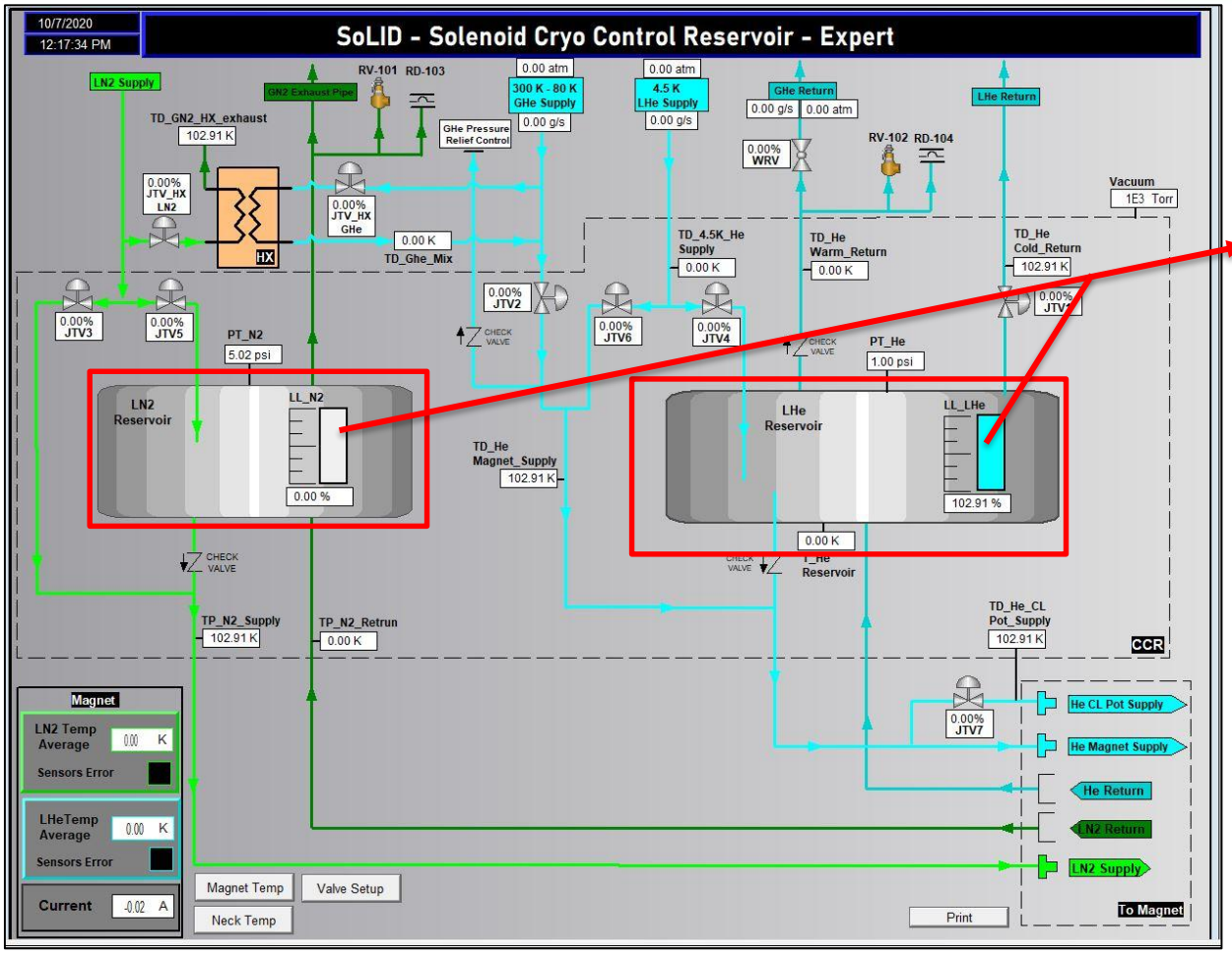
- PLC performs the following:
  - Readout of liquid level values
    - ADC module configured and scaled to read 0–20 mA signal
    - Readouts critical, especially during cooldown of solenoid
    - Values used as PID controller process variable input to control valves
  - Monitors signal readout faults
    - Each ADC module allows individual channel fault detection
  - Controls power cycling of liquid level meter device
    - Assigned one relay channel to provide 5 VDC to line voltage controller module, which controls 120 VAC supply to liquid level meter device
  - Transfers data to HMI and EPICS systems
    - Signals monitored and controlled from HMI and EPICS screens

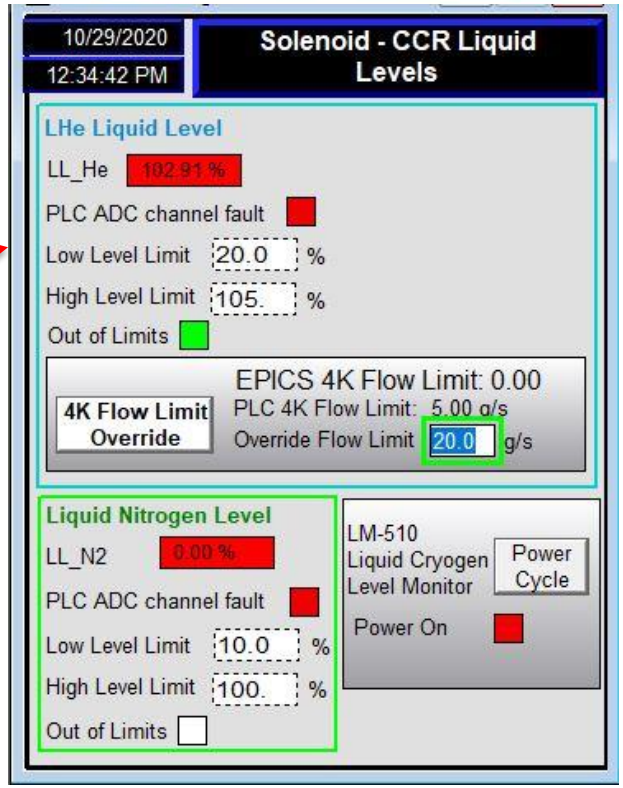
Controls - PLC programming

- PLC readout and fault detection for LHe and LN_2



Monitoring - HMI screens





Cryo Control Reservoir – Expert HMI screen allows monitoring of liquid levels installed in LN_2 and LHe reservoirs

Expert Liquid Level Screen pops up when user clicks a liquid level figure on CCR screen.
CCR Liquid Levels screen provides detailed information and power cycle control for the liquid meter

Task Status

- Programming tasks to control and monitor LHe and LN_2 levels
  - PLC code is complete
  - HMI screens are complete
    - Testing in progress
- Documentation
  - Wiring drawings to show connections of sensors in progress
  - Control diagram is complete
- Hardware tasks
  - Liquid level meter, probes, PLC system, and voltage controller are in hand
  - Installation and wiring for sensors is pending

Conclusions

DSG is contributing proactively to complete tasks required to for control and monitoring of liquid levels

Thank You