



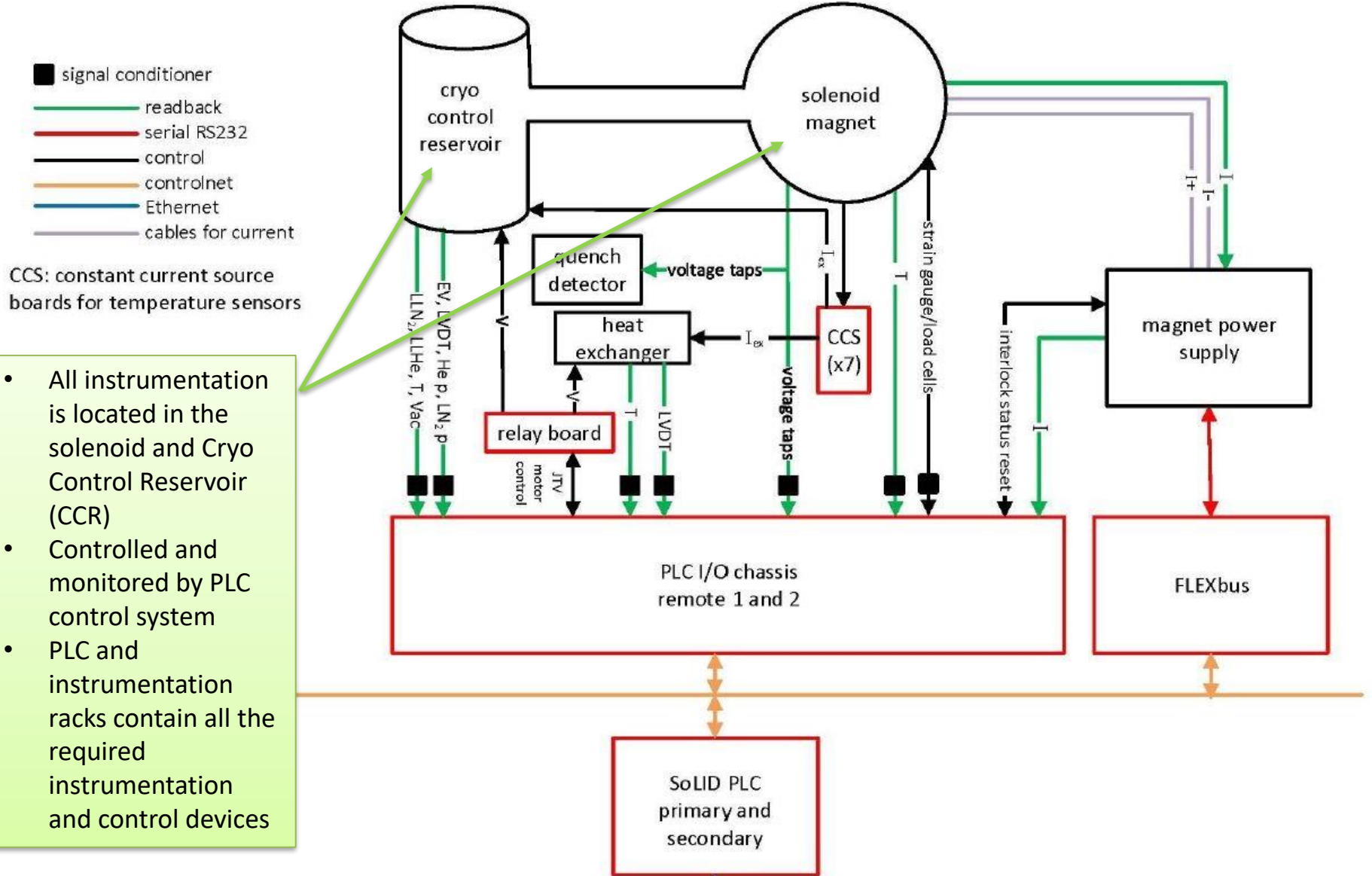
SoLID Solenoid Instrumentation and Controls Rack Layouts

Pablo Campero
Detector Support Group
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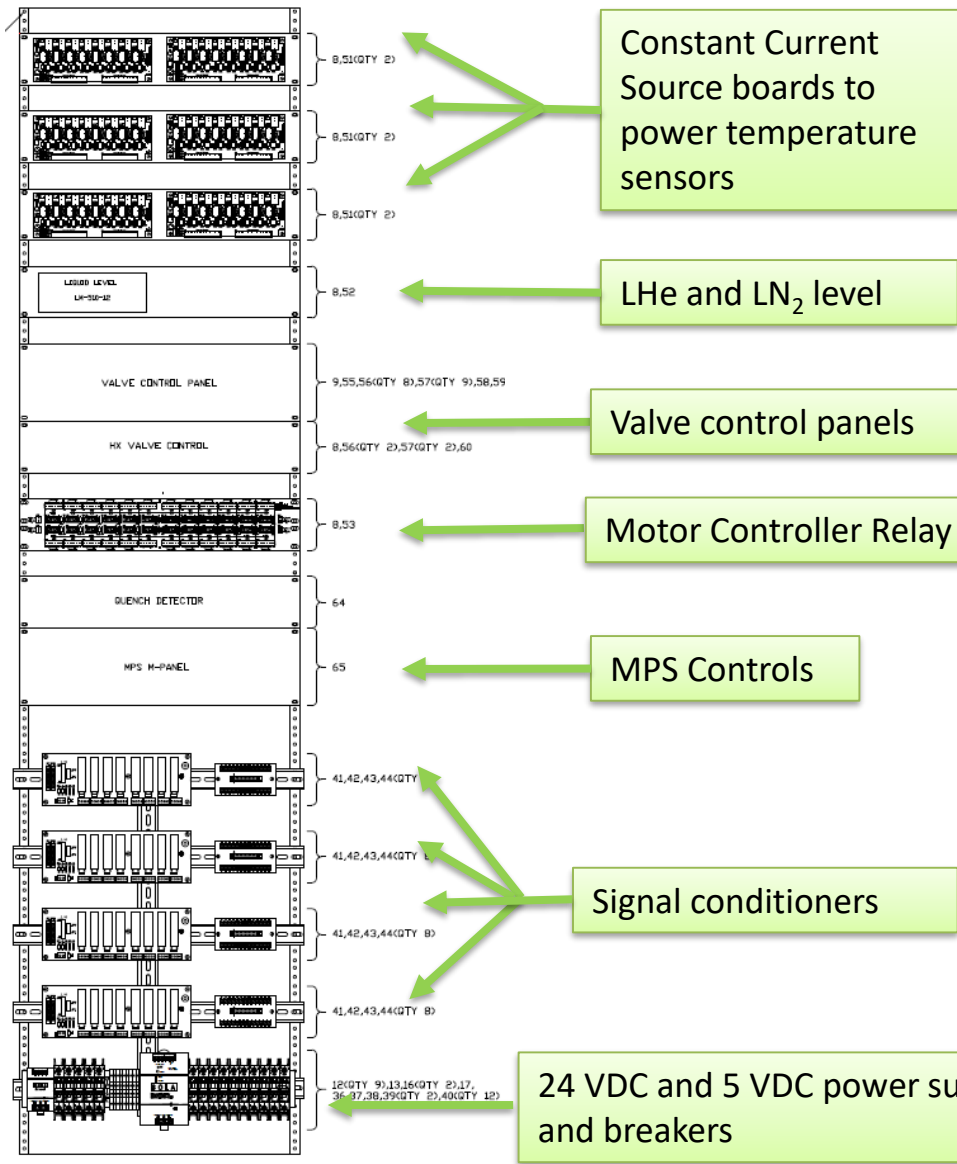
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- Instrumentation and PLC Controls Rack Layout
- Parts List
- Conclusions

Instrumentation and Controls Overview

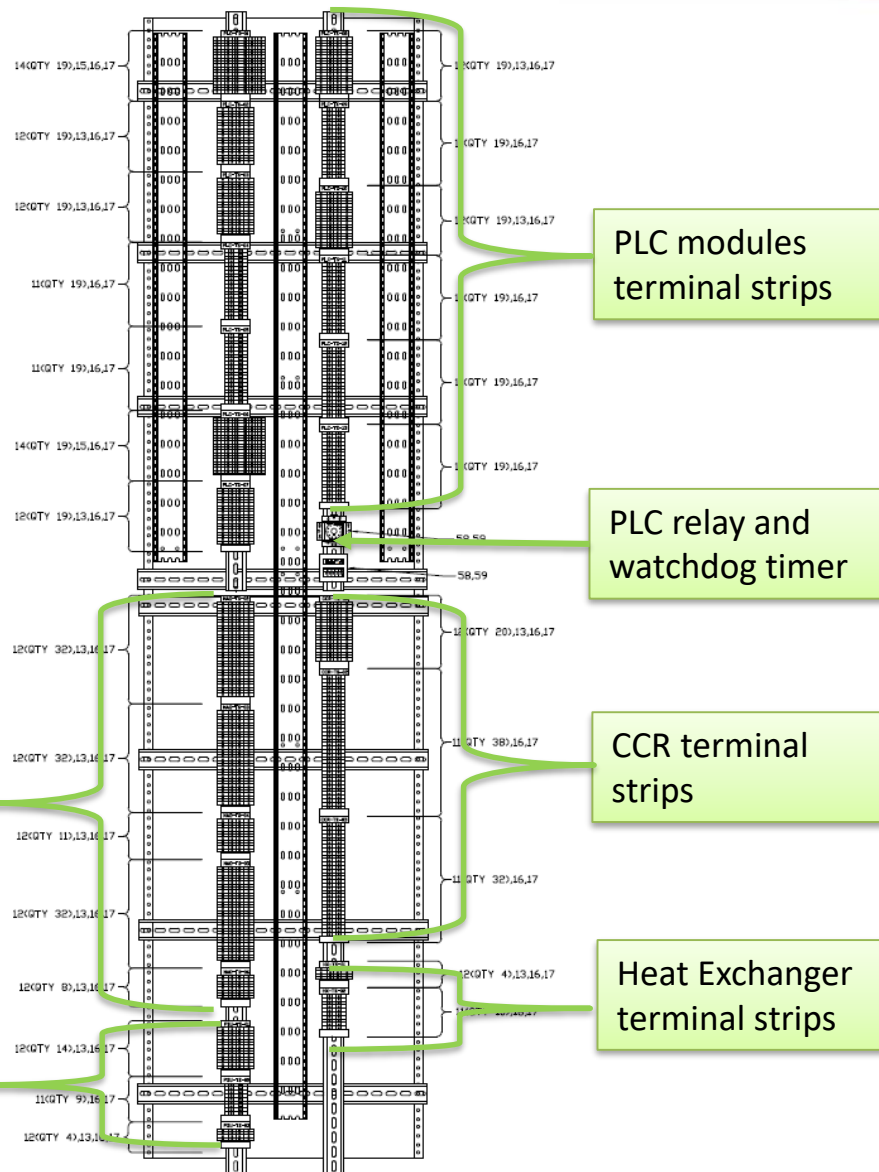


Instrumentation Rack #1 Layout – Front View

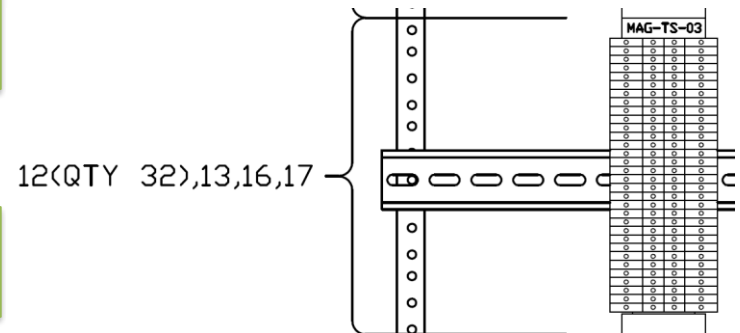


- Rack #1 19 in. W x 44U H
- Front view diagram shows instrumentation to control/monitor
 - Temperature sensors
 - JT valves motors
 - Liquid levels
 - MPS Current
- Numbers next to brackets refer to components detailed in parts list
- Numbers within parenthesis represent quantity per component

Instrumentation Rack #1 Layout – Rear View



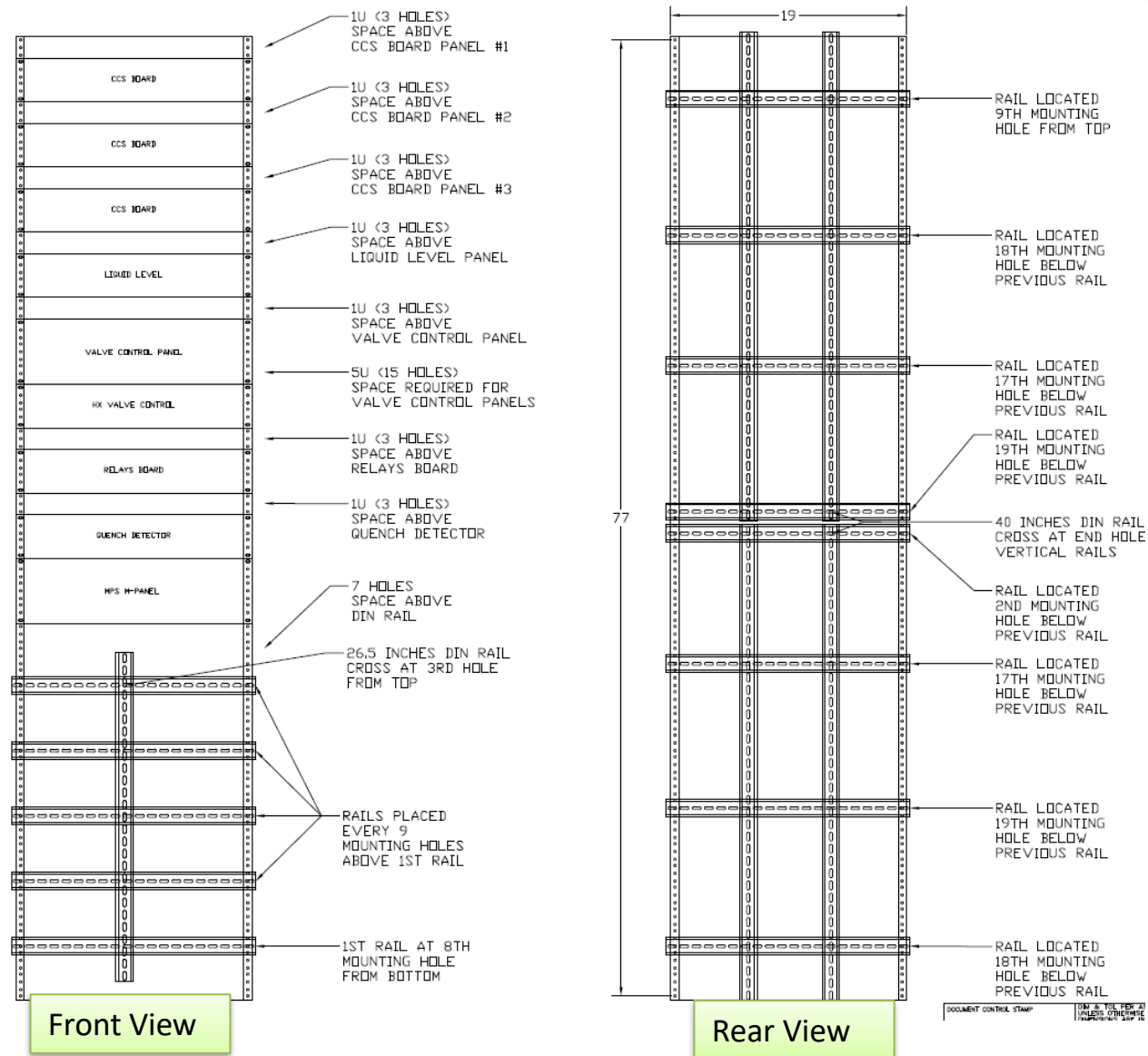
- Rear view of rack shows terminal blocks locations
 - PLC connections
 - Temperature sensors, load sensors
 - Valve controls
 - Heat exchanger
- Terminal Strips grouped by
 - PLC module type
 - Type of sensor
 - Type of instrumentation
 - Sensor location



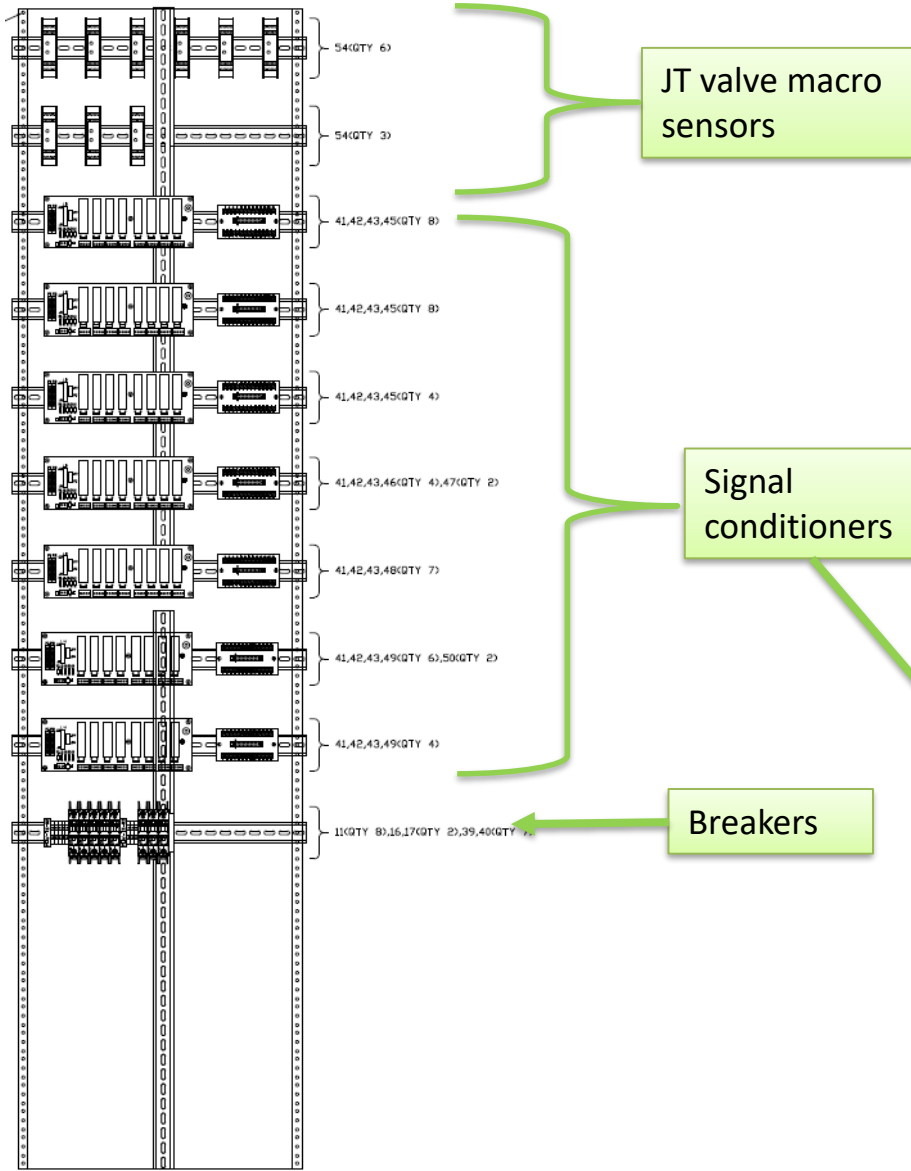
Example of terminal strip group for magnet's temperature sensors

Instrumentation Rack #1 Layout – Frame

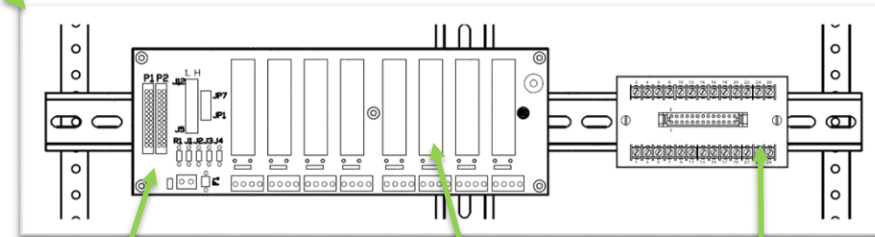
- Drawing provides detailed information about location of rails and control instruments in rack
- Facilitates installation
 - Panels for devices, controllers, and boards
 - Rails for terminal blocks



Instrumentation Rack #2 Layout – Front View



- Rack #2 19 in. W x 44U
- Shown in front view
 - JT valves macro sensors
 - Signal conditioners backplanes
 - Signal conditioner breakout boards
 - Breakers to protect instrumentation in rack



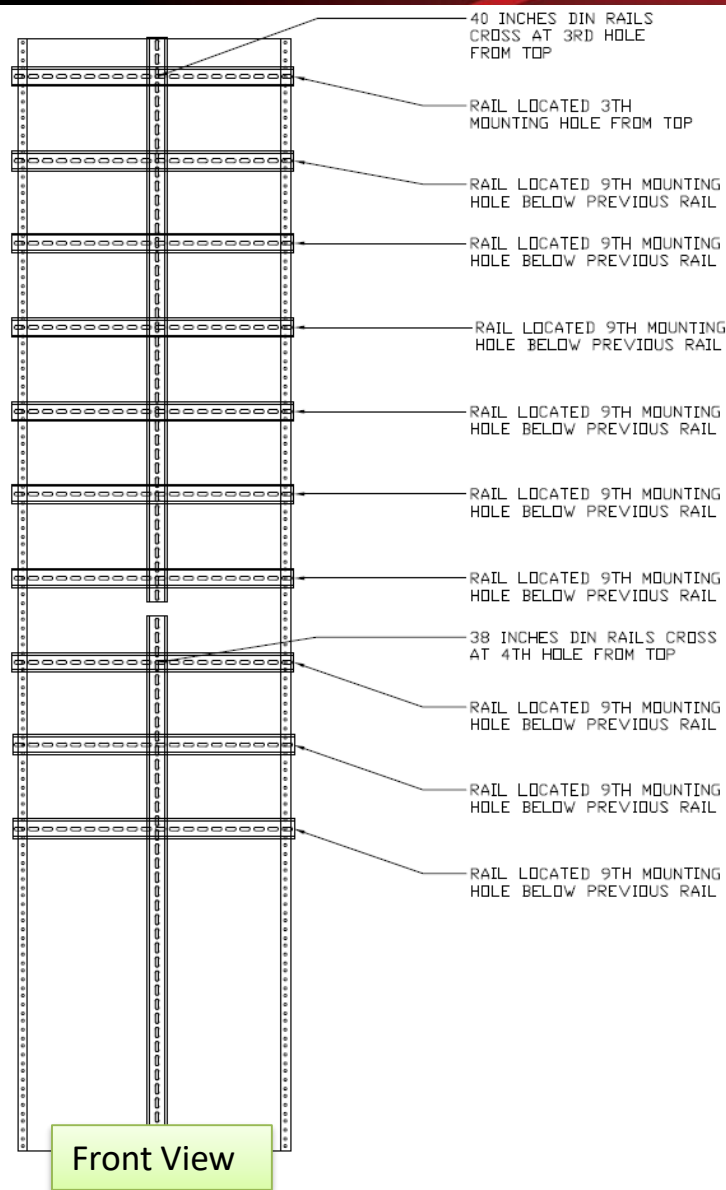
Signal conditioner backplane

Signal conditioner modules

Signal conditioner breakout boards

Instrumentation Rack #2 Layout– Frame

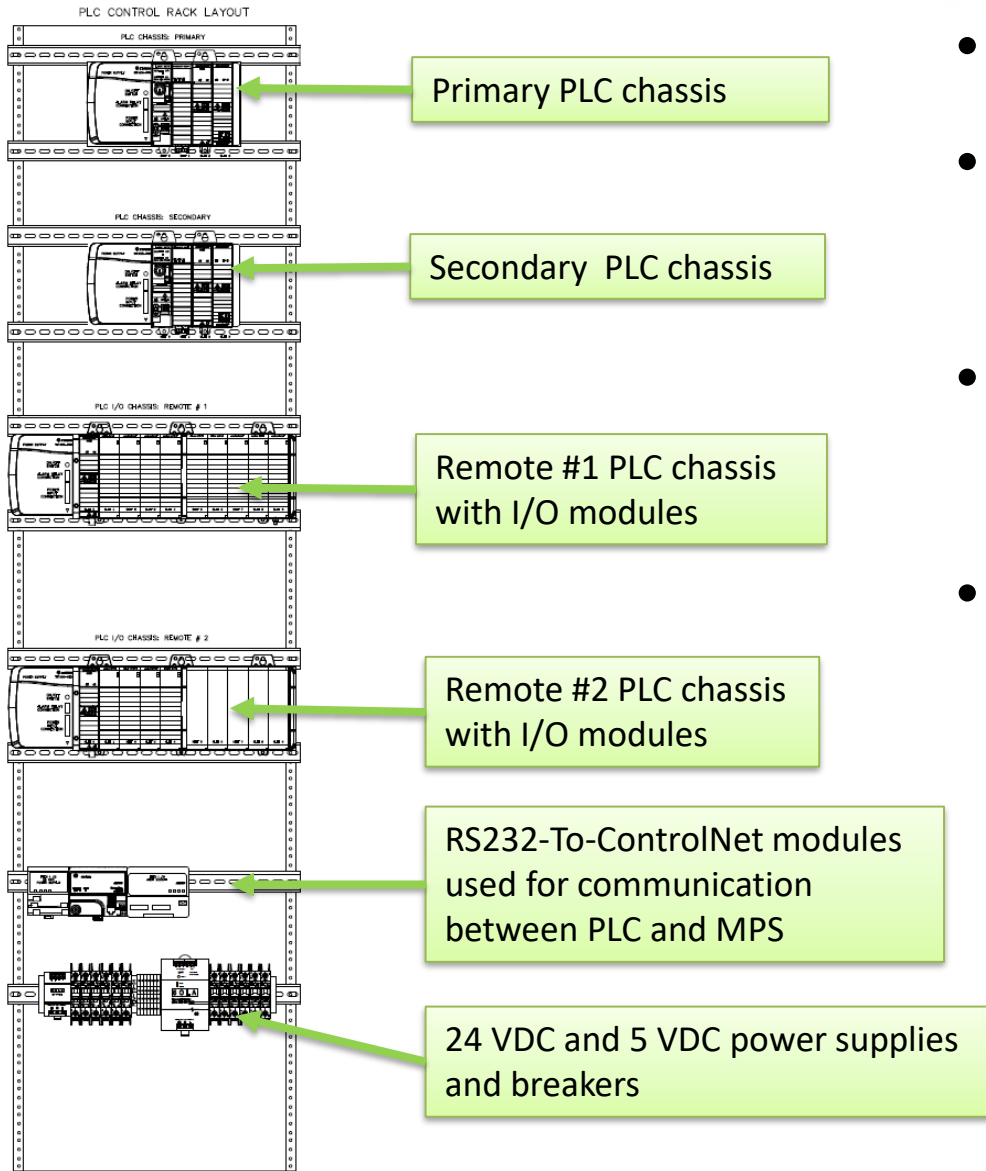
- Rear side of rack #2 is empty and available for possible needed instrumentation
- Drawing provides detailed information
 - Location of rails and control instruments
 - Rack dimensions
- Facilitates installation
 - Rails for JT valve macro sensors
 - Rails for signal conditioners board



Instrumentation Racks – Current Status

- Some components have been acquired, but not installed in rack #1
- Rack #1 is located in Test Lab next to magnet
 - For first stage of testing (low current, 100 A), rack will stay next to magnet
 - Final location will be in Hall A
- Rack #2 needs to be acquired

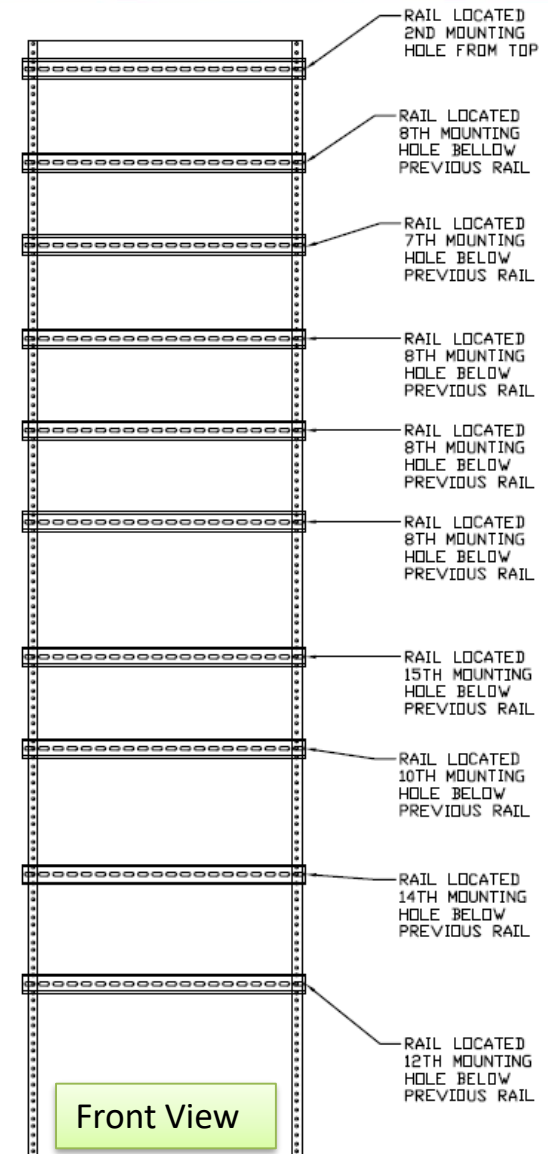
PLC Controls Rack Layout – Front Panel



- Rack 19 in. W x 44U H
- Will be located in Hall A counting house
- No PLC components will be installed in rear of rack
- All components drawn to 1:1 scale to dimensions provided by vendor or manufacturer

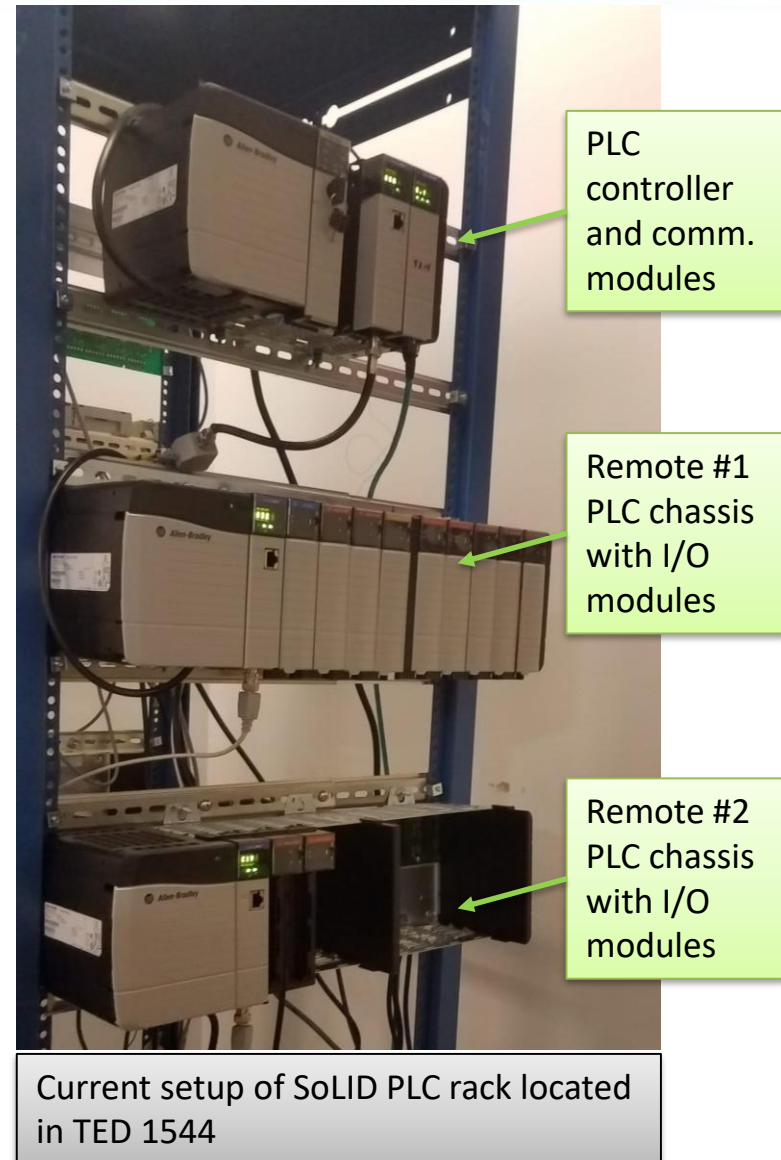
PLC Controls Rack Layout Frame – Front View

- Frame drawing provides detailed information about location of rails
- Facilitates installation of components
 - PLC chassis
 - Communication modules
 - 5 and 24 V power supplies
- Spaces between rails allow easy wiring access to PLC I/O chassis

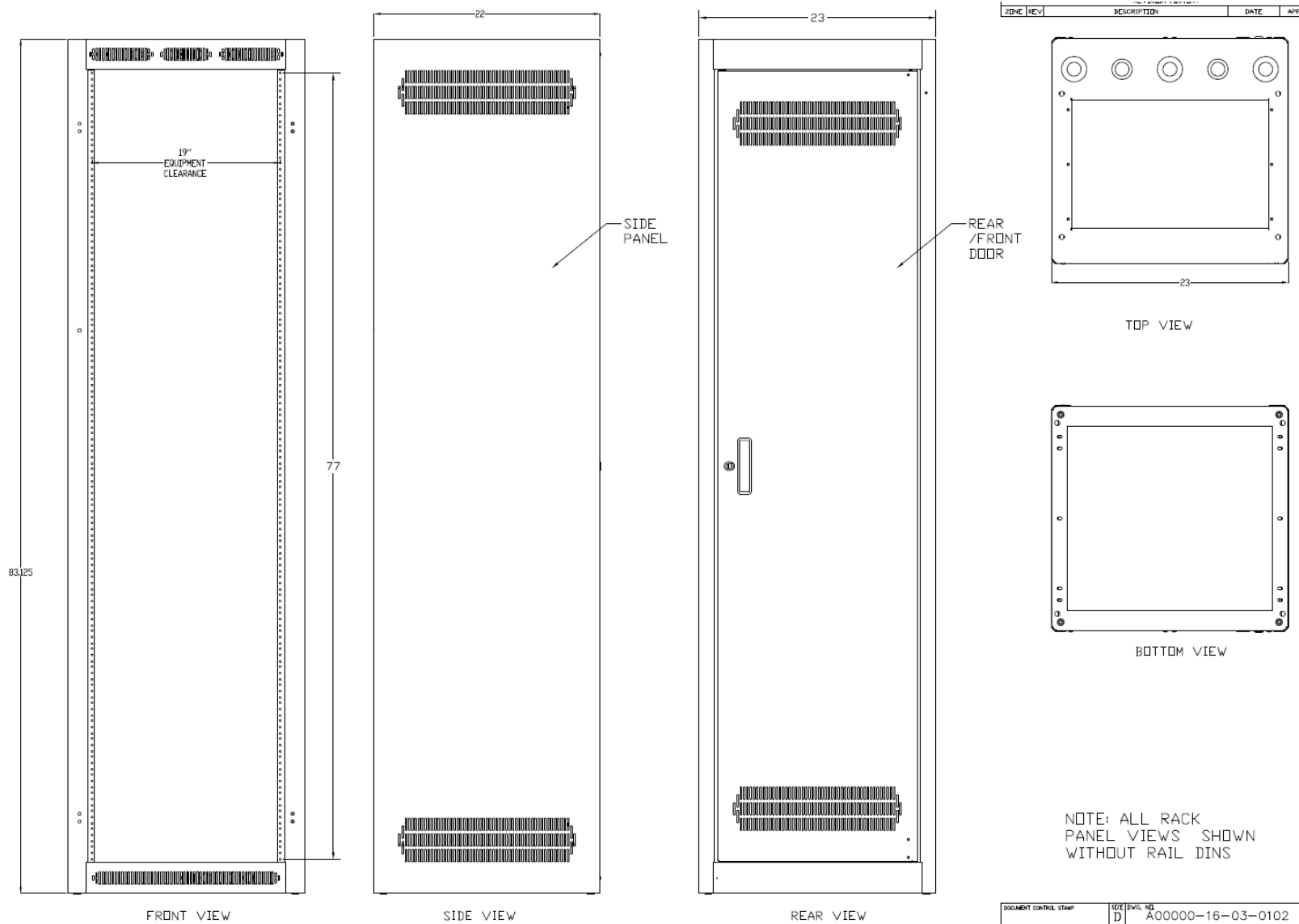


PLC Controls Rack Layout – Current Status

- More PLC components need to be installed in PLC rack
- Currently PLC rack houses three PLC chassis
 - **Primary PLC chassis** : PLC controller, Ethernet, and ControlNet modules
 - **Two Remote I/O PLC chassis:**
 - **Remote #1:** ControlNet (x1), digital input (x1), analog input (x5), analog output (x1), and relay (x2)
 - **Remote #2:** ControlNet (x1), relay (x1), and analog input (x2)



Instrumentation and PLC Controls Racks – Frame



Parts List

- Detailed information of all instrumentation to be installed in PLC and instrumentation racks

Number linked with rack drawings, located next to brackets

PARTS LIST				
#	QTY	DESCRIPTION	MANUFACTURER	PART NUMBER
1	3	19' RACK ASSEMBLY, 44U TALL	-	-
2	0	19' RACK ASSEMBLY, 22U TALL	-	-
3	12	DIN MOUNTING RAIL	ALTECH CORP	251120/2M
4	-	10-32 CLIP-ON PANEL NUT	-	-
5	-	1/2 X 10-32 RACK SCREW	-	-
6	-	10-32 KEP NUT	TANNER	10FNKEZ
7	4	SLOTTED WIRING DUCT	AUTOMATION DIRECT	T1-0506G-1
8	6	2-UNIT RACK PANEL	-	-
9	1	3-UNIT RACK PANEL	-	-
10	6	POWER STRIP	WIREDOLD	V20GB606
11	216	1-LEVEL TERMINAL BLOCK	ALLEN-BRADLEY	1492-J4
12	268	2-LEVEL TERMINAL BLOCK	ALLEN-BRADLEY	1492-JD3
13	16	2-LEVEL END BARRIER	ALLEN-BRADLEY	1492-EBJD3
14	38	3-LEVEL TERMINAL BLOCK	ALLEN-BRADLEY	1492-WTF3
15	2	3-LEVEL END BARRIER	ALLEN-BRADLEY	1492-EBTF3
16	33	END ANCHOR	ALLEN-BRADLEY	1492-EA35J
17	30	TERMINAL GROUP MARKER	ALLEN-BRADLEY	1492-GM35
18	-	JUMPERS, 20-POLE, INSULATED	ALLEN-BRADLEY	1492-SJTS-20-B
19	2	4-SLOTS BACKPLANE	ALLEN-BRADLEY	1752-A4
20	2	10-SLOTS BACKPLANE	ALLEN-BRADLEY	1756-A10
21	4	POWER SUPPLY	ALLEN-BRADLEY	1756-PA72
22	2	PLC CONTROLLER	ALLEN-BRADLEY	1756-L72
23	2	REDUNDANCY MODULE	ALLEN-BRADLEY	1756-RM2
24	2	ETHERNET MODULE	ALLEN-BRADLEY	1756-EN2T
25	4	CONTROLNET MODULE	ALLEN-BRADLEY	1756-CN2
26	1	DC INPUT MODULE	ALLEN-BRADLEY	1756-IV16
27	1	ANALOG OUTPUT MODULE	ALLEN-BRADLEY	1756-OF4
28	3	RELAY MODULE	ALLEN-BRADLEY	1756-DW161
29	8	ANALOG INPUT MODULE	ALLEN-BRADLEY	1756-IF16
30	2	20-SCREW TERMINAL BLOCK	ALLEN-BRADLEY	1756-TBNH

PARTS LIST				
#	QTY	DESCRIPTION	MANUFACTURER	PART NUMBER
31	11	36-SCREW TERMINAL BLOCK	ALLEN-BRADLEY	1756-TBCH
32	5	EMPTY SLOT FILLER	ALLEN-BRADLEY	1756-N2
33	1	24V POWER SUPPLY	ALLEN-BRADLEY	1794-PS13
34	1	CONTROLNET ADAPTER	ALLEN-BRADLEY	1794-ACN15
35	1	ASCII MODULE	PROSOFT	MV194-GSCE
36	2	24V POWER SUPPLY	SOCLA	SDN 10-24-100P
37	2	5V POWER SUPPLY	SOCLA	SDN 5-5-100T
38	6	10A CIRCUIT BREAKER	ALLEN-BRADLEY	1489-AIC100
39	5	5A CIRCUIT BREAKER	ALLEN-BRADLEY	1489-AIC050
40	30	2A CIRCUIT BREAKER	ALLEN-BRADLEY	1489-AIC050
41	11	8-CHANNEL BACKPLANE	DATAFORTH	SCMP05-2
42	11	RIBBON CABLE W/ CONNECTORS	DATAFORTH	SCMXCA-004-1
43	11	BREAKOUT BOARD	DATAFORTH	SCMXIF-DIN
44	32	SIGNAL CONDITIONING MODULE	DATAFORTH	SCMSB30-01D
45	20	SIGNAL CONDITIONING MODULE	DATAFORTH	SCMSB38-31D
46	4	SIGNAL CONDITIONING MODULE	DATAFORTH	SCMSB31-03D
47	2	SIGNAL CONDITIONING MODULE	DATAFORTH	SCMSB38-35D
48	7	SIGNAL CONDITIONING MODULE	DATAFORTH	SCMSB31-09D
49	10	SIGNAL CONDITIONING MODULE	DATAFORTH	SCMSB43-05D
50	2	SIGNAL CONDITIONING MODULE	DATAFORTH	SCMSB34-1562
51	6	CURRENT SOURCE BOARD	JLAB	04-CMA-1D-01-B
52	1	LIQUID LEVEL MONITOR	CRYDMAGNETICS	LM-S10
53	1	RELAY BOARD	JLAB	RB-24
54	9	SIGNAL CONDITIONING MODULE	MACRO SENSORS	LVC-4000/2500
55	1	KEY SWITCH	ALLEN-BRADLEY	800T-H33B
56	10	3-POSITION SWITCH	ALLEN-BRADLEY	800T-J91A

PARTS LIST				
#	QTY	DESCRIPTION	MANUFACTURER	PART NUMBER
57	11	SWITCH LABEL	ALLEN-BRADLEY	800T-X700
58	1	12-POSITION ROTARY SWITCH	GRAYHILL	SISPT30-01-1-AJN
59	1	ROTARY SWITCH KNOB	ELECTROSWITCH	1400R
60	1	LCD VOLTMETER	RED LION	CUBSVR00
61	2	RELAY SOCKET	ALLEN-BRADLEY	700-HN126
62	1	CONTROL RELAY	ALLEN-BRADLEY	700-HA33Z24
63	1	TIMING RELAY	POTTER & BRUMFIELD	CNT-35-96
64	1	QUENCH DETECTOR	DANFYSIK	-
65	1	POWER SUPPLY M-PANEL	DANFYSIK	-
66	1	POWER SUPPLY CRATE	DANFYSIK	-
67	1	RACK SHELF	GENERALDEVICE	D-4456
68	-	SLIDING SHELF	HAMMOND	RSVS1921BK1

Conclusions

- PLC and instrumentation rack layouts completed
 - Developed drawings critical for assembly of new racks
- Parts list for SoLID magnet control system generated
 - Parts list provides information required for acquisition of instrumentation for SoLID magnet

Thank You