

INSTRUCTIONS:

- 1. CONTRACTOR SHALL USE THIS DRAWING FILE TO CREATE SHOP DRAWINGS FOR JEA REVIEW.
- 2. PLEASE CONTACT ARISS FAJARDO AT FAJAAJ@JEA.COM FOR QUESTIONS OR ADDITIONAL INFORMATION.
- 3. DO NOT PRINT THIS SHEET IN SUBMITTAL SET.

NO.	BY	DATE	REVISIONS	<div>ELECTRICAL SCHEMATIC</div> <div>MANUFACTURER</div> <div>ADDRESS1</div> <div>ADDRESS2</div> <div>CONTACT_NAME</div> <div>CONTACT_NUMBER</div>	<div>JEA</div> <div>Building Communitysm</div>	DESIGNER:	SHEET TITLE: INSTRUCTION SHEET	
6.						DRAWN BY:	PROJECT: --- PROJECT NAME ---	
5.						DATE:	3-PHASE VFD LIFT STATION DIAGRAM	
4.						CHECKED BY:	JOB No: 12345678	SHEET 0 OF 17
3.						DATE:		
2.						2025 STANDARD PACKAGE, REV. 0		
1.								

GENERAL NOTES:

1. REFER TO "433 PUMP STATION ELECTRICAL" FOR FURTHER DETAILS THAT MUST BE ADHERED TO SUCH AS WIRE, CONTACTOR, AND CIRCUIT BREAKER SIZING.
2. THIS DRAWING IS AN EXAMPLE OF HOW OVERALL CABINET IS TO BE DESIGNED. THE DRAWING WILL NEED TO BE REVISED BASED ON THE PUMP MANUFACTURER, SIZE AND NUMBER OF PUMPS. THINGS THAT WILL CHANGE ARE ENCLOSURE SIZE, CIRCUIT BREAKER SIZE, WIRE SIZE, VFD SIZE, AND OTHER ITEMS. REFER TO SPECIFICATIONS FOR FURTHER DETAILS.
3. REFER TO "433 PUMP STATION ELECTRICAL" HEAT LOAD CALCULATIONS SECTION AND ENCLOSURE SPECIFICATIONS TO SIZE ENCLOSURE CORRECTLY.
4. VFDs SHALL BE BOLTED TO A REMOVABLE PLATE THAT WILL THEN BE CONNECTED TO THE BACK OF THE ENCLOSURE WITH A GASKET. THE BACK OF THE ENCLOSURE SHALL HAVE STUDS TO ATTACH THE PLATE TO. THIS PLATE IS TO BE ADEQUATELY DESIGNED TO SUPPORT THE VFD. ENCLOSURE CUTOUT SHALL BE SIZED A MINIMUM OF 2.75" WIDER AND 3.5" HIGHER ON EACH SIDE OF THE MANUFACTURER RECOMMENDED CUTOUT FOR 40HP VFDs. THIS WILL RESULT IN A CUTOUT THAT IS NO LESS THAN 5.5" WIDER AND 7" HIGHER THAN THE MANUFACTURER'S SPECIFICATION. ADDITIONALLY THIS DISTANCE WILL INCREASE PROPORTIONATELY WITH THE SIZE OF THE VFD. FOR EXAMPLE: 80HP VFDs REQUIRE A CUTOUT THAT IS 5.5" WIDER AND 7.0" HIGHER ON EACH SIDE (A TOTAL OF 11" WIDER AND 14" HIGHER) OF THE MANUFACTURER SPECIFIED CUTOUT. THIS REQUIREMENT IS TO ENSURE THAT A FUTURE REPLACEMENT OF A VFD WILL ALLOW FOR DIFFERENT VFD DIMENSIONS.
5. VFDs SHALL BE RATED FOR CORROSIVE ENVIRONMENTS AND DRIVE CONTROL BOARDS SHALL BE CONFORMAL COATED TO PROTECT AGAINST CORROSION. REFER TO "495 VARIABLE FREQUENCY DRIVES".
6. VFD ENCLOSURES LOCATED OUTSIDE SHALL BE NEMA 12/3R WITH THE VFD HEAT SINKS VENTED OUT THE BACK. REFER TO DRAWINGS FOR FURTHER DETAILS.
7. THE REAR SUNSHIELD SHALL HAVE A REMOVABLE COVER WITH HANDLES TO ALLOW ACCESS TO THE VFD HEAT SINKS FOR CLEANING AND MAINTENANCE. THE HEAT SHIELD WILL HAVE STUDS WITH WING NUTS FOR ATTACHING THE REMOVABLE COVER.
8. SEAL LEAK/OVERTEMP RELAYS MUST BE CHANGED AS REQUIRED BY PUMP MANUFACTURER AND ADJUSTED TO RECOMMENDED SETTINGS.
9. REFER TO "433 RADIO AND ANTENNA POLE/TOWER SELECTION".
10. ENSURE GOOD ELECTRICAL CONTACT BETWEEN BACK PANEL AND ALL MECHANICAL GROUND CONNECTIONS.
11. REFER TO NOTES AND DETAILS ON ALL DRAWING SHEETS FOR MORE MANUFACTURING DETAILS.
12. THE SURGE PROTECTION DEVICE (SPD) IS TO BE SHIPPED LOOSE FOR MOUNTING AT THE DISCONNECT IN THE FIELD. THE CORRECT SPD MUST BE SELECTED BASED ON THE SERVICE VOLTAGE: 480V WYE.
13. ALL FIELD WIRING SHALL BE #12 AWG STRANDED, TIN-PLATED COPPER. APPLY DIELECTRIC GREASE TO ENDS TO PREVENT CORROSION.
14. ALL CONTROL WIRING SHALL BE #18 AWG STRANDED, TIN-PLATED COPPER. APPLY DIELECTRIC GREASE TO ENDS TO PREVENT CORROSION.
15. ALL WIRES IN CONTROL PANEL SHALL BE TERMINATED WITH FERRULES. APPLY DIELECTRIC GREASE TO THE ENDS TO PREVENT CORROSION.
16. ALL MOUNTING SCREWS SHALL BE STAINLESS STEEL, DRILLED AND TAPPED (NO SELF-TAPPING SCREWS ARE ALLOWED).
17. PANEL MUST MEET UL508A CONTROL PANEL WITH UL 508A LABEL
18. PANEL MUST MEET UL698A INTRINSICALLY SAFE PANEL WITH UL698A LABEL
19. THIS DRAWING IS FOR 480VAC SERVICE. THE TAPS ON THE TRANSFORMER MUST BE CONNECTED FOR 480VAC.
20. ALL TERMINALS, RELAYS, SURGE SUPPRESSORS, BREAKERS, AND OTHER DEVICES MUST BE LABELED.
21. INSTALL PLUGGABLE JUMPERS ON TERMINALS WHERE INDICATED. APPLY DIELECTRIC GREASE TO JUMPERS TO PREVENT CORROSION.
22. USE 6MM FERRULES FOR WIRES TERMINATING AT PLC.
23. ALL WIRES TERMINATING AT PLC RACK MUST BE ROUTED THROUGH WIREWAY FROM BELOW.
24. ALL ANALOG SIGNAL WIRING SHALL BE SHIELDED CABLE WITH THE SHIELD GROUNDED ONLY AT ONE POINT.
25. THIS DRAWING IS FOR A TRIPLEX PUMP STATION. DUPLEX PUMP STATIONS REQUIRE FEWER PUMP CONTROLS.

TABLE OF CONTENTS:

1. GENERAL NOTES
2. SCADA RTU - FRONT VIEW
3. SCADA RTU - BACK PANEL LAYOUT
4. SCADA RTU - 120 VAC VOLTAGE
5. SCADA RTU - 24 VDC VOLTAGE
6. SCADA RTU - VFD CONTROL WIRING
7. SCADA RTU - PLC DIGITAL I/O
8. SCADA RTU - PLC ANALOG INPUT
9. SCADA RTU - PLC & RADIO CONNECTION
10. SCADA RTU - 24 VDC TERMINAL BLOCK LAYOUT
11. SCADA RTU - 120 VAC TERMINAL BLOCK LAYOUT
12. SCADA RTU - INTRINSIC SAFETY DETAIL
13. SCADA RTU - INTRINSIC SAFETY WIRING
14. SCADA RTU - INTRINSIC SAFETY NOTES
15. MCC - FRONT PANEL VIEW
16. MCC - BACK PANEL LAYOUT
17. MCC - PANEL MAIN VAC VOLTAGE

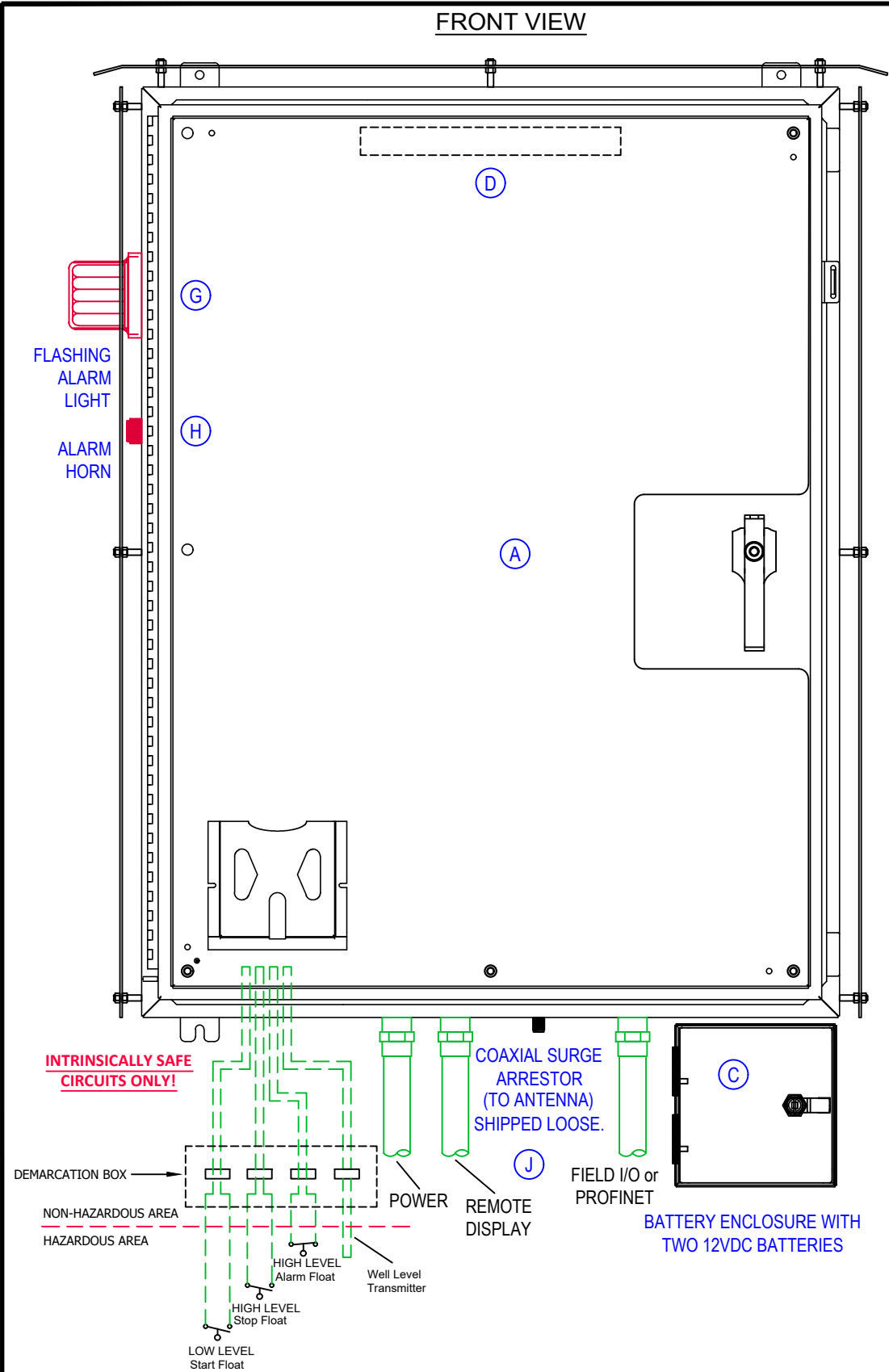
DRAWING LAYER COLOR LEGEND:

- GREY - NOTES
- BLACK - ELECTRICAL SCHEMATIC WIRING
DIAGRAMS AND DEVICES
- BLUE - PART IDENTIFICATION
- PURPLE - WIRE NUMBERS
- GREEN - FIELD DEVICES AND WIRING
OUTSIDE ENCLOSURE (DASHED)
- RED - FUTURE DEVICES AND WIRING
- TEAL - DIMENSIONS

CONTROL WIRE UL508A COLOR:

- RED - 120 VAC
- WHITE - NEUTRAL
- BLUE - +24 VDC
- WHITE / BLUE STRIPE - 0 VDC

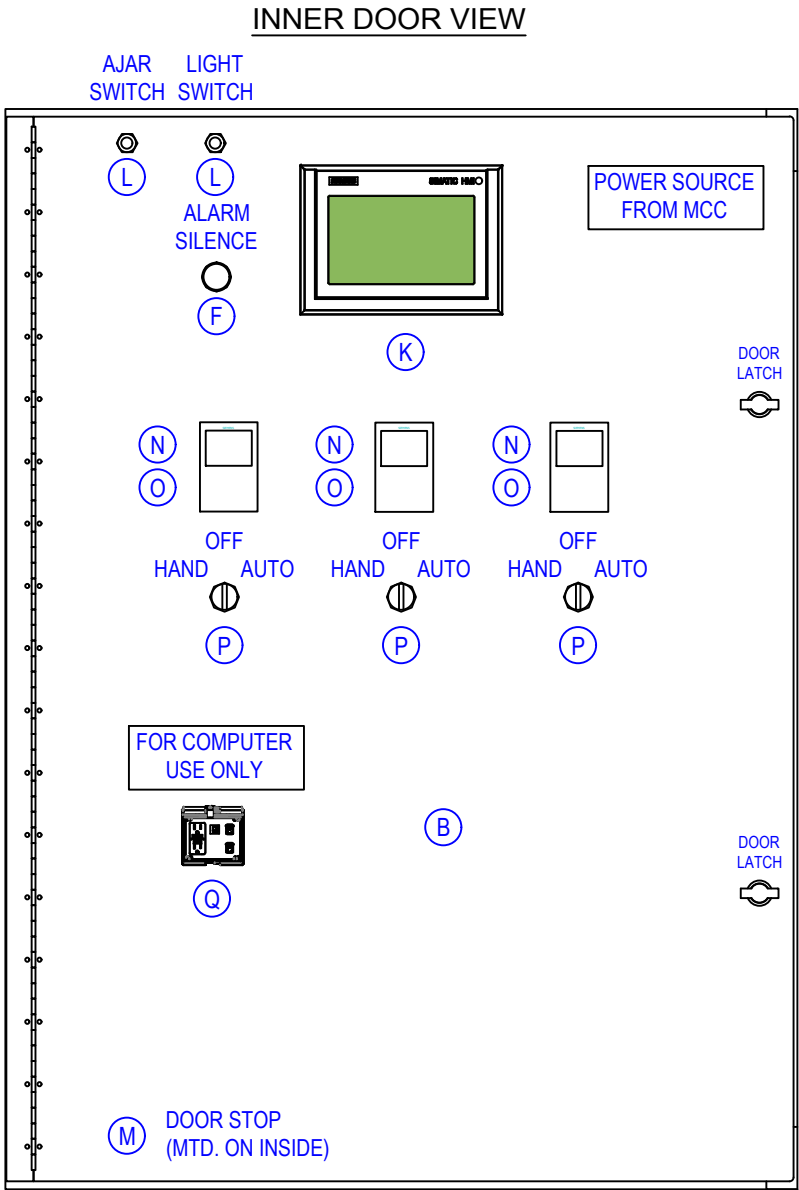
NO.	BY	DATE	REVISIONS	<div>ELECTRICAL SCHEMATIC</div> <div>MANUFACTURER ADDRESS1 ADDRESS2</div> <div>CONTACT_NAME CONTACT_NUMBER</div>	<div>JEA</div> <div>Building Communitysm</div>	DESIGNER:	SHEET TITLE: GENERAL NOTES	
6.						DRAWN BY:	PROJECT: --- PROJECT NAME ---	
5.						DATE:	3-PHASE VFD LIFT STATION DIAGRAM	
4.						CHECKED BY:	JOB No: 12345678	
3.						DATE:	SHEET 1 OF 17	
2.						2025 STANDARD PACKAGE, REV. 0		



BILL of MATERIAL				
	QTY	MANUFACTURER	PART NUMBER	DESCRIPTION
A	1	SCHAEFER	CUSTOM ENCLOSURE	SEE THIS SHEET FOR DETAILS
	2	OEM	CUSTOM INNER DOORS	SEE THIS SHEET FOR DETAILS
B	1	SCHAEFER	SPN1AL-888-JEA	BATTERY ENCLOSURE, .125 ALUMINUM
C	2	POWER SONIC	PS-12180 F2	BATTERY, LEAD-ACID, 12VDC, 18Ah
	1	RITTAL	4140820	13" 20 LED LIGHT 24VDC
E	--	--	--	--
F	1	SIEMENS	52PX8A1K / 52BAK	MOMENTARY PUSHBUTTON, 30mm, FLUSH
G	1	INGRAM PRODUCTS	LX40F	ALARM LIGHT W/ FLASHER, 120VAC, RED
H	1	INGRAM PRODUCTS	PW120AR	ALARM HORN, ELECTRONIC, 120VAC, RED
I	--	--	--	--
J	1	TIMES-PROTECT	LP-STR-NFF	COAXIAL SURGE ARRESTOR (ANTENNA)
K	1	SIEMENS	6AV2 124-0GC01-0AX0	OPERATOR PANEL, TP700 COMFORT DISPLAY
	1	SIEMENS	6AV2 181-8XP00-0AX0	HMI MEMORY CARD, 2GB
L	2	OMRON	6X283	SNAP ACTION SWITCH (DOOR AJAR)
	2	ALLIED	642-2137	ACTUATOR FOR SWITCH
M	2	SCHAEFER	SP-DSTOPK-SS-SW	INNER/OUTER DOOR STOP KIT, SS
N	3	SIEMENS	6SL3255-0AA00-4JA0	IOP-2 PANEL
O	3	SIEMENS	6SL3256-0AP00-0JA0	DOOR MOUNTING KIT
P	3	SIEMENS	52SX2BAB	3 POSITION MAINTAINED SWITCH, 30mm
	12	SIEMENS	52BJK	CONTACT BLOCK, 1NO-1NC
Q	1	MENCOM	LP3-GF-2RJ45-R	GFCI RECPT W/ RJ45, 3A

CUSTOM ENCLOSURE:
SPN12AL-483610 (48"H x 36"W x 10"D) NEMA 12/3R RATED, FABRICATED FROM .125 MARINE GRADE ALUMINUM WITH WHITE POLYESTER POWDER COAT FINISH INSIDE AND OUT. OUTER DOORS ARE FITTED WITH A PADLOCKABLE 3-POINT LATCH AND DOOR STOPS.

HEAT SHIELDS FABRICATED FROM .125 MARINE GRADE ALUMINUM SHALL BE INSTALLED ON FRONT, BACK, TOP, AND SIDES. HOLES SHALL BE CUT IN SHIELD FOR ALARM LIGHT AND HORN. HEAT SHIELDS SHALL ALSO HAVE WHITE POLYESTER POWDER COAT FINISH ON ALL SIDES.



HINGED INNER DOORS:
FABRICATED FROM .125 ALUMINUM WITH CONTINUOUS HINGE, TWIST LATCHES, AND DOOR STOP MOUNTED ON INSIDE OF EACH.

NO.	BY	DATE	REVISIONS
6.			
5.			
4.			
3.			
2.			
1.			

ELECTRICAL SCHEMATIC

MANUFACTURER
ADDRESS1
ADDRESS2

CONTACT_NAME
CONTACT_NUMBER



DESIGNER:
DRAWN BY:
DATE:
CHECKED BY:
DATE:
2025 STANDARD PACKAGE, REV. 0

SHEET TITLE: **SCADA RTU - FRONT VIEW**

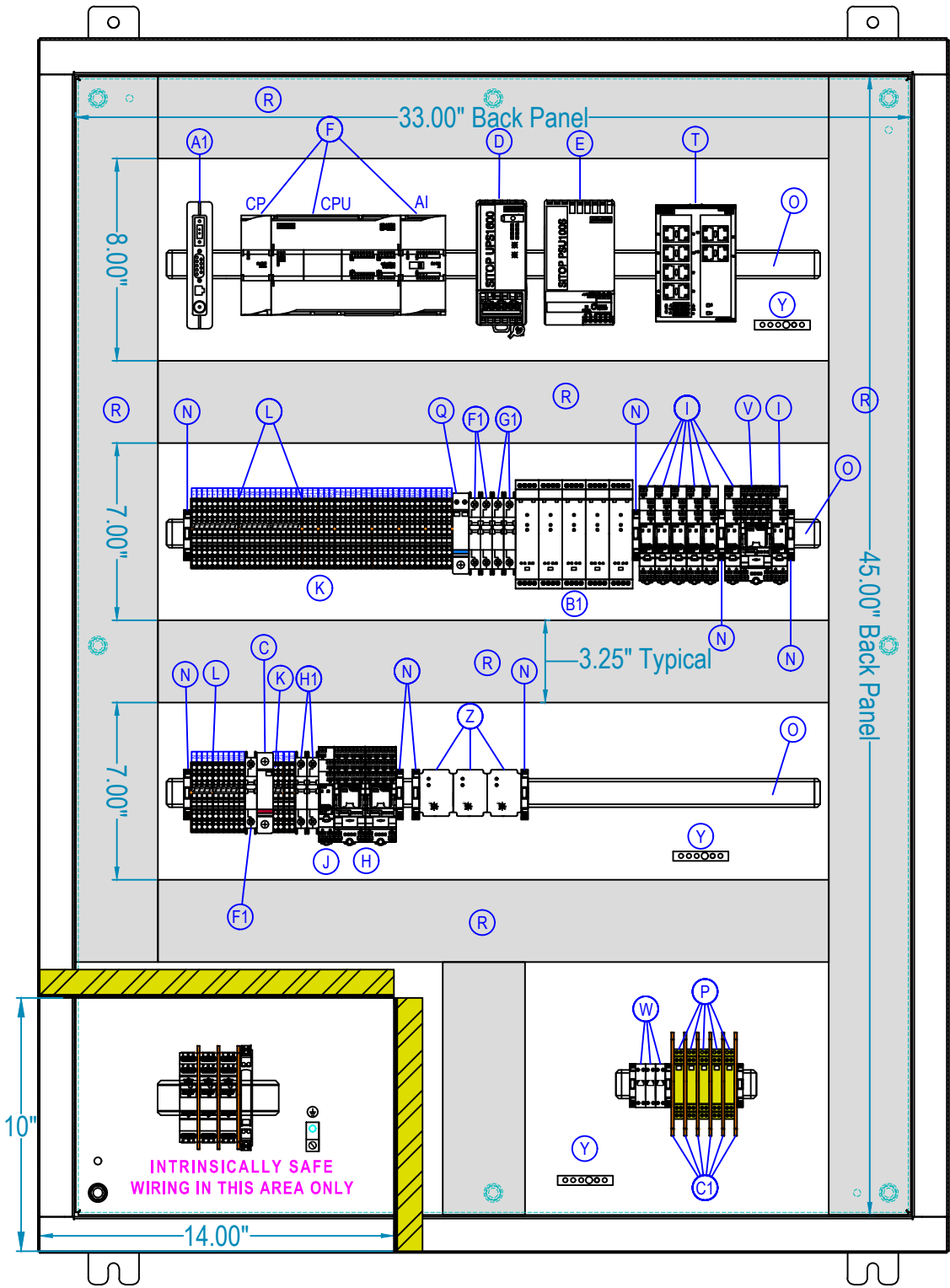
PROJECT: **--- PROJECT NAME ---**

3-PHASE VFD LIFT STATION DIAGRAM

JOB No: **12345678**

SHEET **2** OF **17**

BACK PANEL LAYOUT



BACK PANEL:
45" H x 33" W. FABRICATED FROM 12ga. CARBON STEEL WITH
WHITE INDUSTRIAL GRADE ENAMEL FINISH.

BILL of MATERIAL

	QTY	MANUFACTURER	PART NUMBER	DESCRIPTION
A	1	SCHAEFER	SPP-4836	BACK PANEL, CARBON STEEL, WHITE
B	--	--	--	--
C	1	CITEL	DS41S-120	120VAC SURGE SUPPRESSOR, BASE
D	1	SIEMENS	6AG113-43AB00-7AY2	SIPLUS PS UPS1600, 10A, PROFINET
E	1	SIEMENS	6AG133-42BA20-4AA0	SIPLUS PSU100S, 10A
F	1	SIEMENS	6AG1215-1AG40-4XB0	SIPLUS S7-1200, 1215C DC/DC/DC
	1	SIEMENS	6ES795-48LC04-0AA0	SIMATIC S7 SD CARD, 4MB
	1	SIEMENS	6AG123-14HF32-4XB0	SIPLUS S7-1200 SM 1231 8AI
	1	SIEMENS	6AG1241-1AH32-4XB0	COMMUNICATION MODULE, RS232, 9-PIN MALE
	1	SIEMENS	6ES7231-5PA30-0XB0	S7-1200 SB 1231, ANALOG INPUT, RTD
G	--	--	--	--
H	2	FINDER	58P481205060	RELAY, STATUS, SPRING, 4NO-NC, 120VAC
I	7	FINDER	4CP190245050	RELAY, STATUS, SPRING, SPDT, 24VDC
J	1	FINDER	4CP181205060	RELAY, STATUS, SPRING, SPDT, 120VAC
K	65	WAGO	2002-1401	TERMINAL, 2002, SPRING, GRAY
L	20	WAGO	2002-1492	TERMINAL END / PART. PLATE, ORANGE
M	20	WAGO	2002-400	ADJACENT JUMPER, 2-WAY CONTINUOUS
N	10	WAGO	249-116	TERMINAL END STOP, GRAY
O	1	WAGO	210-112	2M DIN RAIL, GALVANIZED, SLOTTED
P	5	CITEL	DLAW-24D3	ANALOG SURGE SUPPRESSOR, 24VDC
Q	1	CITEL	DS220S-24DC	24VDC SURGE SUPPRESSOR
R	4	PANDUIT	3" W X 3"H X 72" L	WIREWAY, HINGE COVER, WIDE FINGER
S	--	--	--	--
T	1	SIEMENS	6GK5112-0BA00-2AB2	SCALANCE XB112 ETHERNET SWITCH
U	--	--	--	--
V	1	FINDER	58P490245050	RELAY, STATUS, SPRING, 4NO-NC, 24VDC
W	3	PHOENIX	2313931	PROFINET SURGE PROTECTOR
X	--	--	--	--
Y	2	SIEMENS	ECGB5	EQUIPMENT GROUND BAR, 5-POINT
Z	3	MACROMATIC	TCP2G100	SEAL LEAK / OVERTEMP RELAY, 120VAC
A1	1	---	---	RADIO, SPREAD-SPECTRUM, UNLICENSED
	1	---	---	DIN RAIL MOUNT KIT
B1	1	---	---	RADIO ANTENNA CABLE
	5	PR ELECTRONICS	4114	ANALOG SIGNAL ISOLATOR
C1	5	PR ELECTRONICS	4501	DISPLAY UNIT
	5	WAGO	2002-1492	SEPARATOR, ORANGE
D1	3	SIEMENS	6GK1901-1BB10-2AA0	PROFINET CONNECTOR, SIPLUS
E1	2	SIEMENS	6XV1840-2AH10	PROFINET CABLE, FAST CONNECT
F1	3	SIEMENS	5SJ4110-7HG41	CB4, CB5, CB10, UL489, 1 POLE, 10A
G1	2	SIEMENS	5SJ4103-7HG40	CB6 and CB7, UL489, 1 POLE, 3A
H1	2	SIEMENS	5SJ4105-7HG40	CB11 and CB12, UL489, 1 POLE, 0.5A

NO.	BY	DATE	REVISIONS
6.			
5.			
4.			
3.			
2.			
1.			

ELECTRICAL SCHEMATIC

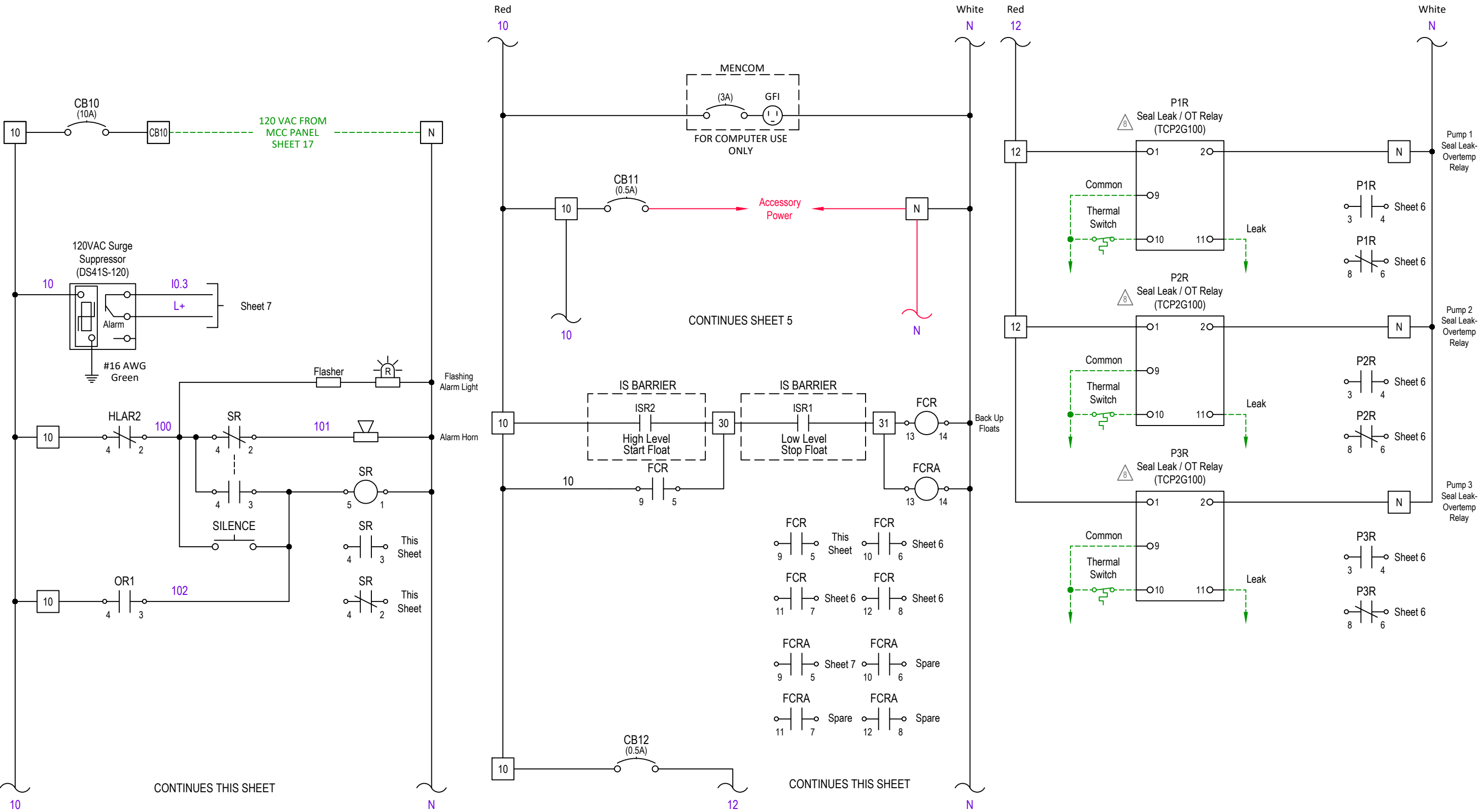
MANUFACTURER
ADDRESS1
ADDRESS2

CONTACT_NAME
CONTACT_NUMBER



DESIGNER:
DRAWN BY:
DATE:
CHECKED BY:
DATE:
2025 STANDARD PACKAGE, REV. 0

SHEET TITLE:
SCADA RTU - BACK PANEL LAYOUT
PROJECT:
--- PROJECT NAME ---
3-PHASE VFD LIFT STATION DIAGRAM
JOB No:
12345678
SHEET 3 OF 17



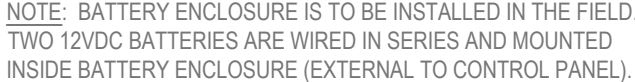
NO.	BY	DATE	REVISIONS
6.			
5.			
4.			
3.			
2.			
1.			

ELECTRICAL SCHEMATIC
MANUFACTURER
ADDRESS1
ADDRESS2
CONTACT_NAME
CONTACT_NUMBER



DESIGNER:
DRAWN BY:
DATE:
CHECKED BY:
DATE:
2025 STANDARD PACKAGE, REV. 0

SHEET TITLE:	SCADA RTU - 120 VAC VOLTAGE
PROJECT:	--- PROJECT NAME ---
JOB No:	12345678
SHEET	4
OF	17



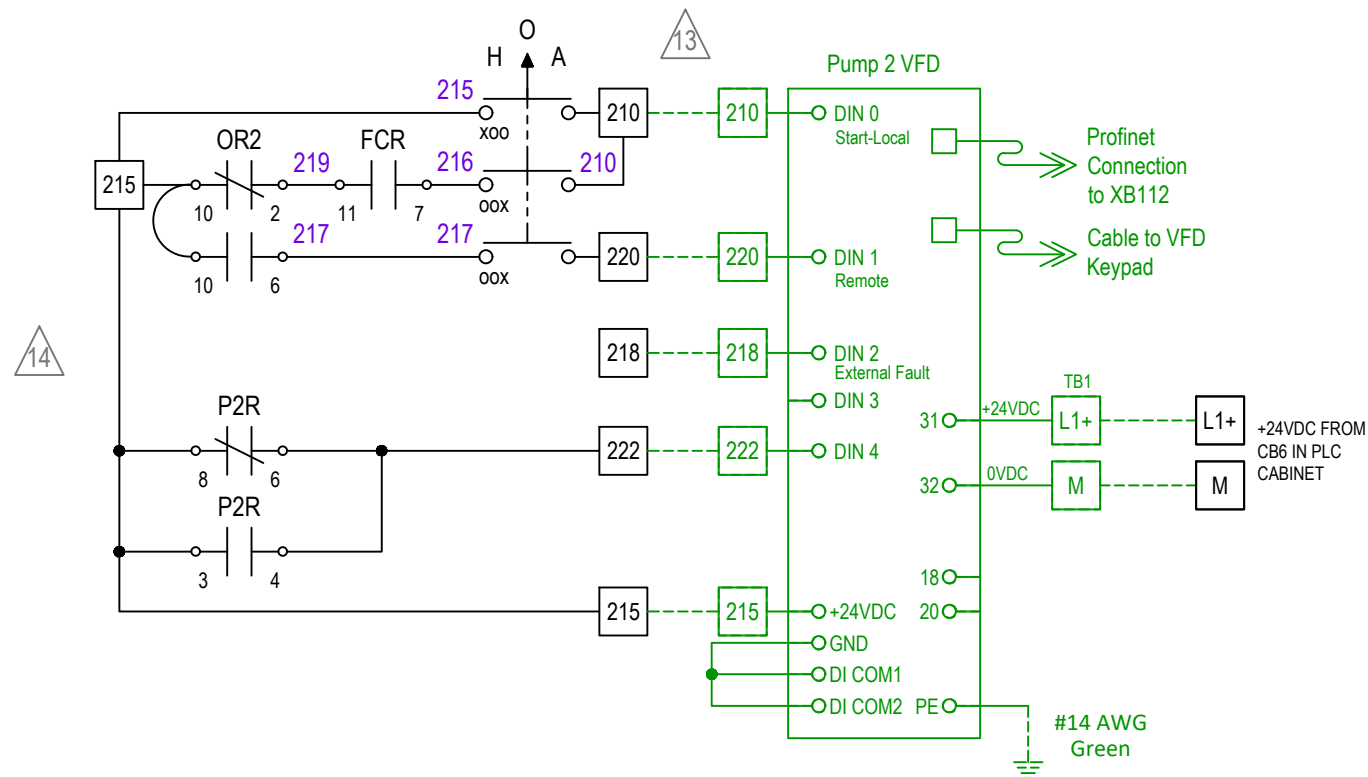
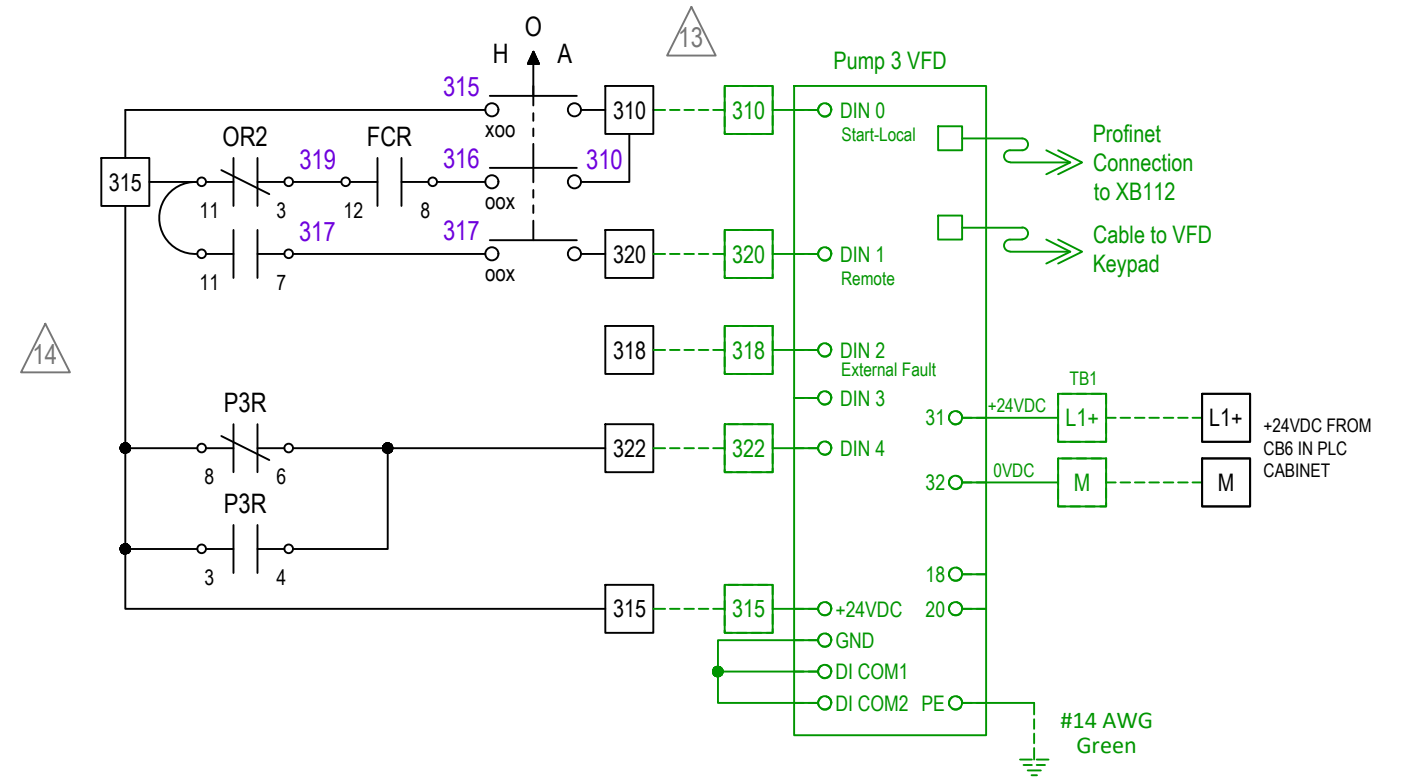
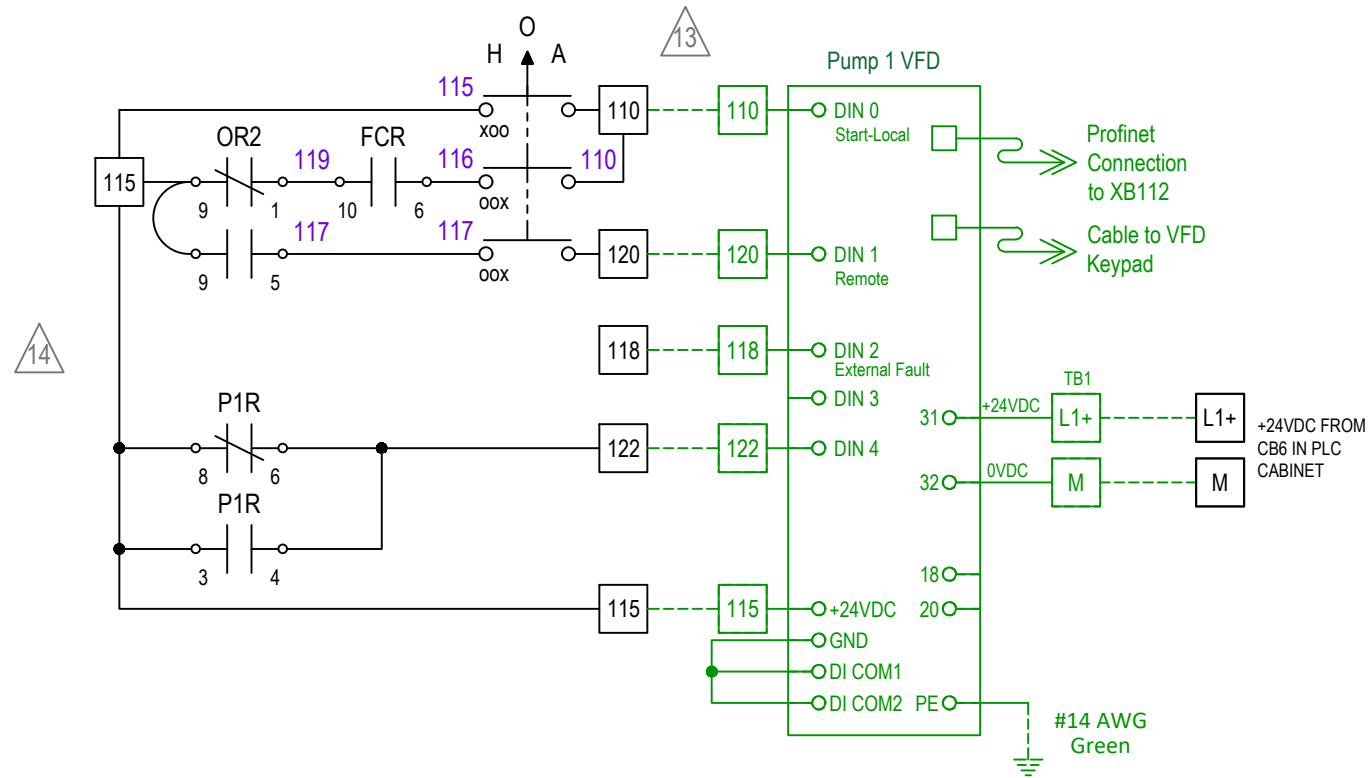
ELECTRICAL SCHEMATIC

MANUFACTURER
ADDRESS1
ADDRESS2

CONTACT_NAME
CONTACT_NUMBER

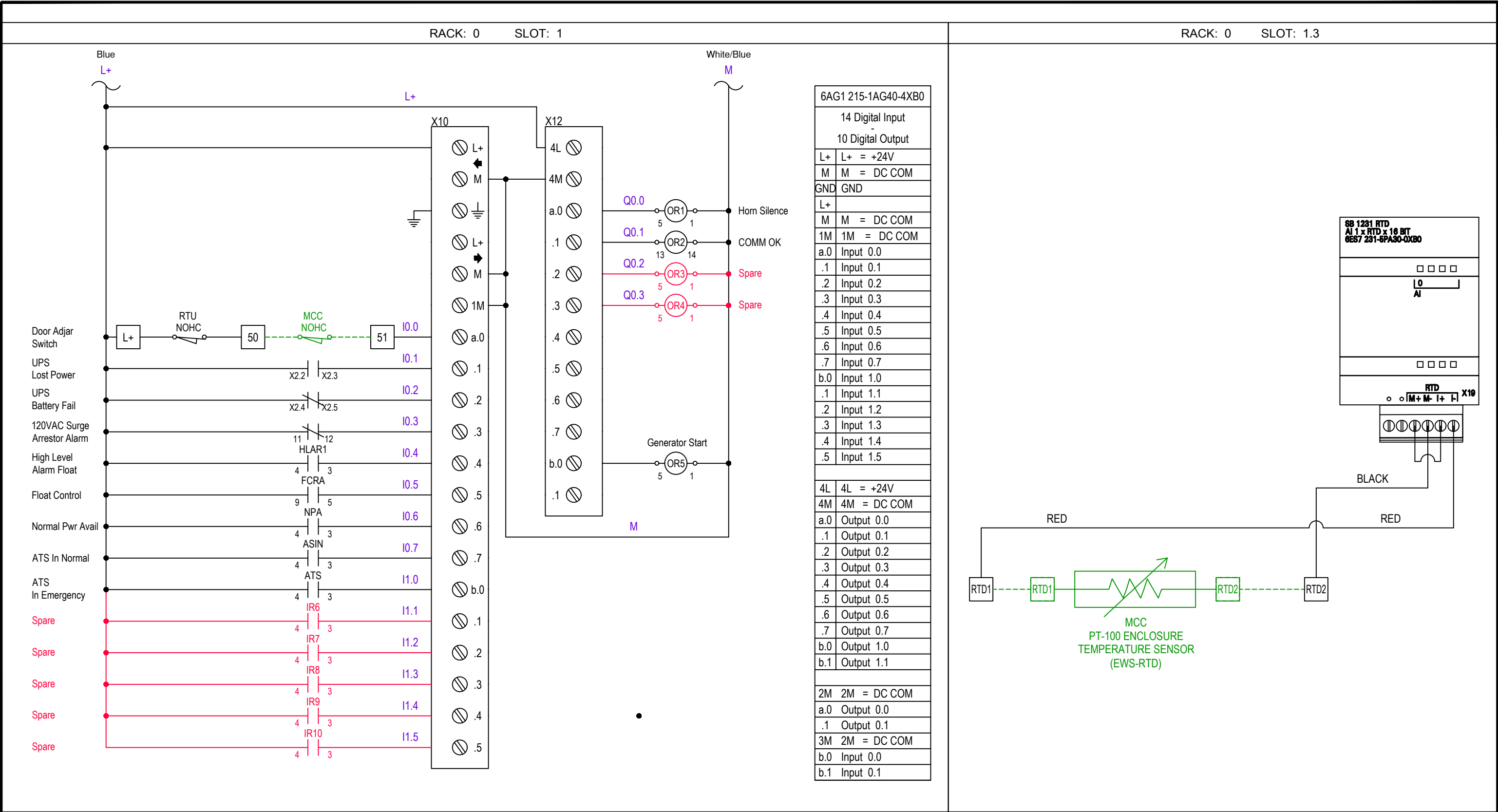


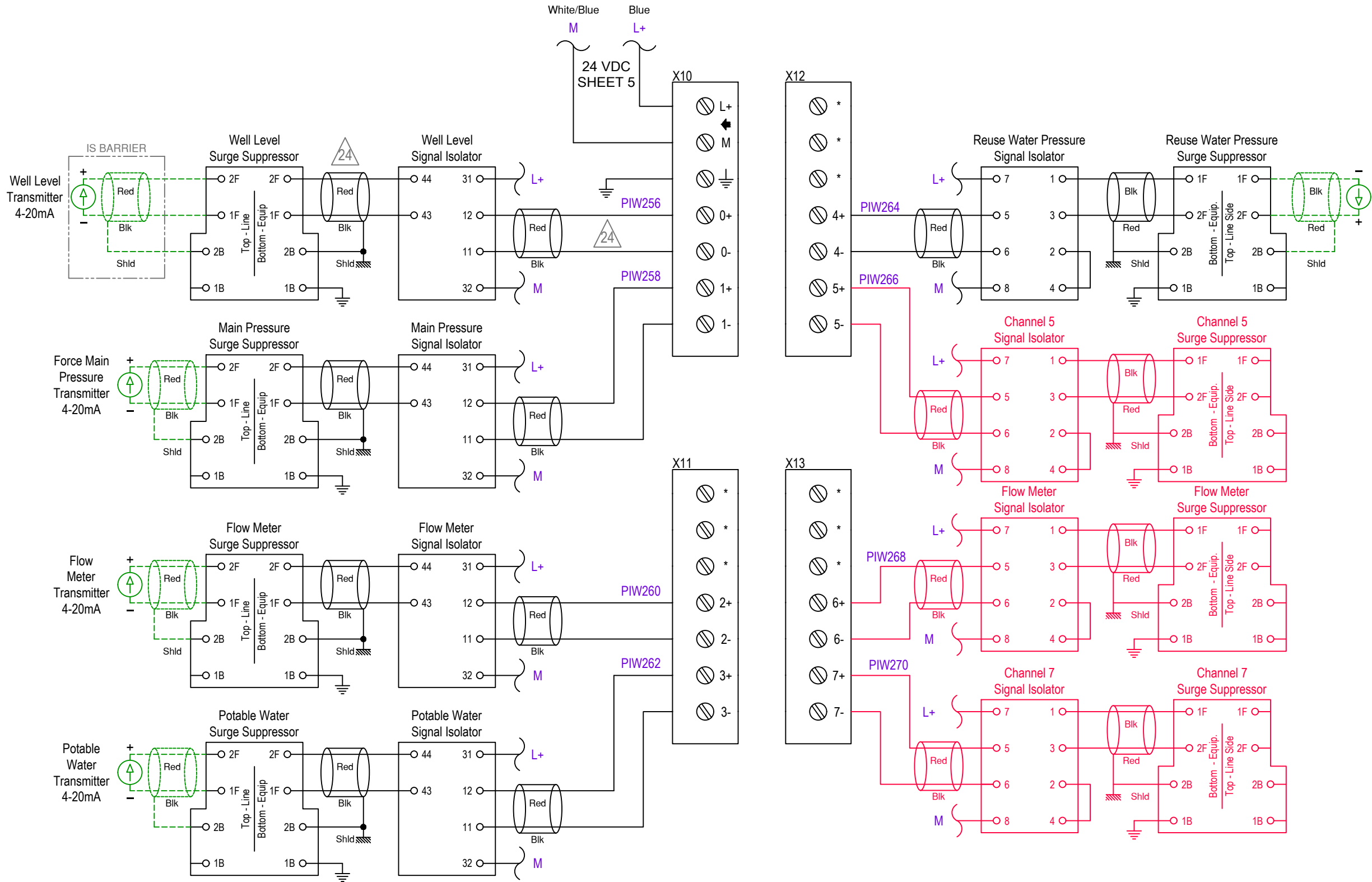
DESIGNER:	SHEET TITLE:		
DRAWN BY:	SCADA RTU - 24 VDC VOLTAGE		
DATE:	PROJECT:		
CHECKED BY:	--- PROJECT NAME ---		
DATE:	3-PHASE VFD LIFT STATION DIAGRAM		
2025 STANDARD PACKAGE, REV. 0	JOB No:	SHEET	OF
	12345678	5	17



NO.	BY	DATE	REVISIONS	ELECTRICAL SCHEMATIC MANUFACTURER ADDRESS1 ADDRESS2 CONTACT_NAME CONTACT_NUMBER		DESIGNER:	SHEET TITLE: SCADA RTU - VFD CONTROL WIRING	
6.						DRAWN BY:	PROJECT:	
5.						DATE:	--- PROJECT NAME ---	
4.						CHECKED BY:	3-PHASE VFD LIFT STATION DIAGRAM	
3.						DATE:	JOB No:	SHEET
2.						2025 STANDARD PACKAGE, REV. 0	12345678	6
1.								OF 17







6AG1 231-4HF32-4XB0	
8 Analog Input	
L+	L+ = +24V
M	M = DC COM
GND	GND
0+	CH0 + => PIW256
0-	CH0 -
1+	CH1 + => PIW258
1-	CH1 -
*	
*	
*	
2+	CH2 + => PIW260
2-	CH2 -
3+	CH3 + => PIW262
3-	CH3 -
*	
*	
*	
4+	CH4 + => PIW264
4-	CH4 -
5+	CH5 + => PIW266
5-	CH5 -
*	
*	
*	
6+	CH6 + => PIW268
6-	CH6 -
7+	CH7 + => PIW270
7-	CH7 -

NO.	BY	DATE	REVISIONS
6.			
5.			
4.			
3.			
2.			
1.			

ELECTRICAL SCHEMATIC

MANUFACTURER
ADDRESS1
ADDRESS2

CONTACT_NAME
CONTACT_NUMBER



DESIGNER:
DRAWN BY:
DATE:
CHECKED BY:
DATE:
2025 STANDARD PACKAGE, REV. 0

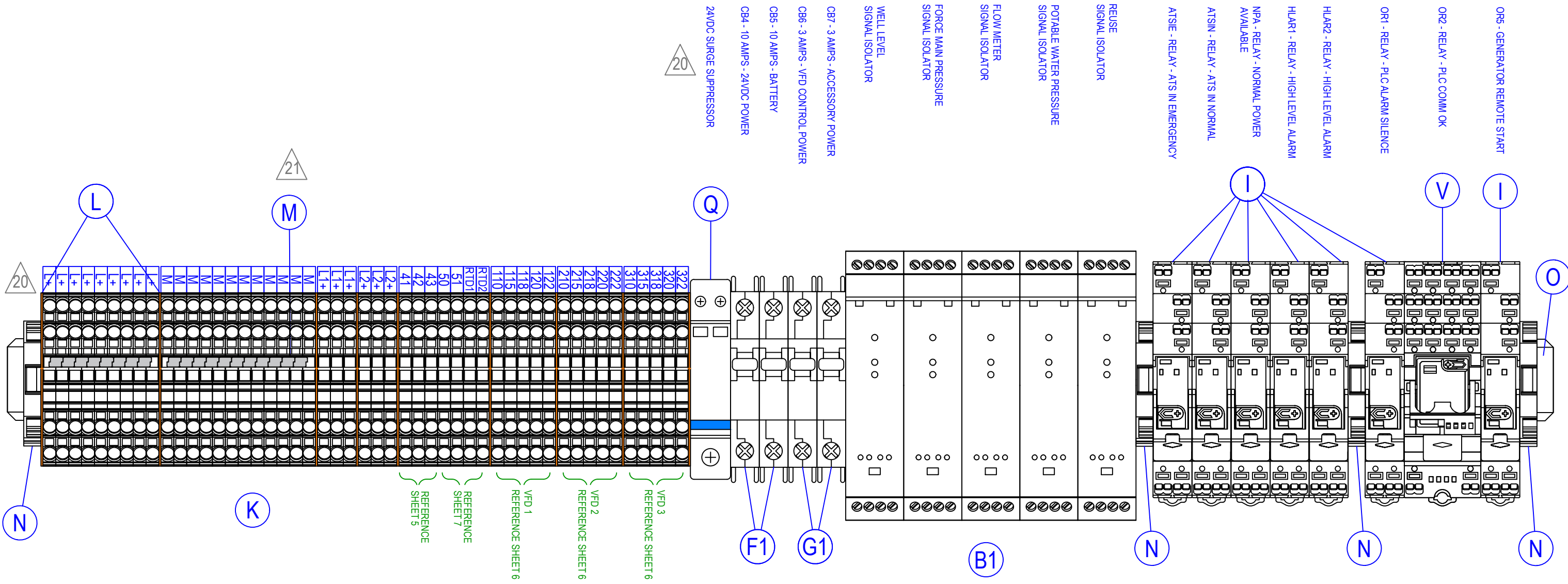
SHEET TITLE:
SCADA RTU - PLC ANALOG INPUT

PROJECT:
--- PROJECT NAME ---

3-PHASE VFD LIFT STATION DIAGRAM

JOB No:
12345678

SHEET 8 OF 17



NO.	BY	DATE	REVISIONS
6.			
5.			
4.			
3.			
2.			
1.			

ELECTRICAL SCHEMATIC

MANUFACTURER
ADDRESS1
ADDRESS2

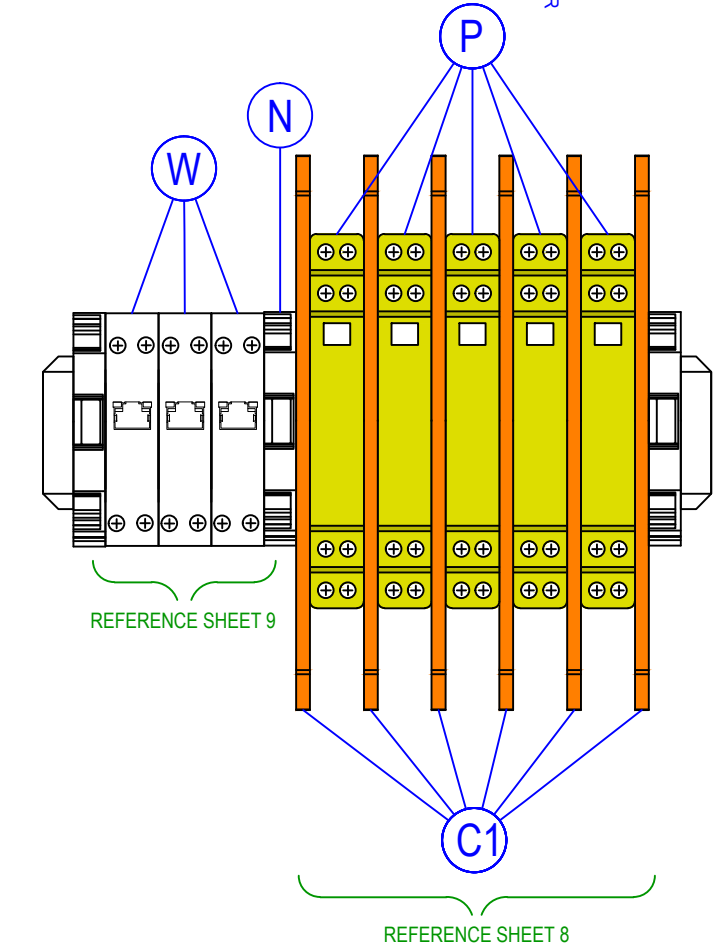
CONTACT_NAME
CONTACT_NUMBER



DESIGNER:
DRAWN BY:
DATE:
CHECKED BY:
DATE:
2025 STANDARD PACKAGE, REV. 0

SHEET TITLE: CONTROL PANEL - 24 VDC TERMINAL BLOCK LAYOUT	
PROJECT: --- PROJECT NAME ---	
3-PHASE VFD LIFT STATION DIAGRAM	
JOB No: 12345678	SHEET 10 OF 17

REUSE WATER PRESS XMITTER
SURGE SUPPRESSOR
POTABLE WATER PRESSURE XMITTER
SURGE SUPPRESSOR
FLOW METER
SURGE SUPPRESSOR
MAIN PRESSURE XMITTER
SURGE SUPPRESSOR
WELL LEVEL
SURGE SUPPRESSOR
GENERATOR
PROFINET NETWORK ISOLATOR
PONY PUMP
PROFINET NETWORK ISOLATOR
FLOW METER
PROFINET NETWORK ISOLATOR



20

P3R - PUMP 3

P2R - PUMP 2

P1R - PUMP 1

FCRA - RELAY - FLOAT CONTROL

FCR - RELAY - FLOAT CONTROL

SR - RELAY - ALARM SILENCE

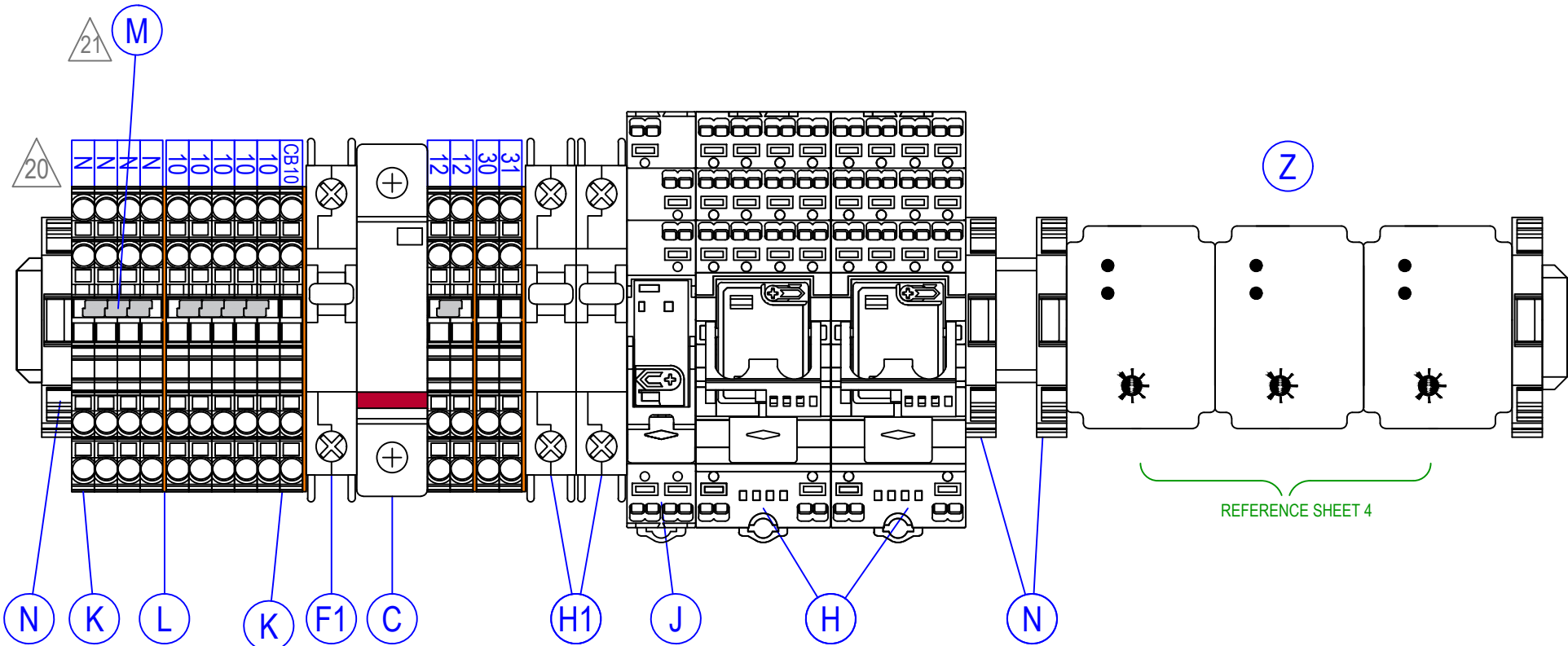
CB12 - 0.5 AMPS - FIELD DEVICES

CB11 - 0.5 AMPS - ACCESSORY POWER

120VAC SURGE SUPPRESSOR

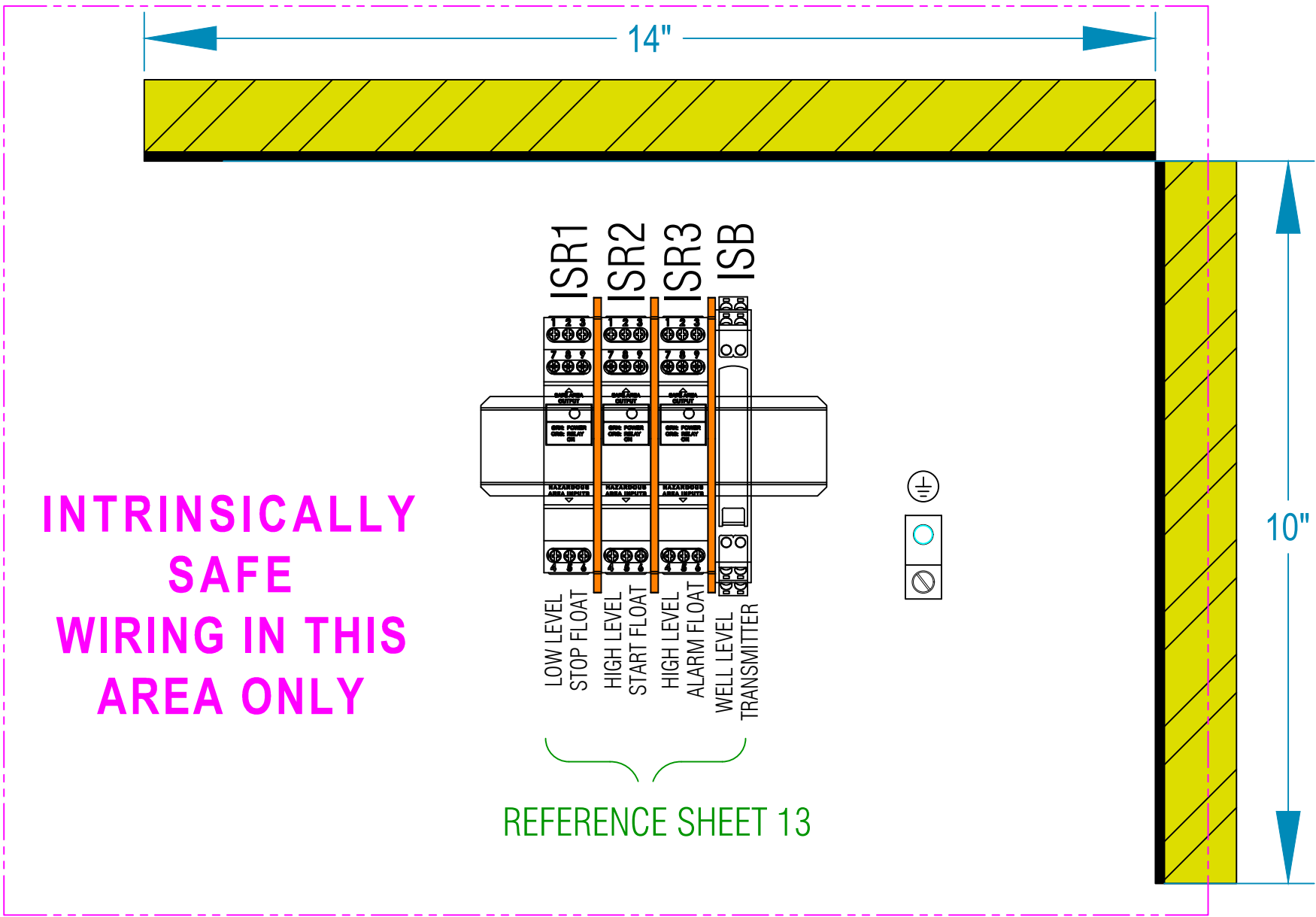
CB10 - 10 AMPS - CONTROL PANEL POWER

20



NO.	BY	DATE	REVISIONS	ELECTRICAL SCHEMATIC		DESIGNER:		SHEET TITLE:	
6.				MANUFACTURER		DRAWN BY:		SCADA RTU - 120 VAC TERMINAL BLOCK LAYOUT	
5.				ADDRESS1		DATE:		PROJECT:	
4.				ADDRESS2		CHECKED BY:		--- PROJECT NAME ---	
3.				CONTACT_NAME		DATE:		3-PHASE VFD LIFT STATION DIAGRAM	
2.				CONTACT_NUMBER		2025 STANDARD PACKAGE, REV. 0		JOB No: 12345678	
1.								SHEET 11 OF 17	

BACK PANEL LAYOUT



- NOTES:
1. TERMINAL ON CONTROL CIRCUIT TERMINAL STRIP
 2. FIELD WIRING (EXTERNAL TO CONTROL PANEL)
 3. PANEL WIRING
 4. SEAL ALL CONDUITS ENTERING CONTROL PANEL
 5. CONTROL PANEL IS UL698A LABELED
 6. INSTALL IN ACCORDANCE WITH ARTICLE 504 OF THE N.E.C.
 7. MINIMUM #16 AWG WIRE AT 600V

CONTROL WIRE COLOR CODE:

120VAC POWER	BLACK	24VDC POSITIVE (+)	BLUE
120VAC CONTROL	RED	24VDC NEGATIVE (-)	WHITE / BLUE
120VAC NEUTRAL	WHITE	GROUND	GREEN

TORQUE TABLES:

GROUND TERMINALS			
RECOMMENDED TIGHTENING TORQUE			
MFG	PART#	WIRE SIZE	TORQUE - SCREWDRIIVER
DISCONNECTS OF FLORIDA, INC.	DLA2	14-10AWG	35 lb.in.
		8AWG	40 lb.in.
		6-4AWG	45 lb.in.
		3-2AWG	50 lb.in.
Cutler-Hammer	GBK_ - Small Holes	14-10AWG	20 lb.in.
		8AWG	25 lb.in.
		6AWG	35 lb.in.
	GBK_ - Large Holes	14-10AWG	35 lb.in.
		8AWG	40 lb.in.
		6-4AWG	45 lb.in.
		3-1/0AWG	50 lb.in.

BILL OF MATERIALS				
ITEM	QTY	PART NUMBER	DESCRIPTION	MANUFACTURER
-	1	UL-698A-LBL	UL 698A Label, Hazardous Location	UL
C	3	ISEUR1	Intrinsically safe relay, 120VAC	Macromatic
E	1	MTL7787+	Intrinsically safe barrier, 4-20mA	Eaton
F	2	DLA2	Ground Lug	Disc of FL
G	0.25	210-112	Din Rail, 35mm, 2M	Wago

BACK PANEL:
INSTALL PANEL IN CONTROL PANEL ENCLOSURE (48 X 36 X 12) LOWER LEFT CORNER. SEE SHEET 3
FABRICATED FROM 12ga. STEEL WITH WHITE POLYESTER POWDER COAT FINISH.

NO.	BY	DATE	REVISIONS
6.			
5.			
4.			
3.			
2.			
1.			

ELECTRICAL SCHEMATIC

MANUFACTURER
ADDRESS1
ADDRESS2

CONTACT_NAME
CONTACT_NUMBER



DESIGNER:
DRAWN BY:
DATE:
CHECKED BY:
DATE:
2025 STANDARD PACKAGE, REV. 0

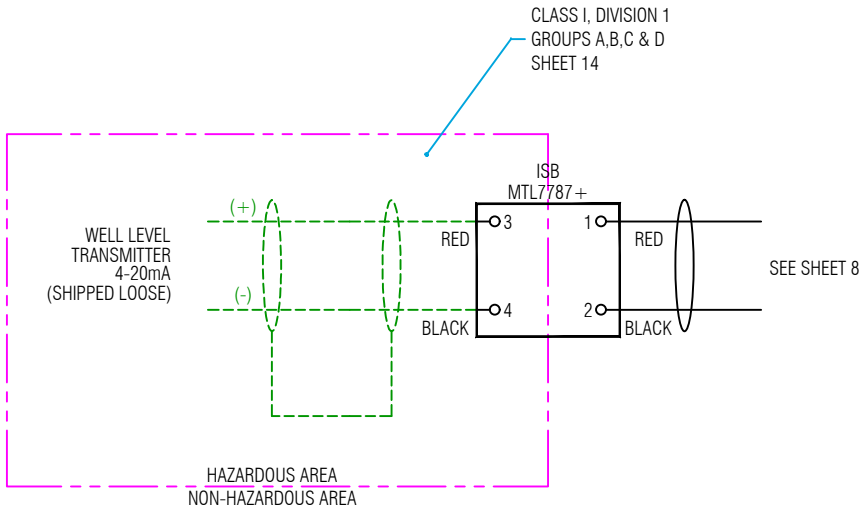
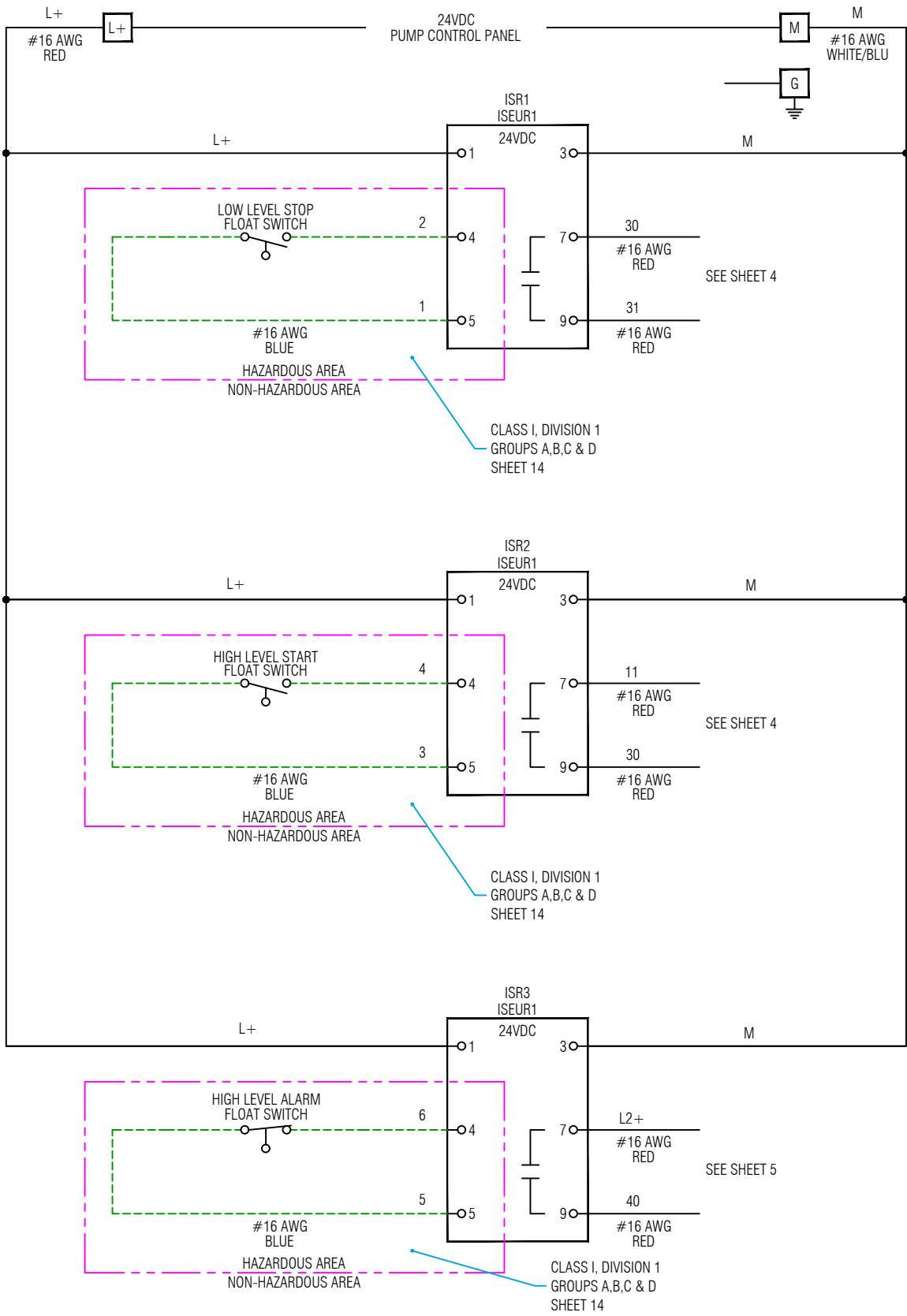
SHEET TITLE:
SCADA RTU - INTRINSIC SAFETY DETAIL

PROJECT:
--- PROJECT NAME ---

3-PHASE VFD LIFT STATION DIAGRAM

JOB No:
12345678

SHEET 12 OF 17



NO.	BY	DATE	REVISIONS
6.			
5.			
4.			
3.			
2.			
1.			

ELECTRICAL SCHEMATIC

MANUFACTURER
ADDRESS1
ADDRESS2

CONTACT_NAME
CONTACT_NUMBER



DESIGNER:
DRAWN BY:
DATE:
CHECKED BY:
DATE:
2025 STANDARD PACKAGE, REV. 0

SHEET TITLE:
SCADA RTU - INTRINSIC SAFETY WIRING

PROJECT:
--- PROJECT NAME ---

3-PHASE VFD LIFT STATION DIAGRAM

JOB No: 12345678

SHEET 13 OF 17

CONTROL DRAWING ISD2A01
ASSOCIATED APPARATUS / APPAREILLAGE CONNEXE

Revision A

Notes:

1. The output current of this associated apparatus is limited by a resistor such that the output voltage-current plot is a straight line drawn between open-circuit voltage and short-circuit current.

2. This associated apparatus may be connected to simple apparatus as defined in Article 504.2 installed and temperature classified in accordance with Article 504.10(D) of the National Electrical Code (ANSI/NFPA 70), or other local codes as applicable.

3. Capacitance and inductance of the field wiring from the simple aparatus to the associated apparatus shall be calculated. Cable capacitance, C_{cable}, must be less than the marked capacitance, Ca (or Co), shown on the associated apparatus used. The same applies for inductance (L_{cable}, Li and La or Lo, respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used: C_{cable} = 60 pF/ft., L_{cable} = 0.2 µH/ft.

4. If connected to intrinsically safe equipment, the equipment must be third party listed as intrinsically safe for the application, and have intrinsically safe entity parameters conforming with the below.

I.S. Equipment	Associated Apparatus
V max (or Ui)	Voc (or Uo)
I max (or Ii)	Isc (or Io)
P max, Pi Ci +	Po
Ccable Li +	Ca (or Co)
Lcable	La (or Lo)

5. If connected to intrinsically safe equipment, capacitance and inductance of the field wiring from the intrinsically safe equipment to the associated apparatus shall be calculated and included in the system calculations as shown in Note 6.

6. Cable capacitance, C_{cable}, plus intrinsically safe equipment capacitance, Ci must be less than the marked capacitance, Ca (or Co), shown on any associated apparatus used. The same applies for inductance (L_{cable}, La (or Lo), respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used: C_{cable} = 60 pF/ft., L_{cable} = 0.2 µH/ft.

7. Associated apparatus must be installed in an enclosure suitable for the application in accordance with the National Electrical Code (ANSI/NFPA 70) for installation in the United States, the Canadian Electrical Code for installations in Canada, or other local codes, as applicable.

8. Intrinsically safe circuits must be wired and separated in accordance with Article 504.20 of the National Electrical Code (ANSI/NFPA 70) or other local codes, as applicable.

9. This associated apparatus has not been evaluated for use in combination with another associated apparatus.

10. If connected to intrinsically safe equipment, installations in which both the Ci and Li of the intrinsically safe equipment exceed 1% of the Ca (or Co) and La (or Lo) parameters of the associated apparatus (excluding the cable), then 50% of Ca (or Co) and La (or Lo) parameters are applicable and shall not be exceeded. The reduced capacitance shall not be greater than 1 µF for Groups C and/or D, and 600 nF for Groups A and B. The values of Ca (or Co) and La (or Lo) determined by this method shall not be exceeded by the sum of all of Ci plus cable capacitances and the sum of all of the Li plus cable inductances.

11. All channels comprise a single intrinsically safe circuit.

Approvals:

Class I; Division I; Groups A,B,C,D
Class II; Division I; Groups E,F,G
Class III
Zone 0; [Ex ia] IIC Ga
Zone 20; [Ex ia] IIIC Da

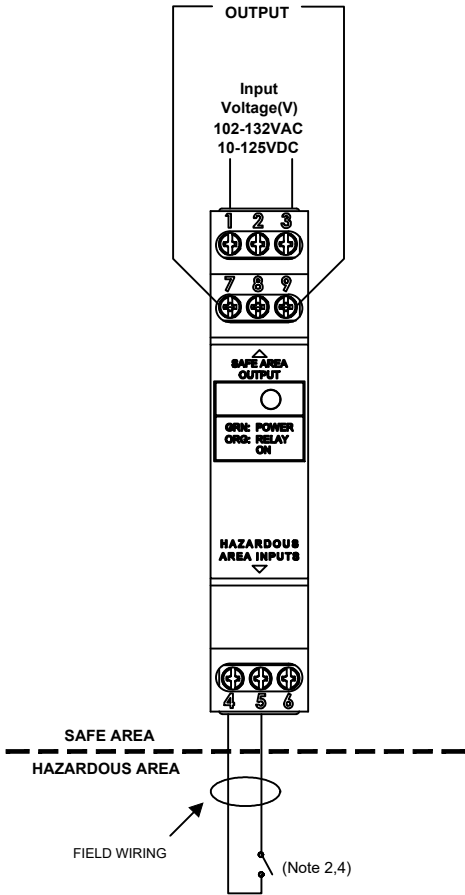
Ratings:

Input Voltage(V): 102-132VAC 10-125VDC
Temperature(Ta): -28°C≤Ta≤60°C (Max. 3 A)
-28°C≤Ta≤40°C (Max. 5 A)
Maximum Voltage(Um): 132VAC
Contacts Ratings (terminals 7,9):
-5A 125VAC/30VDC (Max. Ta 40°C)
-3A 125VAC/30VDC (Max. Ta 60°C)
-D300 Pilot Duty (Max. Ta 60°C)

WARNING!

SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
AVERTISSEMENT!
LA SUBSTITUTION DE COMPOSANTS PEUT COMPROMETTRE LA SÉCURITÉ INTRINSÈQUE.

ISE, MBE SERIES



Entity Parameters(terminals 4-5):

Voc(Uo)	10.29 V
Isc(Io)	18.05 mA
Po	46.44 mW
Ca(Co)	2.63 µF
La(Lo)	109.10 mH

DRAFT 01 February 2018

SPECIFICATIONS

'Key' barriers shown in blue

For notes 1 to 7 see 'Terminology' (later in this section)

Model No.	Safety description1			Polarities 2 available			Application	Basic circuit		Max. end-3 to-end resistance	Vwkg at 4 10µA or (1µA)	5 Vmax	Fuse6 rating
	V	Ω	mA	+	-	ac		Hazardous	Safe	Ω	V	V	mA
7787+/-	28	300	93	✓	✓		Transmitters Controller outputs, switches			333	26.6	27.2	50
	28	diode	—							0.9V+21Ω	26.6	27.2	50
7787P+	28	234	119	✓						253	26.4	27.2	80
	28	diode	—							0.9V+21Ω	26.4	27.2	80

a Terminals 3 & 7 connected togetherDiagrams show positive versions. All diodes reversed on negative versions. Additional diodes fitted on ac versions.

DRAFT 01 February 2018

MTL7700 RANGE BARRIER APPLICATIONS

ANALOGUE INPUTS (HIGH LEVEL)

2-wire transmitters, 4/20mA, conventional and smart

The recommended barrier for use with 'conventional' and 'smart' 4/20mA transmitters (fed by a 26V regulated supply) is the MTL7787+. This provides up to 12.9V (14.6V for MTL7787P+) at Vwkg and 20mA for a transmitter and its lines as well as 5V for the typical 250Ω load. This application and this barrier is suitable for use with the optional power bus facility.

The MTL7706+ is recommended for applications where an unregulated supply of up to 35V is used. It provides 16.0V for conventional and Smart transmitters at 20mA, as well as 5V for a typical 250Ω load. With the MTL7706+ terminal 3 is negative with respect to earth, so the connections to terminals 3 and 4 should be reversed.

Vibration probes

The 3-wire transmitters used with vibration monitoring equipment are invariably supplied by a -24V dc power supply – hence the recommended barrier choice is the negatively-polarised MTL7796–.

ANALOGUE INPUTS (LOW-LEVEL)

Thermocouples and mV sources

The recommended barrier for thermocouples and mV sources is the MTL7760ac. This 2-channel non-polarised barrier retains the 'earth-free' nature of the signal and, providing the receiver's input 'floats', rejects common-mode ac and dc interference up to at least 7V and is unaffected by earth faults on the primary element.

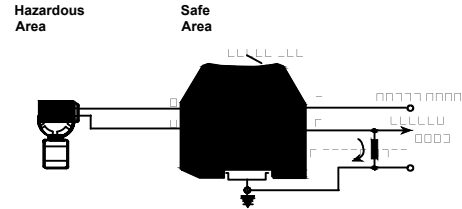
AC sensors, photocells, microphones and turbine flowmeters


The MTL7760ac is the recommended choice for these devices. While many of these are designated 'simple apparatus' and thus do not need certification, note that some ac sensors may be subject to a significant level of inductance and will therefore need to be designed and certified for hazardous-area locations.

Slidewire displacement transducers

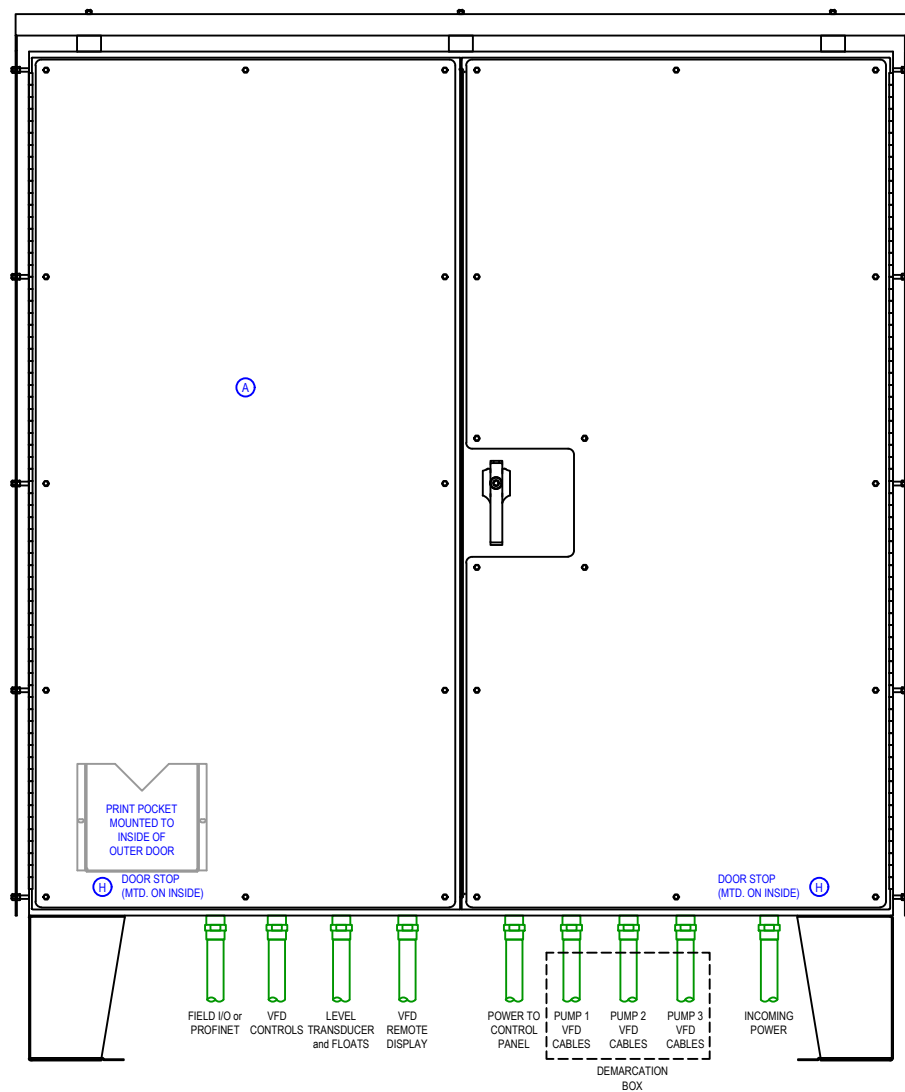
The simplest choice is the MTL7760ac. This barrier supplies power and brings back a unipolar signal.

MTL7700 range barriers protect devices located in all normally occurring explosive atmospheres, including air/flammable gas mixtures, dusts and fibres. Applications covered include the protection of installations incorporating uncertified devices ('simple apparatus') such as thermocouples, switches and resistive sensors, or separately certified 'energy storing' (or 'voltage producing') apparatus including ac sensors, transmitters and current-to-pneumatic (I/P) converters. Recommended choices for specific applications are discussed briefly in the following pages.



NO.	BY	DATE	REVISIONS	ELECTRICAL SCHEMATIC MANUFACTURER ADDRESS1 ADDRESS2 CONTACT_NAME CONTACT_NUMBER		DESIGNER:	SHEET TITLE: SCADA RTU - INTRINSIC SAFETY NOTES	
6.						DRAWN BY:	PROJECT: --- PROJECT NAME ---	
5.						DATE:	3-PHASE VFD LIFT STATION DIAGRAM	
4.						CHECKED BY:	JOB No: 12345678	
3.						DATE:	SHEET 14 OF 17	
2.						2025 STANDARD PACKAGE, REV. 0		

FRONT VIEW



CUSTOM ENCLOSURE:
NEMA 12/3R RATED, FABRICATED FROM .125 MARINE GRADE ALUMINUM WITH WHITE POLYESTER POWDER COAT FINISH INSIDE AND OUT. OUTER DOORS ARE FITTED WITH A PADLOCKABLE 3-POINT LATCH AND DOOR STOPS. ENCLOSURE IS MOUNTED ON 12-INCH TYPE 316 STAINLESS STEEL LEGS.

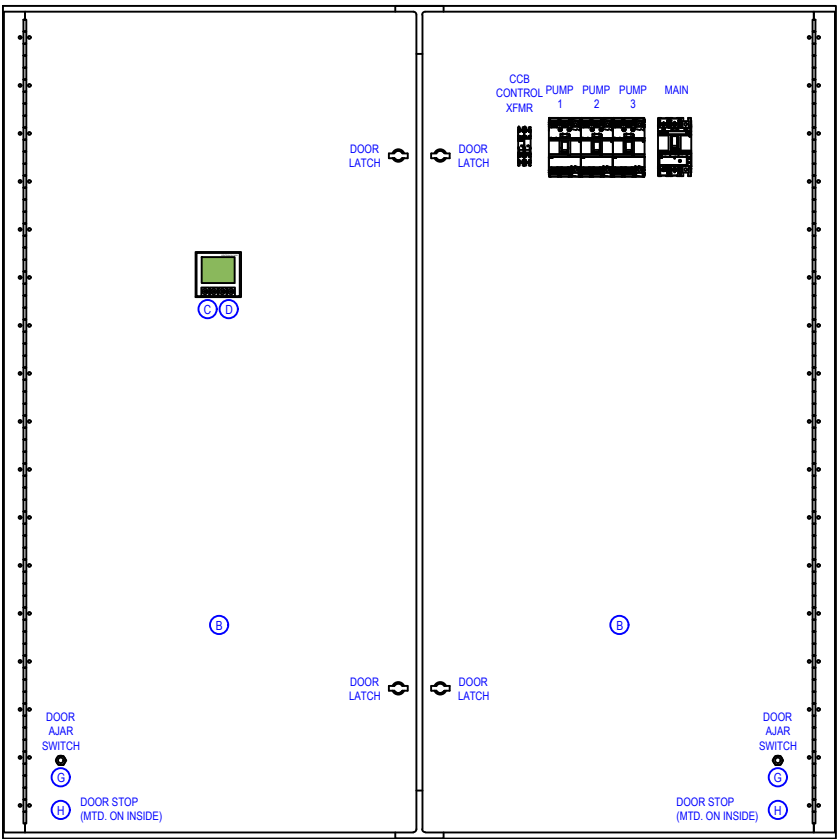
HEAT SHIELDS FABRICATED FROM .125 MARINE GRADE ALUMINUM SHALL BE INSTALLED ON FRONT, BACK, TOP, AND SIDES. HOLES SHALL BE CUT IN SHIELD FOR ALARM LIGHT AND HORN. HEAT SHIELDS SHALL ALSO HAVE WHITE POLYESTER POWDER COAT FINISH ON ALL SIDES.

REFER TO ENCLOSURE SPECIFICATIONS FOR FURTHER DETAILS.


BILL of MATERIAL

	QTY	MANUFACTURER	PART NUMBER	DESCRIPTION
A	1	OEM	CUSTOM ENCLOSURE	SEE THIS SHEET FOR DETAILS
B	2	OEM	CUSTOM INNER DOORS	SEE THIS SHEET FOR DETAILS
C	1	SIEMENS	7KM4220-0BA01-1EA0	SETRON PAC4220
D	1	SIEMENS	7KM9300-0AE02-0AA0	PROFINET EXPANSION MODULE
E	--	--	--	--
F	1	APT	S50A277V3Y	SURGE PROTECTOR, 480V WYE
G	2	OMRON	6X283	SNAP ACTION SWITCH (DOOR AJAR)
	2	ALLIED	642-2137	ACTUATOR FOR SWITCH
H	4	SCHAEFER	SP-DSTOPK-SS-SW	INNER/OUTER DOOR STOP KIT, SS
I	--	--	--	--
J	--	--	--	--

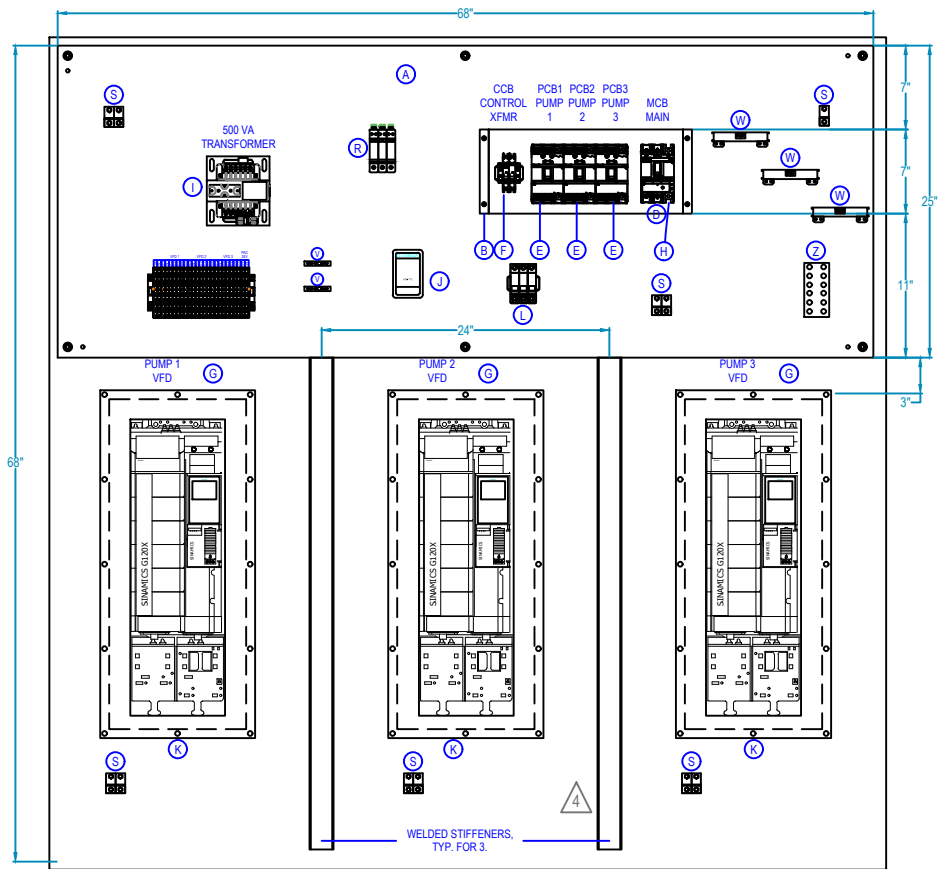
INNER DOOR VIEW



TWO HINGED INNER DOORS:
FABRICATED FROM .125 ALUMINUM WITH CONTINUOUS HINGE, TWIST LATCHES, AND DOOR STOP MOUNTED ON INSIDE OF EACH.

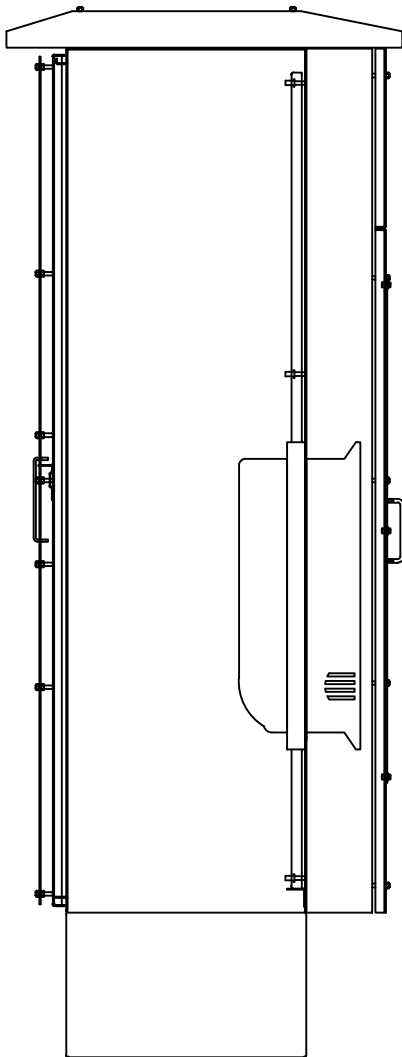
NO.	BY	DATE	REVISIONS	ELECTRICAL SCHEMATIC MANUFACTURER ADDRESS1 ADDRESS2 CONTACT_NAME CONTACT_NUMBER		DESIGNER:	SHEET TITLE: MCC - FRONT PANEL VIEW	
6.						DRAWN BY:	PROJECT: --- PROJECT NAME ---	
5.						DATE:	3-PHASE VFD LIFT STATION DIAGRAM	
4.						CHECKED BY:	JOB No: 12345678	
3.						DATE:	SHEET 15 OF 17	
2.						2025 STANDARD PACKAGE, REV. 0		

BACK PANEL LAYOUT



BACK PANEL:
FABRICATED FROM 10ga. CARBON STEEL WITH WHITE
INDUSTRIAL GRADE ENAMEL FINISH.

RIGHT SIDE VIEW



Installation of Flange Mount VFDs:

Provide cut-outs in the back of the enclosure to accept VFD aluminum mounting plates. Mounting plates shall be attached to studs on the back of the enclosure and gasketed.

VFDs are to be bolted to these plates with the heat sinks extending outside the enclosure for cooling.

Consult VFD manufacturer's installation guide for flange mount cut-out dimensions and recommended instructions. See General Note #4 for additional details and requirements. Dimensions of cut-out must be shown on drawing.

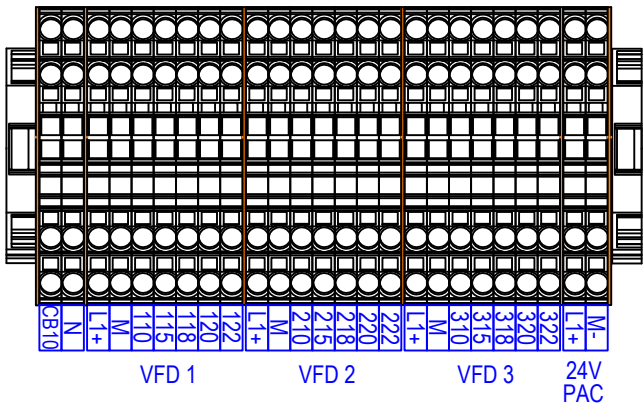
The rear sunshield shall have a removable cover with handles to allow access to the VFD heat sinks for cleaning and maintenance. The heat shield will have studs with wing nuts for attaching the removable cover.

Seal all penetrations.


BILL of MATERIAL

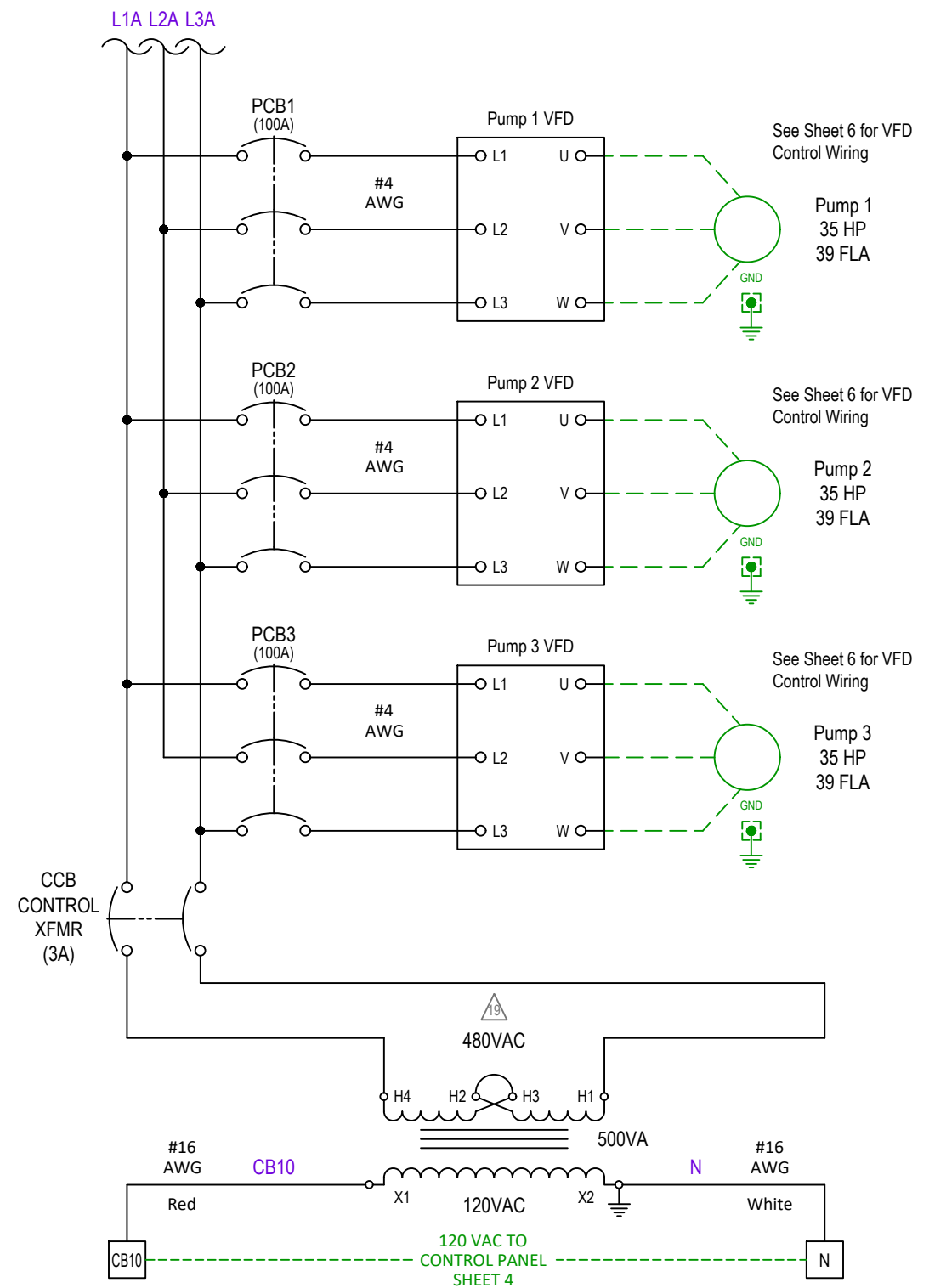
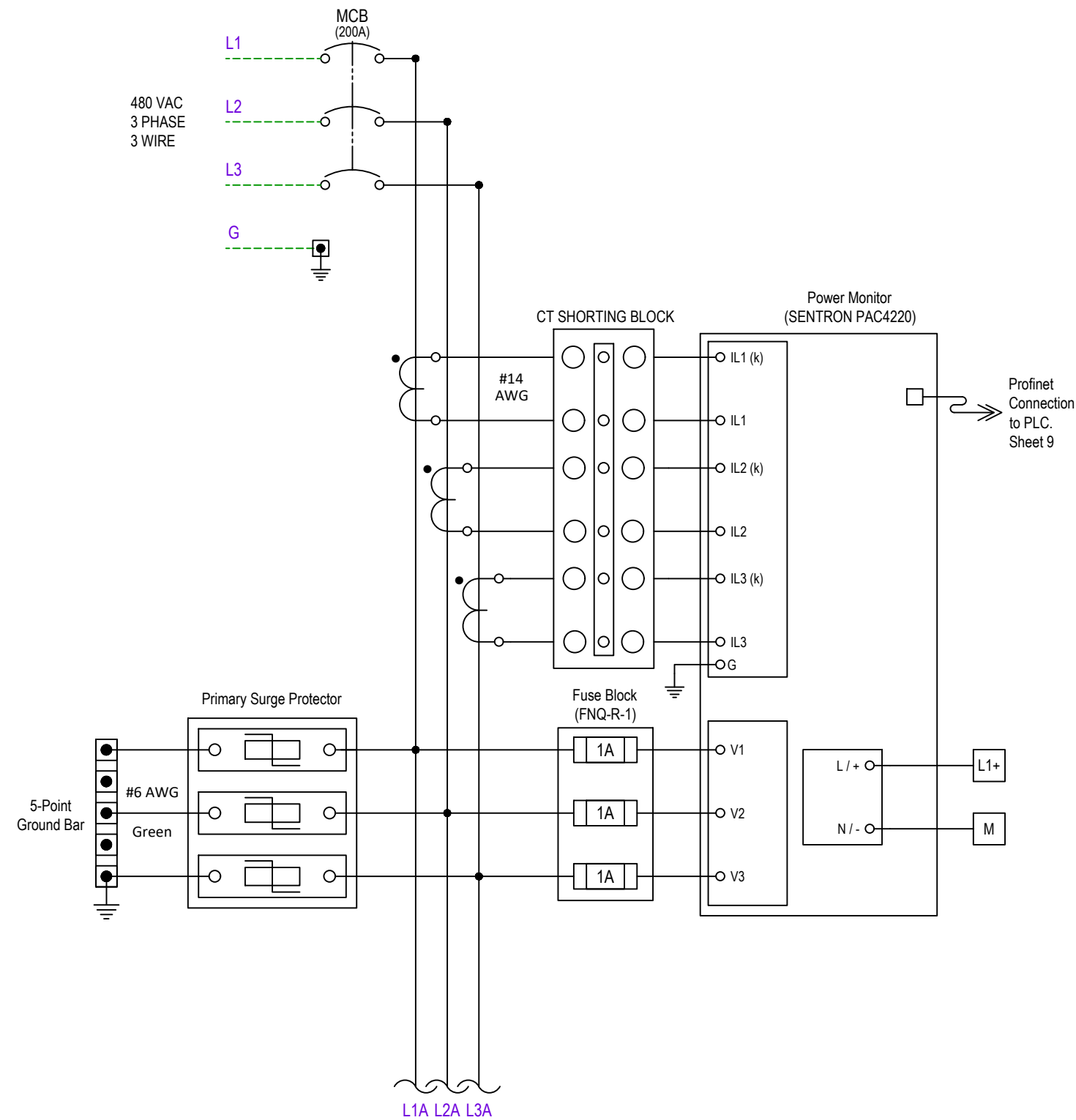
	QTY	MANUFACTURER	PART NUMBER	DESCRIPTION
A	1	OEM	CUSTOM BACK PANEL	SEE THIS SHEET FOR DETAILS
B	1	OEM	BREAKER MOUNT	TO RAISE CBs FLUSH WITH INNER DOOR
C	--	--	--	--
D	1	SIEMENS	3VA5220-5ED31-0AA0	MCB, 3P, 200A
E	3	SIEMENS	3VA5110-5ED31-0AA0	PCB1 AND PCB2, 3P, 100A
F	1	SIEMENS	5SJ4203-7HG42	CCB, 2P, 3A, 480V
G	3	SIEMENS	6SL3230-XXXX	SINAMICS G120X
	3	SIEMENS	6SL3261-XXXX	VFD FLANGE MOUNTING KIT
	3	SIEMENS	6SL305-4AG00-2AA0	SINAMICS SD CARD, 512 MB
H	1	SIEMENS	3TA6FG04	POWER DISTRIBUTION LUGS, KIT OF 3
I	1	SIEMENS	MT0500A	CONTROL TRANSFORMER, 500VA
J	1	OMEGA	EWS RTD	PT100 TEMPERATURE SENSOR, RTD
K	3	OEM	VFD MOUNTING PLATE	SEE THIS SHEET FOR DETAILS
L	3	BUSSMANN	FNQ-R-1	FUSE, CLASS CC REJECTION, 600V, 1A
M	25	WAGO	2002-1401	TERMINAL, 2002, SPRING, GRAY
N	5	WAGO	2002-1492	TERMINAL END / PART. PLATE, ORANGE
O	-	WAGO	2002-400	ADJACENT JUMPER, 2-WAY CONTINUOUS
P	10	WAGO	249-116	TERMINAL END STOP, GRAY
Q	-	WAGO	210-112	2M DIN RAIL, GALVANIZED, SLOTTED
R	1	CITEL	DS43S-480	PRIMARY SPD, TYPE 1, 480V WYE
S	9	PANDUIT	LAMA2-14-QY	GROUND LUG, DUAL-RATED, #2-14AWG
T	--	--	--	--
U	1	PANDUIT	1.5"W x 3"H x 72"L	WIREWAY, HINGE COVER, WIDE FINGER
V	2	SIEMENS	ECGB5	EQUIPMENT GROUND BAR, 5-POINT
W	3	SIEMENS	PDS-CTSC-021	CURRENT XFMR, 200:5 RATIO, SPLIT CORE
X	3	SIEMENS	6GK1901-1BB10-2AA0	PROFINET CONNECTOR, SIPLUS
Y	2	SIEMENS	6XV1840-2AH10	PROFINET CABLE, FAST CONNECT
Z	1	EI GAUGE TECH	EI-SB-6TC	CT SHORTING BLOCK

TERMINAL STRIP DETAIL



REFERENCE SHEET 6

NO.	BY	DATE	REVISIONS	ELECTRICAL SCHEMATIC MANUFACTURER ADDRESS1 ADDRESS2 CONTACT_NAME CONTACT_NUMBER		DESIGNER:		SHEET TITLE: MCC - BACK PANEL LAYOUT	
6.						DRAWN BY:		PROJECT: --- PROJECT NAME ---	
5.						DATE:		3-PHASE VFD LIFT STATION DIAGRAM	
4.						CHECKED BY:		JOB No: 12345678	
3.						DATE:		SHEET 16 OF 17	
2.						2025 STANDARD PACKAGE, REV. 0			



NO.	BY	DATE	REVISIONS
6.			
5.			
4.			
3.			
2.			
1.			

ELECTRICAL SCHEMATIC

MANUFACTURER
ADDRESS1
ADDRESS2
CONTACT_NAME
CONTACT_NUMBER



DESIGNER:
DRAWN BY:
DATE:
CHECKED BY:
DATE:
2025 STANDARD PACKAGE, REV. 0

SHEET TITLE: MCC - PANEL MAIN VAC VOLTAGE	
PROJECT: --- PROJECT NAME ---	
3-PHASE VFD LIFT STATION DIAGRAM	
JOB No: 12345678	SHEET 17 OF 17