



**Grid Solutions**  
A GE and Alstom joint venture

# 220kV/132kV GIS SUBSTATION GHAZI ROAD , LAHORE

**220kV LINE RELAY SET-2 PANEL  
=D08+R2  
SCHEMATIC DRAWINGS**

DOC / DWG REVIEW CODE	
<input type="checkbox"/> A	Approved, Issue IFC.
<input type="checkbox"/> B	Approved with comments as noted, Issue IFC after incorporation of these comments.
<input type="checkbox"/> C	Revise and re-submit for approval.
<input type="checkbox"/> D	Rejected.
Signed .....	
Date .....	
Permission to proceed does not constitute acceptance of approval of design details, analysers, test methods or materials/ selected by the CONTRACTOR and does not relieve the CONTRACTOR from full compliance with AGREEMENT obligations.	

REFERENCE DRAWINGS					
SR. NO.	DRAWING TITLE				DOCUMENT NO.
1.	220kV / 132kV Metering & Protection SLD				P60194-E-SLMP-001
2.	220kV GIS LCC Schematic Drawings				P60194-E-GISS-001
REVISION HISTORY					
REV	DATE	DRW. BY	CHK. BY	APR. BY	REVISION DESCRIPTION
0	20.11.2018	ASJ	MFT	NAH	AS BUILT
Scale NOT-TO-SCALE				Sheet size A3	
Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)					
Contractor  Grid Solutions A GE and Alstom joint venture				Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore Pakistan	
Project 220kV / 132kV GIS SUBSTATION GHAZI ROAD , LAHORE					
Title 220kV LINE RELAY SET-2 PANEL SCHEMATIC DRAWINGS					
Order no P-60194			Document no P60194-E-RLC-SC-002		
Sheet type A		Total sheets 35		Sheet no 1	

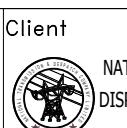
	PAGE NO.	SHEET NAME	SHEET DESCRIPTION	ISSUE / REVISION												
				A	B	C	D	E	F	01	02	03	04	05		
A B C D E F	01	A	Cover Sheet		X	X										
	02	AA1	List Of Contents		X	X										
	03	AA2	List Of Contents		X	X										
	04	AB	Symbol and Legends		X	X										
	05	AC1	Component List		X	X										
	06	AC2	Component List		X	X										
	07	AD	Panel View		X	X										
	08	AE	Bay Concept & Protection Logice		X	X										
	09	D	AC Supply Distribution Circuit													
	10	E	DC Supply Distribution Circuit													
	11	F	AC/DC Supply Failure Circuit													
	12	G	Relay Control & Supply Circuit													
	13	H1	Distance Relay Protection CT/VT Circuit													
	14	H2	Autorecloser VT Input Circuit													
	15	H3	Distance Relay Protection CT/VT Circuit													
	16	I1	Distance Relay input Circuit													
	17	I2	Auto Recloser Input Circuit													
	18	I3	Auto Recloser Input Circuit													
	19	I4	System Input Circuit													
	20	K1	Protection Trips Circuit													
	21	K11	Trips Circuit for Coil-1													
	22	K12	Trips Circuit for Coil-2													
	23	NA1	System Alarm Circuit													
	24	NA2	System Alarm Circuit													
	25	NA3	System Alarm Circuit													
	26	PA1	Protection Inter Circuit													
	27	PA2	Protection Inter Circuit													
	28	RA1	Annunciation Circuit													
	29	RA2	Event & Fault Recorder Circuit													
	30	RA3	Annunciation Circuit													
	31	Z1	Component Diagram													
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REV.	DESCRIPTION	DATE	DRAWER											Project no. P-60194	Sheet type AA1	Sheet no. 02

	1	2	3	4	5	6	7	8					
	PAGE NO.	SHEET NAME	SHEET DESCRIPTION			ISSUE / REVISION							
						A	B	C	D	E	F	01	
A	32	Z2	Component Diagram			X	X						
	33	Z3	Component Diagram			X	X						
	34	Z4	Component Diagram			X	X						
	35	Z5	Component Diagram			X	X						
B													
C													
D													
E													
F													
	0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE RELAY SET-2 PANEL (=D08+R2) LIST OF CONTANTS	Drawing no. P60194-E-RLC-SC-002			
	REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type AA2	Sheet no. 03	

	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
A		CIRCUIT BREAKER		MINIATURE CIRCUIT BREAKER		AUXILIARY CONTACTOR NO+NC	21	DISTANCE
B		SWITCH/ISOLATOR		KEY OPERATED SELECTOR SWITCH		AMMETER	24	OVEREXCITATION
C		EARTHING		LIMITED SWITCH		VOLTMETER	25	SYNCHROCHECK
D		SF6 TO AIR BUSHING		HUMIDITY & TEMPERATURE CONTROLLER		POWER FACTOR METER	49	THERMAL OVERLOAD
E		LINE TRAP		PANEL HEATER		DIGITAL PANEL METER	50/51	PHASE INST./OVERCURRENT
F		SURGE ARRESTOR		THREE PIN SOCKET		ACTIVE POWER METER	50N/51N	EARTH INST./OVERCURRENT
G		CURRENT TRANSFORMER		INDICATION LIGHT		REACTIVE POWER METER	50BF	CIRCUIT BREAKER FAILURE
H		COUPLING CAPACITOR VOLTAGE TRANSFORMER		PUSH BUTTON		ENERGY METER	64	RESTRICTED EARTH FAULT
I		POWER TRANSFORMER		AUXILIARY CONTACTOR COIL			67N	DIRECTIONAL EARTH FAULT
J		AUTO TRANSFORMER		POWER SUPPLY AC/DC			68	POWER SWING BLOCKING
K				TERMINAL			78	OUT OF STEP
L				OPTO CONTACTS			79	AUTO-RECLOSING
M				RELAY CONTACTS			85	COMMUNICATION FAILURE
N				HOOTER			87T	TRAFO DIFFERENTIAL
O				AC BELL			87C	DIFFERENTIAL CONNECTION
P							87BB	DIFFERENTIAL BUSBAR

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0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV LINE RELAY SET-2 PANEL (=D08+R2) SYMBOLA AND LEGENDS	Drawing no. P60194-E-RLC-SC-002
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type AB
									Sheet no. 04

	1	2	3	4	5	6	7	8			
A	QTY.	DEVICE DESCRIPTION		DEVICE SPECIFICATIONS DEVICE TYPE ; TECHNICAL DATA / SPECIFICATIONS			DEVICE DESIGNITION		MANUFACTURER		
	01	DISTANCE PROTECTION RELAY		MULTILIN D60, Cortec: D60-U03-HKH-F8L-H6D-M4L-P4L-U6U-W6U Supply: 125-250VDC / 100-240VAC@50Hz, 4 VT + 4 CT (50-240VAC:1/5A) Inputs 24 Opto Inputs, 40 Relay Outputs			-F21		GE		
B	01	OVERCURRENT EARTHFAULT RELAY		AGILE P14N, Cortec: P14N-B16A7C0570A Supply: 24-250VDC / 110-240VAC, 4 CT (1/5A) Inputs 8 Opto Inputs, 8 Relay Outputs			-F50		GE		
	01	AUTO RECLOSE RELAY		AGILE P841, Cortec: P841-91BA7M0810M Supply: 110-250VDC / 100-240VAC, 4 VT + 3 CT (100-120V:1/5A) Inputs 16 Opto Inputs, 14 Relay Outputs			-F79		GE		
C	05	TEST BLOCK		MMLG01, Cortec: MMLG01-R1AA9002D			-XT21A-C,-XT50,-XT79		GE		
	03	TRIPPING RELAY (SELF-RESETTING)		MVAJ101, Cortec: MVAJ101-RA1002A Supply: 220-250VDC, 8 NO + 2 NC Contacts			-F94R,-F94Y,-F94B		GE		
D	02	TRIPPING RELAY (HAND/ELECTRICAL RESET)		MVAJ105, Cortec: MVAJ105-RA1002A Supply: 220-250VDC, 8 NO + 2 NC Contacts			-F8650,-F86DTT		GE		
	02	CONTROL MCB - PANEL LIGHT & HEATER		G62C02+CAH(2), 2-Pole, Ratings: 2A, 230VAC, 6kA @ 230VAC, 2 CO Contacts			-F101-102		GE		
E	01	CONTROL ELCB - PANEL SOCKET		DM100C16/030+CAH(2), 2-Pole, Ratings: 16A, 30mA, 230VAC, 10 kA @ 230VAC, 2 CO Contacts			-F103		GE		
	04	CONTROL MCB - DC DISTRIBUTION		EP102UCC04+CAH(2), 2-Pole, Ratings: 4A, 220VDC, 10kA @ 250VDC, 2 CO Contacts			-F201-204		GE		
F	01	AC MCB - VT CIRCUIT		G64C02+CAH(2), 4-Pole, Ratings 2A, 240 VAC, 6KA, 2 CO Contacts			-F104		GE		
	01	SELECTOR SWITCH - AUTORECLOSER IN-OUT		YS-AK-2-2-44-D, 2 Position, Ratings: 10A, 220VDC, Keylockable on both positions			-S79		YONGSUNG ELECTRIC CO., LTD.		
G	01	SELECTOR SWITCH - AUTORECLOSER 1PH-3PH		YS-AK-2-2-44-D, 2 Position, Ratings: 10A, 220VDC, Keylockable on both positions			-S80		YONGSUNG ELECTRIC CO., LTD.		
	01	PUSHBUTTON - DISTANCE TRANSFER TRIP RELAY RESET		YS-AP1-2-40-B-D-W, Push Button Black, Spring return, Ratings: 10A, 220VDC			-S86DTT		YONGSUNG ELECTRIC CO., LTD.		
H	01	INDICATION LAMP - DC SUPPLY FAILURE		YS-PL-2-AL-22-R-W, Type: Integrated LED , Color : RED , Supply : 230VAC @ 50Hz			-H200		YONGSUNG ELECTRIC CO., LTD.		
	32	AUXILIARY CONTACTOR		PRC4M40DCML, Coil Voltage: 220VDC, 4 CO Contacts			-KAC,-KS79,-KQ0.RY/ONR/ONY/OYB/ONC/OFC,-KVTL -K86DTT,-KRT/YT/BT/Z2T/Z3T,-KPSD/T,-KSOTF,-KPR/S, -K21F,-K79R/Y/B/L/F,-K50L/H/F,-KDCM,-KDC1/2		GE		
I	01	AUXILIARY CONTACTOR		MCRC022ATWN+MARN211AT, Coil Voltage: 220VDC, 3 NO + 3 NC Contacts			KCR		GE		
	02	AUXILIARY CONTACTOR		PRC4M40ANL, Coil Voltage: 230VAC, 4 CO Contacts			-KACM, -KDC		GE		
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REV.	DESCRIPTION		DATE	DRAWER							
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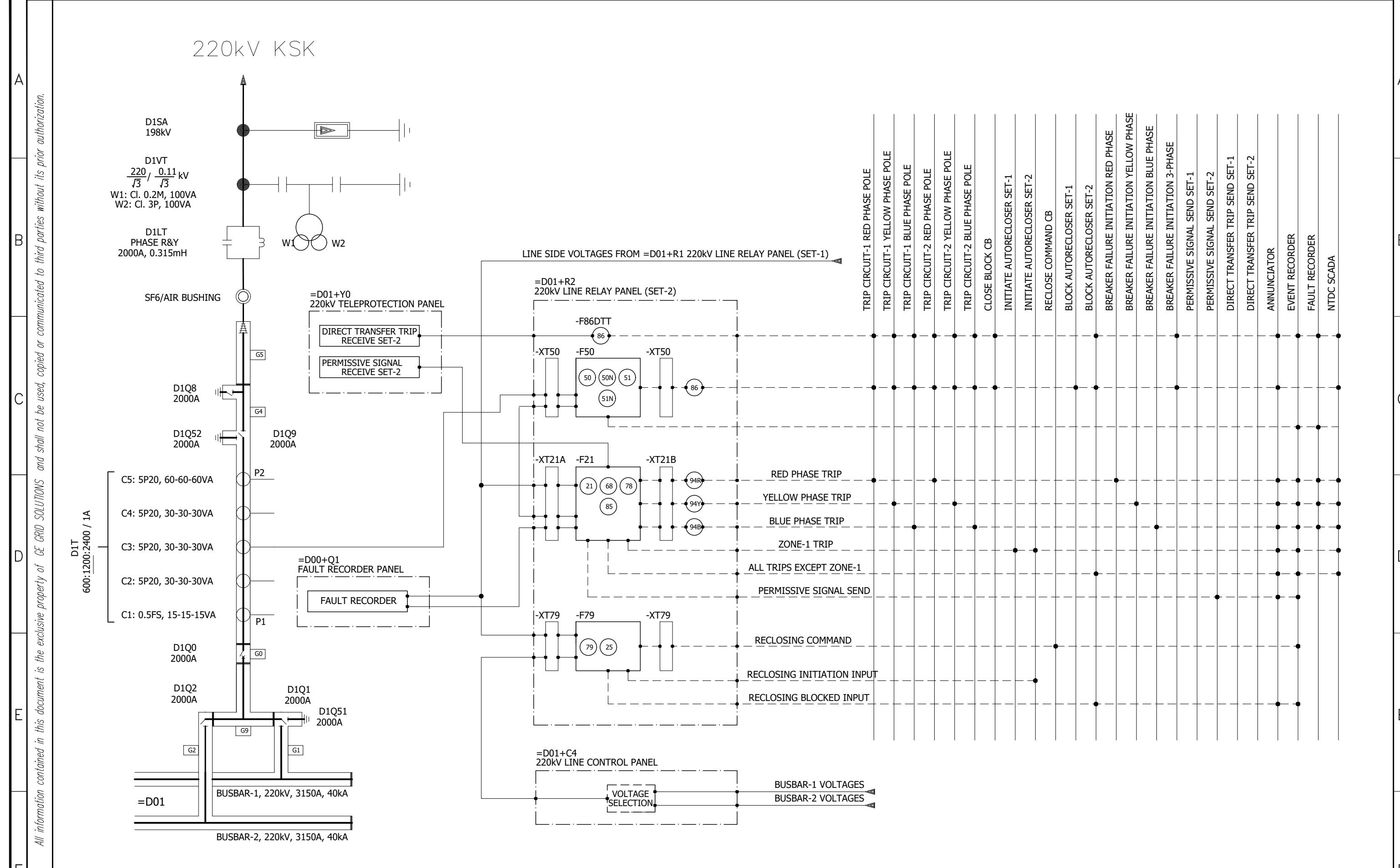
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	QTY.	DEVICE DESCRIPTION	DEVICE SPECIFICATIONS DEVICE TYPE ; TECHNICAL DATA / SPECIFICATIONS			DEVICE DESIGNITION	MANUFACTURER				
A	01	PANEL LIGHT	YST8-30-5W+YSP3315GW-B, 230VAC @ 50HZ, 5W, WITH DOOR LIMIT SWITCH			-H100,-S100	YONGSUNG ELECTRIC CO., LTD.				
	01	THREE PIN SOCKET	1N+PE, 16A, 230VAC @ 50Hz			-X100	LEAR				
	01	PANEL HEATER	230VAC @ 50Hz, 50W			-R100	E-LABS				
	01	HUMIDITY & TEMPERATURE CONTROLLER	40-90%RH, 25-50 deg.C, 230VAC @ 50Hz			-B100	E-LABS				
B	4	TERMINAL BLOCK FOR AC SUPPLY DISTRIBUTION	CBD-4, SCREW TYPE, FEED THROUGH TERMINAL			-XAC	CABUR				
	8	TERMINAL BLOCK FOR DC SUPPLY DISTRIBUTION	CBD-4, SCREW TYPE, FEED THROUGH TERMINAL			-XDC	CABUR				
	16	TERMINAL BLOCK FOR CT CIRCUIT	SCB-6, Screw Type, Feed Through Terminal			-X4	CABUR				
	18	TERMINAL BLOCK FOR VT CIRCUIT	SCB-6, SCREW TYPE, FEED THROUGH TERMINAL			-X5	CABUR				
C	2	TERMINAL BLOCK FOR CONTROL CIRCUIT	CBD-4, SCREW TYPE, FEED THROUGH TERMINAL			-X3	CABUR				
	22	TERMINAL BLOCK FOR CONTROL CIRCUIT	CBD-4, SCREW TYPE, FEED THROUGH TERMINAL			-X6	CABUR				
	19	TERMINAL BLOCK FOR CONTROL CIRCUIT	CBD-4, SCREW TYPE, FEED THROUGH TERMINAL			-X7	CABUR				
	9	TERMINAL BLOCK FOR CONTROL CIRCUIT	CBD-4, SCREW TYPE, FEED THROUGH TERMINAL			-X8	CABUR				
D	5	TERMINAL BLOCK FOR CONTROL CIRCUIT	CBD-4, SCREW TYPE, FEED THROUGH TERMINAL			-X10	CABUR				
	9	TERMINAL BLOCK FOR TRIP CIRCUIT 1	CBD-4, SCREW TYPE, FEED THROUGH TERMINAL			-XTC1	CABUR				
	11	TERMINAL BLOCK FOR TRIP CIRCUIT 2	CBD-4, SCREW TYPE, FEED THROUGH TERMINAL			-XTC2	CABUR				
	5	TERMINAL BLOCK FOR AR INITIATION/BLOCKING	CBD-4, SCREW TYPE, FEED THROUGH TERMINAL			-X22	CABUR				
E	2	TERMINAL BLOCK FOR CB CLOSE BLOCK	CBD-4, SCREW TYPE, FEED THROUGH TERMINAL			-X23	CABUR				
	8	TERMINAL BLOCK FOR AR CLOSE COMMAND	CBD-4, SCREW TYPE, FEED THROUGH TERMINAL			-X24	CABUR				
	3	TERMINAL BLOCK FOR BFI	CBD-4, SCREW TYPE, FEED THROUGH TERMINAL			-X25	CABUR				
	26	TERMINAL BLOCK FOR ANNUNCIATION	CBD-4, SCREW TYPE, FEED THROUGH TERMINAL			-XAN	CABUR				
F	15	TERMINAL BLOCK FOR SIGNALLING TO EVENT RECORDER	CBD-4, SCREW TYPE, FEED THROUGH TERMINAL			-XEN	CABUR				
	6	TERMINAL BLOCK FOR SIGNALLING TO FAULT RECORDER	CBD-4, SCREW TYPE, FEED THROUGH TERMINAL			-XFR	CABUR				
	12	TERMINAL BLOCK FOR SIGNALLING TO SCADA INTERFACE PANEL	CBD-4, SCREW TYPE, FEED THROUGH TERMINAL			-XSC	CABUR				
	0	AS BUILT	20.11.2018	ASJ	Manufacturer  <b>EPESOL</b> 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  <b>Grid Solutions</b> A GE and Alstom joint venture	Client  <b>NATIONAL TRANSMISSION &amp; DISPATCH COMPANY LIMITED (NTDC-WAPDA)</b>	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV LINE RELAY SET-2 PANEL (=D08+R2) COMPONENT LIST	Drawing no. P60194-E-RLC-SC-002	
REV.	DESCRIPTION		DATE	DRAWER					Project no. P-60194	Sheet type AC2	Sheet no. 06



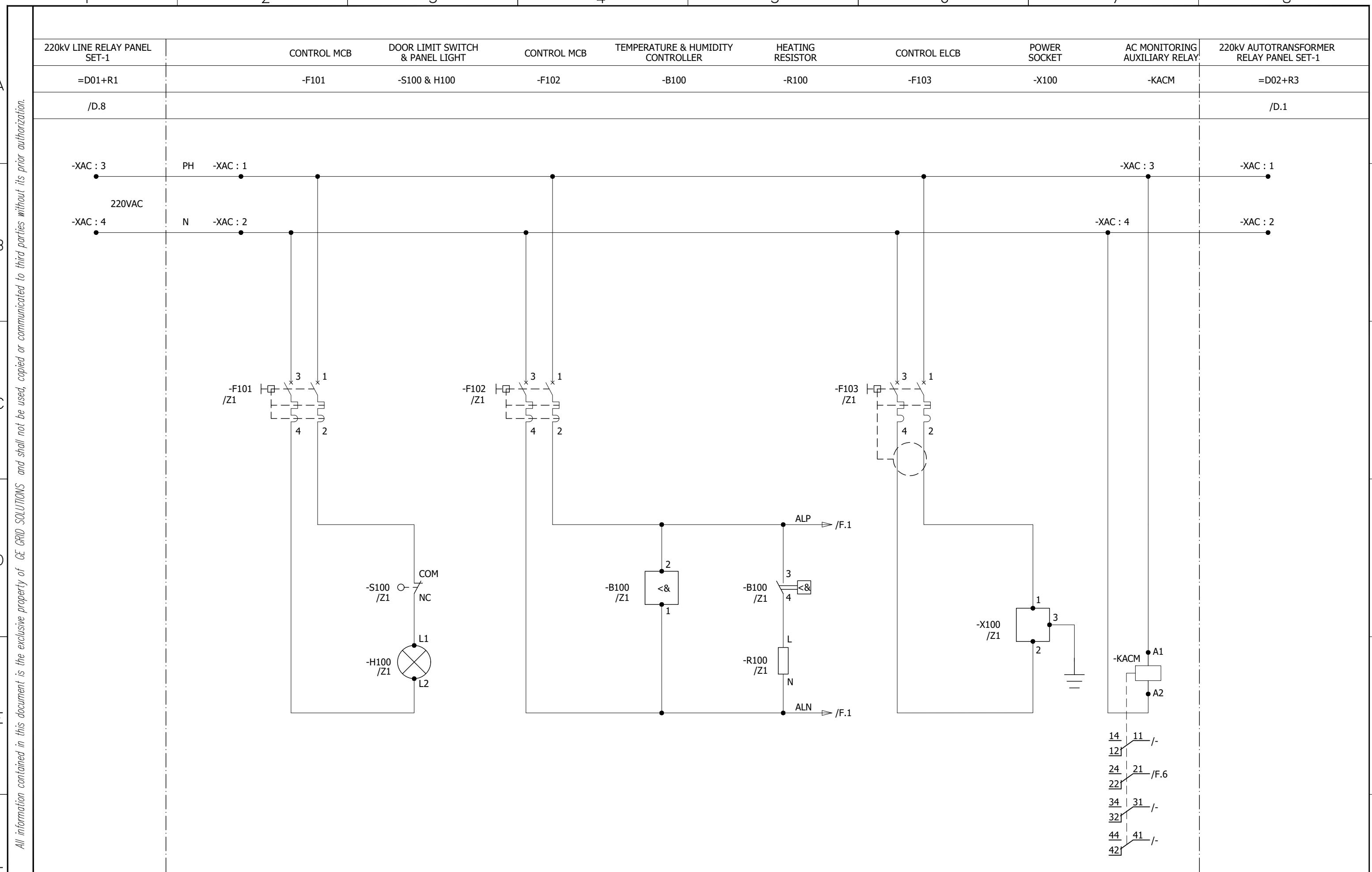


## 220kV KSK

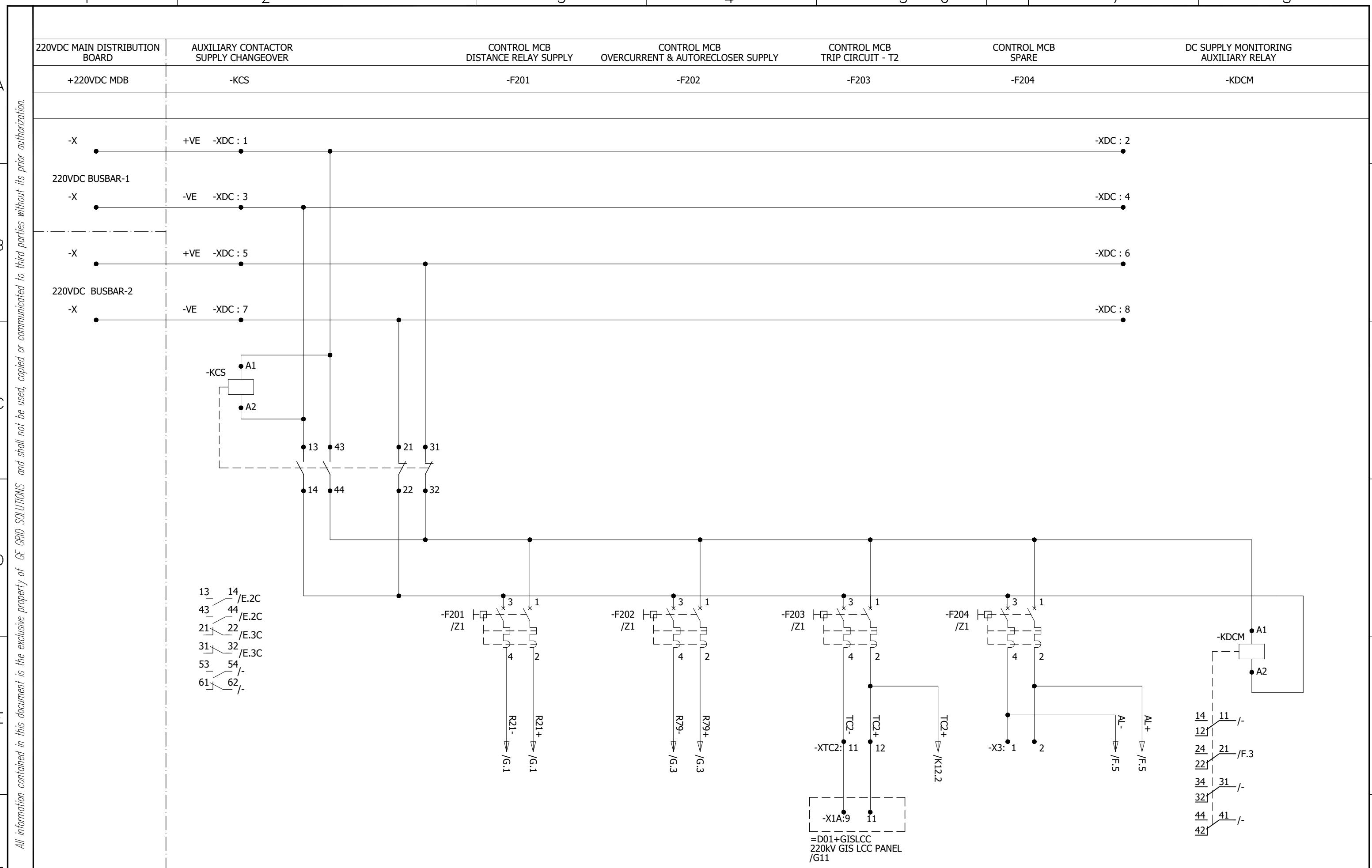
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0	AS BUILT	20.11.2018	ASJ	Manufacturer EPESOL 7-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor Grid Solutions A GE and Alstom joint venture	Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV LINE RELAY SET-2 PANEL (=D08+R2) BAY CONCEPT & PROTECTION LOGICS	Drawing no. P60194-E-RLC-SC-002	
REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type AE	Sheet no. 08



0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 21-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE RELAY SET-2 PANEL (=D08+R2) AC SUPPLY DISTRIBUTION	Drawing no. P60194-E-RLC-SC-002		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type D	Sheet no. 09
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0	AS BUILT	20.11.2018	ASJ	Manufacturer	Contractor	Client	Project	Title	Drawing no.
REV.	DESCRIPTION	DATE	DRAWER	EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Grid Solutions A GE and Alstom joint venture	NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	220KV LINE RELAY SET-2 PANEL (=D08+R2) DC SUPPLY DISTRIBUTION	P60194-E-RLC-SC-002
									Project no. P-60194 Sheet type E Sheet no. 10

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## 220V DC CIRCUIT FAULTY

## 220V DC CIRCUIT FAULTY INDICATION

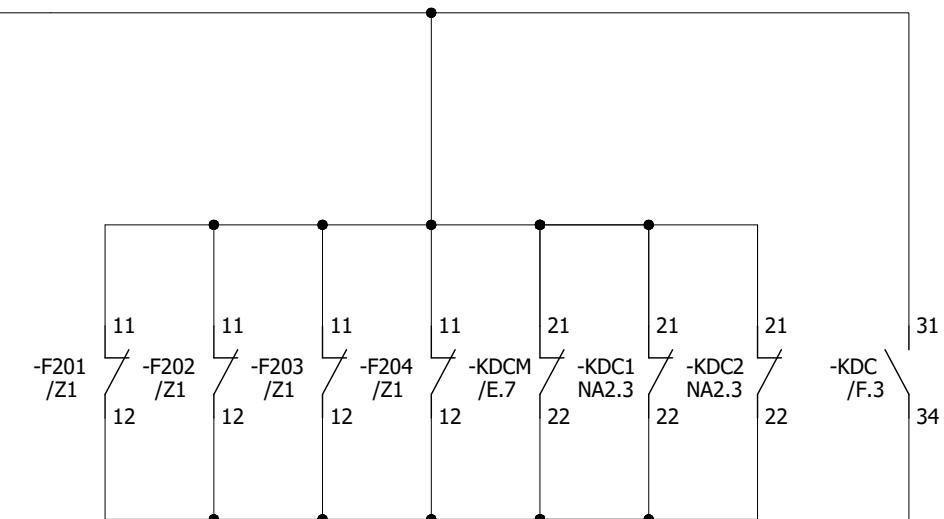
## 220V AC CIRCUIT FAULTY

-KDC

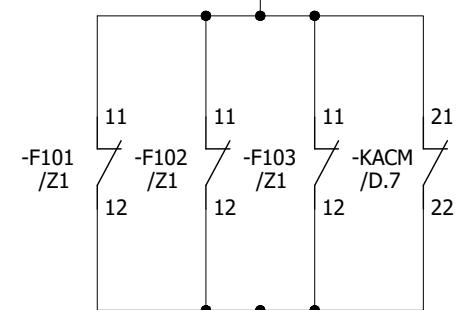
-H200

-KAC

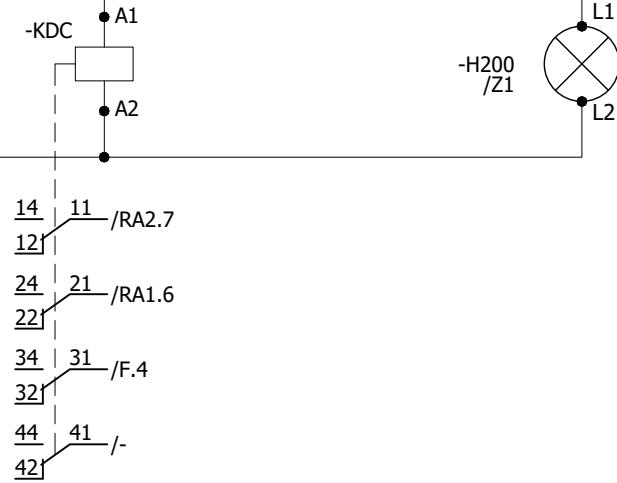
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31  
34

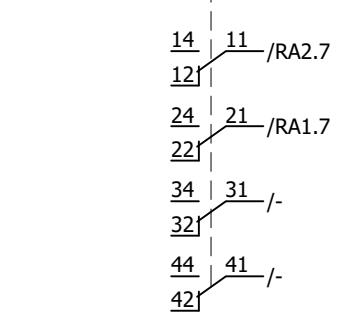
/E.5 ➔ AL+

21  
22

/D.5 ➔ ALN



/E.5 ➔ AL-



A A

B B

C C

D D

E E

F F

1 1

0	AS BUILT	20.11.2018	ASJ	Manufacturer  71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE RELAY SET-2 PANEL (=D08+R2) AC/DC SUPPLY FAILURE CIRCUIT	Drawing no. P60194-E-RLC-SC-002	
REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type F	Sheet no. 11

A

B

C

D

E

F

8 8

RESET PUSHBUTTON  
DIRECT TRANSFER TRIP RELAY

## DISTANCE PROTECTION

## AUTO RECLOSER

## AUTO RECLOSER

OVERCURRENT &  
EARTHFAULT

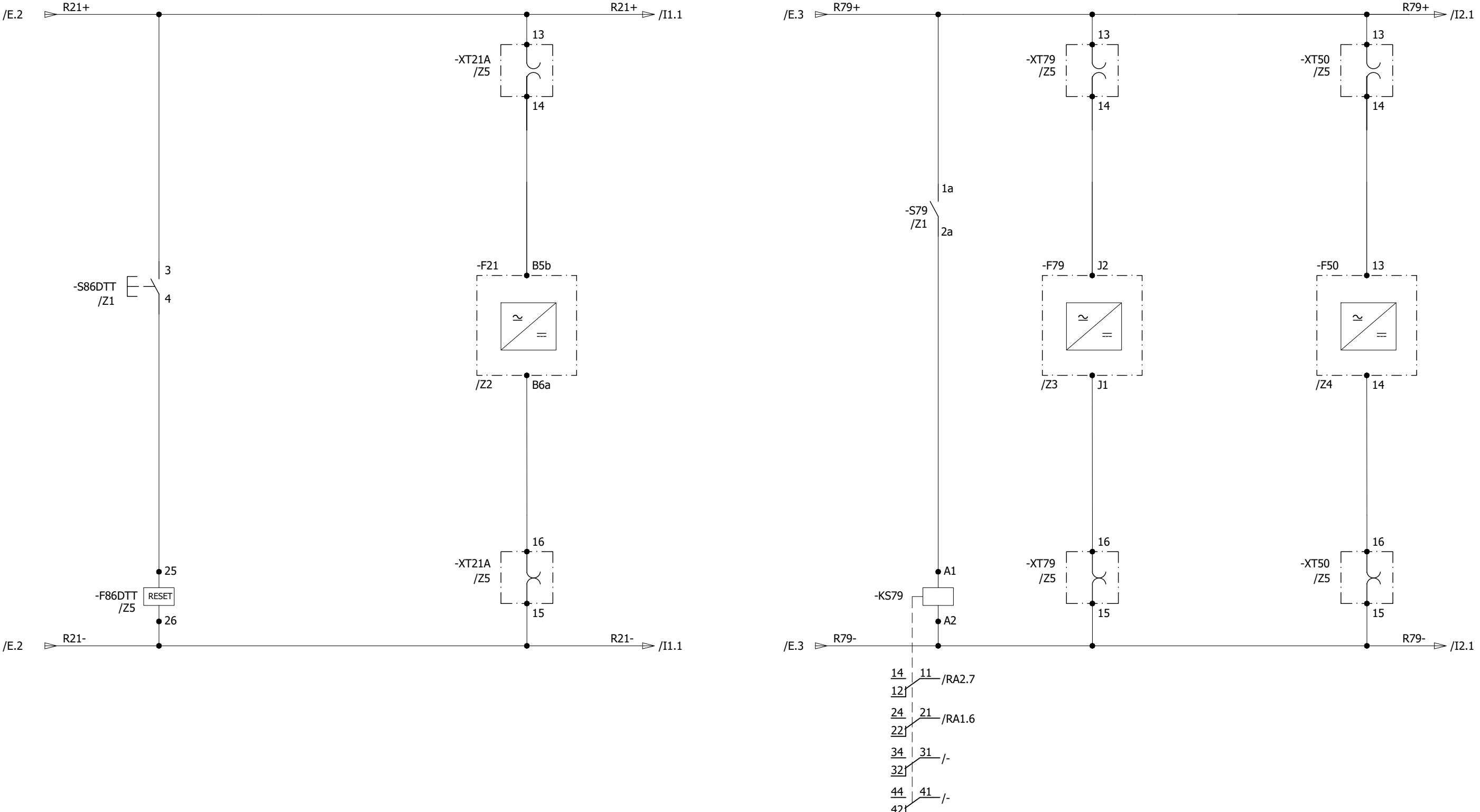
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RELAY SUPPLY

IN/OUT

RELAY SUPPLY

RELAY SUPPLY



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A

A

B

B

C

C

D

D

E

E

F

F

0	AS BUILT	20.11.2018	ASJ	Manufacturer  71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV LINE RELAY SET-2 PANEL (=D08+R2) RELAY CONTROL & SUPPLY	Drawing no. P60194-E-RLC-SC-002
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type G
									Sheet no. 12

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## TEST BLOCK

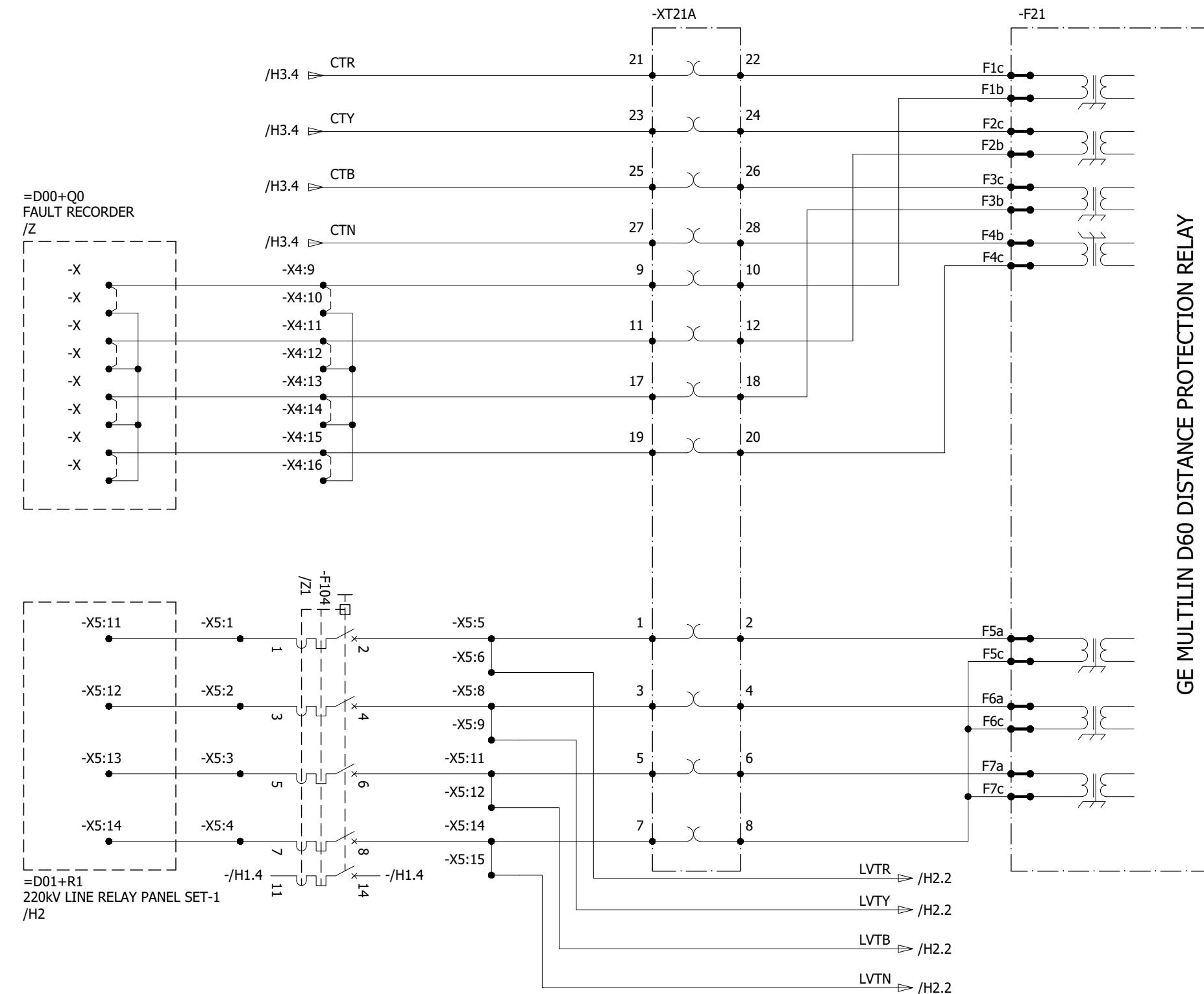
# DISTANCE PROTECTION RELAY

-XT21A

/Z5

-F21

/Z2



GE MULTILIN D60 DISTANCE PROTECTION RELAY

0	AS BUILT	20.11.2018	ASJ	<b>Manufacturer</b>  <p><b>EPESOL</b> 71-B Garden Block, New Garden Town, Lahore, Pakistan</p>	<b>Contractor</b>  <p>Grid Solutions A GE and Alstom joint venture</p>	<b>Client</b>  <p>NATIONAL TRANSMISSION &amp; DISPATCH COMPANY LIMITED (NTDC-WAPDA)</p>	<b>Project</b> 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	<b>Title</b> 220KV LINE RELAY SET-2 PANEL (=D08+R2) DISTANCE PROTECTION CT/VT CIRCUIT	<b>Drawing no.</b>		
									P60194-E-RLC-SC-002		
									<b>Project no.</b> P-60194		
									<b>Sheet type</b> H1		
REV.	DESCRIPTION	DATE	DRAWER						Sheet no.	13	

1

2

3

4

5

6

7

8

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220KV LINE CONTROL  
PANEL

=D01+C4

/MA1

TEST BLOCK

AUTORECLOSER  
RELAY

-XT79

-F79

/Z5

/Z3

-X12: 35

-X5:17

-X12: 36

-X5:18

-XT79  
21 22  
23 24

-F79  
C23 C24

/H1.6 ▷ LVTR

/H1.6 ▷ LVTY

/H1.6 ▷ LVTB

/H1.6 ▷ LVTN

1 2  
3 4  
5 6  
7 8

C19 C20  
C21 C22

=D00+Q1  
FAULT RECORDER PANEL

-X5:7 -X  
-X5:10 -X  
-X5:13 -X  
-X5:16 -X

AGILE P841 AUTORECLOSER RELAY

A

A

B

B

C

C

D

D

E

E

F

F

0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE RELAY SET-2 PANEL (=D08+R2) AUTORECLOSER VT INPUTS	Drawing no. P60194-E-RLC-SC-002
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type H2
									Sheet no. 14

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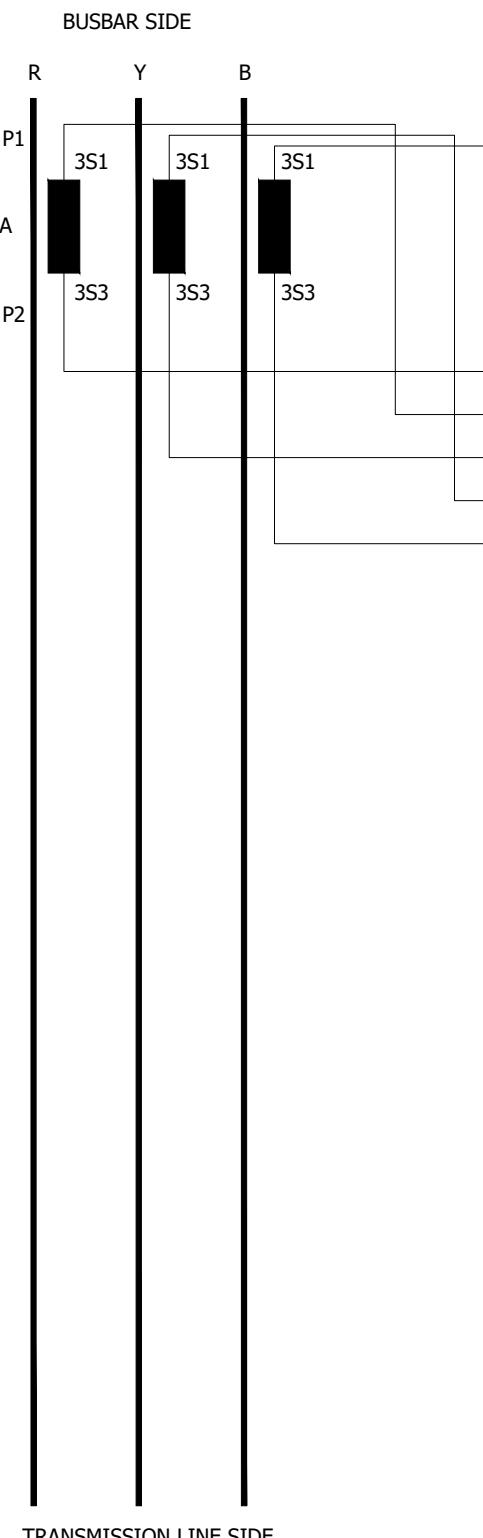
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0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV LINE RELAY SET-2 PANEL (=D08+R2) DISTANCE PROTECTION CT/VT CIRCUIT	Drawing no. P60194-E-RLC-SC-002	
REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type H3	Sheet no. 15

1 2 3 4 5 6 7 8



220kV GIS HALL

CONTROL ROOM

TEST BLOCK

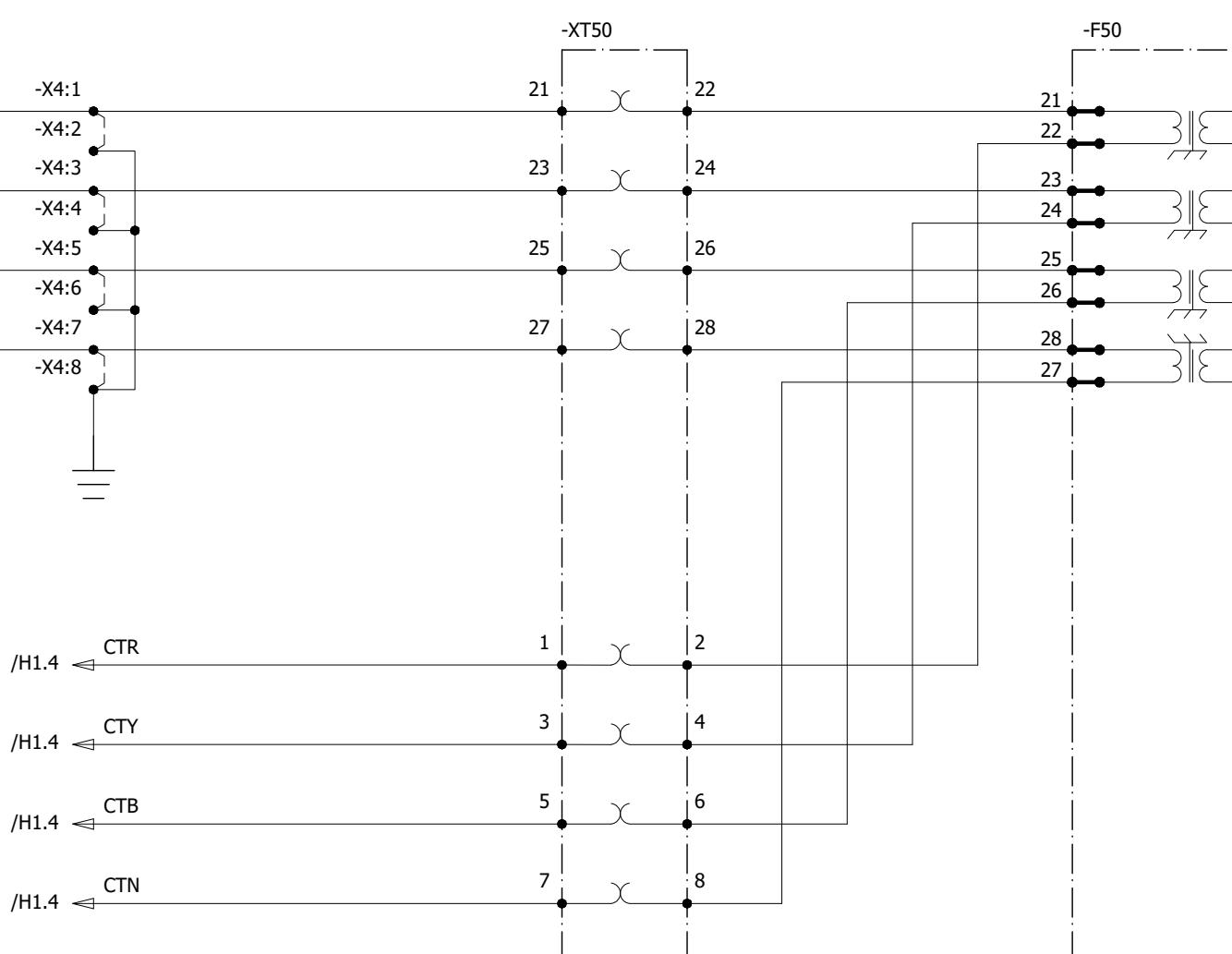
OVERCURRENT & EARTHFAULT PROTECTION RELAY

-XT50

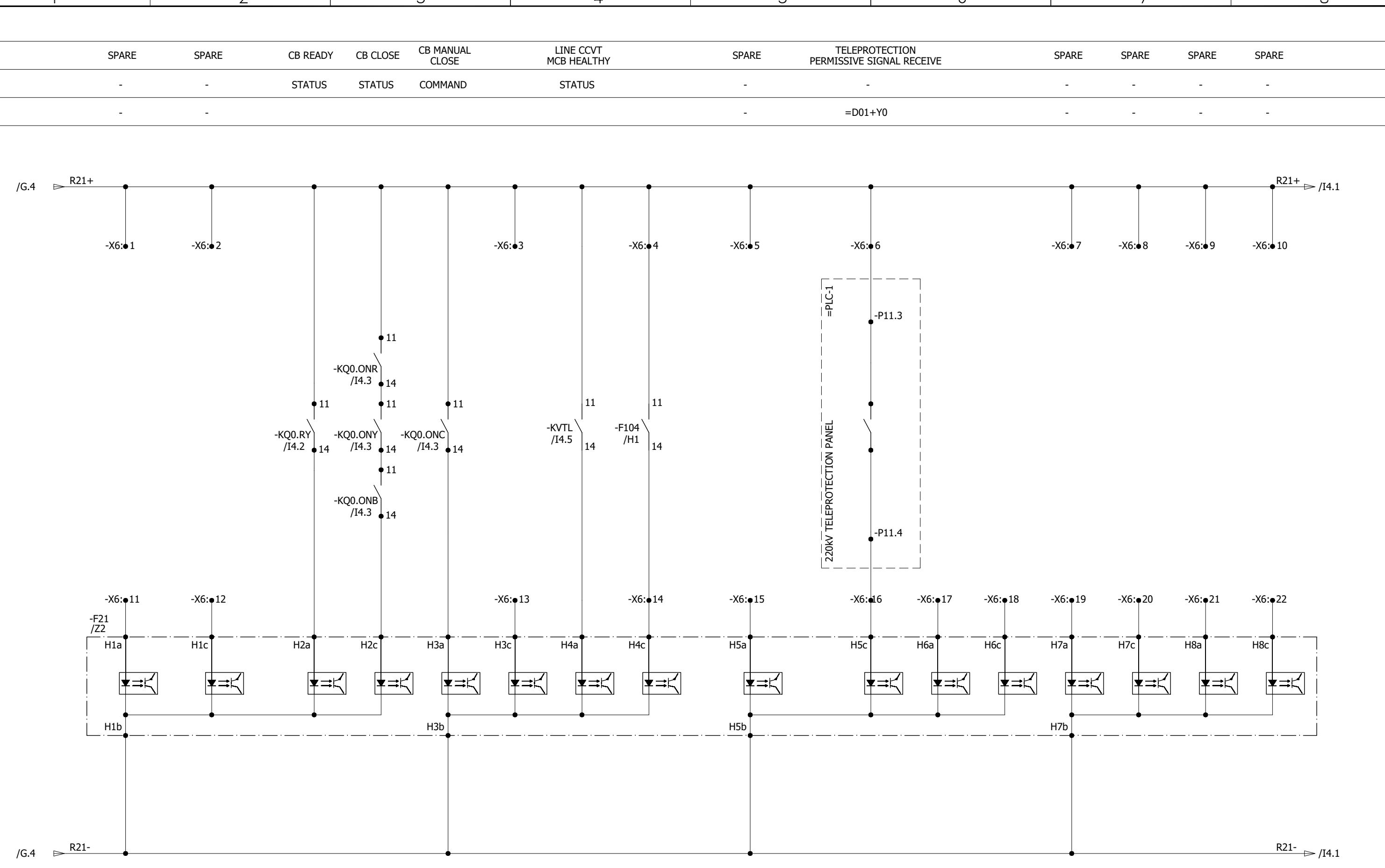
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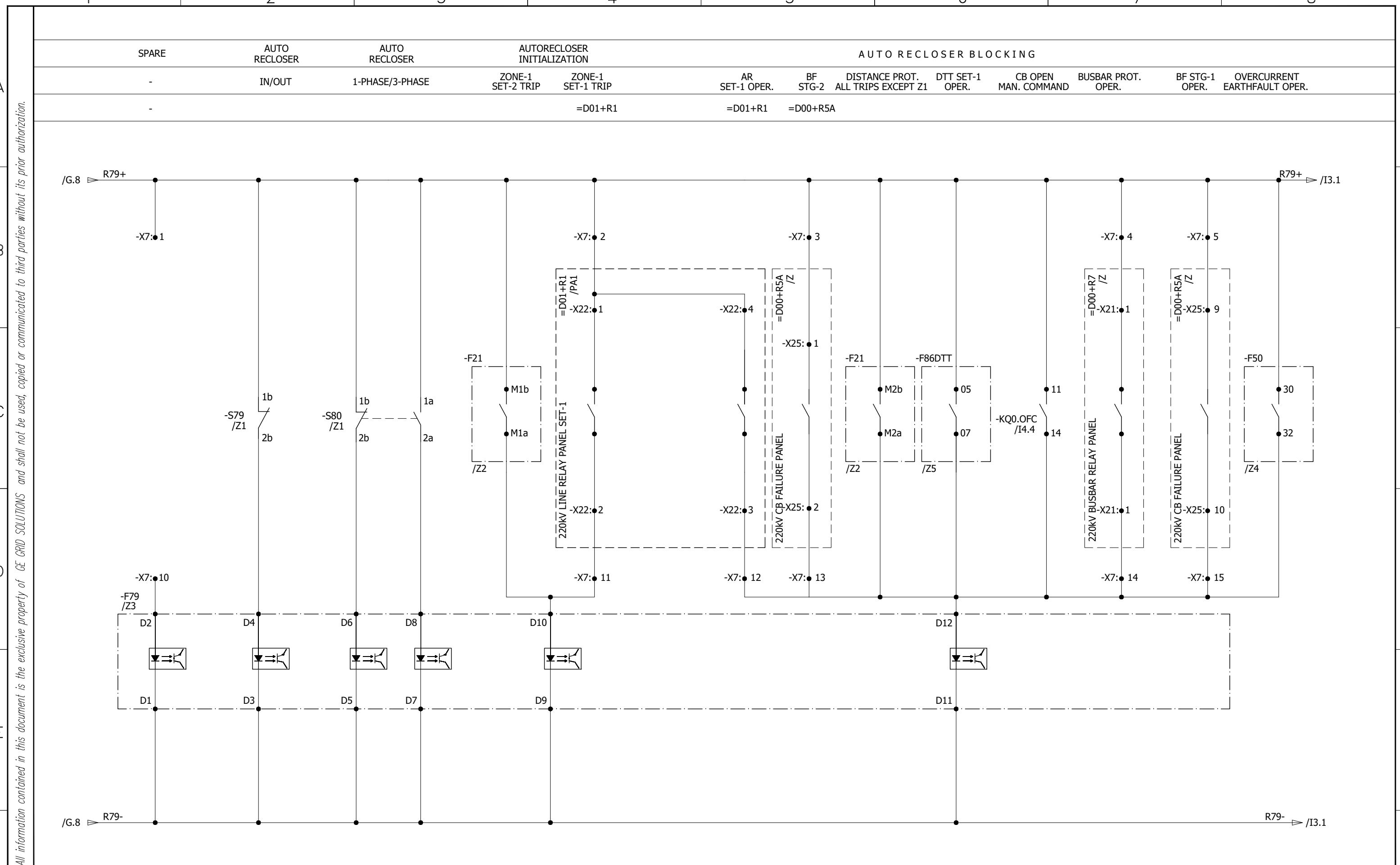
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/Z4



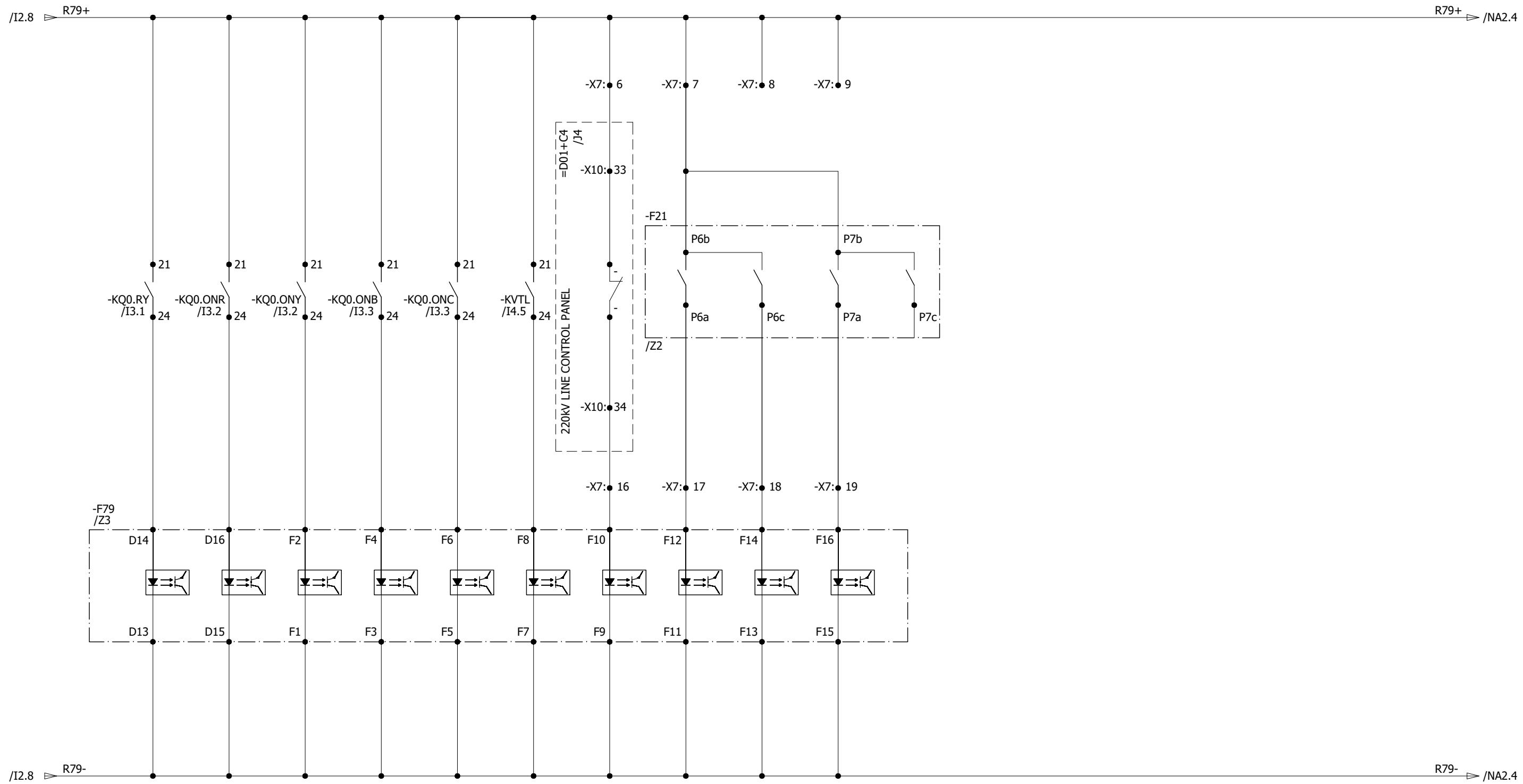
AGILE P14N OVERCURRENT & EARTHFAULT PROTECTION RELAY





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	CB READY	CB CLOSE	CB CLOSE	CB CLOSE	CB MANUAL CLOSE	LINE CCVT MCB HEALTHY	BUSBAR VT MCB HEALTHY	DISTANCE ZONE-1		
	STATUS	RED POLE	YELLOW POLE	BLUE POLE	COMMAND	STATUS	STATUS	R-PHASE	Y-PHASE	B-PHASE
					=D01+C4	TRIP	TRIP	TRIP		



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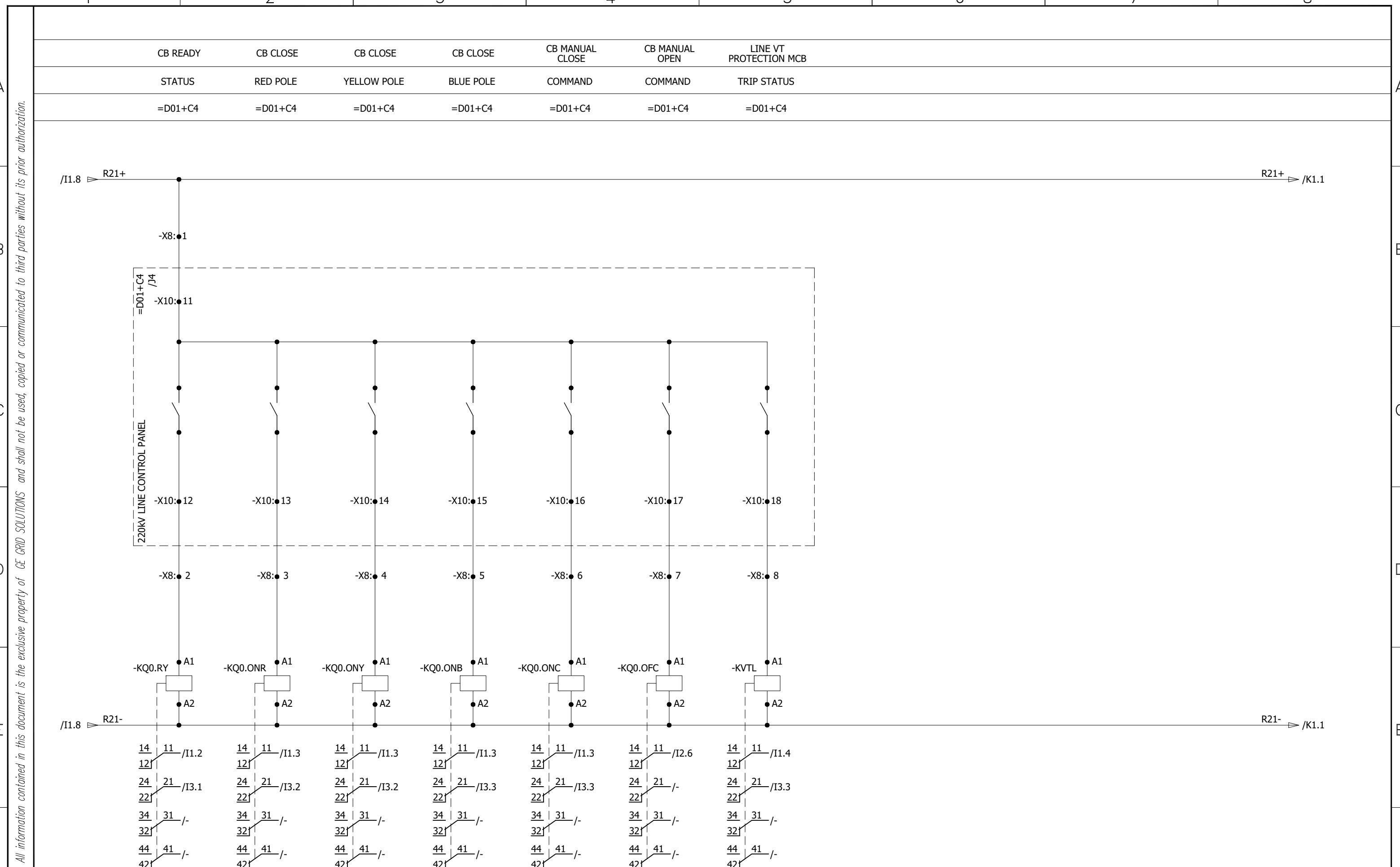
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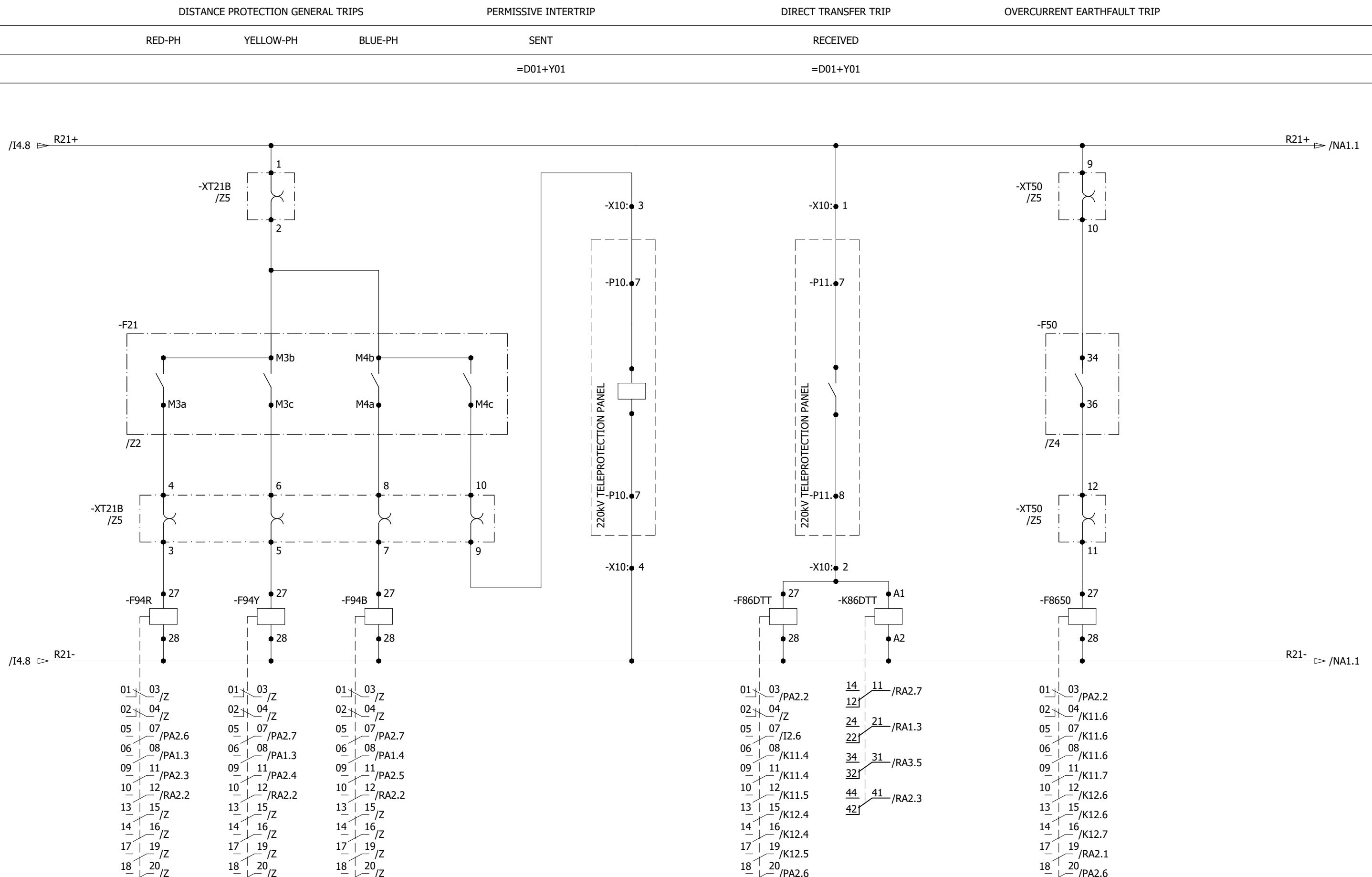
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0	AS BUILT	20.11.2018	ASJ	Manufacturer  71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE RELAY SET-2 PANEL (=D08+R2) AUTO RECLOSE INPUTS	Drawing no. P60194-E-RLC-SC-002
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194      Sheet type I3      Sheet no. 18

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0	AS BUILT		20.11.2018	ASJ	Manufacturer	Contractor	Client	Project	Title	Drawing no.			
REV.	DESCRIPTION		DATE	DRAWER	EPEPSOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Grid Solutions A GE and Alstom joint venture	NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	220KV LINE RELAY SET-2 PANEL (=D08+R2) SYSTEM INPUTS	P-60194-E-RLC-SC-002	Project no.	Sheet type	Sheet no.
										P-60194	I4	19	
1			2	3	4	5	6	7	8				



0	AS BUILT	20.11.2018	ASJ	<b>Manufacturer</b>  <b>EPESOL</b> 71-B Garden Block, New Garden Town, Lahore, Pakistan	<b>Contractor</b>  Grid Solutions A GE and Alstom joint venture	<b>Client</b>  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	<b>Project</b> 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	<b>Title</b> 220kV LINE RELAY SET-2 PANEL (=D08+R2) PROTECTION TRIPS	<b>Drawing no.</b>		
								P60194-E-RLC-SC-002			
								Project no.			
REV.	DESCRIPTION	DATE	DRAWER					P-60194	K1	20	

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220KV LINE RELAY PANEL  
SET-1

DISTANCE PROTECTION SET-2 GENERAL TRIPS

DIRECT TRANSFER TRIP - RECEIVED

OVERCURRENT EARTHFAULT TRIP

220KV CIRCUIT BREAKER  
FAILURE PANEL

=D01+R1

RED-PH

YELLOW-PH

BLUE-PH

RED-PH

YELLOW-PH

BLUE-PH

RED-PH

YELLOW-PH

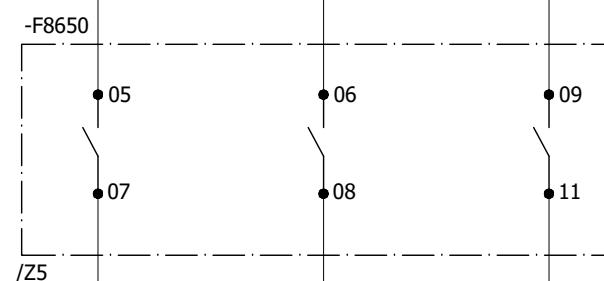
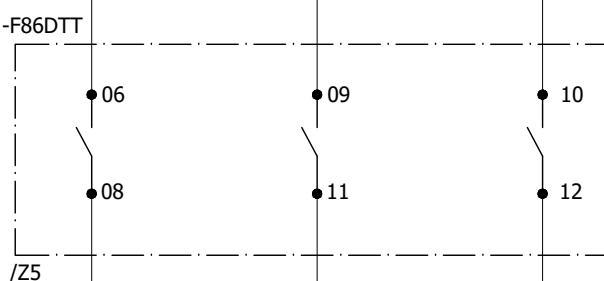
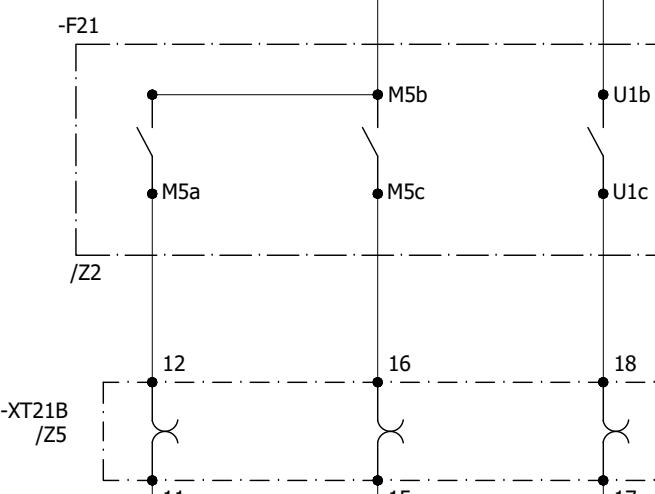
BLUE-PH

=D00+R5A

/K11

/Z

-XTC1: 5 TC1+ -XTC1: 1 -XTC1: 5 TC1+ -XTC1: 9



-XTC1: 6 -XTC1: 2 -XTC1: 6 -XTC1: 10  
-XTC1: 7 -XTC1: 3 -XTC1: 7 -XTC1: 11  
-XTC1: 8 -XTC1: 4 -XTC1: 8 -XTC1: 12

A

A

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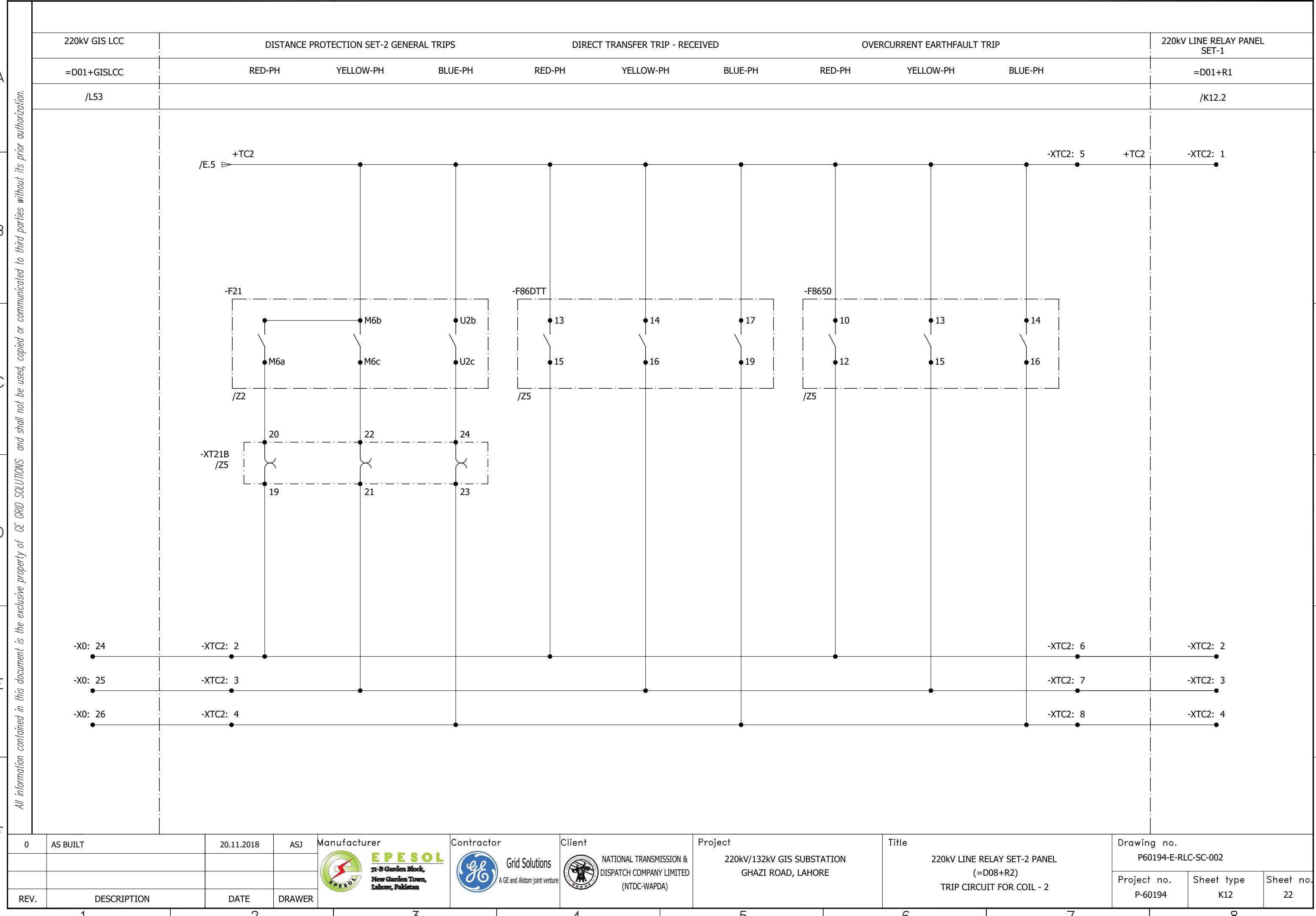
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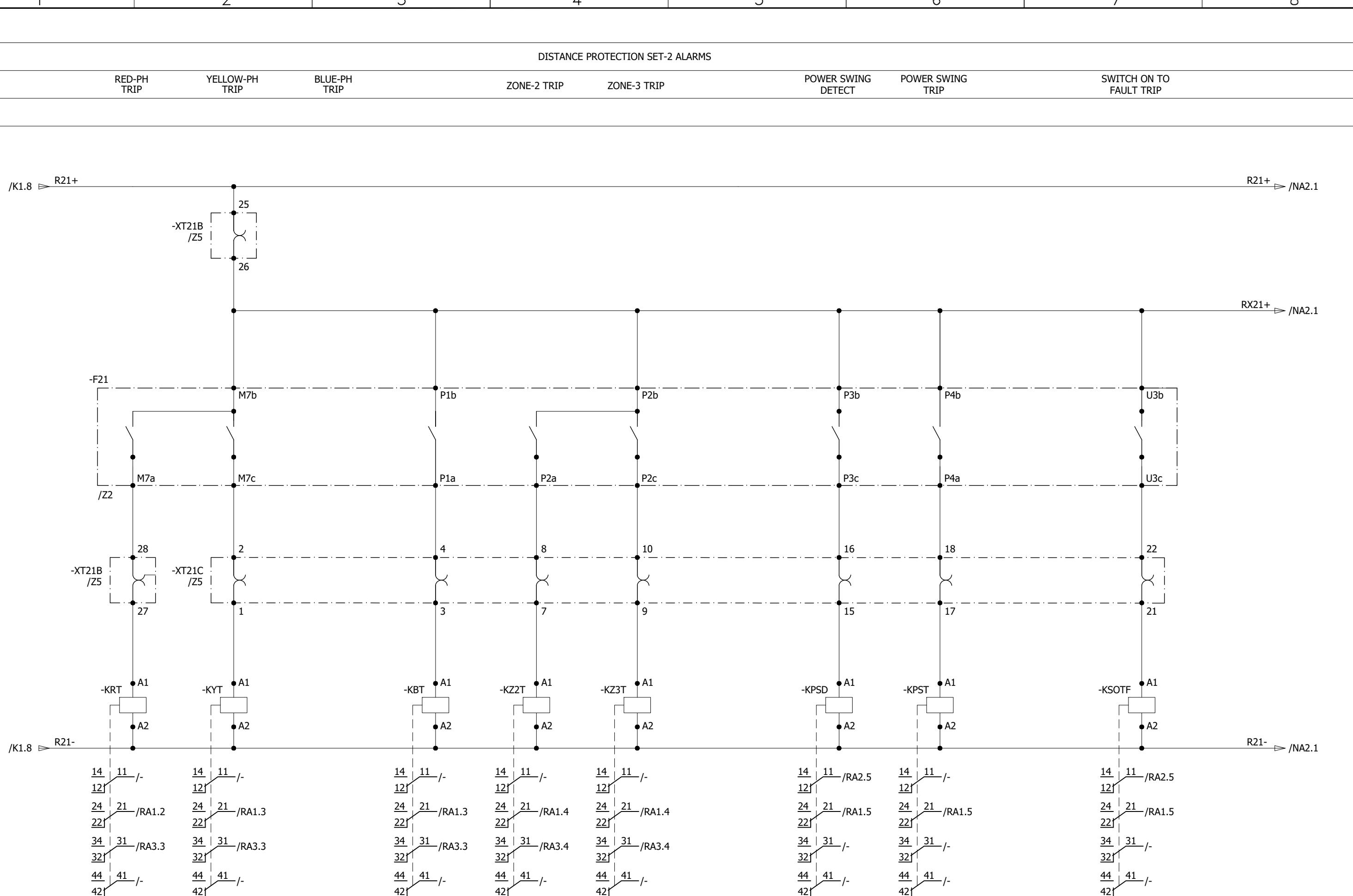
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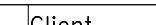
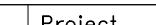
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0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 21-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE RELAY SET-2 PANEL (=D08+R2) TRIP CIRCUIT FOR COIL - 1	Drawing no. P60194-E-RLC-SC-002
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type K11
									Sheet no. 21





0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV LINE RELAY SET-2 PANEL (=D08+R2) SYSTEM ALARMS	Drawing no. P60194-E-RLC-SC-002		
									Project no. P-60194		
									Sheet type NA1	Sheet no. 23	
REV.	DESCRIPTION	DATE	DRAWER								
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## DISTANCE PROTECTION SET-2 ALARMS

R21+ DC SUPPLY  
MONITORING

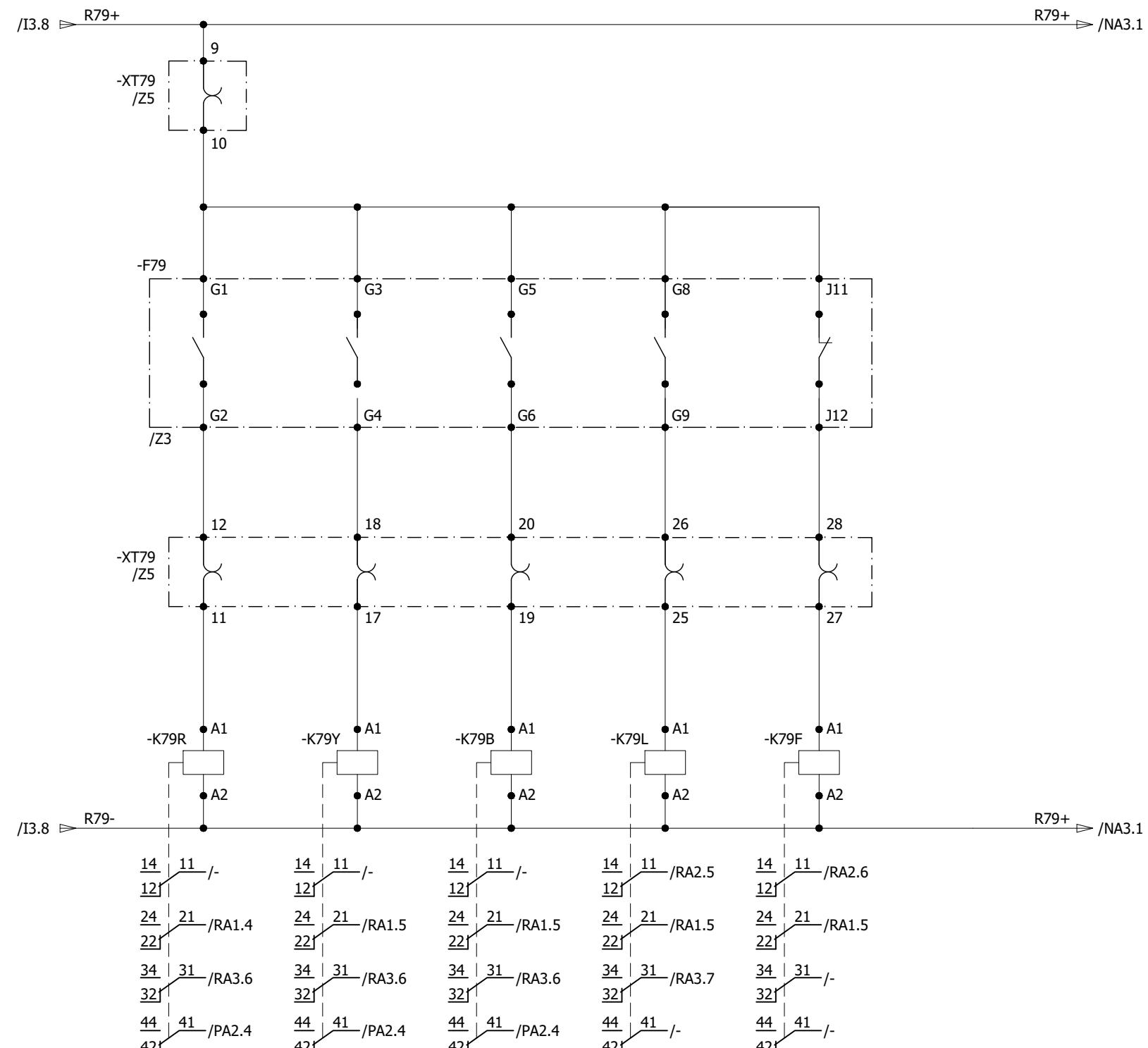
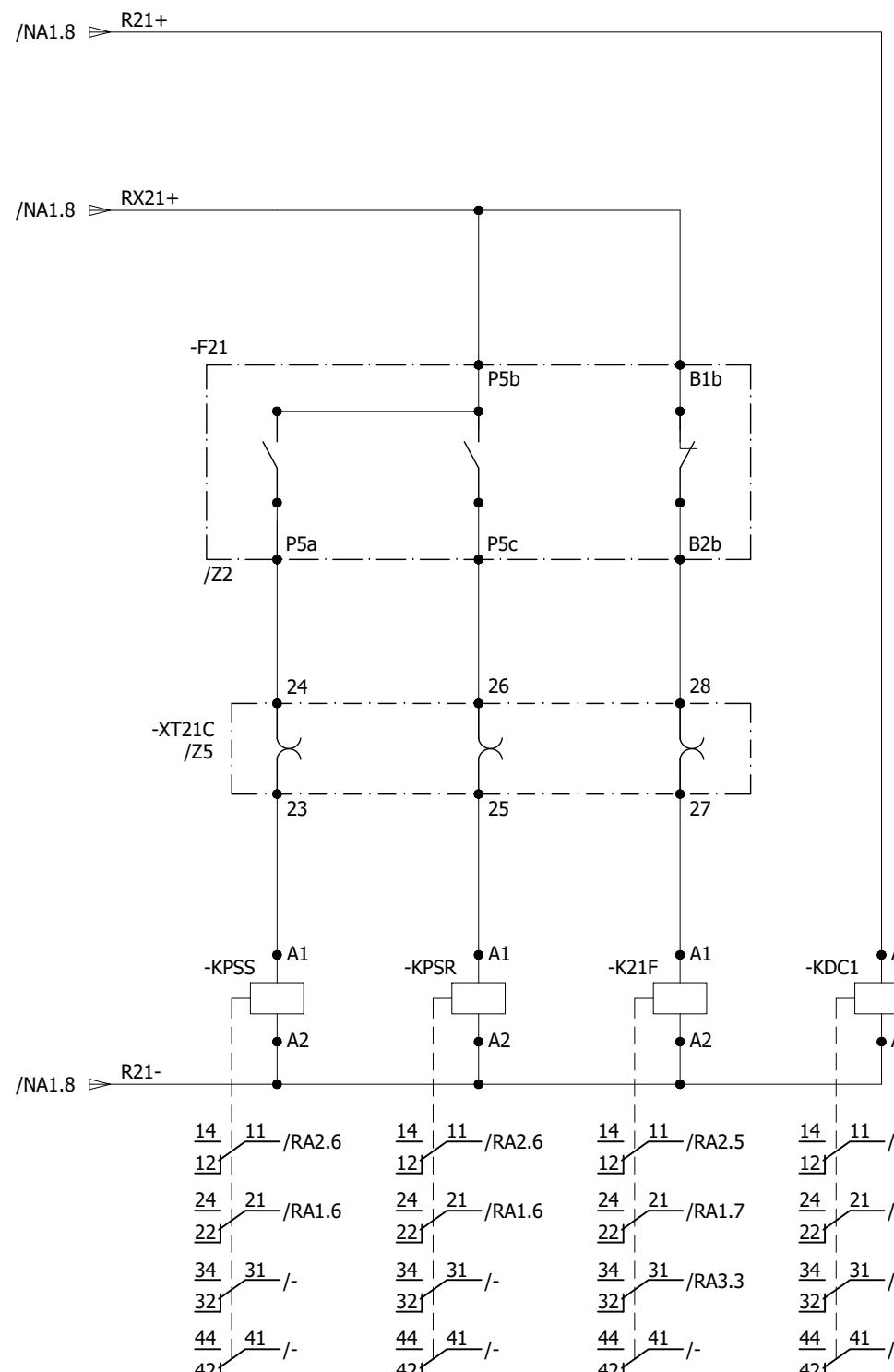
## AUTORECLOSER SET-2 ALARMS

PERMISSIVE INTER  
TRIP SENTPERMISSIVE INTER  
TRIP RECEIVEDPROTECTION  
FAULTY

+KDC1

RED-POLE  
RECLOSINGYELLOW-POLE  
RECLOSINGBLUE-POLE  
RECLOSINGAUTORECLOSER  
LOCKED OUTPROTECTION  
FAULTY

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0	AS BUILT	20.11.2018	ASJ	Manufacturer  71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE RELAY SET-2 PANEL (=D08+R2) SYSTEM ALARMS	Drawing no. P60194-E-RLC-SC-002
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type NA2
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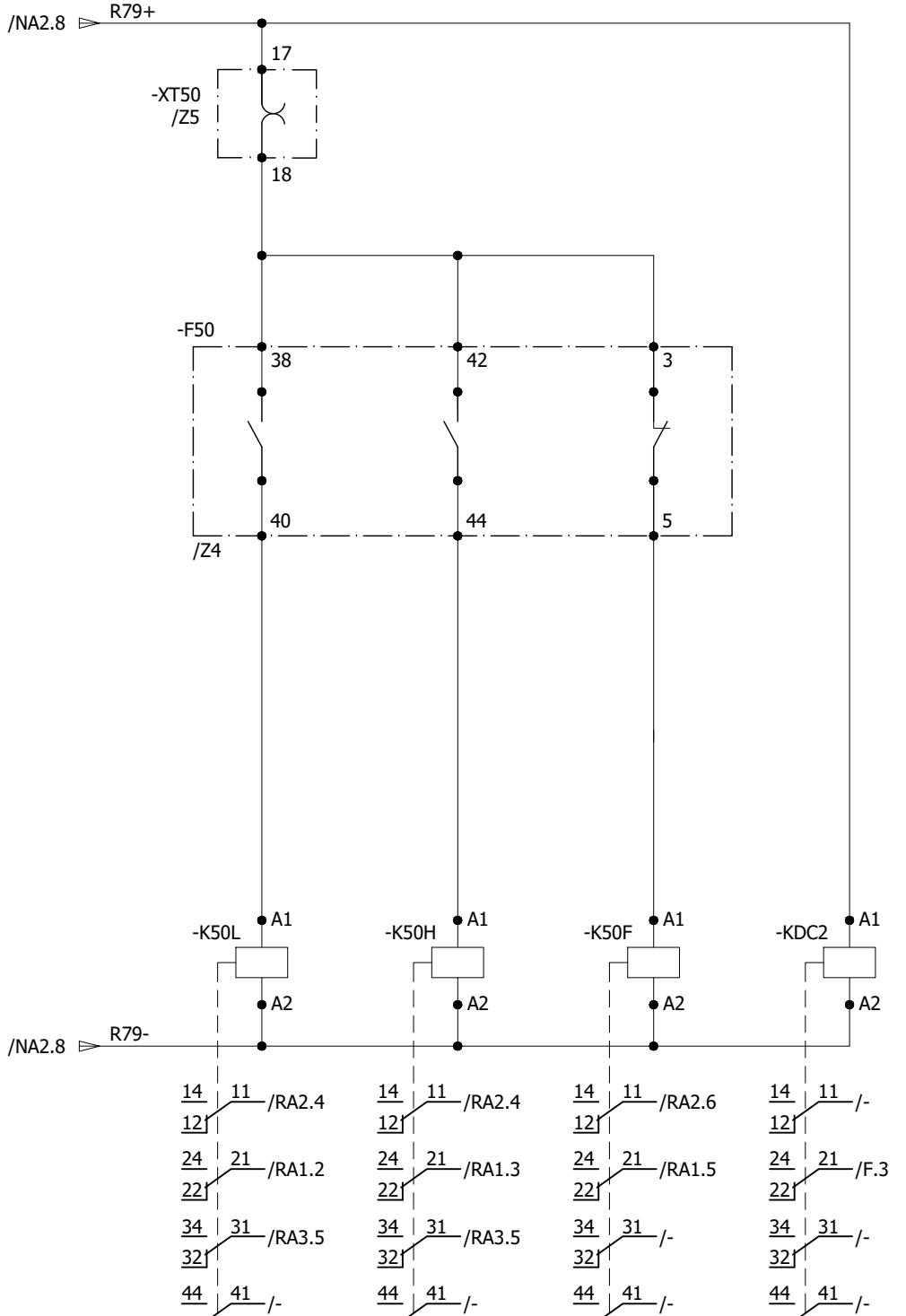
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OVERCURRENT EARTHFAULT ALARMS R79+ DC SUPPLY MONITORING

LOW-SET TRIP

HIGH-SET TRIP PROTECTION FAULTY

+KDC2



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0	AS BUILT	20.11.2018	ASJ	Manufacturer  71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE RELAY SET-2 PANEL (=D08+R2) SYSTEM ALARMS	Drawing no. P60194-E-RLC-SC-002	
REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type NA3	Sheet no. 25

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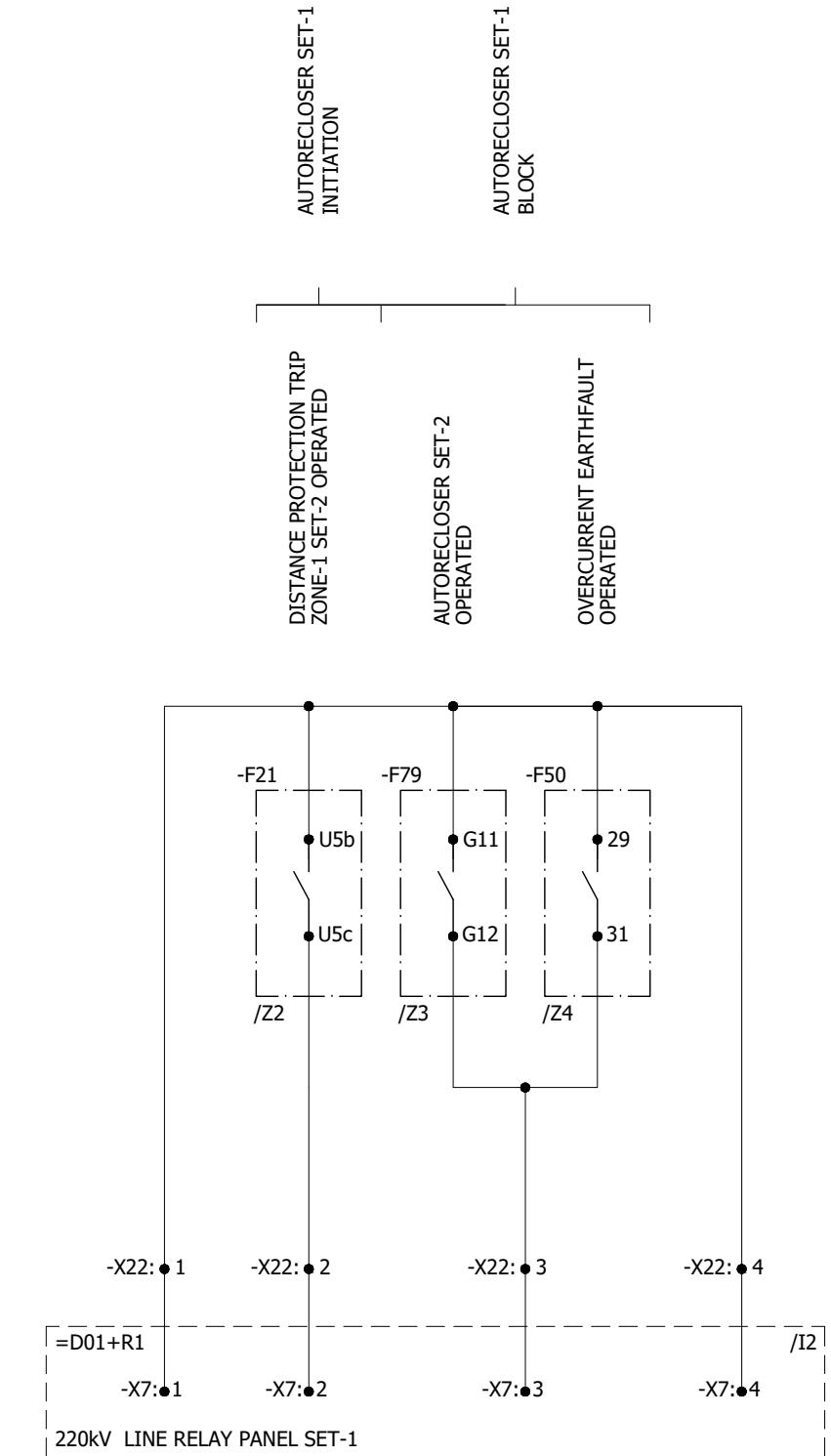
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0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV LINE RELAY SET-2 PANEL (=D08+R2) PROTECTION INTER-CIRCUITS	Drawing no. P60194-E-RLC-SC-002
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type PA1
									Sheet no. 26

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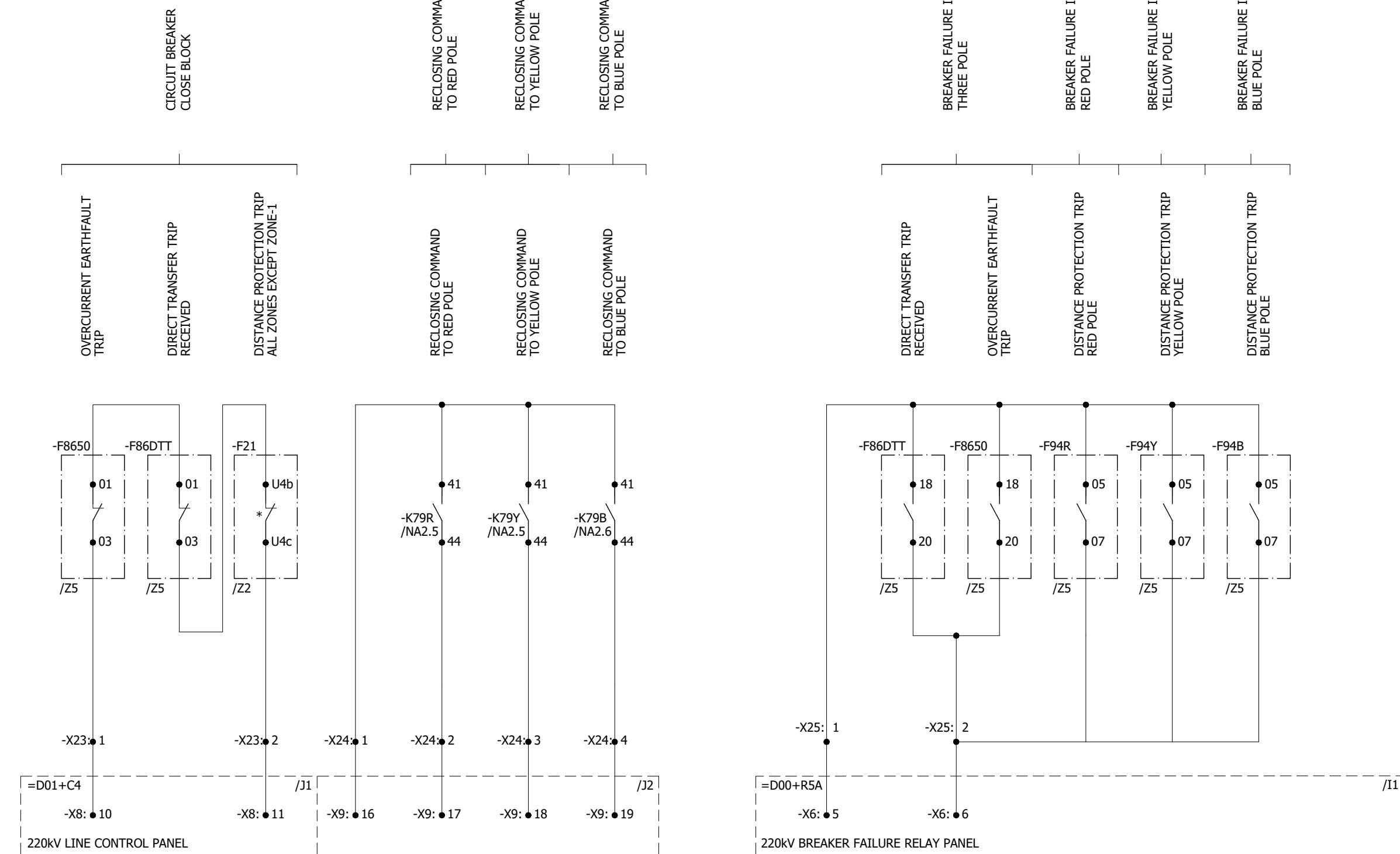
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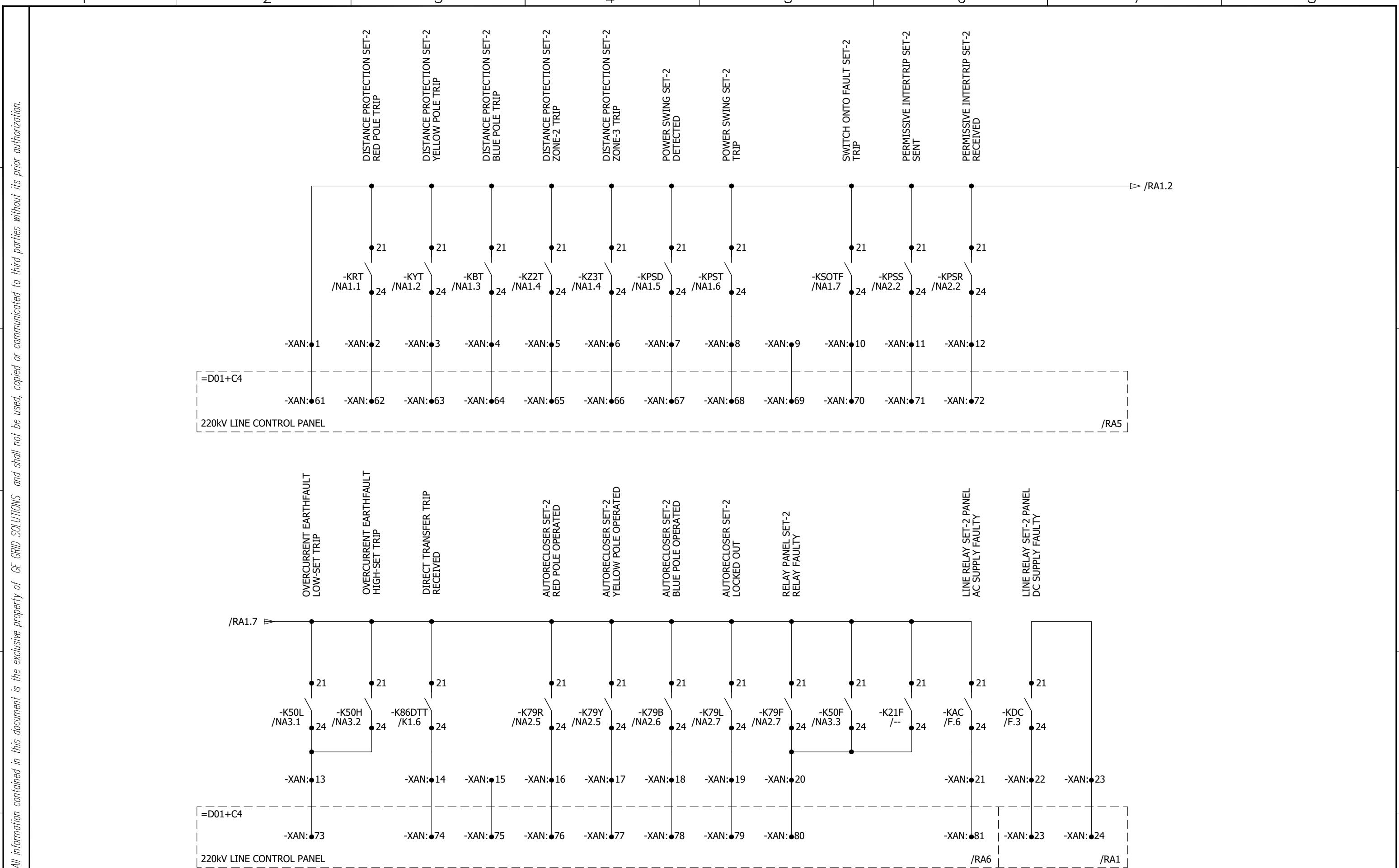
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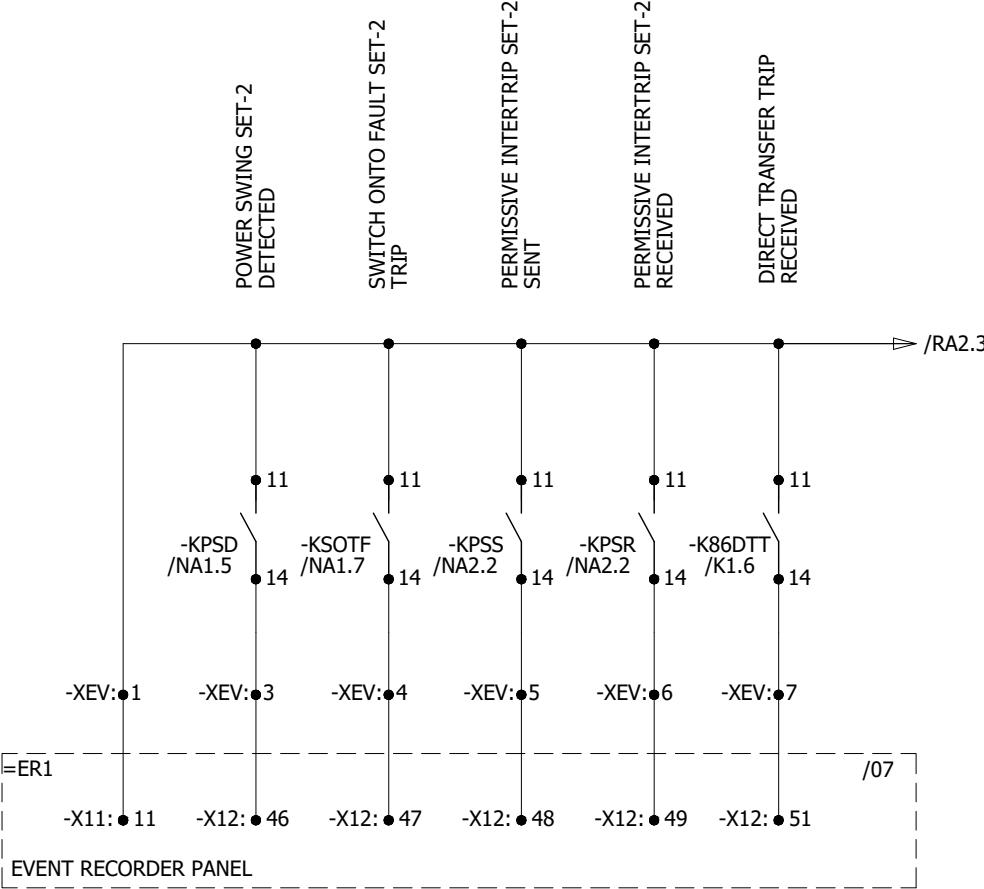
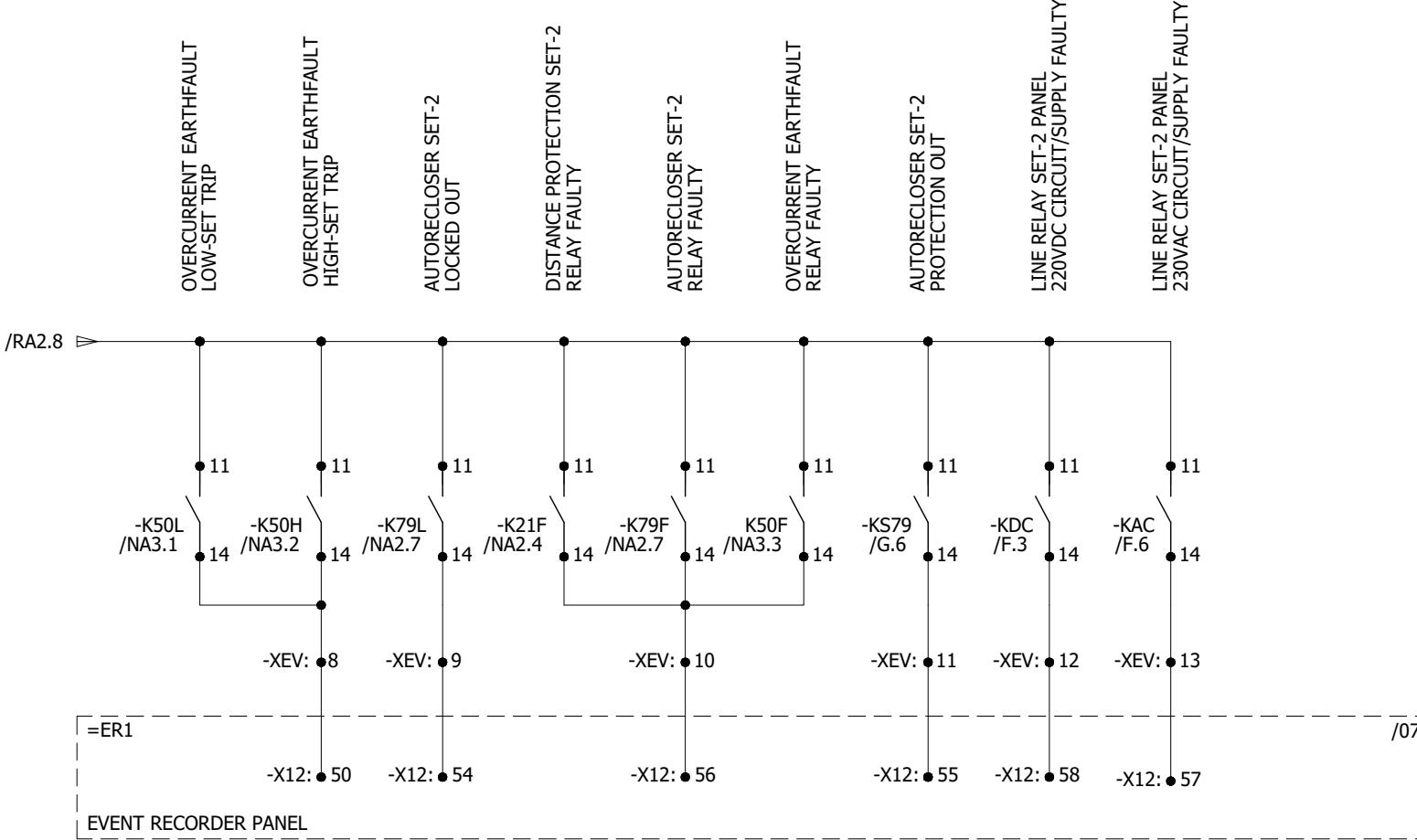
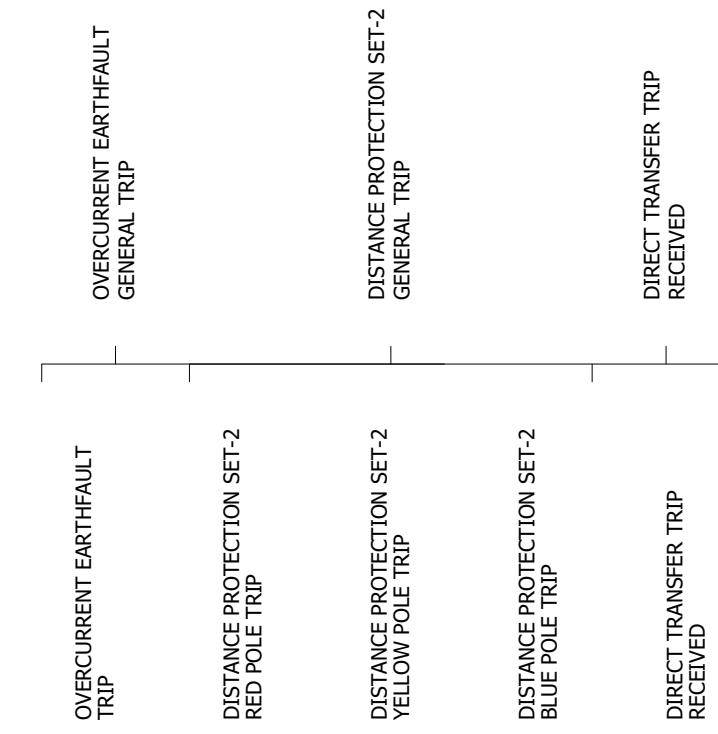
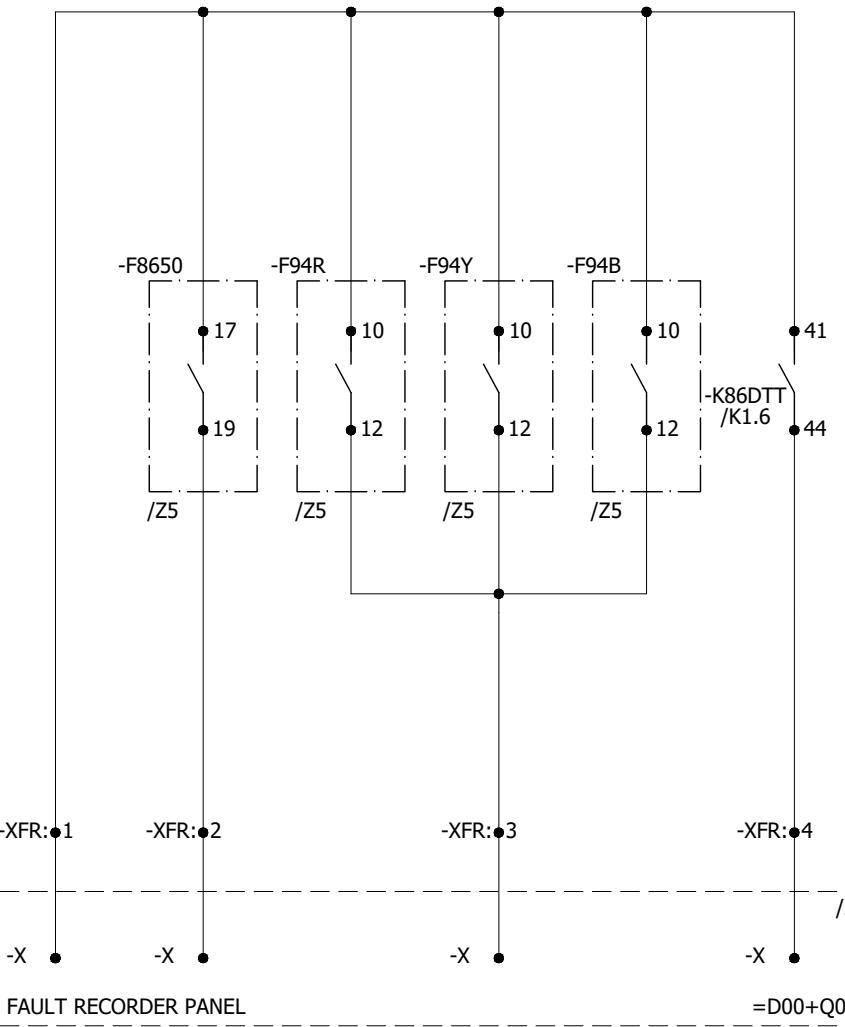


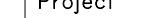
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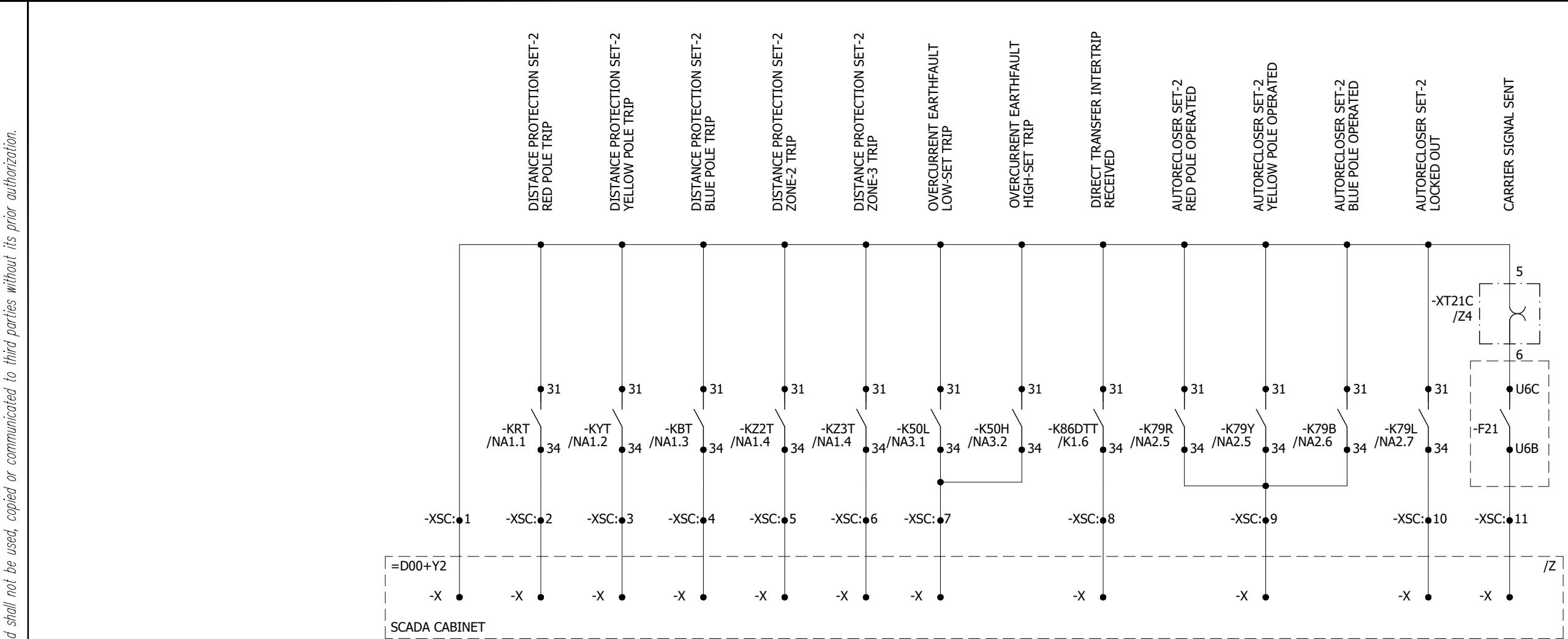
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REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type RA1	Sheet no. 28
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0	AS BUILT	20.11.2018	ASJ	Manufacturer  <b>EPESOL</b> 73-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  <b>Grid Solutions</b> A GE and Alstom joint venture	Client  <b>NATIONAL TRANSMISSION &amp; DISPATCH COMPANY LIMITED</b> (NTDC-WAPDA)	Project 220KV/132kV GIS SUBSTATION GAZI ROAD, LAHORE	Title 220KV LINE RELAY SET-2 PANEL (=D08+R2) EVENT & FAULT RECORDER CIRCUITS	Drawing no.		
									P60194-E-RLC-SC-002		
REV.	DESCRIPTION	DATE	DRAWER						Project no.	Sheet type	Sheet no.
									P-60194	RA2	29

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0	AS BUILT	20.11.2018	ASJ	Manufacturer  71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE RELAY SET-2 PANEL (=D08+R2) SCADA CIRCUIT	Drawing no. P60194-E-RLC-SC-002	
REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type RA3	Sheet no. 30

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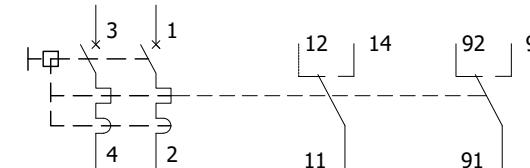
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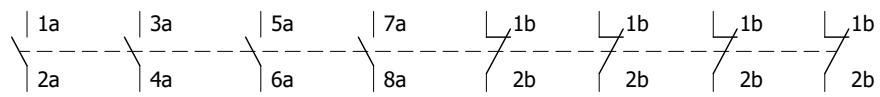
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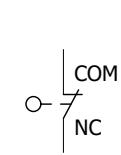


-F101	D.2	F.6	
-F102	D.4	F.6	
-F103	D.6	F.6	
-F201	E.2	F.2	
-F202	E.3	F.2	
-F203	E.4	F.2	
-F204	E.5	F.3	



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-S80	I2.3			I2.3		

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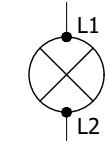


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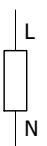


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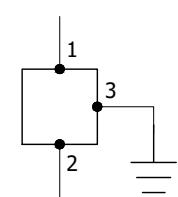


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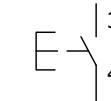


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D



-X100	D.7
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-S6DTT	G.2
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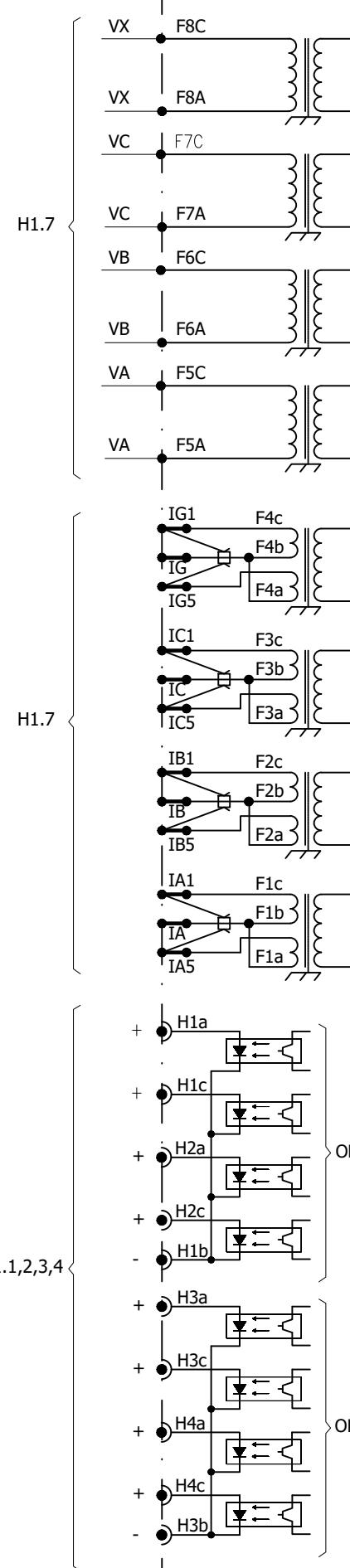
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REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type Z1	Sheet no. 31
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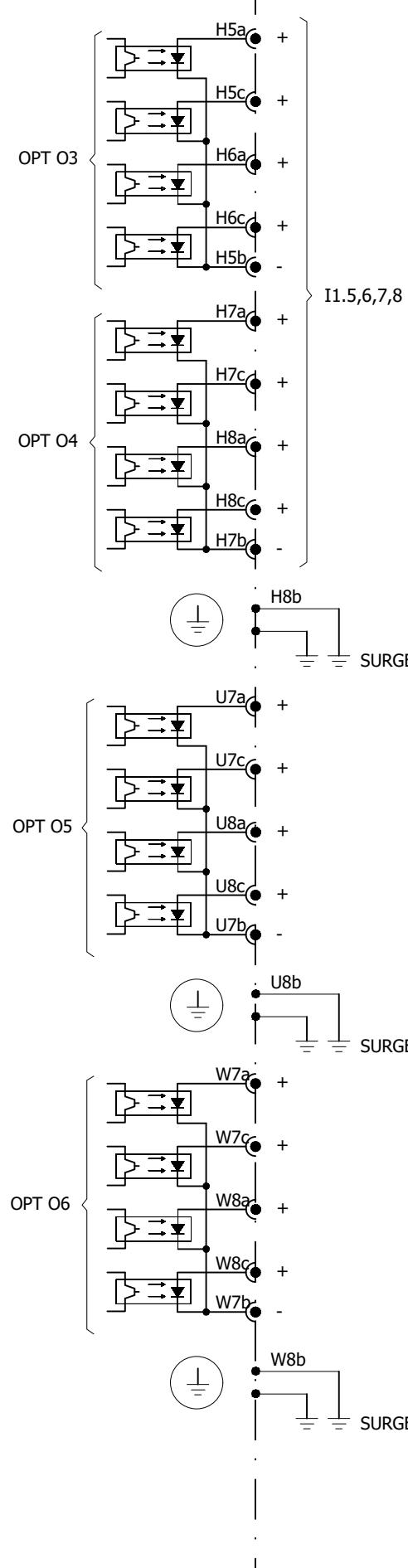
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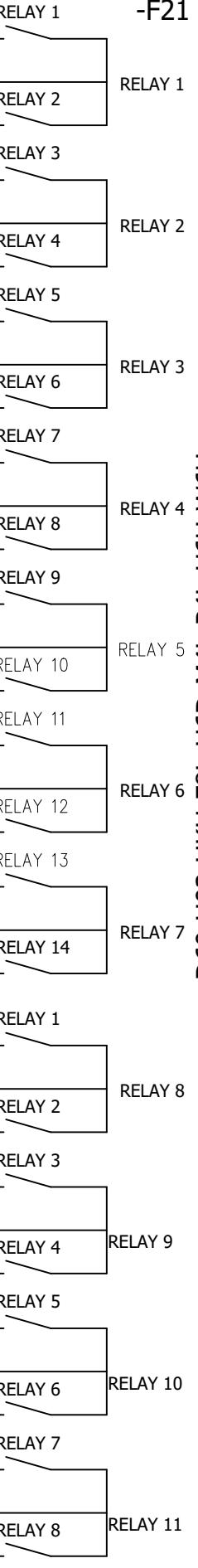
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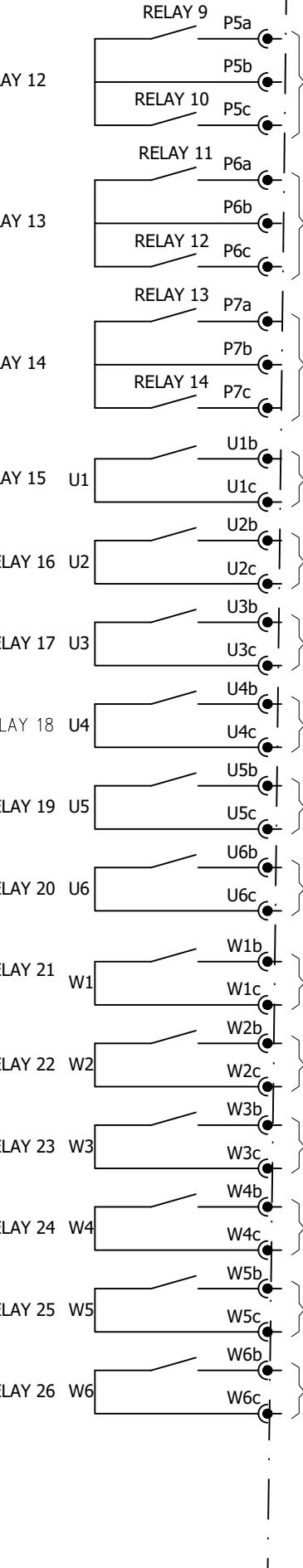
-F21

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-F21

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RELAY 12

RELAY 13

RELAY 14

RELAY 15

RELAY 16

RELAY 17

RELAY 18

RELAY 19

RELAY 20

RELAY 21

RELAY 22

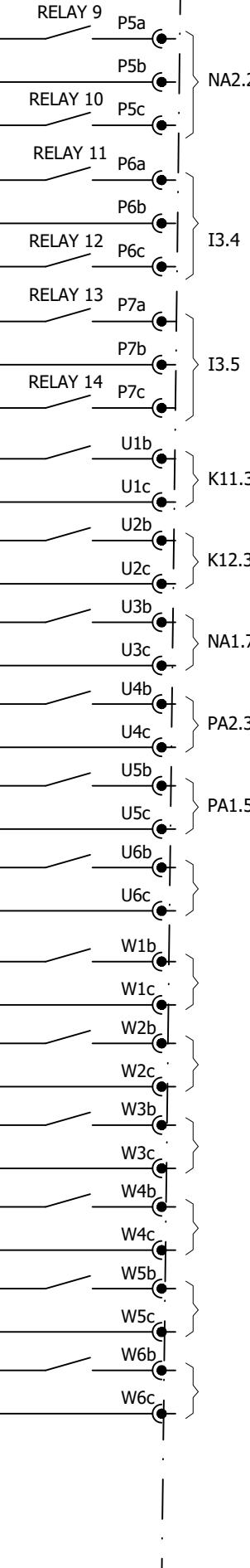
RELAY 23

RELAY 24

RELAY 25

RELAY 26

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RELAY 9

NA2.2

RELAY 10

RELAY 11

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RELAY 22

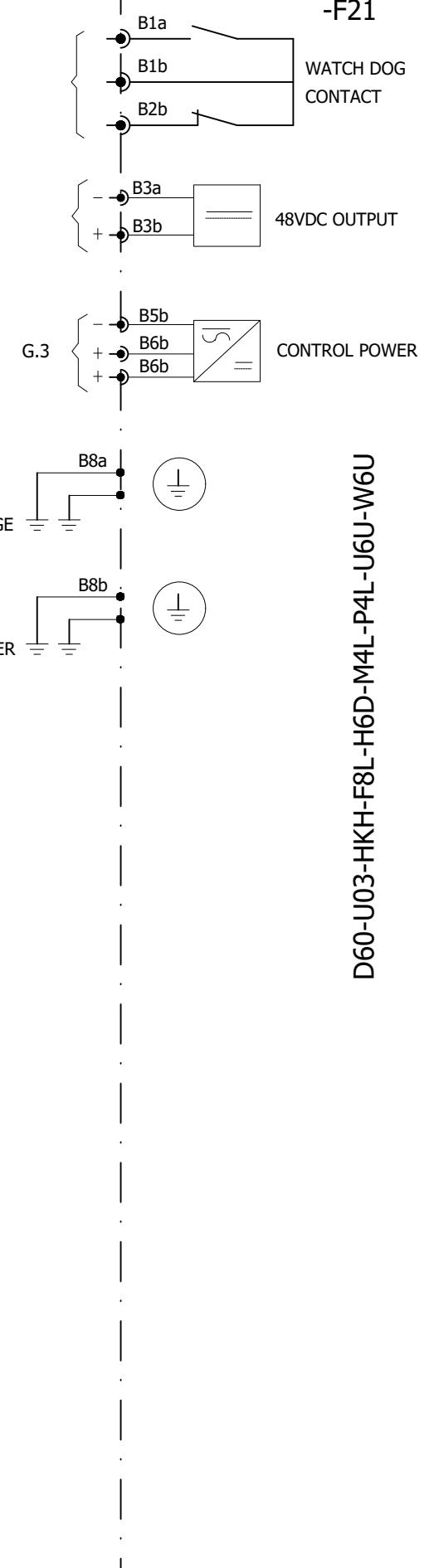
RELAY 23

RELAY 24

RELAY 25

RELAY 26

7



WATCH DOG CONTACT

48VDC OUTPUT

CONTROL POWER

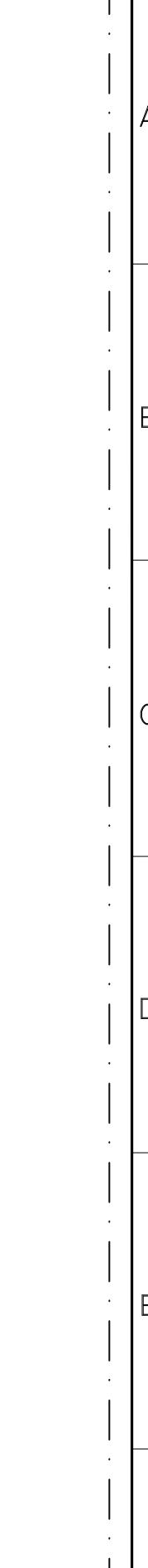
SURGE

FILTER

D60-U03-HKH-F8L-H6D-M4L-P4L-U6U-W6U

-F21

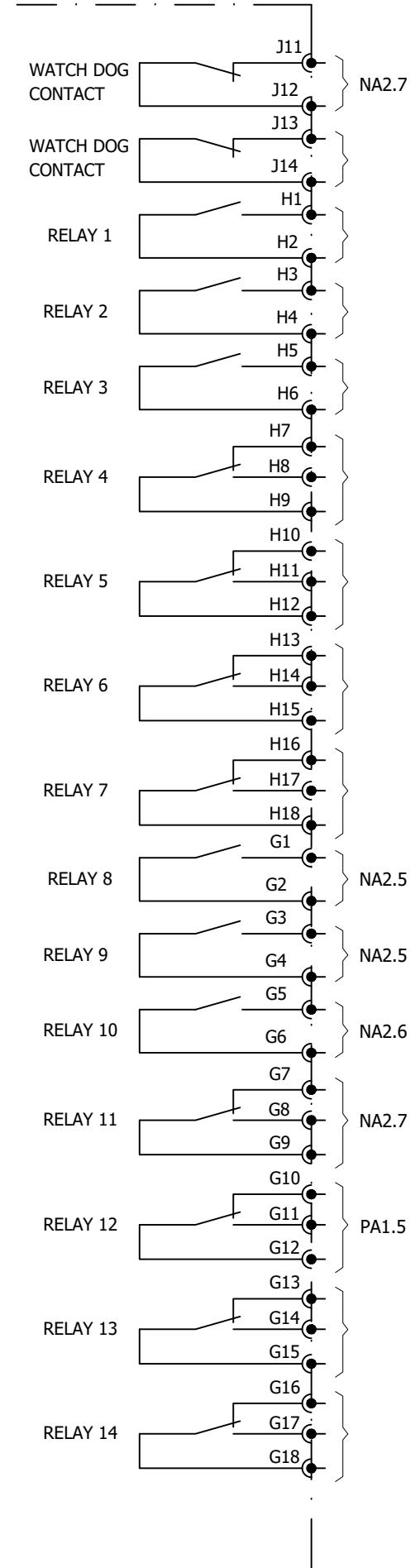
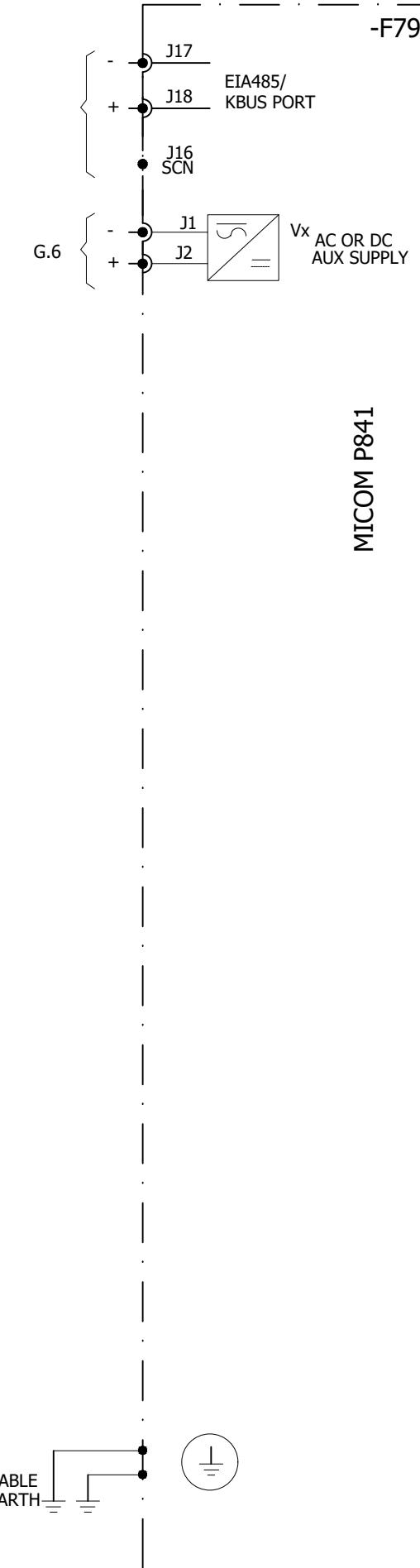
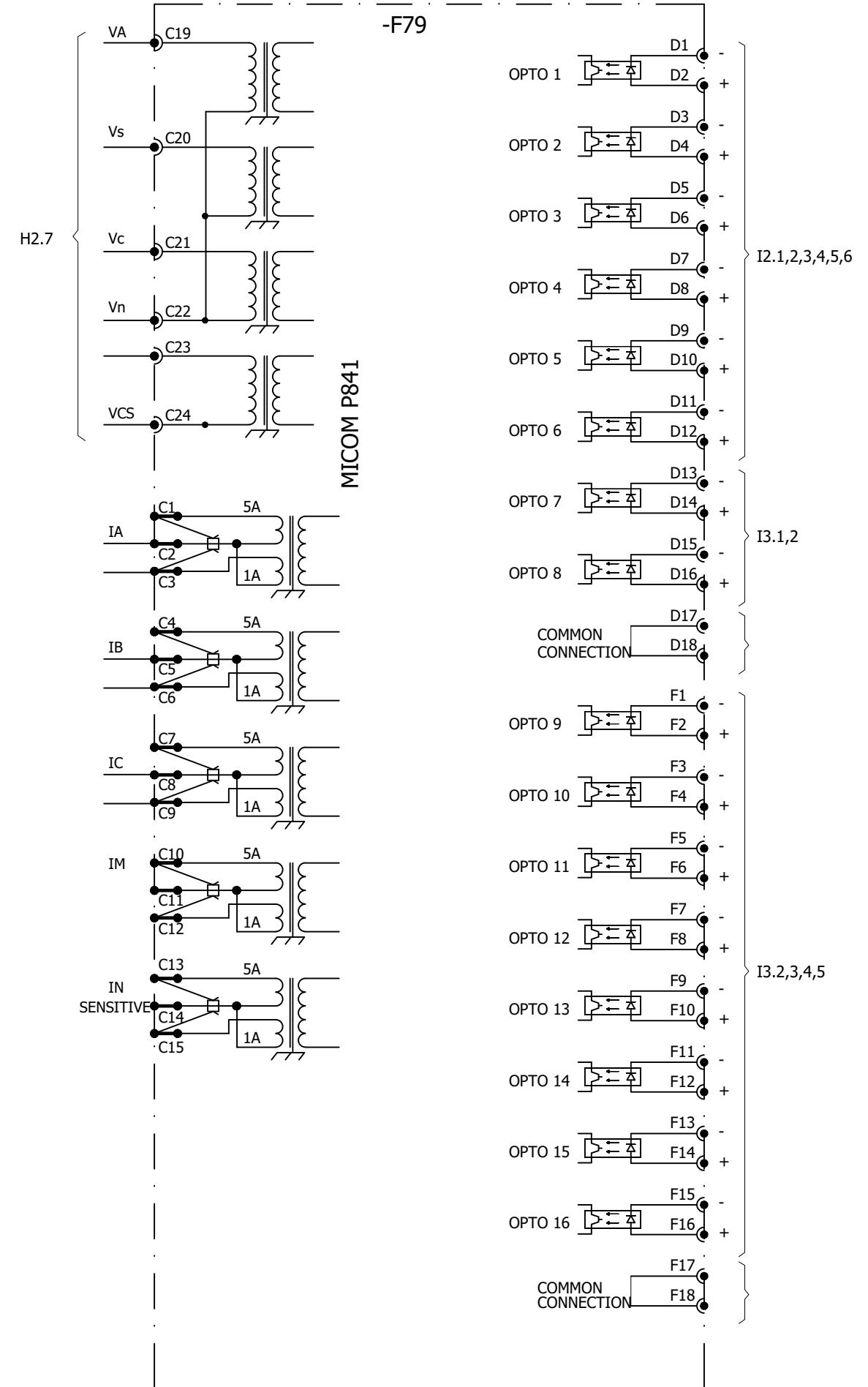
8



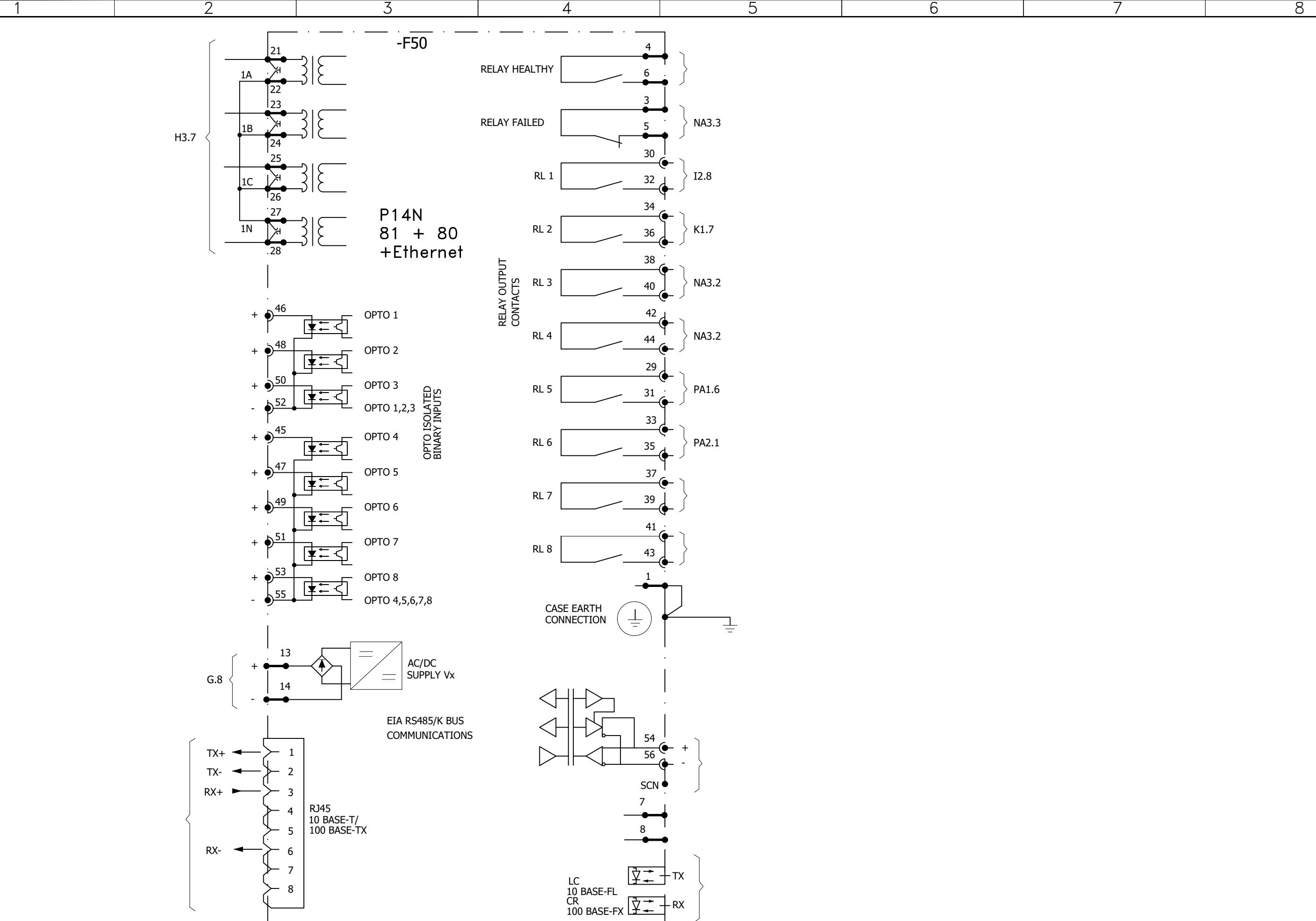
-F21

0	AS BUILT	20.11.2018	ASJ	Manufacturer	Contractor	Client	Project	Title	Drawing no.
				EPE SOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Grid Solutions A GE and Alstom joint venture	NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	220KV LINE RELAY SET-2 PANEL (=D08+R2) COMPONENT DIAGRAM	P60194-E-RLC-SC-002
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type Z2
									Sheet no. 32

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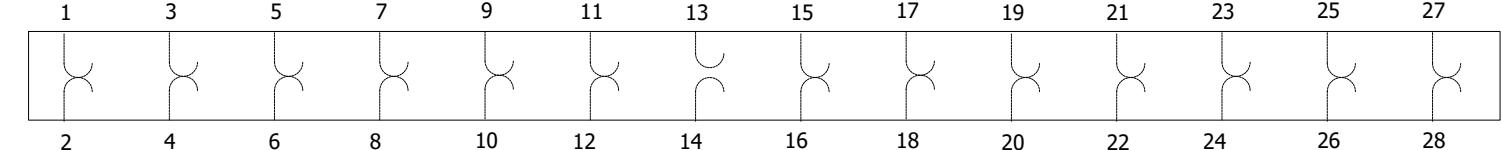


0	AS BUILT	20.11.2018	ASJ	<b>Manufacturer</b>  <b>EPESOL</b> 21-B Garden Block, New Garden Town, Lahore, Pakistan	<b>Contractor</b>  <b>Grid Solutions</b> <small>A GE and Alstom joint venture</small>	<b>Client</b>  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED <small>(NTDC-WAPDA)</small>	<b>Project</b> 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	<b>Title</b> 220kV LINE RELAY SET-2 PANEL <small>(=D08+R2)</small> COMPONENT DIAGRAM	Drawing no.		
								P60194-E-RLC-SC-002			
								Project no.	Sheet type	Sheet no.	
								P-60194	Z3	33	
REV.	DESCRIPTION	DATE	DRAWER								

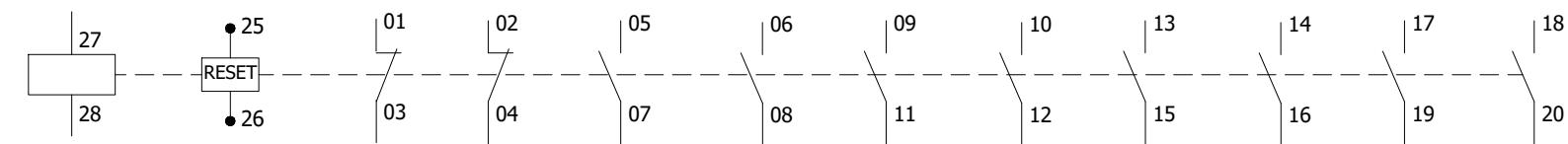


0	AS BUILT	20.11.2018	ASJ	Manufacturer  21-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE RELAY SET-2 PANEL (=D08+R2) COMPONENT DIAGRAM	Drawing no. P60194-E-RLC-SC-002
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type Z4
									Sheet no. 34

1 2 3 4 5 6 7 8



-XT21A	H1.5			G.3	H1.5		
-XT21B	K1.2			K11.2	K12.2		NA1.2
-XT21C	NA1.2,3		RA3.7	NA1.4		NA1.6	
-XT50	H3.5		K1.7	G.8	NA3.2	H3.5	
-XT79	H2.5		NA2.5	G.6	NA2.6	H2.5	NA2.7



-F94R	K1.2				PA2.6	PA1.3	PA2.3	RA2.2			
-F94Y	K1.2				PA2.7	PA1.3	PA2.4	RA2.2			
-F94B	K1.3				PA2.7	PA1.4	PA2.5	RA2.2			
-F86DTT	K1.5	G.2	PA2.2		I2.6	K11.4	K11.5	K12.4	K12.4	K12.5	PA2.6
-F8650	K1.7		PA2.2		K11.6	K11.6	K11.7	K12.6	K12.6	K12.7	PA1.2

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0	AS BUILT	20.11.2018	ASJ	Manufacturer  71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV LINE RELAY SET-2 PANEL (=D08+R2) COMPONENT DIAGRAM	Drawing no. P60194-E-RLC-SC-002
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type Z5
									Sheet no. 35

1 2 3 4 5 6 7 8