



Grid Solutions
A GE and Alstom joint venture

220kV/132kV GIS SUBSTATION GHAZI ROAD , LAHORE

220kV CB FAILURE PROTECTION PANEL (=D00+R5B) SCHEMATIC DRAWINGS

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
3.		
4.		

REVISION HISTORY

REV	DATE	DRW. BY	CHK. BY	APR. BY	REVISION DESCRIPTION
0	30.10.2018	ASJ	ABA	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

Project

220kV / 132kV GIS SUBSTATION
GHAZI ROAD , LAHORE

Title

220kV CB FAILURE PROTECTION PANEL
(=D00+R5B)
SCHEMATIC DRAWINGS

Order no

P-60194

Document no

P60194-E-DFR-SC-001

Sheet type
A

Total sheets
46

Sheet no
1

	1	2	3	4	5	6	7	8			
	PAGE NO.	SHEET NAME	SHEET DESCRIPTION			ISSUE / REVISION					
						A	B	C	D	E	F
A	33	K51	Trip Circuit for 132kV Breaker Coil-1-1			X	X				
	34	K52	Trip Circuit for 132kV Breaker Coil-1-2			X	X				
	35	NA1	System Alarms			X	X				
	36	PA	Closing Lockout Signal			X	X				
	37	RA1	Tripping Annunciations			X	X				
	38	RA2	SCADA Interface Cabinet			X	X				
B	39	RA3	Event Recorder			X	X				
	40	RA4	Fault Recorder			X	X				
	41	Z1	Component Diagram			X	X				
	42	Z2	Component Diagram			X	X				
	43	Z3	Component Diagram			X	X				
	44	Z4	Component Diagram			X	X				
C	45	Z5	Component Diagram			X	X				
	46	Z6	Component Diagram			X	X				
D											
E											
F	0	AS BUILT	30.10.2018	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 CB FAILURE PROTECTION PANEL (=D00+R5B) LIST OF CONTENTS	Drawing no. P60194-E-DFR-SC-001	
										Project no. P-60194	Sheet type AA1
										Sheet no. 03	
	REV.	DESCRIPTION	DATE	DRAWER							

1 2 3 4 5 6 7 8

	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	30.10.2018	ASJ	Manufacturer EPESOL 77-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 CB FAILURE PROTECTION PANEL (=D00+R5B) SYMBOLS AND LEGENDS	Title 220kV CB FAILURE PROTECTION PANEL (=D00+R5B) SYMBOLS AND LEGENDS	Drawing no. P60194-E-DFR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type AB
									Sheet no. 04

	1	2	3	4	5	6	7	8			
	QTY.	DEVICE DESCRIPTION	DEVICE SPECIFICATIONS DEVICE TYPE ; TECHNICAL DATA / SPECIFICATIONS			DEVICE DESIGNITION	MANUFACTURER				
A	04	BREAKER FAILURE PROTECTION RELAY	AGILE P841, Cortec: P841-91BA7M0660M Supply: 110-250VDC / 100-240VAC, 4 VT + 3 CT (100-120V:1/5A) Inputs 16 Opto Inputs, 14 Relay Outputs			-50BF1,-50BF2,-50BF3,-50BF4	GE				
B	08	TEST BLOCK	MMLG01, Cortec: MMLG01-R1AA9002D			-XTBF1-1,-XTBF1-2,-XTBF2-1,-XTBF2-2, -XTBF3-1,-XTBF3-2,-XTBF4-1,-XTBF4-2	GE				
C	08	TRIPPING RELAY (HAND/ELECTRICAL RESET)	MVAJ105, Cortec: MVAJ105-RA1002A Supply: 220-250VDC, 8 NO + 2 NC Contacts			-86BF1-1,-86BF1-2,-86BF2-1,-86BF2-2, -86BF3-1,-86BF3-2,-86BF4-1,-86BF4-2	GE				
D	02	CONTROL MCB - PANEL LIGHT & HEATER	G62C02+(CAH2), 2-Pole, Ratings: 2A, 230VAC, 6kA @ 230VAC, 2 C/O Contact			-F101-102	GE				
E	01	CONTROL ELCB - PANEL SOCKET	DM100C216/030+(CAH2), 2-Pole, Ratings: 16A, 30mA, 230VAC, 2 C/O Contact			-F103	GE				
F	05	CONTROL MCB - DC DISTRIBUTION	EP102UCC04+(CAH2), 2-Pole, Ratings: 4A, 220VDC, 10kA @ 220VDC, 2 C/O Contact			-F201,-F202,-F203,-F204,-F205	GE				
G	01	PUSHBUTTON - DIRECT TRANSFER TRIP RESET	YS-AP1-2-40-B-D-W, Black button, Spring return, 2-Pole, Ratings: 12A, 220VDC			-S86	YONGSUNG				
H	01	AUXILIARY CONTACTOR	MCRC022ATWN+MARN211AT, Coil Voltage: 220VDC, 3NO+3NC Contacts			-KCS	GE				
I	24	AUXILIARY CONTACTOR	PRC4M40DCML, Coil Voltage: 220VDC, 4 C/O Contacts			-KDC1,-KDC2,-KDC3,-KDC4,-KDCM,-KAC,-K1ST1,-K2ST1,-K3ST1 -K4ST1,-KIST2,-K2ST2,-K3ST2,-K4ST2,-K50BF1,-K50BF2,-K50BF3 -K50BF4,-K1ST2A,-K2ST2A,-K4ST2A, -K86BF1-2, -K86BF2-2 -K86BF4-2	GE				
J	03	AUXILIARY CONTACTOR	PRC4M40ANL, Coil Voltage: 230VAC, 4 C/O Contacts			-KACM,-KDC,-KDCA	GE				
K	01	INDICATION LAMP - DC SUPPLY FAILURE	YS-PL-2-AL-22-R-W, Type: Integrated LED , Color : RED , Supply : 230VAC @ 50Hz			-H200	YONGSUNG				
L	01	PANEL LIGHT WITH DOOR SWITCH	YST8-30-5W+YSP3315GWB, 230VAC @ 50Hz, 20W, with Door Limit Sw.			-H100,-S100	YONGSUNG				
M	01	THREE PIN SOCKET	1N+PE, 16A, 230VAC @ 50Hz			-X100	LEAR				
N	01	PANEL HEATER	230VAC @ 50Hz, 50W			-R100	E-LABS				
O	01	HUMIDITY & TEMPERATURE CONTROLLER	Thermostat and Humidstat			-B100	E-LABS				
P	32	TERMINAL BLOCKS FOR CT (SCREW TYPE) WITH SHORTENING	SCB-6			-X4	CABUR				
Q	ARRANGEMENT FOR CT SHORTENING										
R	05	TERMINAL BLOCKS FOR AC SUPPLY DISTRIBUTION	CBD-4			-XAC	CABUR				
S	08	TERMINAL BLOCKS FOR DC SUPPLY DISTRIBUTION	CBD-4			-XDC	CABUR				
T	25	TERMINAL BLOCKS FOR CONTROL FUNCTION	CBD-4			-X6	CABUR				
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REV.	DESCRIPTION	DATE	DRAWER	1	2	3	4	5	6	7	8

	1	2	3	4	5	6	7	8			
	QTY.	DEVICE DESCRIPTION		DEVICE SPECIFICATIONS DEVICE TYPE ; TECHNICAL DATA / SPECIFICATIONS			DEVICE DESIGNITION		MANUFACTURER		
		TERMINAL BLOCKS FOR CONTROL FUNCTION		CBD-4			-X7		CABUR		
A	25	TERMINAL BLOCKS FOR CONTROL FUNCTION		CBD-4			-X8		CABUR		
	25	TERMINAL BLOCKS FOR CONTROL FUNCTION		CBD-4			-X9		CABUR		
	10	TERMINAL BLOCKS FOR CONTROL FUNCTION		CBD-4			-X24		CABUR		
B	18	TERMINAL BLOCKS FOR STAGE-2 TRIPPING		CBD-4			-X23		CABUR		
	35	TERMINAL BLOCKS FOR TRIP CIRCUIT-1		CBD-4			-XTC1		CABUR		
	35	TERMINAL BLOCKS FOR TRIP CIRCUIT-2		CBD-4			-XTC2		CABUR		
C	13	TERMINAL BLOCKS FOR TRIP CIRCUIT-1 132KV		CBD-4			-XTC3		CABUR		
	13	TERMINAL BLOCKS FOR TRIP CIRCUIT-2 132KV		CBD-4			-XTC4		CABUR		
	30	TERMINAL BLOCKS FOR ANNUNCIATION		CBD-4			-XAN		CABUR		
D	24	TERMINAL BLOCKS FOR SCADA		CBD-4			-XSC		CABUR		
	24	TERMINAL BLOCKS FOR EVENT RECORDER		CBD-4			-XEV		CABUR		
	26	TERMINAL BLOCKS FOR FAULT RECORDER		CBD-4			-XFL		CABUR		
E	07	TERMINAL BLOCKS FOR BFI STAGE-2		CBD-4			-X25		CABUR		
	06	TERMINAL BLOCKS WITH DIODE TYPE IN-D4007, RATED MAXIMUM VOLTAGE 350VDC, RATED BREAK DOWN VOLTAGE 430VDC		DAS.4/6			-XD		CABUR		
F	0	AS BUILT		30.10.2018	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 CB FAILURE PROTECTION PANEL (=D00+R5B) COMPONENT LIST	Drawing no. P60194-E-DFR-SC-001
	REV.	DESCRIPTION		DATE	DRAWER				Project no. P-60194		

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1

1

1

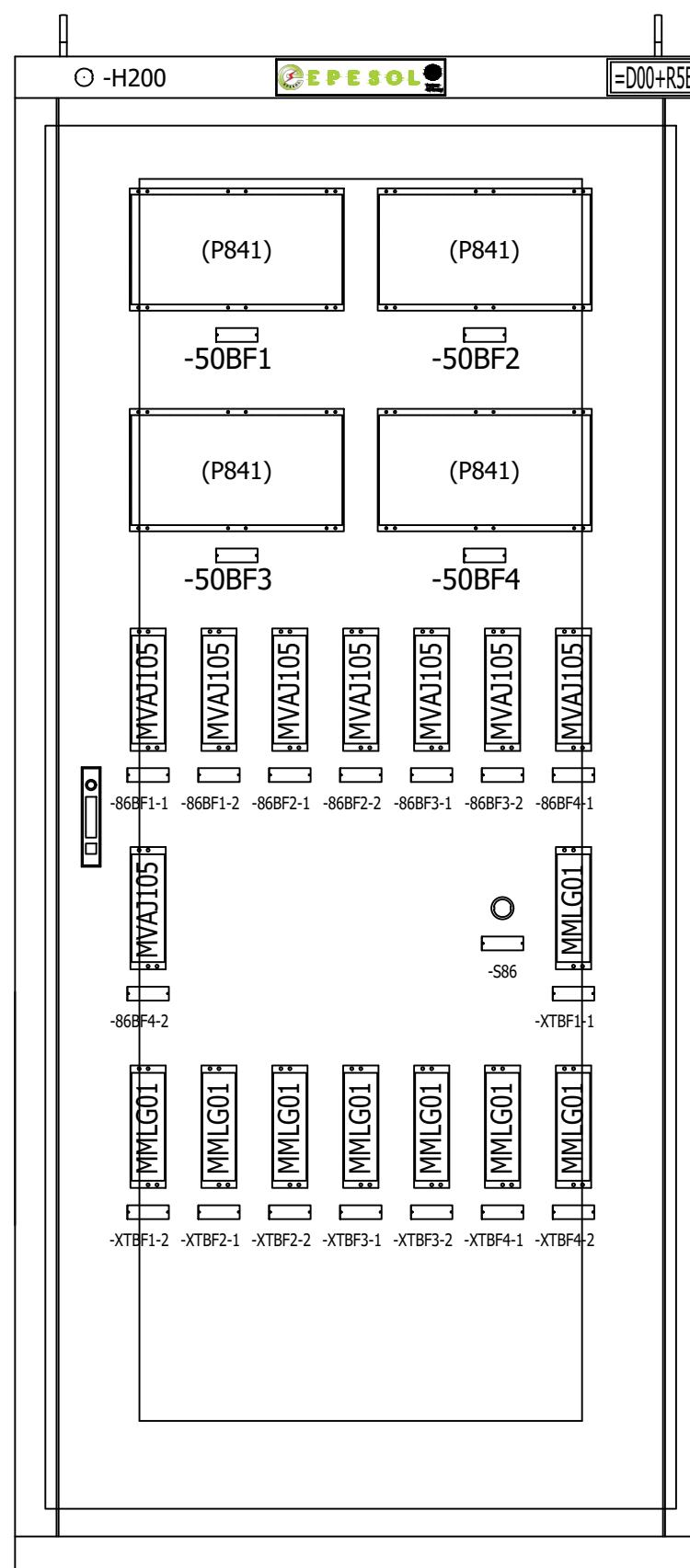
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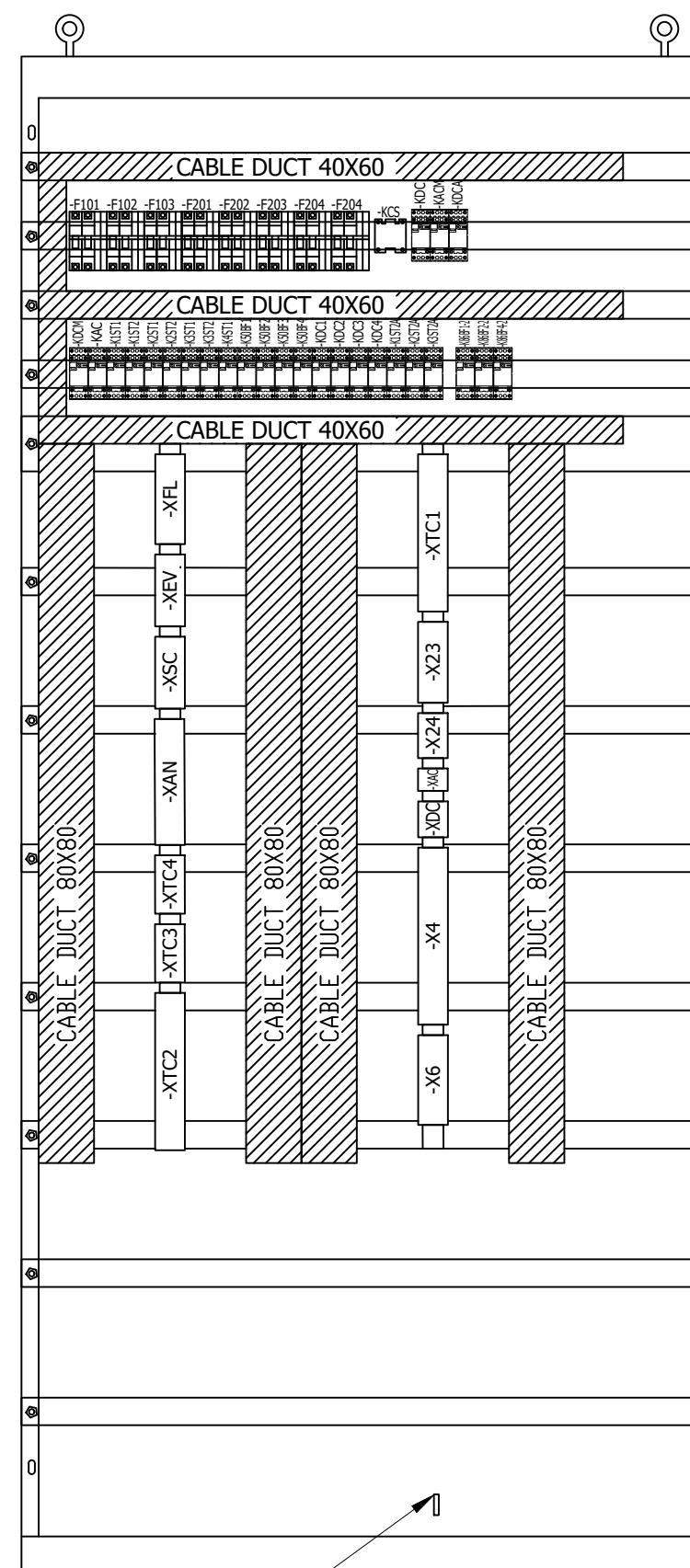
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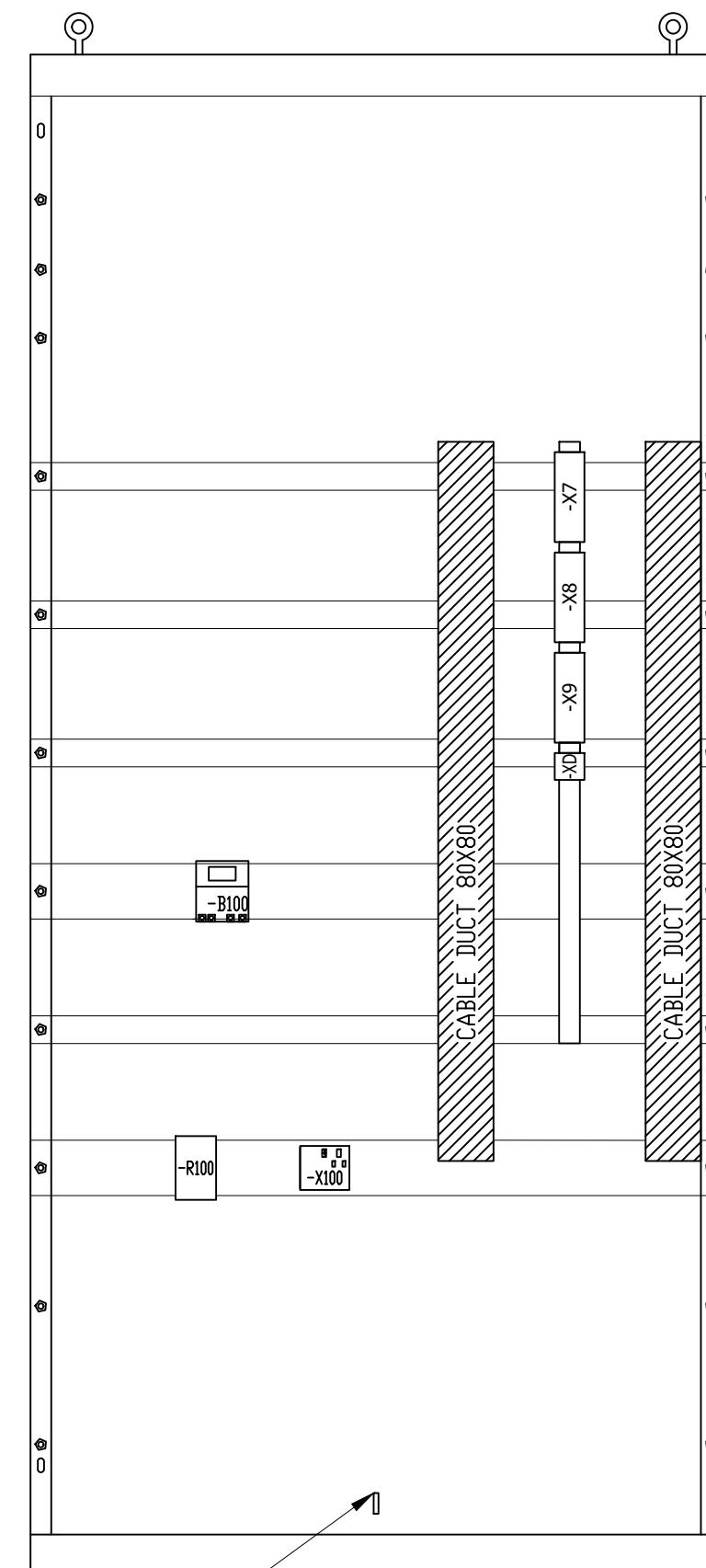
FRONT SIDE VIEW



LEFT SIDE VIEW



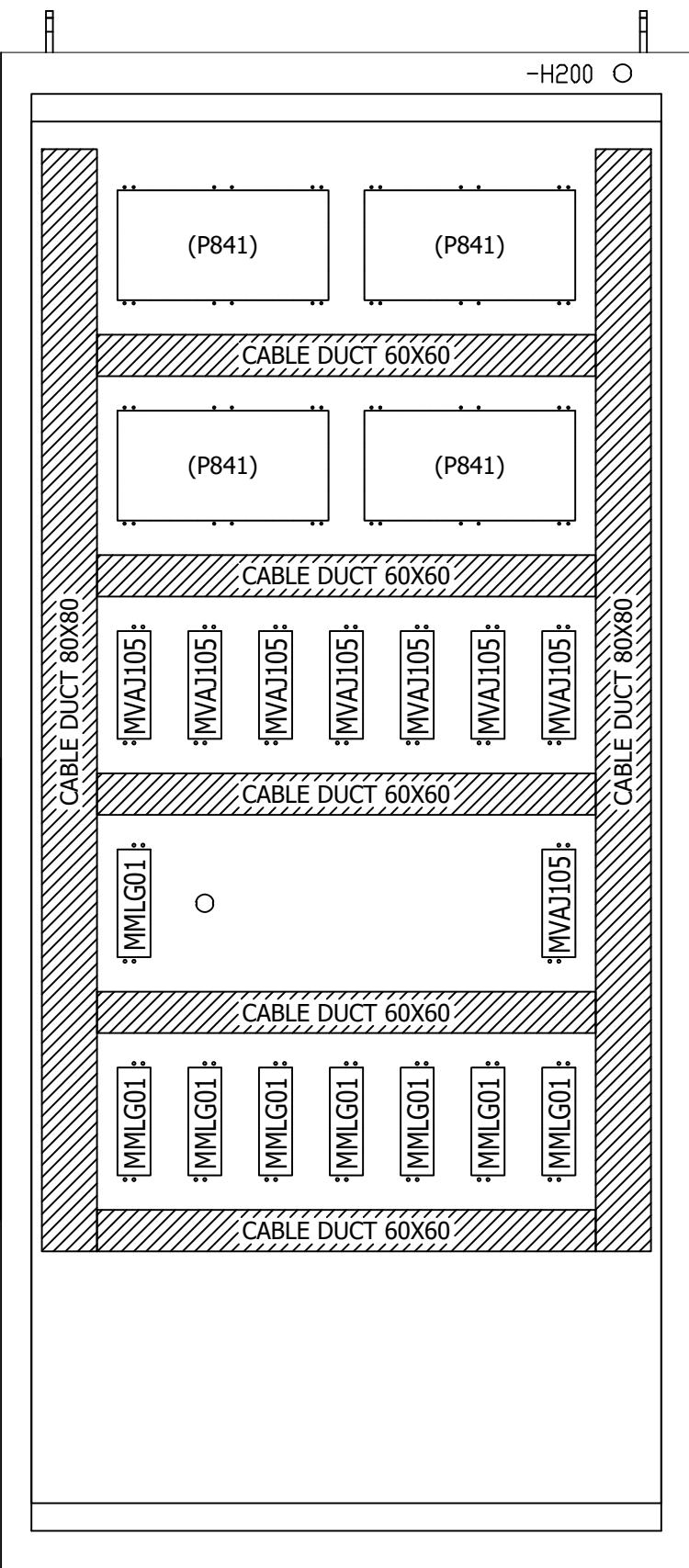
RIGHT SIDE VIEW



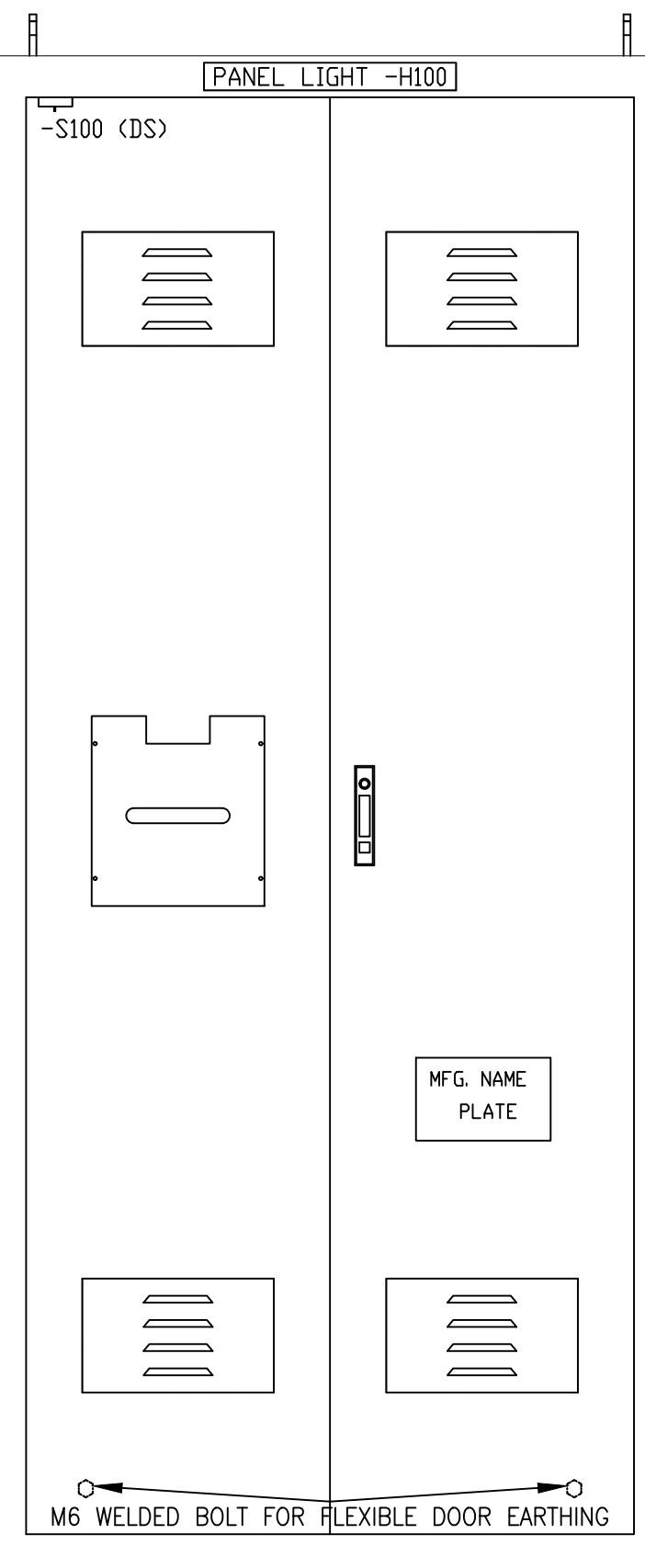
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0	AS BUILT	30.10.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV CB FAILURE PROTECTION PANEL (=D00+R5B) PANEL VIEW	Drawing no. P60194-E-DFR-SC-001	
									Project no. P-60194	
	REV.	DESCRIPTION	DATE	DRAWER					Sheet type AD	Sheet no. 07

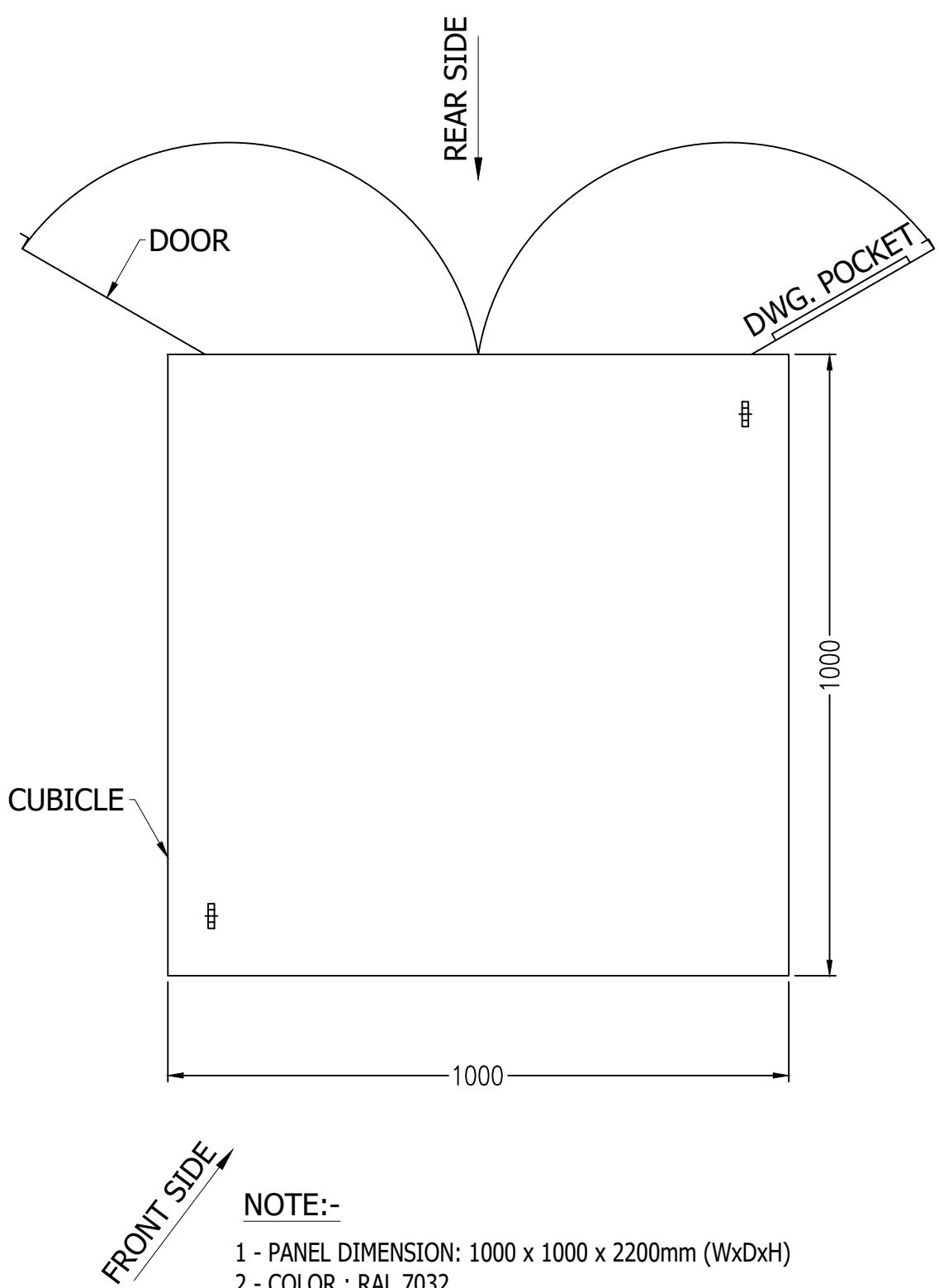
BACK VIEW WITHOUT DOOR



BACK VIEW WITH DOOR



TOP VIEW



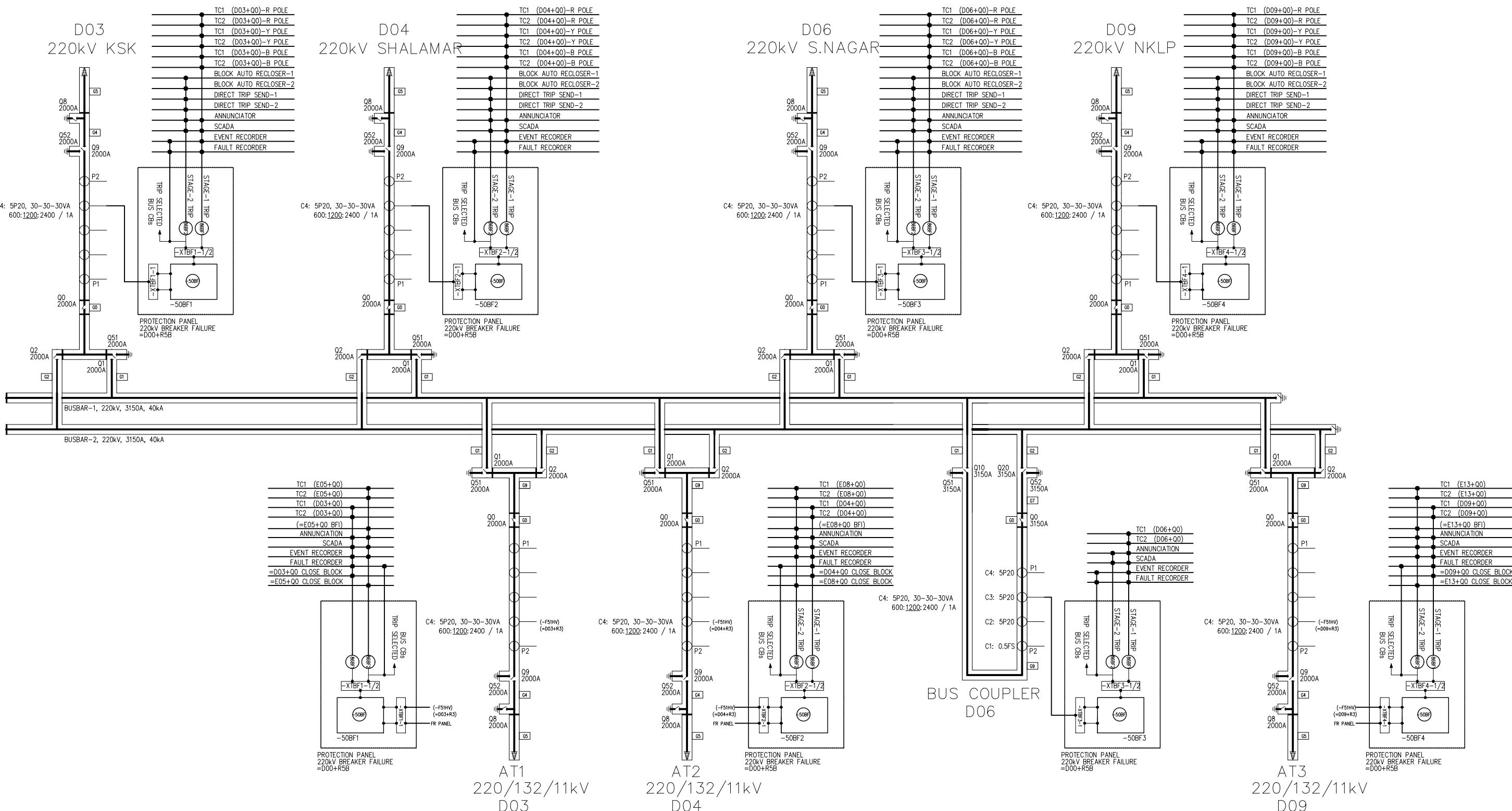
NOTE:-

- 1 - PANEL DIMENSION: 1000 x 1000 x 2200mm (WxDxH)
- 2 - COLOR : RAL 7032
- 3 - SHEET THICKNESS : 2-2.5 mm
- 4- PROTECTION CLASS : IP-51 (INDOOR TYPE)
- 5 - ALL DOOR FITTED WITH 16mm EARTH STRAP & INSULATED WITH GREEN-YELLOW COLOUR.

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0	AS BUILT	30.10.2018	ASJ	Manufacturer  EPE SOL 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 CB FAILURE PROTECTION PANEL (=D00+R5B) PANEL VIEW	Title 220kV CB FAILURE PROTECTION PANEL (=D00+R5B) PANEL VIEW	Drawing no. P60194-E-DFR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194 Sheet type AD1 Sheet no. 07a

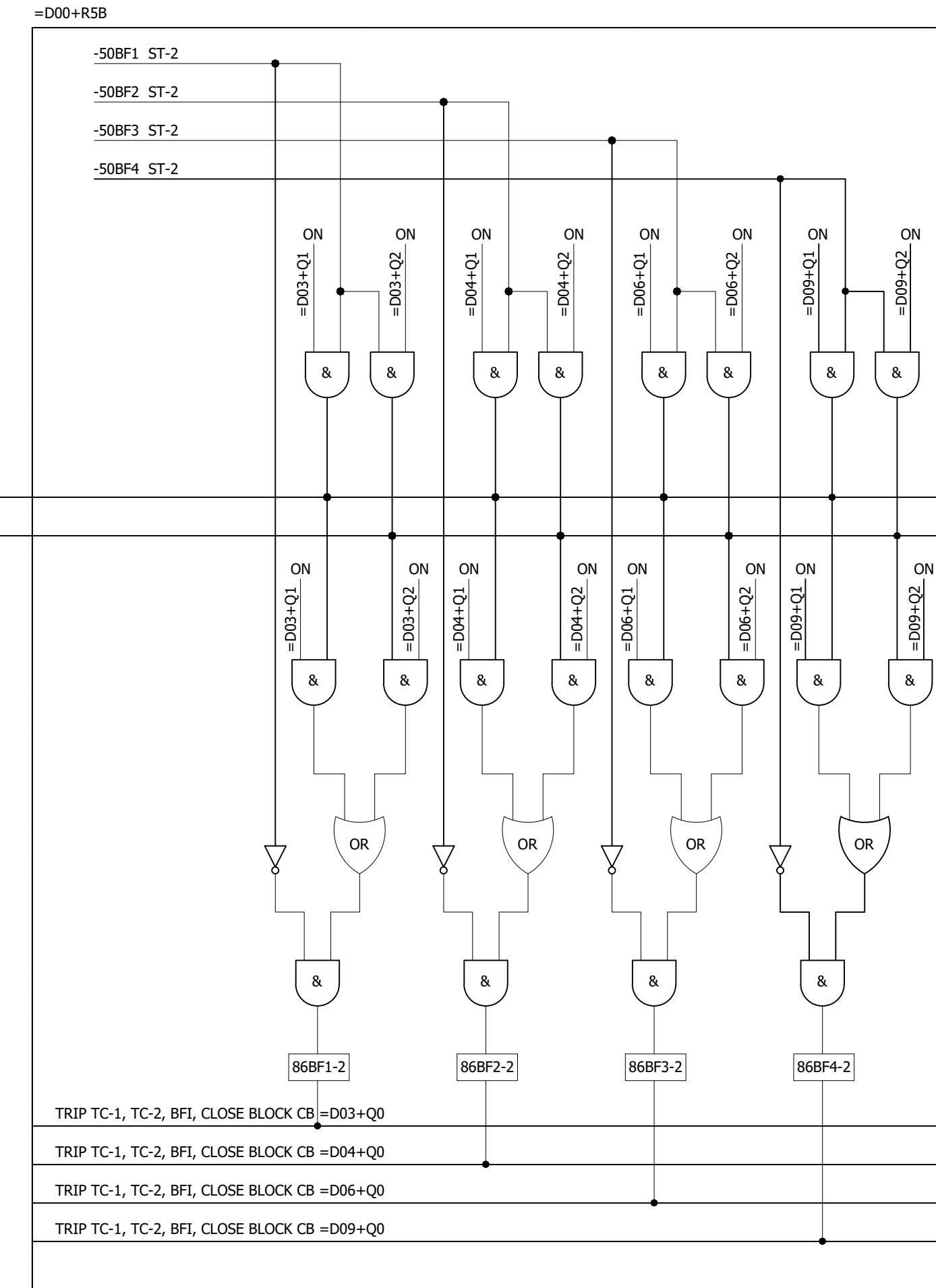
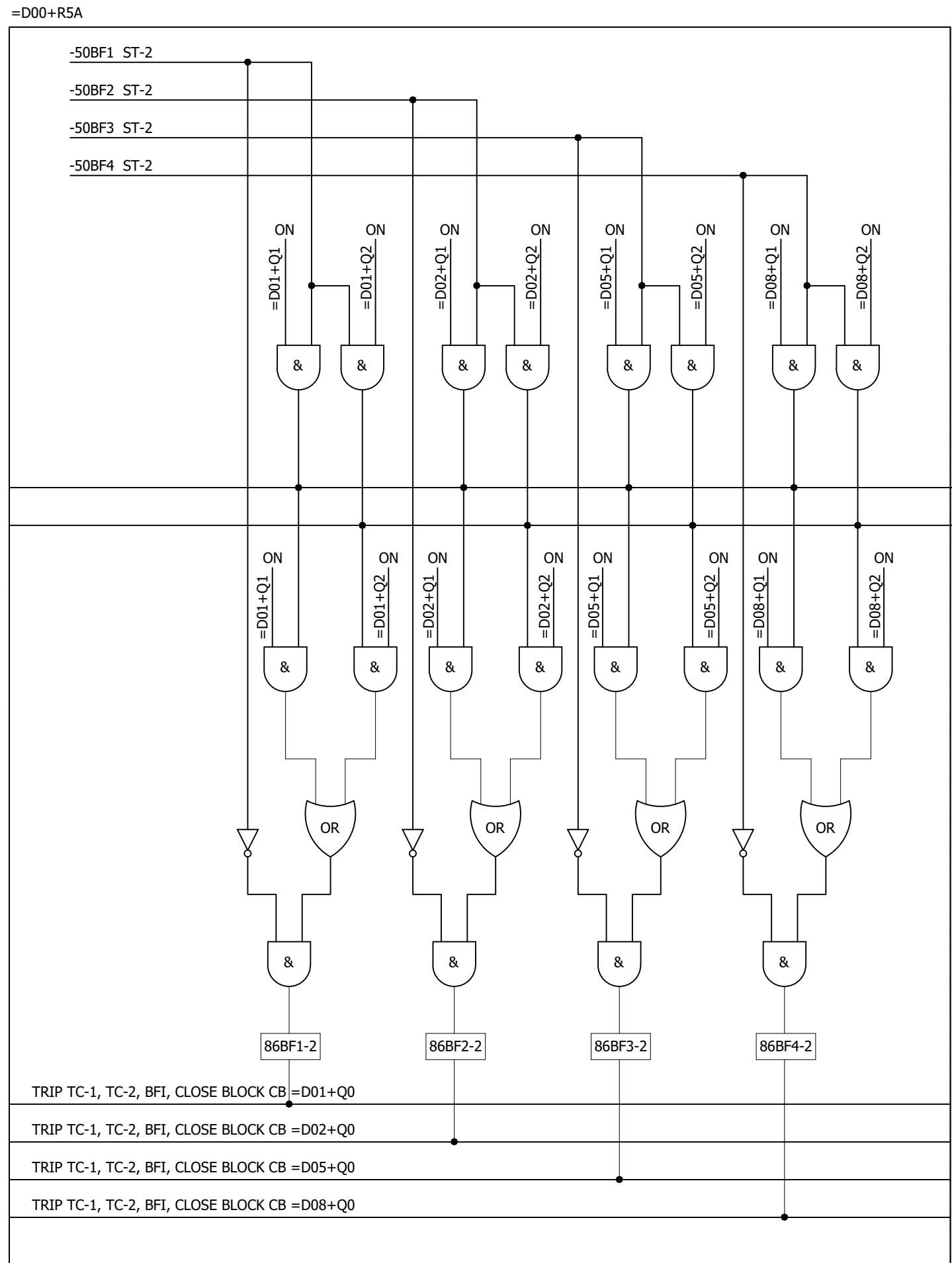
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0	AS BUILT	30.10.2018	ASJ	Manufacturer EPE SOL 7-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor Grid Solutions A GE and Alstom joint venture	Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV CB FAILURE PROTECTION PANEL CONCEPT & PROTECTION LOGICS (=D00+R5B)	Drawing no. P60194-E-DFR-SC-001		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type AE1	Sheet no. 08

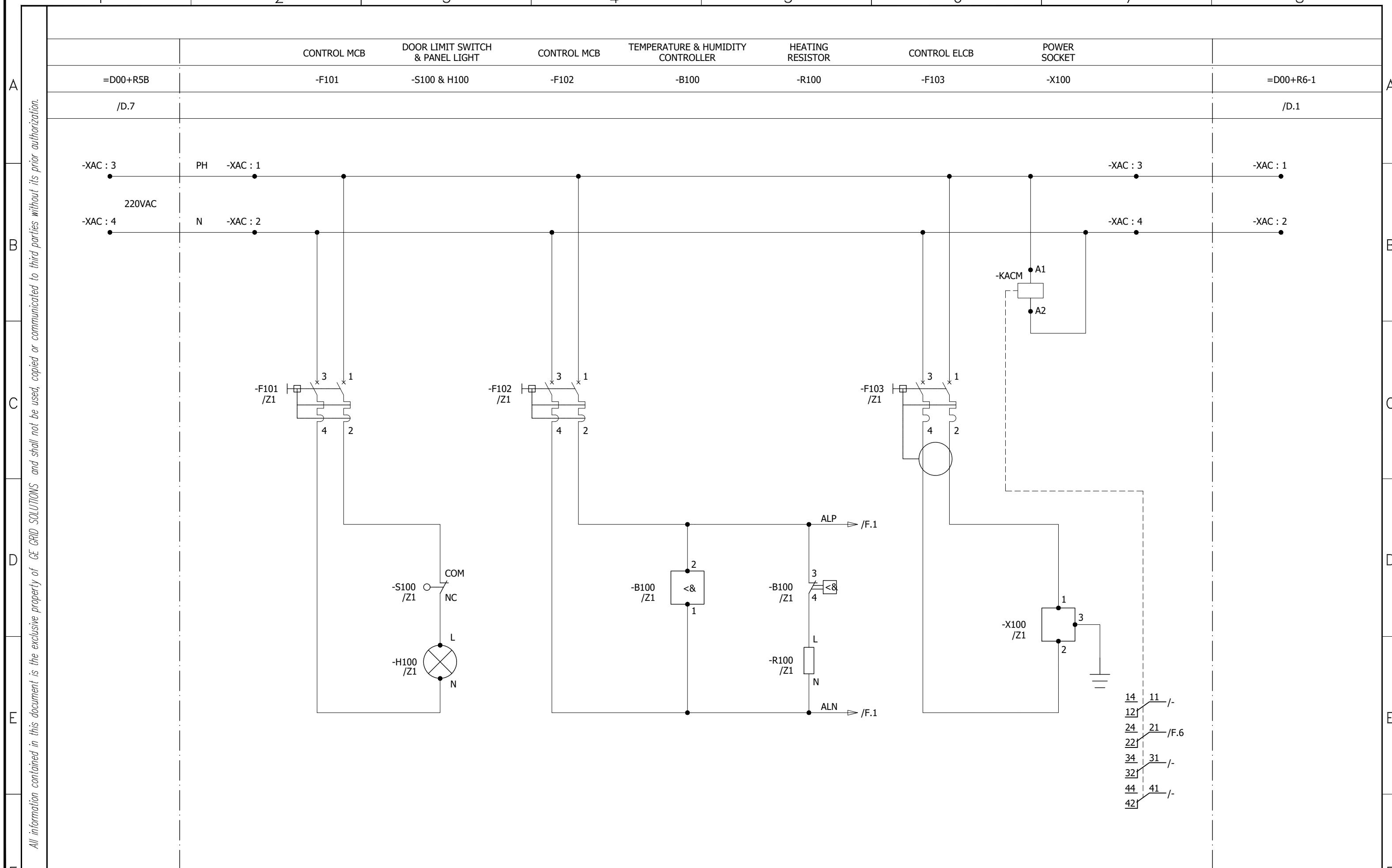
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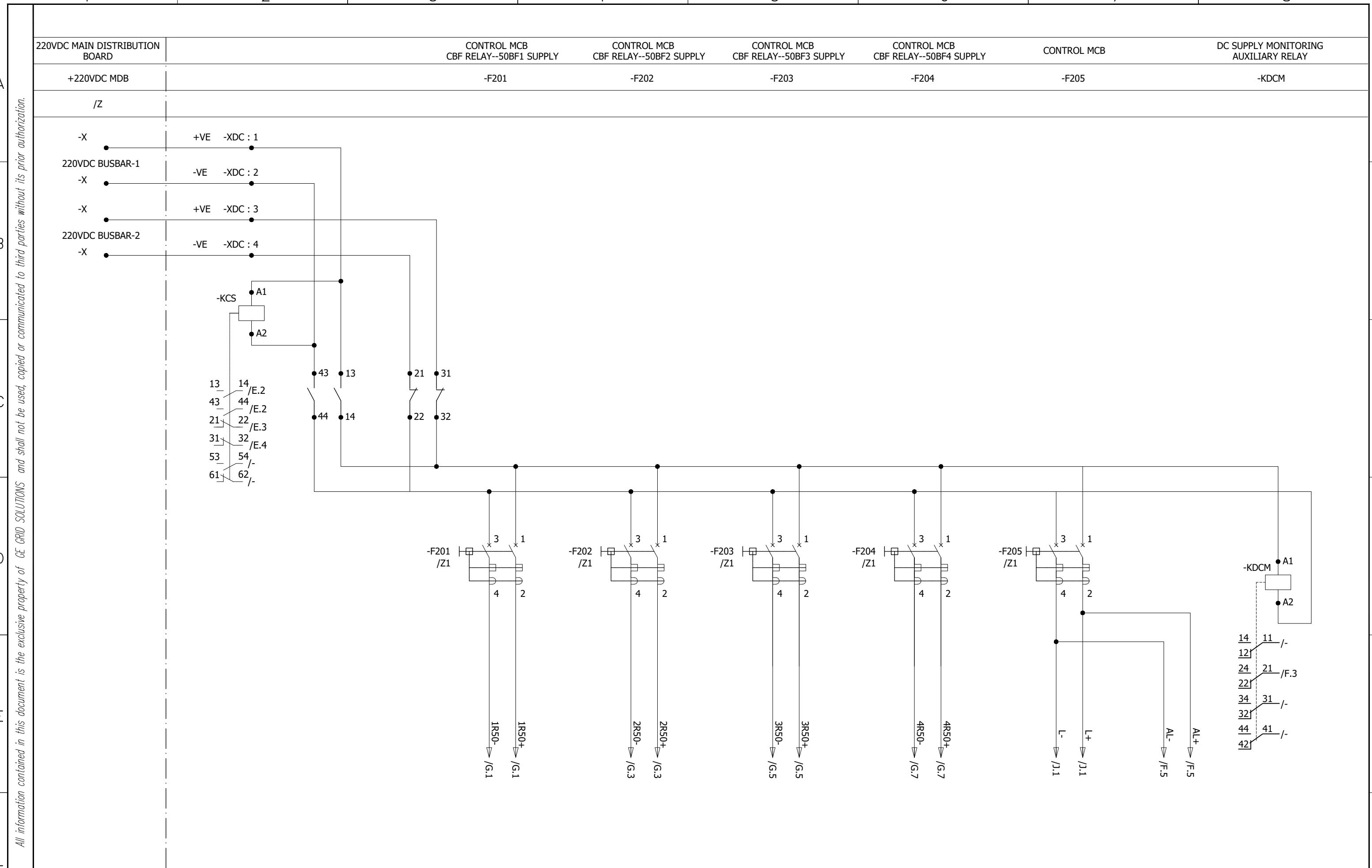


0	AS BUILT	30.10.2018	ASJ	Manufacturer EPE SOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor GE Grid Solutions A GE and Alstom joint venture	Client NTDC-WAPDA NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV CB FAILURE PROTECTION PANEL BAY BREAKERS TRIP LOGIC (=D00+R5B)	Drawing no. P60194-E-DFR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
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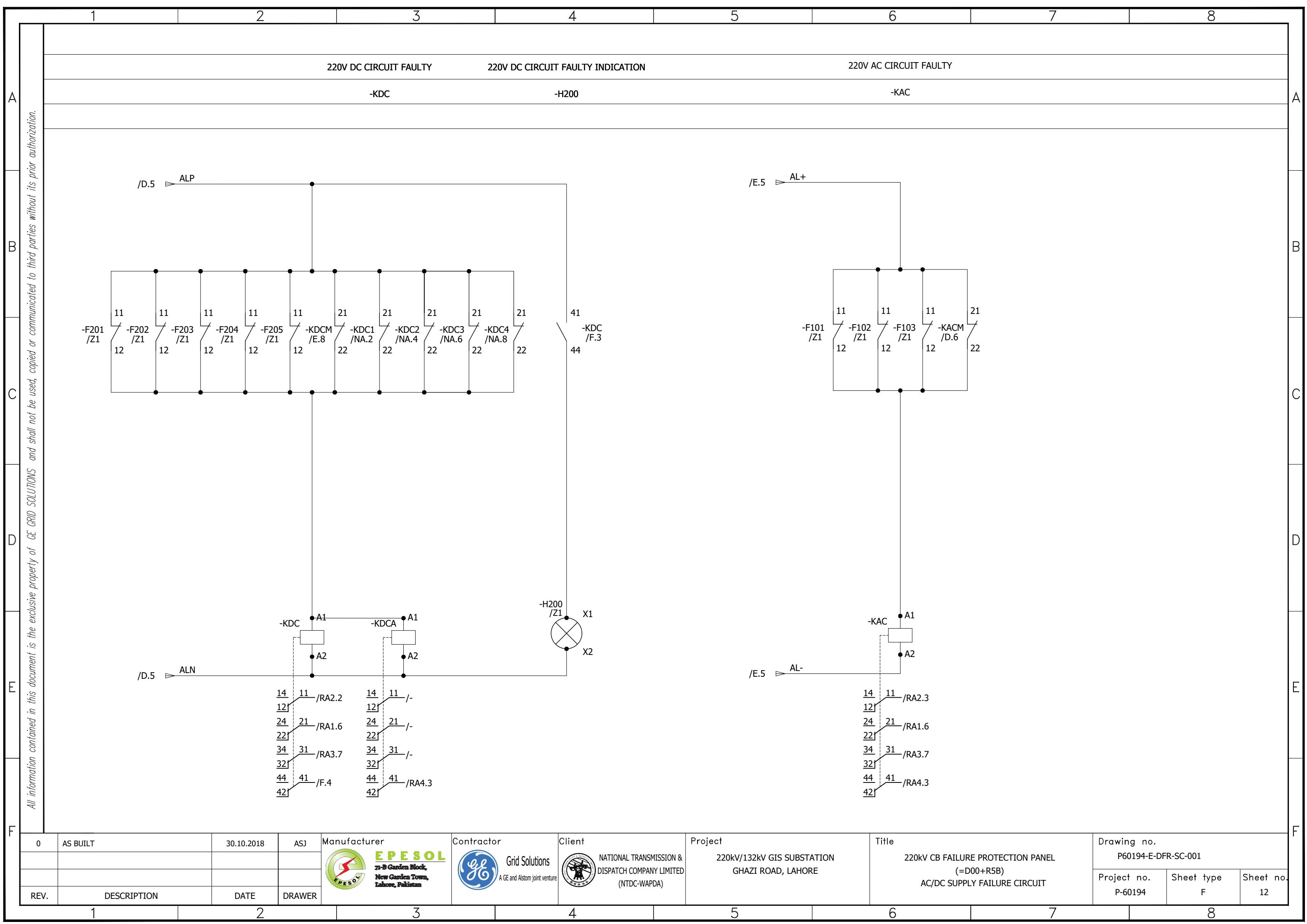
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0	AS BUILT	30.10.2018	ASJ	Manufacturer EPE SOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor Grid Solutions A GE and Alstom joint venture	Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV CB FAILURE PROTECTION PANEL (=D00+R5B) AC SUPPLY DISTRIBUTION	Drawing no. P60194-E-DFR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type D
									Sheet no. 10



0	AS BUILT	30.10.2018	ASJ	Manufacturer EPE SOL 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 GAZI ROAD, LAHORE	Title 220kV CB FAILURE PROTECTION PANEL (=D00+R5B) DC SUPPLY DISTRIBUTION	Drawing no. P60194-E-DFR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type E
									Sheet no. 11



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BREAKER FAILURE PROTECTION

BREAKER FAILURE PROTECTION

BREAKER FAILURE PROTECTION

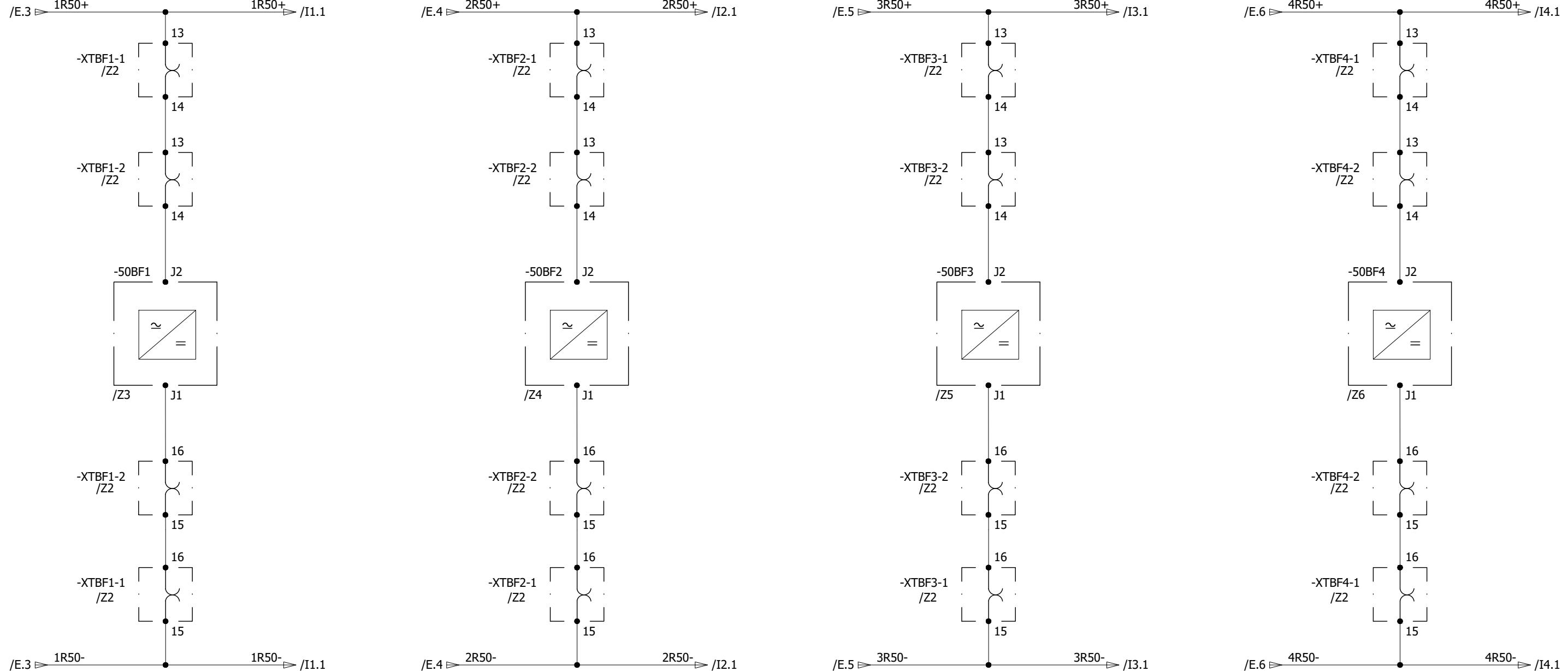
BREAKER FAILURE PROTECTION

RELAY SUPPLY

RELAY SUPPLY

RELAY SUPPLY

RELAY SUPPLY

($=D03+Q0$)($=D04+Q0$)($=D06+Q0$)($=D09+Q0$)

A

A

B

B

C

C

D

D

E

E

F

F

AS BUILT

30.10.2018

ASJ

Manufacturer
EPE SOL
21-B Garden Block,
New Garden Town,
Lahore, Pakistan

Contractor
GE 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 CB FAILURE PROTECTION PANEL
($=D00+R5B$)
RELAY CONTROL & SUPPLY

Drawing no.
P60194-E-DFR-SC-001

Project no. P-60194
Sheet type G
Sheet no. 13

REV.

DESCRIPTION

DATE

DRAWER

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A

A

B

B

C

C

D

D

E

E

F

F

220kV TRAFO RELAY
SET-1 PANEL
(=D03+R3)

CONTROL ROOM

TEST BLOCK

BREAKER FAILURE PROTECTION
RELAY

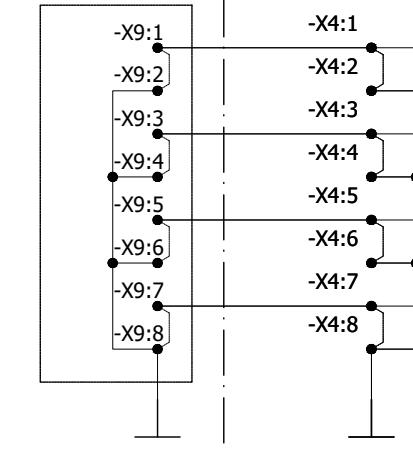
-XTBF1-1,-XTBF2-1

-50BF1,-50BF2

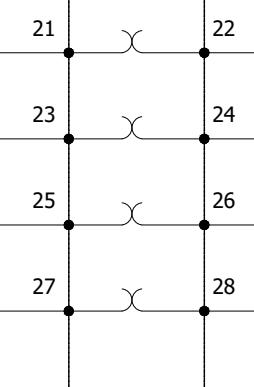
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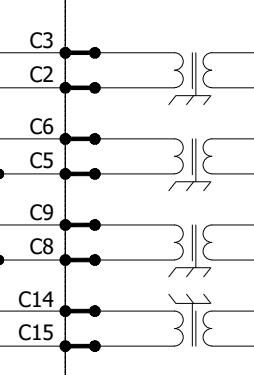
=D03+R3
EFP RELAY (-F51HV)
/H5



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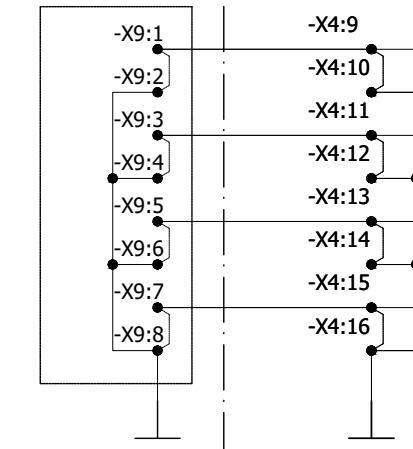
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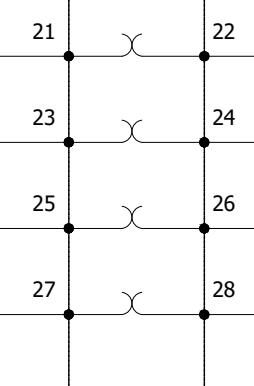
P841

220kV TRAFO RELAY
SET-1 PANEL
(=D04+R3)

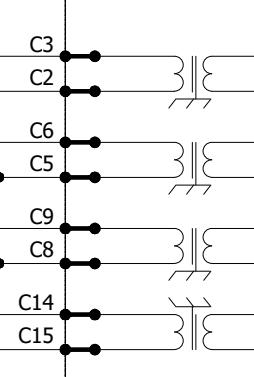
=D04+R3
EFP RELAY (-F51HV)
/H5



-XTBF2-1



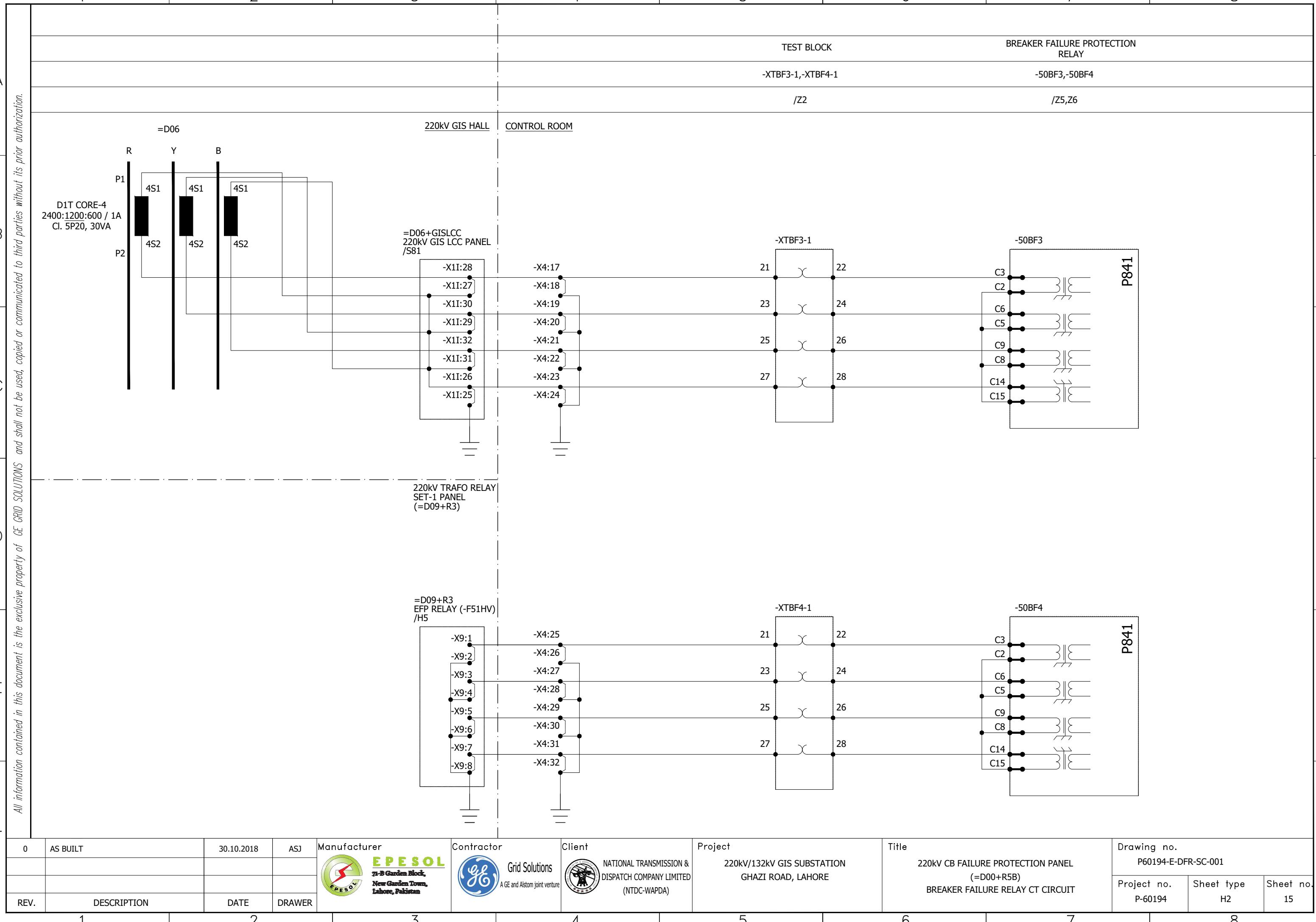
-50BF2



P841

0	AS BUILT	30.10.2018	ASJ	Manufacturer	Contractor	Client	Project	Title	Drawing no.
				EPESOL 7-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 CB FAILURE PROTECTION PANEL (=D00+R5B) BREAKER FAILURE RELAY CT CIRCUIT	P60194-E-DFR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type H1
									Sheet no. 14

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BREAKER FAILURE INITIATION

BUSBAR

132 BREAKER

CBF STAGE-2
FROM OTHER CB

CB CLOSE STATUS

CB ABNORMAL
CONDITION

CB POLE DISCREPANCY CBF STAGE-2

220 KV TRAFO RELAY SET-1 220 KV TRAFO RELAY SET-2 220 KV TRAFO RELAY SET-1 220 KV TRAFO RELAY SET-2

TRIP

(=E05+QO)

TRIP

(=D03+QO)

(=D03+QO)

(=D03+QO)

TRIPPING FROM

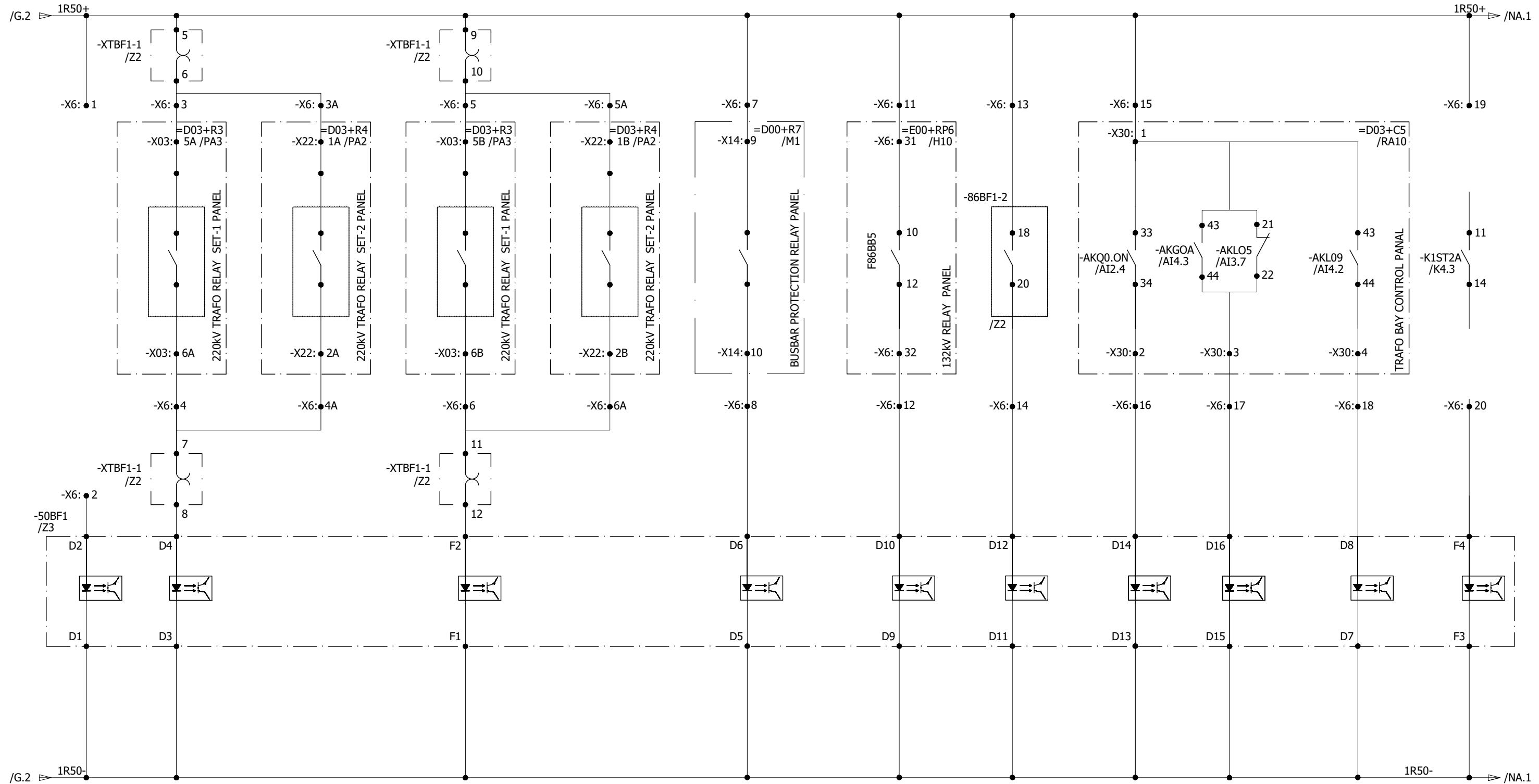
(=D03+R3) (ELECTRICAL BF1) (=D03+R4)

(=D03+R3) (MECHANICAL BF1) (=D03+R4)

BUSBAR PROTECTION OPERATED

OTHER CB

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0	AS BUILT	30.10.2018	ASJ	Manufacturer EPE SOL 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 CB FAILURE PROTECTION PANEL (=D00+R5B) CBF RELAY INPUT CIRCUIT-50BF1	Drawing no. P60194-E-DFR-SC-001	
REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type I1	Sheet no. 16

BREAKER FAILURE INITIATION

BUSBAR

132 BREAKER

CBF STAGE-2
FROM OTHER CB

CB CLOSE STATUS

CB ABNORMAL
CONDITION

CB POLE DISCREPANCY

CBF STAGE-2

220 KV TRAFO RELAY SET-1 220 KV TRAFO RELAY SET-2 220 KV TRAFO RELAY SET-1 220 KV TRAFO RELAY SET-2

TRIP

TRIP

TRIP

TRIP

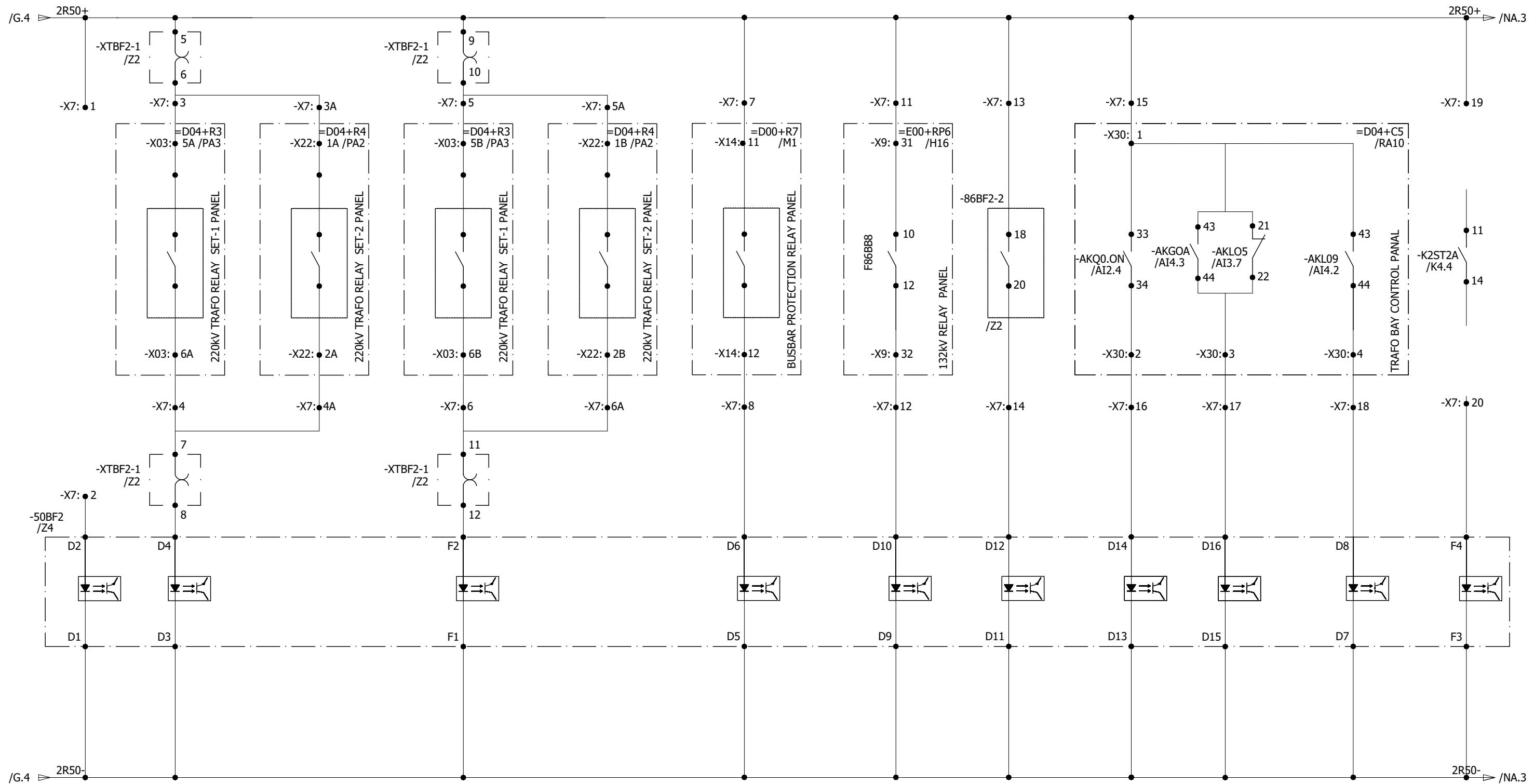
TRIP

TRIPPING FROM

($=D03+R3$) (ELECTRICAL BF1)($=D03+R4$)($=D03+R3$)($=D03+R4$) (MECHANICAL BF1)

BUSBAR PROTECTION OPERATED

OTHER CB



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A

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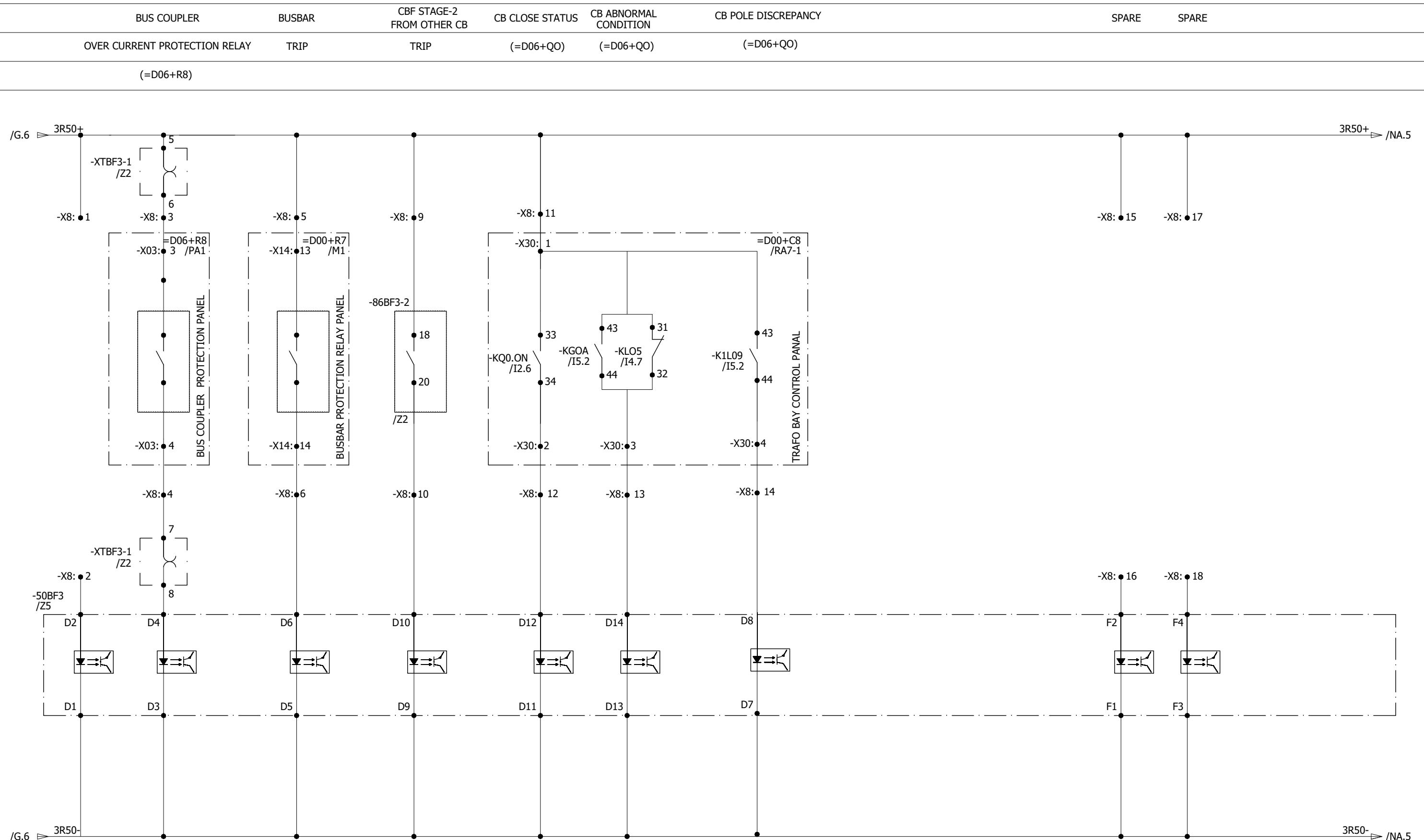
5

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7

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0	AS BUILT	30.10.2018	ASJ	Manufacturer EPE SOL 21-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor GE 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 CB FAILURE PROTECTION PANEL ($=D00+R5B$) CBF RELAY INPUT CIRCUIT-50BF2	Drawing no. P60194-E-DFR-SC-001
REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type I2
								Sheet no. 17	



BREAKER FAILURE INITIATION

BUSBAR

132 BREAKER

CBF STAGE-2
FROM OTHER CB

CB CLOSE STATUS

CB ABNORMAL
CONDITION

CB POLE DISCREPANCY

CBF STAGE-2

220 KV TRAFO RELAY SET-1 220 KV TRAFO RELAY SET-2 220 KV TRAFO RELAY SET-1 220 KV TRAFO RELAY SET-2

TRIP

TRIP (=E05+QO)

TRIP

TRIP (=D09+QO)

TRIP (=D09+QO)

TRIP (=D09+QO)

TRIPPING FROM

(=D09+R3) (ELECTRICAL BF1) (=D09+R4)

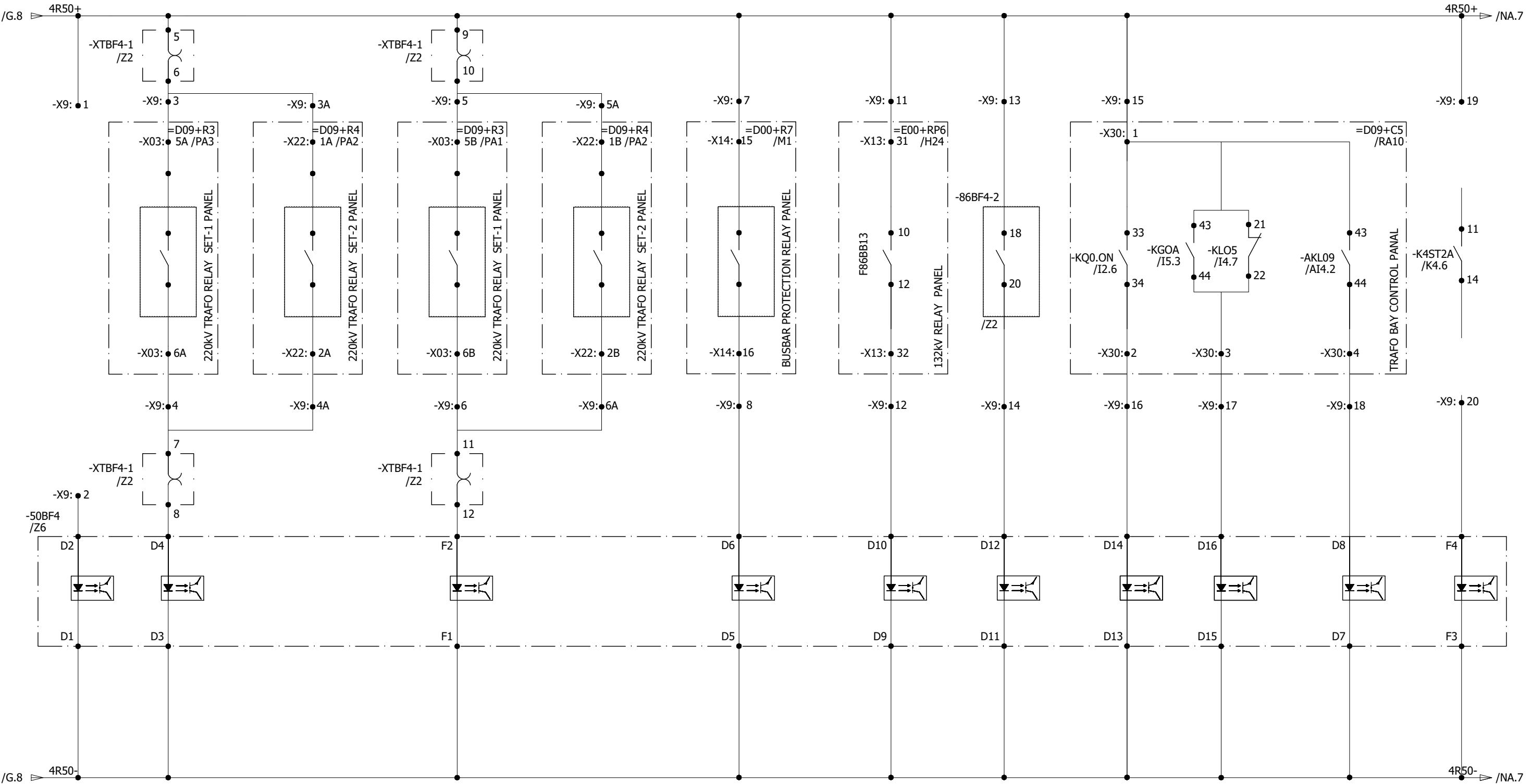
(=D09+R3) (MECHANICAL BF1) (=D09+R4)

BUSBAR PROTECTION OPERATED

OTHER CB

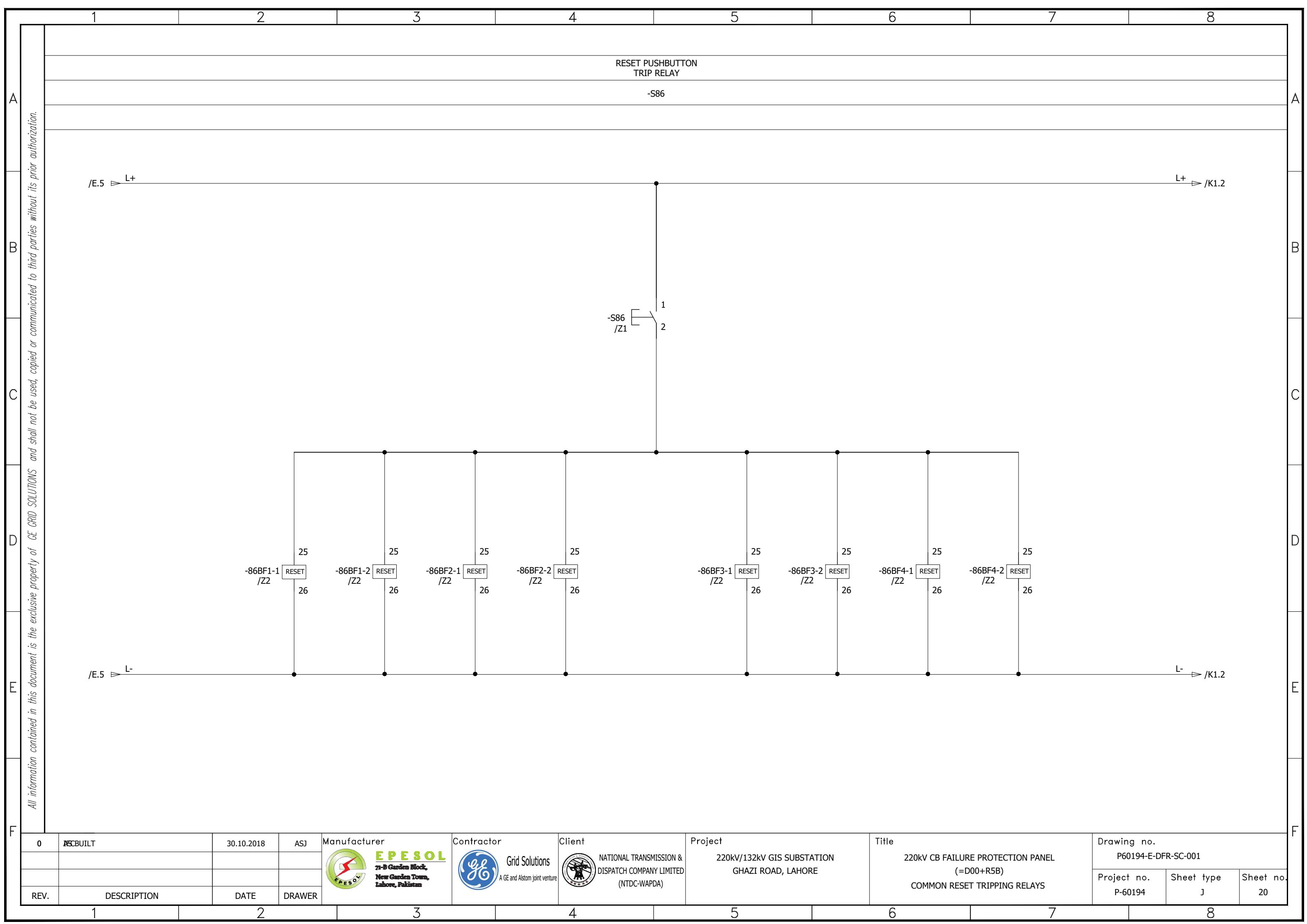
NOTE:

NOTE:

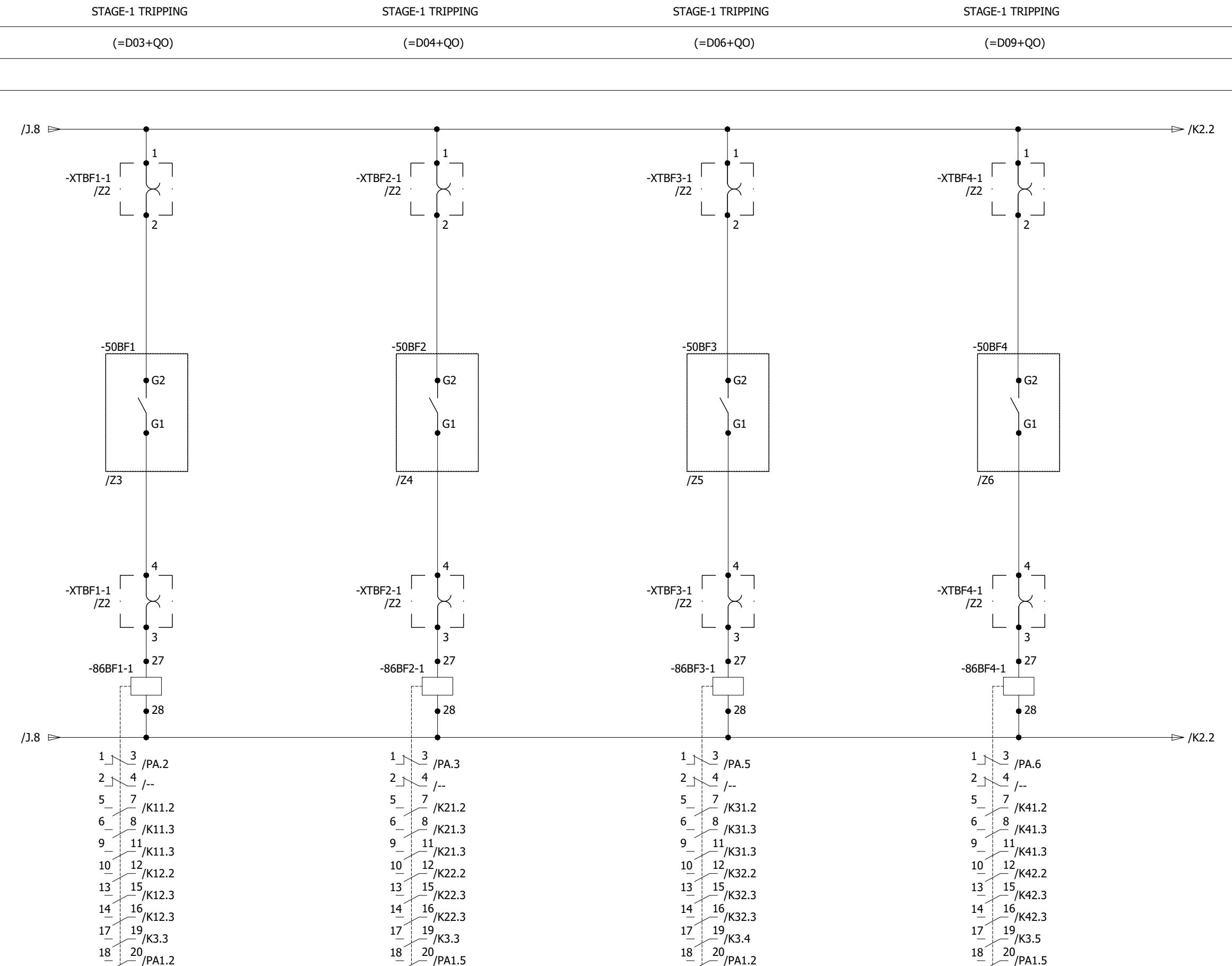


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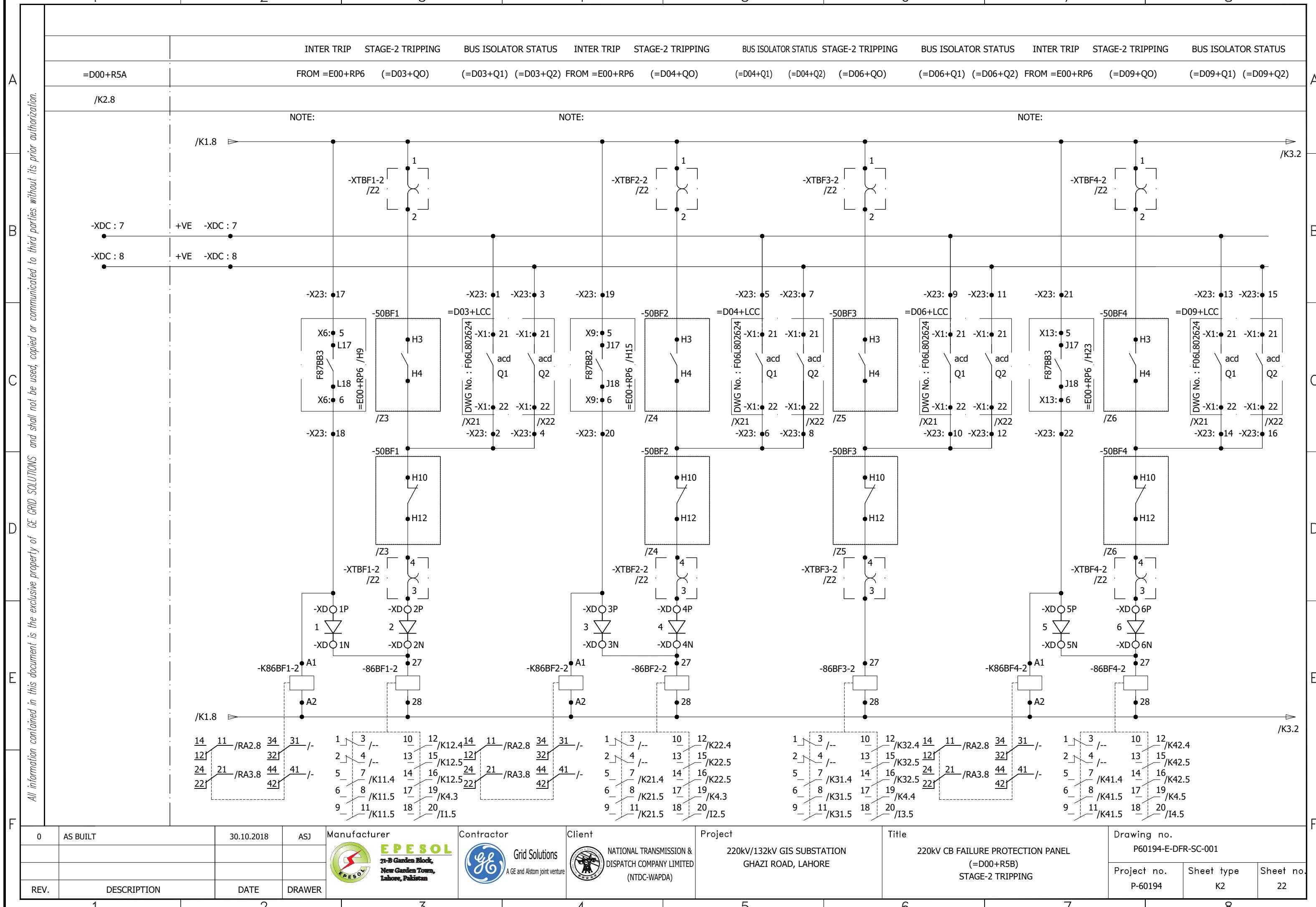
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REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194



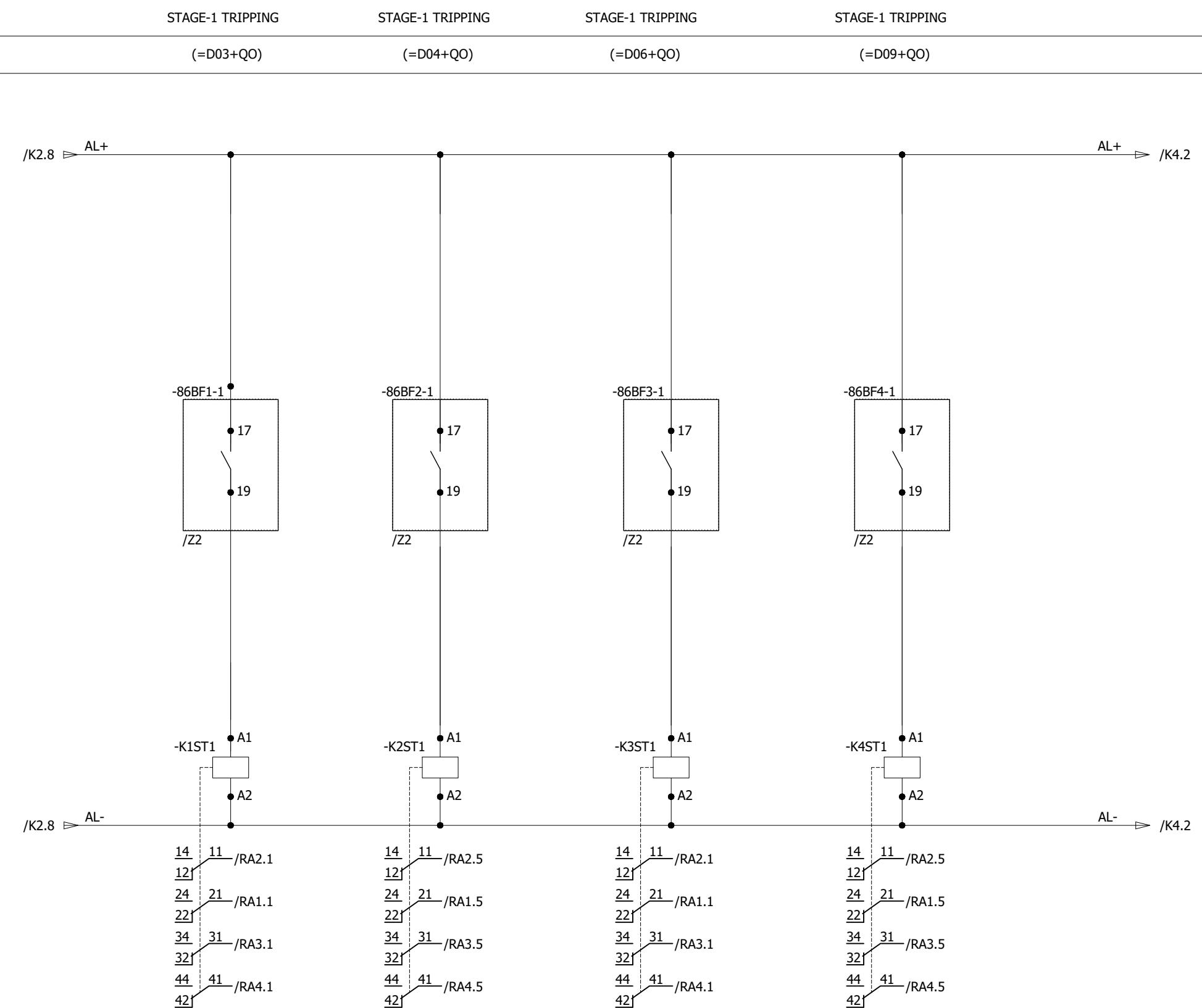
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0	AS BUILT		30.10.2018	ASJ	Manufacturer  EPE SOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GAZI ROAD, LAHORE	Title 220kV CB FAILURE PROTECTION PANEL (=D00+R5B) STAGE-1 TRIPPING	Drawing no. P60194-E-DFR-SC-001		
REV.	DESCRIPTION		DATE	DRAWER						Project no. P-60194	Sheet type K1	Sheet no. 21
1	2	3	4	5	6	7	8					

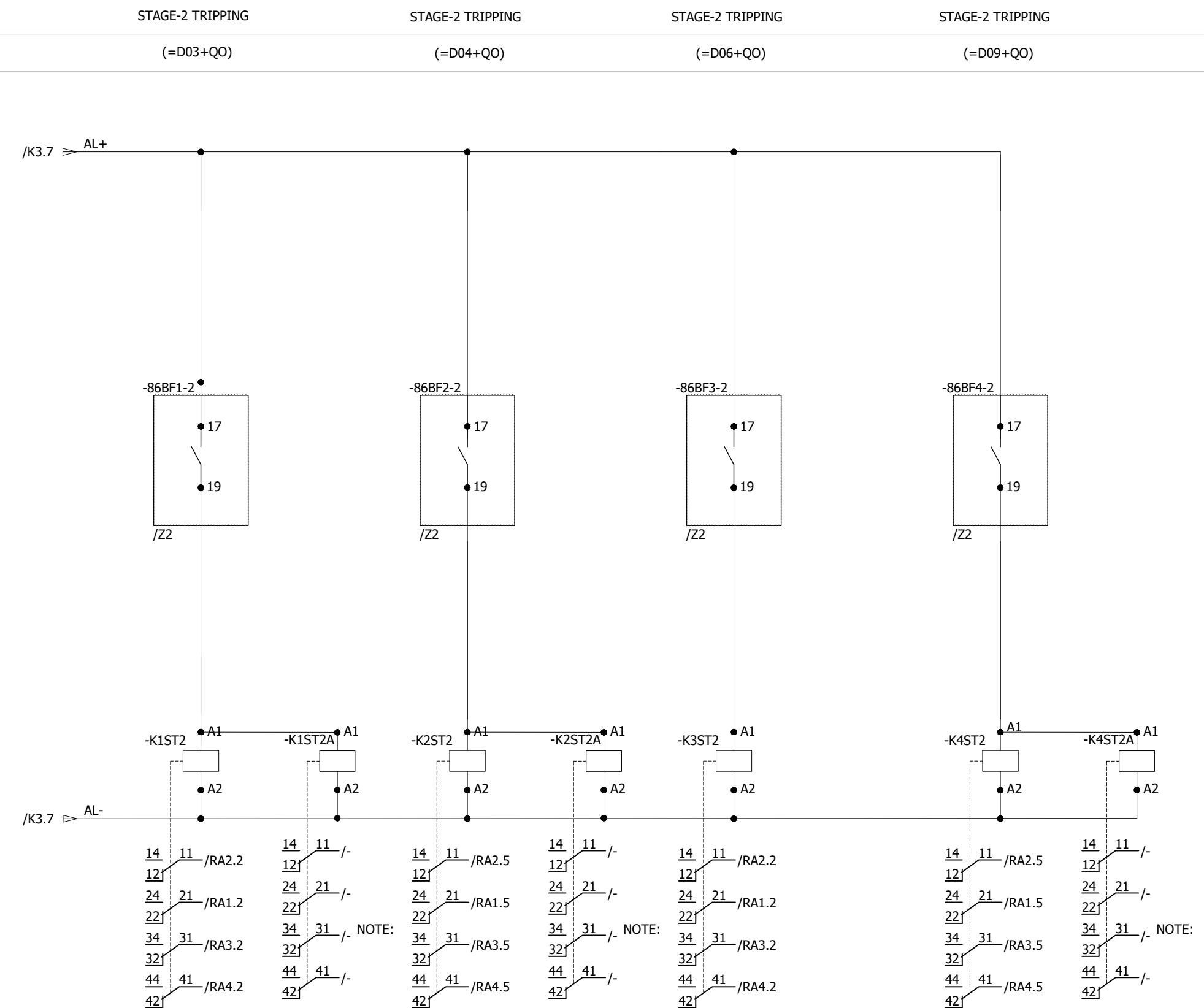


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1	2	3	4	5	6	7	8		
A	STAGE-1 TRIPPING (=D03+Q0)	STAGE-1 TRIPPING (=D04+Q0)	STAGE-1 TRIPPING (=D06+Q0)	STAGE-1 TRIPPING (=D09+Q0)			A		
B							B		
C							C		
D							D		
E							E		
F							F		
0	AS BUILT	30.10.2018	ASJ	Manufacturer  EPE SOL 7-B Garden 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 CB FAILURE PROTECTION PANEL (=D00+R5B) STAGE-1 CONTACT MULTIPLICATION	Drawing no. P60194-E-DFR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						
1	2	3	4	5	6	7	8		

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A

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0	AS BUILT	30.10.2018	ASJ	Manufacturer  EPEPSOL 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 CB FAILURE PROTECTION PANEL (=D00+R5B) STAGE-2 CONTACT MULTIPLICATION	Drawing no. P60194-E-DFR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type K4
									Sheet no. 24

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220KV LINE RELAY PANEL
SET-2

STAGE-1 CB COIL-1

=DO3 TRIP ON ADJ. CB

220KV BUSBAR PROTECTION
RELAY PANEL

=D03+R4

(=D03+Q0)

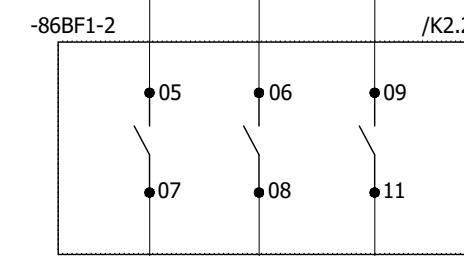
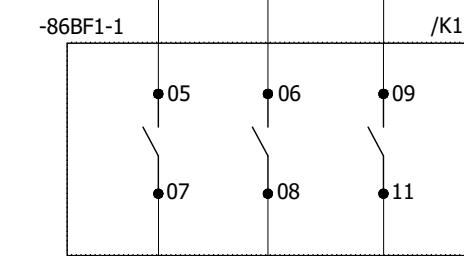
BF STAGE-II OPERATED

=D00+R7

/K13

/N1

-XTC1: 5 TC1+ -XTC1: 1 -XTC1: 5 TC1+ -X21:1



-XTC1: 6 -XTC1: 2 -XTC1: 6 -X21:2
-XTC1: 7 -XTC1: 3 -XTC1: 7 -X21:3
-XTC1: 8 -XTC1: 4 -XTC1: 8 -X21:4

A
B
C
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F

0	AS BUILT	30.10.2018	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 CB FAILURE PROTECTION PANEL (=D00+R5B) TRIP CIRCUIT FOR COIL - 1	Drawing no. P60194-E-DFR-SC-001	
REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type K11	Sheet no. 25

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220KV LINE RELAY PANEL
SET-1

STAGE-1 CB COIL-2

=DO3 TRIP ON ADJ. CB

220KV BUSBAR PROTECTION
RELAY PANEL

=D03+R4

(=D03+Q0)

BF STAGE-II OPERATED

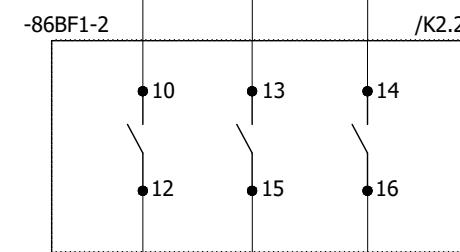
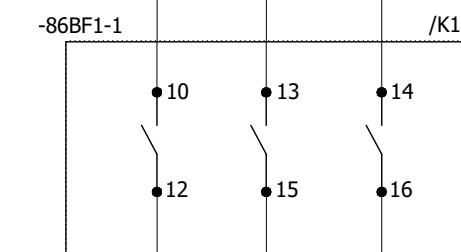
=D00+R7

/K23

/N3

-XTC2: 5 TC2+ -XTC2: 1

-XTC2: 5 TC2+ -X21:9



-XTC2: 6 -XTC2: 2

-XTC2: 6 -X21:10

-XTC2: 7 -XTC2: 3

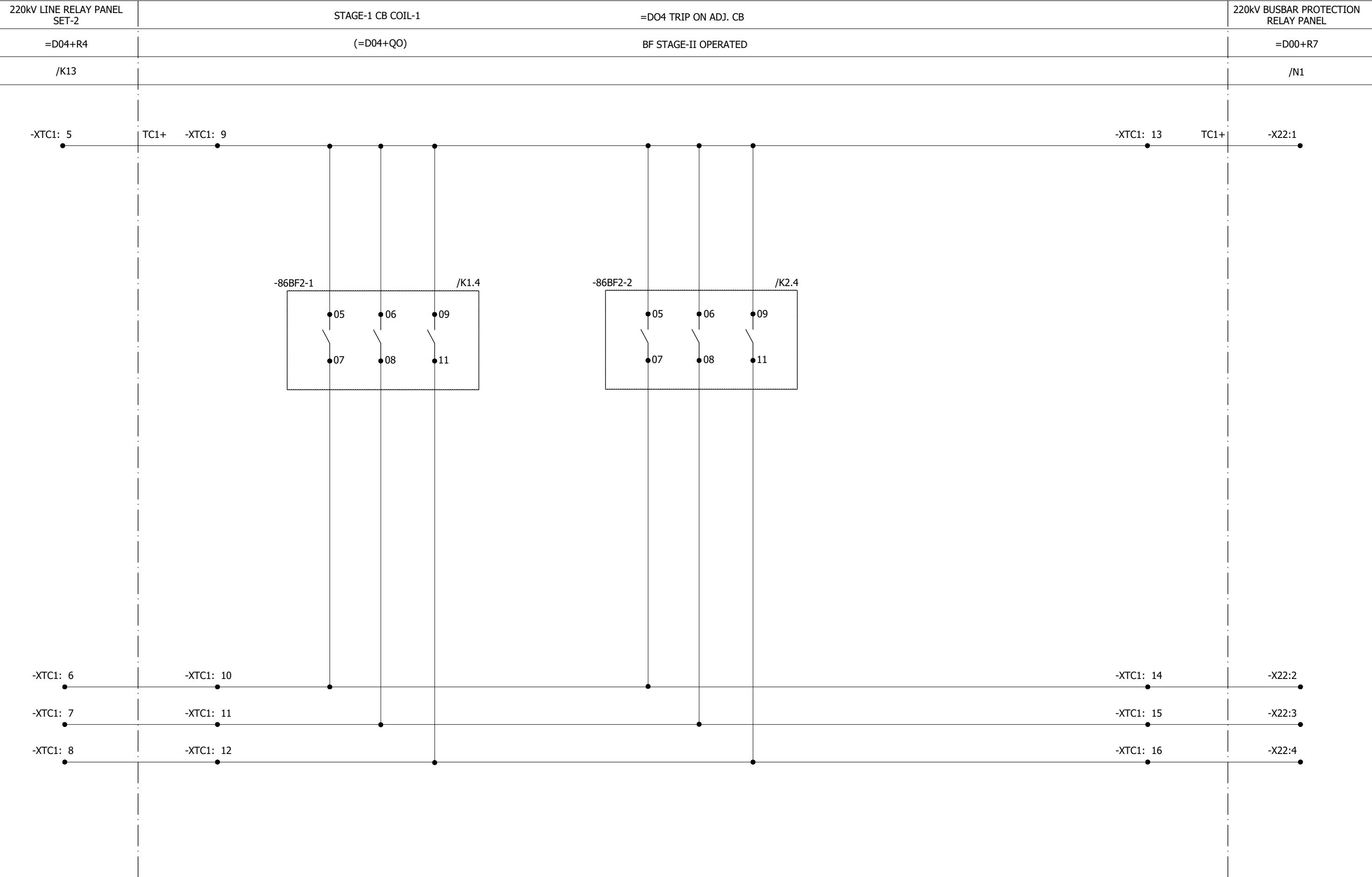
-XTC2: 7 -X21:11

-XTC2: 8 -XTC2: 4

-XTC2: 8 -X21:12

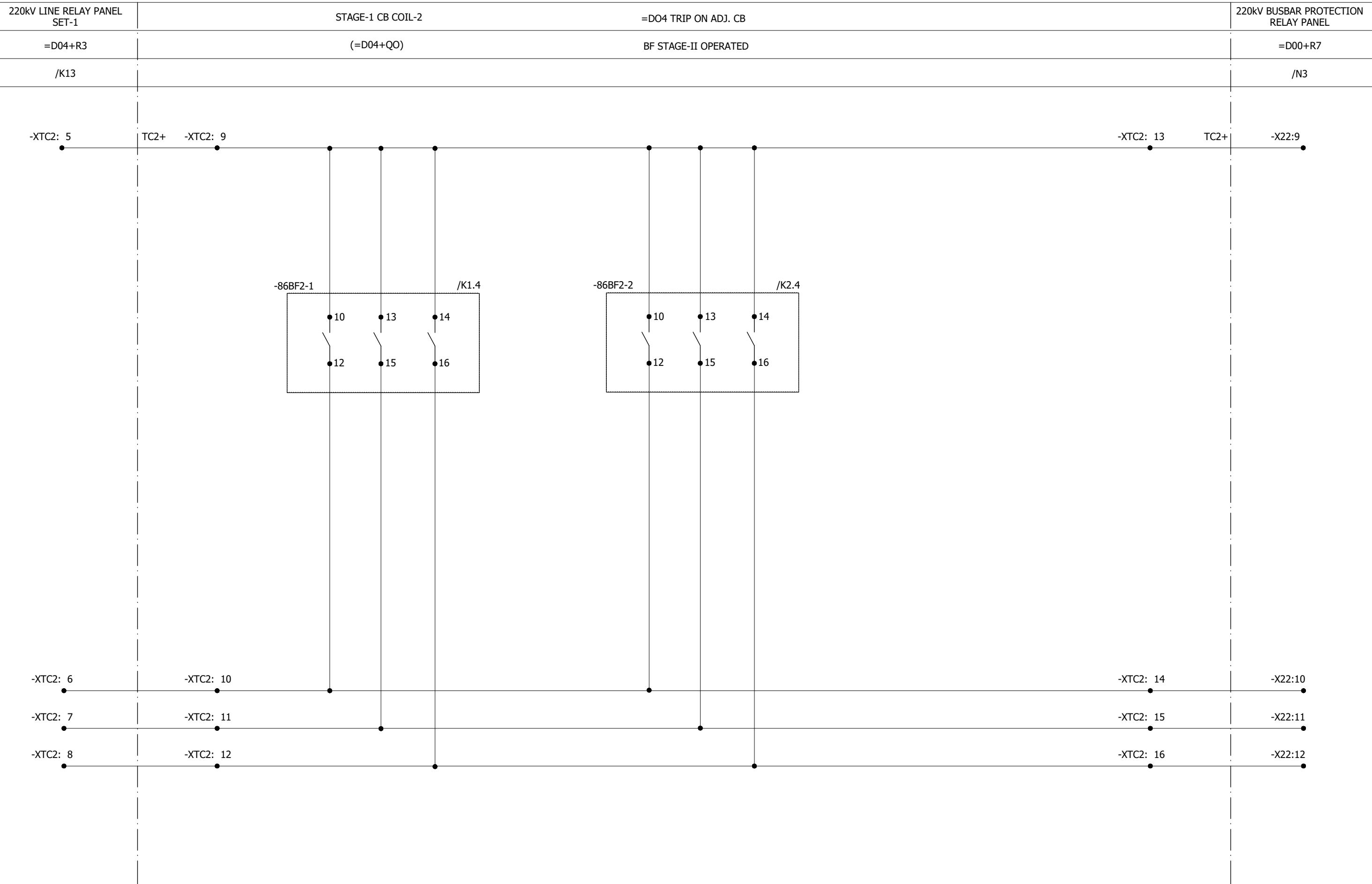
0	AS BUILT	30.10.2018	ASJ	Manufacturer  EPESOL 7a-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV CB FAILURE PROTECTION PANEL (=D00+R5B) TRIP CIRCUIT FOR COIL - 2	Drawing no. P60194-E-DFR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type K12
									Sheet no. 26

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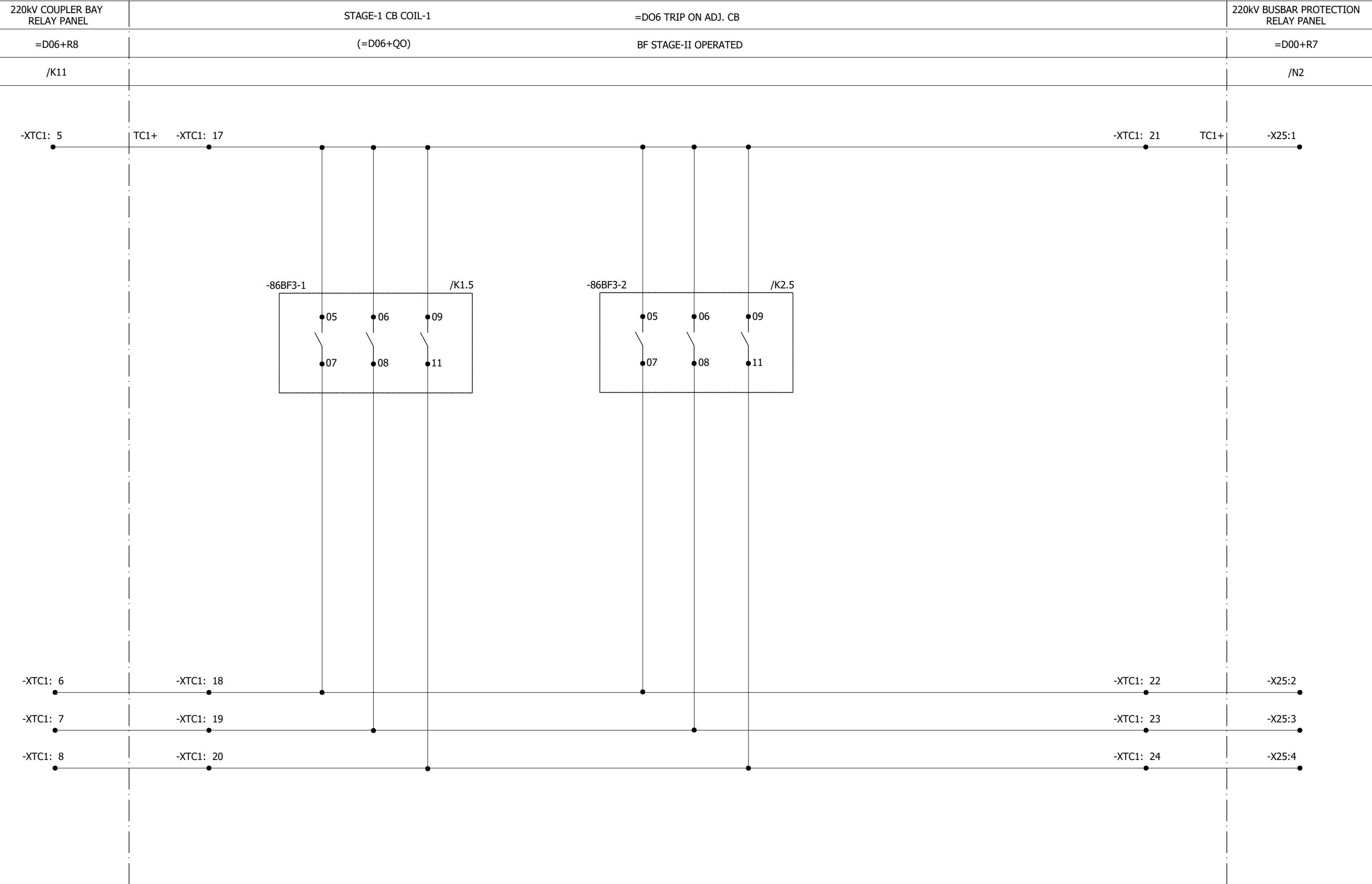
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REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194 Sheet type K21 Sheet no. 27

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0	AS BUILT		30.10.2018	ASJ	Manufacturer	Contractor	Client	Project	Title	Drawing no.			
REV.	DESCRIPTION		DATE	DRAWER	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 CB FAILURE PROTECTION PANEL (=D00+R5B) TRIP CIRCUIT FOR COIL - 2	P-60194	P-60194	Sheet type	Sheet no.
										K22		28	

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0	AS BUILT		30.10.2018	ASJ	Manufacturer	Contractor	Client	Project	Title	Drawing no.		
REV.	DESCRIPTION		DATE	DRAWER	EPE SOL 7-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 CB FAILURE PROTECTION PANEL (=D00+R5B) TRIP CIRCUIT FOR COIL - 1	P-60194-E-DFR-SC-001		
										Project no. P-60194	Sheet type K31	Sheet no. 29
1			2		3	4	5	6	7	8		

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220KV COUPLER BAY
RELAY PANEL

STAGE-1 CB COIL-2

=D06 TRIP ON ADJ. CB

220KV BUSBAR PROTECTION
RELAY PANEL

=D06+R8

(=D06+Q0)

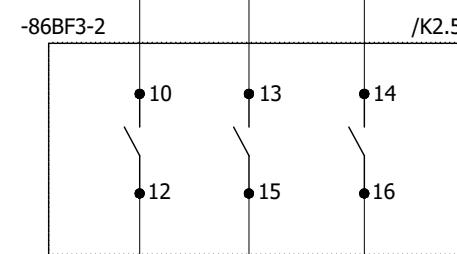
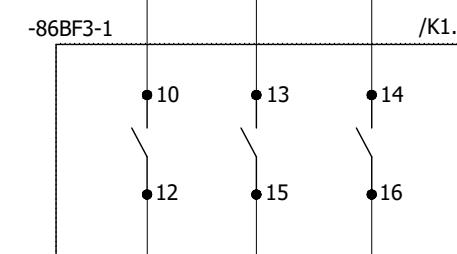
BF STAGE-II OPERATED

=D00+R7

/K21

/N4

-XTC2: 5 TC2+ -XTC2: 17 -XTC2: 21 TC2+ -X25:9



0	AS BUILT		30.10.2018	ASJ	Manufacturer  EPE SOL 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 CB FAILURE PROTECTION PANEL (=D00+R5B) TRIP CIRCUIT FOR COIL - 2	Drawing no. P60194-E-DFR-SC-001		
REV.	DESCRIPTION		DATE	DRAWER						Project no. P-60194	Sheet type K32	Sheet no. 30
1			2	3	4	5	6	7	8			

1

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220KV LINE RELAY PANEL
SET-2

STAGE-1 CB COIL-1

=DO9 TRIP ON ADJ. CB

220KV BUSBAR PROTECTION
RELAY PANEL

=D09+R4

(=D09+QO)

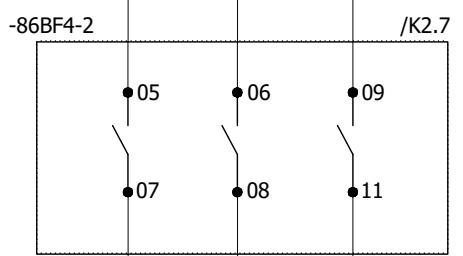
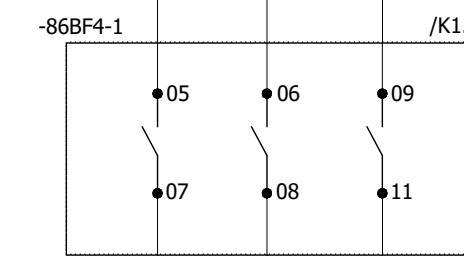
BF STAGE-II OPERATED

=D00+R7

/K13

/N2

-XTC1: 5 TC1+ -XTC1: 25 -XTC1: 29 TC1+ -X27:1



-XTC1: 6 -XTC1: 26 -XTC1: 30 -X27:2
-XTC1: 7 -XTC1: 27 -XTC1: 31 -X27:3
-XTC1: 8 -XTC1: 28 -XTC1: 32 -X27:4

0	AS BUILT	30.10.2018	ASJ	Manufacturer  EPE SOL 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 CB FAILURE PROTECTION PANEL (=D00+R5B) TRIP CIRCUIT FOR COIL - 1	Drawing no. P60194-E-DFR-SC-001		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type K41	Sheet no. 31
1	2	3	4	5	6	7	8				

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220KV LINE RELAY PANEL
SET-1

STAGE-1 CB COIL-2

=DO9 TRIP ON ADJ. CB

220KV BUSBAR PROTECTION
RELAY PANEL

=D09+R3

(=D09+QO)

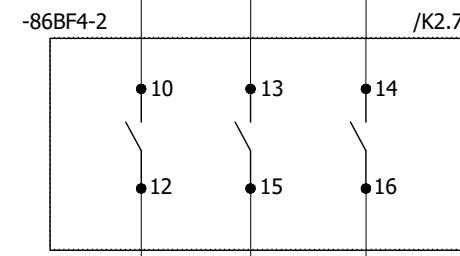
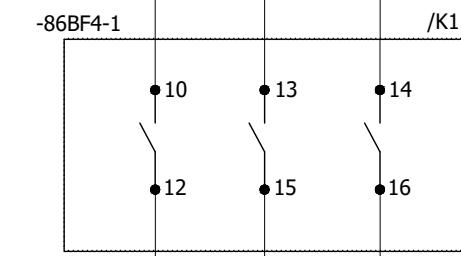
BF STAGE-II OPERATED

=D00+R7

/K23

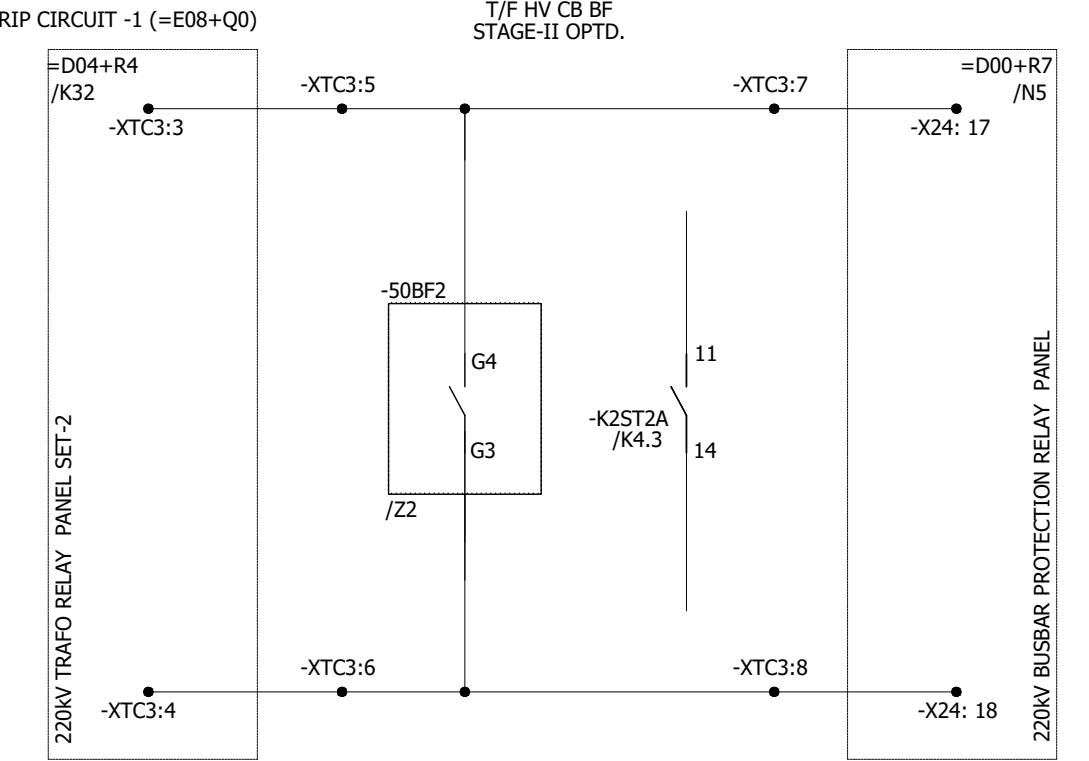
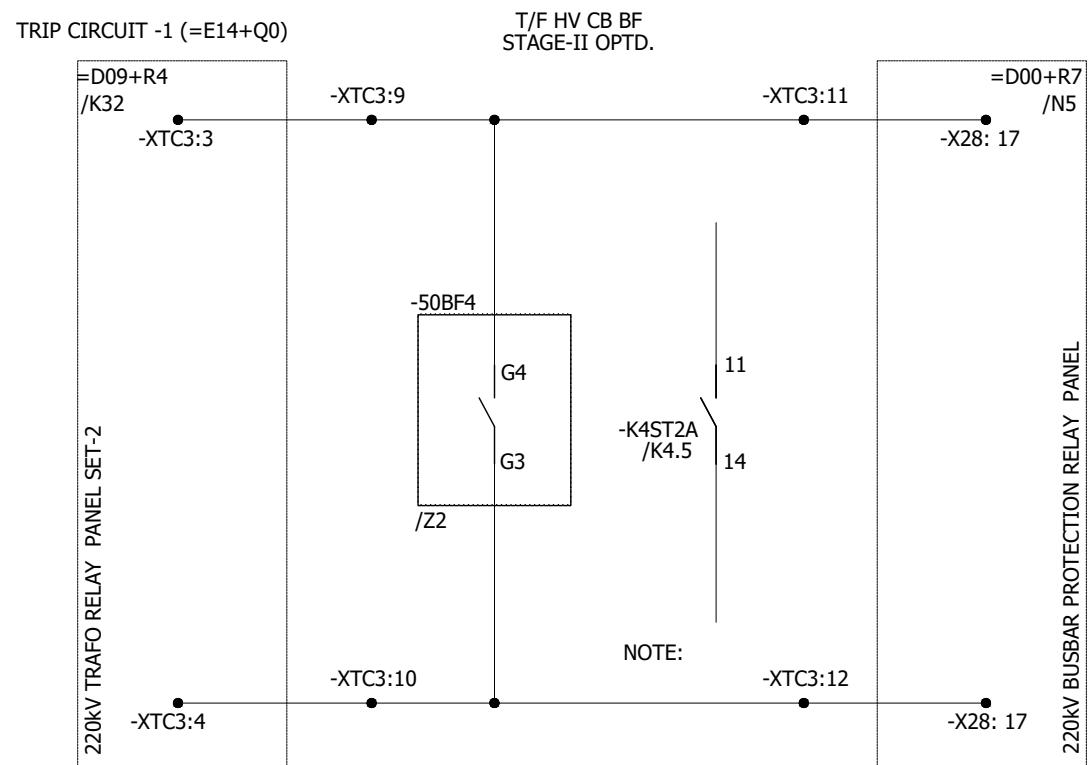
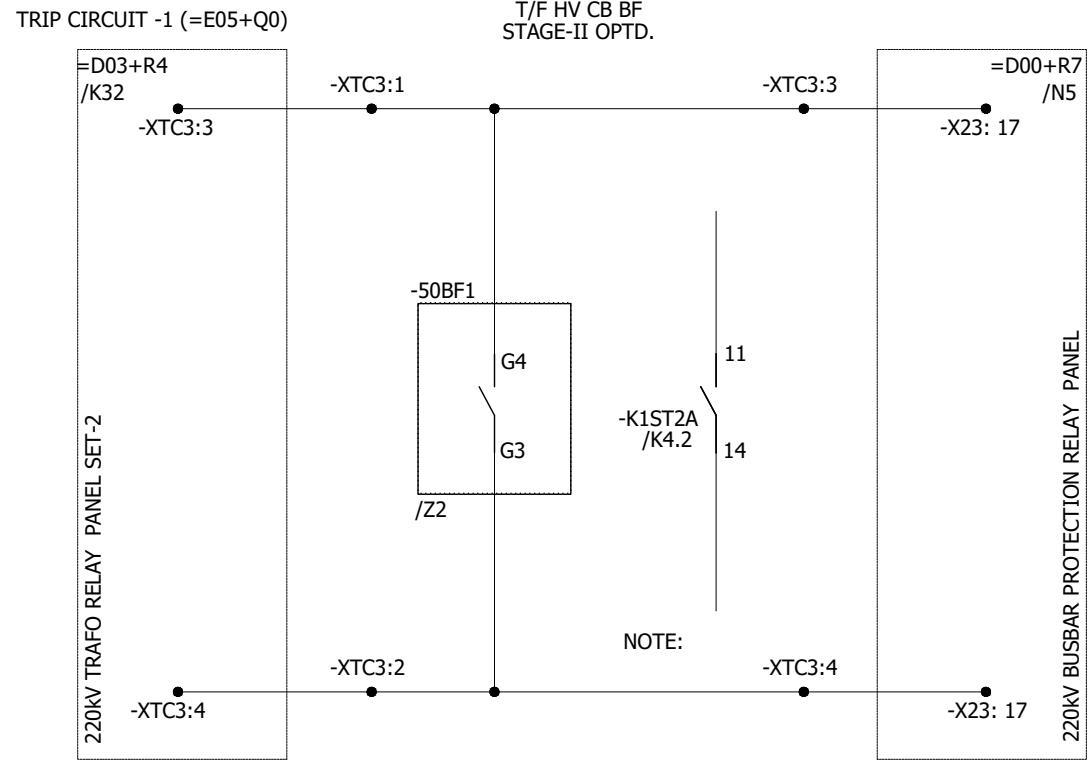
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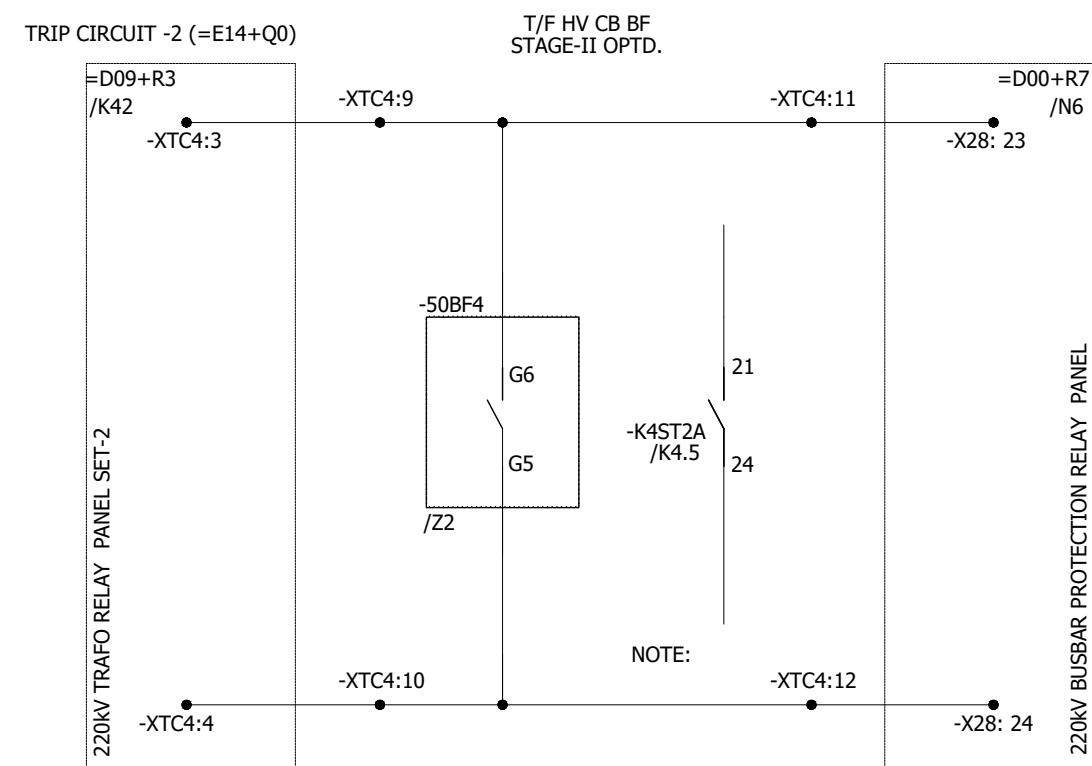
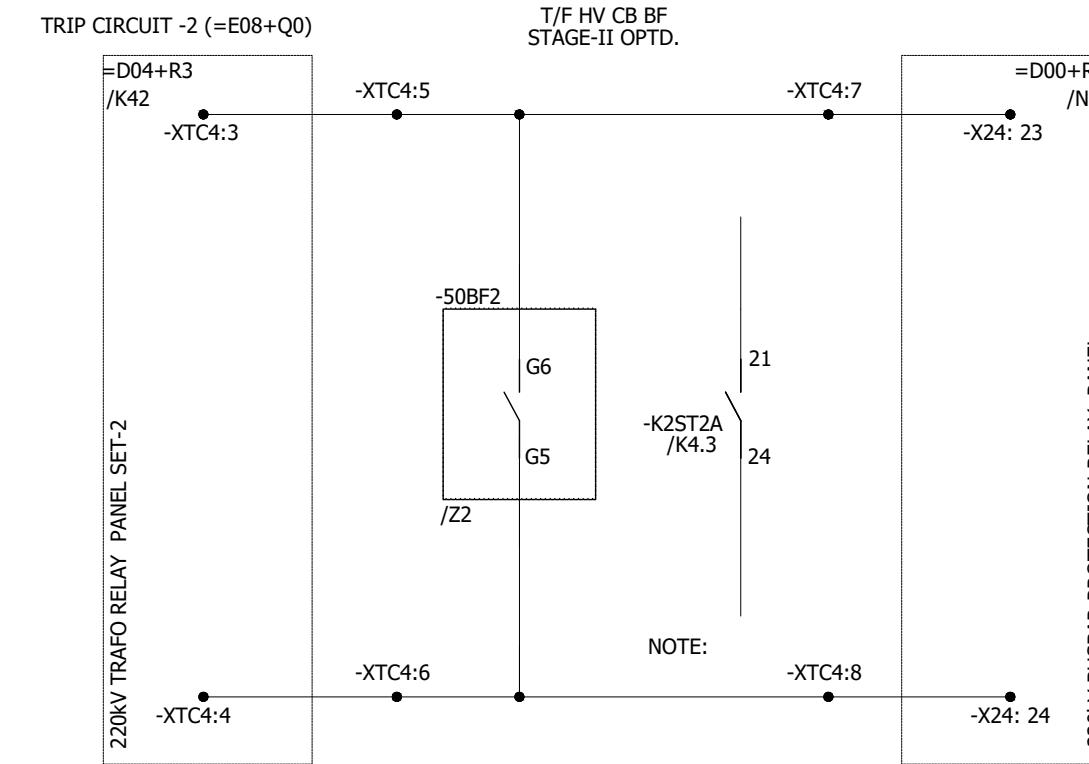
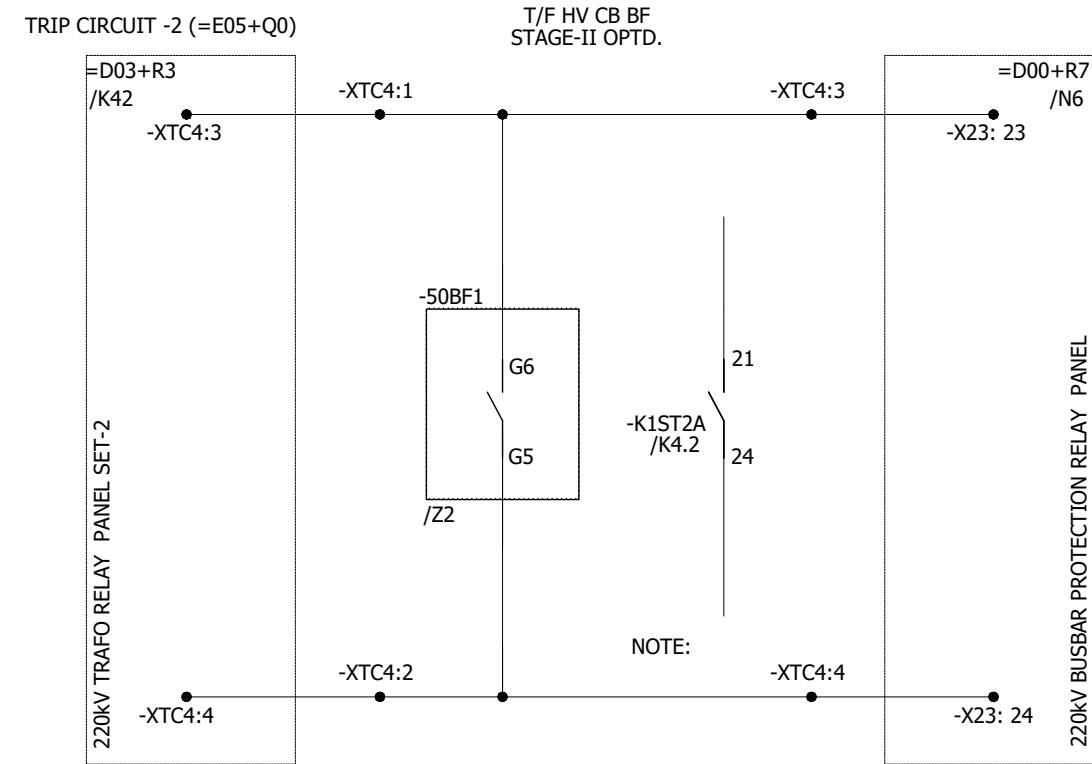


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-XTC2: 7 -XTC2: 27 -XTC2: 31 -X27:11
-XTC2: 8 -XTC2: 28 -XTC2: 32 -X27:12

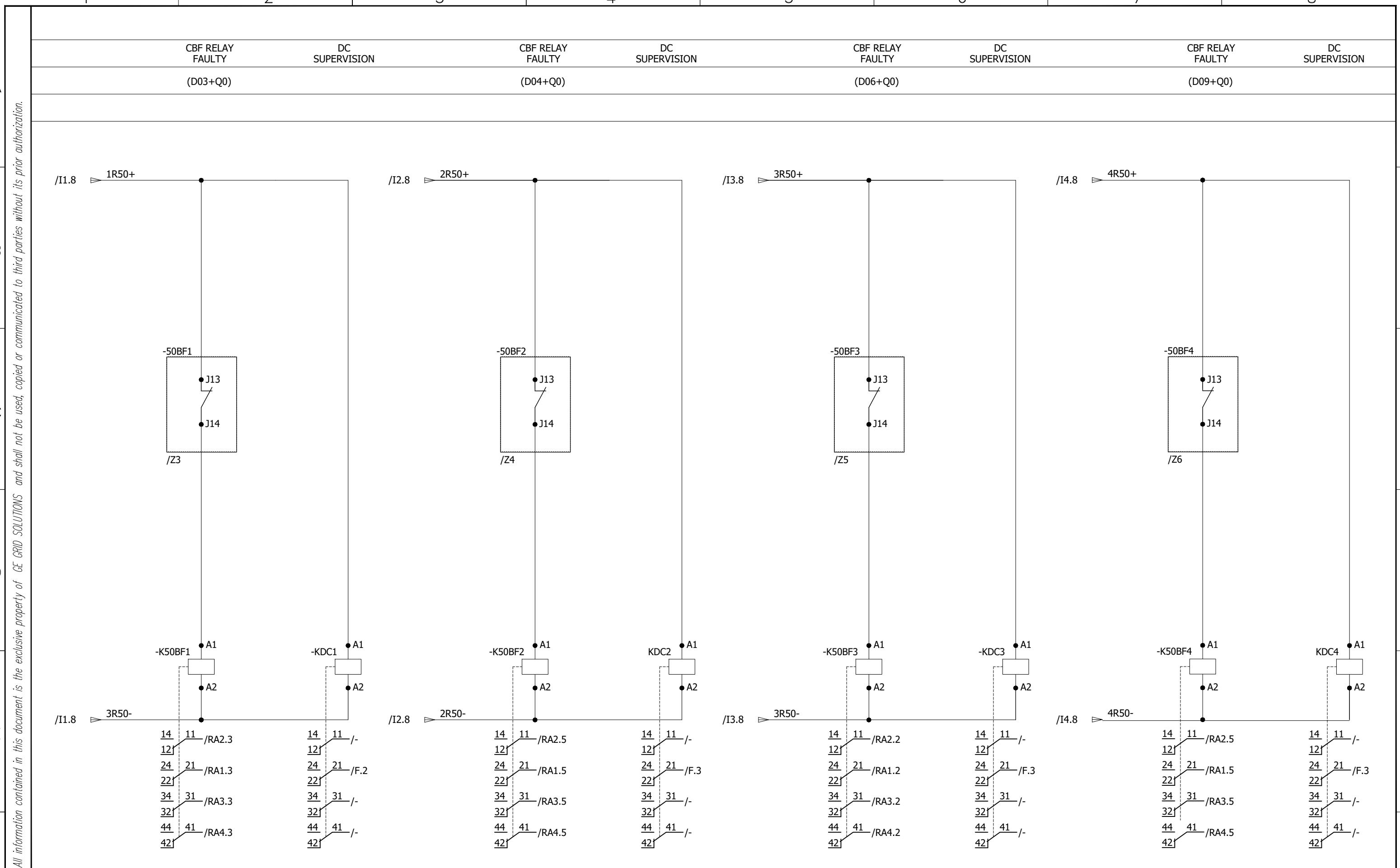
0	AS BUILT	30.10.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV CB FAILURE PROTECTION PANEL (=D00+R5B) TRIP CIRCUIT FOR COIL - 2	Drawing no. P60194-E-DFR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type K42
									Sheet no. 32



0	AS BUILT	30.10.2018	ASJ	Manufacturer  EPESOL 72-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 CB FAILURE PROTECTION PANEL (=D00+R5B) TRIP CIRCUIT FOR 132kV BREAKER COIL - 1	Drawing no. P60194-E-DFR-SC-001		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type K51	Sheet no. 33
1	2	3	4	5	6	7	8				



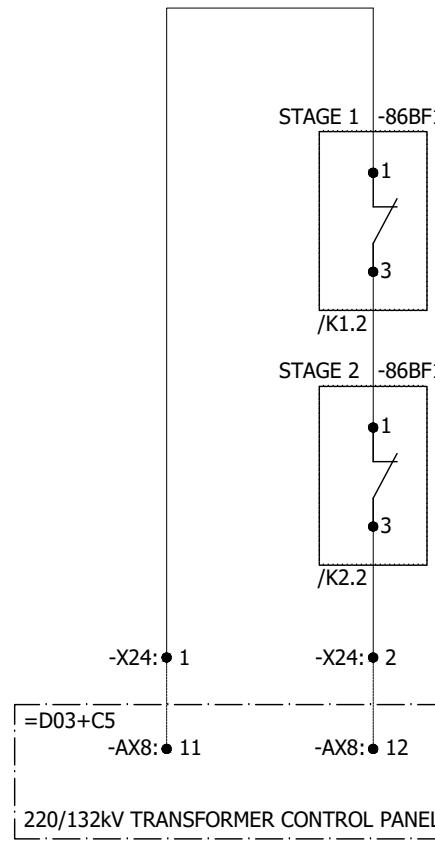
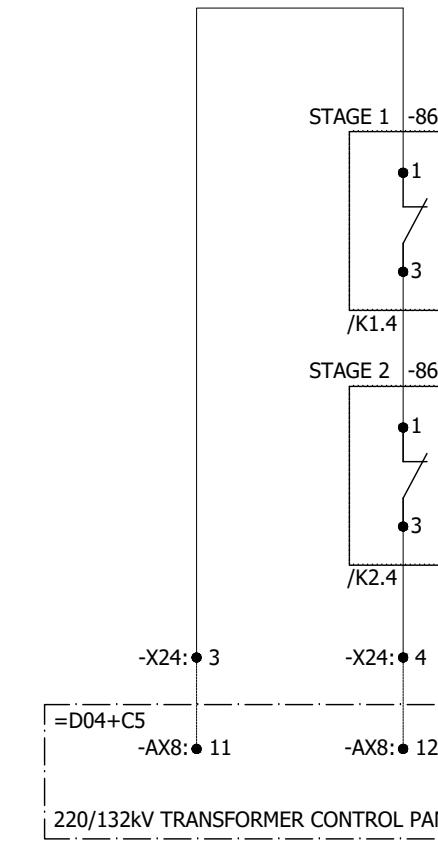
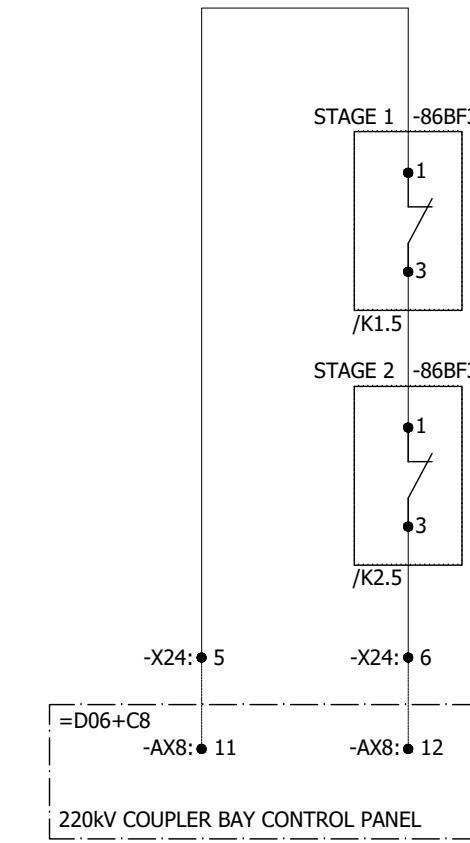
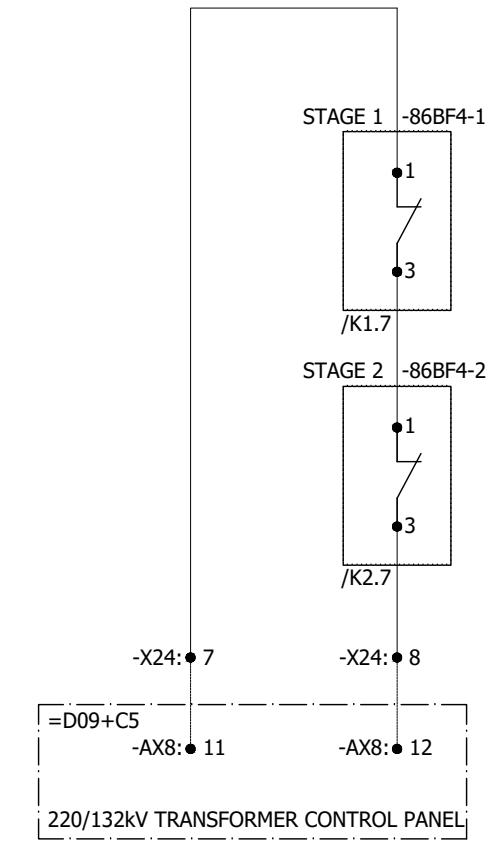
0	AS BUILT	30.10.2018	ASJ	Manufacturer	Contractor	Client	Project	Title	Drawing no.
				E P E S O L 7-B Garden Block, New Garden Town, Lahore, Pakistan	Grid Solutions A GE and Alstom joint venture	NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	220kV CB FAILURE PROTECTION PANEL (=D00+R5B) TRIP CIRCUIT FOR 132kV BREAKER COIL - 2	P60194-E-DFR-SC-001
REV.	DESCRIPTION	DATE	DRAWER					Project no.	Sheet type
								P-60194	K52
									Sheet no. 34



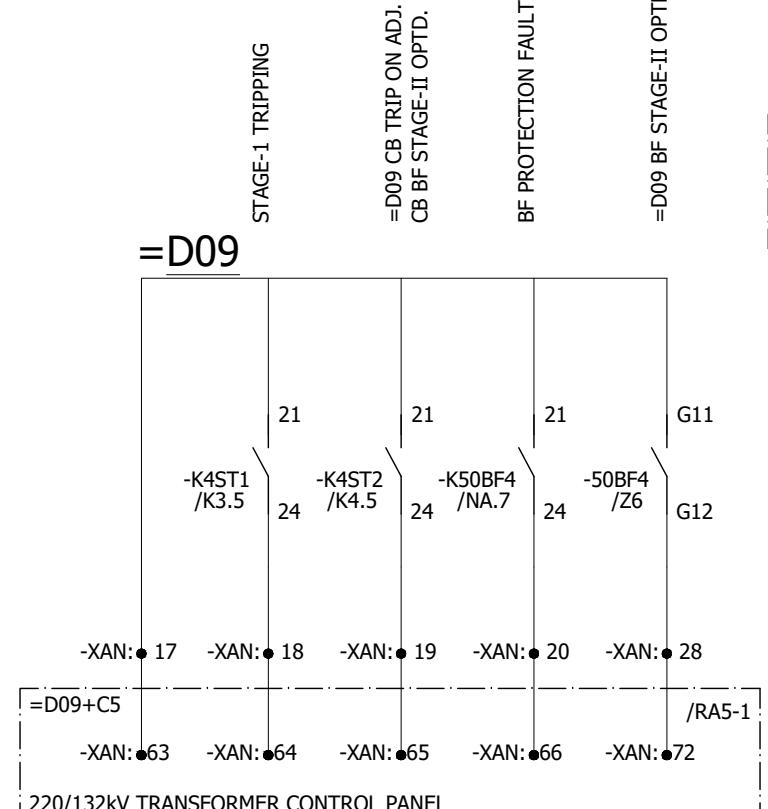
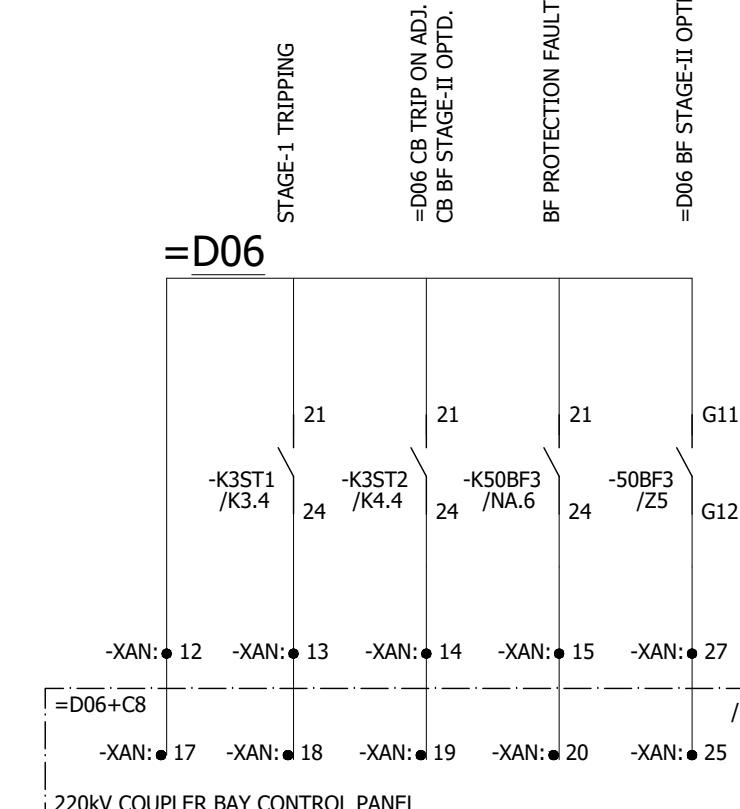
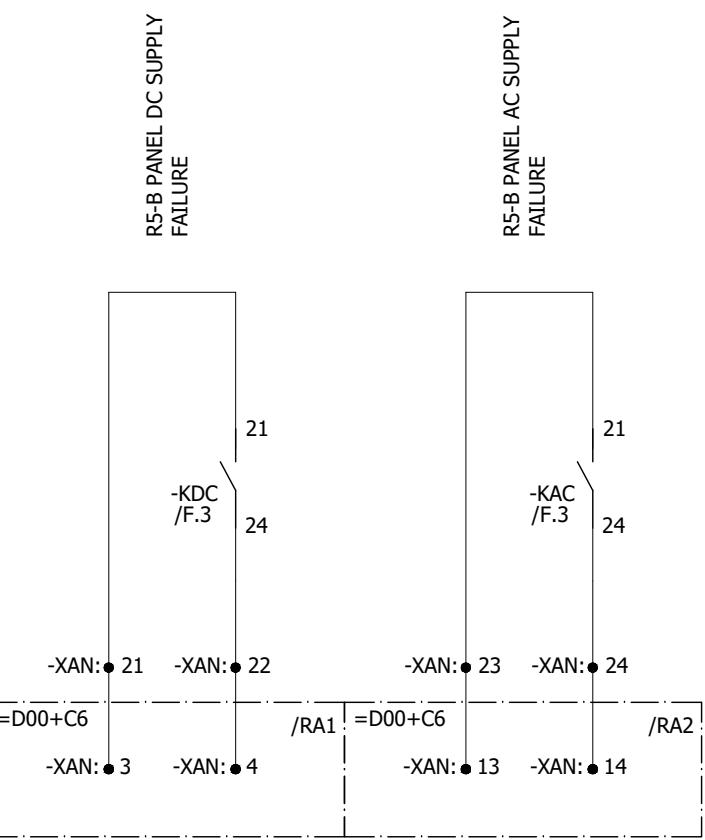
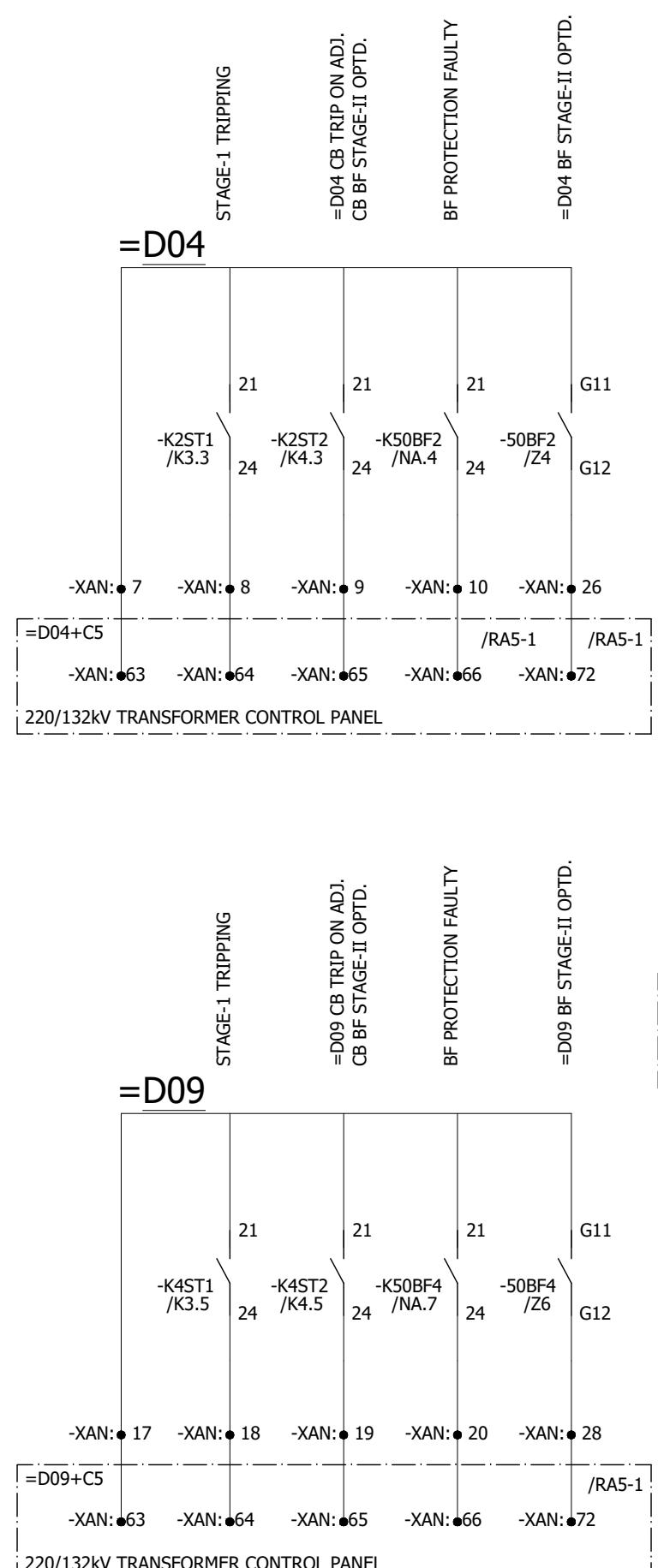
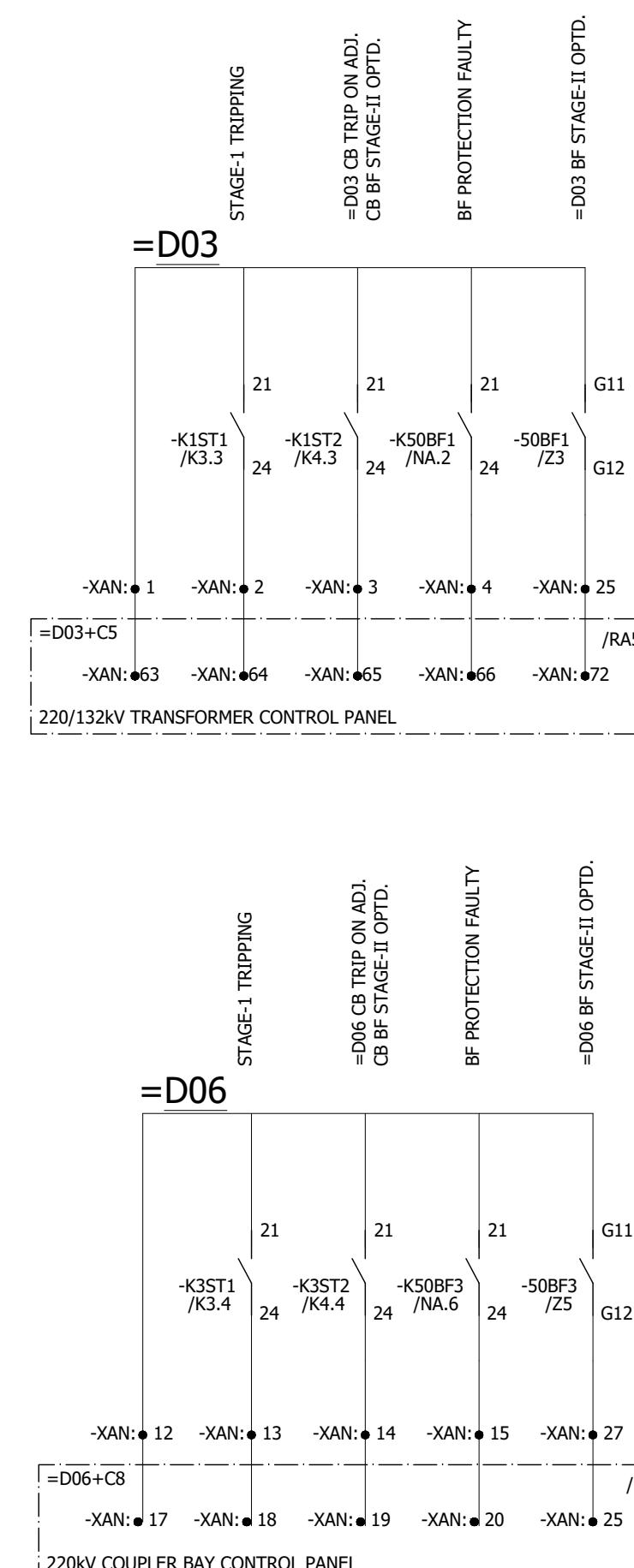
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0	AS BUILT	30.10.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV CB FAILURE PROTECTION PANEL (=D00+R5B) SYSTEM ALARMS	Drawing no. P60194-E-DFR-SC-001		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type NA	Sheet no. 35
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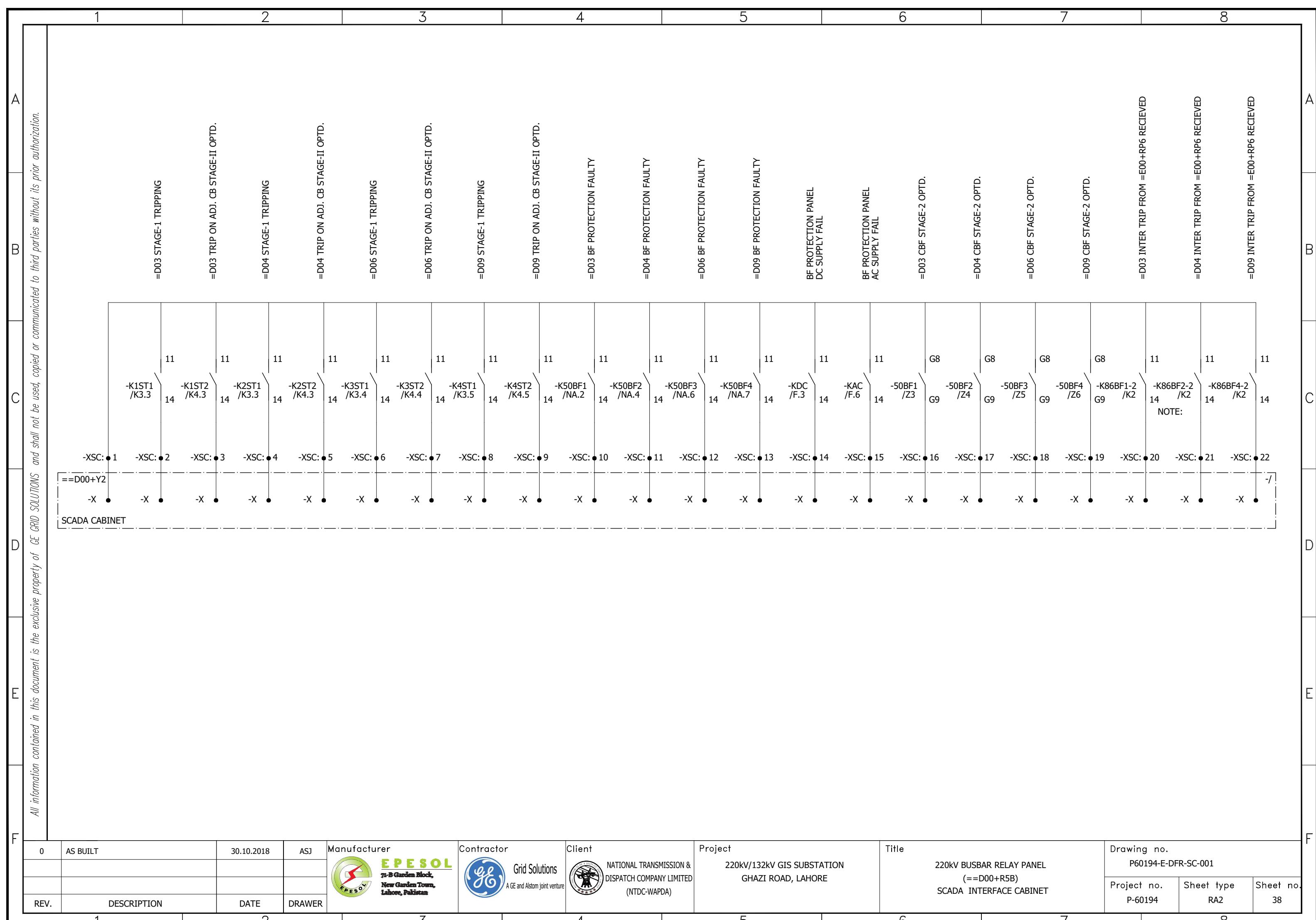
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=D03=D04=D06=D09

0	AS BUILT	30.10.2018	ASJ	Manufacturer	Contractor	Client	Project	Title	Drawing no.	
				 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 CB FAILURE PROTECTION PANEL (=D00+R5B) CLOSING LOCKOUTS SIGNAL	P60194-E-DFR-SC-001	
REV.	DESCRIPTION	DATE	DRAWER					Project no.	Sheet type	Sheet no.



0	IFC	05.06.2018	MUR	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 BUSBAR RELAY PANEL (=D00+R5B) TRIPPING ANNOUNCEMENTS	Drawing no. P60194-E-DFR-SC-001		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type RA1	Sheet no. 37
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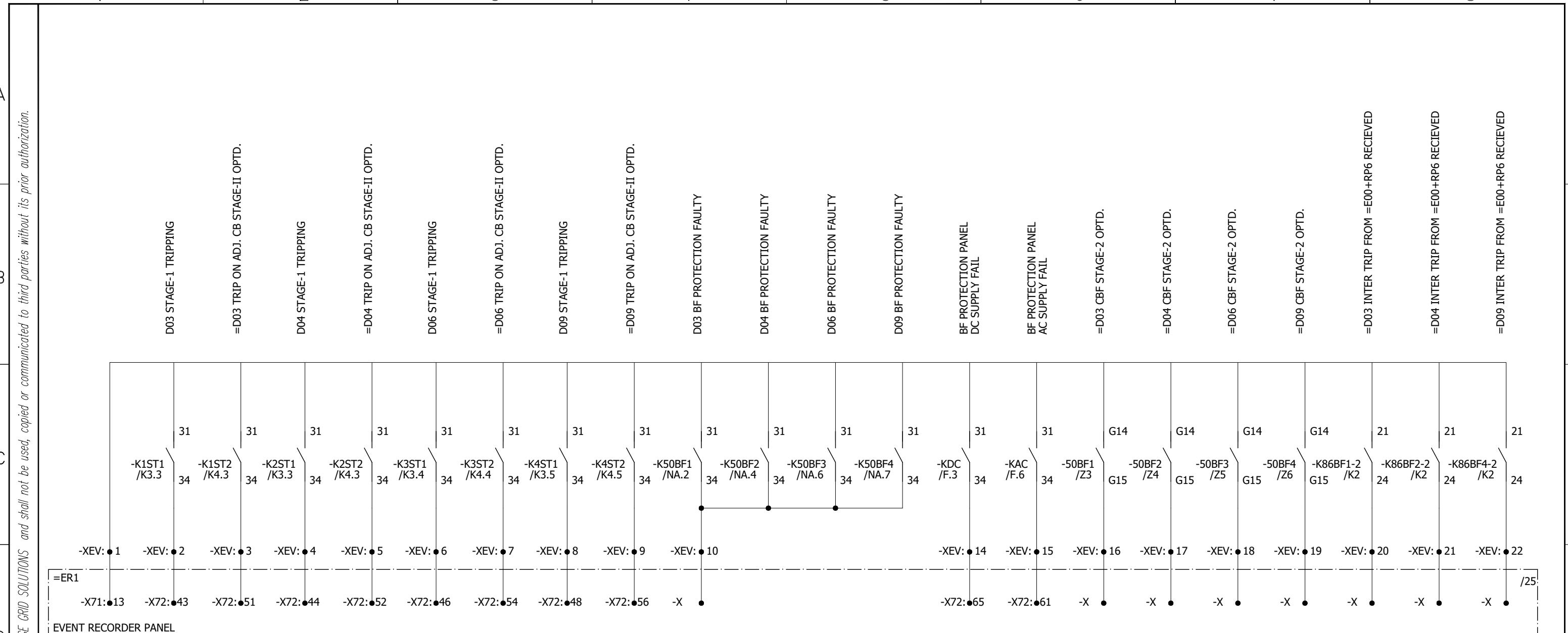
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0	AS BUILT	30.10.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GAZI ROAD, LAHORE	Title 220kV BUSBAR RELAY PANEL (=D00+R5B) EVENT RECORDER	Drawing no. P60194-E-DFR-SC-001			
REV.	DESCRIPTION	DATE	DRAWER							Project no. P-60194	Sheet type RA3	Sheet no. 39

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A

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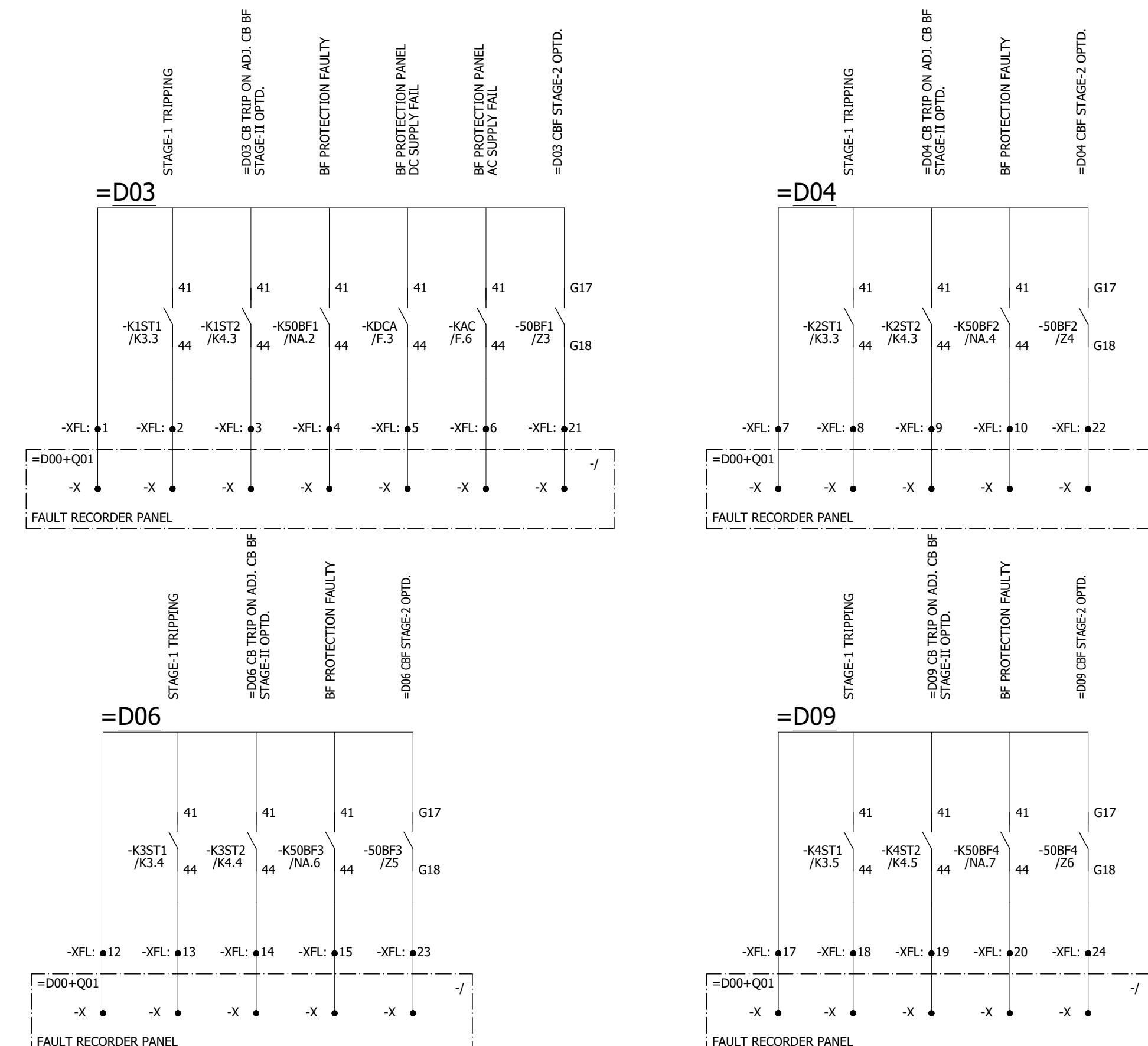
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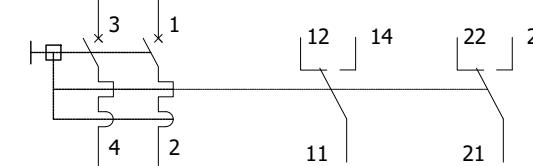
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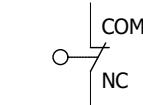
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REV.	DESCRIPTION	DATE	DRAWER						
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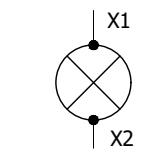
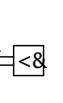
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-F102	D.4	F.6	
-F103	D.6	F.6	
-F201	E.3	F.1	
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-F204	E.6	F.2	
-F205	E.7	F.2	



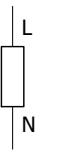
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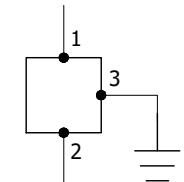
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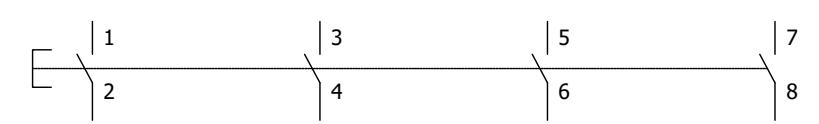
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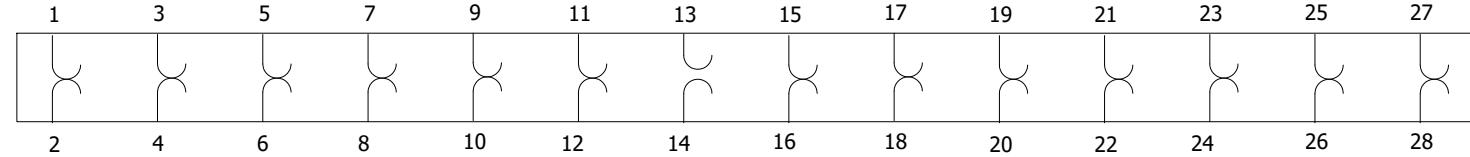
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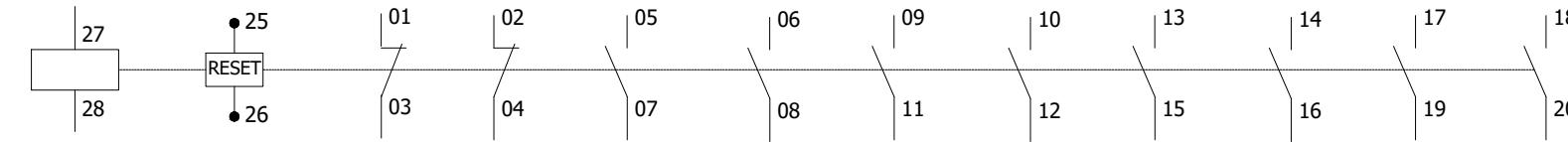
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0	AS BUILT	30.10.2018	ASJ	Manufacturer  EPESOL 7a-B Garden Block, New Garden Town, Lahore, Pakistan		Contractor  Grid Solutions A GE and Alstom joint venture		Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE		Title 220kV CB FAILURE PROTECTION PANEL (=D00+R5B) COMPONENT DIAGRAM		
REV.	DESCRIPTION	DATE	DRAWER							Project no. P-60194	Sheet type Z1	Sheet no. 41
1	2	3	4	5	6	7	8					

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-XTBF1-1	K1.2	K1.2	I1.2	I1.2			G.2	G.2			H1.5	H1.5	H1.5	H1.5
-XTBF1-2	K2.2	K2.2					G.2	G.2						
-XTBF2-1	K1.4	K1.4	I2.2	I2.2			G.4	G.4			H1.5	H1.5	H1.5	H1.5
-XTBF2-2	K2.4	K2.4					G.4	G.4						
-XTBF3-1	K1.5	K1.5	I3.2	I3.2			G.5	G.5			H2.5	H2.5	H2.5	H2.5
-XTBF3-2	K2.5	K2.5					G.5	G.5						
-XTBF4-1	K1.7	K1.7	I4.2	I4.2			G.7	G.7			H2.5	H2.5	H2.5	H2.5
-XTBF4-2	K2.7	K2.7					G.7	G.7						



86BF1-1	K1.2	J.2	PA3.4		K11.2	K11.3	K11.3	K12.2	K12.3	K12.2	K3.3	PA1.2
86BF1-2	K2.2	J.3			K11.4	K11.5	K11.5	K12.4	K12.5	K12.5		
86BF2-1	K1.4	J.3	PA3.4		K21.2	K21.3	K21.3	K22.2	K22.3	K22.2	K3.3	PA1.5
86BF2-2	K2.4	J.4			K21.4	K21.5	K21.5	K22.4	K22.5	K22.5		
86BF3-1	K1.5	J.5	PA3.4		K31.2	K31.3	K31.3	K32.2	K32.3	K32.2	K3.4	PA1.2
86BF3-2	K2.5	J.6			K31.4	K31.5	K31.5	K32.4	K32.5	K32.5		
86BF4-1	K1.7	J.6	PA3.4		K41.2	K41.3	K41.3	K42.2	K42.3	K42.2	K3.5	PA1.5
86BF4-2	K2.7	J.7			K41.4	K41.5	K41.5	K42.4	K42.5	K42.5		

0 AS BUILT 30.10.2018 ASJ Manufacturer EPE SOL 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

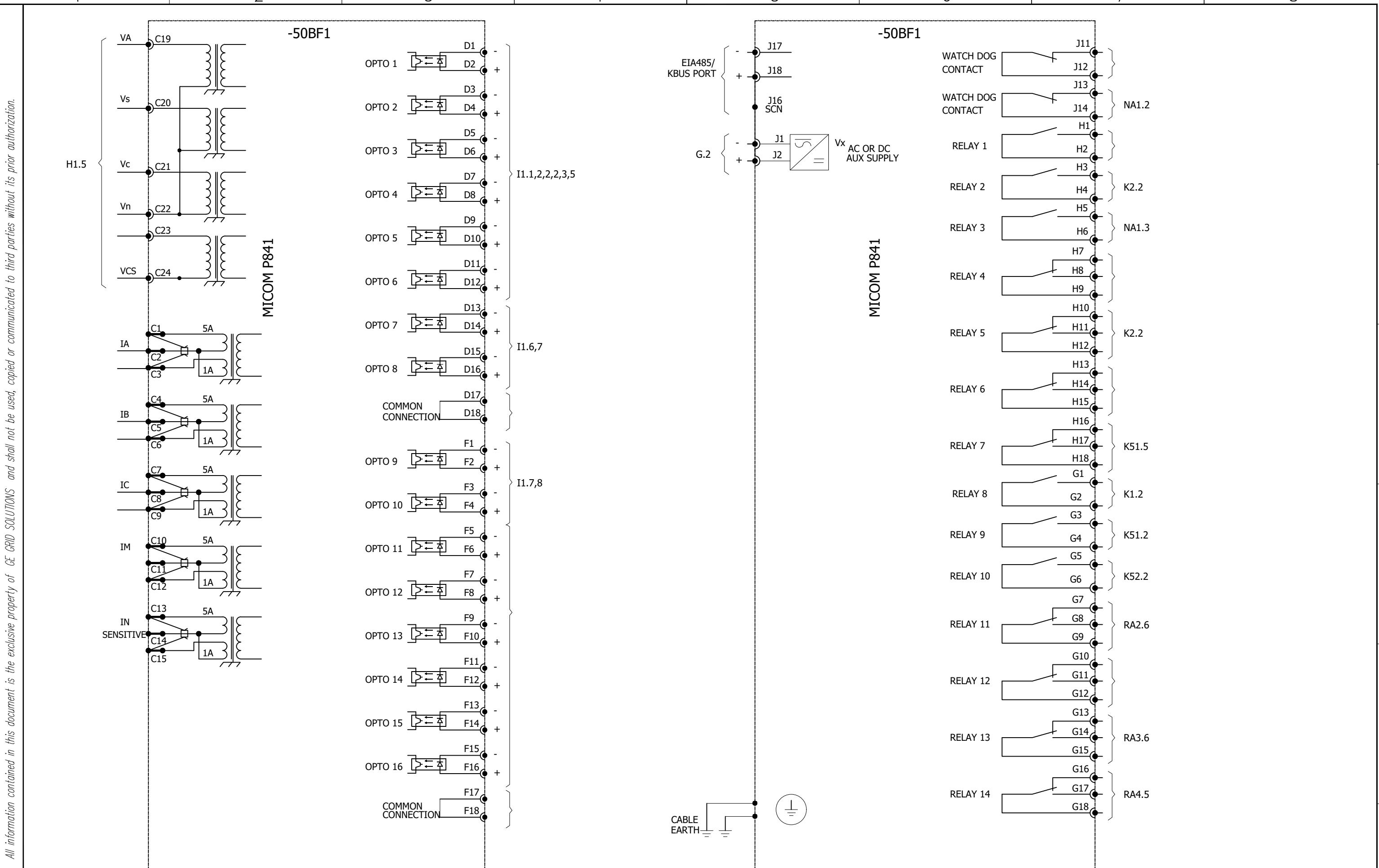
Title 220kV CB FAILURE PROTECTION PANEL (=D00+R5B) COMPONENT DIAGRAM

Drawing no. P60194-E-DFR-SC-001

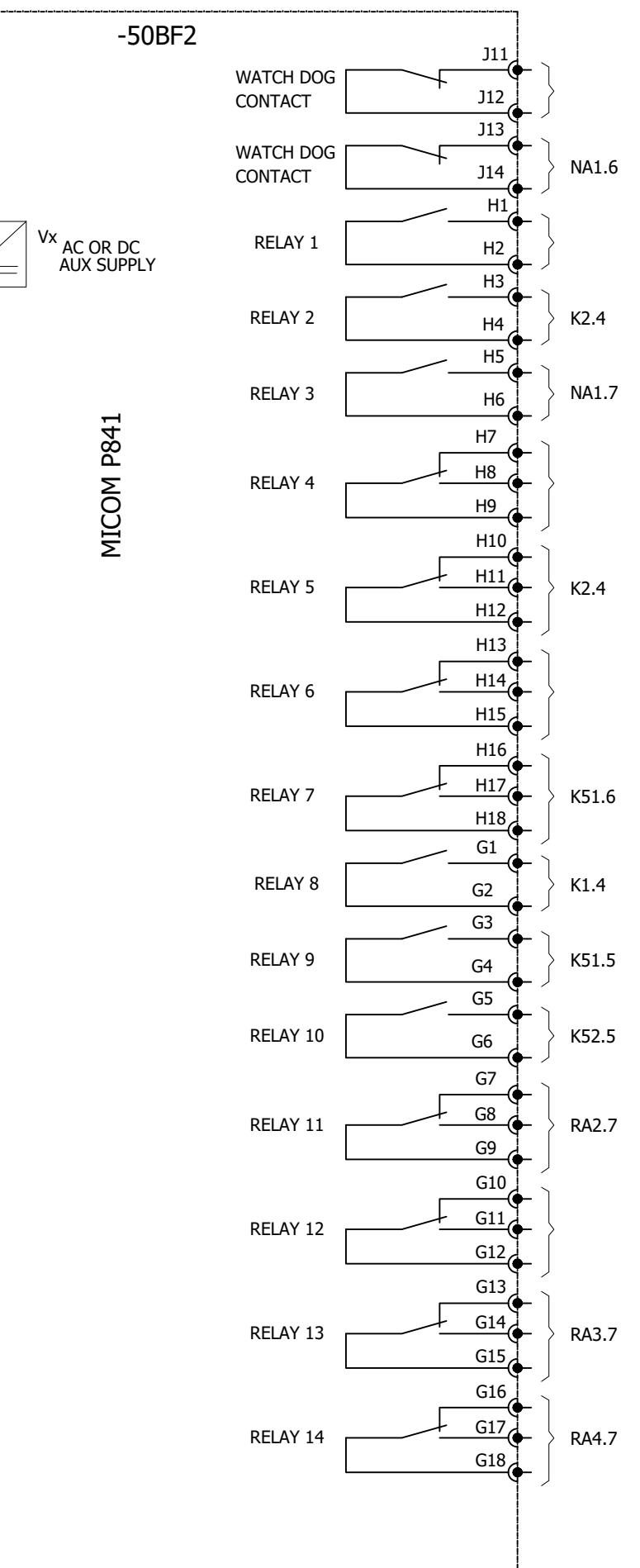
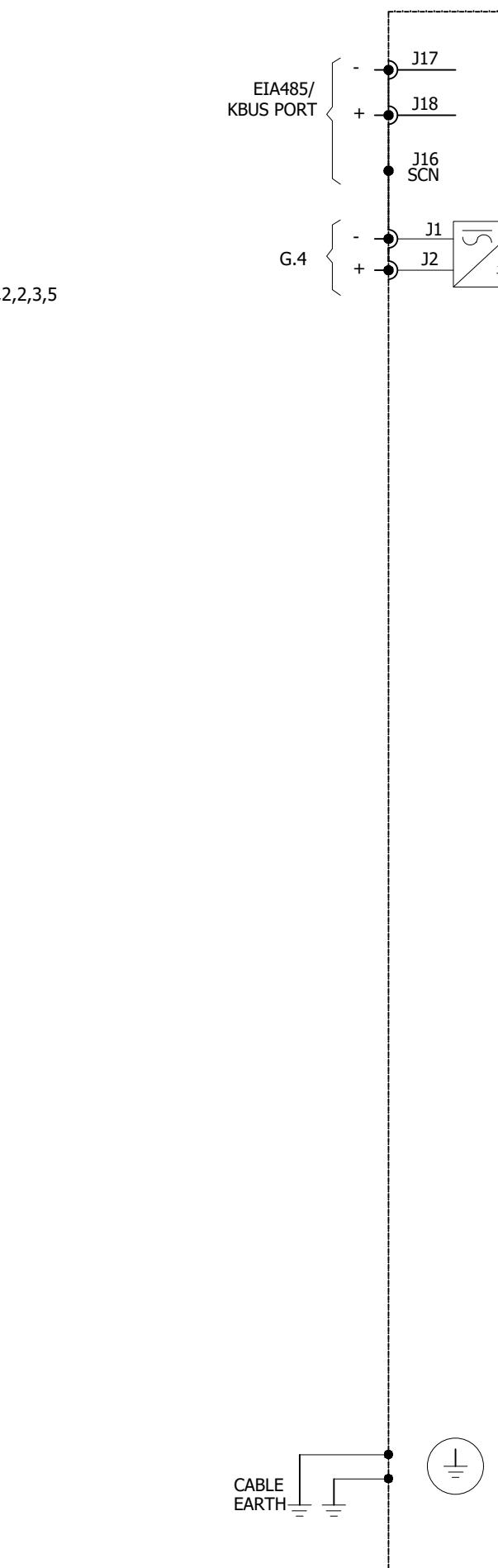
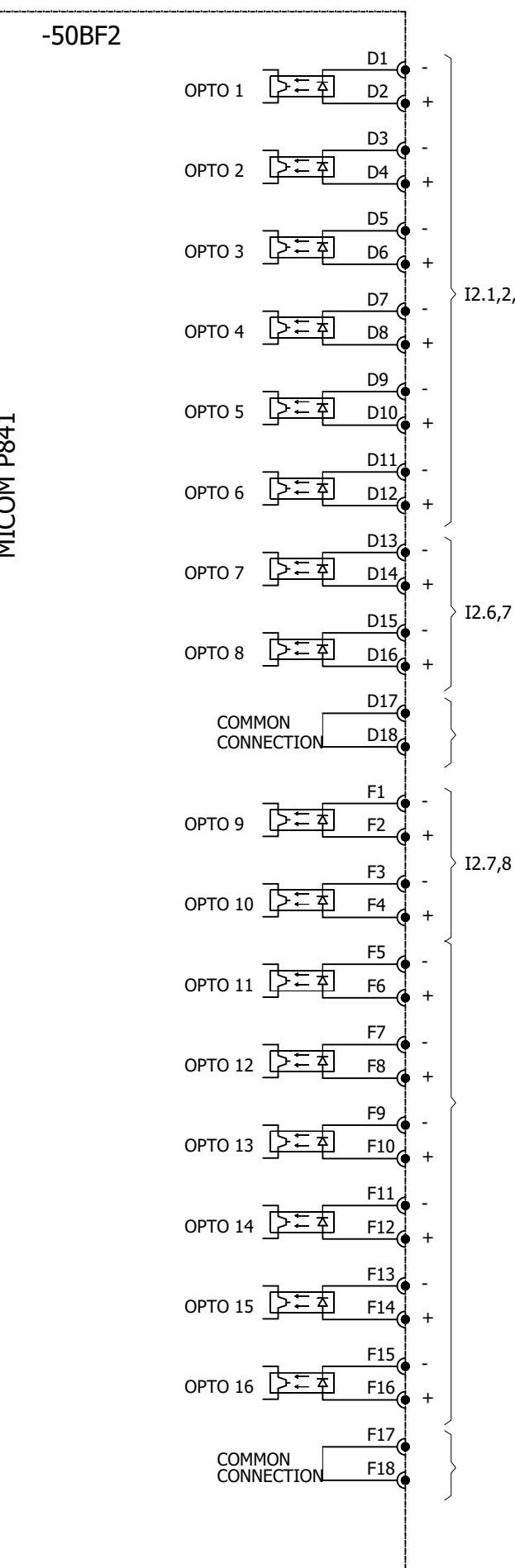
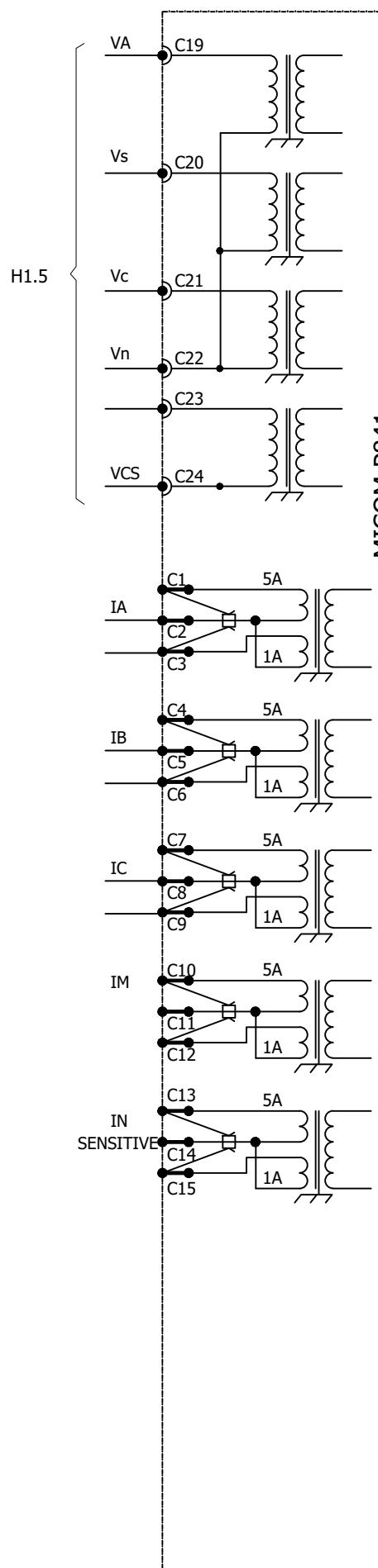
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Sheet type Z2

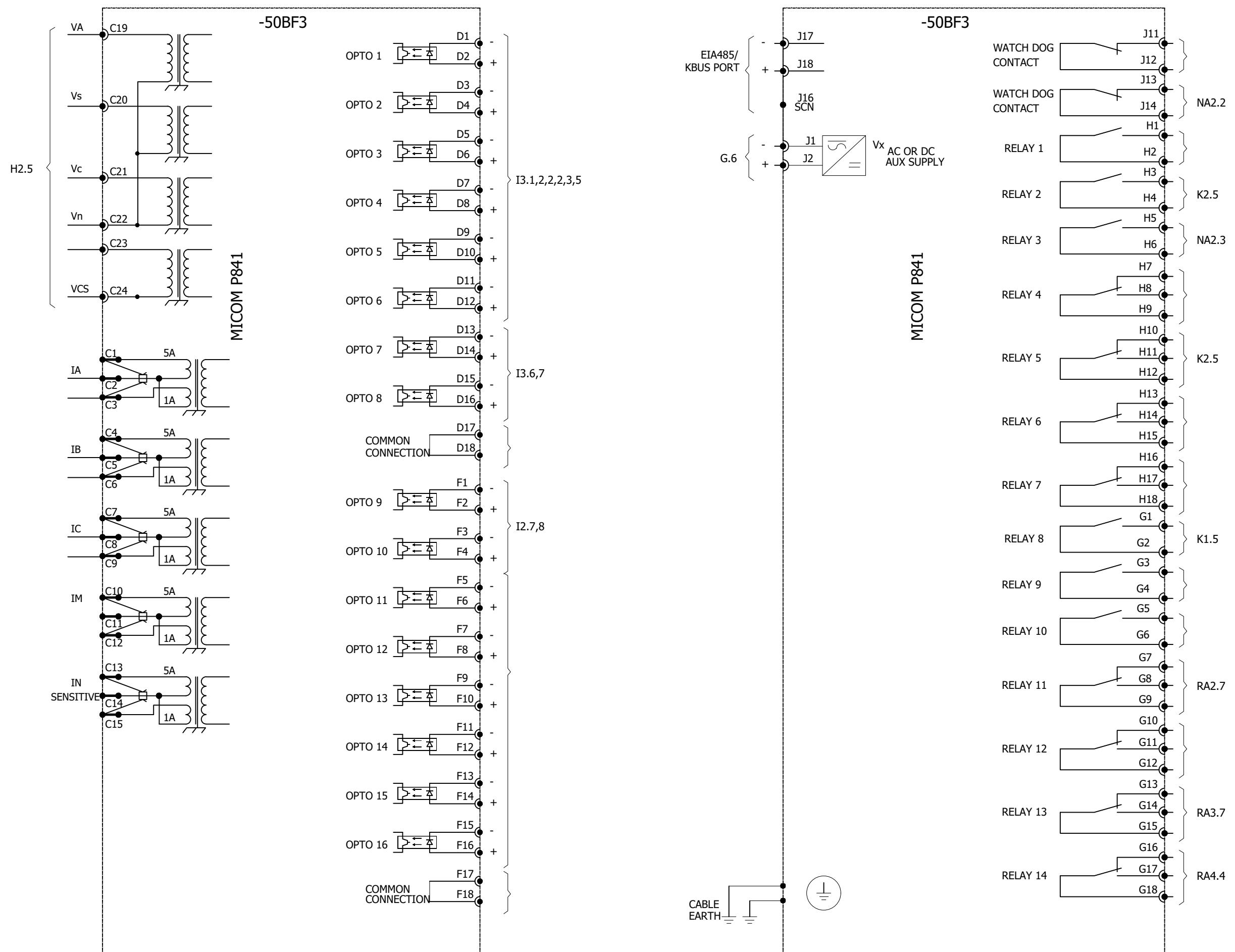
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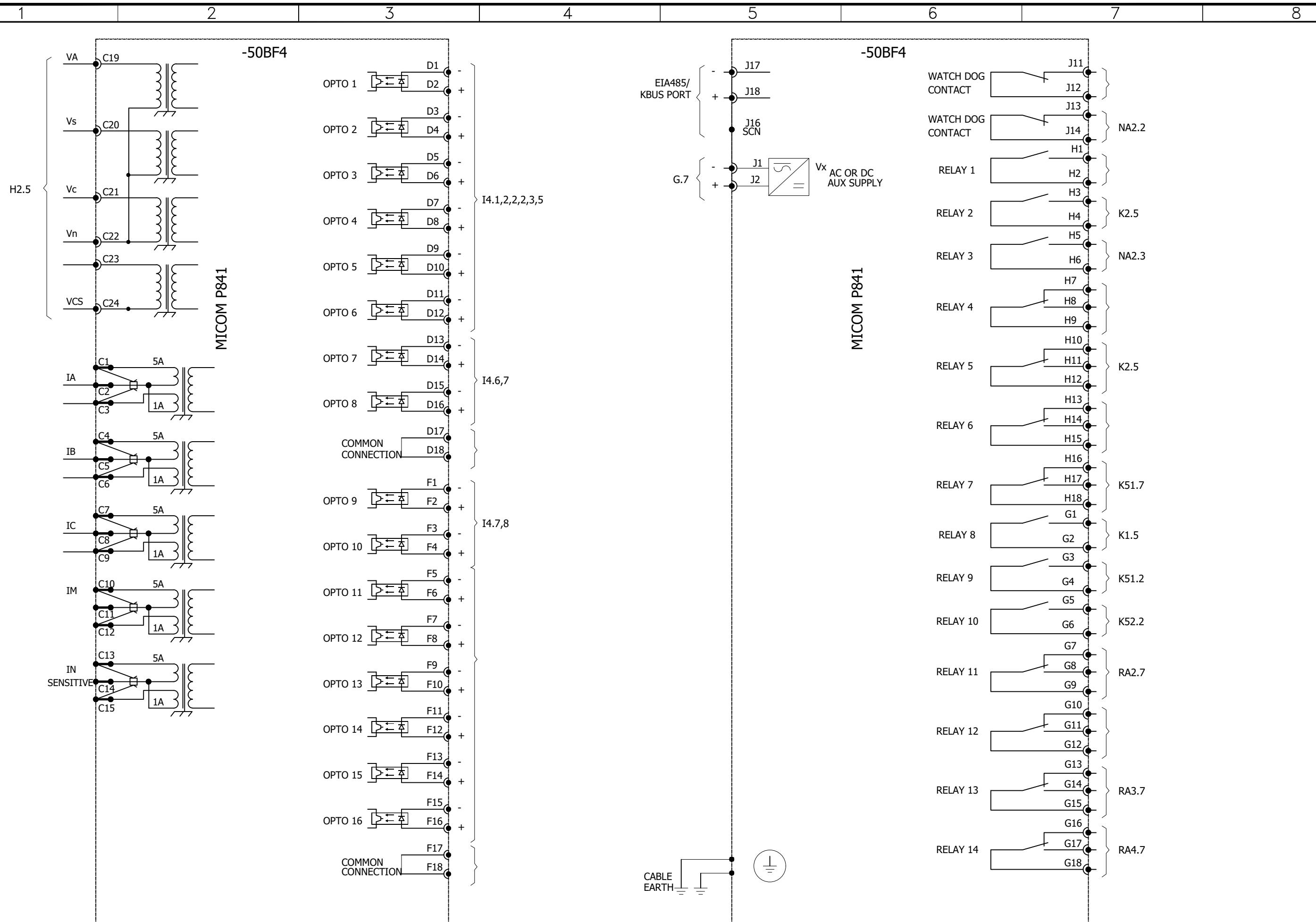
0	AS BUILT	30.10.2018	ASJ	Manufacturer	Contractor	Client	Project	Title	Drawing no.
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REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194 Sheet type Z3 Sheet no. 43



0	AS BUILT	30.10.2018	ASJ	Manufacturer EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor GE Grid Solutions A GE and Alstom joint venture	Client NTDC-WAPDA NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED	Project 220kV/132kV GIS SUBSTATION GAZI ROAD, LAHORE	Title 220kV CB FAILURE PROTECTION PANEL (=D00+R5B) COMPONENT DIAGRAM	Drawing no. P60194-E-DFR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type Z4
									Sheet no. 44



0	AS BUILT	30.10.2018	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 CB FAILURE PROTECTION PANEL (=D00+R5B) COMPONENT DIAGRAM	Drawing no. P60194-E-DFR-SC-001		
									Project no. P-60194		
									Sheet type Z5		
									Sheet no. 45		
REV.	DESCRIPTION	DATE	DRAWER	1	2	3	4	5	6	7	8



0	AS BUILT	30.10.2018	ASJ	Manufacturer  7-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 GAZI ROAD, LAHORE	Title 220kV CB FAILURE PROTECTION PANEL (=D00+R5B) COMPONENT DIAGRAM	Drawing no. P60194-E-DFR-SC-001		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type Z6	Sheet no. 46
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