



Grid Solutions

A GE and Alstom joint venture

220/132kV GIS SUBSTATION GHAZI ROAD , LAHORE

220kV BUSBAR RELAY PANEL (=D00+R7) SCHEMATIC DRAWINGS

REFERENCE DRAWINGS

SR. NO.	DRAWING TITLE	DOCUMENT NO.
1.	220kV / 132kV Metering & Protection SLD	P60194-E-SLMP-001
2.		
3.		
4.		

REVISION HISTORY					
REV	DATE	DRW. BY	CHK. BY	APR. BY	REVISION DESCRIPTION
0	10.10.2018	ASJ	MSC	NAH	AS BUILT

Scale	NOT-TO-SCALE	Sheet size	A3
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Client	 <p>NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)</p>
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Contractor	 <p>Grid Solutions A GE and Alstom joint venture</p>	Manufacturer	 <p>EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan</p>
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Project	<p>220kV / 132kV GIS SUBSTATION GHAZI ROAD , LAHORE</p>		
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Title	<p>220kV BUSBAR RELAY PANEL (=D00+R7) SCHEMATIC DRAWINGS</p>		
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Order no	P-60194	Document no	P60194-E-DBR-SC-001
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Sheet type	A	Total sheets	36	Sheet no	1
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	PAGE NO.	SHEET NAME	SHEET DESCRIPTION	ISSUE / REVISION											
				A	B	C	D	E	F	01	02	03	04	05	
A All information contained in this document is the exclusive property of GE GRID SOLUTIONS and shall not be used, copied or communicated to third parties without its prior authorization.	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	AC	Component List		X	X									
	06, 06a	AD, AD1	Panel View		X	X									
	07	AE	Bay Concept & Protection Logic		X	X									
	08	AF	Bay Concept & Protection Logic		X	X									
	09	D	AC Supply Distribution Circuit		X	X									
	10	E	DC Supply Distribution Circuit		X	X									
	11	F	AC/DC Supply Failure Circuit		X	X									
	12	G	Relay Control & Supply Circuit		X	X									
	13	H1	Differential Relay Protection CT Circuit		X	X									
	14	H2	Differential Relay Protection CT Circuit		X	X									
	15	H3	Differential Relay Protection CT Circuit		X	X									
	16	H4	Differential Relay Protection CT Circuit		X	X									
	17	H5	Differential Relay Protection CT Circuit		X	X									
	18	I1	Power Equipment Inputs		X	X									
	19	I2	Power Equipment Inputs		X	X									
	20	I3	Power Equipment Inputs		X	X									
	21	I4	Power Equipment Inputs		X	X									
	22	J	Common Reset Tripping Relays		X	X									
	23	K1	Protection Trips		X	X									
	24	K2	Protection Trips		X	X									
	25	K3	Protection Trips		X	X									
	26	M1	CB Fail Initialization & Auto Reclosure		X	X									
	27	M2	CB Fail Initialization & Auto Reclosure		X	X									
	28	M3	CB Fail Initialization & Auto Reclosure		X	X									
	29	N1	Trip Circuit-1		X	X									
	30	N2	Trip Circuit-1		X	X									
	31	N3	Trip Circuit-2		X	X									
	32	N4	Trip Circuit-2		X	X									
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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	02	03	04	05
A	33	Z1	Component Diagram			X	X									
	34	Z2	Component Diagram			X	X	X								
	35	Z3	Component Diagram			X	X	X								
	36	Z4	Component Diagram			X		X								
B																
C																
D																
E																
F																
	0	AS BUILT	10.10.2018	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 BUSBAR RELAY PANEL (=D00+R7) LIST OF CONTENTS	Drawing no. P60194-E-DBR-SC-001						
	REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type AA2	Sheet no. 03				

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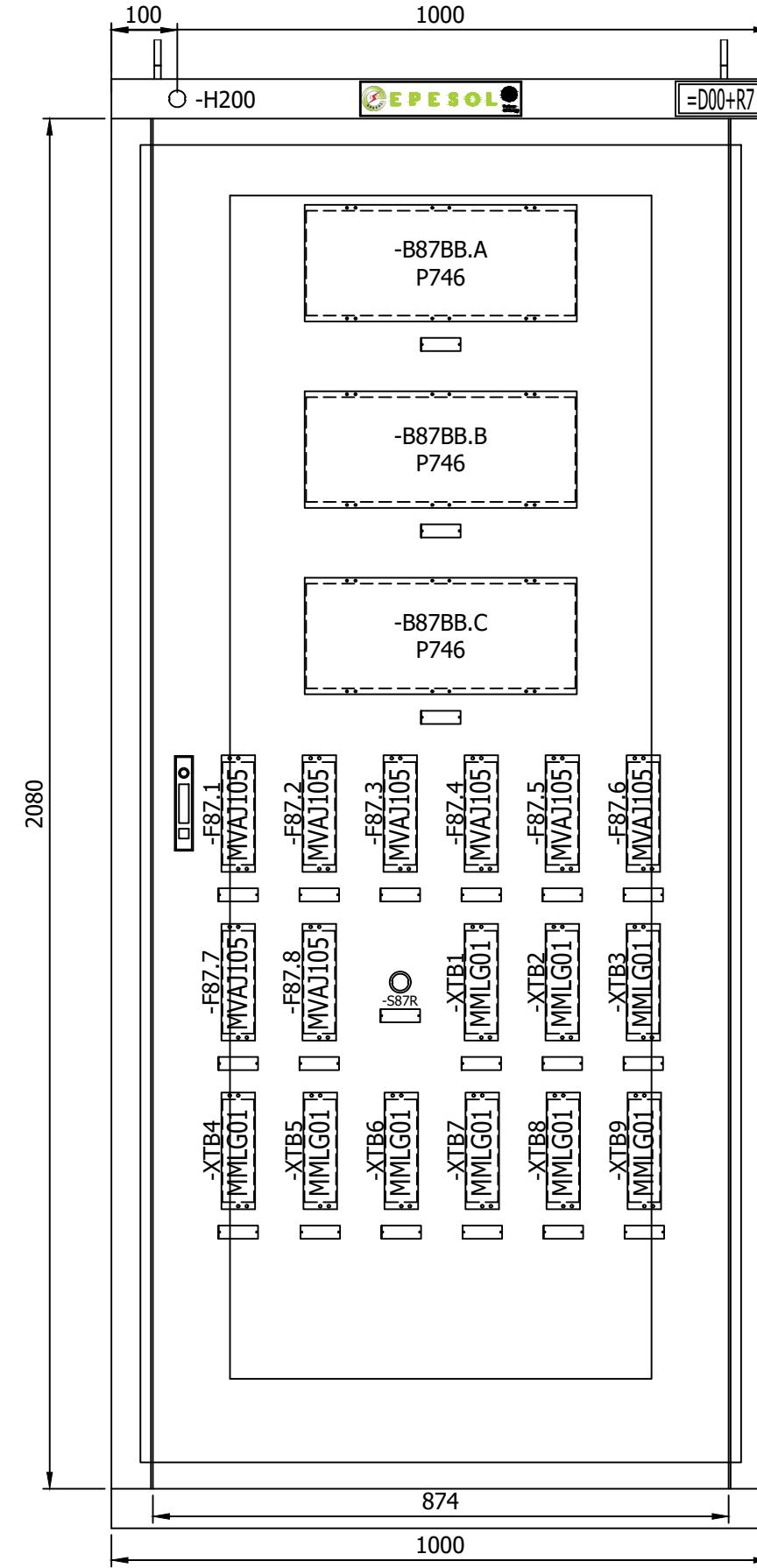
	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
A		CIRCUIT BREAKER		MINIATURE CIRCUIT BREAKER		AUXILIARY CONTACTOR NO+NC	21	DISTANCE
B		SWITCH/ISOLATOR		KEY OPERATED SELECTOR SWITCH		AMMETER	24	OVEREXCITATION
C		EARTHING		LIMITED SWITCH		VOLTMETER	25	SYNCHROCHECK
D		SF6 TO 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

0	AS BUILT	10.10.2018	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 BUSBAR RELAY PANEL (=D00+R7) SYMBOLS AND LEGENDS	Drawing no. P60194-E-DBR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194 Sheet type AB Sheet no. 04

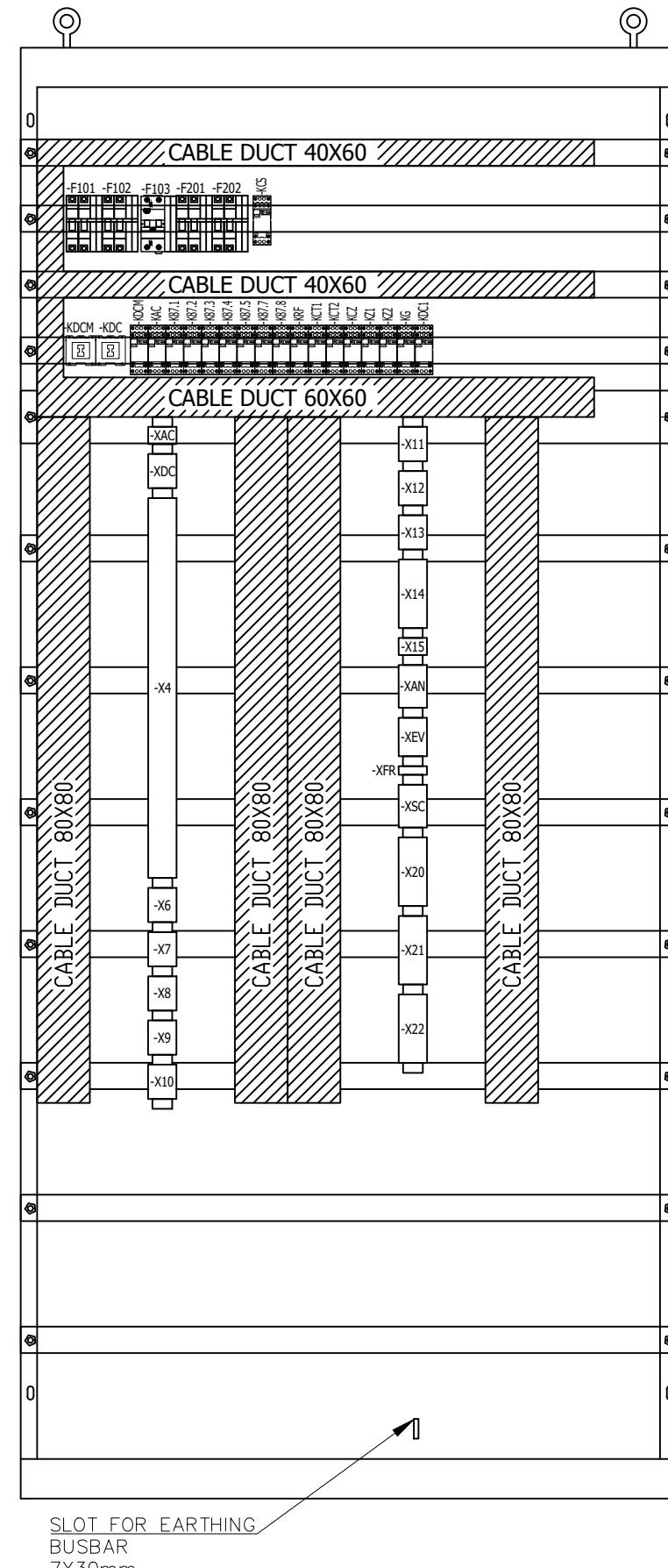
	1	2	3	4	5	6	7	8		
	QTY.	DEVICE DESCRIPTION	DEVICE SPECIFICATIONS DEVICE TYPE ; TECHNICAL DATA / SPECIFICATIONS			DEVICE DESIGNITION	MANUFACTURER			
A	03	BUSBAR DIFFERENTIAL PROTECTION	P746, Cortec: P746-91BK6M0030K Supply: 110-250VDC / 100-240VAC@50Hz, In=1A/5A, Vn=(100/120V) (18CT/3VT) 40 Opto Inputs, 24 Relay Outputs			-B87BB.A,-B87BB.B,-B87BB.C	GE			
	09	TEST BLOCK	MMLG01, Cortec: MMLG01-R1AA9002D			-XTB1,-XTB2,-XTB3,-XTB4,-XTB5,-XTB6,-XTB7,-XTB8,-XTB9	GE			
	08	TRIPPING RELAY (HAND/ELECTRICAL RESET)	MVAJ105, Cortec: MVAJ105-RA1002A Supply: 220-250VDC, 8 NO + 2 NC Contacts			-F87.1,-F87.2,-F87.3,-F87.4,-F87.5,-F87.6,-F87.7,-F87.8	GE			
B	02	CONTROL MCB - PANEL LIGHT & HEATER	2-Pole, Ratings: 2A, 240VAC, 10kA @ 240VAC, 2 C/O Contacts, Ord: G62C02+CAH(2)			-F101-102	GE			
	01	CONTROL ELCB - PANEL SOCKET	2-Pole, Ratings: 16A, 30mA, 240VAC, 1P+N, 2 C/O Contacts, Ord: DM100C16/030+CAH(2)			-F103	GE			
	02	CONTROL MCB - DC DISTRIBUTION	2-Pole, Ratings: 4A, 250VDC, 10kA @ 250VDC, 2 C/O Contacts, Ord: EP102UCC04+CAH(2)			-F201-202	GE			
C	01	PUSHBUTTON - PROTECTION TRIP RESET	Type: Switch (A Type), Color : BLACK , Supply : 220VDC, Ord: YS-AP1-2-31-B-D-W			-S86	YONGSUNG			
	01	INDICATION LAMP - DC SUPPLY FAILURE	Type: Integrated LED, Color : RED , Supply : 230VAC @ 50Hz, Ord: YS-PL-2-AL-22-R-W			-H200	YONGSUNG			
	01	AUXILIARY CONTACTOR - SUPPLY CHANGE OVER	Coil Voltage: 220VDC, 16A, 3 NO + 3 NC Contacts, Ord: MCRC022ATWN+MARN211AT			-KCS	GE			
D	02	CONTACTOR RELAY	Coil Voltage: 230VAC @ 50/60 Hz, 6A, 4 C/O Contacts, Ord: PRC4M40ANL			-KACM, -KDC	GE			
	17	CONTACTOR RELAY	Coil Voltage: 220VDC, DIODE, 4 C/O Contacts, Ord: PRC4M40DCML			-KDCM, -KAC, -K87.1, -K87.2, -K87.3, -K87.4, -K87.5, -K87.7,	GE			
						-K87.8, -KRF, -KCT1, -KCT2, -KCZ, -KZ1, -KZ2, -KG, -KDC1				
E	04	TERMINAL BLOCKS - AC SUPPLY DISTRIBUTION	Screw-type, Feed Through Terminal, CBD-4			-XAC	CABUR			
	08	TERMINAL BLOCKS - DC SUPPLY DISTRIBUTION	Screw-type, Feed Through Terminal, CBD-4			-XDC	CABUR			
	72	TERMINAL BLOCKS - CT INPUTS	Screw-type, Feed Through Terminal, SCB-6			-X4	CABUR			
F	64	TERMINAL BLOCKS - ISO. & CB. INPUTS	Screw-type, Feed Through Terminal, CBD-4			-X6, -X7, -X8, -X9, -X10, -X11, -X12, -X13	CABUR			
	16	TERMINAL BLOCKS - BREAKER FAILURE INITIALIZATION	Screw-type, Feed Through Terminal, CBD-4			-X14	CABUR			
	16	TERMINAL BLOCKS - AUTO RECLOSER BLOCK	Screw-type, Feed Through Terminal, CBD-4			-X15	CABUR			
G	10	TERMINAL BLOCKS - ANNUNCIATION SIGNALS	Screw-type, Feed Through Terminal, CBD-4			-XAN	CABUR			
	09	TERMINAL BLOCKS - EVENT RECORDER	Screw-type, Feed Through Terminal, CBD-4			-XEV	CABUR			
	02	TERMINAL BLOCKS - FAULT RECORDER	Screw-type, Feed Through Terminal, CBD-4			-XFR	CABUR			
H	10	TERMINAL BLOCKS - SCADA	Screw-type, Feed Through Terminal, CBD-4			-XSC	CABUR			
	16	TERMINAL BLOCKS - CLOSE BLOCK	Screw-type, Feed Through Terminal, CBD-4			-X20	CABUR			
	152	TERMINAL BLOCKS - TRIP CIRCUIT	Screw-type, Feed Through Terminal, CBD-4			-X21, -X22, -X23, -X24, -X25, -X26, -X27, -X28	CABUR			
I	37	TERMINAL BLOCKS - SPARE	Screw-type, Feed Through Terminal, CBD-4			-X	CABUR			
	01	PANEL LIGHT	230VAC @ 50Hz, 05W, Ord: YS-T8-30-5W			-H100	YONGSUNG			
	01	DOOR SWITCH	230VAC @ 50Hz, 1 NO Contact, Ord: YS P3315GW-B + YS MS-C			-S100	YONGSUNG			
J	01	THREE PIN SOCKET	1N+PE, 16A, 230VAC @ 50Hz			-X100	LOCAL			
	01 / 01	PANEL HEATER / HUMIDITY & TEMPERATURE CONTROLLER	230VAC @ 50Hz, 60W / 40-90%RH, 25-50 deg.C, 230VAC @ 50Hz			-R100 / -B100	E-LABS			
K	0	AS BUILT	10.10.2018	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+R7) COMPONENT LIST	Drawing no. P60194-E-DBR-SC-001
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	REV.	DESCRIPTION	DATE	DRAWER					Sheet type AC	Sheet no. 05

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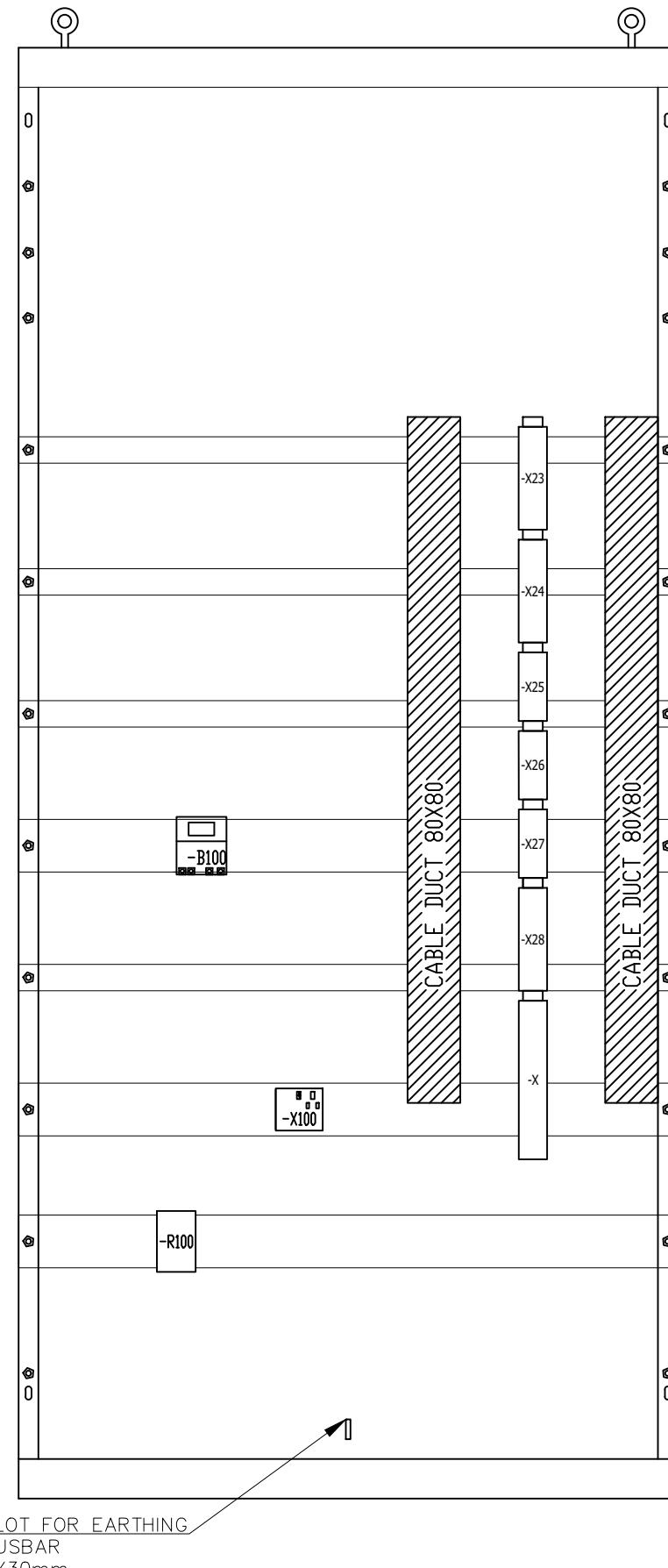
FRONT VIEW

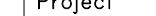


LEFT SIDE VIEW



RIGHT SIDE VIEW



0	AS BUILT	10.10.2018	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 BUSBAR RELAY PANEL (=D00+R7) PANEL VIEW	Drawing no. P60194-E-DBR-SC-001
									Project no. P-60194
									Sheet type AD
REV.	DESCRIPTION	DATE	DRAWER						Sheet no. 06

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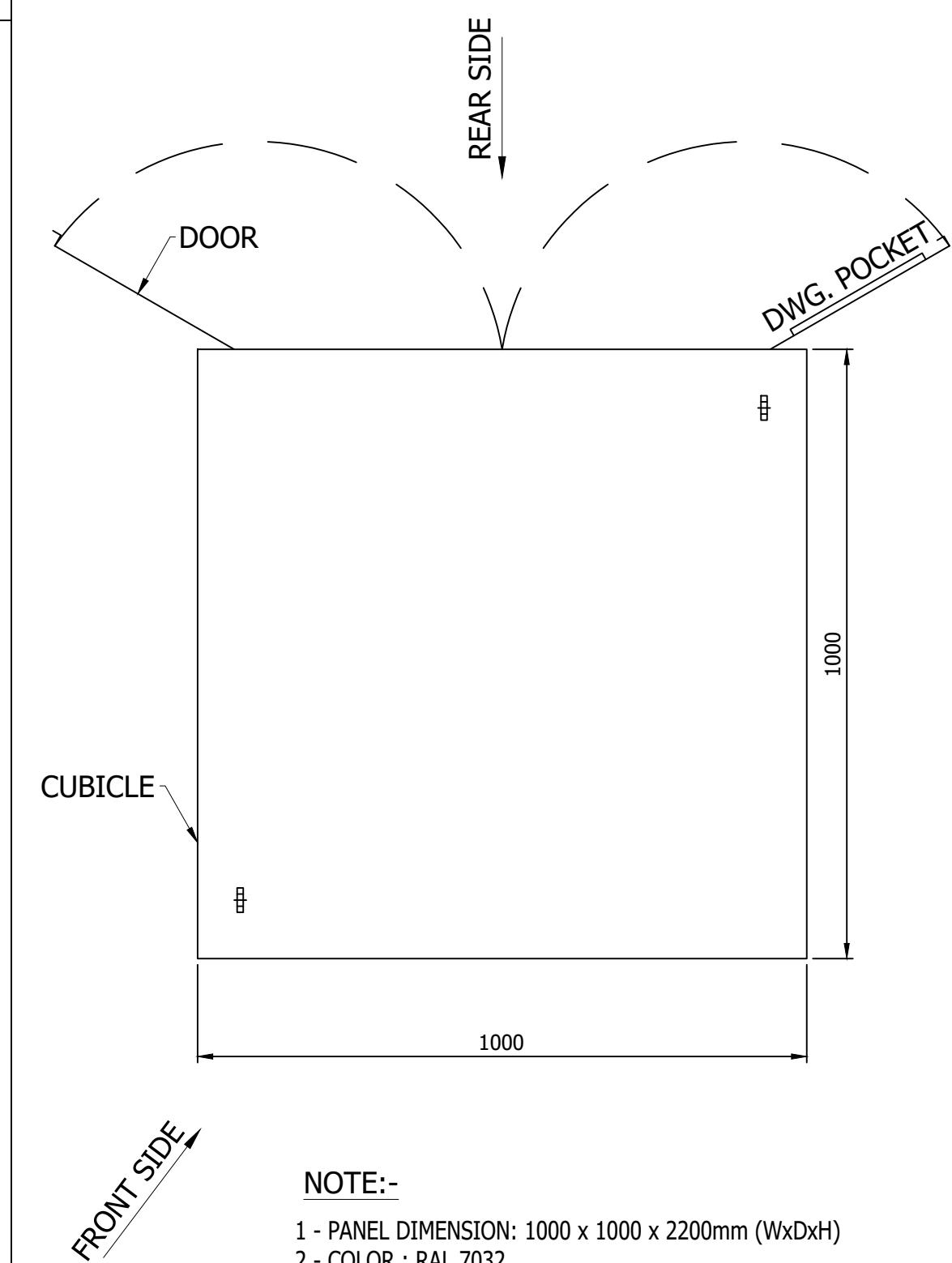
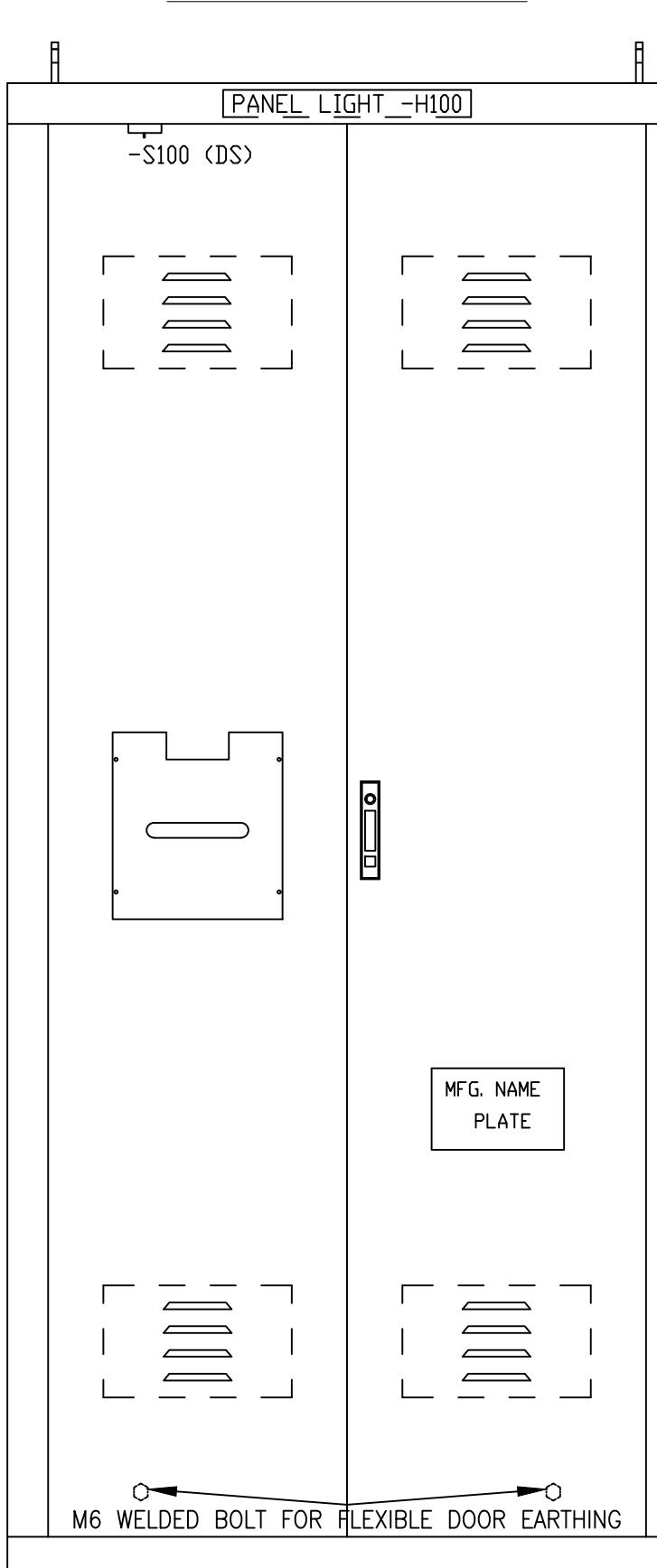
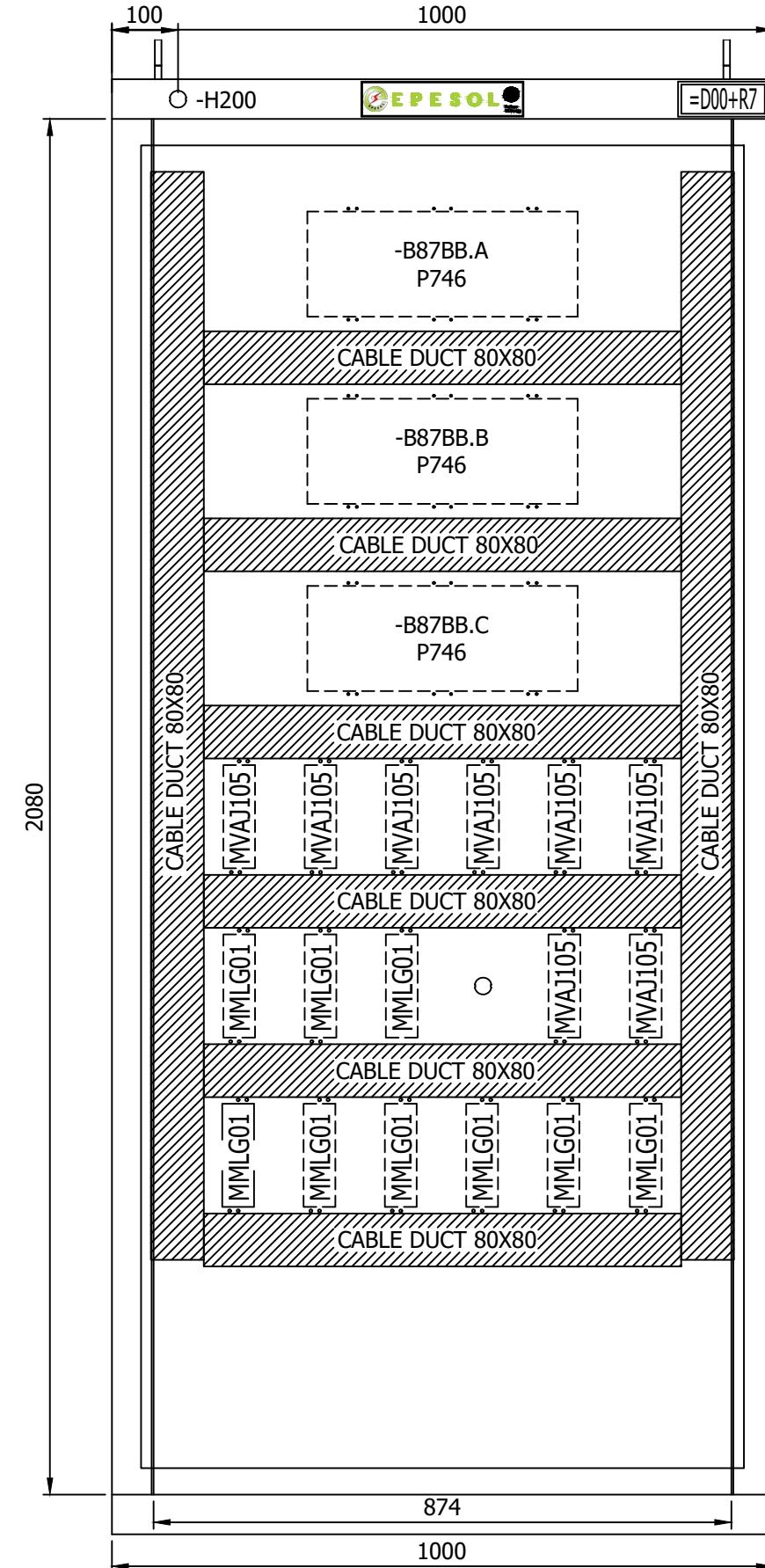
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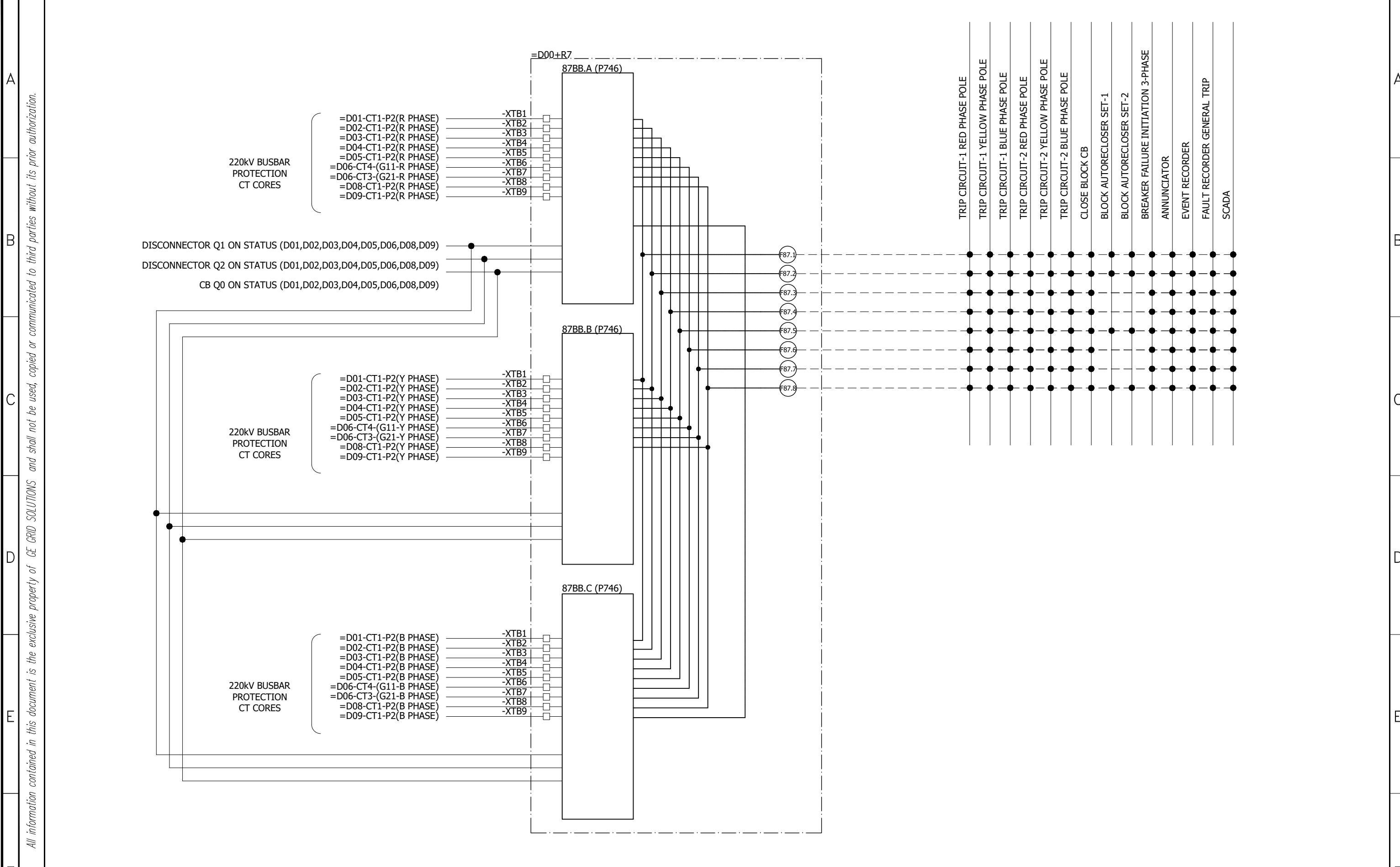
8

FRONT VIEWBACK VIEW WITH DOORTOP VIEWNOTE:-

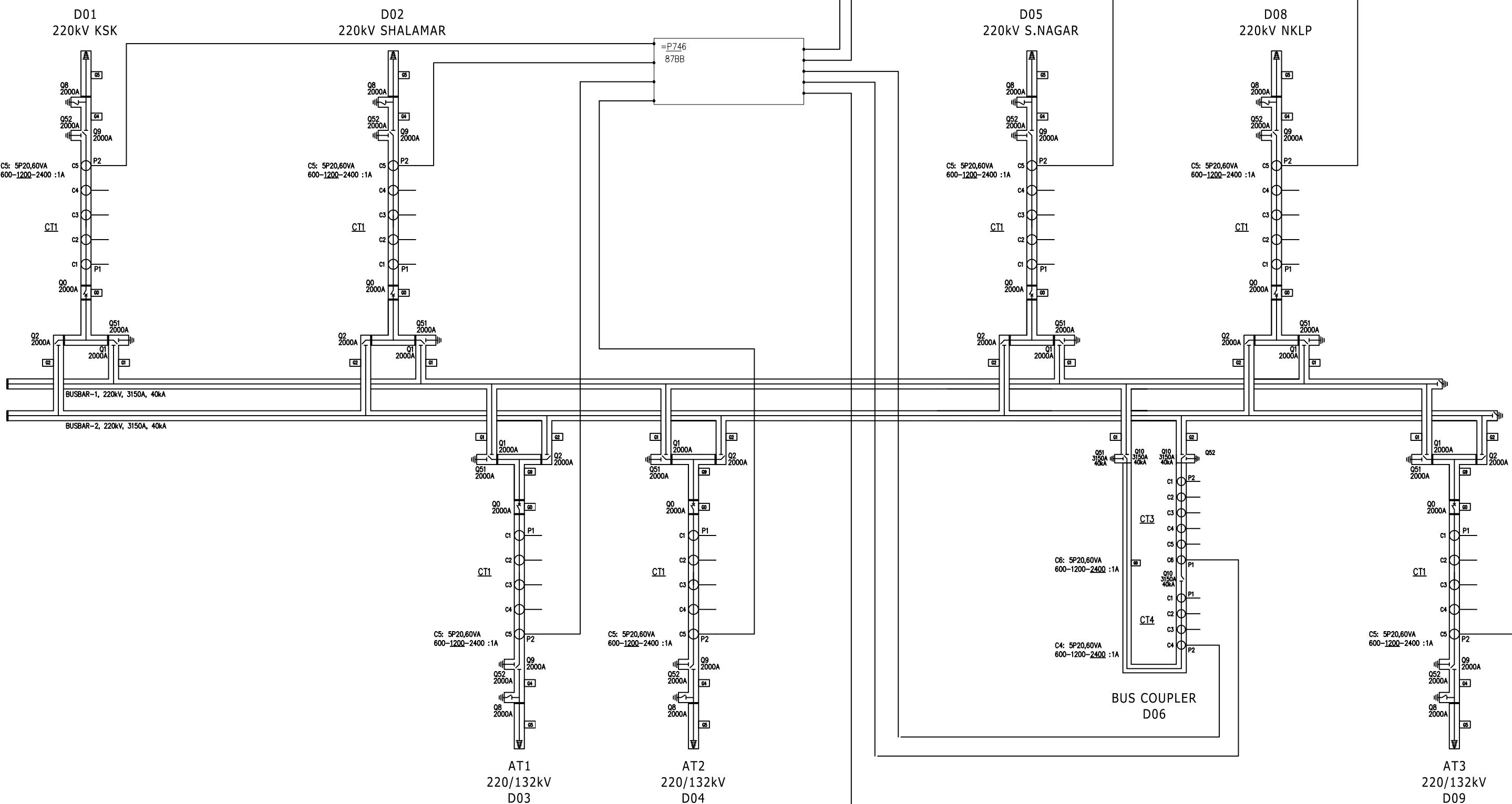
- 1 - PANEL DIMENSION: 1000 x 1000 x 2200mm (WxDxH)
- 2 - COLOR : RAL 7032
- 3 - SHEET THICKNESS : 2-2.5 mm
- 4- PROTECTION CLASS : IP-51 (INDOOR TYPE)
- 5 - ALL DOOR FITTED WITH 16mm EARTH STRAP & INSULATED WITH GREEN-YELLOW COLOUR.

0	AS BUILT	10.10.2018	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 BUSBAR RELAY PANEL (=D00+R7) PANEL VIEW	Drawing no. P60194-E-DBR-SC-001	
REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type AD1	Sheet no. 06a

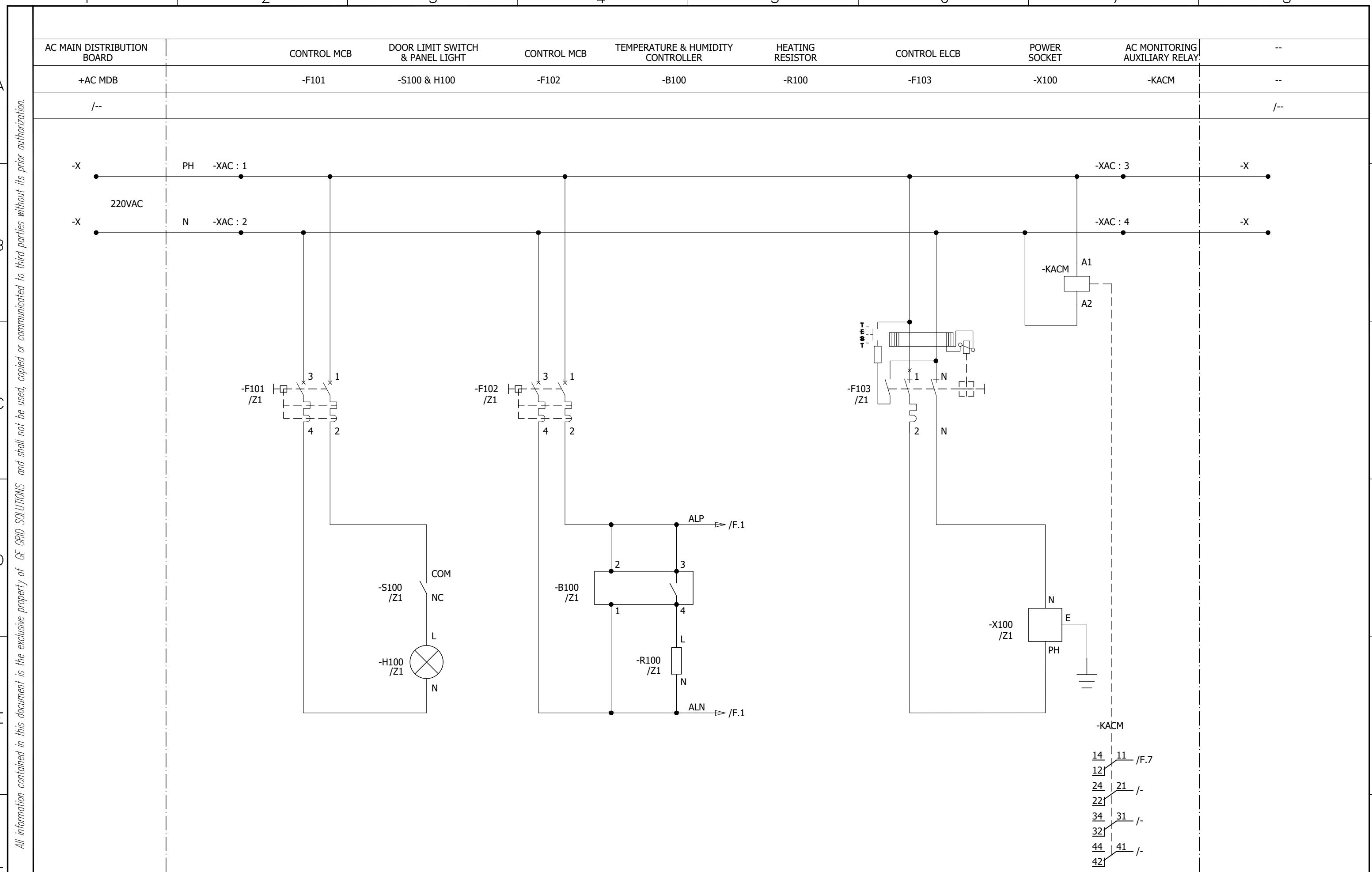
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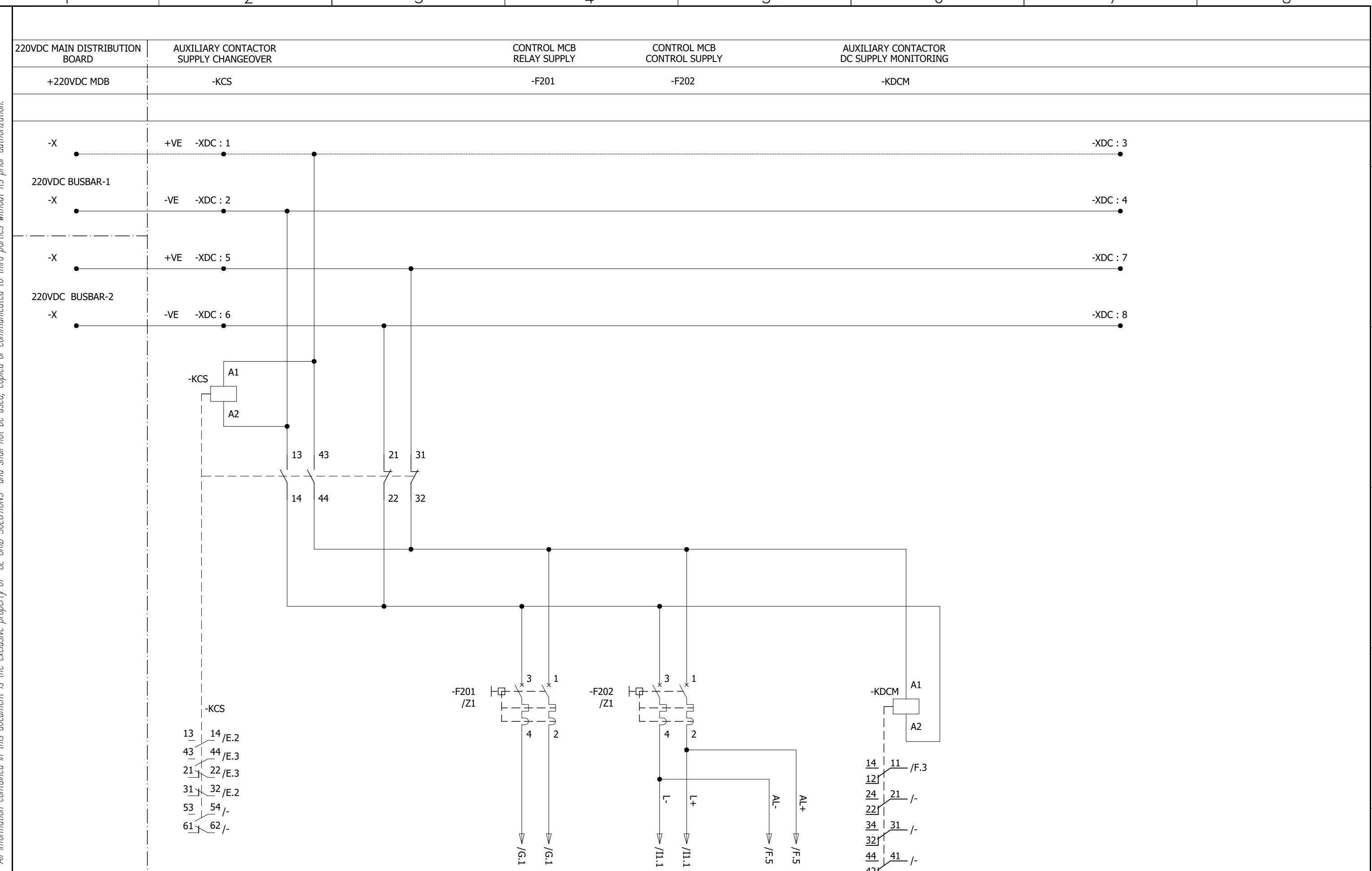
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0	AS BUILT	10.10.2018	ASJ	Manufacturer	Contractor	Client	Project	Title	Drawing no.
				EPE SOL 7-B Garden Block, New Garden Town, Lahore, Pakistan	Grid Solutions A GE and Alstom joint venture	NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	220KV BUSBAR RELAY PANEL (=D00+R7) BAY CONCEPT & PROTECTION LOGICS	P-60194-E-DBR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. Sheet type Sheet no.



0	AS BUILT		10.10.2018	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 BUSBAR RELAY PANEL (=D00+R7) AC SUPPLY DISTRIBUTION	Drawing no. P60194-E-DBR-SC-001		
REV.	DESCRIPTION		DATE	DRAWER						Project no. P-60194	Sheet type D	Sheet no. 09
1	2	3	4	5	6	7	8					



0	AS BUILT	10.10.2018	ASJ	Manufacturer  EPESOL 7-E 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 220/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV BUSBAR RELAY PANEL (=D00+R7) DC SUPPLY DISTRIBUTION	Drawing no.		
									P60194-E-DBR-SC-001		
									Project no.	Sheet type	
									P-60194	E	
REV.	DESCRIPTION	DATE	DRAWER						Sheet no.	10	

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220V DC CIRCUIT FAULTY

220V DC CIRCUIT FAULTY INDICATION

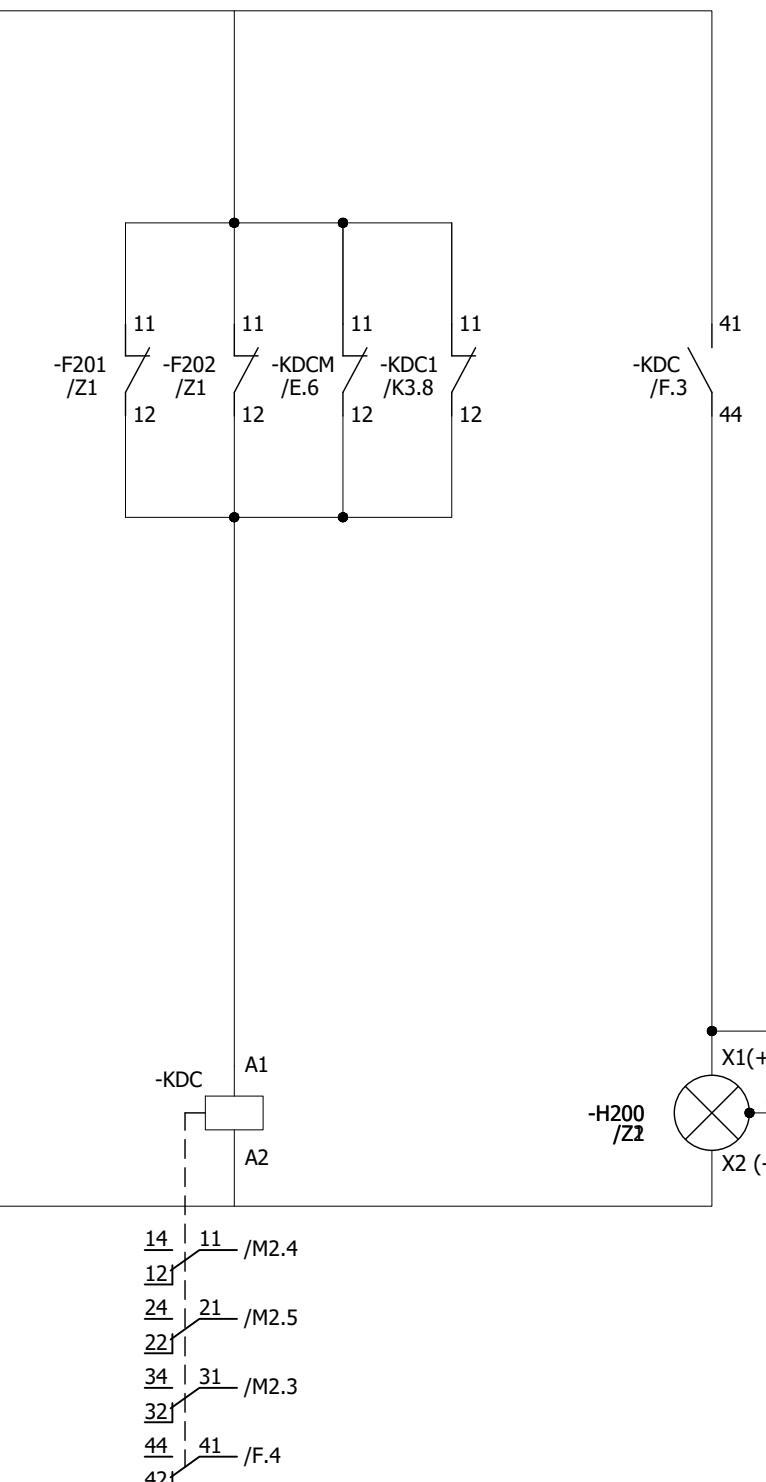
220V AC CIRCUIT FAULTY

-KDC

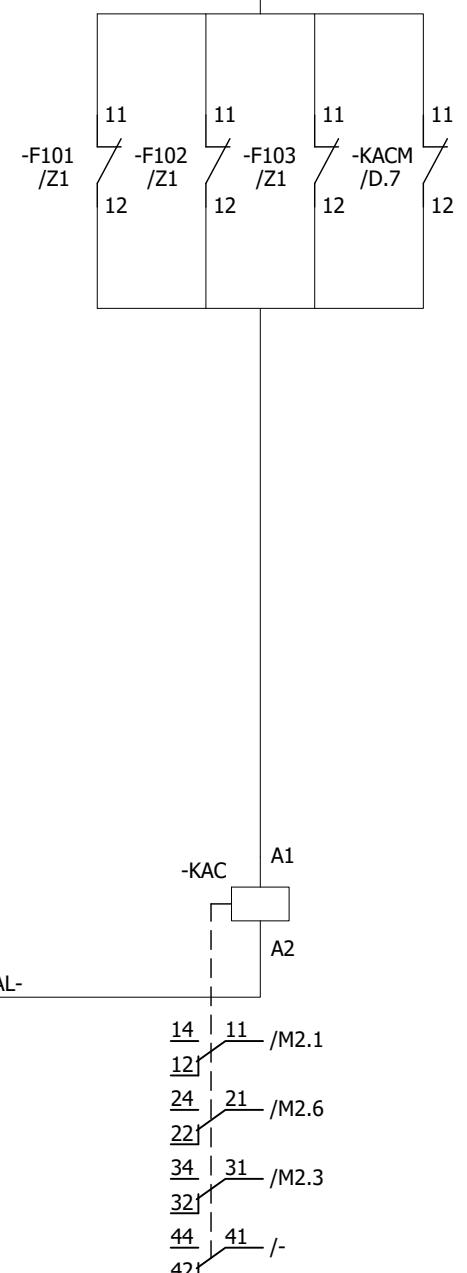
-H200

-KAC

/D.5 ➔ ALP



/E.5 ➔ AL+



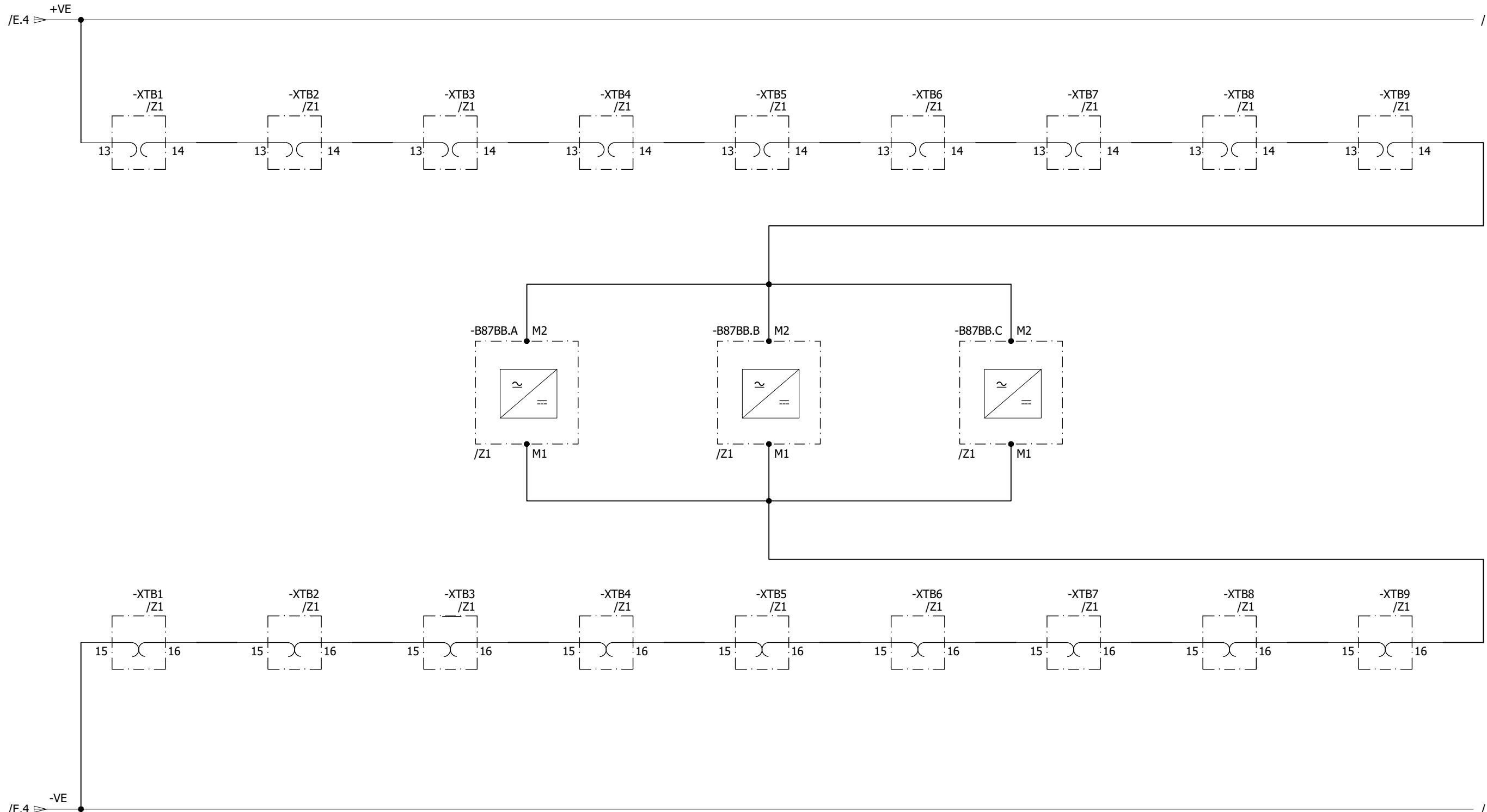
/D.5 ➔ ALN

F

0	AS BUILT	10.10.2018	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 BUSBAR RELAY PANEL (=D00+R7) AC/DC SUPPLY FAILURE CIRCUIT	Drawing no. P60194-E-DBR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type F
									Sheet no. 11

BUSBAR DIFFERENTIAL PROTECTION

RELAY SUPPLY



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A

A

B

B

C

C

D

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0	AS BUILT	10.10.2018	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 BUSBAR RELAY PANEL (=D00+R7) RELAY SUPPLY	Drawing no. P60194-E-DBR-SC-001
									Project no. P-60194
	DESCRIPTION	DATE	DRAWER						Sheet type G
REV.									Sheet no. 12

TEST BLOCK

BUSBAR DIFFERENTIAL
PROTECTION RELAY

-XTB1,-XTB2

-B87BB.A,-B87BB.B,-B87BB.C

/Z1

/Z2,Z3,Z4

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A

A

B

B

C

C

D

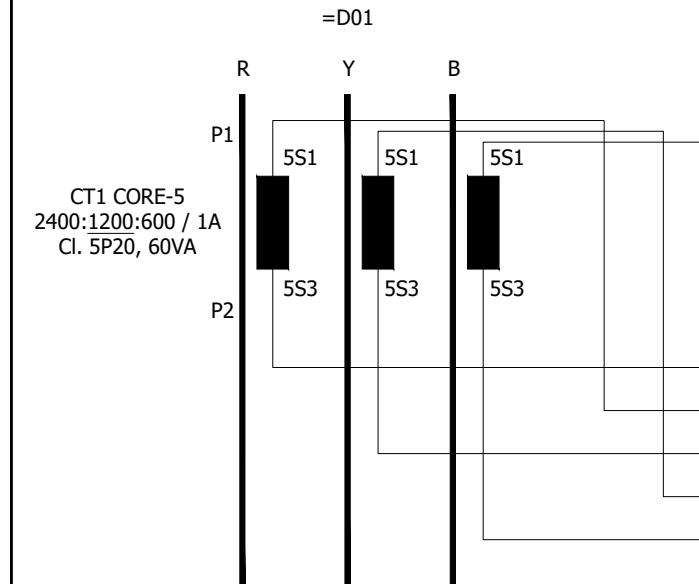
D

E

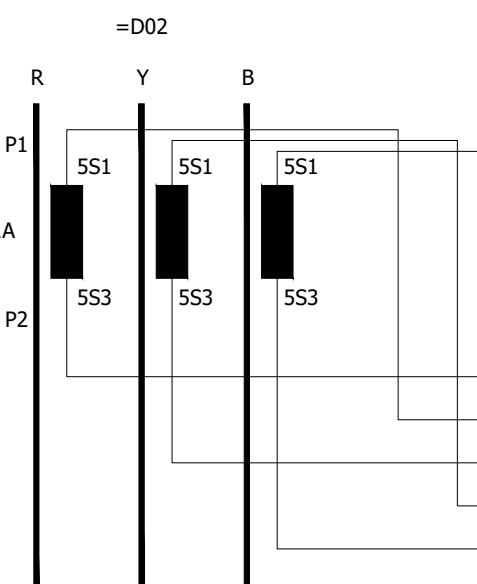
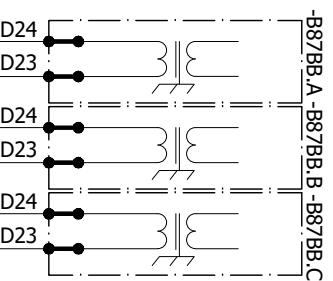
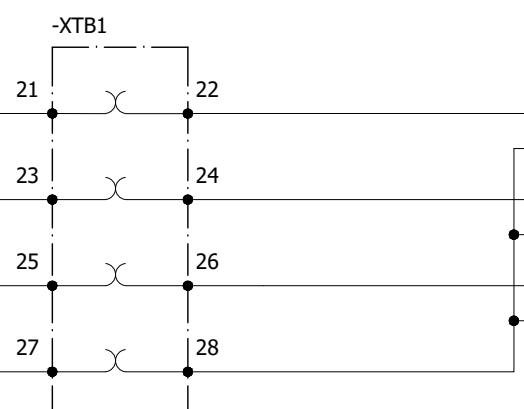
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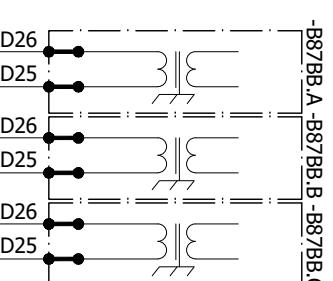
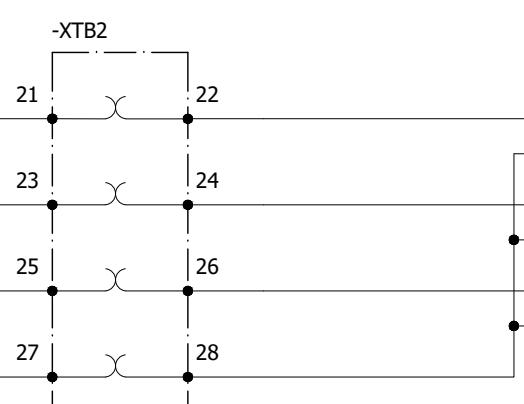
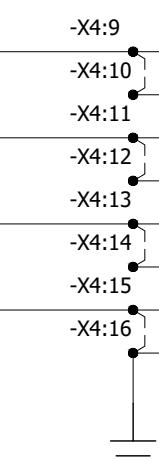
F

220KV GIS HALLCONTROL ROOM

=D01+GISLCC
220KV GIS LCC PANEL
/S82



=D02+GISLCC
220KV GIS LCC PANEL
/S82



0	AS BUILT	10.10.2018	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 BUSBAR RELAY PANEL (=D00+R7) DIFFERENTIAL PROTECTION CT CIRCUIT	Drawing no. P60194-E-DBR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type H1
									Sheet no. 13

TEST BLOCK

BUSBAR DIFFERENTIAL PROTECTION RELAY

-XTB3,-XTB4

-B87BB.A,-B87BB.B,-B87BB.C

/Z1

/Z2,Z3,Z4

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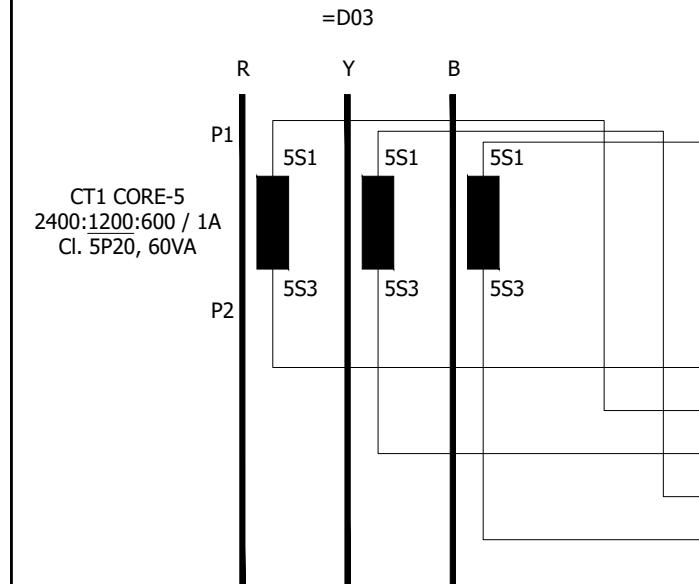
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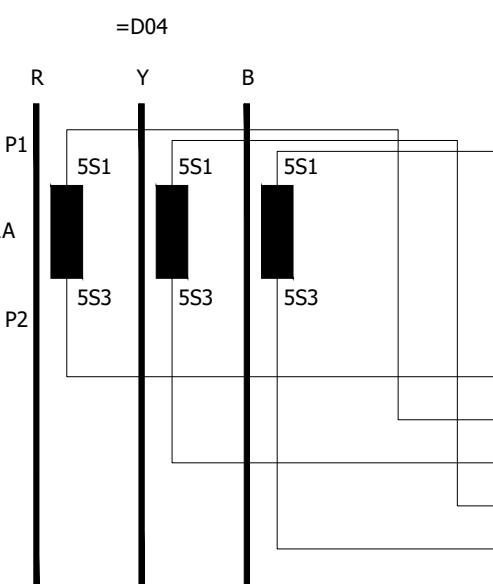
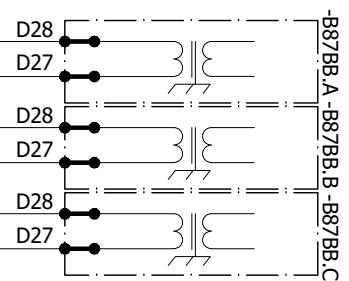
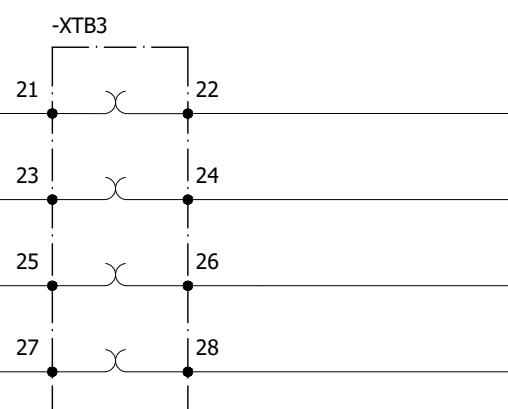
F

F

220KV GIS HALLCONTROL ROOM

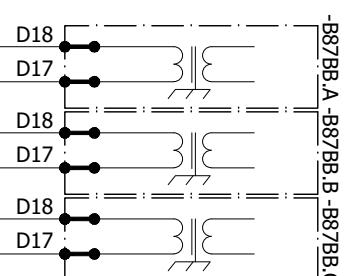
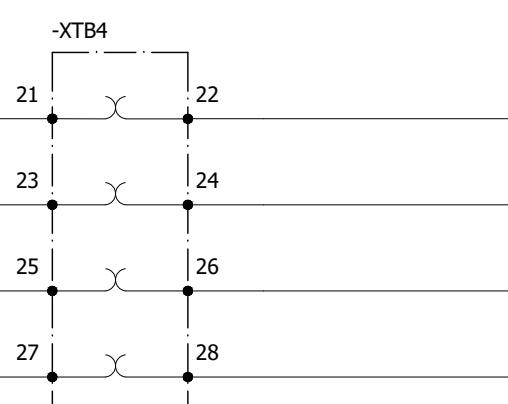
=D03+GISLCC
220KV GIS LCC PANEL
/S82

-X1I:36
-X1I:35
-X1I:38
-X1I:37
-X1I:40
-X1I:39
-X1I:34
-X1I:33



=D04+GISLCC
220KV GIS LCC PANEL
/S82

-X1I:36
-X1I:35
-X1I:38
-X1I:37
-X1I:40
-X1I:39
-X1I:34
-X1I:33



REV.

0

AS BUILT

10.10.2018

ASJ

DESCRIPTION

DATE

DRAWER

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TEST BLOCK

BUSBAR DIFFERENTIAL PROTECTION RELAY

-XTB5,-XTB6

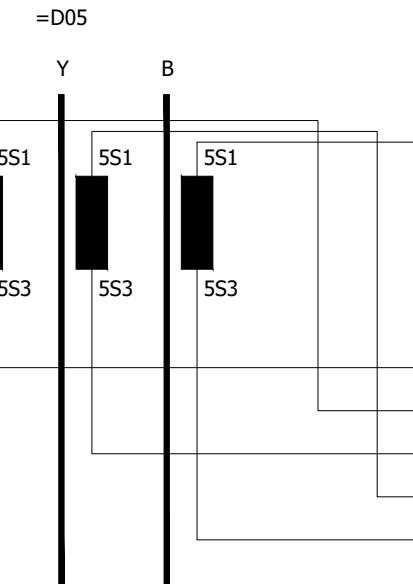
-B87BB.A,-B87BB.B,-B87BB.C

/Z1

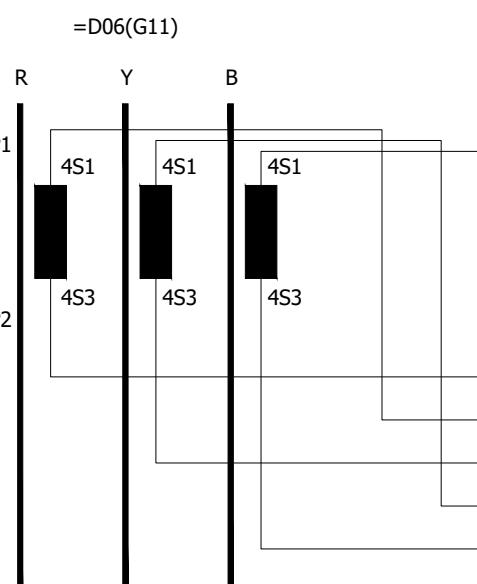
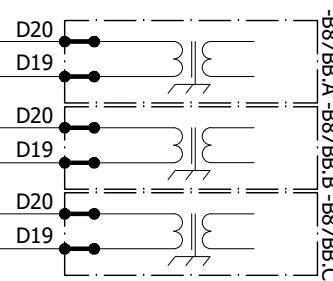
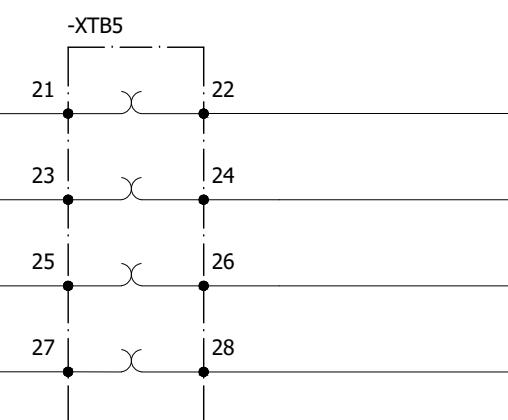
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220kV GIS HALL

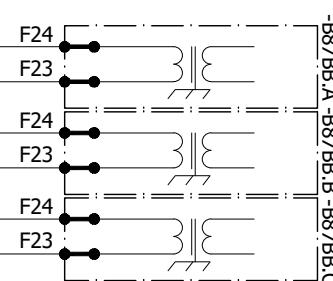
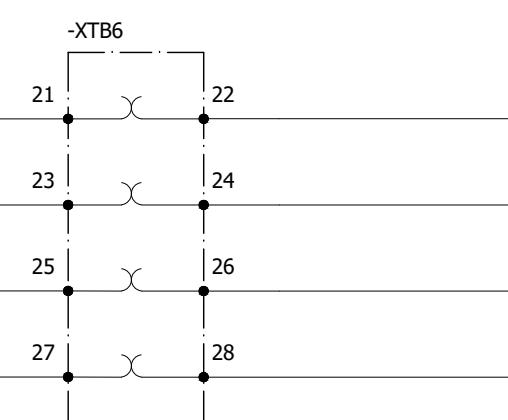
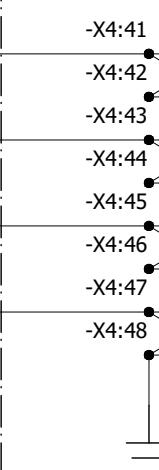
CONTROL ROOM



=D05+GISLCC
220kV GIS LCC PANEL
/S82



=D06+GISLCC
220kV GIS LCC PANEL
/S80



0	AS BUILT	10.10.2018	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 BUSBAR RELAY PANEL (=D00+R7) DIFFERENTIAL PROTECTION CT CIRCUIT	P-60194-E-DBR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194 Sheet type H3 Sheet no. 15

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TEST BLOCK

BUSBAR DIFFERENTIAL PROTECTION RELAY

-XTB7,-XTB8

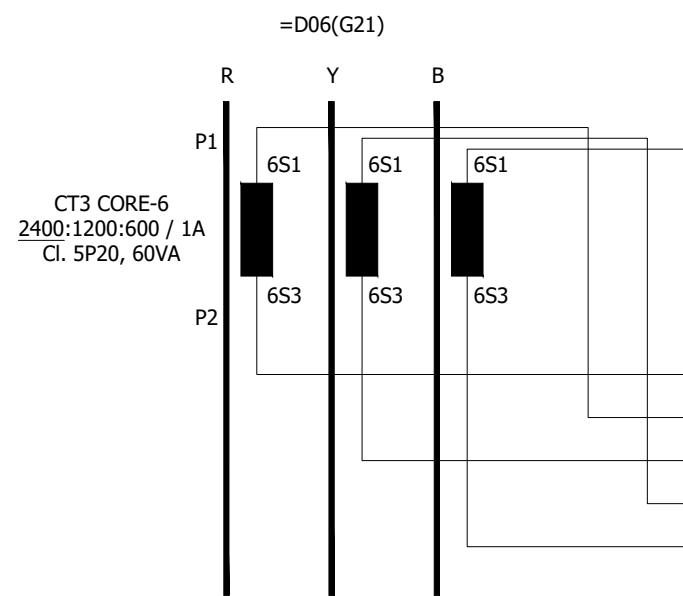
-B87BB.A,-B87BB.B,-B87BB.C

/Z1

/Z2,Z3,Z4

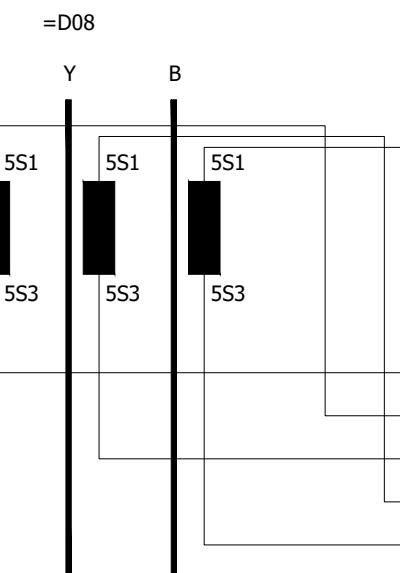
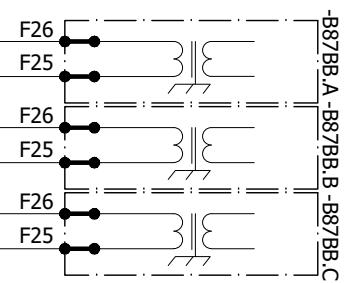
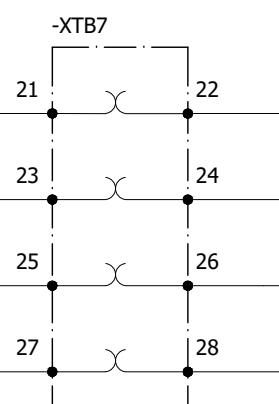
220KV GIS HALL

CONTROL ROOM



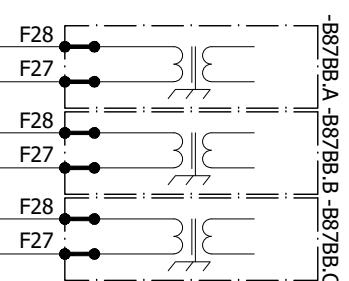
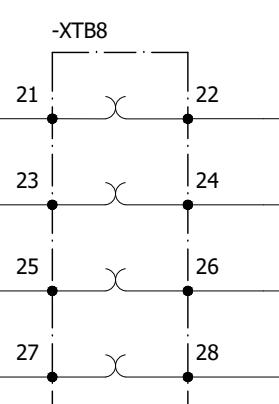
=D06+GISLCC
220KV GIS LCC PANEL
/S84

-X3I:44
-X3I:43
-X3I:46
-X3I:45
-X3I:48
-X3I:47
-X3I:42
-X3I:41



=D08
220KV GIS LCC PANEL
/S82

-X1I:36
-X1I:35
-X1I:38
-X1I:37
-X1I:40
-X1I:39
-X1I:34
-X1I:33



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0	AS BUILT	10.10.2018	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 BUSBAR RELAY PANEL (-D00+R7) DIFFERENTIAL PROTECTION CT CIRCUIT	Drawing no. P60194-E-DBR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type H4
									Sheet no. 16

TEST BLOCK

BUSBAR DIFFERENTIAL
PROTECTION RELAY

-XTB9

-B87BB.A,-B87BB.B,-B87BB.C

/Z1

/Z2,Z3,Z4

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0	AS BUILT	10.10.2018	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 BUSBAR RELAY PANEL (=D00+R7) DIFFERENTIAL PROTECTION CT CIRCUIT	Drawing no. P60194-E-DBR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194

220KV POWER EQUIPMENT STATUS SIGNALS

=D01

=D01

=D01

=D02

=D02

=D02

Q1

Q2

Q0

Q1

Q2

Q0

CLOSE

CLOSE

RED POLE CLOSE

YELLOW POLE CLOSE

BLUE POLE CLOSE

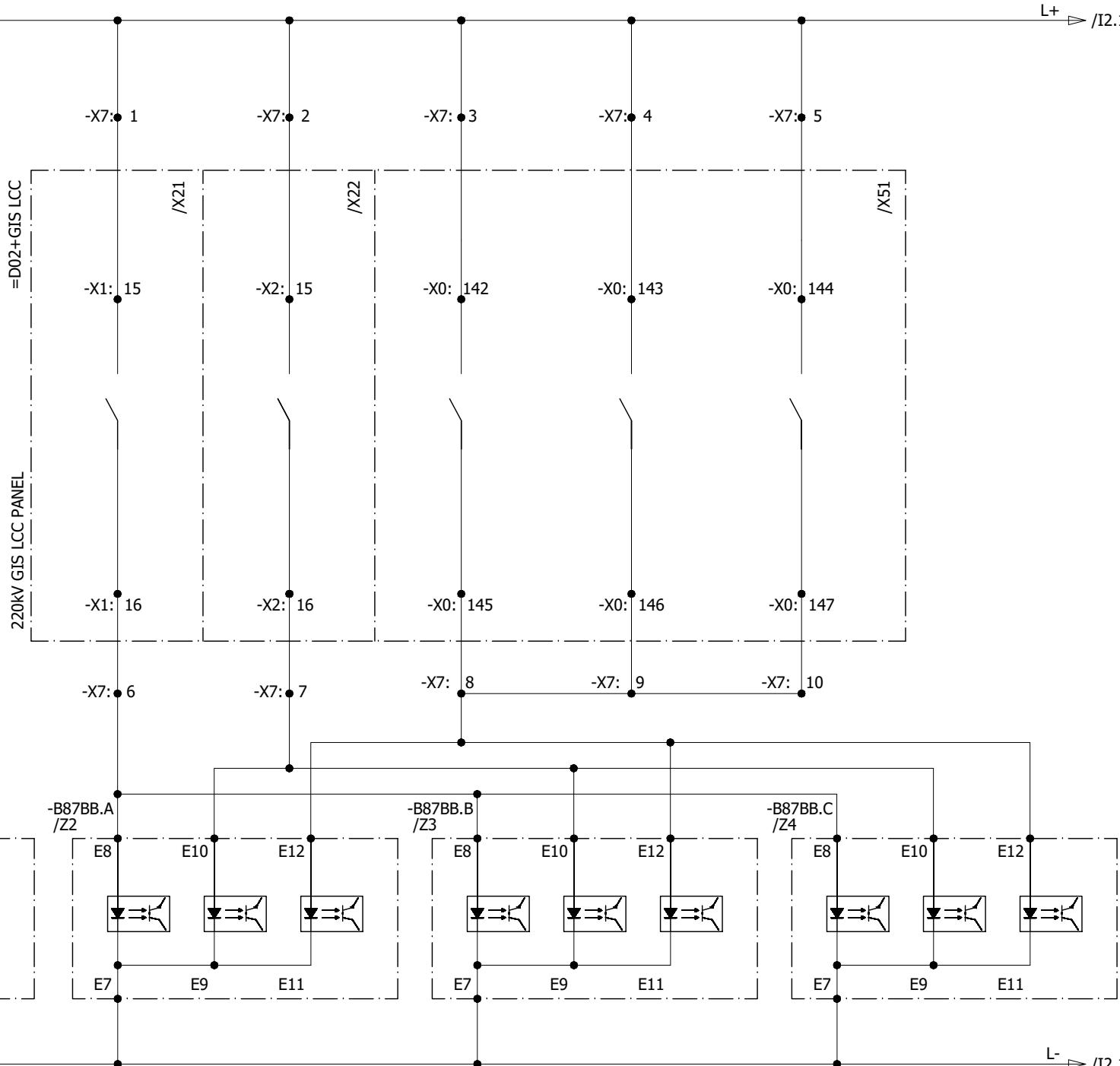
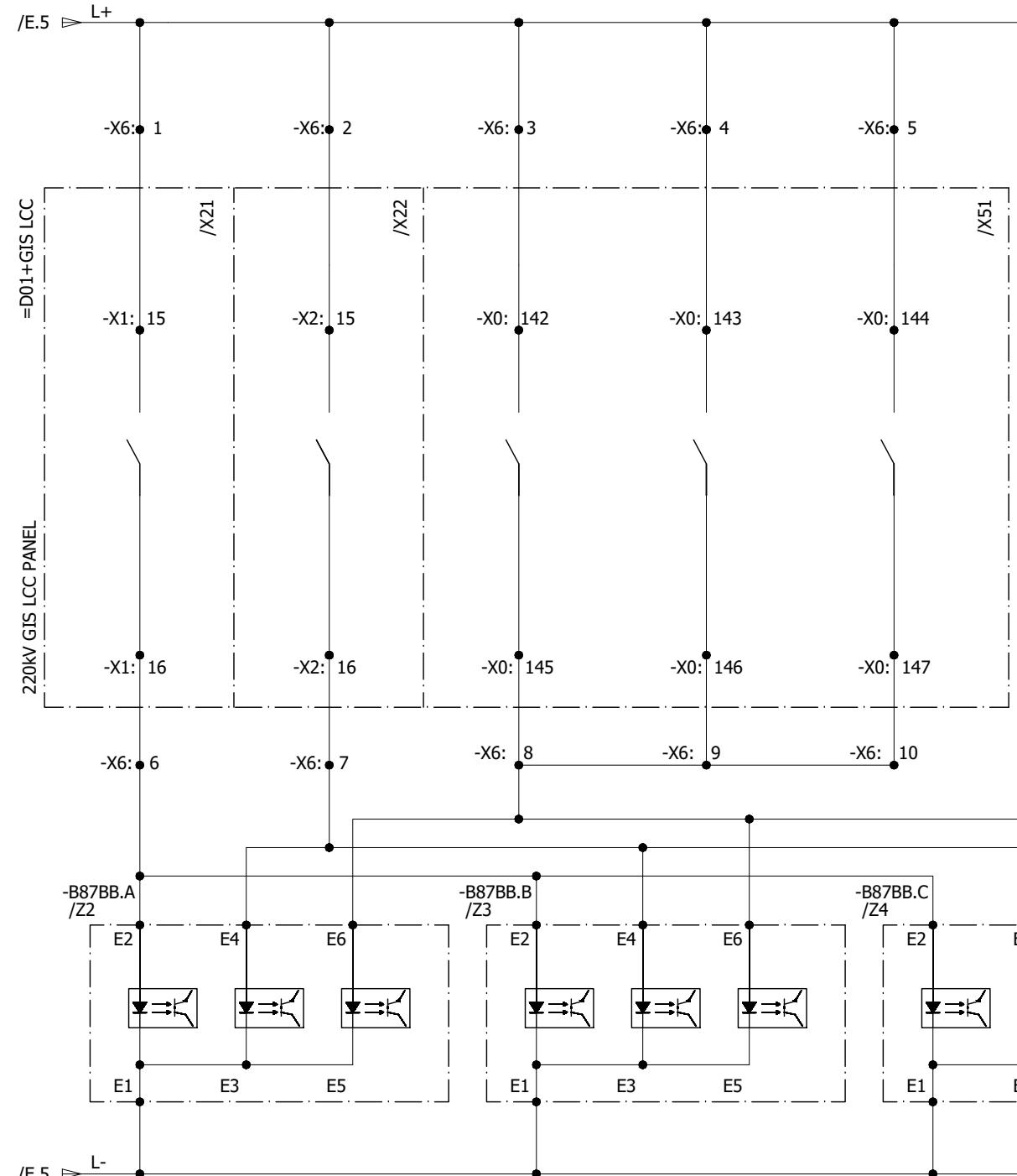
CLOSE

CLOSE

RED POLE CLOSE

YELLOW POLE CLOSE

BLUE POLE CLOSE



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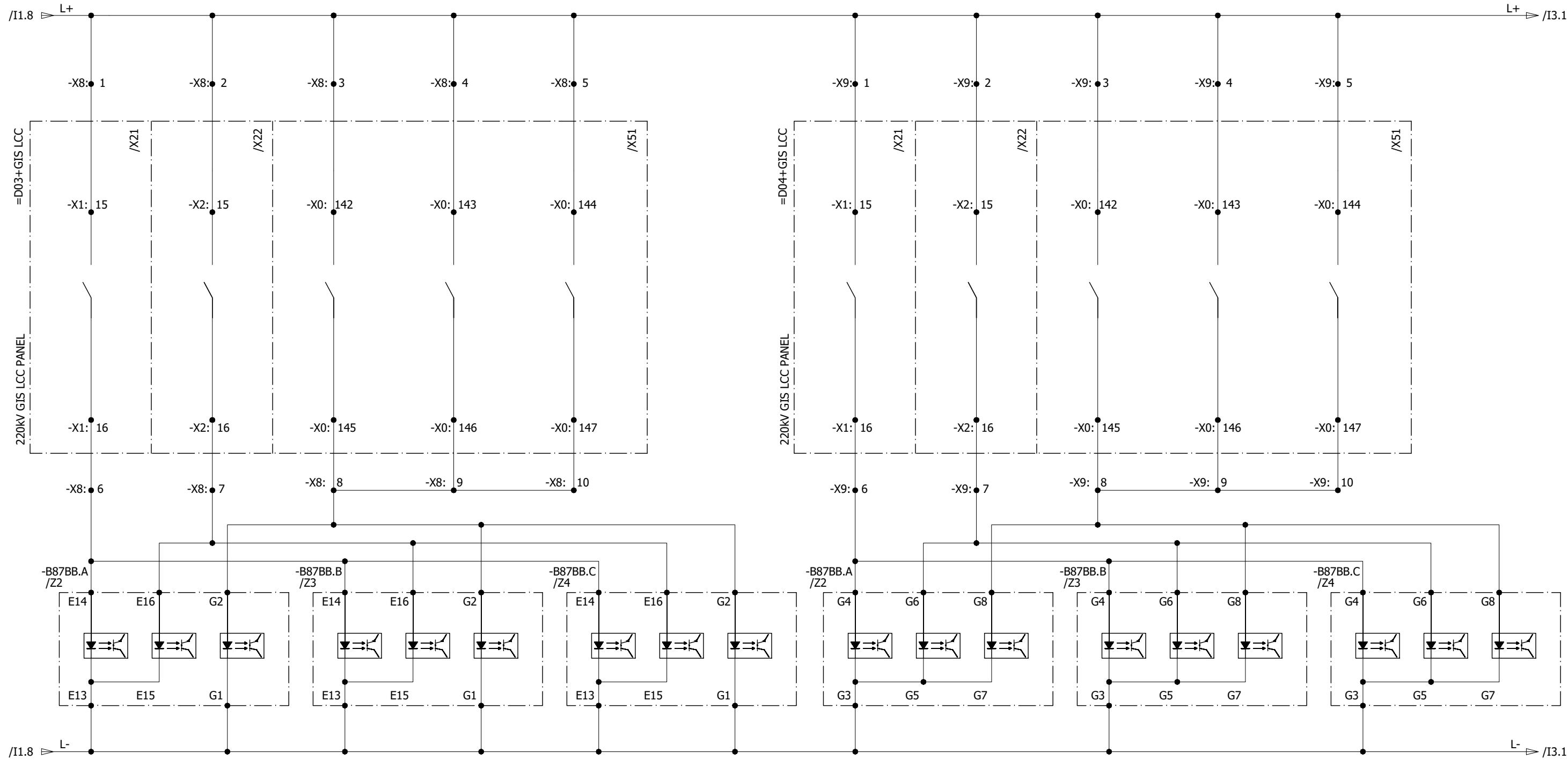
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0	AS BUILT	10.10.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV BUSBAR RELAY PANEL (=D00+R7) POWER EQUIPMENT INPUTS	Drawing no. P60194-E-DBR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type I1
									Sheet no. 18

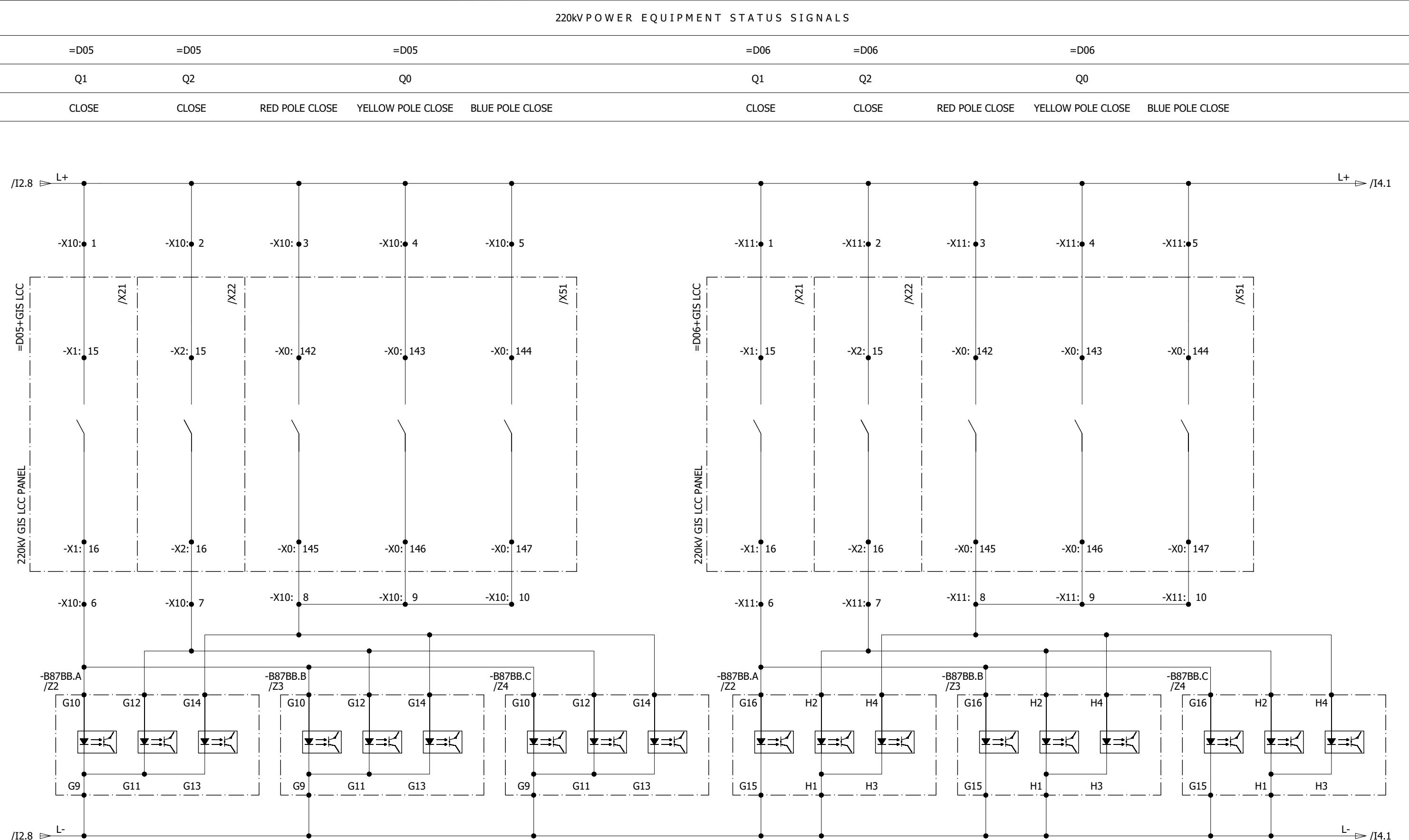
220KV POWER EQUIPMENT STATUS SIGNALS

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A	=D03	=D03	=D03	=D04	=D04	=D04	A
	Q1	Q2	Q0		Q1	Q2	
	CLOSE	CLOSE	RED POLE CLOSE	YELLOW POLE CLOSE	BLUE POLE CLOSE	CLOSE	CLOSE



0	AS BUILT	10.10.2018	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 220/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV BUSBAR RELAY PANEL (=D00+R7) POWER EQUIPMENT INPUTS	Drawing no. P60194-E-DBR-SC-001		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type I2	Sheet no. 19
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0	AS BUILT	10.10.2018	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 220/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV BUSBAR RELAY PANEL (=D00+R7) POWER EQUIPMENT INPUTS	Drawing no. P60194-E-DBR-SC-001	
									Project no. P-60194	
REV.	DESCRIPTION	DATE	DRAWER						Sheet type I3	Sheet no. 20

220KV POWER EQUIPMENT STATUS SIGNALS

=D08

=D08

=D08

=D09

=D09

=D09

A

Q1

Q2

Q0

Q1

Q2

Q0

A

CLOSE

CLOSE

RED POLE CLOSE

YELLOW POLE CLOSE

BLUE POLE CLOSE

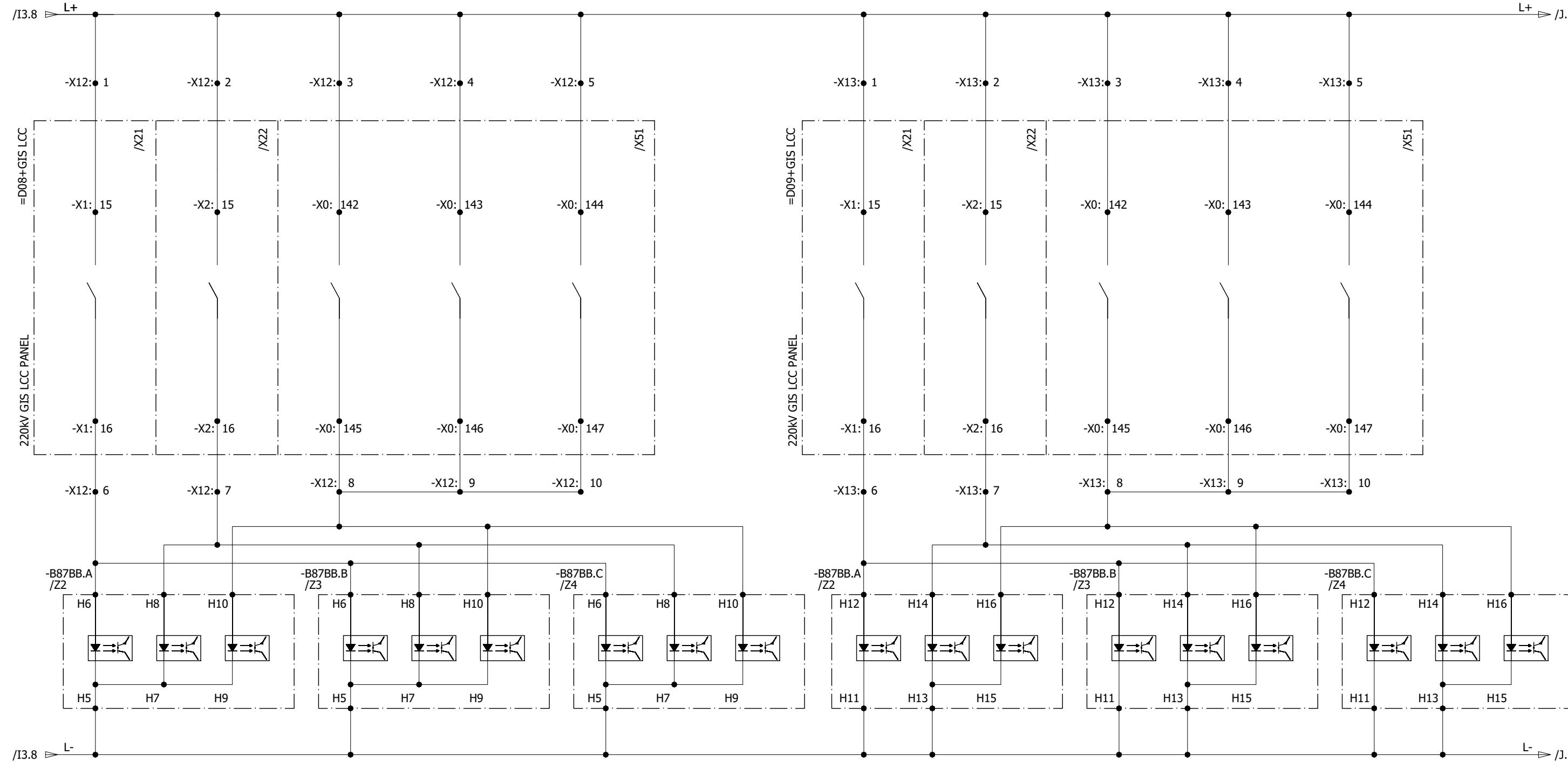
CLOSE

CLOSE

RED POLE CLOSE

YELLOW POLE CLOSE

BLUE POLE CLOSE



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0	AS BUILT	10.10.2018	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 220/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV BUSBAR RELAY PANEL (=D00+R7) POWER EQUIPMENT INPUTS	Drawing no. P60194-E-DBR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194

Sheet type
I4

Sheet no.
21

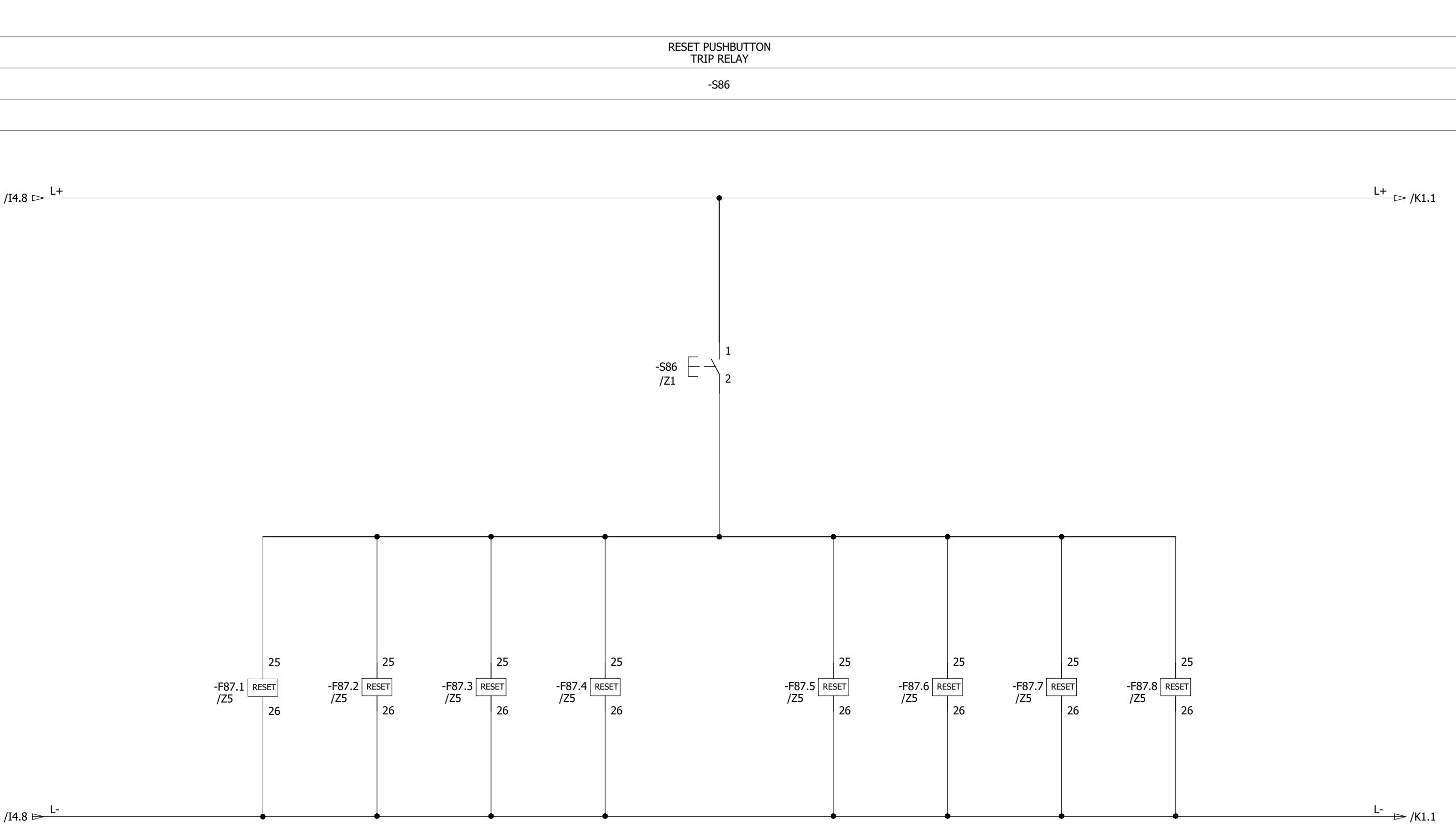
1 2 3 4 5 6 7 8

**RESET PUSHBUTTON
TRIP RELAY**

-S86

/I4.8 L+ L+ /K1.1

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0	AS BUILT	10.10.2018	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 COUPLER BAY RELAY PANEL (=D00+R7) COMMON RESET TRIPPING RELAYS	Drawing no. P60194-E-DCR-SC	
									Project no. P-60194	
REV.	DESCRIPTION	DATE	DRAWER						Sheet type J	Sheet no. 22

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TRIPPING AND LOCKOUT RELAY

=D01

=D02

=D03

=D04

=D05

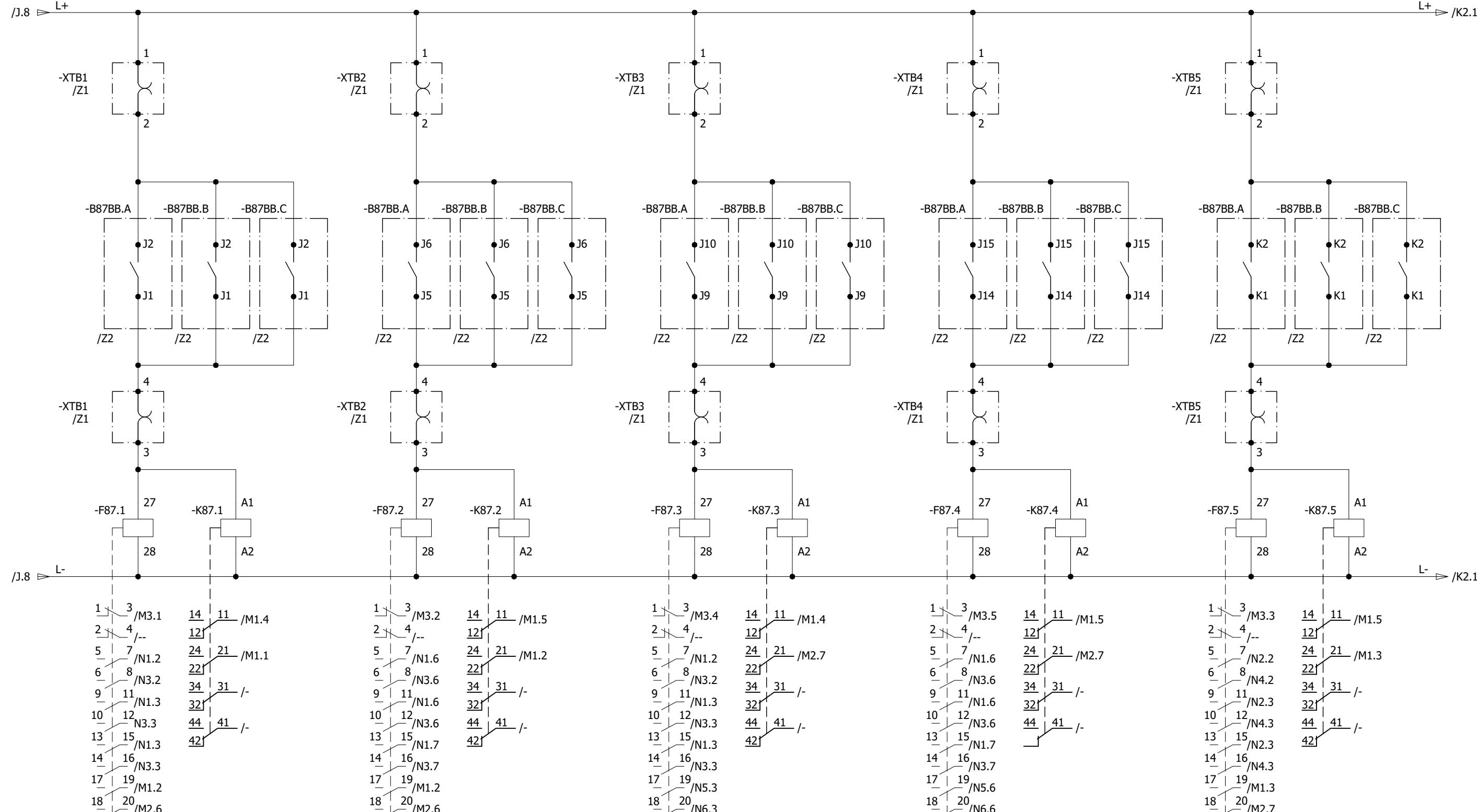
-F87.1

-F87.2

-F87.3

-F87.4

-F87.5



0	AS BUILT	10.10.2018	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 BUSBAR RELAY PANEL (=D00+R7) PROTECTION TRIPS	P60194-E-DBR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194 Sheet type K1 Sheet no. 23

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TRIPPING AND LOCKOUT RELAY

TRIPPING AND LOCKOUT RELAY

TRIPPING AND LOCKOUT RELAY

TRIPPING RELAY FAULTY

CT OPEN ZONE-1

=D06

=D08

=D09

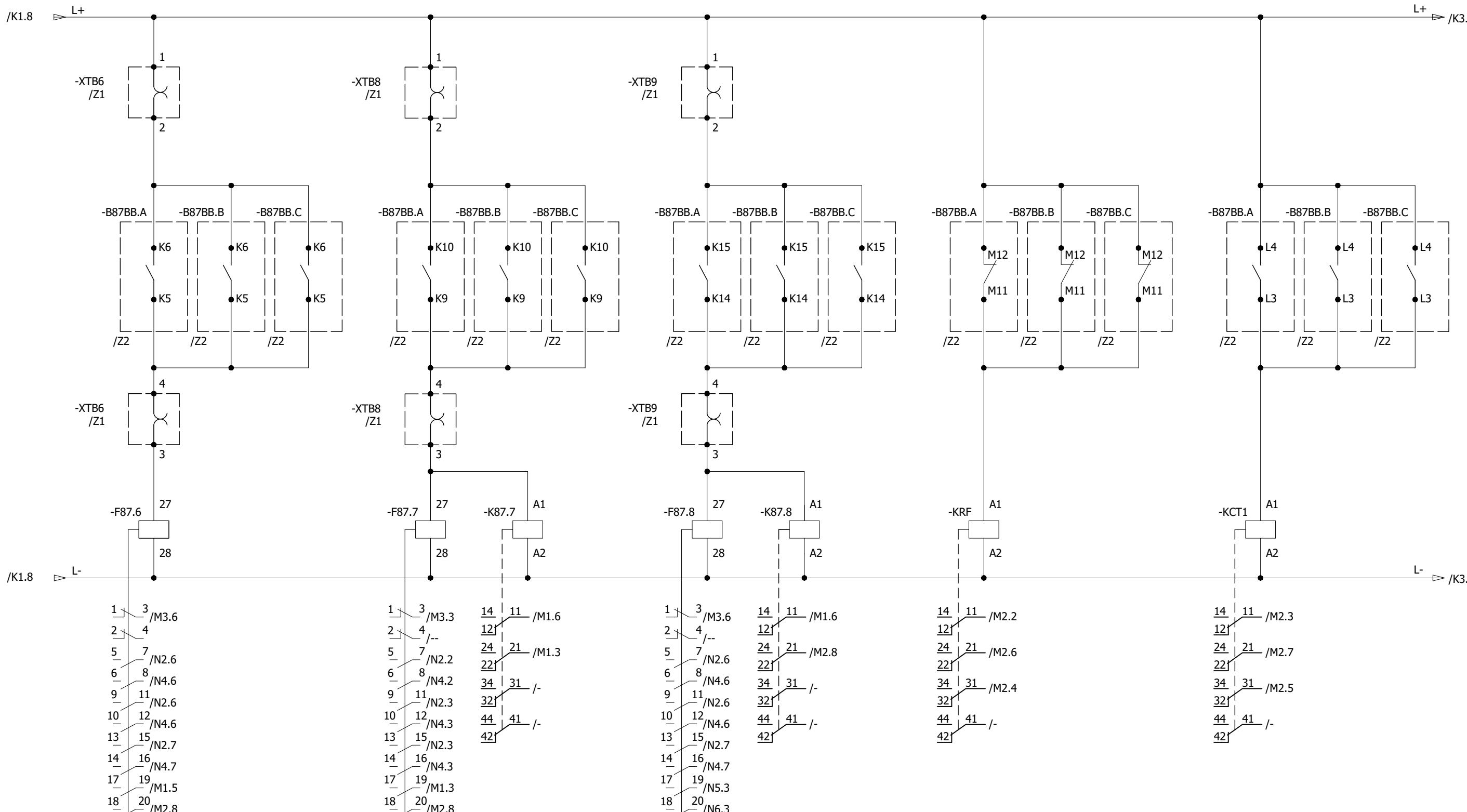
-F87.6

-F87.7

-F87.8

-KRF

-KCT1



0	AS BUILT	10.10.2018	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 BUSBAR RELAY PANEL (=D00+R7) PROTECTION TRIPS	Drawing no. P60194-E-DBR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type K2

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CT OPEN ZONE-2

CHECK ZONE OPERATED

ZONE-1 OPERATED

ZONE-2 OPERATED

GENERAL TRIP(ZONE-1/ZONE-2/CHECK ZONE)

DC MONIT. CCT.

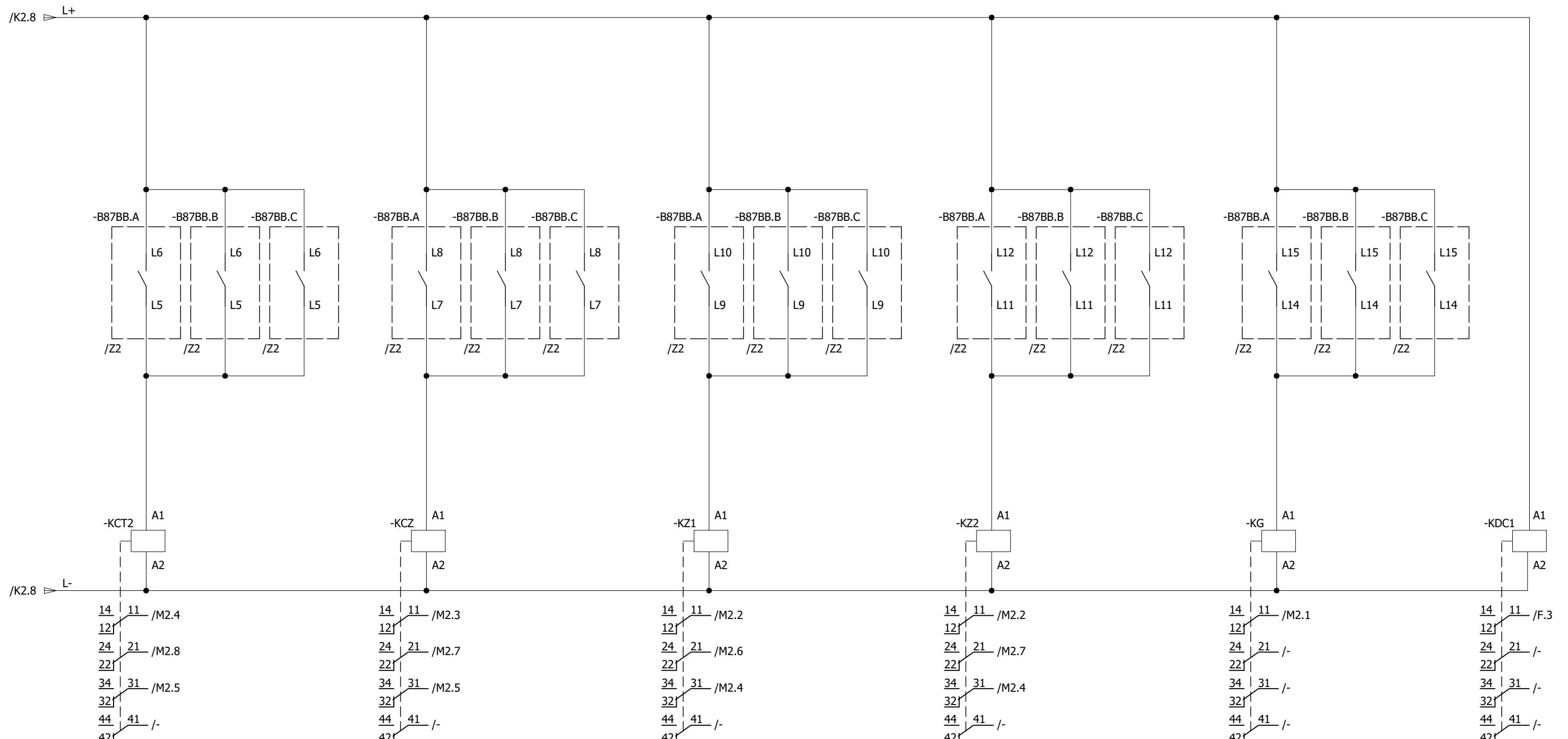
-KCT2

-KCZ

-KZ1

-KZ2

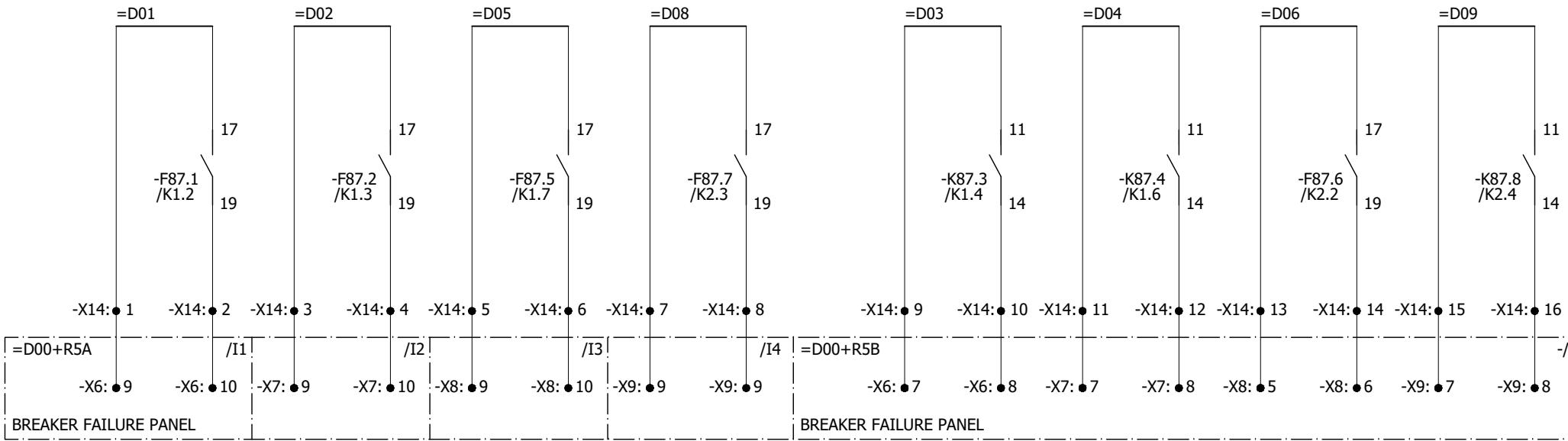
-KG



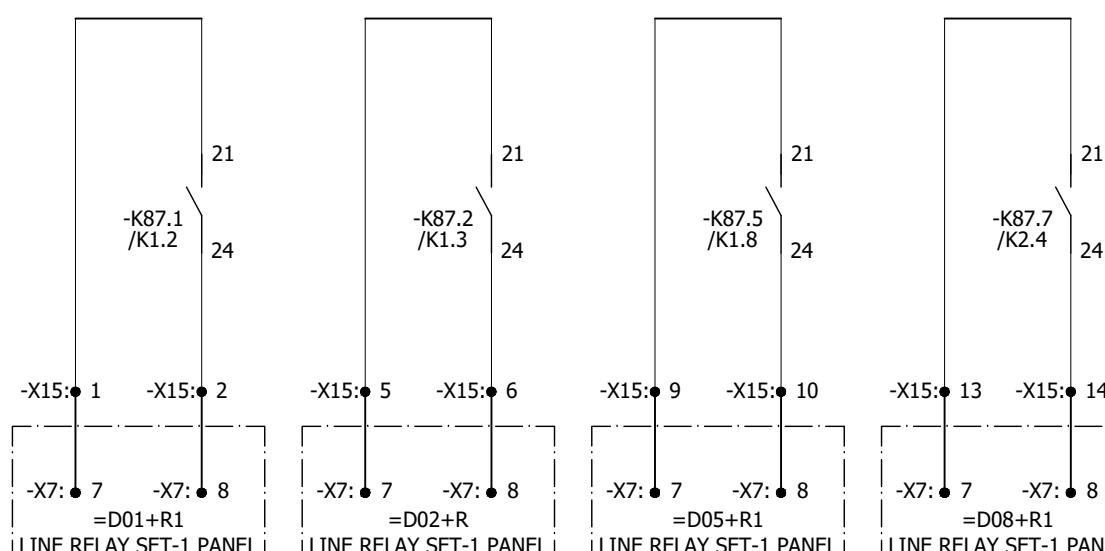
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									Project no. P-60194
REV.	DESCRIPTION	DATE	DRAWER						Sheet type K3

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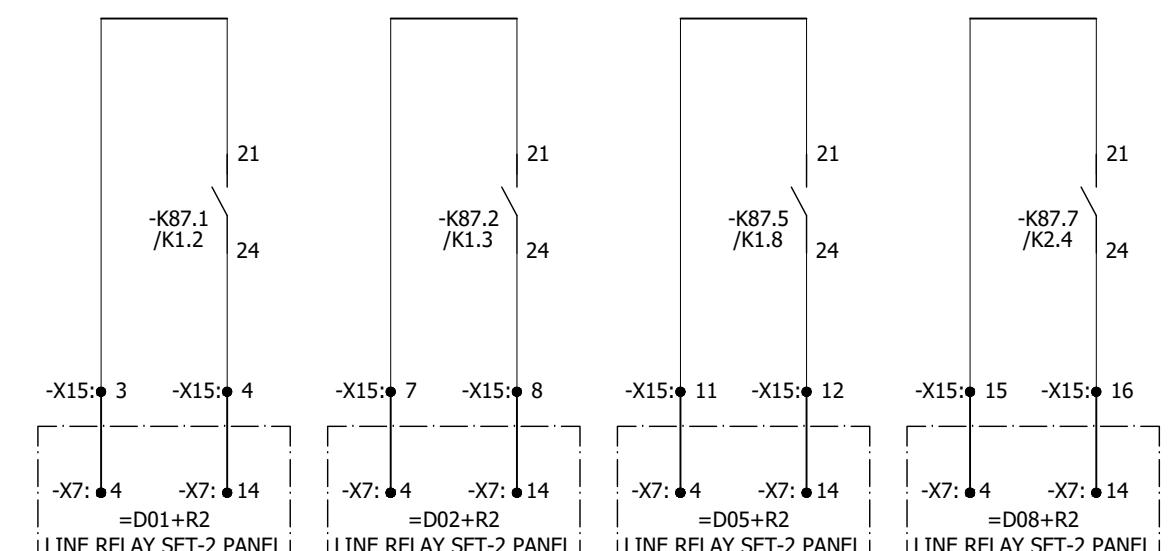
BREAKER FAILURE INITIALIZATION



AUTO RECLOSURE BLOCK (SET - 1)



AUTO RECLOSURE BLOCK (SET - 2)



0	AS BUILT		10.10.2018	ASJ	Manufacturer  EPEPSOL 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 220/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV BUSBAR RELAY PANEL (=D00+R7) CB FAIL INITIALIZATION & AUTO RECLOSE BLOCK	Drawing no. P60194-E-DBR-SC-001
REV.	DESCRIPTION		DATE	DRAWER	Project no. P-60194	Sheet type M1	Sheet no. 26			
1	2	3	4	5	6	7	8			

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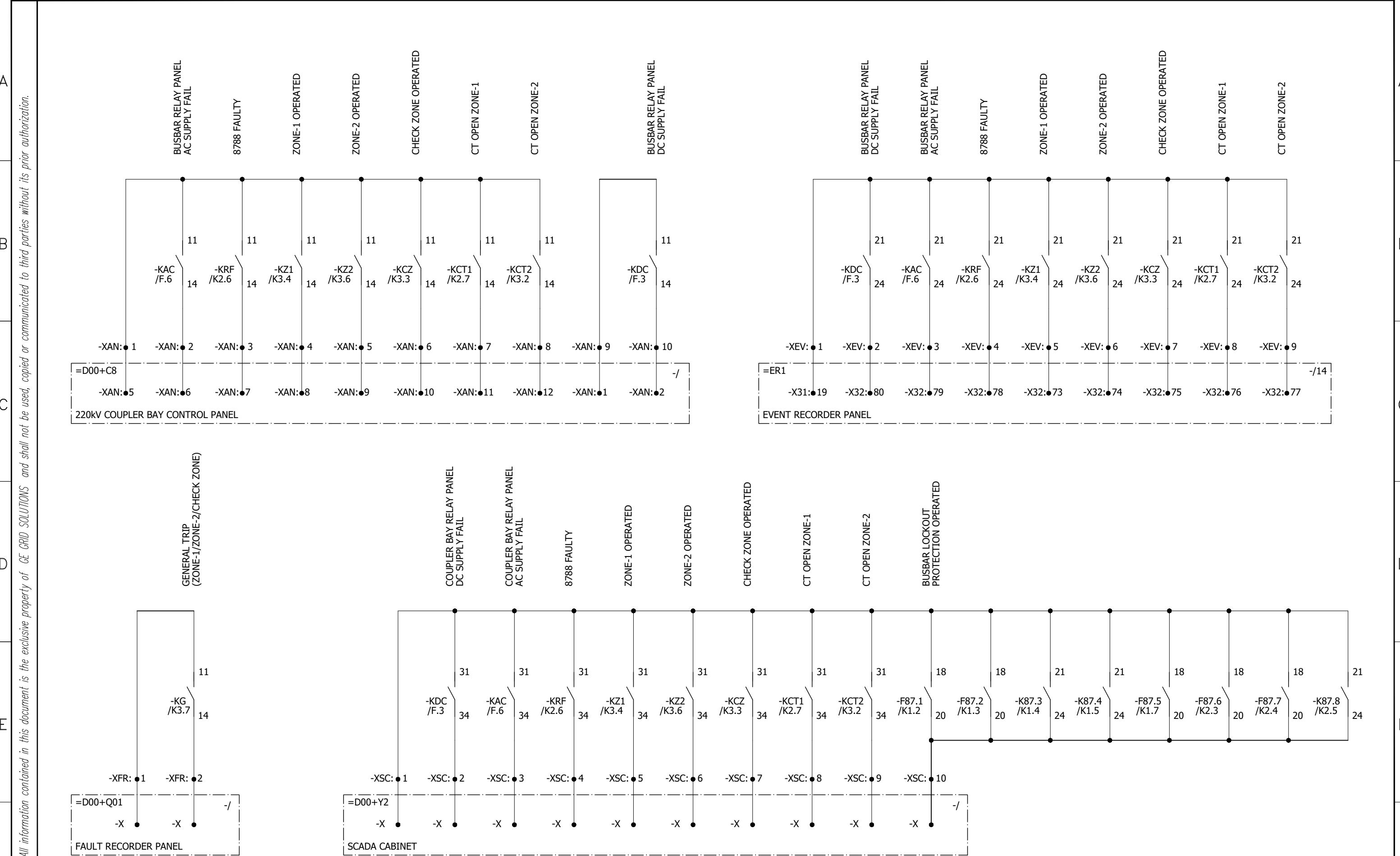
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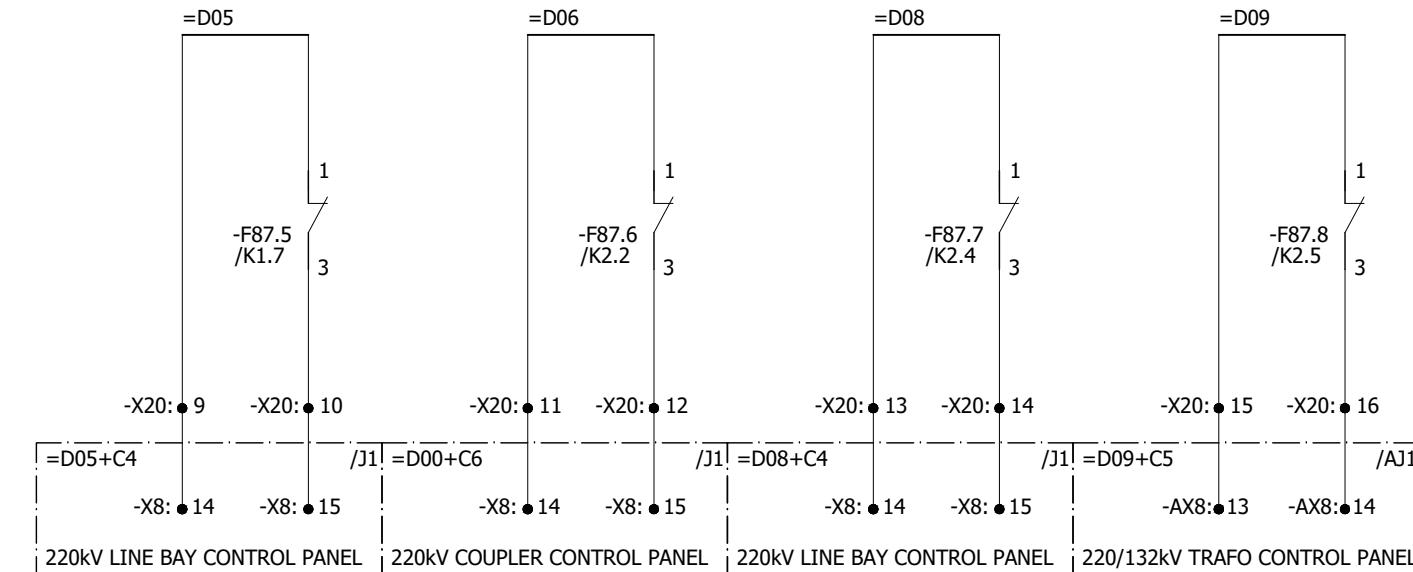
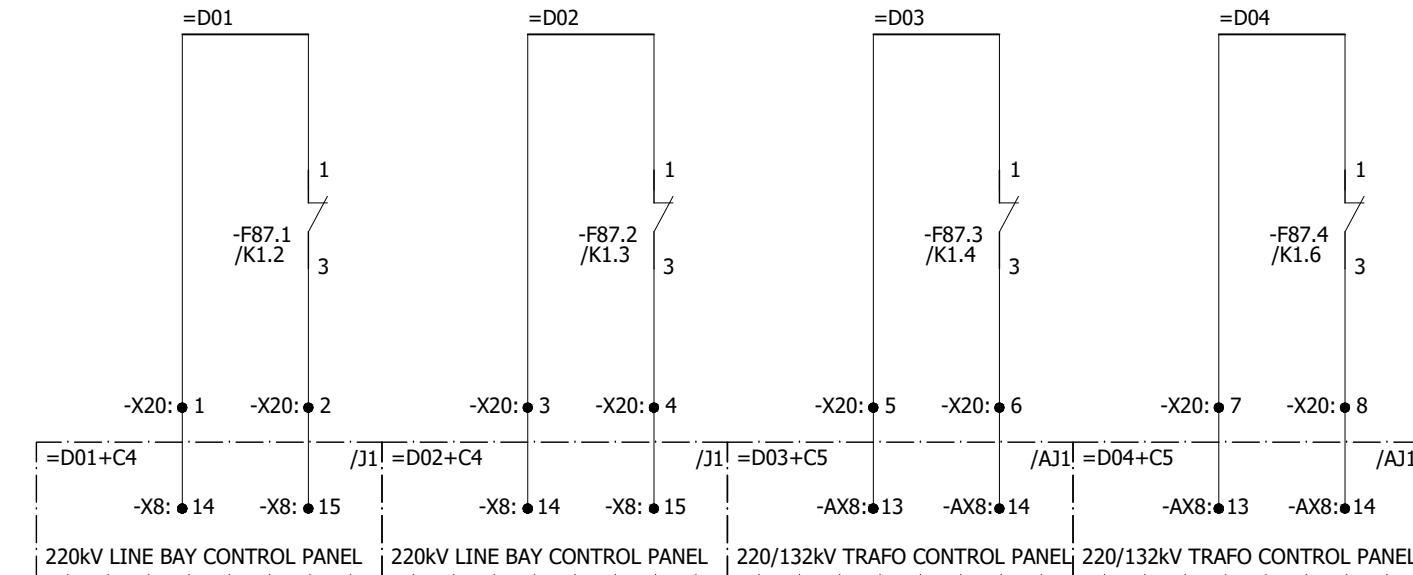
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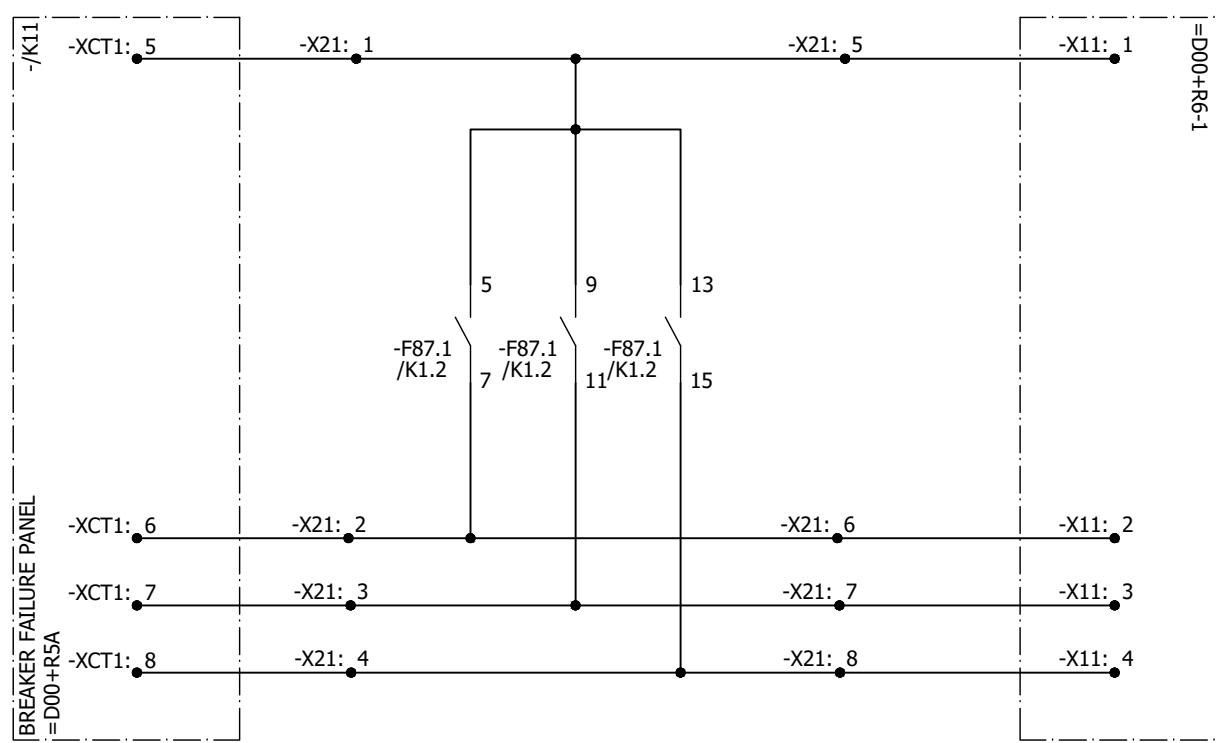
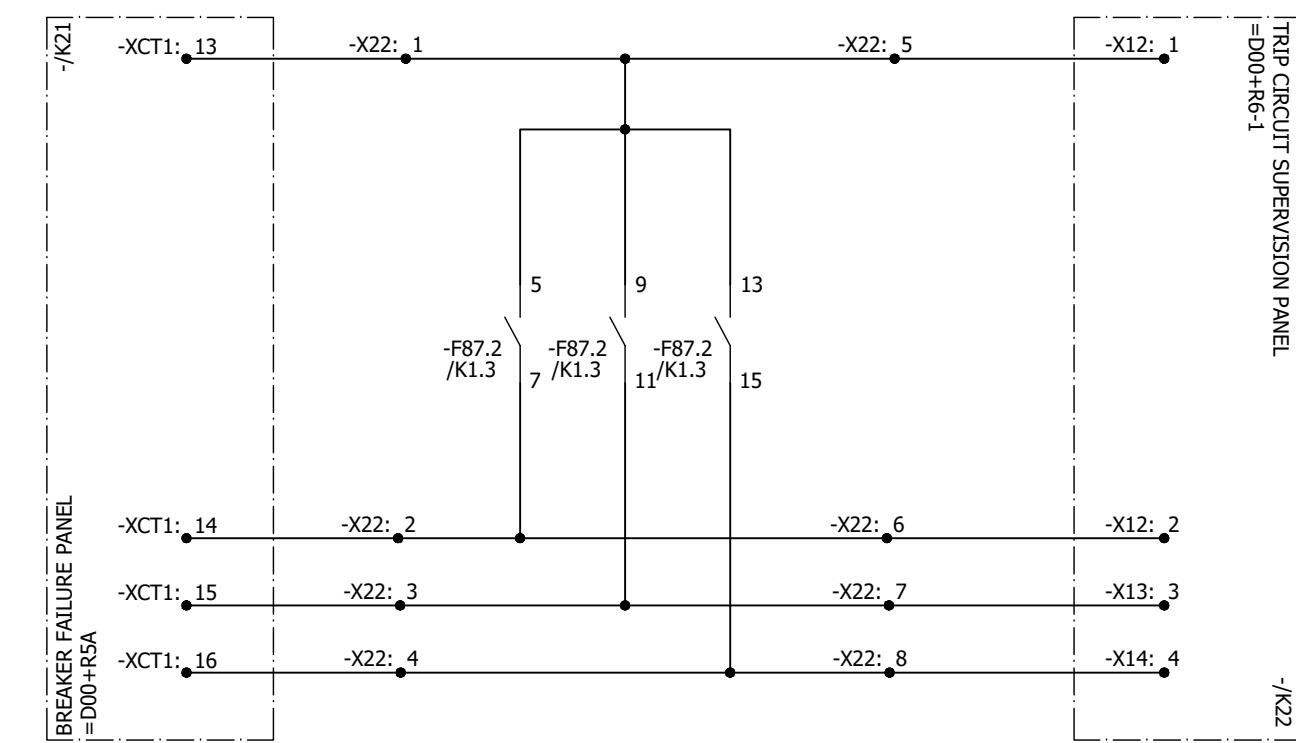
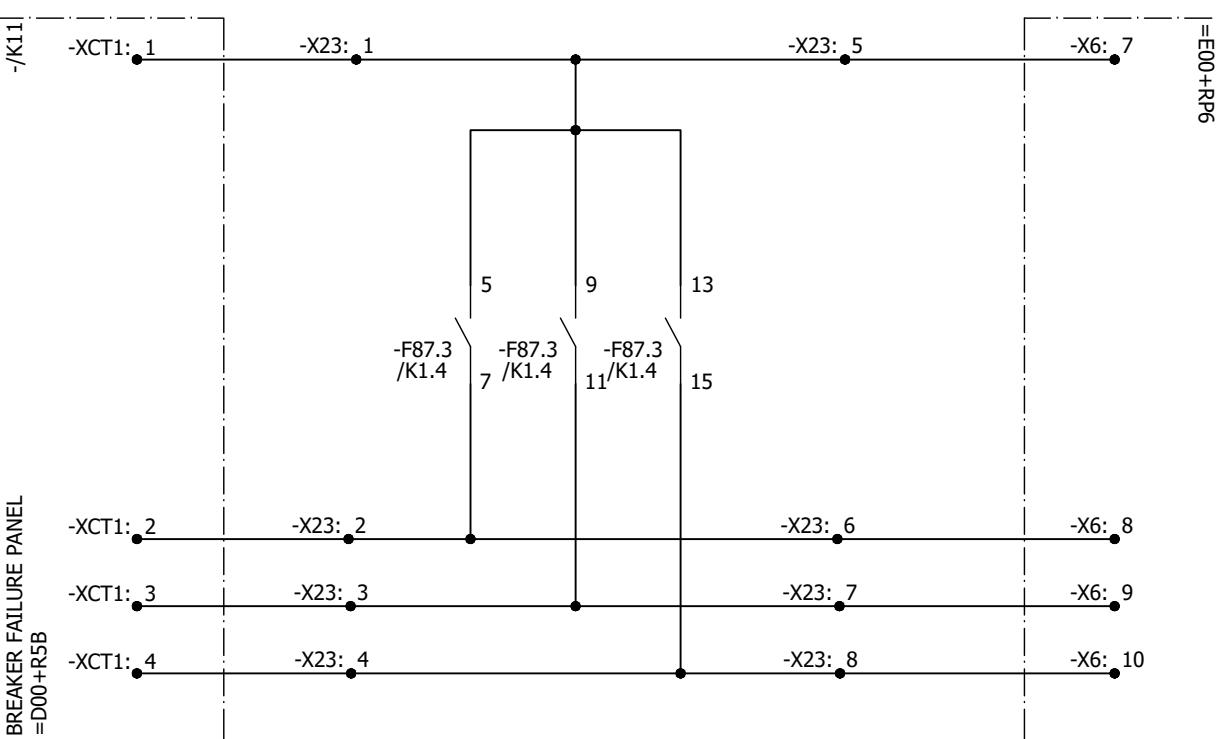
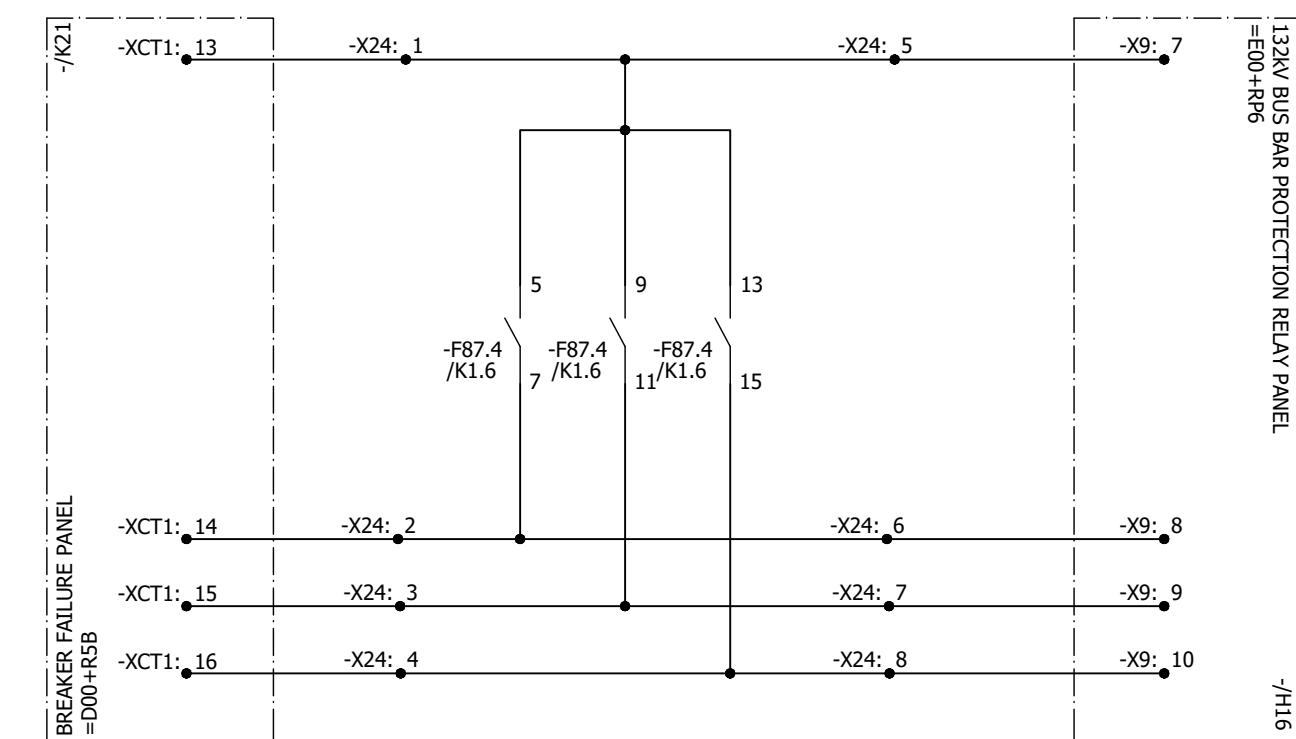
0	AS BUILT	10.10.2018	ASJ	Manufacturer  EPEPSOL 7a-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV BUSBAR RELAY PANEL (=D00+R7) ALARM AND TRIP ANNOUNCEMENTS	Drawing no. P60194-E-DBR-SC-001		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type M2	Sheet no. 27
1	2	3	4	5	6	7	8				

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CLOSE BLOCK

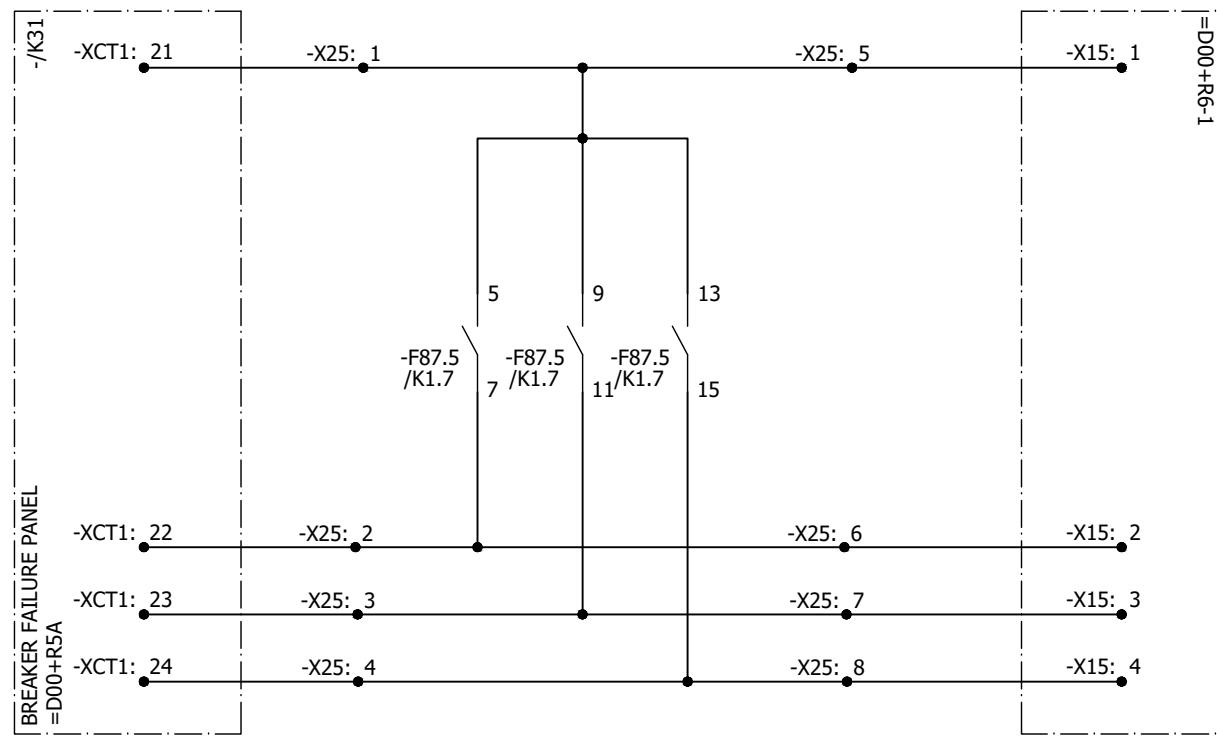
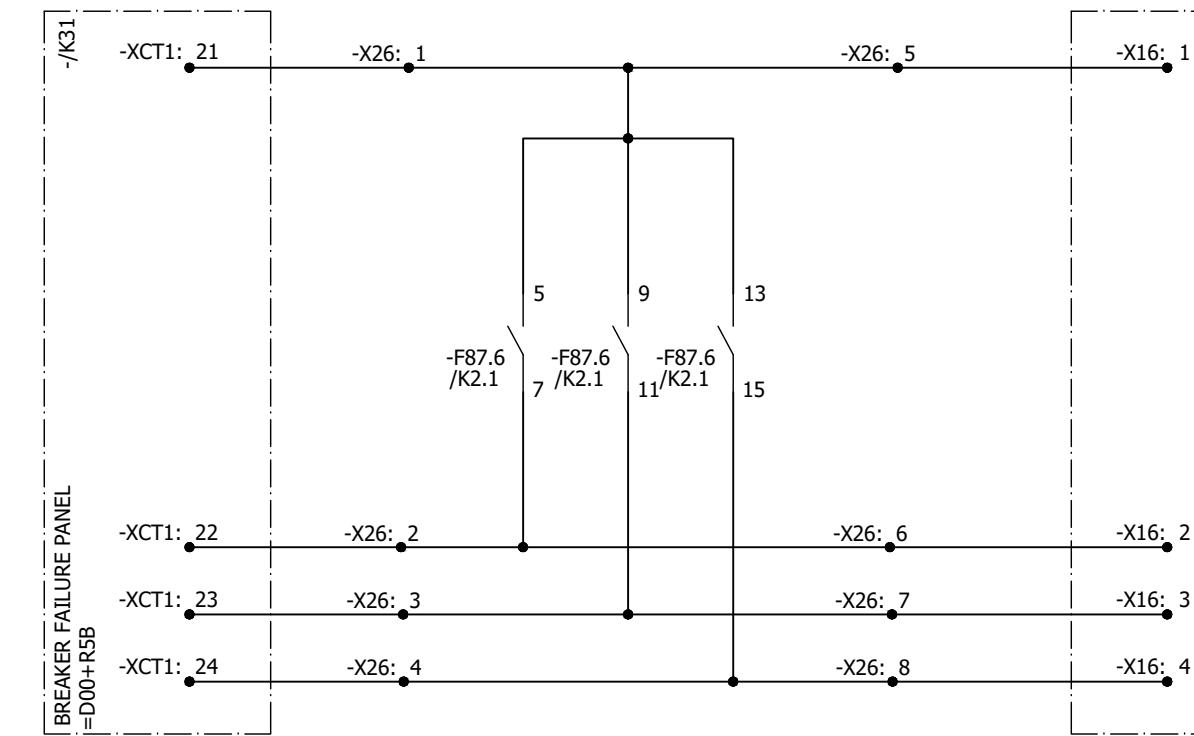
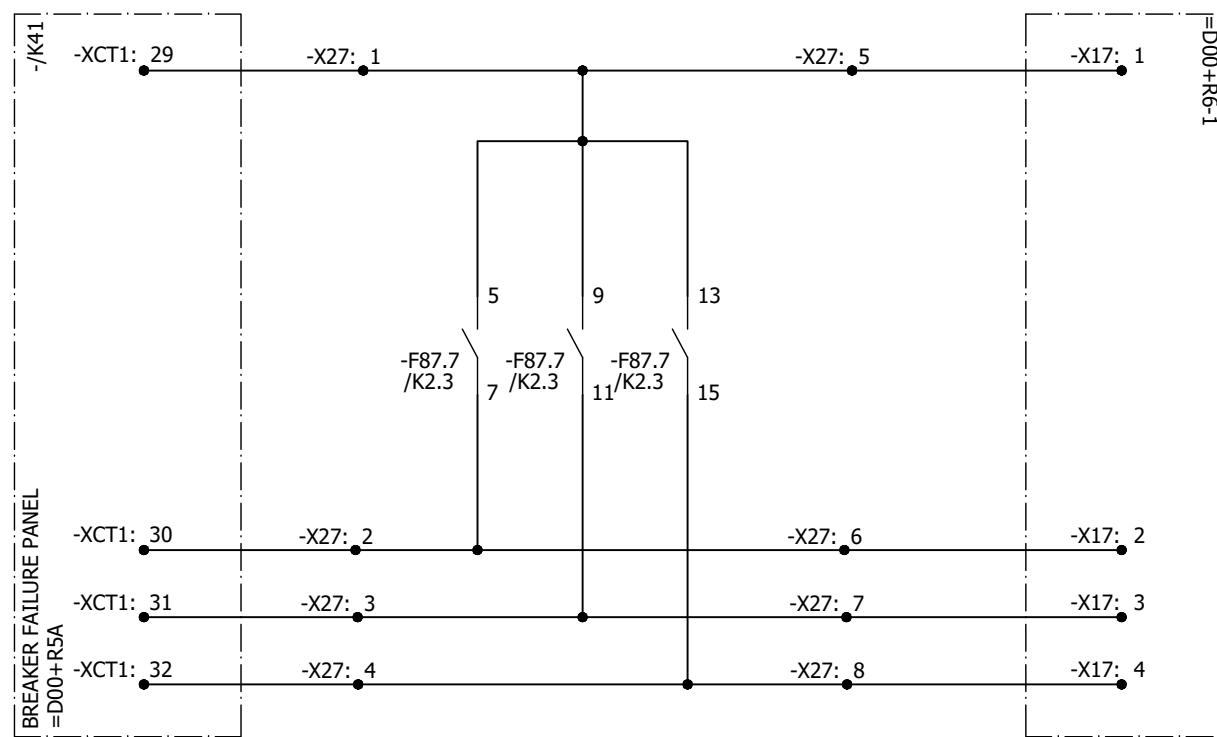
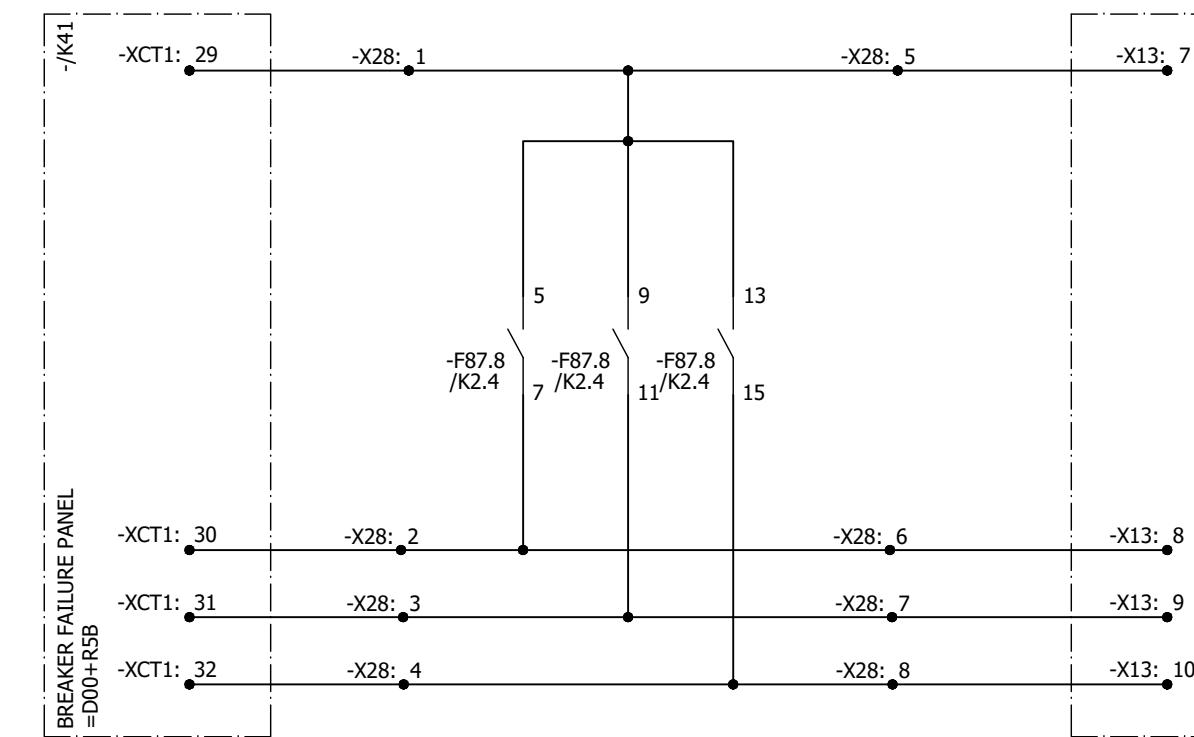


0	AS BUILT	10.10.2018	ASJ	Manufacturer  EPESOL 7-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV BUSBAR RELAY PANEL (=D00+R7) CLOSE BLOCK	Drawing no. P60194-E-DBR-SC-001		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type M3	Sheet no. 28
1	2	3	4	5	6	7	8				

TRIP CIRCUIT-1 (D01)TRIP CIRCUIT-1 (D02)TRIP CIRCUIT-1 (D03)TRIP CIRCUIT-1 (D04)

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0	AS BUILT	10.10.2018	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 220/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV BUSBAR RELAY PANEL (=D00+R7) TRIP CIRCUIT-1	Drawing no. P60194-E-DBR-SC-001		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type N1	Sheet no. 29
1	2	3	4						5	6	7

TRIP CIRCUIT-1 (D05)**TRIP CIRCUIT-1 (D06)****TRIP CIRCUIT-1 (D08)****TRIP CIRCUIT-1 (D09)**

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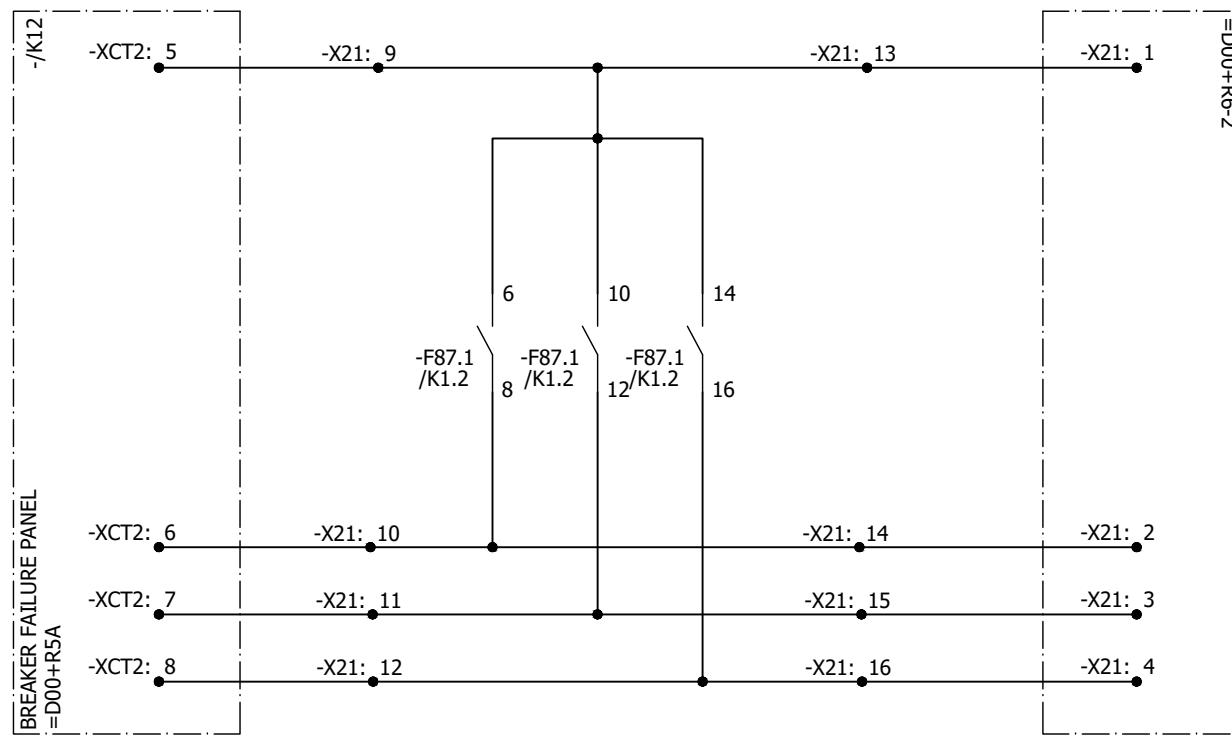
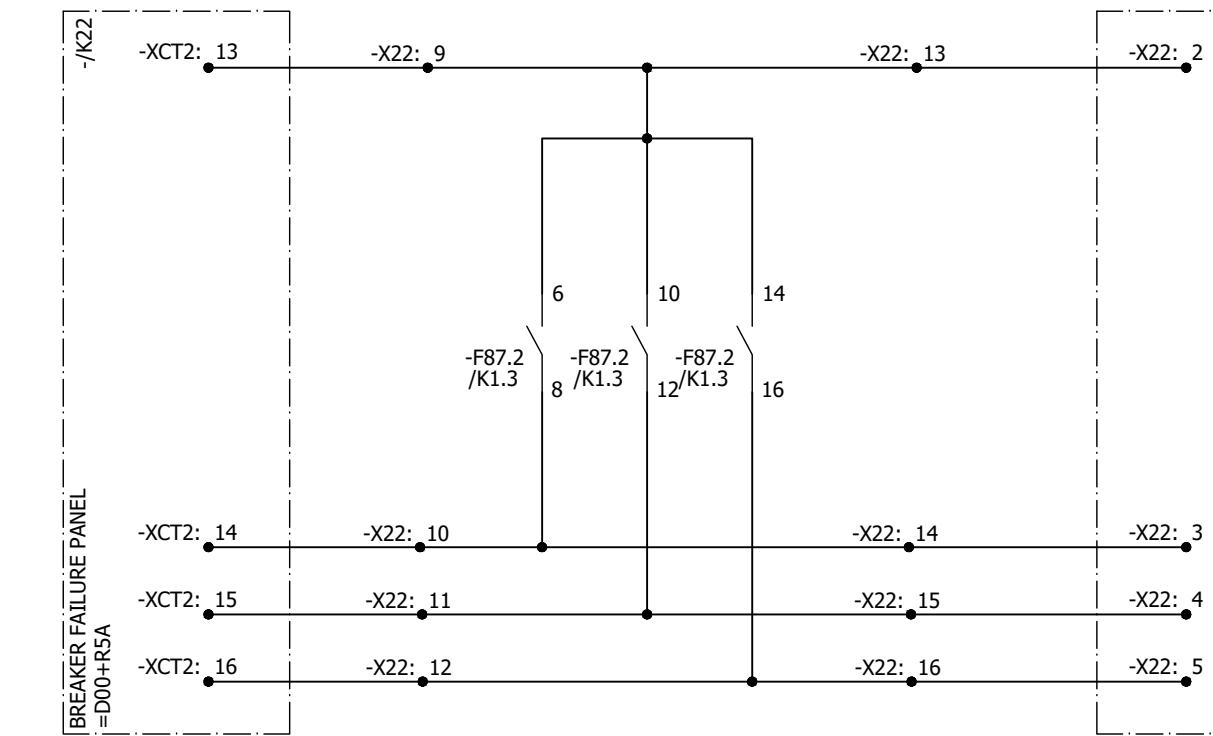
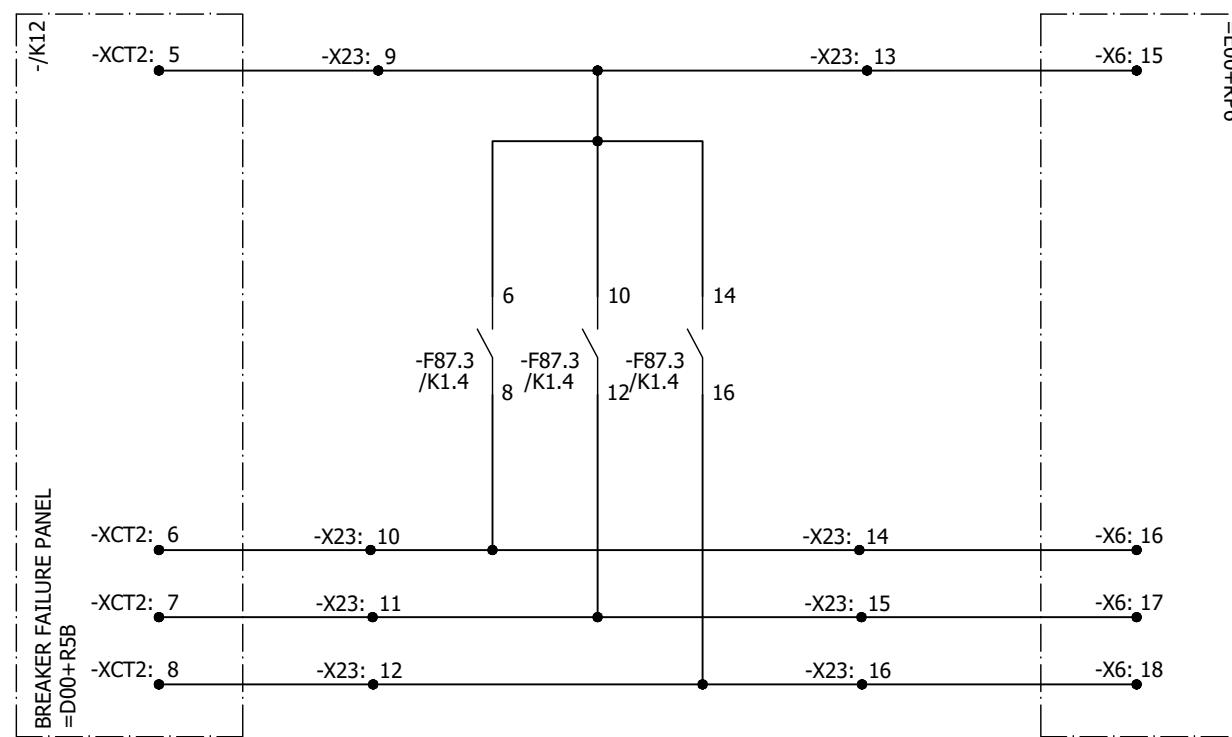
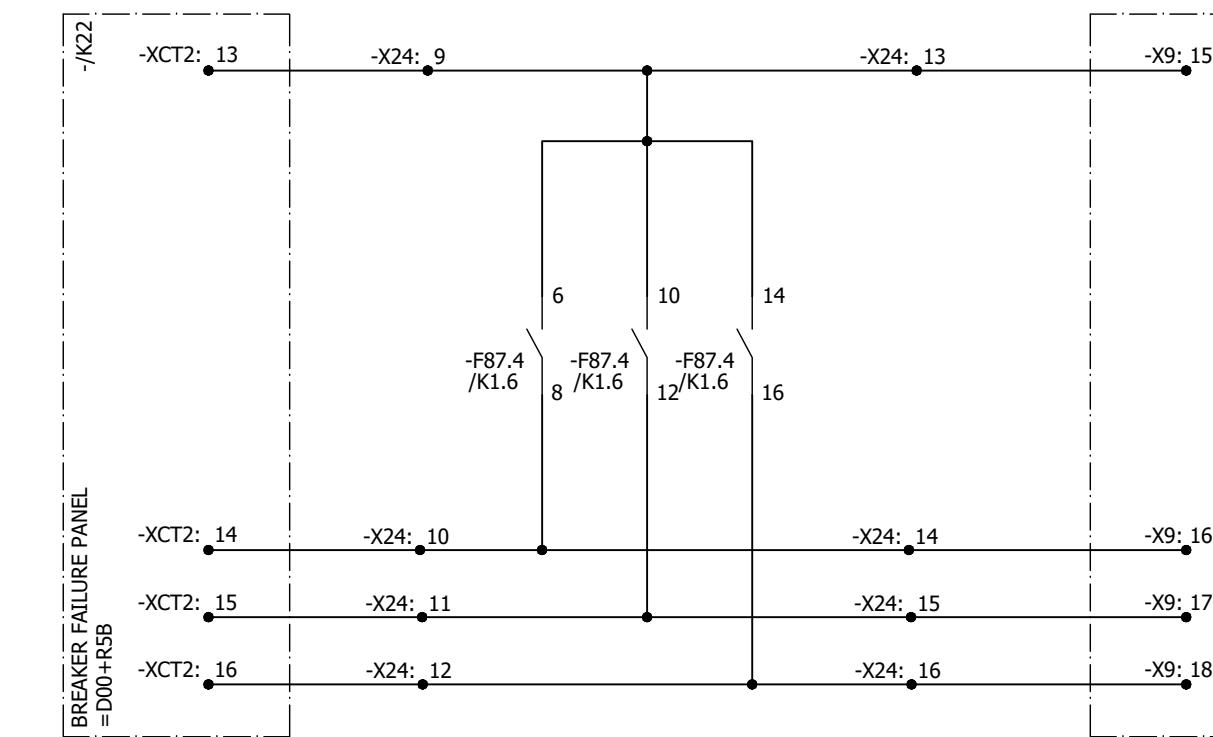
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0	AS BUILT	10.10.2018	ASJ	Manufacturer EPE SOL 7-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor GE Grid Solutions A GE and Alstom joint venture	Client NTDC-WAPDA NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED	Project 220/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV BUSBAR RELAY PANEL (=D00+R7) TRIP CIRCUIT-1	Drawing no. P60194-E-DBR-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type N2
									Sheet no. 30

TRIP CIRCUIT-2 (D01)**TRIP CIRCUIT-2 (D02)****TRIP CIRCUIT-2 (D03)****TRIP CIRCUIT-2 (D04)**

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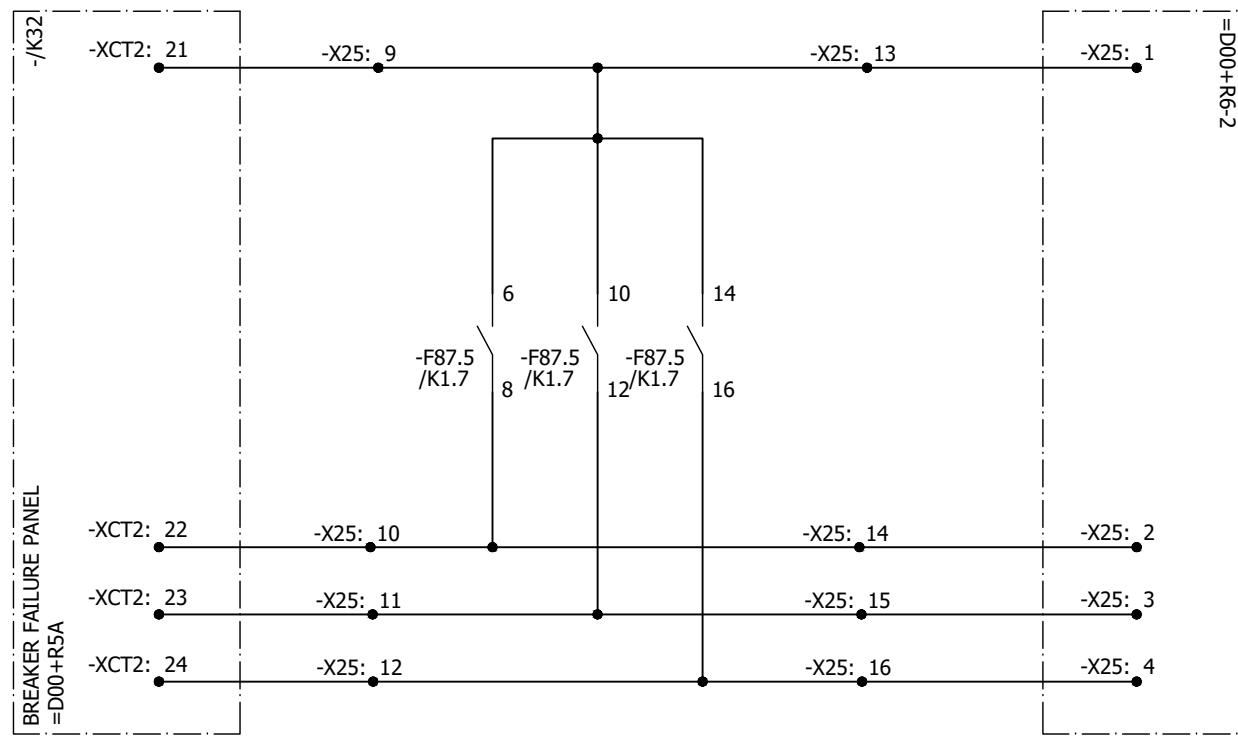
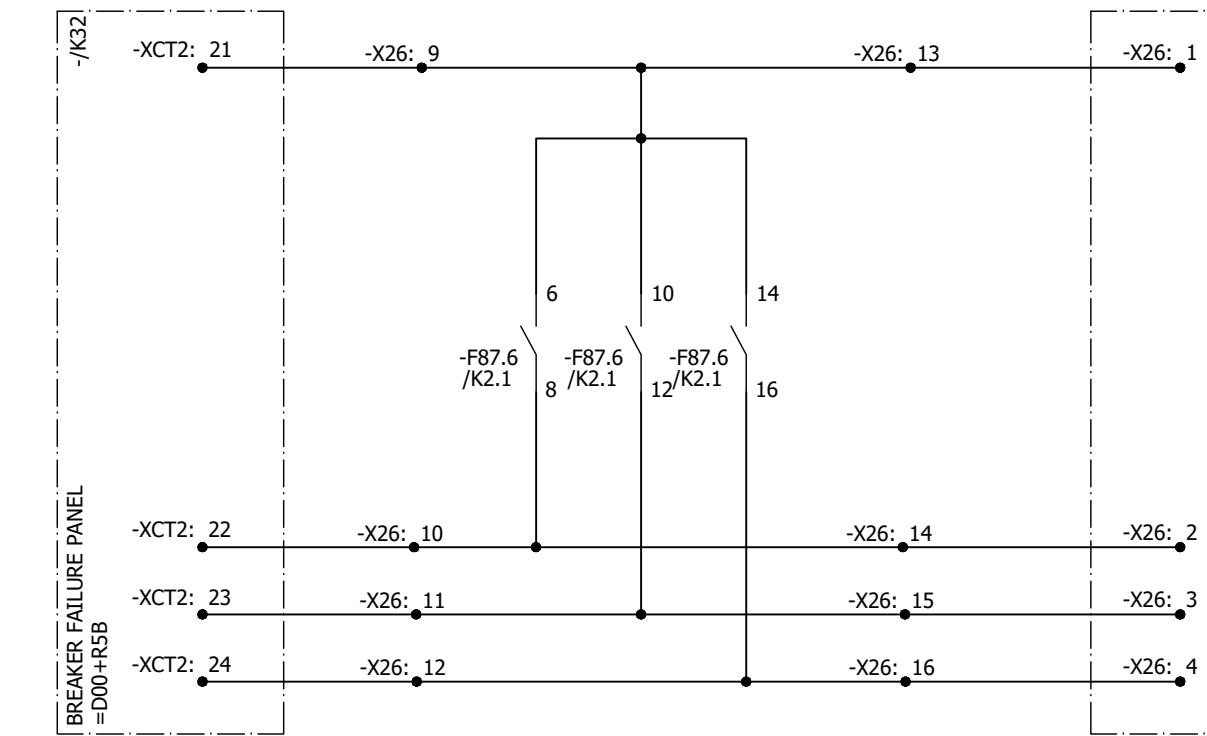
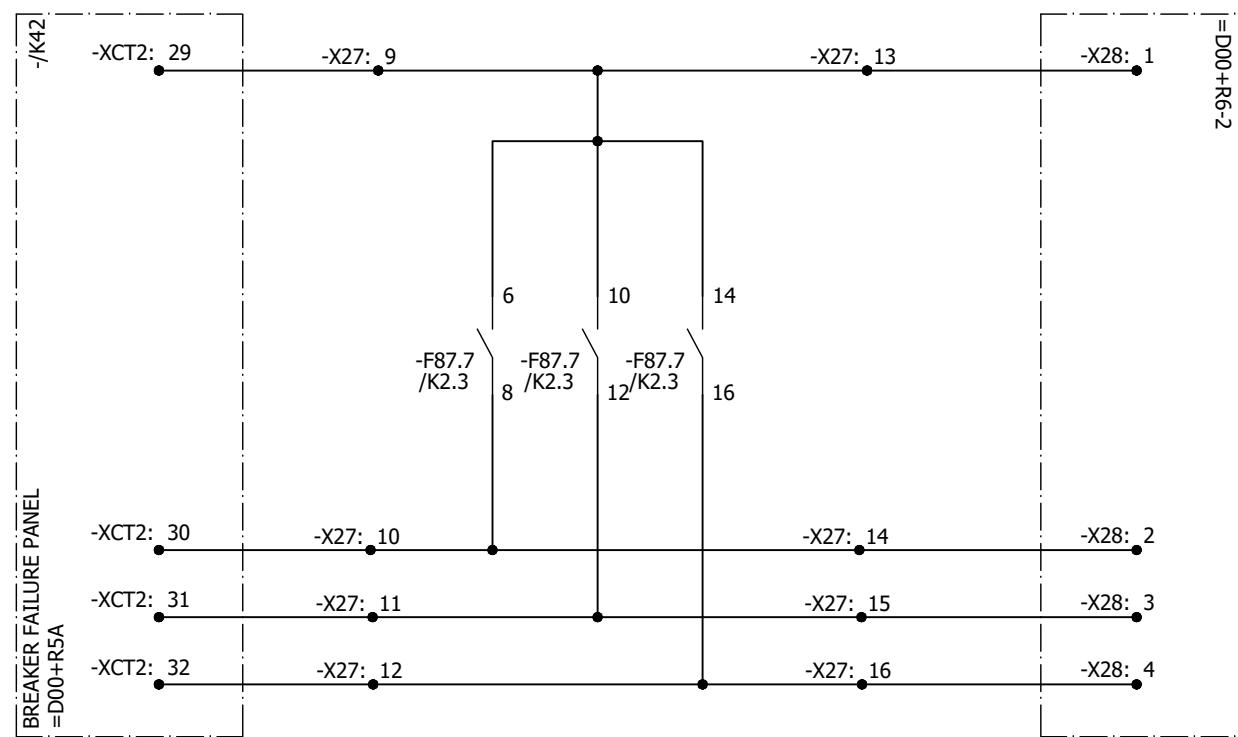
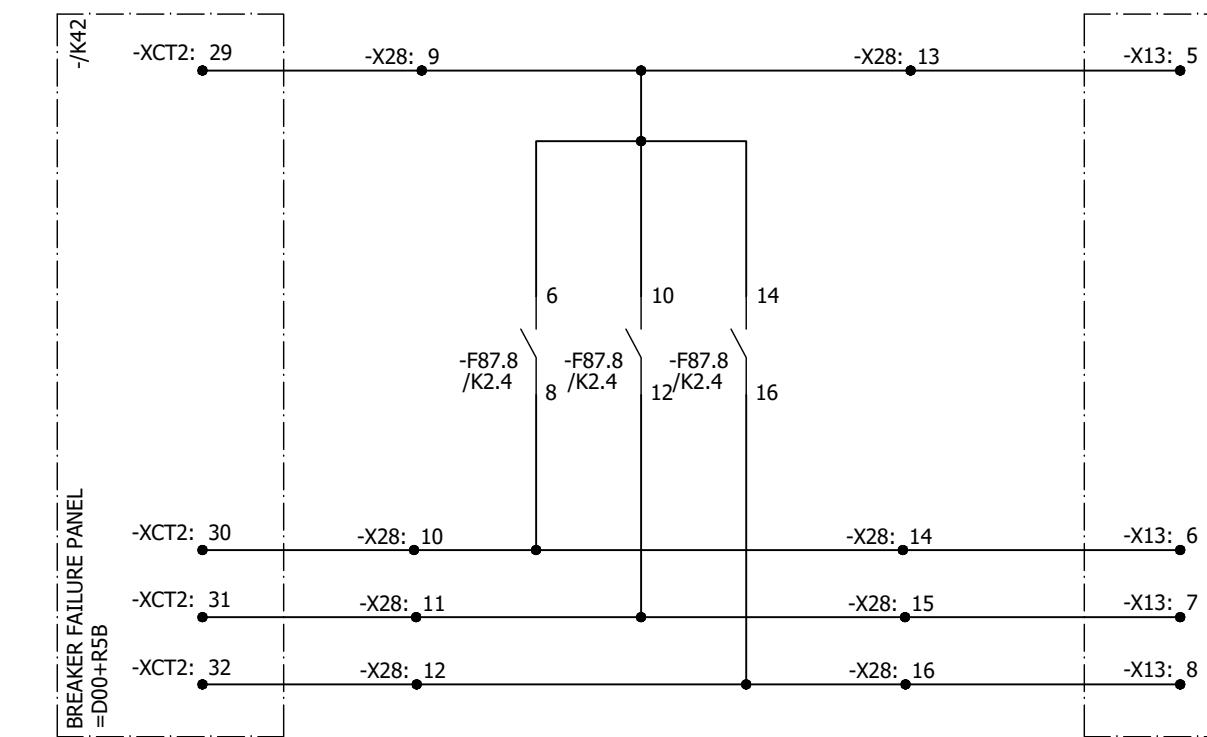
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REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194

TRIP CIRCUIT-2 (D05)**TRIP CIRCUIT-2 (D06)****TRIP CIRCUIT-2 (D08)****TRIP CIRCUIT-2 (D09)**

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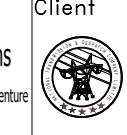
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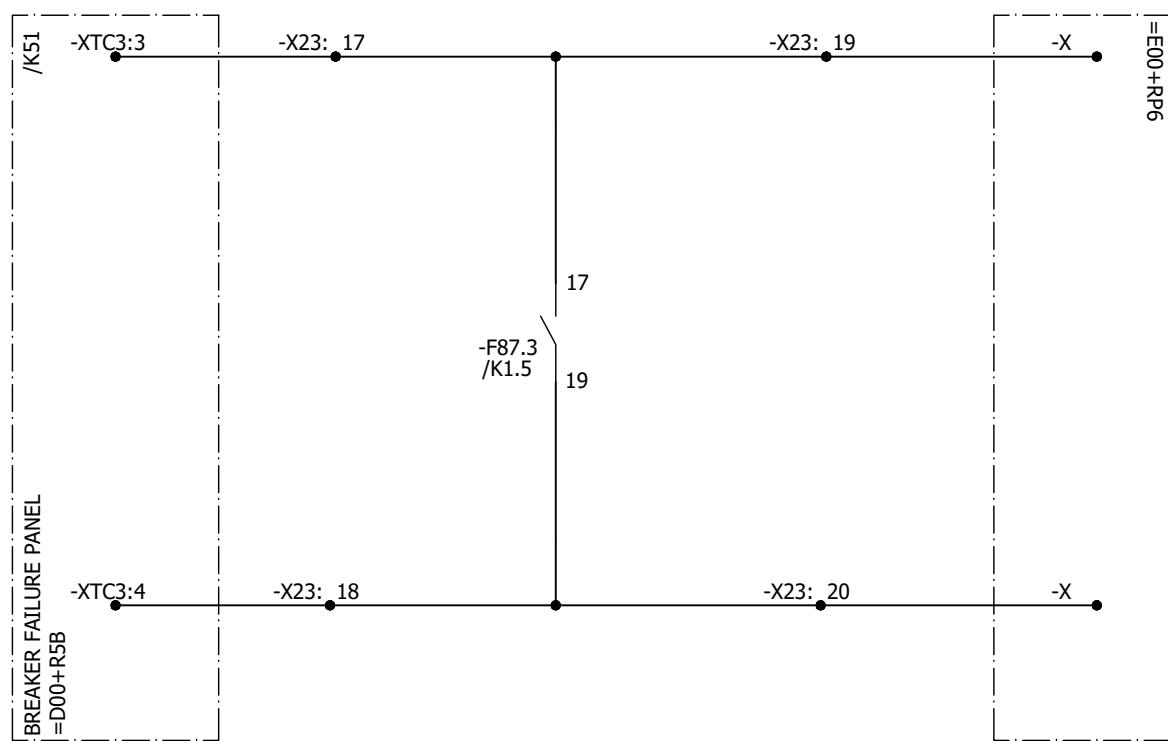
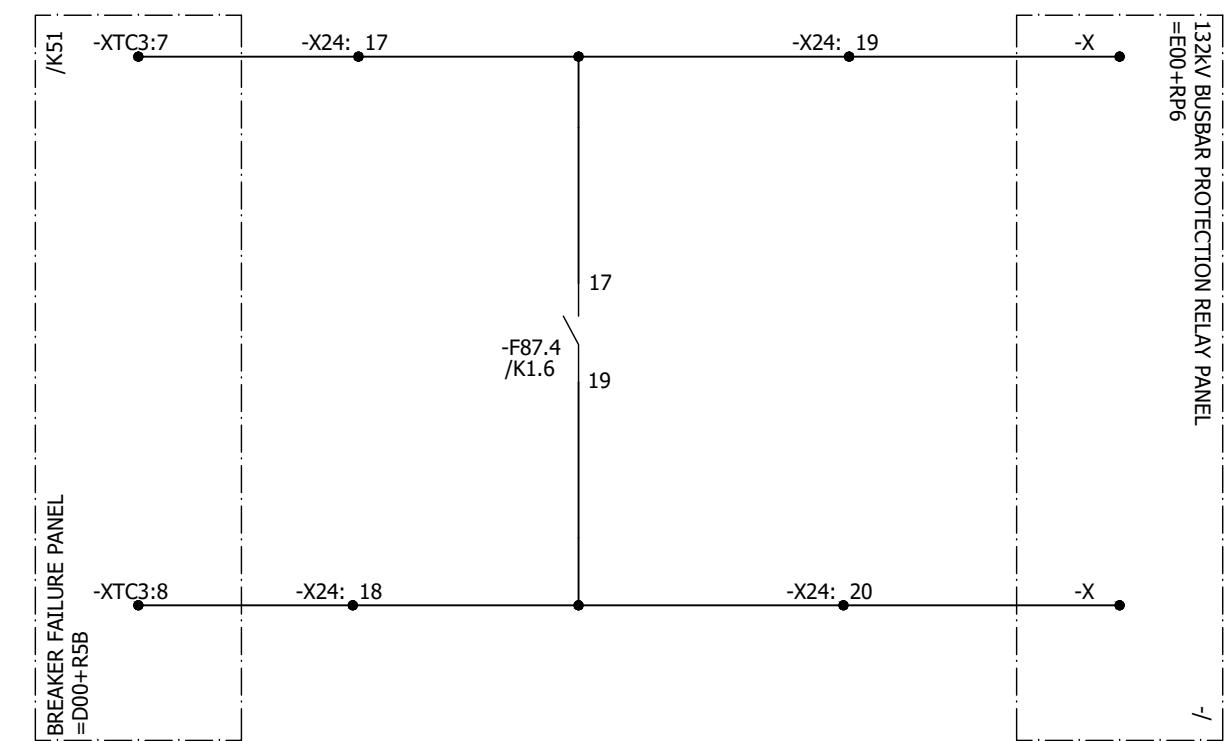
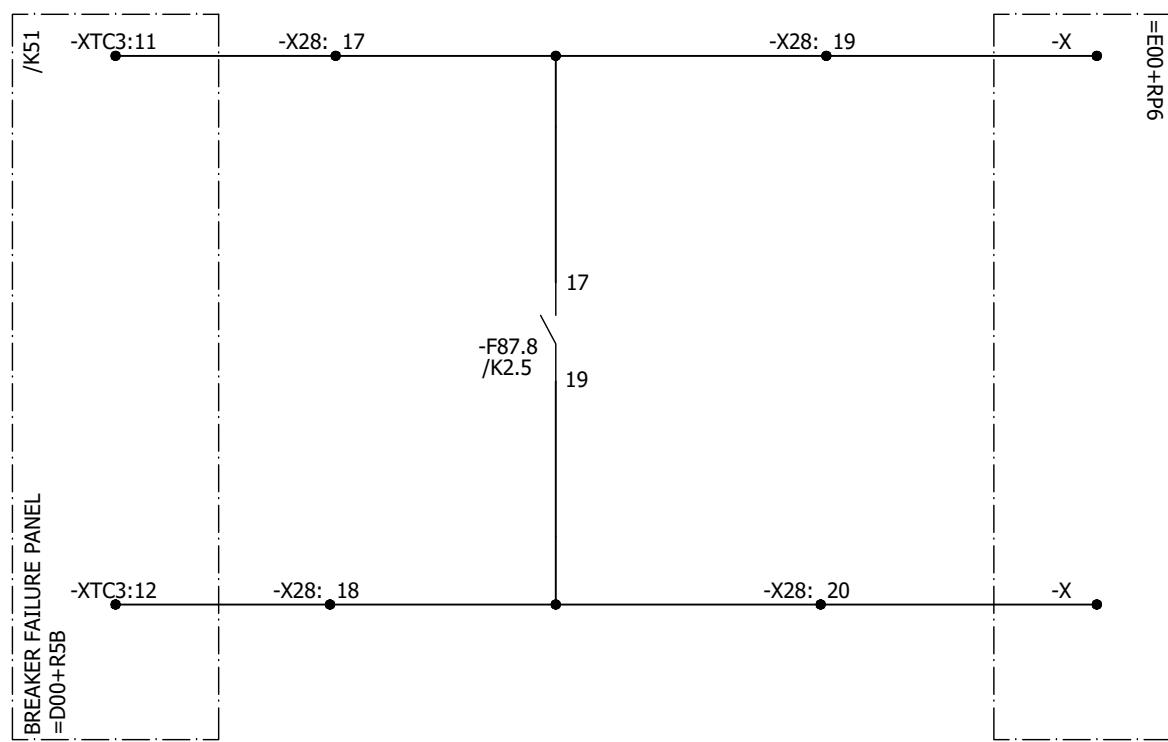
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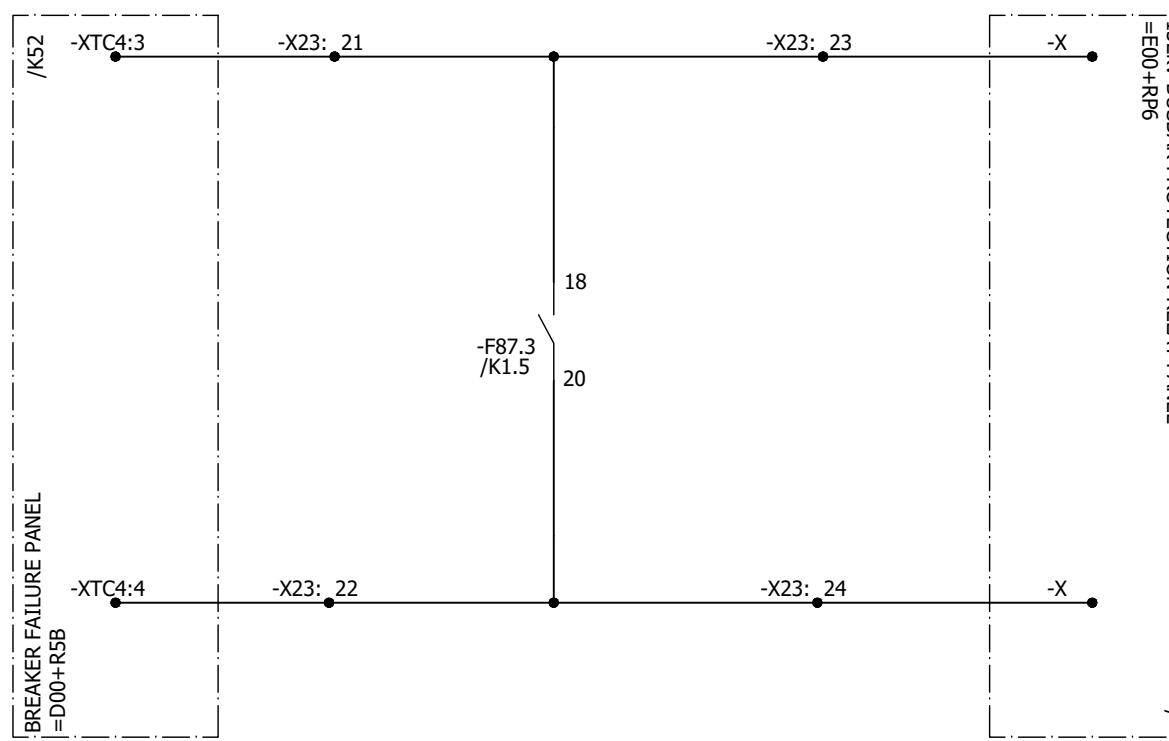
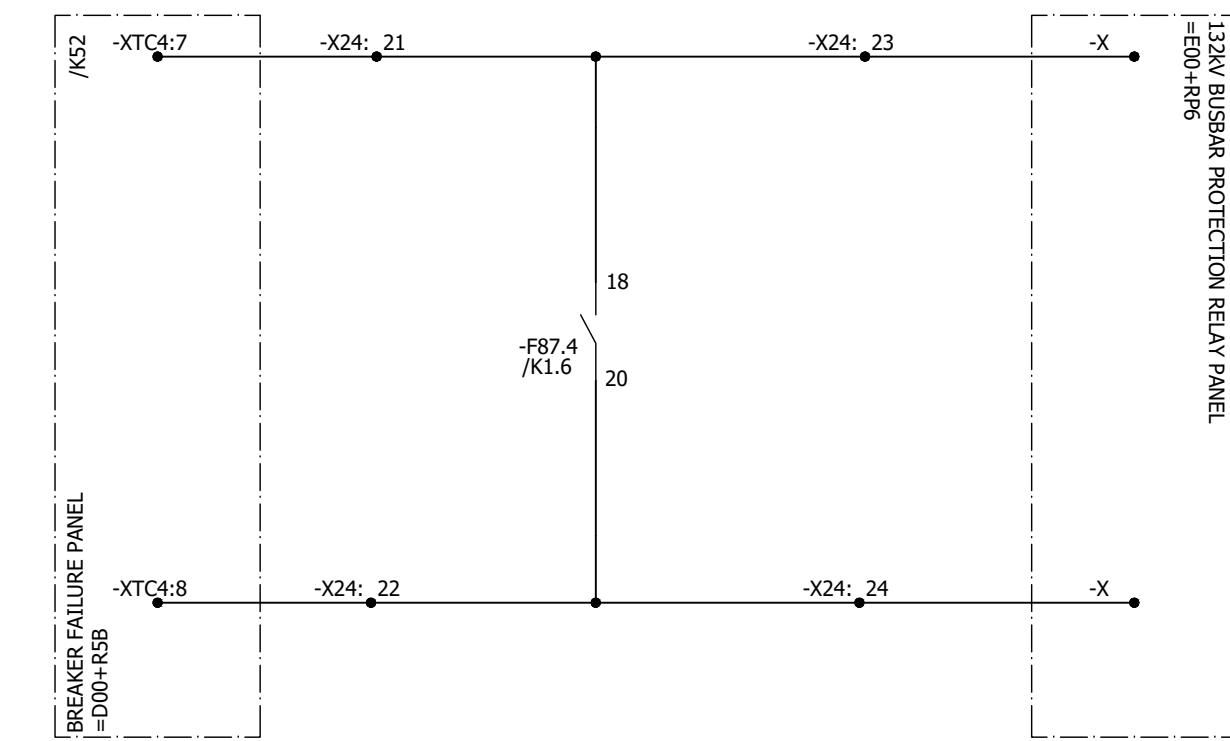
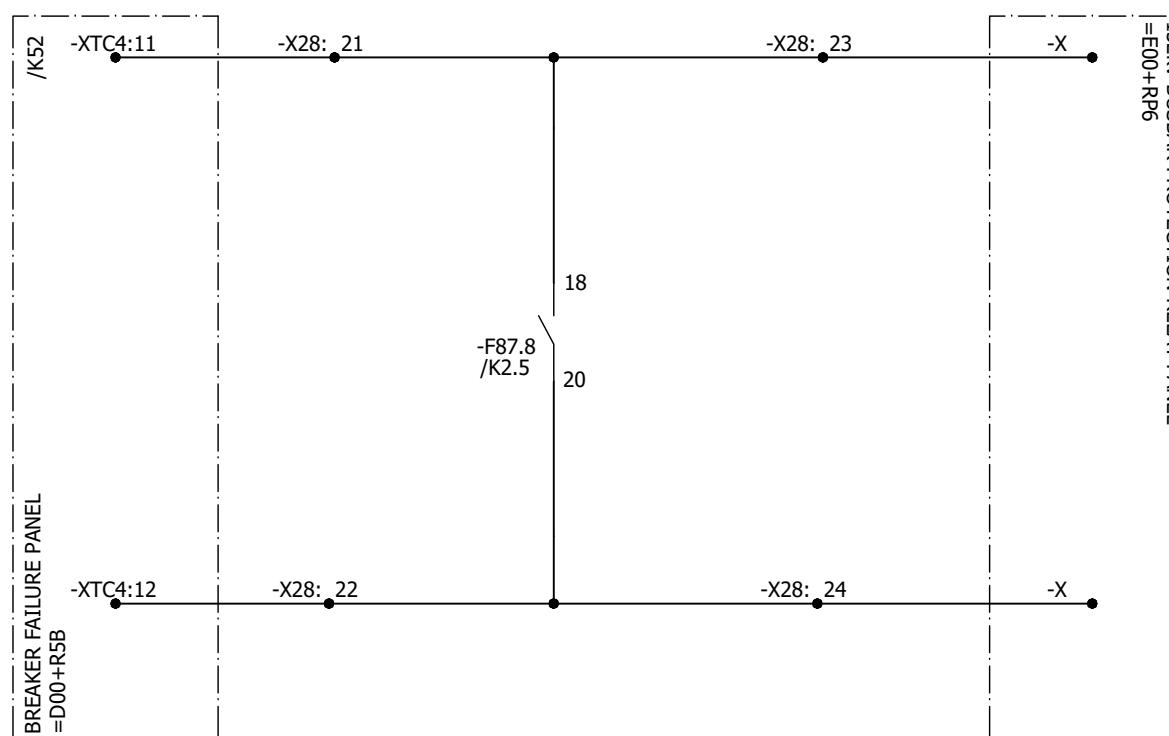
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REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type N4	Sheet no. 32
1	2	3	4								

1 2 3 4 5 6 7 8

TRIP CIRCUIT-1 (E05+Q0)**TRIP CIRCUIT-1 (E08+Q0)****TRIP CIRCUIT-1 (E14+Q0)**

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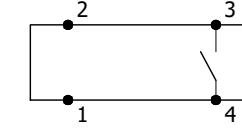
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REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type N5	Sheet no. 33
1	2	3	4	5	6	7	8				

TRIP CIRCUIT-2 (E05+Q0)**TRIP CIRCUIT-2 (E08+Q0)****TRIP CIRCUIT-2 (E14+Q0)**

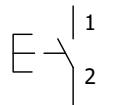
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REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type N6	Sheet no. 34
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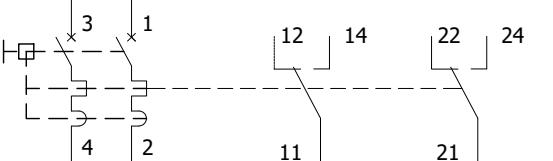
-B100	D.4	D.5
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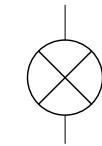
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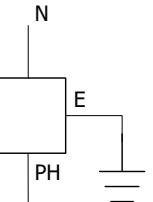
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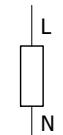
-F101	D.2	F.6	
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-F201	E.4	F.2	
-F202	E.4	F.3	



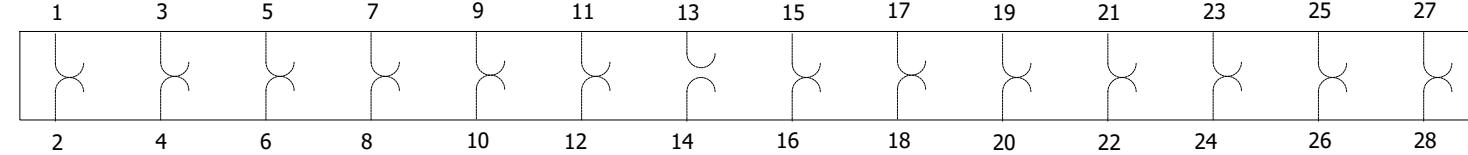
-H100	D.3
-H200	F.4



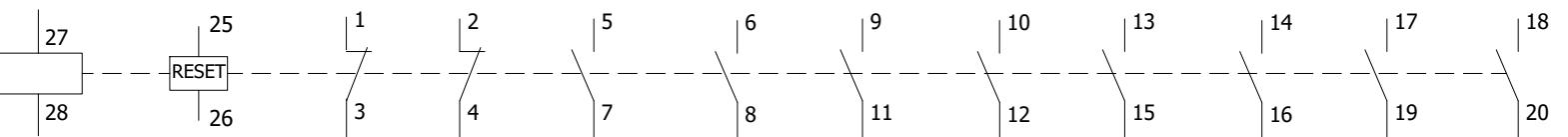
-X100	D.7
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-R100	D.5
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-XT1	K1.2	K1.2		G.2	G.2			H1.5
-XT2	K1.3	K1.3		G.2	G.2			H1.5
-XT3	K1.4	K1.4		G.2	G.2			H2.5
-XT4	K1.6	K1.6		G.2	G.2			H2.5
-XT5	K1.7	K1.7		G.2	G.2			H3.5
-XT6	K2.2	K2.2		G.2	G.2			H3.5
-XT7				G.2	G.2			H4.5
-XT8	K2.3	K2.3		G.2	G.2			H4.5
-XT9	K2.4	K2.4		G.2	G.2			H5.5



-F87.1	K1.2	J.2	M3.1		N1.2	N3.2	N1.3	N3.3	N1.3	N3.3	M1.2	M2.6
-F87.2	K1.3	J.3	M3.2		N1.6	N3.6	N1.6	N3.6	N1.7	N3.7	M1.2	M2.6
-F87.3	K1.4	J.3	M3.4		N1.2	N3.2	N1.3	N3.3	N1.3	N3.3	N5.3	N6.3
-F87.4	K1.6	J.4	M3.5		N1.6	N3.6	N1.6	N3.6	N1.7	N3.7	N5.6	N6.6
-F87.5	K1.7	J.5	M3.3		N2.2	N4.2	N2.3	N4.3	N2.3	N4.3	M1.3	M2.7
-F87.6	K2.2	J.6	M3.6		N2.6	N4.6	N2.6	N4.6	N2.7	N4.7	M1.5	M2.8
-F87.7	K2.3	J.6	M3.3		N2.2	N4.2	N2.3	N4.3	N2.3	N4.3	M1.3	M2.8
-F87.8	K2.4	J.7	M3.6		N2.6	N4.6	N2.6	N4.6	N2.7	N4.7	N5.3	N6.3

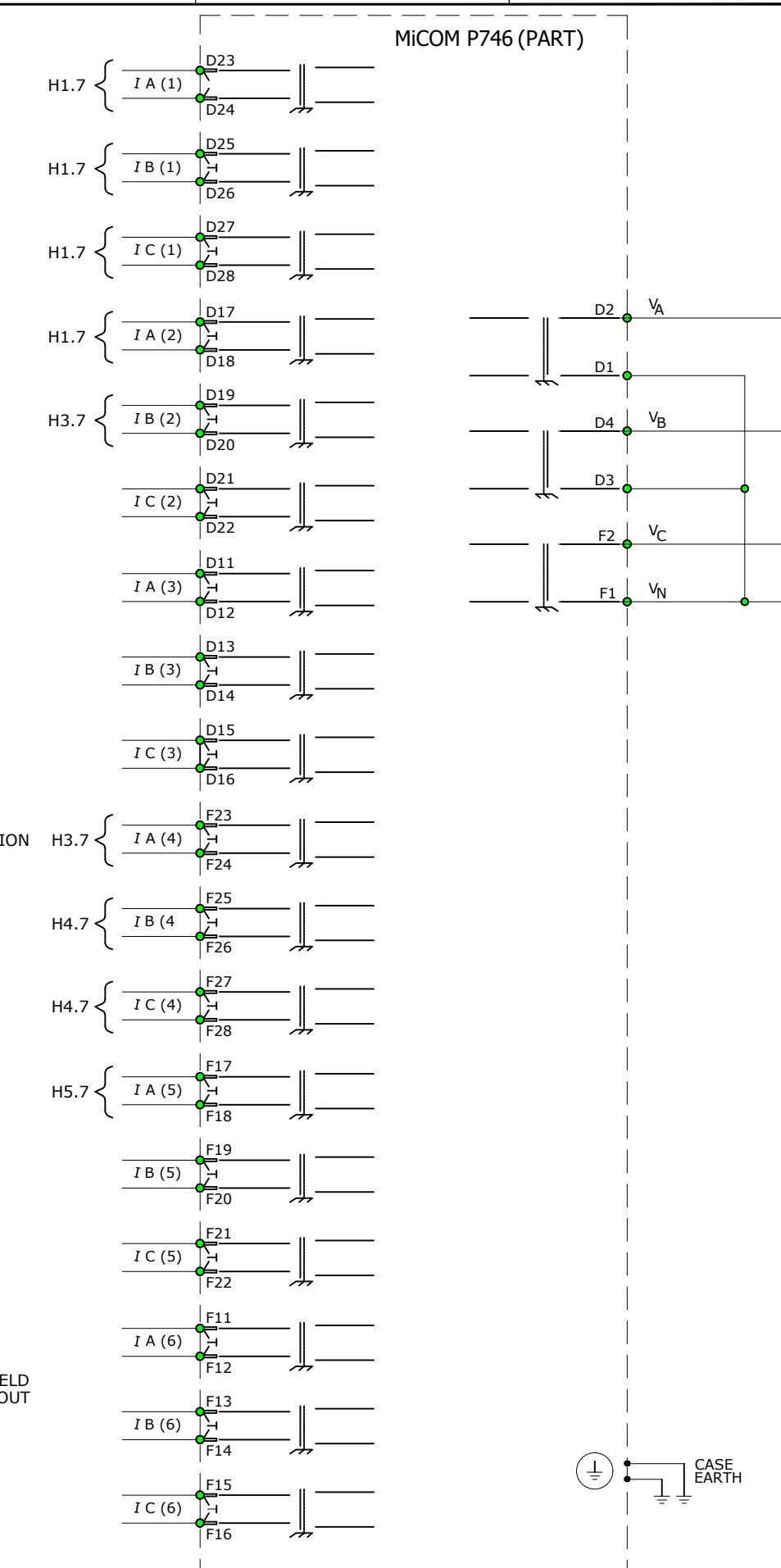
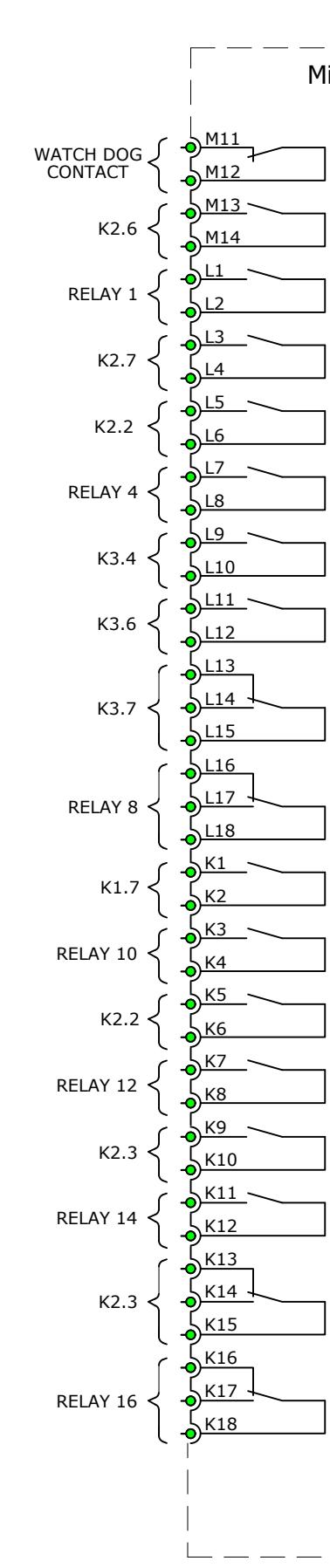
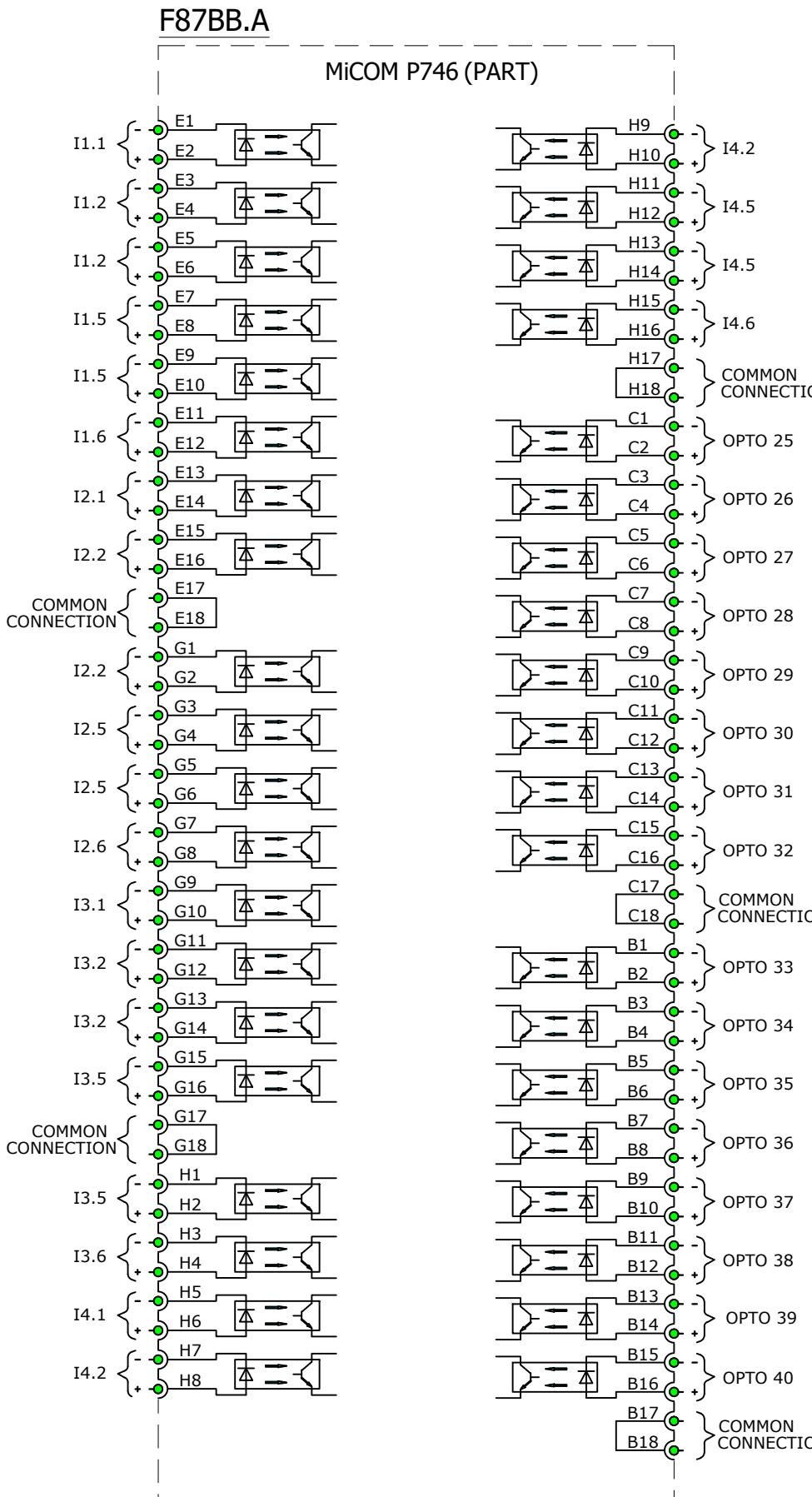
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0	AS BUILT	10.10.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV BUSBAR RELAY PANEL (=D00+R7) COMPONENT DIAGRAM	Drawing no. P60194-E-DBR-SC-001		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type Z1	Sheet no. 33
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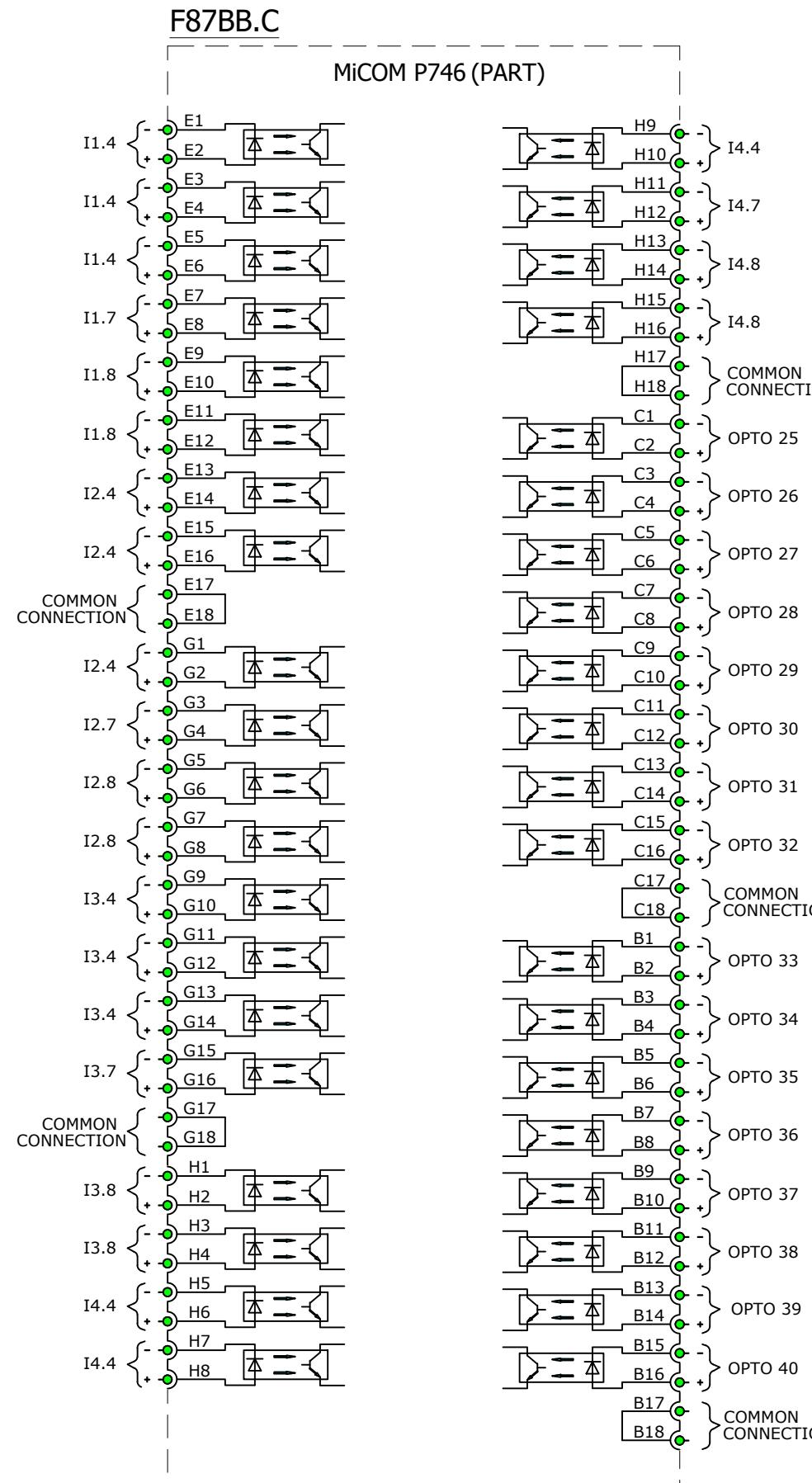
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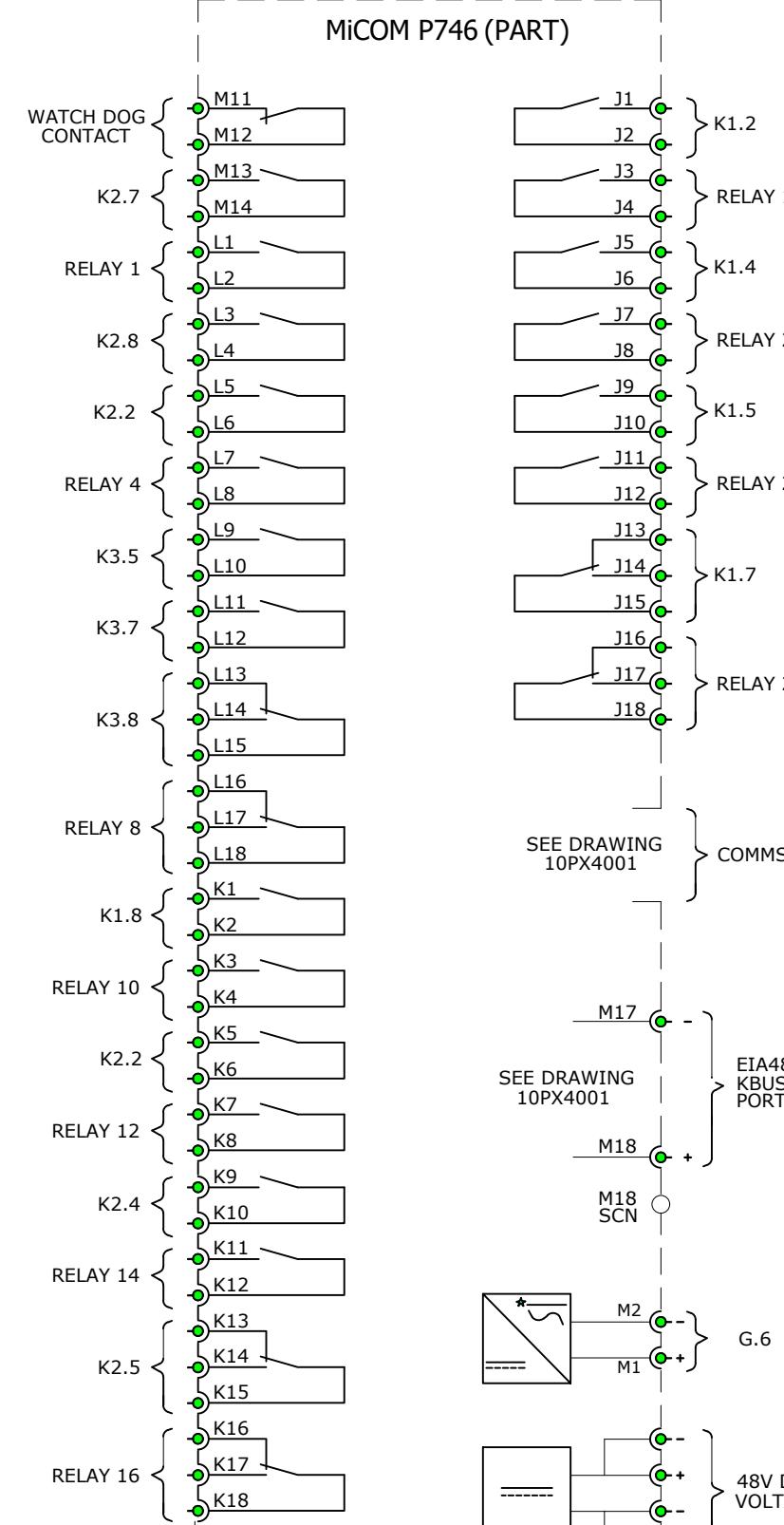
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REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type Z2	Sheet no. 34
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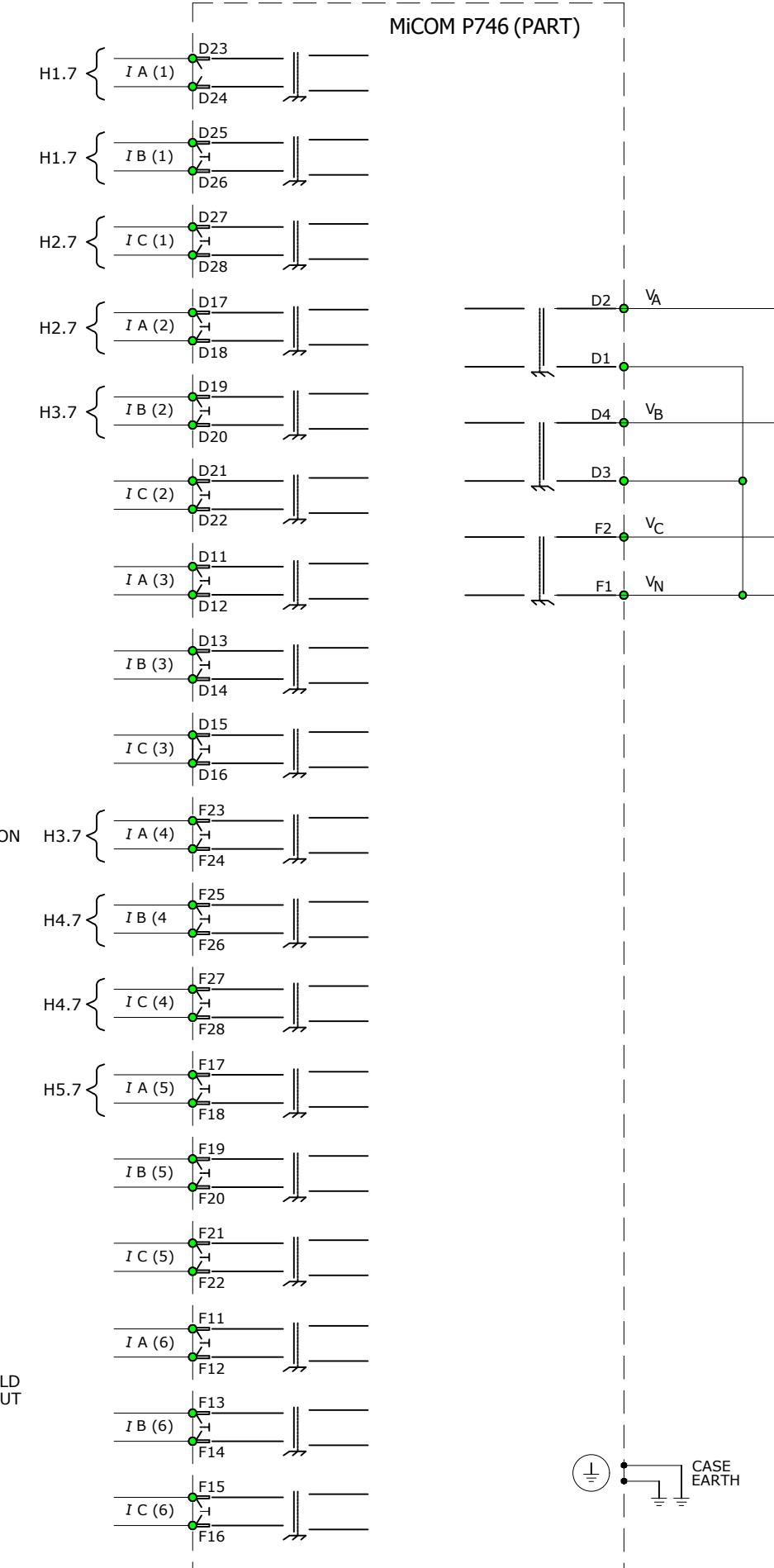
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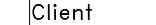


MiCOM P746 (PART)



MiCOM P746 (PART)



0	AS BUILT	10.10.2018	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 BUSBAR RELAY PANEL (=D00+R7) COMPONENT DIAGRAM	Drawing no. P60194-E-DBR-SC-001
									Project no.
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									Sheet no.
REV.	DESCRIPTION	DATE	DRAWER						P-60194 Z4 36