



Grid Solutions
A GE and Alstom joint venture

220kV/132kV GIS SUBSTATION GHAZI ROAD , LAHORE

220kV LINE CONTROL PANEL (=D02+C4) 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			
REVISION HISTORY								
REV	DATE	DRW. BY	CHK. BY	APR. BY	REVISION DESCRIPTION			
0	20.11.2018	ASJ	MFT	NAH	AS BUILT			
Scale					Sheet size			
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Client								
			NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)					
Contractor								
			Grid Solutions A GE and Alstom joint venture					
Manufacturer								
			EPESOL 71-B Garden Block, New Garden Town, Lahore Pakistan					
Project								
220kV / 132kV GIS SUBSTATION GHAZI ROAD , LAHORE								
Title								
220kV LINE CONTROL PANEL (=D02+C4) SCHEMATIC DRAWINGS								
Order no			Document no					
P-60194			P60194-E-RLC-SC-003					
Sheet type		Total sheets	Sheet no					
A		40	1					

	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	01	A	Cover Sheet			X	X	X	X							
	02	AA1	List Of Contents			X	X	X	X							
	03	AA2	List Of Contents			X	X	X	X							
B	04	AB	Symbols and Legends			X	X	X	X							
	05	AC1	Component List			X	X	X	X							
	06, 06a	AC2, AC2.1	Component List			X	X	X	X							
C	07, 07a	AD, AD1	Panel View			X	X	X	X							
	08	AE	Bay Concept & Metering Logics			X	X	X	X							
	09	D	AC Supply Distribution Circuit			X	X	X	X							
D	10	E	DC Supply Distribution Circuit			X	X	X	X							
	11	F	AC/DC Supply Failure Circuits			X	X	X	X							
	12	H1	CT/VT Metering Circuit			X	X	X	X							
E	13	H2	CT/VT Metering Circuit			X	X	X	X							
	14	I1	Power Equipment input Circuit			X	X	X	X							
	15	I2	Power Equipment input Circuit			X	X	X	X							
F	16	I3	Power Equipment input Circuit			X	X	X	X							
	17	I4	Power Equipment input Circuit			X	X	X	X							
	18	I5	Power Equipment input Circuit			X	X	X	X							
G	19	J1	Circuit Breaker Opening/Closing Circuit			X	X	X	X							
	20	J2	Circuit Breaker Opening/Closing Circuit			X	X	X	X							
	21	J3	Circuit Breaker Opening/Closing Circuit			X	X	X	X							
H	22	J4	Circuit Breaker Opening/Closing Circuit			X	X	X	X							
	23	J5	Isolator/Earthing SW. Opening/Closing Circuit			X	X	X	X							
	24	J6	Isolator/Earthing SW. Opening/Closing Circuit			X	X	X	X							
I	25	MA1	Synch Circuits			X	X	X	X							
	26	MA2	Synch Circuits			X	X	X	X							
	27	MA3	Control Circuit			X	X	X	X							
J	28	MA4	Discrepancy Check Circuit			X	X	X	X							
	29	MA5	Discrepancy Check Circuit			X	X	X	X							
	30	MA6	Discrepancy Check Circuit			X	X	X	X							
K	31	RA1	AC Annunciations Circuit			X	X	X	X							
	32	RA2	Protection Trips Circuit			X	X	X	X							
	0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE CONTRPL PANEL (=D02+C4) LIST OF CONTENTS	Drawing no. P60194-E-RLC-SC-003				Project no. P-60194	Sheet type AA1	Sheet no. 02
REV.	DESCRIPTION		DATE	DRAWER												

	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		KWH	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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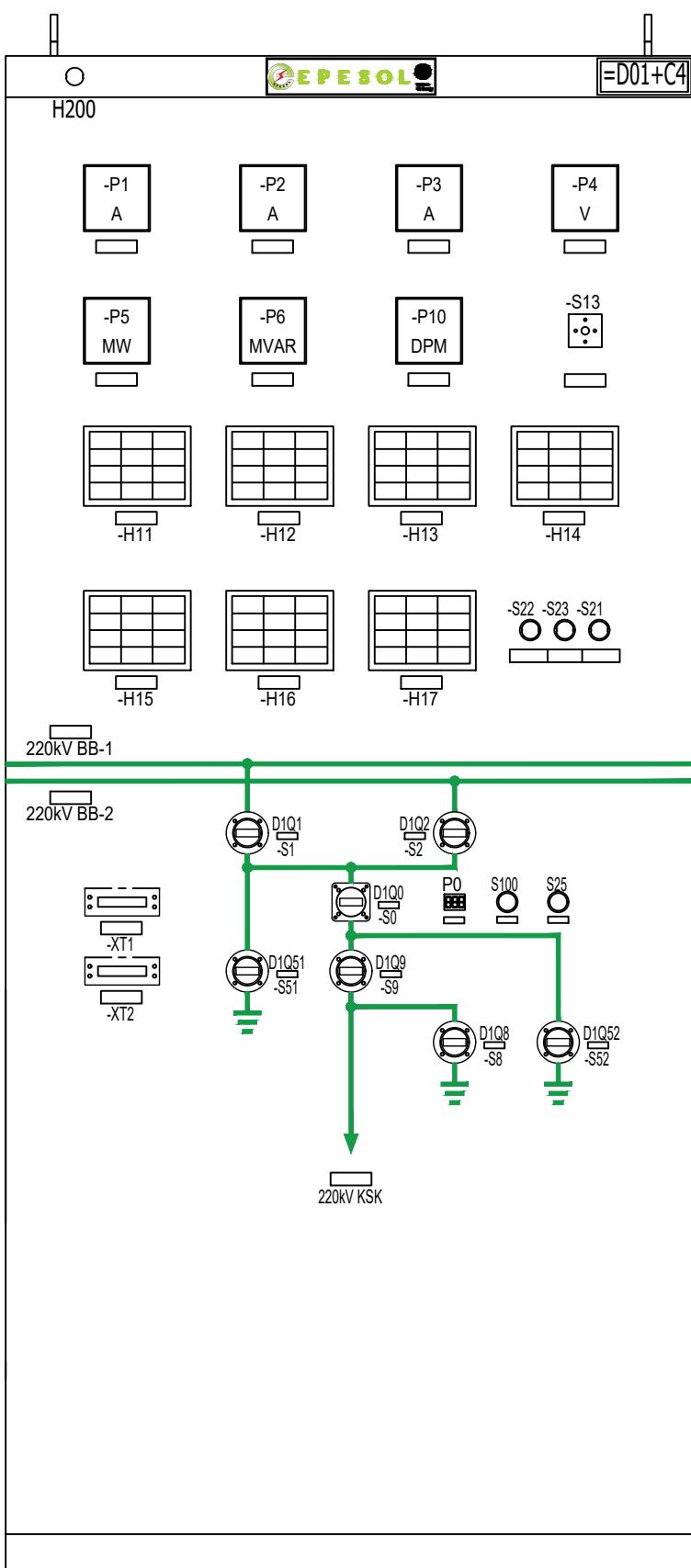
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REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type AB
									Sheet no. 04

	1	2	3	4	5	6	7	8		
	QTY.	DEVICE DESCRIPTION	DEVICE SPECIFICATIONS DEVICE TYPE ; TECHNICAL DATA / SPECIFICATIONS			DEVICE DESIGNITION	MANUFACTURER			
A	01	DIGITAL POWER METER	ENERIUM-150, Accuracy: 0.5S, IP Class: IP52, COM Port: RS485, Size: 96x96 Sq.mm. Supply: 110-375VDC, NOMINAL INPUT: 1/5A, 110VAC(L-L)	-P10			ENERDIS	A		
	02	ANALOG AMMETER	Type: A96MMA, In: 0...20/30mA, Deflection: 240°, Class: 1, Size: 96x96 Sq.mm, Scale-1: 0...600/900A, Scale-2: 0...1200/1800A, Scale-3: 0...2400/3600A	-P1,-P3			FRER			
B	01	DIGITAL AMMETER	Type: D96MMA, In: 0...20/30mA DC, Class: 1, Supply: 220VDC, Size: 96x96 Sq.mm.	-P2			FRER	B		
	01	ANALOG VOLTMETER	Type: A96MMV, In: 0...20/30mA DC, Deflection: 240°, Class: 1, Size: 96x96 Sq.mm. Scale: 0...220/330kV, Marked Red at 220kV	-P4			FRER			
C	01	ANALOG REAL POWER (MW) METER	Type: A96MMA, In: -12.5/10...0...+10/12.5mA DC, Deflection: 240° with CENTER ZERO,	-P5			FRER	C		
		Application: 3PH+4W Balanced System	Size: 96x96 Sq.mm., Class: 1, Scale-1: 450/300...0...300/450 MW (229 MW at 20mA) Scale-2: 625/500...0...500/625 MW (457 MW at 20mA), Scale-3: 1250/1000...0...1000/1250 MW (915 MW at 20mA)							
D	01	ANALOG REACTIVE POWER (MVAR) METER	Type: A96MMA, In: -12.5/10...0...+10/12.5mA DC, Deflection: 240° with CENTER ZERO,	-P6			FRER	D		
		Application: 3PH+4W Balanced System	Size: 96x96 Sq.mm., Class: 1, Scale-1: 450/300...0...300/450 MVAR (229 MVAR at 20mA) Scale-2: 625/500...0...500/625 MVAR (457 MVAR at 20mA), Scale-3: 1250/1000...0...1000/1250 MVAR (915 MVAR at 20mA)							
E	04	CURRENT TRANSDUCER	Type: MCOEAQ, Accuracy Class: 1, Input: 1/1.5A, Output: 0...20/30mA - 1 O/P, Frequency: 50Hz, Supply: 220VDC, CT Ratio: 600:1200:2400 / 1A	-U1,-U2, -U2.1, -U3			FRER	E		
	01	VOLTAGE TRANSDUCER	Type: MCOEVQ, Accuracy Class: 1, Input: 0...110/165VAC(L-L), Output: 0...20/30mA - 1 O/P Frequency: 50Hz, Supply: 220VDC, PT Ratio: 220/0.11 kV(L-L)	-U4			FRER			
F	01	PROGRAMMABLE UNIVERSAL TRANSDUCER	Type: MCOP4, 3-Phase 4 Wire Balanced Load Input Voltage: 110/137.5 VAC (L-L), Input Current: 1/1.25 A, Auxiliary Voltage: 220 VDC 4x Programmable DC mA O/P, Accuracy Class: 1, Output: -12.5/10...0...10/12.5 mA PT Ratio: 220/0.11 kV (L-L), CT Ratio: 600:1200:2400 / 1A.	-U5			FRER	F		
	01	DISCREPANCY SWITCH - CIRCUIT BREAKER	Type: YS-IC-4456-S4(49)-PM-K-G-D22-GM, Standard-type (Push & Turn 90° after 2-position) Square Type, Rating: 220VDC	-S0			YONGSUNG			
G	06	DISCREPANCY SWITCH - ISOLATOR / EARTHING SWITCHES	Type: YS-IC-4456-R4(49)-PM-K-G-D22-GM, Standard-type (Push & Turn 90° after 2-position) Round Type, Rating: 220VDC	-S1,-S51,-S2,-S9,-S52,-S8			YONGSUNG	G		
	01	SELECTOR SWITCH - VOLTMETER	Type: PO-160023R001, 7 Position (L1-L2,L2-L3,L3-L1,OFF,L1-N,L2-N,L3-N)	-S13			GIOVENZANA			
H	01	SELECTOR SWITCH - OPERATION (LOCAL-OFF-SCADA)	Type: YS-AK-2-3-44-D, 2 Position with OFF, 4-Pole, Ratings: 12A, 220VDC, Keytype	-S100			YONGSUNG	H		
	01	SELECTOR SWITCH - SYNCHRONIZATION (ON-BYPASS)	Type: YS-AK-2-2-44-D, 2 Position, 4-Pole, Ratings: 12A, 220VDC, Keytype	-S25			YONGSUNG			
I	0	AS BUILT	20.11.2018	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 GHAZI ROAD, LAHORE	Title 220kV LINE CONTRPL PANEL (=D02+C4) COMPONENT LIST	Drawing no. P60194-E-RLC-SC-003
	REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type AC1

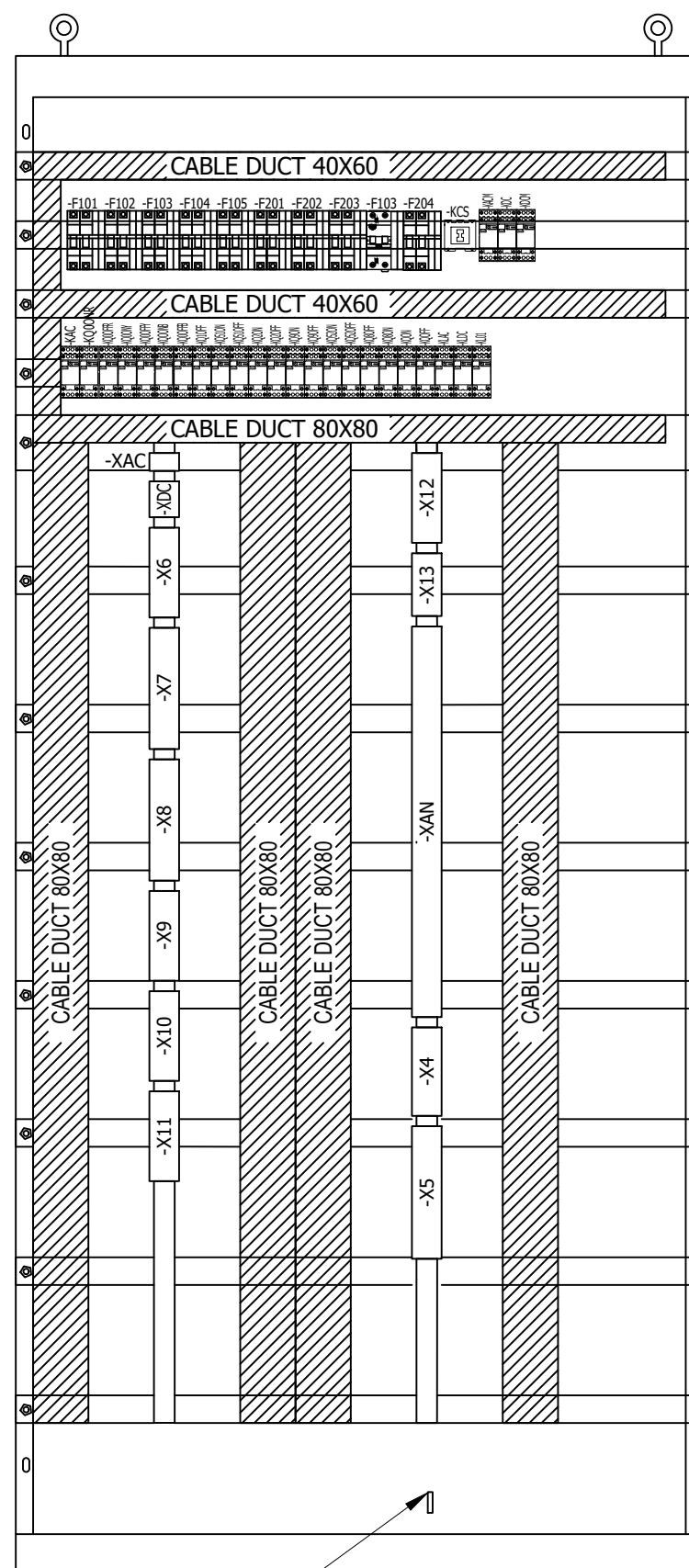
	1	2	3	4	5	6	7	8		
	QTY.	DEVICE DESCRIPTION	DEVICE SPECIFICATIONS DEVICE TYPE ; TECHNICAL DATA / SPECIFICATIONS			DEVICE DESIGNITION	MANUFACTURER			
A	04	TERMINAL BLOCKS - AC SUPPLY DIST.	Screw-type, Feed Through Terminal, CBD-4			-XAC		CABUR		
	08	TERMINAL BLOCKS - DC SUPPLY DIST.	Screw-type, Feed Through Terminal, CBD-4			-XDC		CABUR		
	16	TERMINAL BLOCKS - CT METERING CIRCUIT	Screw-type, Feed Through Terminal, SCB-6			-X4		CABUR		
	28	TERMINAL BLOCKS - VT METERING CIRCUIT	Screw-type, Feed Through Terminal, SCB-6			-X5		CABUR		
B	20	TERMINAL BLOCKS - POWER EQUIP. INPUT	Screw-type, Feed Through Terminal, CBD-4			-X6		CABUR		
	27	TERMINAL BLOCKS - POWER EQUIP. INPUT	Screw-type, Feed Through Terminal, CBD-4			-X7		CABUR		
	27	TERMINAL BLOCKS - CB OPENING/CLOSING CIRCUIT	Screw-type, Feed Through Terminal, CBD-4			-X8		CABUR		
	20	TERMINAL BLOCKS - CB OPENING/CLOSING CIRCUIT	Screw-type, Feed Through Terminal, CBD-4			-X9		CABUR		
C	20	TERMINAL BLOCKS - CB OPENING/CLOSING CIRCUIT	Screw-type, Feed Through Terminal, CBD-4			-X10		CABUR		
	31	TERMINAL BLOCKS - ISO./ESW OPENING/CLOSING CIRCUIT	Screw-type, Feed Through Terminal, CBD-4			-X11		CABUR		
	20	TERMINAL BLOCKS - SYNC. CIRCUIT	Screw-type, Feed Through Terminal, CBD-4			-X12		CABUR		
	14	TERMINAL BLOCKS - SYNC. CIRCUIT	Screw-type, Feed Through Terminal, CBD-4			-X13		CABUR		
D	05	TERMINAL BLOCKS - CONTROL CIRCUIT	Screw-type, Feed Through Terminal, CBD-4			-X14		CABUR		
	16	TERMINAL BLOCKS - DISCREPANCY CHECK CIRCUIT	Screw-type, Feed Through Terminal, CBD-4			-X15		CABUR		
	07	TERMINAL BLOCKS - DISCREPANCY CHECK CIRCUIT	Screw-type, Feed Through Diode Terminal, DAS.4/6			-XD		CABUR		
	87	TERMINAL BLOCKS - ANNUNCIATION CIRCUIT	Screw-type, Feed Through Terminal, CBD-4			-XAN		CABUR		
E	28	TERMINAL BLOCKS - ER/FR CIRCUIT	Screw-type, Feed Through Terminal, CBD-4			-XEV		CABUR		
	16	TERMINAL BLOCKS - SCADA SIGNALS	Screw-type, Feed Through Terminal, CBD-4			-XSC		CABUR		
	06	TERMINAL BLOCKS - SCADA METERING SIGNALS	Screw-type, Feed Through Terminal, CBD-4			-XSA		CABUR		
	06	TERMINAL BLOCKS - CONTROL CIRCUIT	Screw-type, Feed Through Terminal, CBD-4			-X30		CABUR		
F	0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV LINE CONTRPL PANEL (=D02+C4) COMPONENT LIST	Drawing no. P60194-E-RLC-SC-003
									Project no. P-60194	
									Sheet type AC2.1	
	REV.	DESCRIPTION	DATE	DRAWER					Sheet no. 06a	

	1	2	3	4	5	6	7	8			
	QTY.	DEVICE DESCRIPTION	DEVICE SPECIFICATIONS DEVICE TYPE ; TECHNICAL DATA / SPECIFICATIONS			DEVICE DESIGNITION	MANUFACTURER				
A	01	PUSH BUTTON - ACKNOWLEDGE	Type: Switch (A Type), Color : BLACK , Supply : 220VDC, Ord: YS-AP1-2-31-B-D-W	-S21			YONGSUNG	A			
	01	PUSH BUTTON - LAMP TEST	Type: Switch (A Type), Color : RED , Supply : 220VDC, Ord: YS-AP1-2-31-R-D-W	-S22			YONGSUNG				
	01	PUSH BUTTON - RESET	Type: Switch (A Type), Color : GREEN , Supply : 220VDC, Ord: YS-AP1-2-31-G-D-W	-S23			YONGSUNG				
B	03	MCB - AC	2-Pole, Ratings: 2A, 240VAC, 10kA @ 240VAC, 2 C/O Contacts, Ord: G62C02+CAH(2)	-F101, -F102, -F104			GE	B			
	01	MCB - ELCB	2-Pole, Ratings: 16A, 30mA, 240VAC, 1P+N, 2 C/O Contacts, Ord: DM100C16/030+CAH(2)	-F103			GE				
	04	MCB - DC	2-Pole, Ratings: 4A, 250VDC, 10kA @ 250VDC, 2 C/O Contacts, Ord: EP102UCC04+CAH(2)	-F201, -F202, -F203, -F204			GE				
	01	MCB - VT	4-Pole, Ratings: 4A, 110VAC, 10kA @ 110VAC, Ord: G64C02	-F105			GE				
C	01	INDICATION LAMP - DC SUPPLY FAILURE	Type: Integrated LED, Color : RED , Supply : 230VAC @ 50Hz, Ord: YS-PL-2-AL-22-R-W	-H200			YONGSUNG	C			
	01	ANNUNCIATION MODULE	12-Window, Supply: 220 VAC	-H11			E-LABS				
	06	ANNUNCIATION MODULE	12-Window, Supply: 220 VDC	-H12,-H13,-H14,-H15,-H16,H17			E-LABS				
D	02	CONTACTOR RELAY	Coil Voltage: 230VAC @ 50/60 Hz, 6A, 4 C/O Contacts, Ord: PRC4M40ANL	-KACM, -KDC			GE	D			
	01	AUXILIARY CONTACTOR - SUPPLY CHANGEOVER	Coil Voltage: 220VDC, 16A, 3 NO + 3 NC Contacts, Ord: MCRC022ATWN+MARN211AT	-KCS			GE				
	65	CONTACTOR RELAY	Coil Voltage: 220VDC, DIODE, 4 C/O Contacts, Ord: PRC4M40DCML	-KDCM, -KAC, -KQ0.ONR, -KQ0.OFR, -KQ0.ONY, -KQ0.OFY			GE				
				-KQ0.ONB, -KQ0.OFB, -KQ1.ON, -KQ1.OF, -KQ51.ON, -KQ51.OF							
				-KQ2.ON, -KQ2.OF, -KQ9.ON, -KQ9.OF, -KQ52.ON, -KQ52.OF							
				-KQ8.ON, -KQ8.OF, -KQ.ON, -KQ.OFF, -KLAC, -KLDC, -KLO1							
				-KLO2, -KLO3, -KLO4, -KLO4.1, -KLO5, -KLO5.1, -KLO6, -KLO7, -KLO8							
				-KLO9, -KG0A, -KG1A, -KG2A, -KG4A, -KG5A, -KG9A, -KGB							
				-KGW, -KVTM, -KVTP, -KVTPX, -KBVT1, -KBVT2, -KDC2							
				-KSY1, -KOE1, -KO A, -KV TB, -KDC1							
E				-KTX, -KD				D			
				-K0D, -K1D, -K51D, -K2D, -K9D, -K52D, -K8D, -KS21, -KDC3							
	01	NO VOLT RELAY FOR VT	Rated Supply: 110 VAC @ 50 Hz	-KQ8.D			E-LABS	E			
	01	FLASHER RELAY	Rated Supply: 220 VDC	-KFL			E-LABS				
	01	OPERATION COUNTER	Rated Supply: 220 VDC	-P0			E-LABS				
	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	-DS			YONGSUNG				
	01	THREE PIN SOCKET	1N+PE, 16A, 230VAC @ 50Hz	-X100			LOCAL				
	01	PANEL HEATER	230VAC @ 50Hz, 60W	-R100			E-LABS				
	01	HUMIDITY & TEMPERATURE CONTROLLER	40-90%RH, 25-50 deg.C, 230VAC @ 50Hz	-B100			E-LABS				
F	01	TEST BLOCK - CT	YS-CTT-04S	-XT1			YONGSUNG	F			
	01	TEST BLOCK - VT	YS-PTT-04S	-XT2			YONGSUNG				
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REV.		DESCRIPTION	DATE	DRAWER				Project no. P-60194	Sheet type AC2	Sheet no. 06	

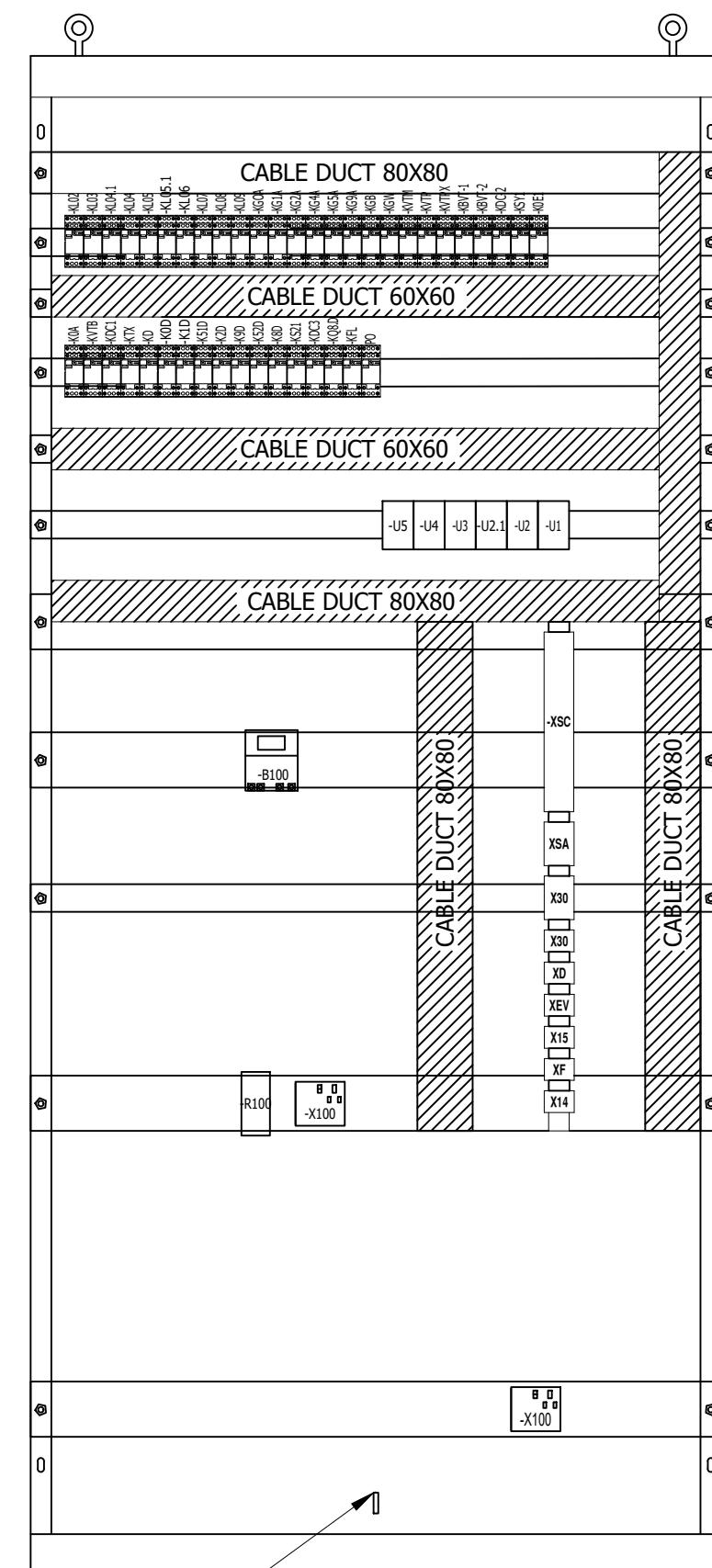
FRONT VIEW



LEFT SIDE VIEW



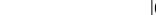
RIGHT SIDE VIEW

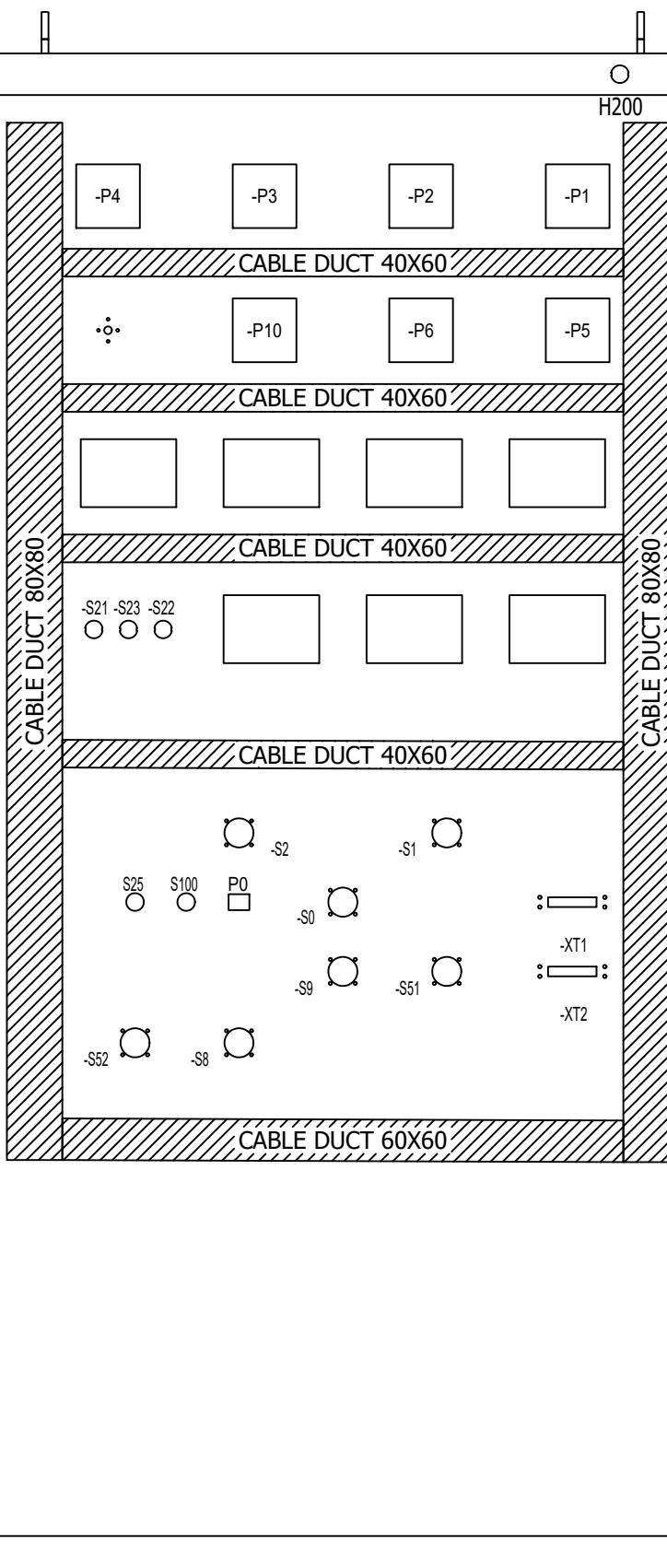
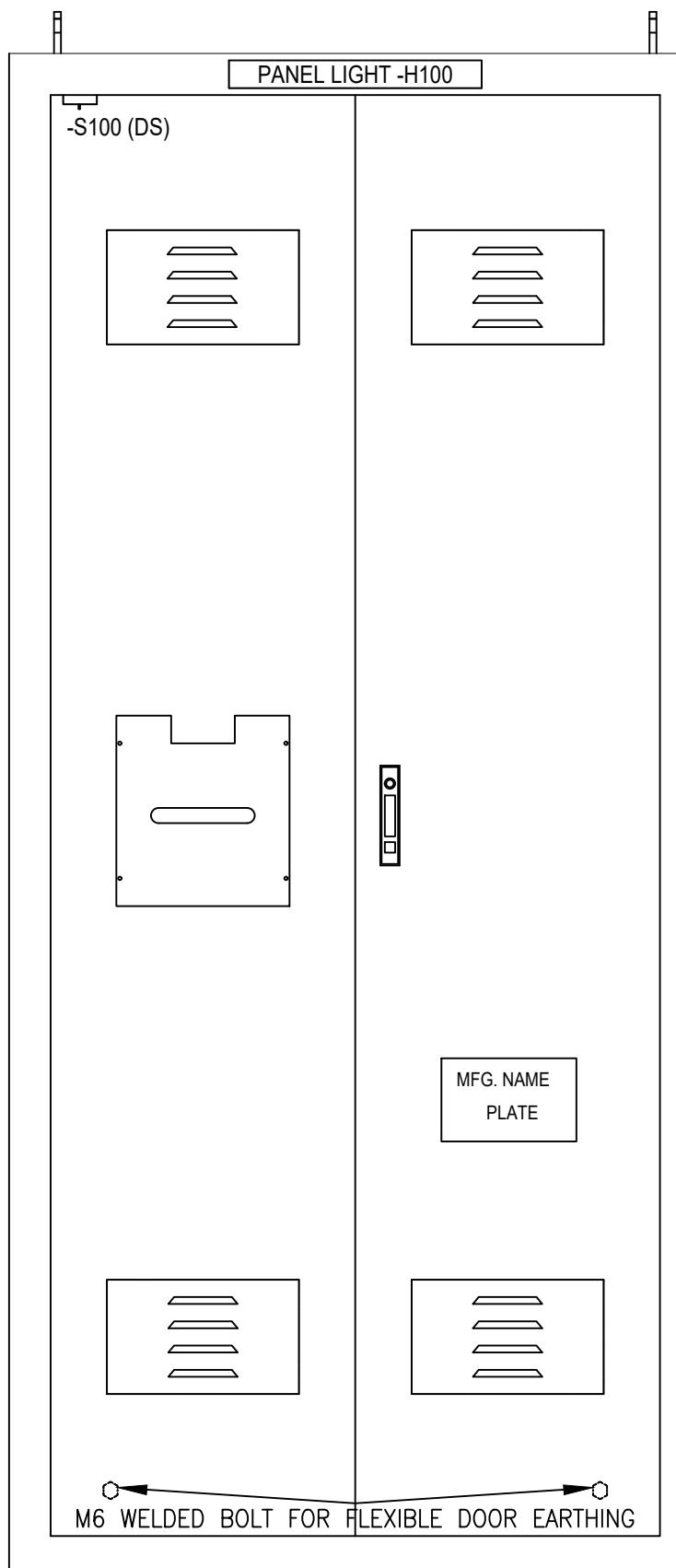
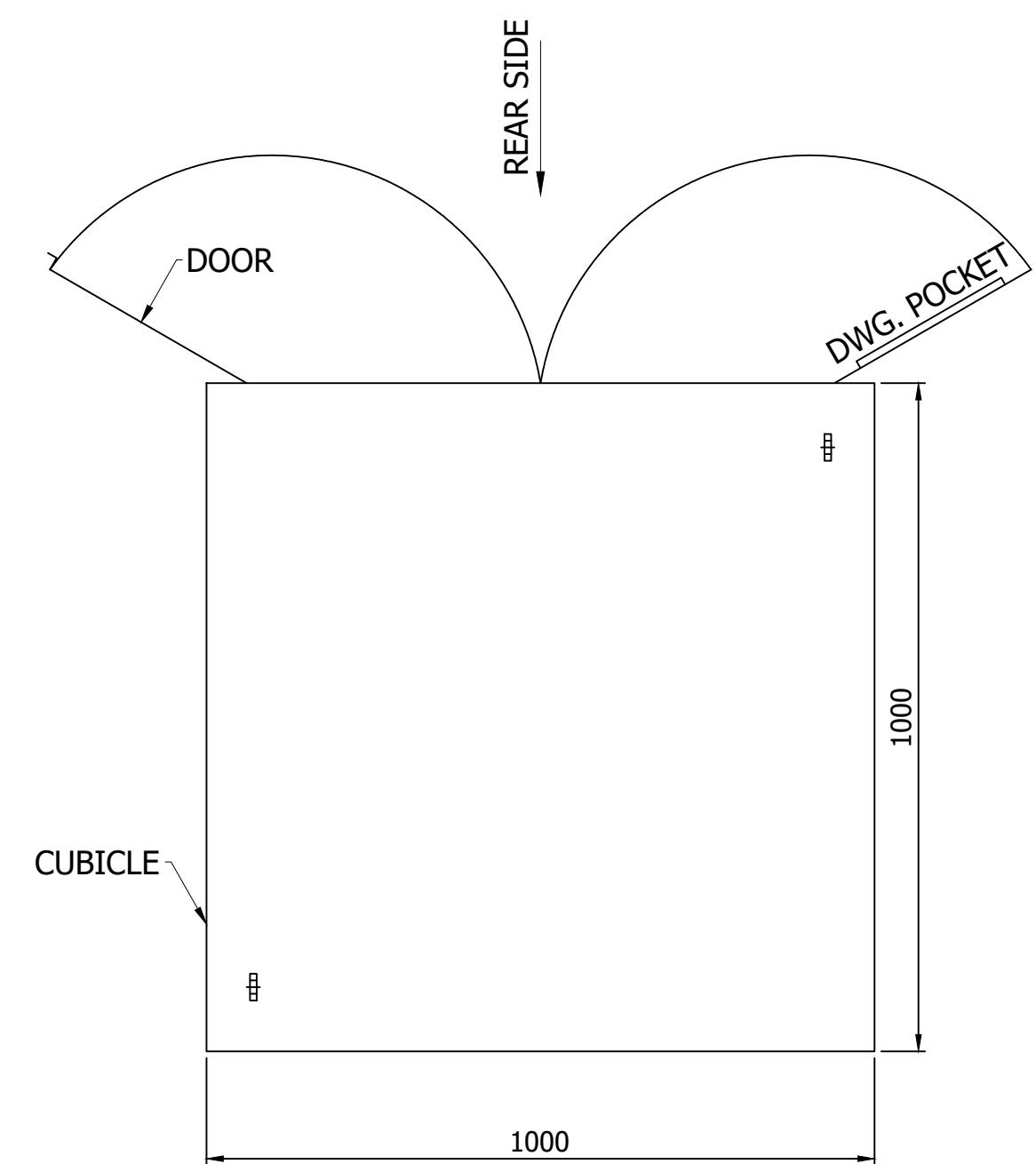


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MIMIC:

1. MIMIC COLOR: GREEN FOR 220kV

0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 7-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GAZI ROAD, LAHORE	Title 220kV LINE CONTROL PANEL (=D02+C4) PANEL VIEW	Drawing no. P60194-E-RLC-SC-003		
									Project no.	Sheet type	Sheet no.
REV.	DESCRIPTION	DATE	DRAWER						P-60194	AD	07

BACK VIEW WITHOUT DOORBACK VIEW WITH DOORTOP VIEWNOTE:-

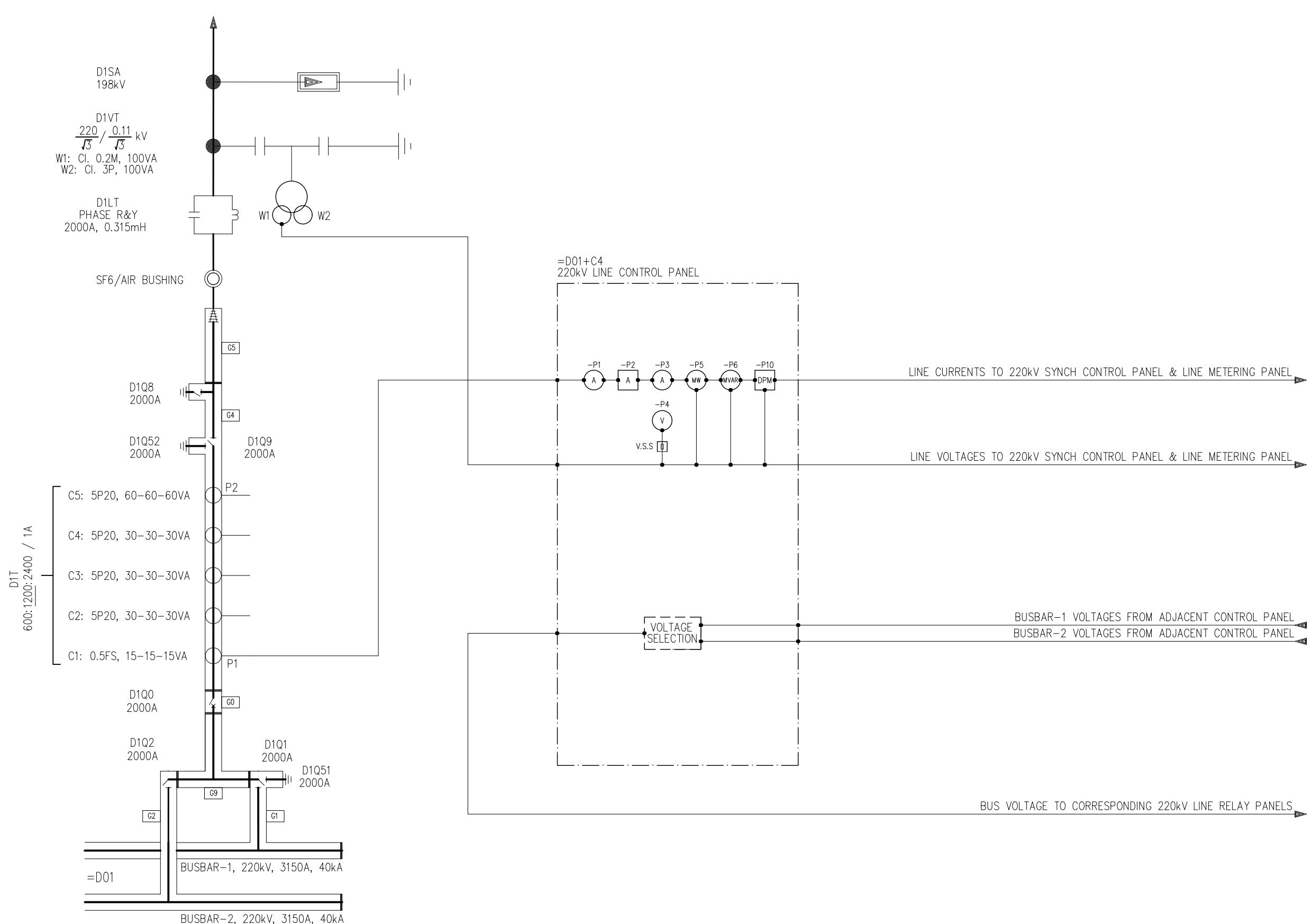
- 1 - PANEL DIMENSION: 1000 x 1000 x 2200mm (WxDxH)
- 2 - COLOR : RAL 7032
- 3 - SHEET THICKNESS : 2-2.5 mm
- 4- PROTECTION CLASS : IP-51 (INDOOR TYPE)
- 5 - ALL DOOR FITTED WITH 16mm EARTH STRAP & INSULATED WITH GREEN-YELLOW COLOUR.

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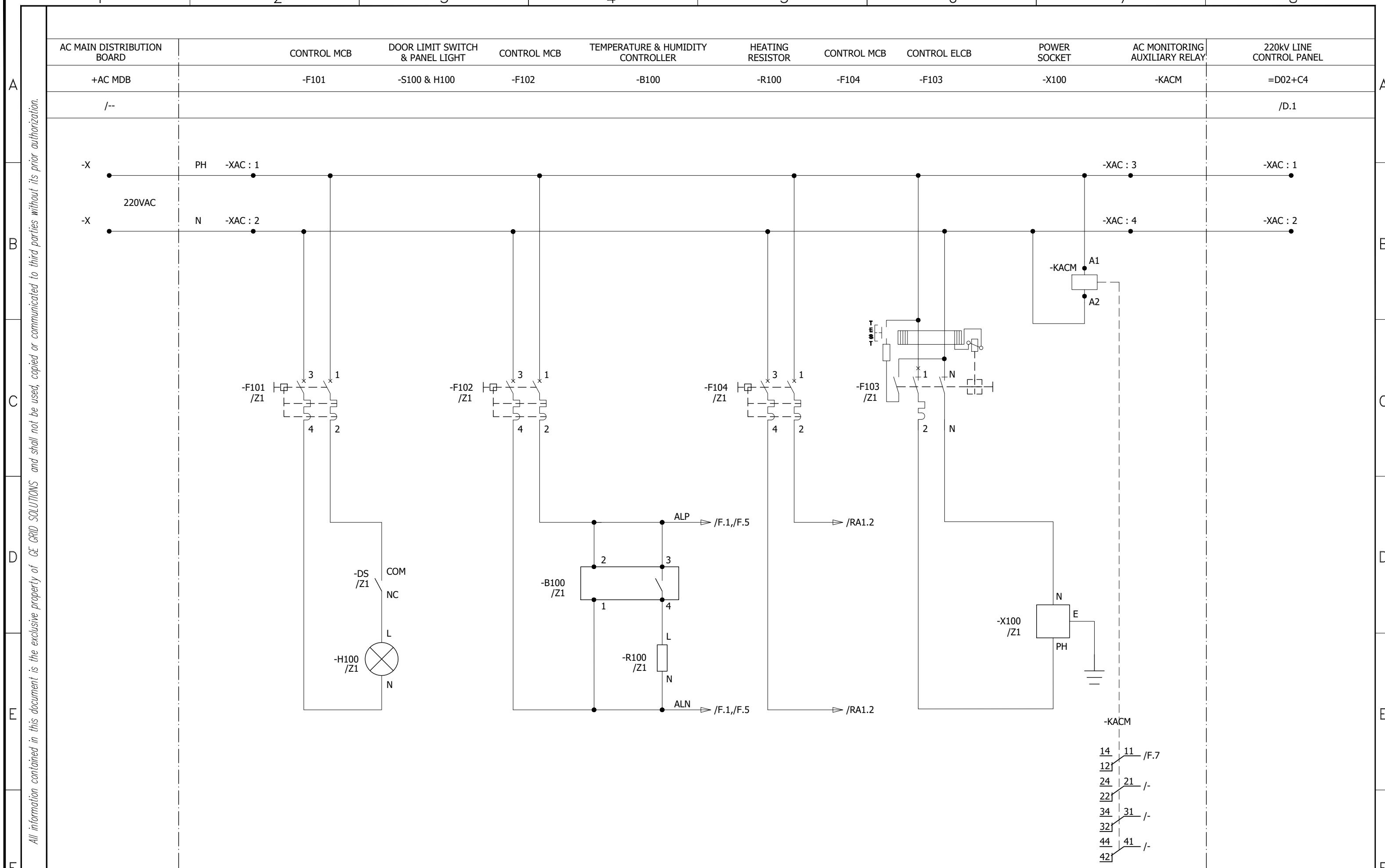
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220kV KSK

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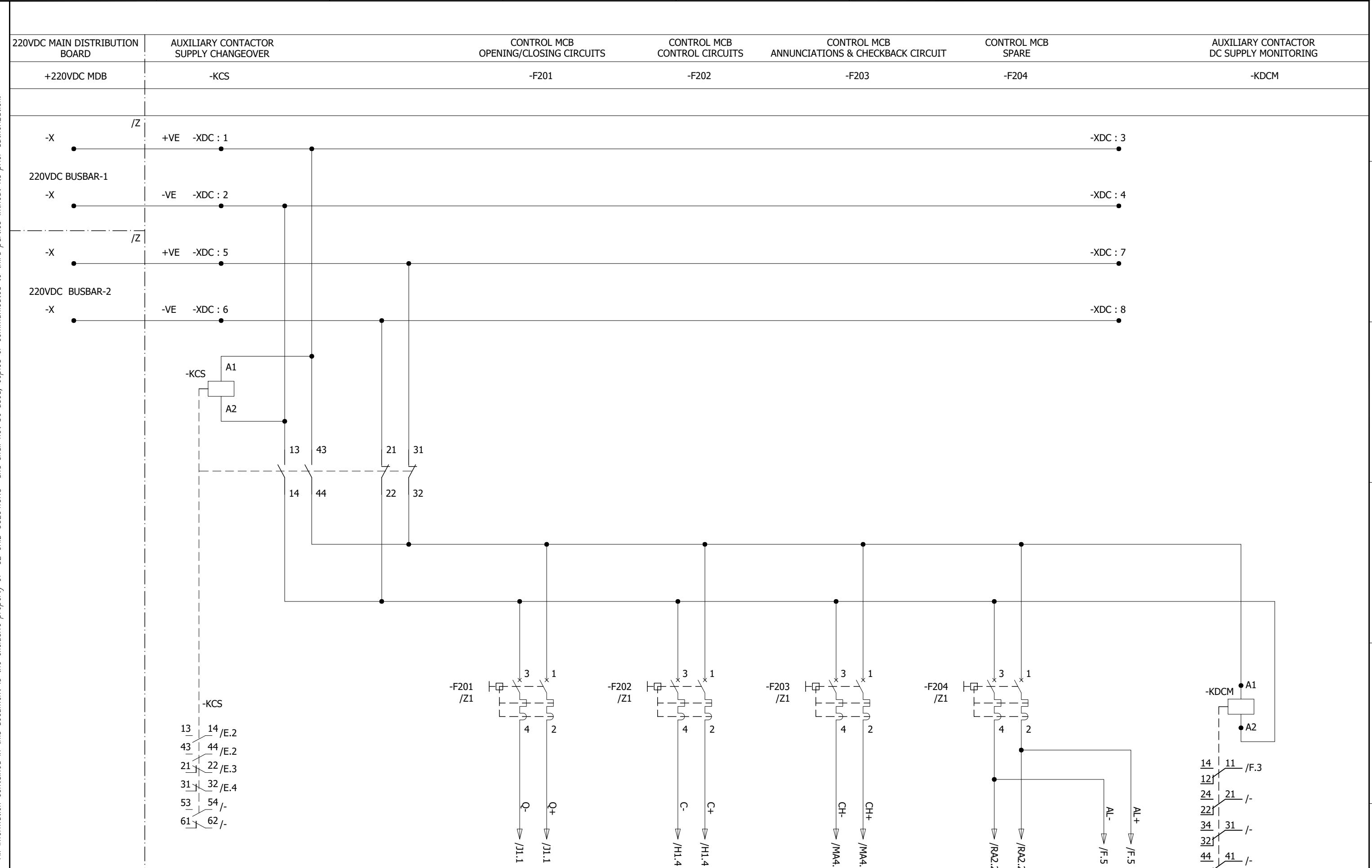


0	AS BUILT	20.11.2018	ASJ	Manufacturer EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor Grid Solutions A GE and Alstom joint venture	Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV LINE CONTROL PANEL (=D02+C4) BAY CONCEPT & METERING	Drawing no. P60194-E-RLC-SC-003		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type AE	Sheet no. 08
1		2	3	4	5	6	7	8			



0	AS BUILT	20.11.2018	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 LINE CONTROL PANEL (=D02+C4) AC SUPPLY DISTRIBUTION	Drawing no. P60194-E-RLC-SC-003
									Project no. P-60194
REV.	DESCRIPTION	DATE	DRAWER						Sheet type D
									Sheet no. 09

1 2 3 4 5 6 7 8



0	AS BUILT	20.11.2018	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 LINE CONTROL PANEL (=D02+C4) DC SUPPLY DISTRIBUTION	Drawing no. P60194-E-RLC-SC-003
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type E
									Sheet no. 10

1 2 3 4 5 6 7 8

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220V DC CIRCUIT FAULTY

220V DC CIRCUIT FAULTY INDICATION

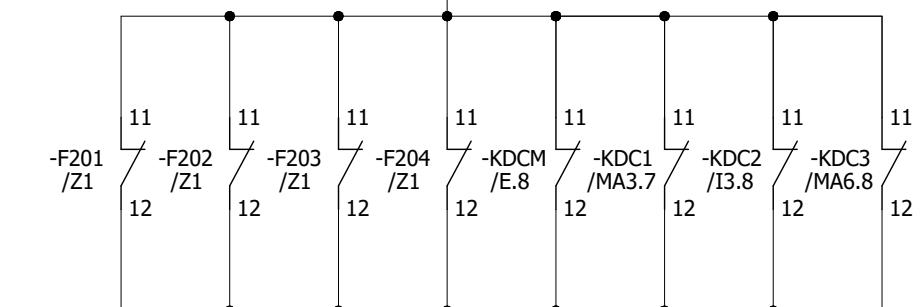
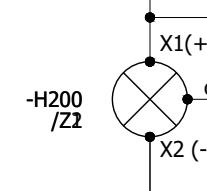
220V AC CIRCUIT FAULTY

-KDC

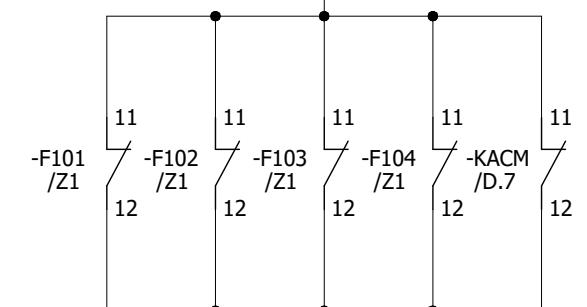
-H200

-KAC

/D.5 ➔ ALP

21
24

/E.5 ➔ AL+



/D.5 ➔ ALN

-KDC

A1
A2

14 11 RA7.8
12 21 /F.4
24 21 -
22 31 RA1.4
34 31 /
32 41 -
44 41 -
42 1 -

/E.5 ➔ AL-

-KAC

A1
A2

14 11 /RA7.7
12 21 -
24 21 -
22 31 /RA3.5
34 31 /
32 41 -
44 41 -
42 1 -

A

A

B

B

C

C

D

D

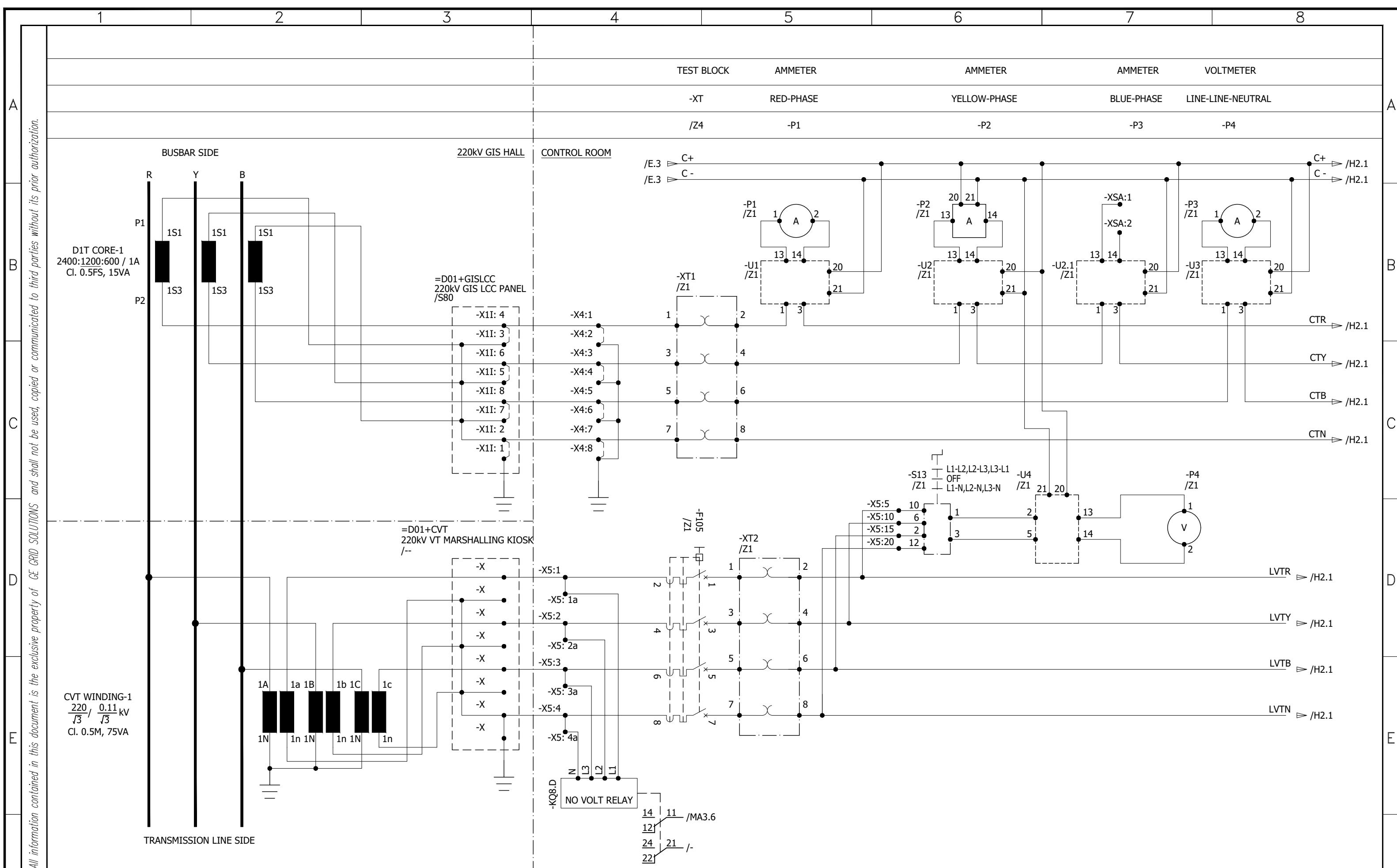
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0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE CONTROL PANEL (=D02+C4) AC/DC SUPPLY FAILURE CIRCUIT	Drawing no. P60194-E-RLC-SC-003
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type F
									Sheet no. 11



F	ELECTRICAL DRAWING										F
0	AS BUILT		20.11.2018	ASJ	Manufacturer  EPESOL 74-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV LINE CONTROL PANEL (-D02+C4) CT/VT METERING CIRCUIT	Drawing no. P60194-E-RLC-SC-003	
									Project no. P-60194	Sheet type H1	Sheet no. 12
	REV.	DESCRIPTION		DATE	DRAWER						
	1		2		3	4	5	6	7	8	

1 2 3 4 5 6 7 8

REAL POWER METERING

REACTIVE POWER METER

DIGITAL POWER METER

220kV SYNCH CONTROL PANEL

LINE METERING PANEL

METER

SCADA

METER

SCADA

=D00+C6

=D00+EM

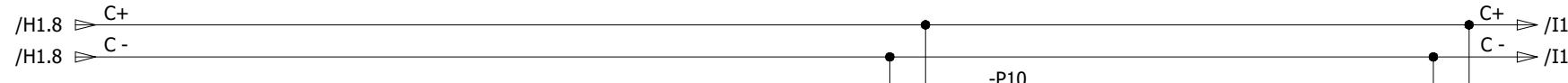
-P5

-P6

-P10

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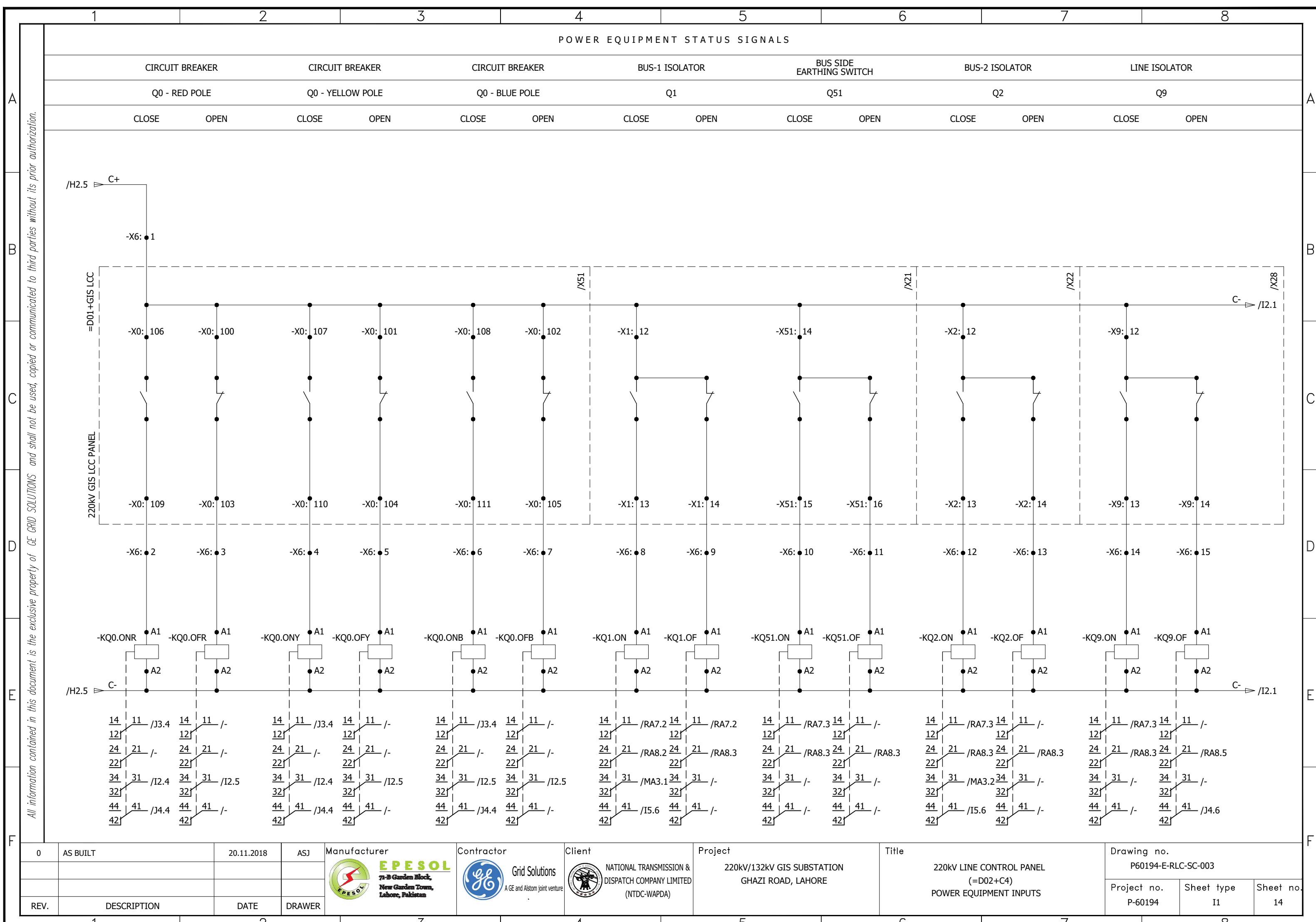


/H1.8 ▷ C+

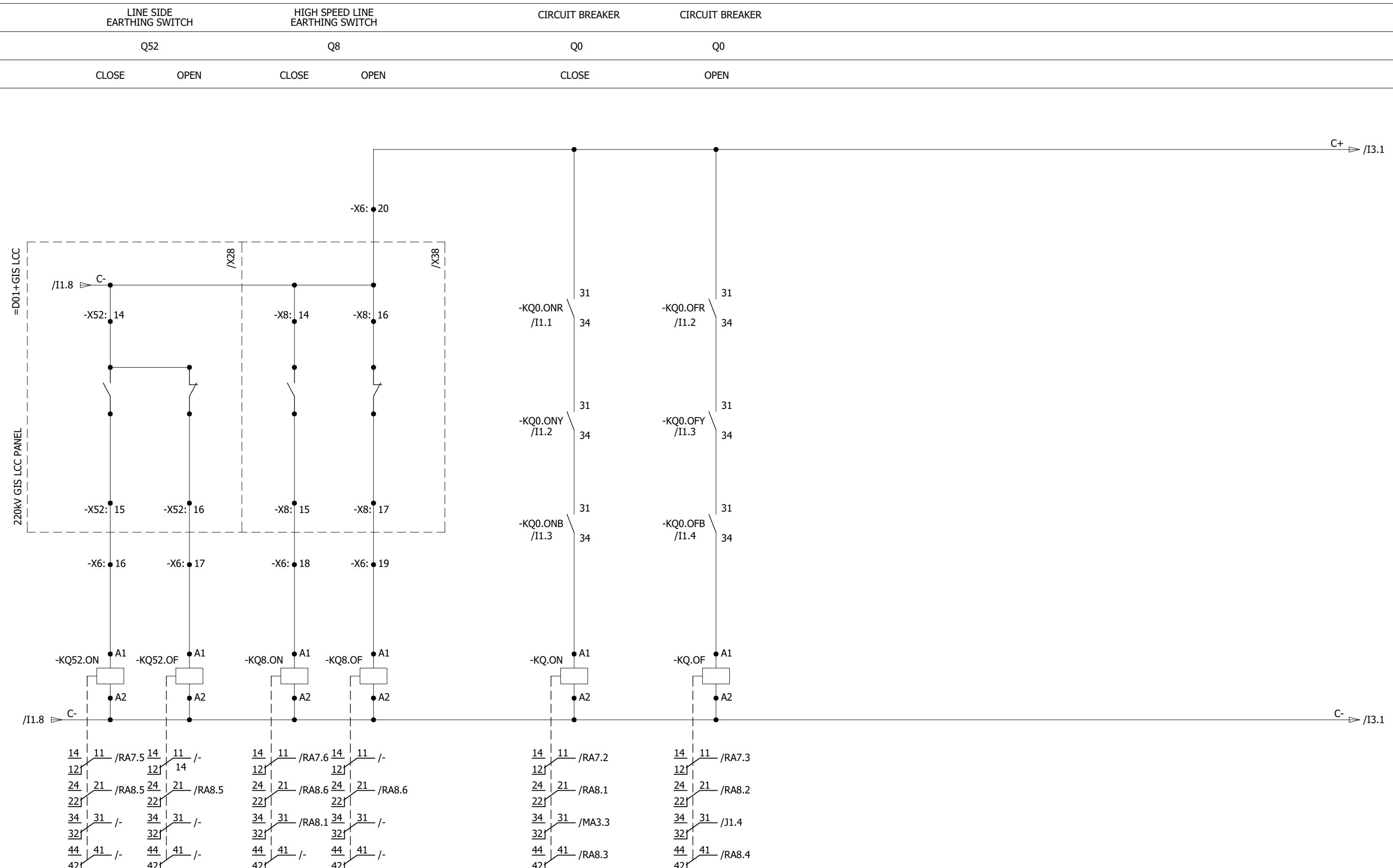
/H1.8 ▷ C-

/H1.8 ▷ C-

/Z1

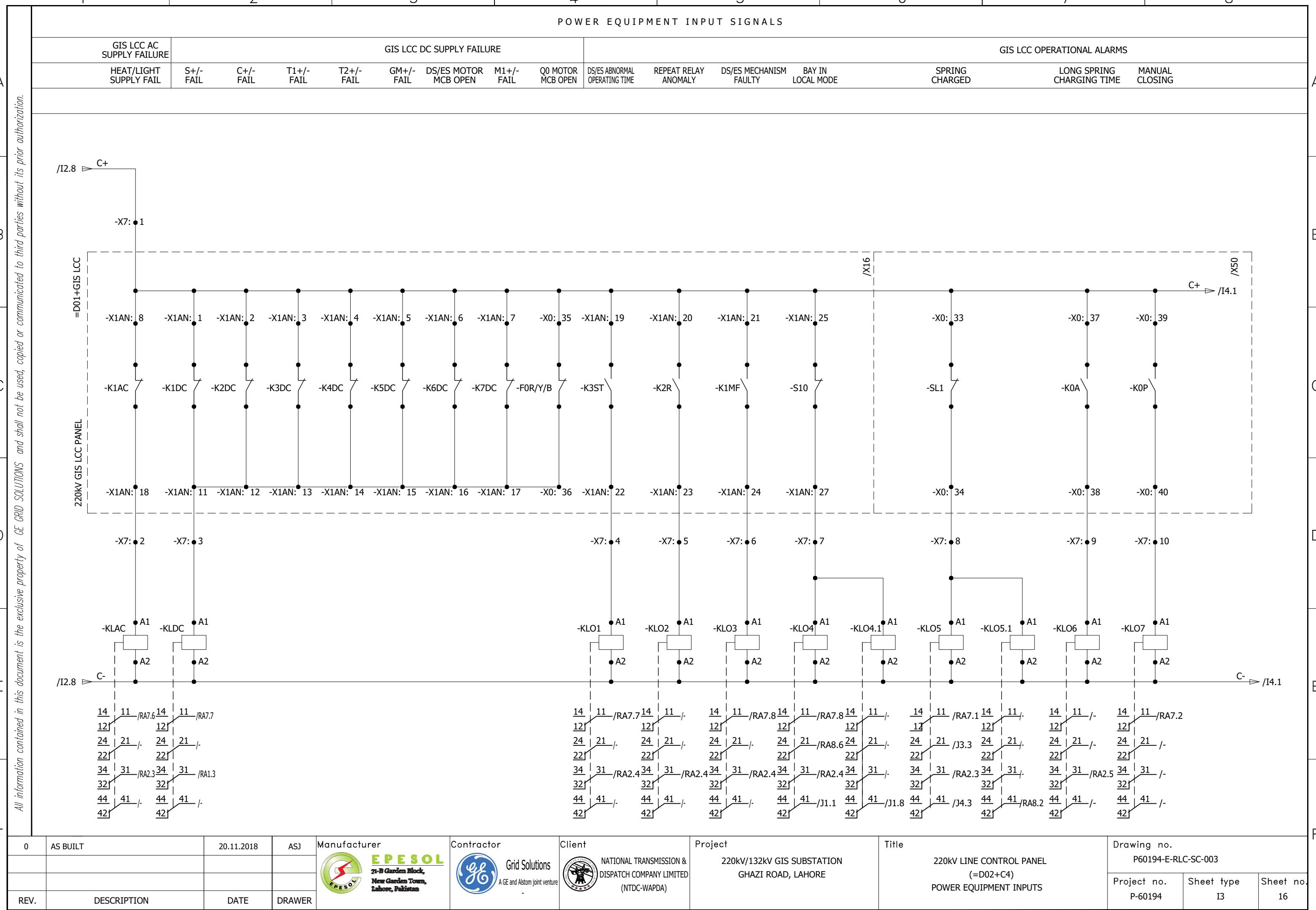


POWER EQUIPMENT STATUS SIGNALS



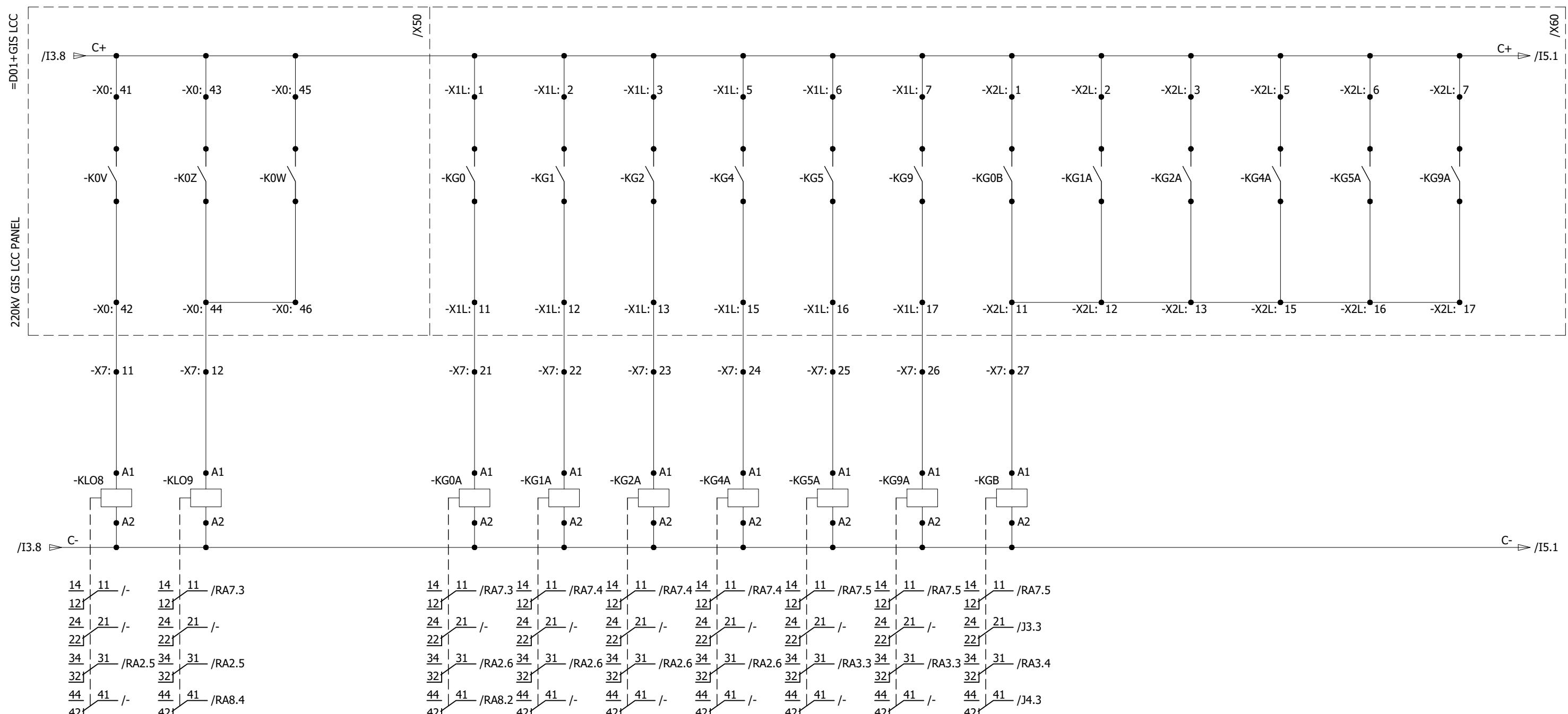
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REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type I2
									Sheet no. 15

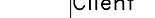
POWER EQUIPMENT INPUT SIGNALS



POWER EQUIPMENT INPUT SIGNALS

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0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 7-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV LINE CONTROL PANEL (=D02+C4) POWER EQUIPMENT INPUTS	Drawing no. P60194-E-RLC-SC-003	
									Project no. P-60194	
REV.	DESCRIPTION	DATE	DRAWER						Sheet type I4	Sheet no. 17

POWER EQUIPMENT INPUT SIGNALS

GIS LCC GAS COMPARTMENT ALARMS

G0 SELF WIRING	G1 SELF WIRING	G2 SELF WIRING	G4 SELF WIRING	G5 SELF WIRING	G9 SELF WIRING
CHECK	CHECK	CHECK	CHECK	CHECK	CHECK

LINE VT ALARMS

METERING WINDING	PROTECTION WINDING
---------------------	-----------------------

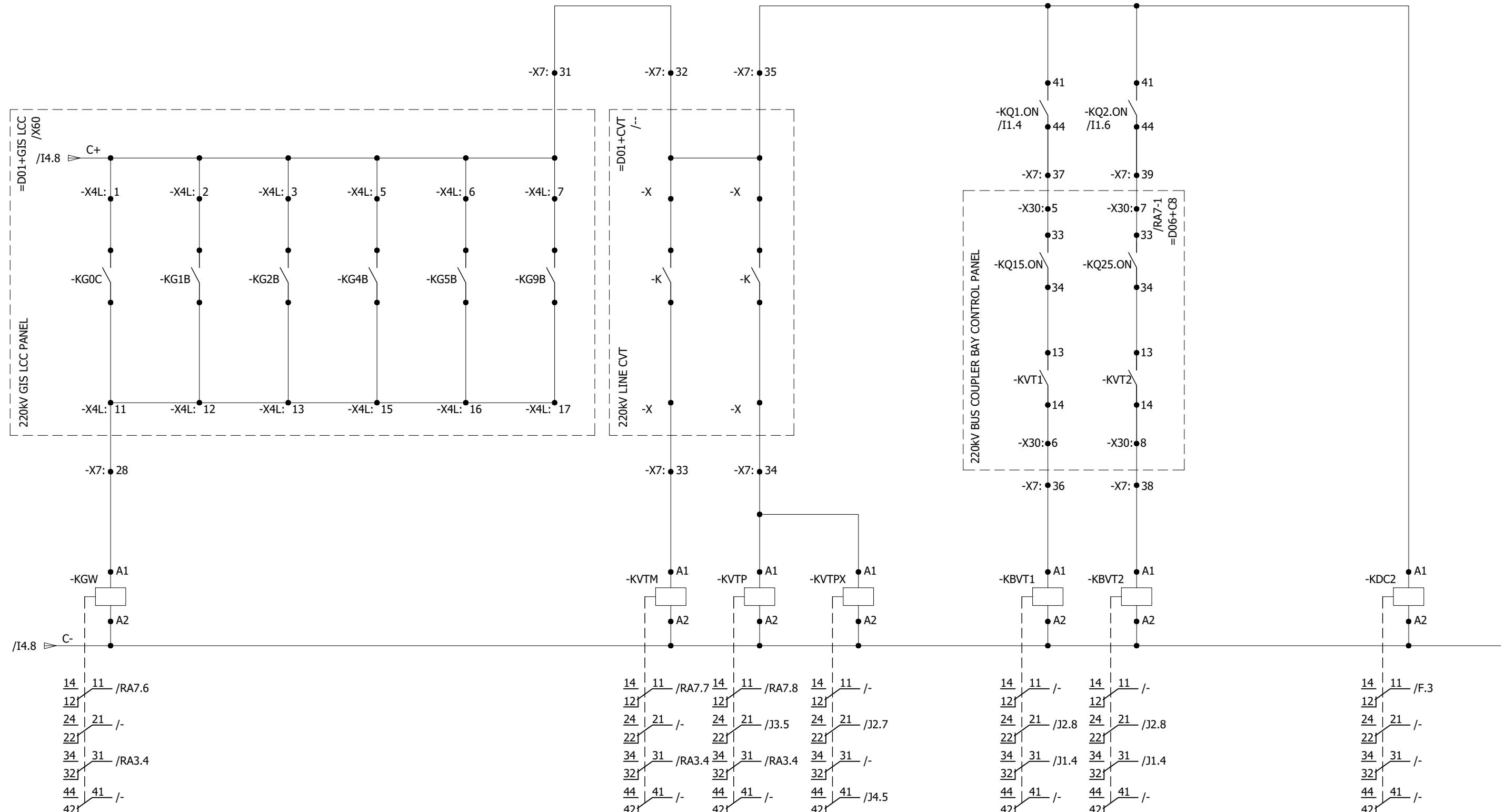
BUS VT SIGNAL FOR SYNCH.

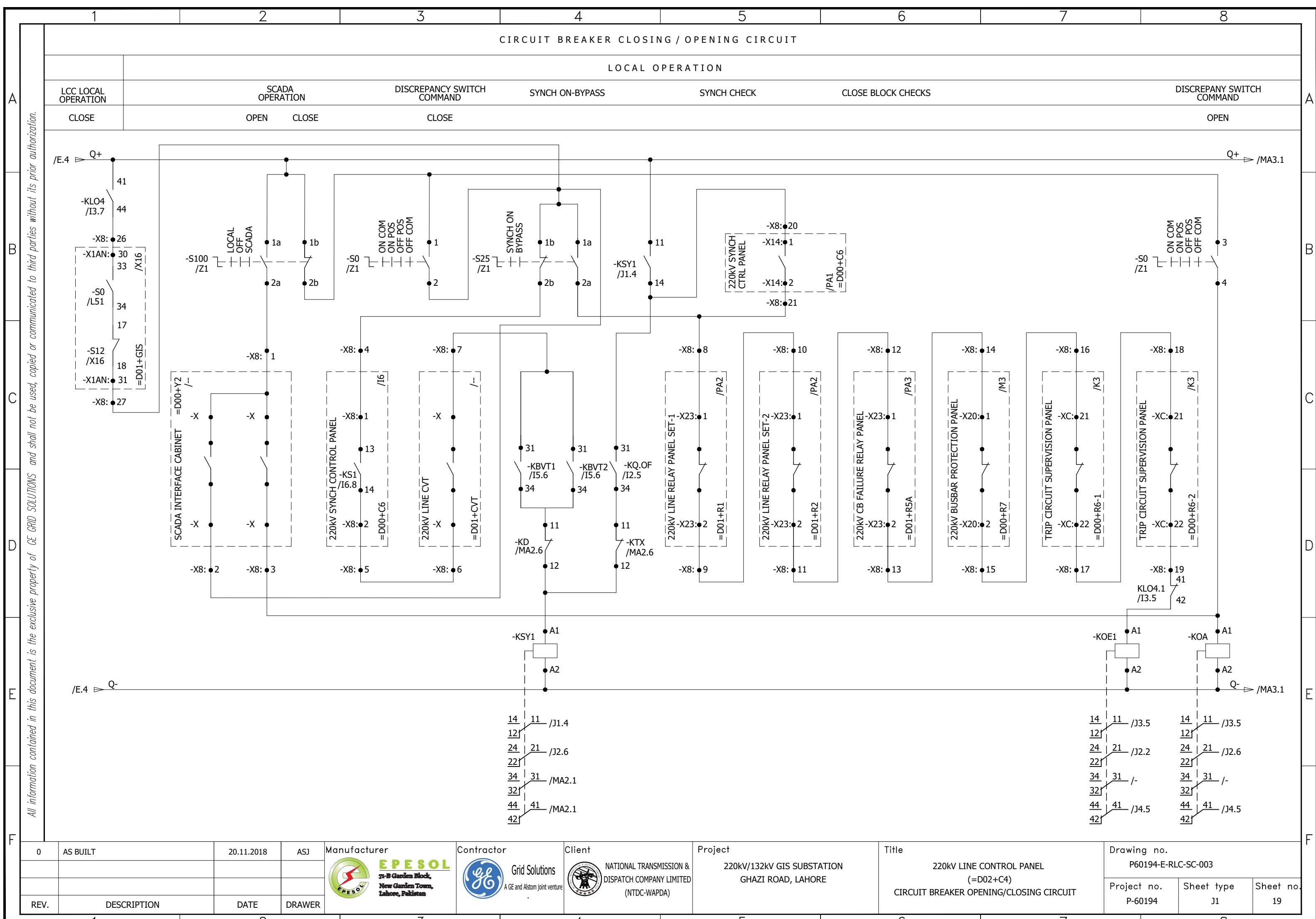
BUS VT-1	BUS VT-2
----------	----------

DC CIRCUIT C+/C- MONITORING

-KDC2

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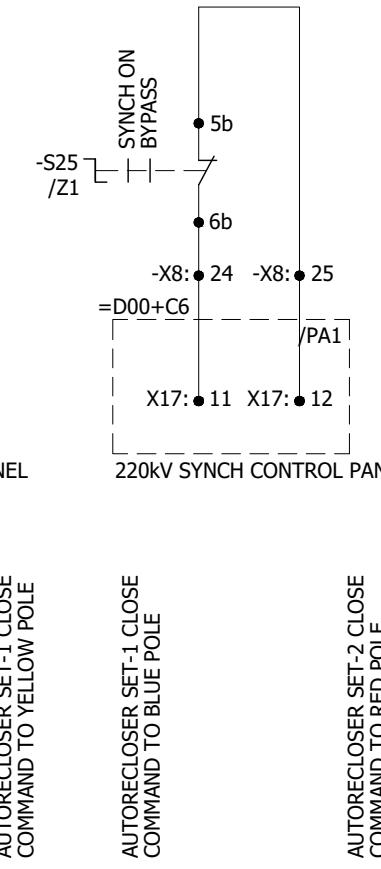
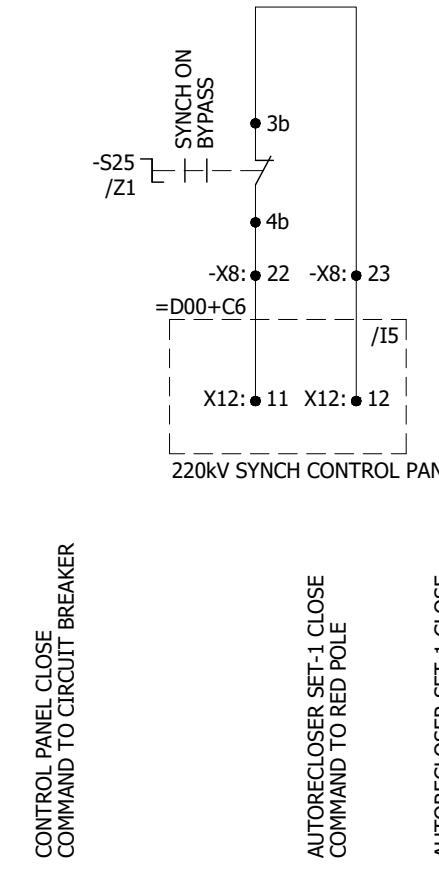




CIRCUIT BREAKER CLOSING / OPENING COMMANDS TO GIS LCC

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A



MANUAL OPENING
COMMAND TO ALL POLES

CONTROL PANEL OPENING
COMMAND TO ALL POLES

SYNCH INITIATION

LINE VT MCB HEALTHY

SYNCH COMMAND TO
220kV SYNCH CONTROL PANEL

BUS VT-1
CIRCUIT HEALTHY

BUS VT-2
CIRCUIT HEALTHY

CONTROL PANEL CLOSE
COMMAND TO CIRCUIT BREAKER

AUTORECLOSER SET-1 CLOSE
COMMAND TO RED POLE

AUTORECLOSER SET-1 CLOSE
COMMAND TO YELLOW POLE

AUTORECLOSER SET-1 CLOSE
COMMAND TO BLUE POLE

AUTORECLOSER SET-2 CLOSE
COMMAND TO RED POLE

AUTORECLOSER SET-2 CLOSE
COMMAND TO YELLOW POLE

AUTORECLOSER SET-2 CLOSE
COMMAND TO BLUE POLE

B

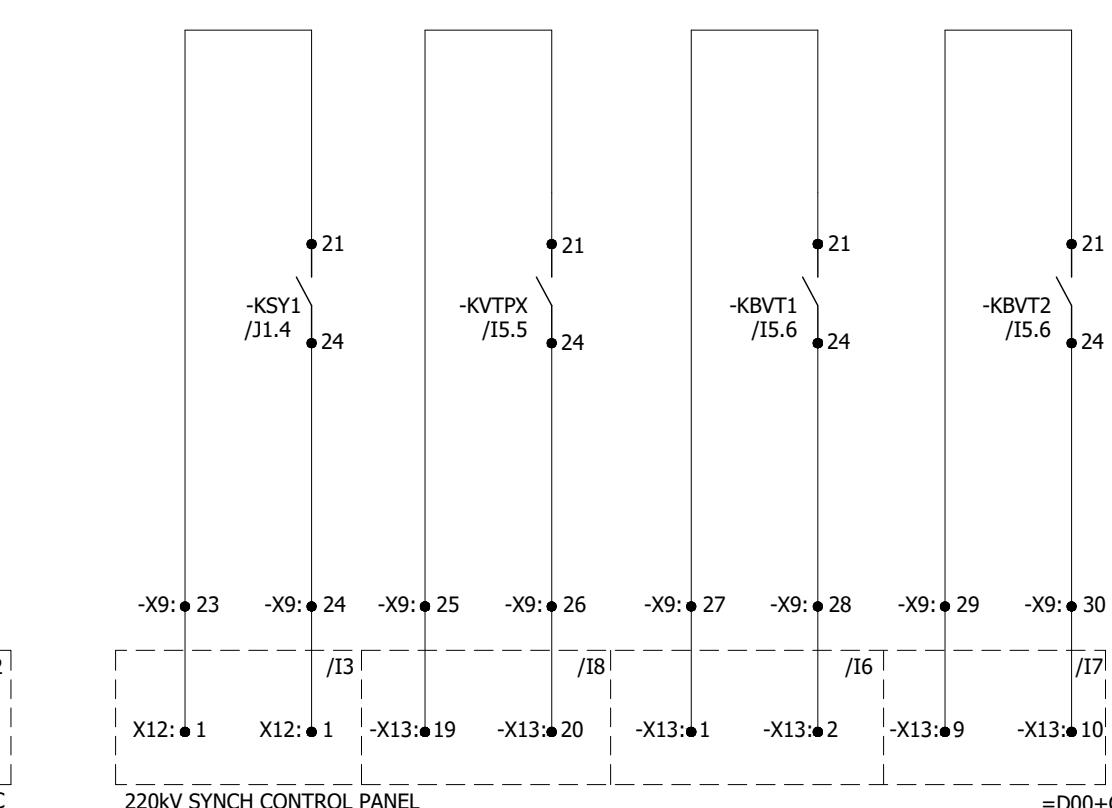
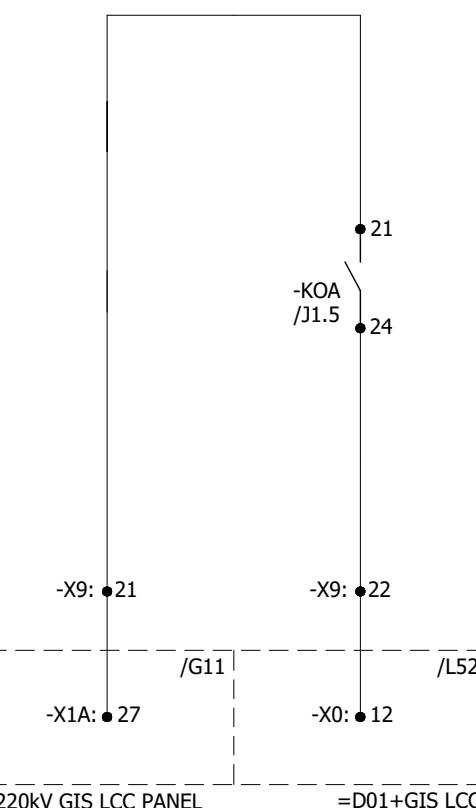
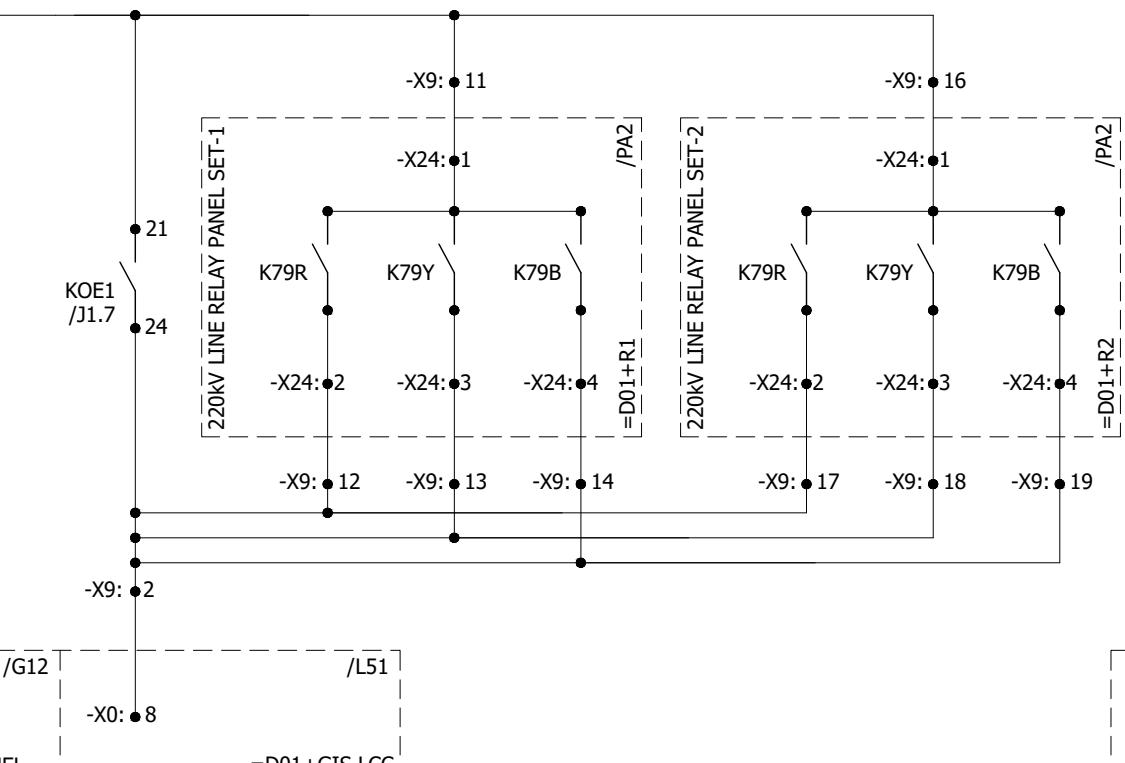
C

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G



=D00+C6

0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV LINE CONTROL PANEL (=D02+C4) CIRCUIT BREAKER OPENING/CLOSING CIRCUIT	Drawing no. P60194-E-RLC-SC-003		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type J2	Sheet no. 20
1	2	3	4	5	6	7	8				

CIRCUIT BREAKER CLOSING / OPENING INTER-CIRCUITS

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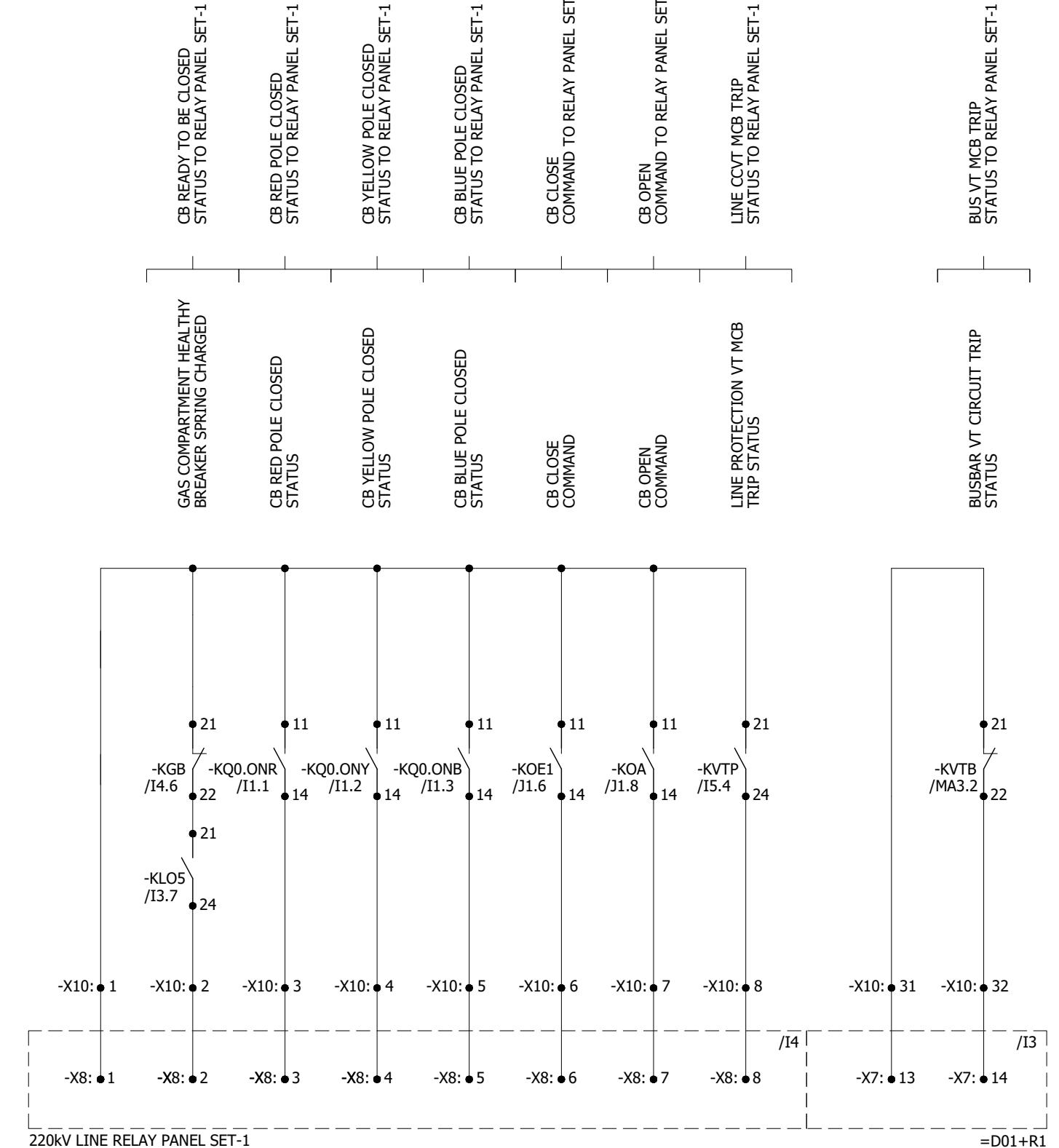
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REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type J3
									Sheet no. 21

CIRCUIT BREAKER CLOSING / OPENING INTER-CIRCUITS

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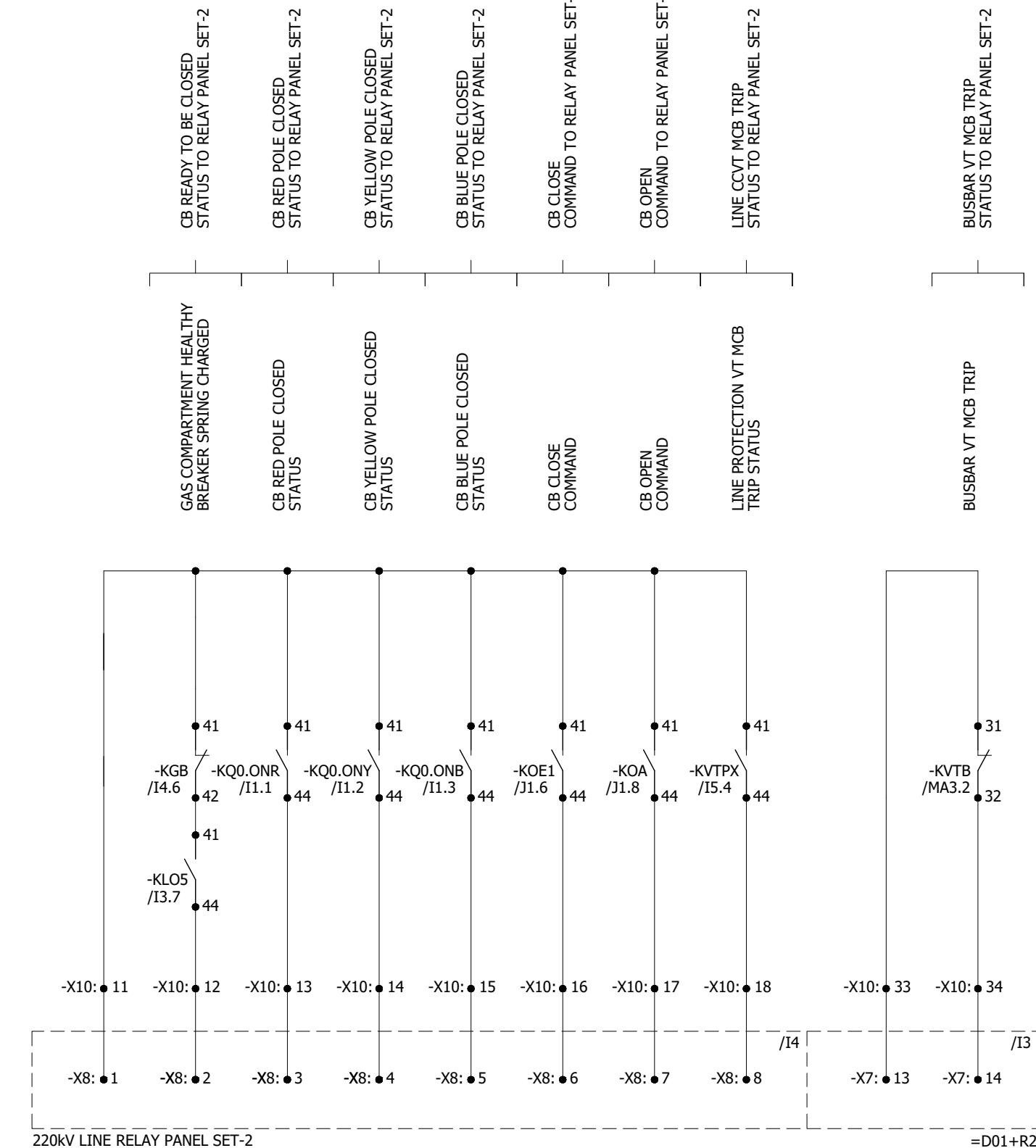
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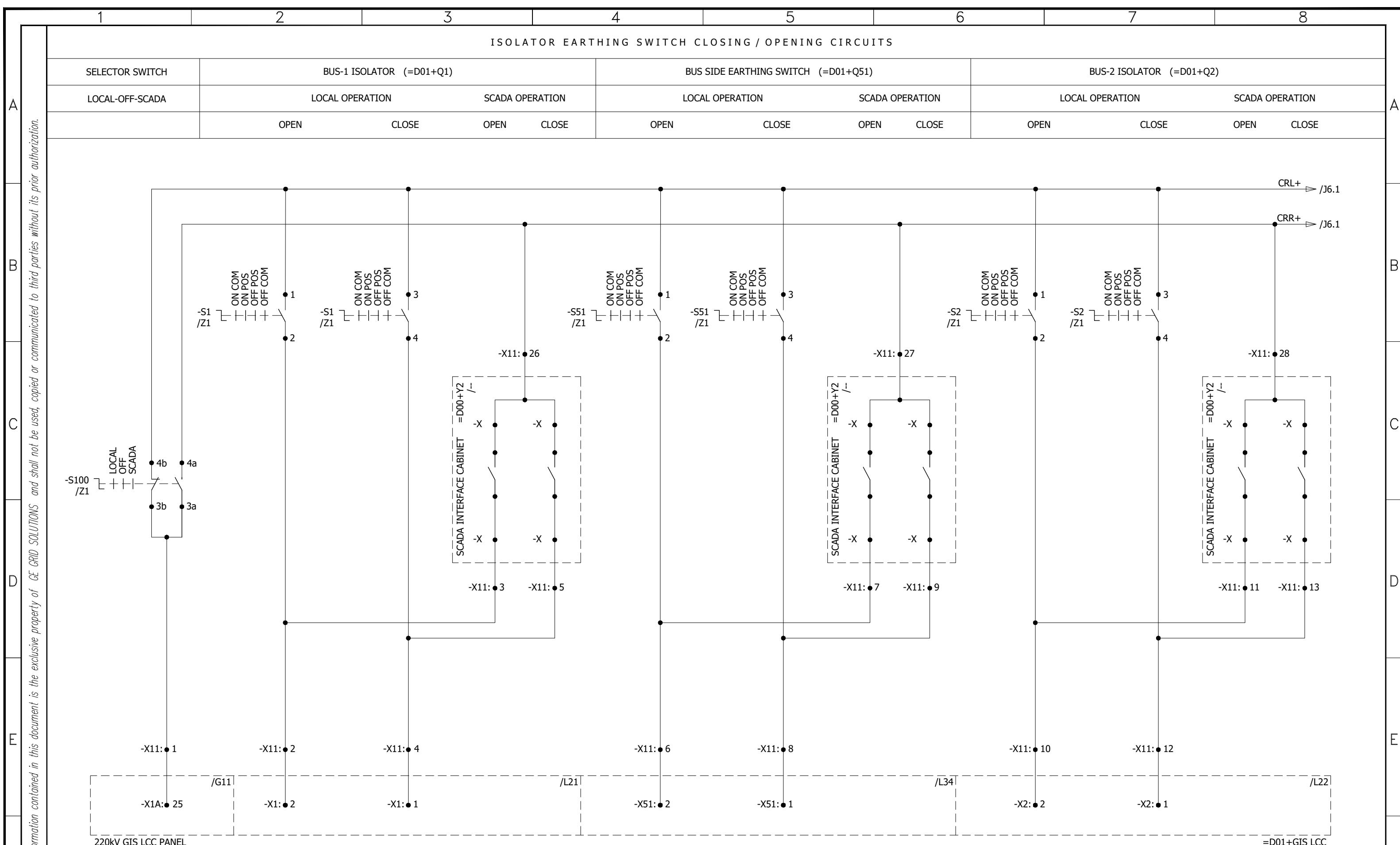
D

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0	AS BUILT	20.11.2018	ASJ	Manufacturer EPE SOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor GE A GE and Alstom joint venture	Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE CONTROL PANEL (=D02+C4) CIRCUIT BREAKER OPENING/CLOSING CIRCUIT	Drawing no. P60194-E-RLC-SC-003	
REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type J4	Sheet no. 22



0	AS BUILT	20.11.2018	ASJ	Manufacturer  7-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  A GE and Alstom joint venture	Client 	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE CONTROL PANEL (=D02+C4) ISOLATOR/EARTHING SW. OPENING/CLOSING CIRCUIT	Drawing no.		
								P60194-E-RLC-SC-003			
								Project no.			
								P-60194	J5	23	
REV.	DESCRIPTION	DATE	DRAWER	1	2	3	4	5	6	7	8

ISOLATOR EARTHING SWITCH CLOSING / OPENING CIRCUITS

LINE ISOLATOR (=D01+Q9)

LINE SIDE EARTHING SWITCH (=D01+Q52)

HIGH SPEED LINE EARTHING SWITCH (=D01+Q8)

LOCAL OPERATION

SCADA OPERATION

LOCAL OPERATION

SCADA OPERATION

LOCAL OPERATION

SCADA OPERATION

CLOSE

OPEN

CLOSE

OPEN

CLOSE

OPEN

CLOSE

OPEN

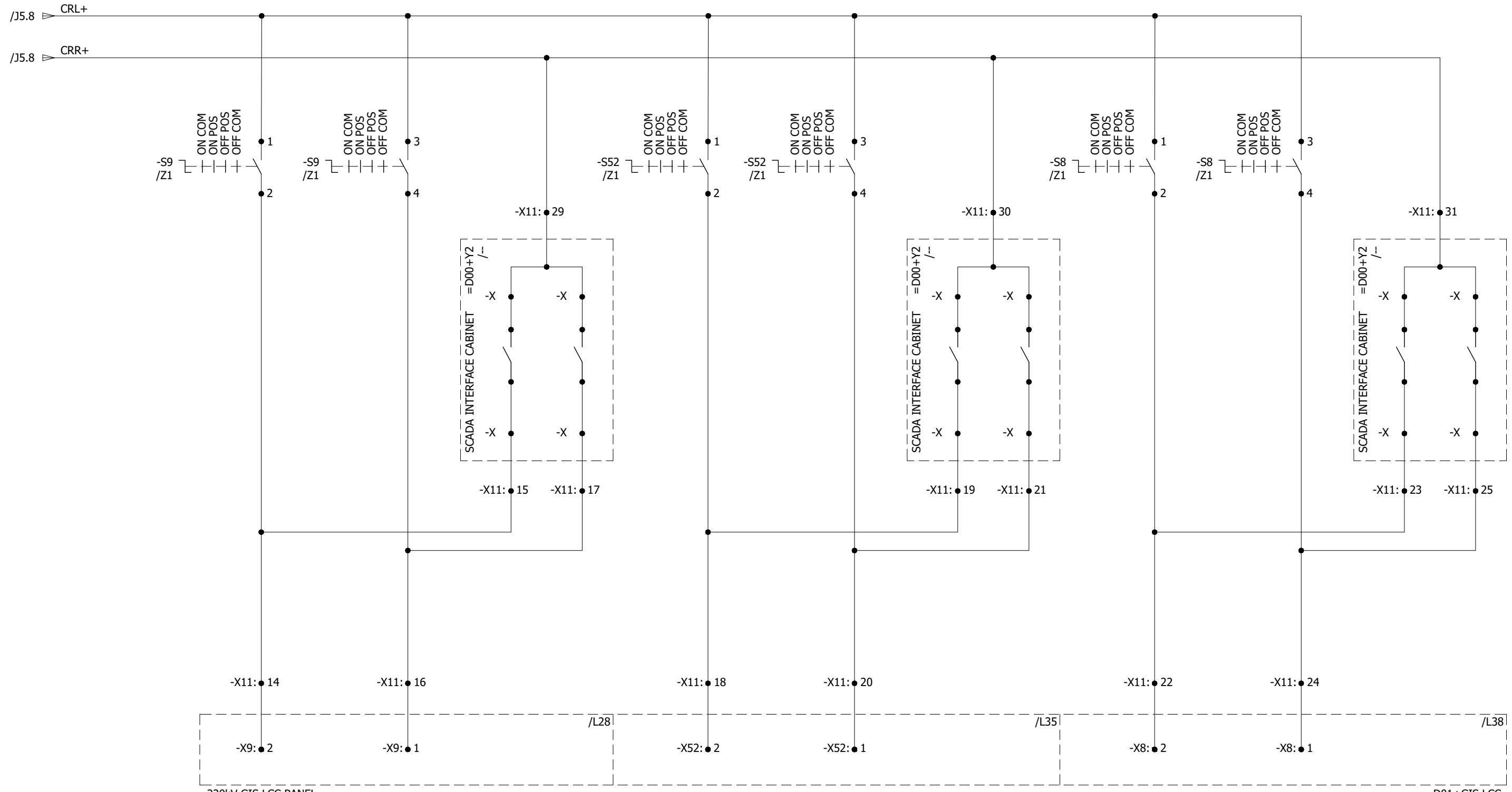
CLOSE

OPEN

CLOSE

OPEN

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0	AS BUILT	20.11.2018	ASJ	Manufacturer EPE SOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor GE Grid Solutions A GE and Alstom joint venture	Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE CONTROL PANEL (=D02+C4) ISOLATOR/EARTHING SW. OPENING/CLOSING CIRCUIT'	Drawing no. P60194-E-RLC-SC-003
REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type J6
									Sheet no. 24

VOLTAGE SELECTION CIRCUIT FOR SYNCHRONIZATION

220KV SHALAMAR LINE
CONTROL PANEL

BUS-1 VOLTAGES SELECTION

BUS-2 VOLTAGES SELECTION

VOLTAGES TO
RELAY PANEL SET-1VOLTAGES TO
RELAY PANEL SET-2

=D02+C4

/MA1

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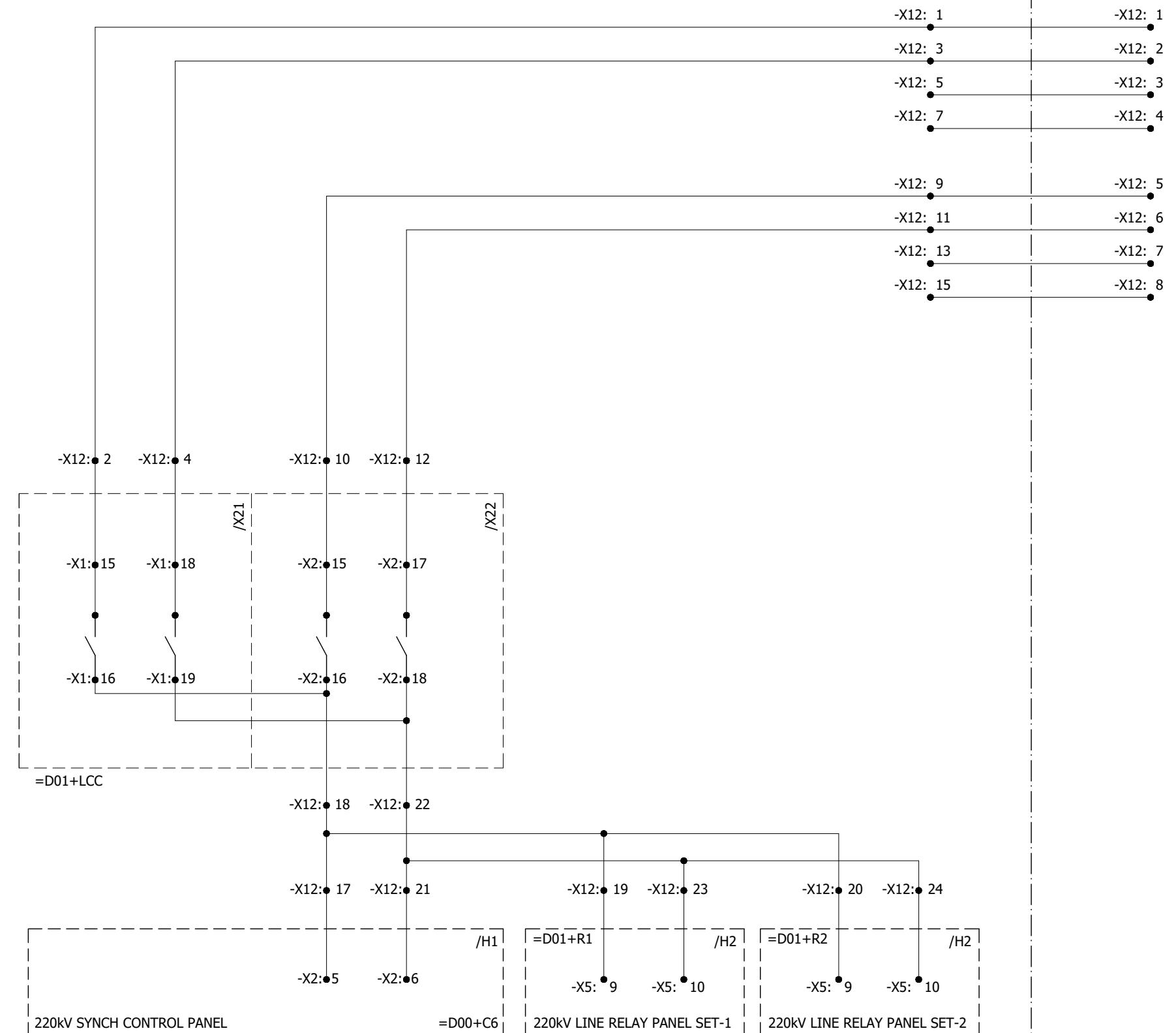
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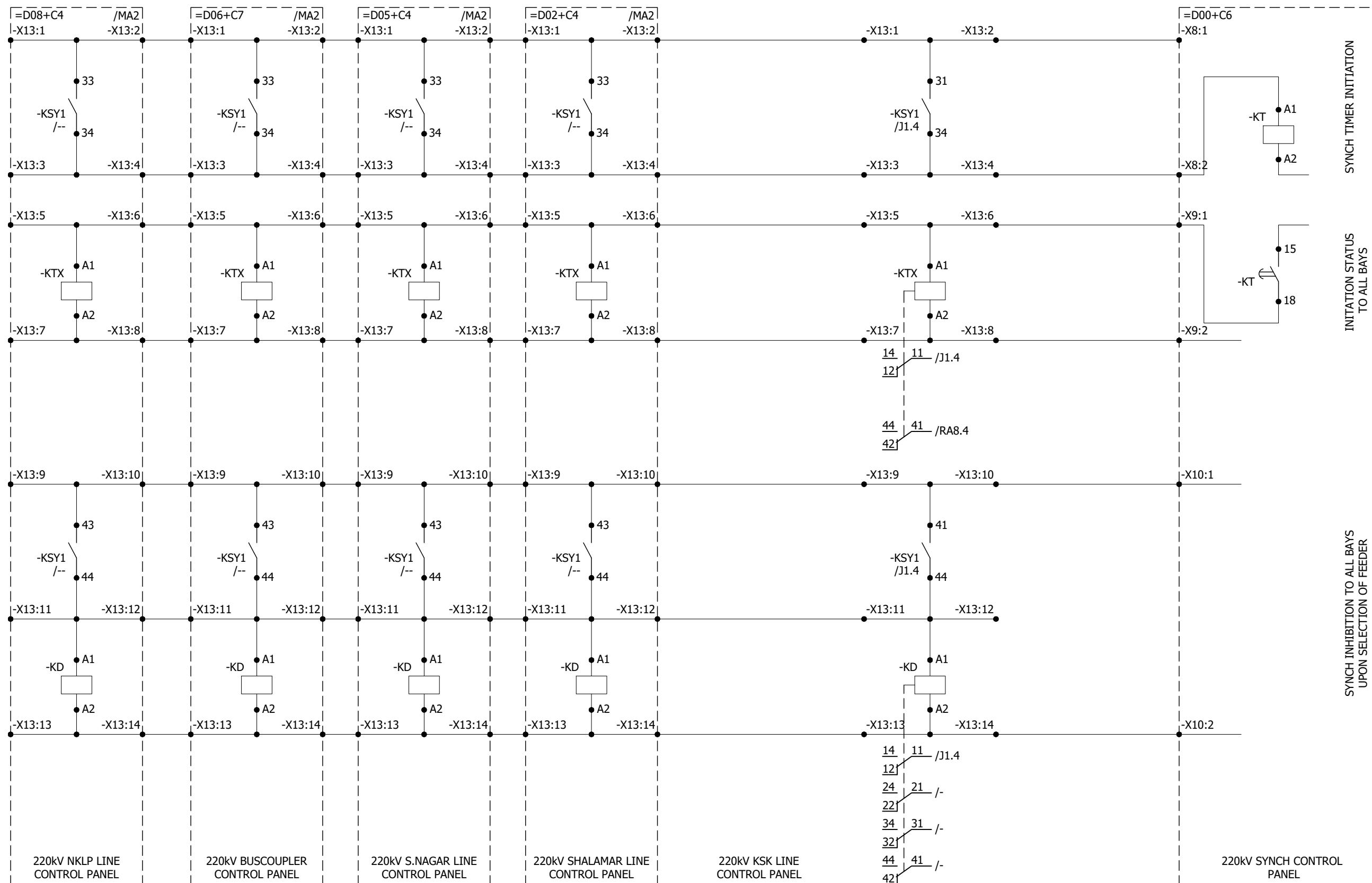


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REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type MA1
									Sheet no. 25

SYNCHRONIZATION INITIATION & INHIBITION CIRCUIT

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0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (=NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE CONTROL PANEL (=D02+C4) SYNCH CIRCUIT	Drawing no. P60194-E-RLC-SC-003
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type MA2
									Sheet no. 26



CONTROL CIRCUIT

BUSBAR-1 VT
PROTECTION WINDINGBUSBAR-2 VT
PROTECTION WINDINGCIRCUIT BREAKER
OPERATION COUNTERINTERLOCK FOR
LINE EARTHING SWITCHDC CIRCUIT Q+/Q-
MONITORING

TRIP STATUS

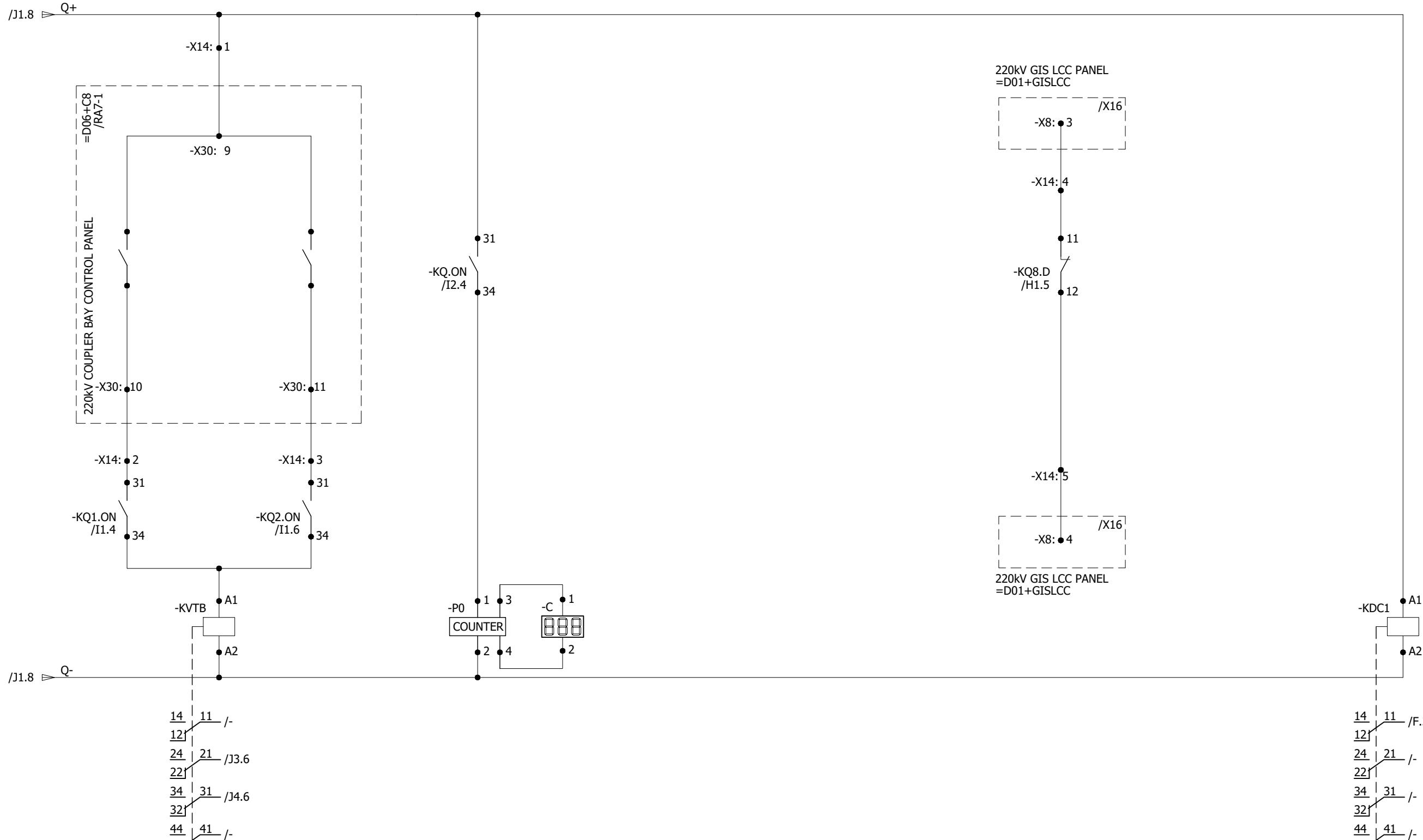
TRIP STATUS

-P0

-KDC1

=D00+C6

=D00+C6



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0	AS BUILT	20.11.2018	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 LINE CONTROL PANEL (=D02+C4) CONTROL CIRCUIT	Drawing no. P60194-E-RLC-SC-003
									Project no. P-60194
REV.	DESCRIPTION	DATE	DRAWER						Sheet type MA3

DISCREPANCY CHECK CIRCUIT

CIRCUIT BREAKER

BUS-1 ISOLATOR

BUS SIDE EARTHING SWITCH

BUS-2 ISOLATOR

LINE ISOLATOR

-Q0

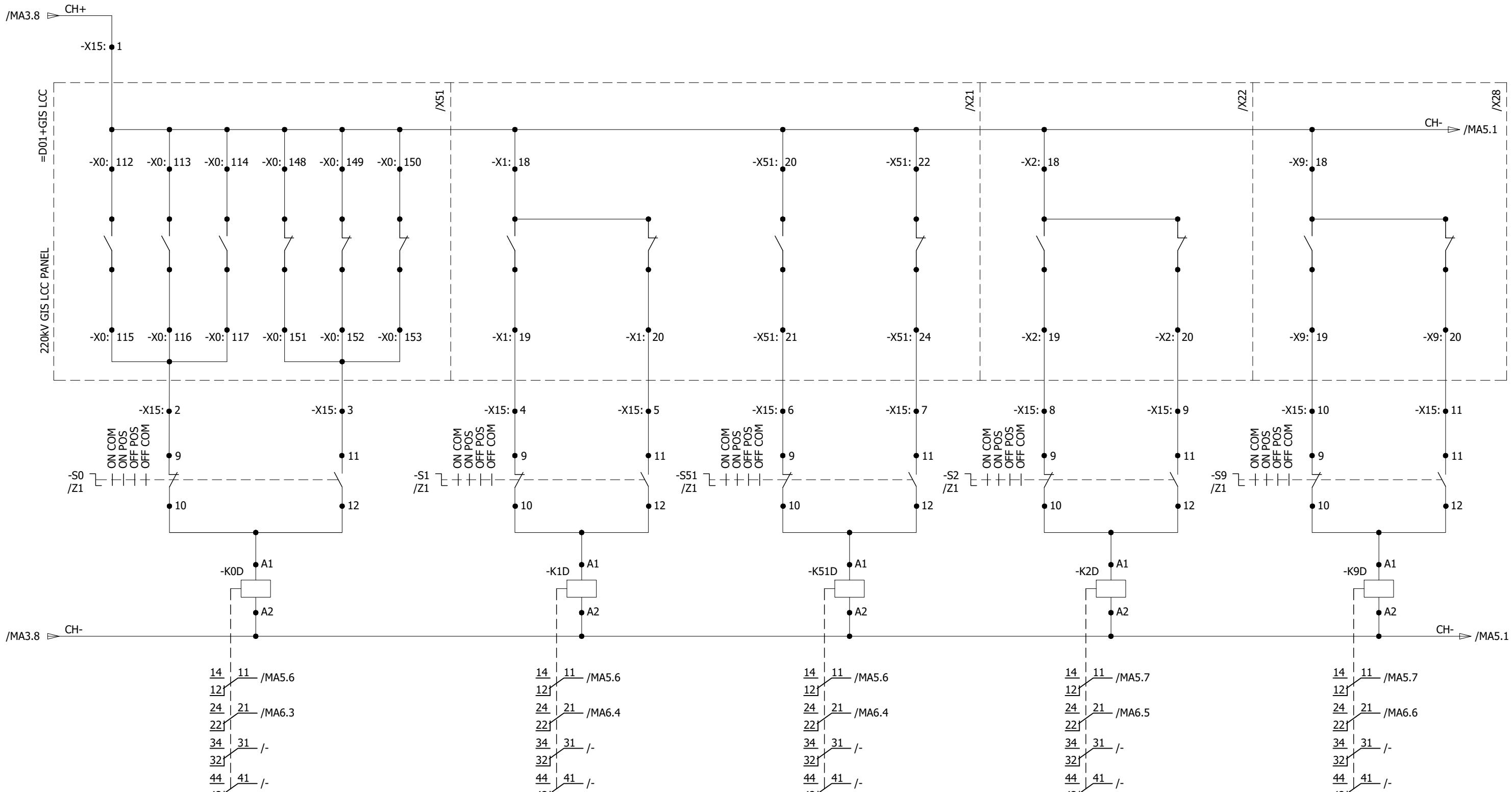
-Q1

-Q51

-Q2

-Q9

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0	AS BUILT	20.11.2018	ASJ	Manufacturer EPE SOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor GE Grid Solutions A GE and Alstom joint venture	Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE CONTROL PANEL (=D02+C4) DISCREPANCY CHECK CIRCUIT	Drawing no. P60194-E-RLC-SC-003
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type MA4
									Sheet no. 28

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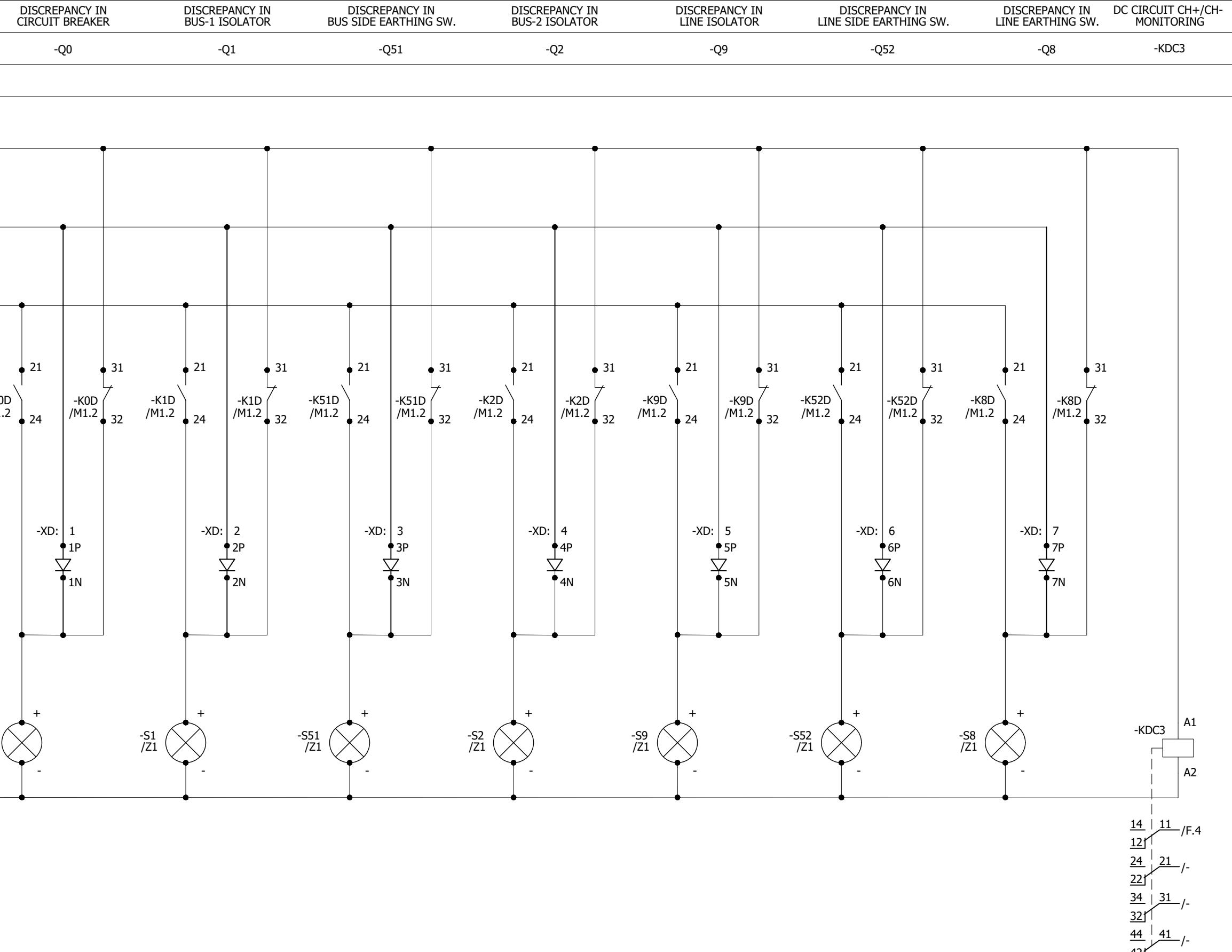
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DISCREPANCY CHECK CIRCUIT



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0	AS BUILT	20.11.2018	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 LINE CONTROL PANEL (=D02+C4) DISCREPANCY CHECK CIRCUIT	Drawing no. P60194-E-RLC-SC-003
01									Project no. P-60194
									Sheet type MA6
REV.	DESCRIPTION	DATE	DRAWER						Sheet no. 30

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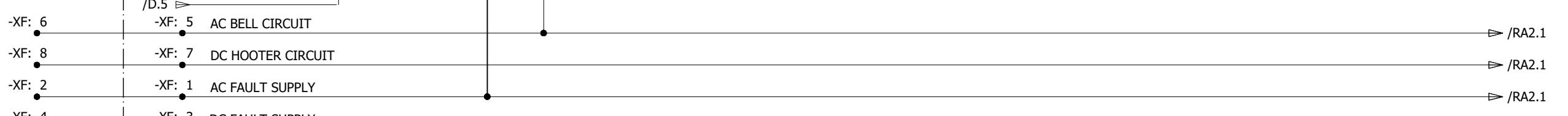
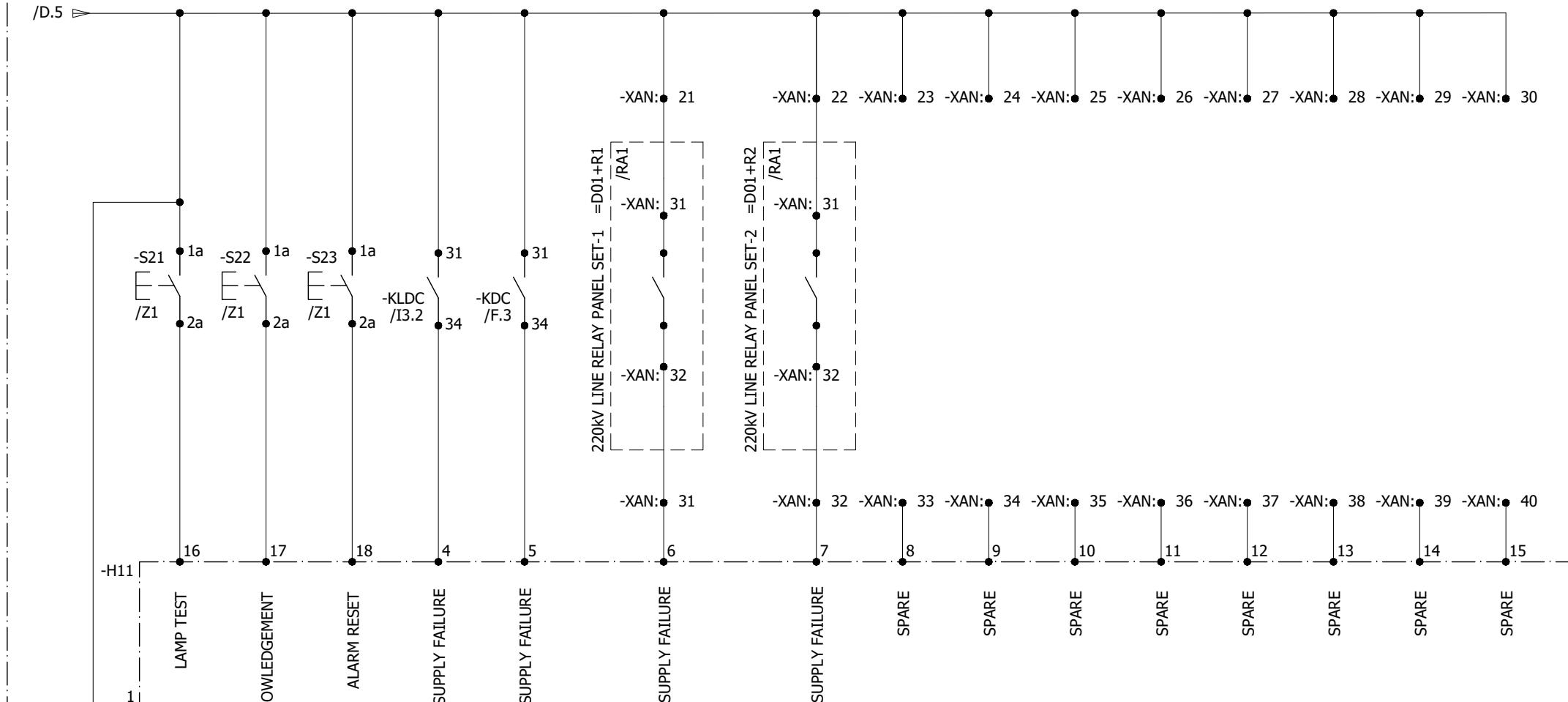
7

8

ANNUNCIATION CIRCUIT

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220KV SYNCH CONTROL
PANEL
=D00+C6
/RA3



0	AS BUILT	20.11.2018	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 LINE CONTROL PANEL (=D02+C4) AC ANNUNCIATIONS	P-60194-E-RLC-SC-003		
									Project no. P-60194	Sheet type RA1	Sheet no. 31

ANNUNCIATION CIRCUIT

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A

A

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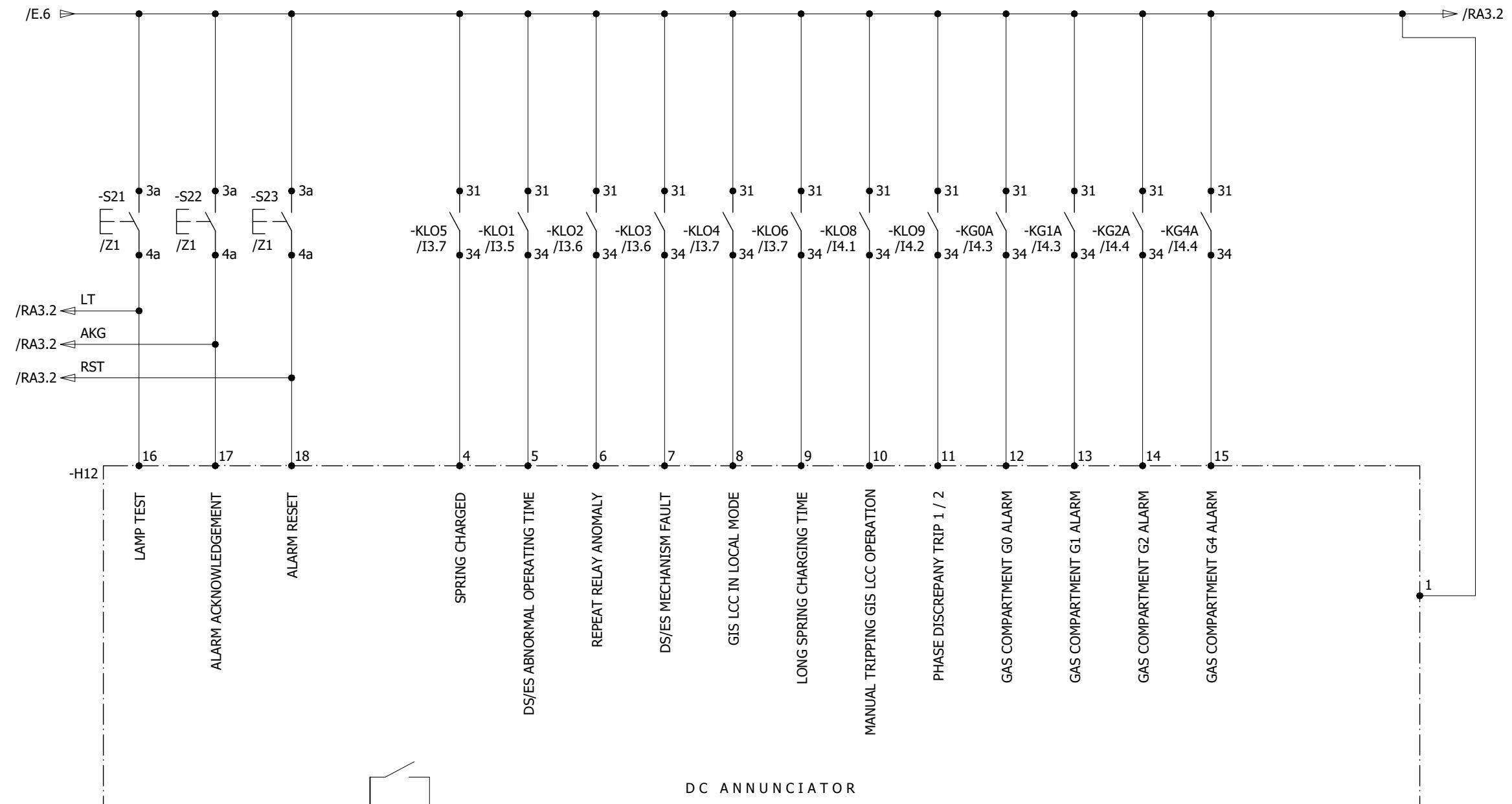
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E

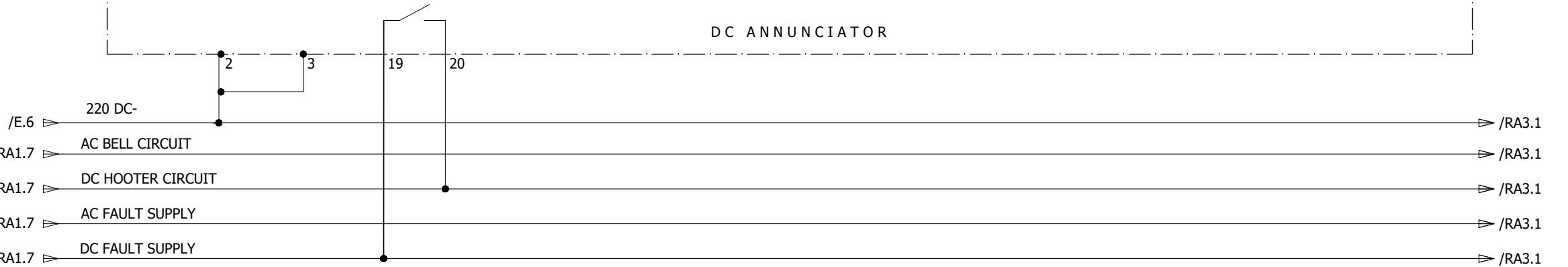
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DC ANNUNCIATOR



0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE CONTROL PANEL (=D02+C4) PROTECTION TRIPS	Drawing no. P60194-E-RLC-SC-003
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type RA2
									Sheet no. 32

ANNUNCIATION CIRCUIT

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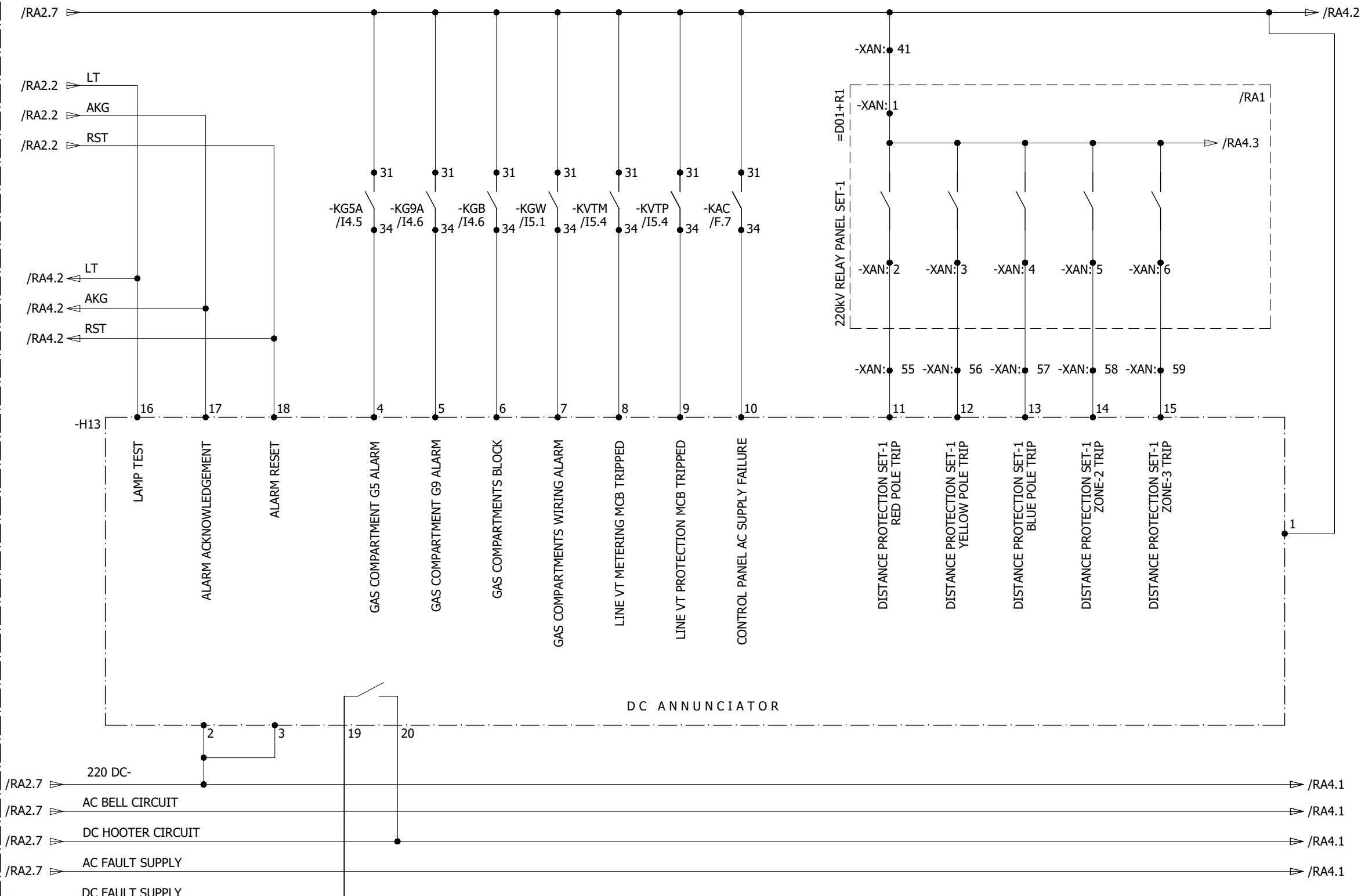
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0	AS BUILT	20.11.2018	ASJ	Manufacturer EPE SOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor Grid Solutions A GE and Alstom joint venture	Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE CONTROL PANEL (=D02+C4) ANNUNCIATOR ALARMS	Drawing no. P60194-E-RLC-SC-003
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194 Sheet type RA3 Sheet no. 33

ANNUNCIATION CIRCUIT

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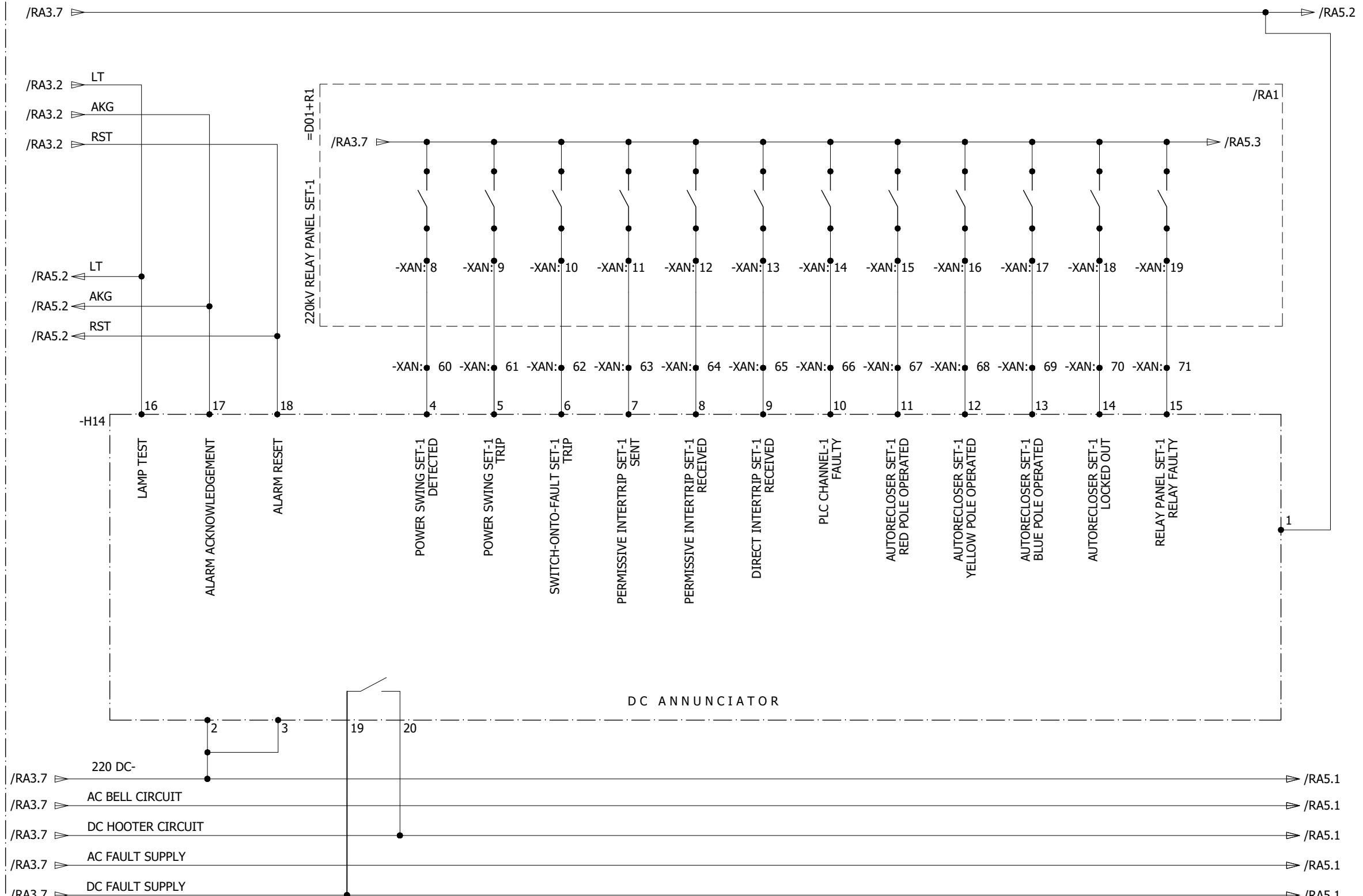
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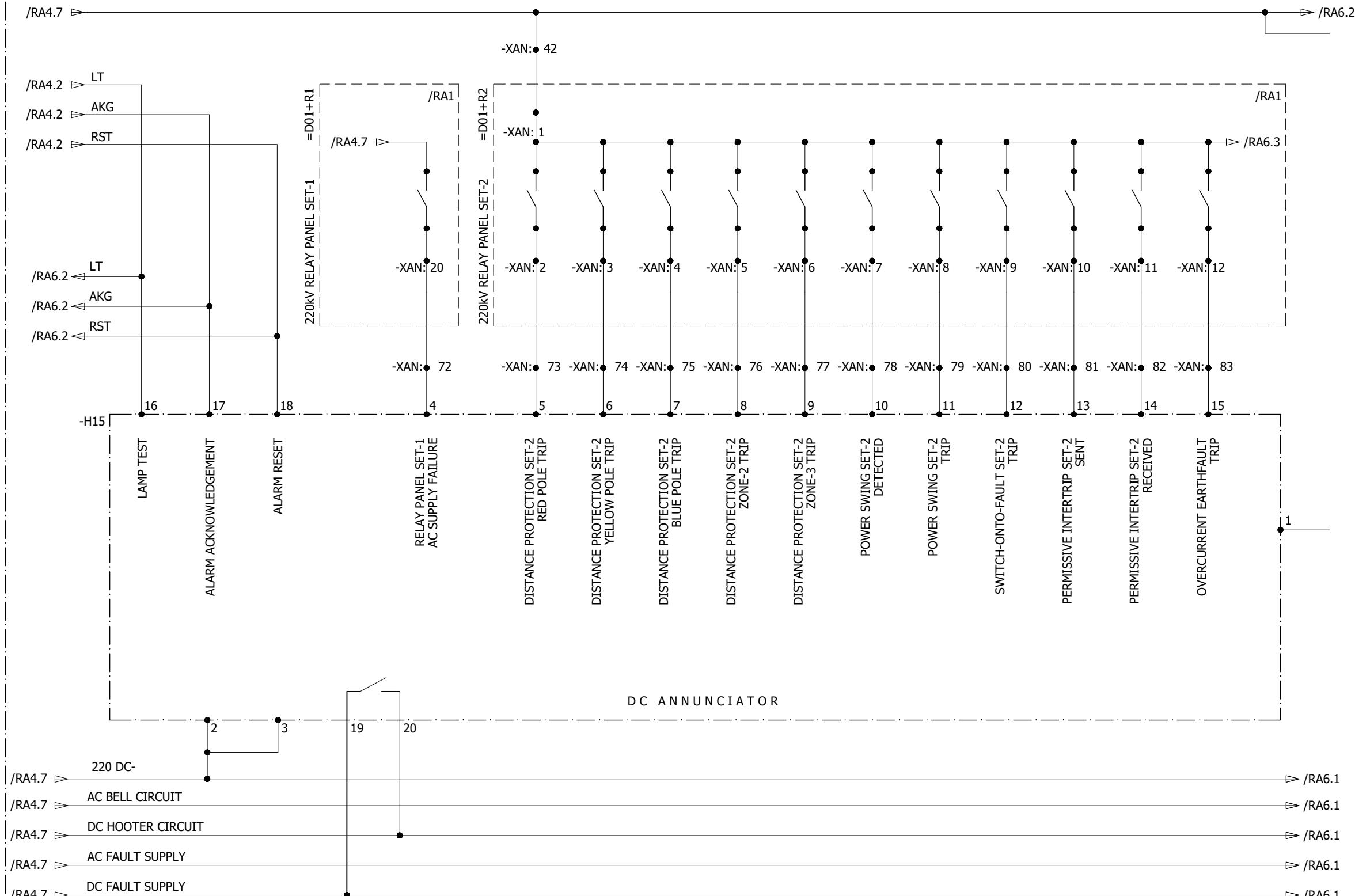
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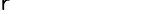


0	AS BUILT	20.11.2018	ASJ	Manufacturer EPE SOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor GE Grid Solutions A GE and Alstom joint venture	Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE CONTROL PANEL (=D02+C4) ANNUNCIATOR ALARMS	Drawing no. P60194-E-RLC-SC-003
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194

ANNUNCIATION CIRCUIT

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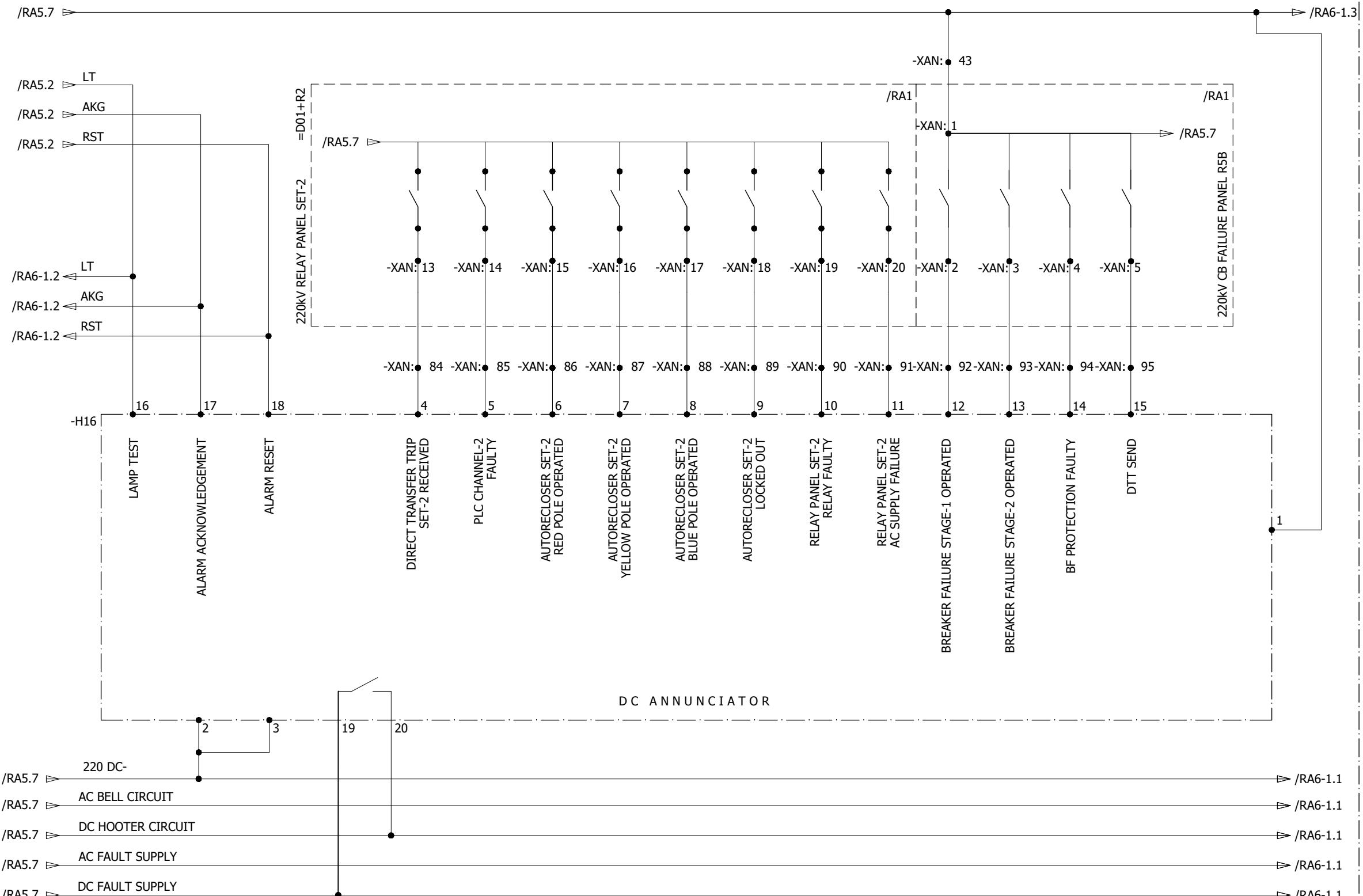


0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 7-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV LINE CONTROL PANEL (=D02+C4) ANNUNCIATOR ALARMS	Drawing no. P60194-E-RLC-SC-003	
									Project no. P-60194	
REV.	DESCRIPTION	DATE	DRAWER						Sheet type RA5	Sheet no. 35

ANNUNCIATION CIRCUIT

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0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220KV LINE CONTROL PANEL (=D02+C4) ANNUNCIATOR ALARMS	Drawing no. P60194-E-RLC-SC-003
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194



ANNUNCIATION CIRCUIT

220KV LINE CONTROL
PANEL

=D02+C4

/RA1

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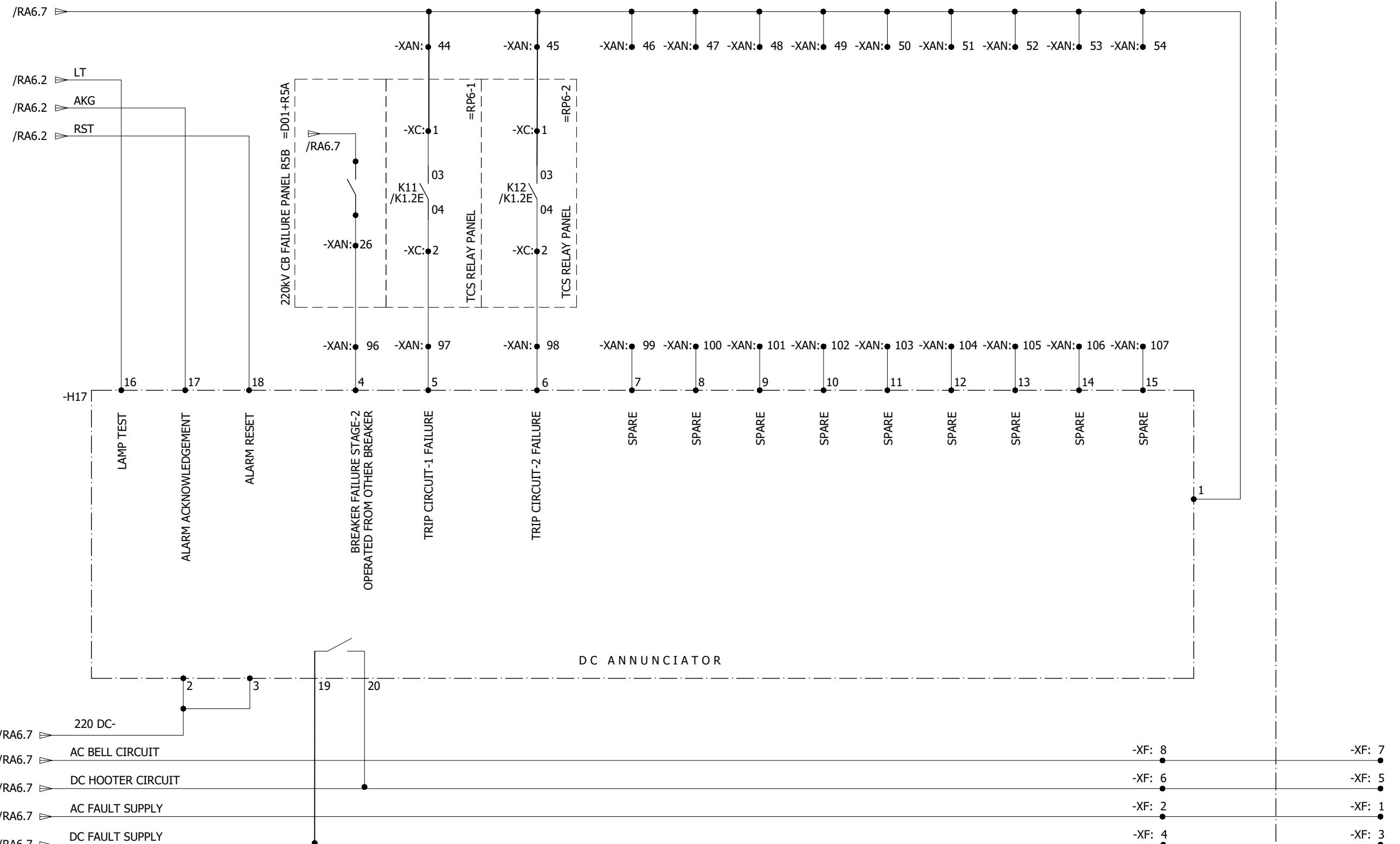
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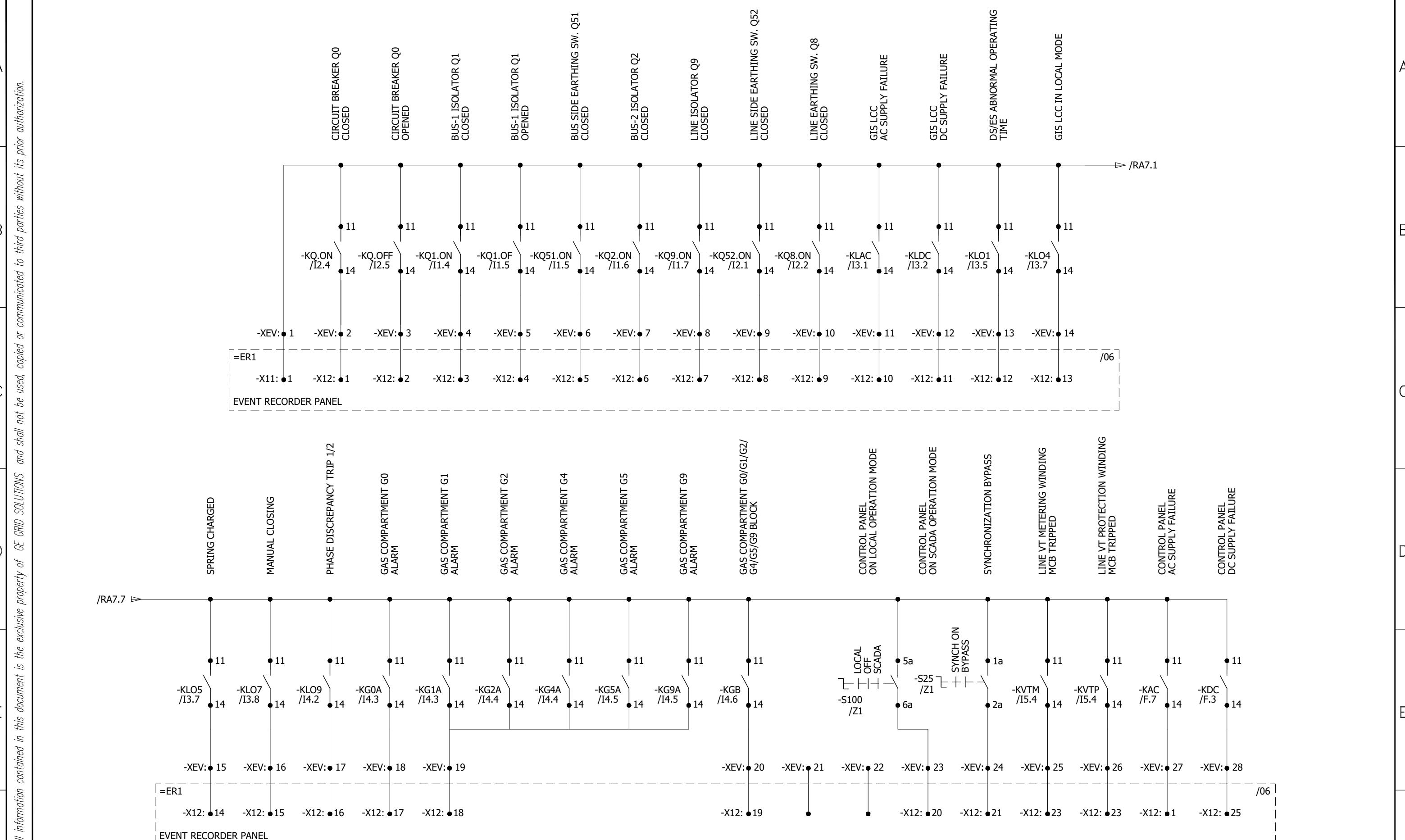
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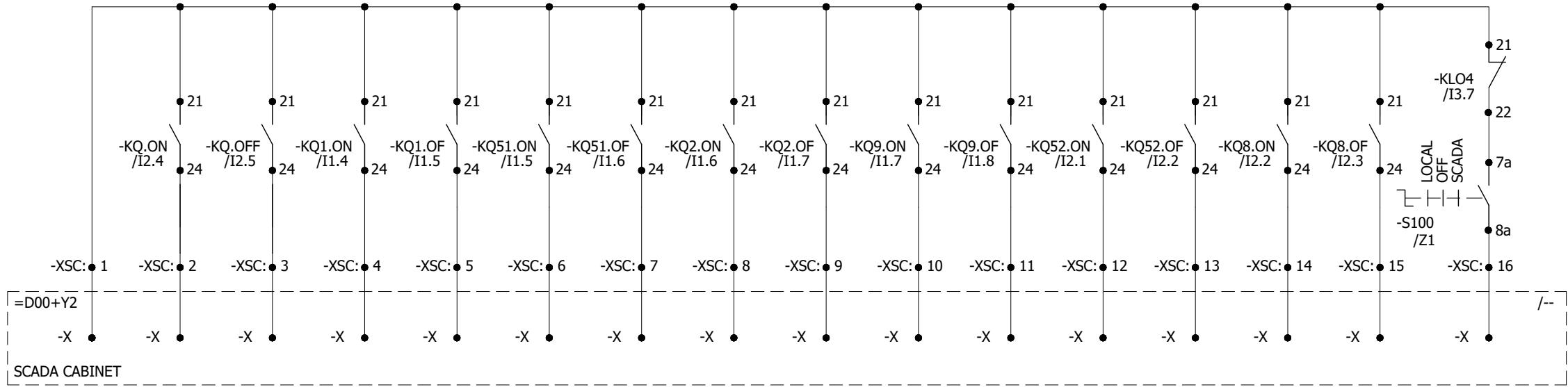
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REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type RA6-1	Sheet no. 37

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0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV LINE CONTRPL PANEL (=D02+C4) EVENT & FAULT RECORDER CIRCUITS	Drawing no. P60194-E-RLC-SC-003		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type RA7	Sheet no. 38
1	2	3	4	5	6	7	8				

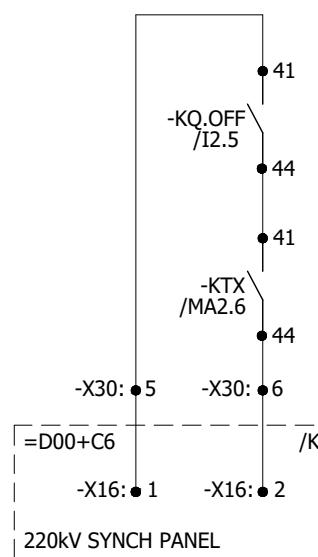
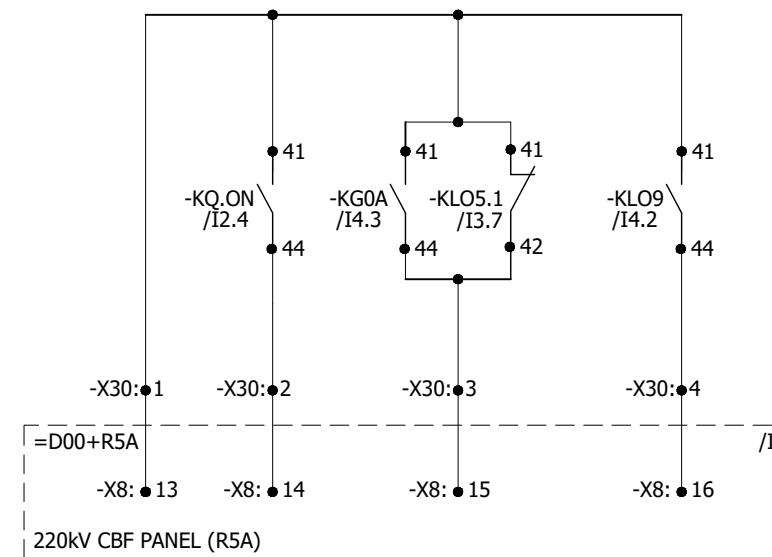
1	2	3	4	5	6	7	8
CIRCUIT BREAKER Q0 CLOSED	CIRCUIT BREAKER Q0 OPENED	BUS-1 ISOLATOR Q1 CLOSED	BUS-1 ISOLATOR Q1 OPENED	BUS SIDE EARTHING SW. Q51 CLOSED	BUS SIDE EARTHING SW. Q51 OPENED	BUS SIDE EARTHING SW. Q52 CLOSED	BUS SIDE EARTHING SW. Q52 OPENED
LINE ISOLATOR Q9 CLOSED	LINE ISOLATOR Q9 OPENED	LINE SIDE EARTHING SW. Q52 CLOSED	LINE SIDE EARTHING SW. Q52 OPENED	LINE SIDE EARTHING SW. Q8 CLOSED	LINE SIDE EARTHING SW. Q8 OPENED	LINE EARTHING SW. Q8 CLOSED	LINE EARTHING SW. Q8 OPENED
CB ON REMOTE (SCADA)							



CIRCUIT BREAKER Q0
CLOSED

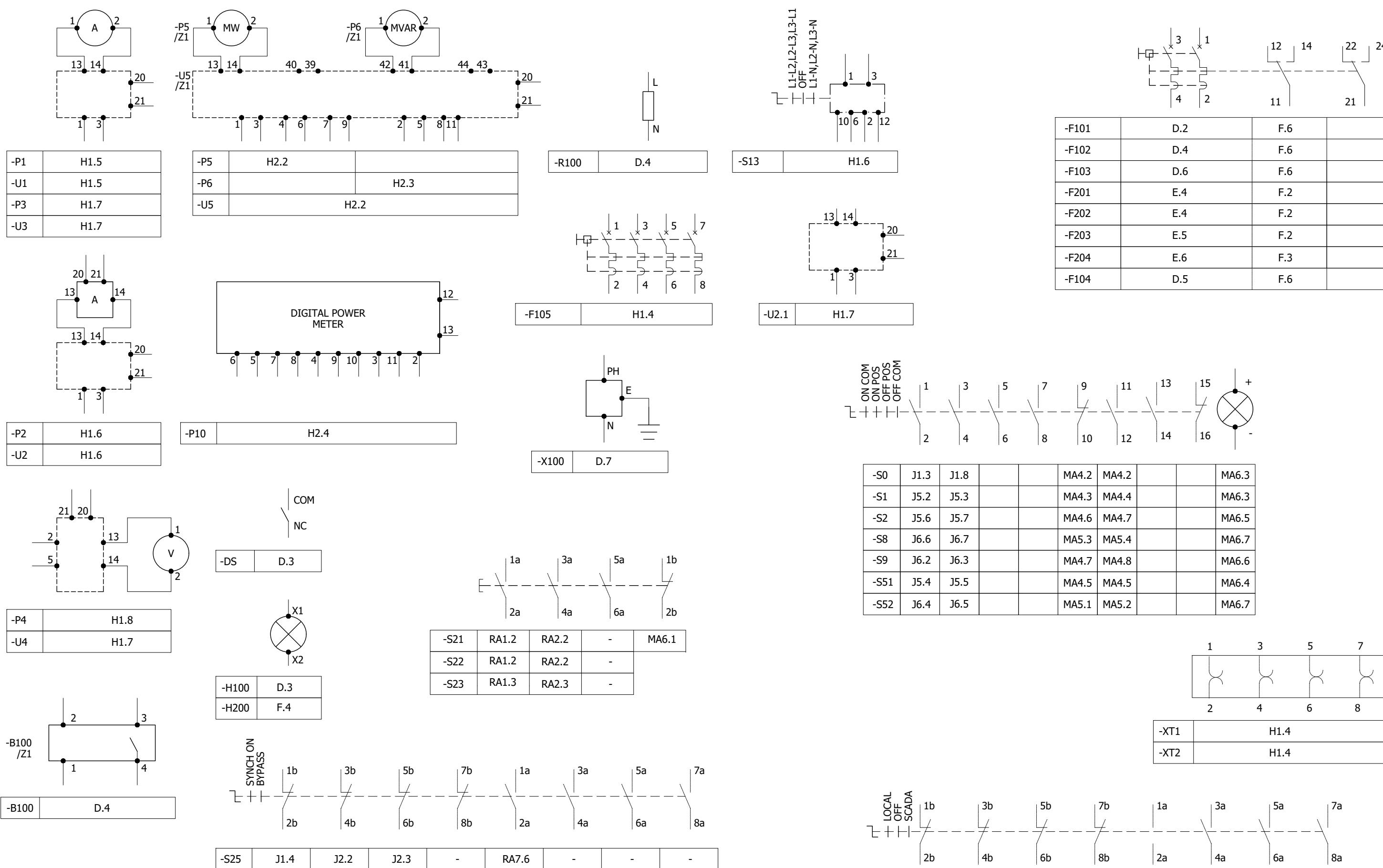
CIRCUIT BREAKER
ABNORMAL CONDITION

POLE DISCREPANCY
(=D01+C4)



0	AS BUILT	20.11.2018	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 LINE CONTRPL PANEL (=D02+C4) SCADA CIRCUIT	P60194-E-RLC-SC-003		
									Project no. P-60194	Sheet type RA8	Sheet no. 39

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0	AS BUILT	20.11.2018	ASJ	Manufacturer  EPESOL 7-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV LINE CONTRPL PANEL (=D02+C4) COMPONENT DIAGRAM	Drawing no. P60194-E-RLC-SC-003		
									Project no.	Sheet type	
									P-60194	Z1	
REV.	DESCRIPTION	DATE	DRAWER							40	