



Grid Solutions

A GE and Alstom joint venture

220kV/132kV GIS SUBSTATION GHAZI ROAD , LAHORE

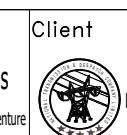
132kV LINE CONTROL PANEL SCHEMATIC DRAWINGS

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	PAGE NO.	SHEET NAME	SHEET DESCRIPTION	ISSUE / REVISION								
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A B C D E F	01	A	COVER SHEET	X								
	02	AA	LIST OF CONTENTS	X								
	03	AB	SYMBOL AND LEGENDS	X								
	04	AC1	COMPONENT LIST	X								
	05	AC2	COMPONENT LIST	X								
	06	AD	PANEL VIEW	X								
	07	AE	SINGLE LINE DIAGRAM	X								
	08	D	AC SUPPLY DISTRIBUTION CIRCUIT	X								
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	10	F	DC SUPPLY FAILURE ALARM CIRCUIT	X								
	11	G	METERING	X								
	12	H1	CB CONTROL CIRCUIT	X								
	13	H2	CB CONTROL CIRCUIT	X								
	14	I1	DISCONNECTOR & EARTH SWITCH CONTROL	X								
	15	I2	DISCONNECTOR & EARTH SWITCH CONTROL	X								
	16	K1	DISCONNECTOR CONTACT MULTIPLICATION	X								
	17	NA1	ALARM MULTIPLICATION	X								
	18	NA2	DISCREPANCY INITIATION	X								
	19	NA3	DISCREPANCY INITIATION	X								
	20	NA4	DISCREPANCY INITIATION	X								
	21	NA5	DISCREPANCY INDICATIONS	X								
	22	RA1	ANNUNCIATOR-1 CIRCUIT	X								
	23	RA2	ANNUNCIATOR-2 CIRCUIT	X								
	24	RA3	ANNUNCIATOR-3 CIRCUIT	X								
	25	RA4	ANNUNCIATOR-4 CIRCUIT	X								
	26	RA5	SCADA & ER SIGNALS	X								
	27	Z1	COMPONENT DIAGRAM	X								
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0	AS BUILT	19-10-2018	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 132kV LINE CONTROL PANEL (=E01+CP31) LIST OF CONTANTS	Drawing no. P60194-E-ELC-SC-002			
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type AA	Sheet no. 02	

	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
A		CIRCUIT BREAKER		MINIATURE CIRCUIT BREAKER		AUXILIARY CONTACTOR NO+NC	21	DISTANCE
B		SWITCH/ISOLATOR		SELECTOR SWITCH		AMMETER	24	OVEREXCITATION
C		EARTHING		LIMITED SWITCH		VOLTmeter	25	SYCHROCHECK
D		GIS TERMINATION		HUMIDITY & TEMPERATURE CONTROLLER		POWER FACTOR METER	49	THERMAL OVERLOAD
E		SF6 TO AIR BUSHING		PANEL HEATER		DIGITAL PANEL METER	50/51	PHASE OVERCURRENT
F		LINE TRAP		THREE PIN SOCKET		ACTIVE POWER METER	50N/51N	EARTH FAULT
G		SURGE ARRESTOR		INDICATION LIGHT		REACTIVE POWER METER	50BF	CIRCUIT BREAKER FAILURE
H		CURRENT TRANSFORMER		PUSH BUTTON		ENERGY METER	64	RESTRICTED EARTH FAULT
I		COUPLING CAPACITOR VOLTAGE TRANSFORMER		AUXILIARY CONTACTOR COIL			67N	DIRECTIONAL EARTH FAULT
J		POWER TRANSFORMER		POWER SUPPLY AC/DC			68	POWER SWING BLOCKING
K		AUTO TRANSFORMER		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	LOW IMPEDANCE DIFFERENTIAL CONNECTION
P							87BB	LOW IMPEDANCE DIFFERENTIAL BUSBAR

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0	AS BUILT	19-10-2018	MUR	Manufacturer EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor Grid Solutions A GE and Alstom joint venture	Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E01+CP31) SYMBOL AND LEGENDS	Drawing no. P60194-E-ELC-SC-002
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type AB
									Sheet no. 03

	1	2	3	4	5	6	7	8			
	QTY.	DEVICE DESCRIPTION	DEVICE SPECIFICATIONS DEVICE TYPE ; TECHNICAL DATA / SPECIFICATIONS			DEVICE DESIGNITION	MANUFACTURER				
A	01	MWH+MVARTH METER	THREE PHASE FOUR WIRE STATIC ENERGY METER, CLASS 0.2, PT RATIO: 132/0.11 KV (L-L), CT RATIO 400:800:1600/1A , MODEL: MT860S-A22R36S33-E1-L21-M3K03-Z7			-P11	ISKRAEMECO				
	02	ANALOG AMMETER	METER: TRANSDUCER OPERATED DIGITAL AMPERE METER, INPUT 0...20/30 mA, ACCURACY CLASS 1, SCALE_1: 0...400/600A, SCALE_2: 0...800/1200A, SCALE_3: 0...1600/2400A. , AUX. VOLTAGE 110 VDC.			-Q1 , -Q3	FRER				
B	02	CURRENT TRANSDUCER	CURRENT TRANSDUCER: 1-INPUT, 2-OUTPUT, NOMINAL INPUT CURRENT 1/1.5A, OUTPUT1: 0...20/30mA, OUTPUT2: 0...20/30mA, AUXILIARY VOLTAGE 110 VDC, ACCURACY CLASS 1, CT RATIO 400:800:1600/1A ORD: A96MMA + MCOEAQ			-U1, -U3	FRER				
	01	DIGITAL AMMETER	METER: TRANSDUCER OPERATED DIGITAL AMPERE METER, INPUT 0...20/30 mA, ACCURACY CLASS 1, SCALE_1: 0...400/600A, SCALE_2: 0...800/1200A, SCALE_3: 0...1600/2400A. , AUX. VOLTAGE 110 VDC.			-Q2	FRER				
C	02	CURRENT TRANSDUCER	CURRENT TRANSDUCER: 1-INPUT, 2-OUTPUT, NOMINAL INPUT CURRENT 1/1.5A, OUTPUT1: 0...20/30mA, OUTPUT2: 0...20/30mA, AUXILIARY VOLTAGE 110 VDC, ACCURACY CLASS 1, CT RATIO 400:800:1600/1A ORD: D96MMA + MCOEAQ			-U2, -U12	FRER				
	01	ANALOG REAL POWER (MW) METER	METER: 240 DEGREE TRANSDUCER OPERATED ANALOGUE MW METER, INPUT -12.5/10...0...+10/12.5 mA, ACCURACY CLASS 1, SCALE_1: 125/100-0-100/125 MW (91.5 MW at 20mA), SCALE_2: 250/200-0-200/250 MW (183 MW at 20mA), SCALE_3: 500/400-0-400/500 MW (366 MW at 20mA).			-Q5	FRER				
D	01	ANALOG REACTIVE POWER (MVAR) METER	METER: 240 DEGREE TRANSDUCER OPERATED ANALOGUE MVAR METER, INPUT -12.5/10...0...+10/12.5 mA, ACCURACY CLASS 1, SCALE_1: 125/100-0-100/125 MVAR (91.5 MVAR at 20mA), SCALE_2: 250/200-0-200/250 MVAR (183 MVAR at 20mA), SCALE_3: 500/400-0-400/500 MVAR (366 MVAR at 20mA).			-Q6	FRER				
	01	PROGRAMMABLE UNIVERSAL TRANSDUCER (for MW and MVAR meters)	TRANSDUCER: 3-PHASE, 4-WIRE BALANCED LOAD, 4 PROGRAMMABLE DC mA OUTPUTS. NOMINAL INPUT VOLTAGE 110/137.5 VAC(L-L), NOMINAL INPUT CURRENT 1/1.25A, AUXILIARY VOLTAGE 110 VDC, ACCURACY CLASS 1, OUTPUT1 to OUTPUT4: -12.5/10...0...+10/12.5 mA, PT RATIO: 132/0.11 KV (L-L), CT RATIO 400:800:1600/1A. ORD: MCOP4			-U5	FRER				
E	01	DIGITAL POWER METER	THREE PHASE DIGITAL POWER METER, ACCURACY CLASS 0.5s, INPUT NOMINAL CURRENT, 1/5A, INPUT NOMINAL VOLTAGE 110 VAC (L-L), AUXILIARY VOLTAGE 110-375 VDC.			-Q7	ENERDIS				
	03	ANNUNCIATOR	TWELVE WINDOW ANNUNCIATOR, RATED VOLTAGE 110 VDC, ORD: AM-101			-H101, -H102, -H103	ELABS				
F	01	ANNUNCIATOR	TWELVE WINDOW ANNUNCIATOR, RATED VOLTAGE 240 VAC, ORD: AM-101			-H106	ELABS				
	01	PUSH BUTTON - LAMP TEST	TYPE: SWITCH (A TYPE:), COLOR : BLACK , SUPPLY : 120VDC, Ord: YS-AP1-2-31-B-D-W			-S21	YONGSUNG				
F	01	PUSH BUTTON - ALARM ACKNOWLEDGMENT	TYPE: SWITCH (A TYPE:), COLOR : RED , SUPPLY : 120VDC, Ord: YS-AP1-2-31-R-D-W			-S22	YONGSUNG				
	0	AS BUILT	19-10-2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  GE Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132KV LINE CONTROL PANEL (=E01+CP31) COMPONENT LIST	Drawing no. P60194-E-ELC-SC-002	
F	REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type AC1	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	PUSH BUTTON - ALARM RESET	TYPE: SWITCH(A TYPE:), COLOR : GREEN , SUPPLY : 120VDC, Ord: YS-AP1-2-31-G-D-W			-S23	YONGSUNG				
	01	SELECTOR SWITCH - OPERATION (LOCAL-OFF-SCADA)	3-POSITION (STATION-OFF-SCADA), 110VDC, KEYLOCKABLE TYPE, ORD: YS-AK-2-3-44-D			-S101	YONGSUNG				
	73	AUXILIARY CONTACTOR	COIL VOLTAGE: 110VDC, 4 C/O CONTACTS, ORD: PRC4M40DCJL			-K0E, -KS0, -KOA, -KDC1, -K1, -K2, -K9, -K0, -K11 TO -K46, -K59,-K0OFF, -K0ON, -K0D, -K1OFF, -K1ON, -K1D, -K2OFF, -K2ON, -K2D, -K9OFF, -K9ON, -K9D, -K51OFF, -K51ON, -K51D, -K53OFF, -K53ON, -K53D, -K8OFF, -K8ON, -K8D, -KDC2, -KS21, -K111, -K222	GE				
B	01	AUXILIARY CONTACTOR - SUPPLY CHANGEOVER	COIL VOLTAGE: 110VDC, 3 NO + 3 NC CONTACTS, ORD: MCRC022ATWJ-B+MARN211AT			-KDC	GE				
	03	AUXILIARY CONTACTOR	COIL VOLTAGE:: 240VAC, 4 C/O CONTACTS, ORD: PRC4M40ANL			-KAMC, -K7, -K8	GE				
	01	CONTROL DISCREPANCY SWITCH - CIRCUIT BREAKER	CONTROL AND DISCREPANCY SWITCH FOR ISOLATOR CONTROL AND INDICATION, SQUARE TYPE FOUR CONTACTS FOR COMMAND AND FOUR CONTACTS FOR INDICATION			-S0	YONGSUNG				
C	06	CONTROL DISCREPANCY SWITCH - ISOLATORS & EARTHING SW.	CONTROL AND DISCREPANCY SWITCH FOR ISOLATOR CONTROL AND INDICATION, ROUND TYPE FOUR CONTACTS FOR COMMAND AND FOUR CONTACTS FOR INDICATION ORD:YS-IC-4456-R4(49)-PM-K-G-D11-G			-S1, -S2, -S9, -S51, -S53, -S8	YONGSUNG				
	01	FLASHER RELAY	FLASHER RELAY, COIL VOLTAGE 110 VDC, ORD: FR-101-110			-K51	ELABS				
	02	TEST BLOCK	YS-CTT-04-S, YS-PTT-04-S			-XTB1, -XTB2	YONGSUNG				
D	02	INDICATION LIGHT - AC AND DC SUPPLY	TYPE: LED , COLOR : RED , SUPPLY : 240VAC ORD: YS-PL-2-AL-22-R-W			-H7, -H8	YONGSUNG				
	01	OPERATION COUNTER	OPERATION COUNTER FOR CIRCUIT BREAKER, RATED VOLTAGE 110VDC			-Q10	ELABS				
	03	CONTROL MCB - PANEL LIGHT & HEATER	2-Pole, Ratings: 2A, 240VAC, 6kA @ 240VAC, 2 C/O Contacts, Ord: G62C02+CAH(2)			-F101, -F102,-F104	GE				
E	01	CONTROL ELCB - PANEL SOCKET	2-Pole, Ratings: 16A, 30mA, 240VAC, 1P+N, 2 C/O Contacts, Ord: DM100C16/030+CAH(2)			-F103	GE				
	03	CONTROL MCB - DC DISTRIBUTION	2-Pole, Ratings: 4A, 250VDC, 10kA @ 250VDC, 2 C/O Contacts, Ord: EP102UCC04+CAH(2)			-F201,-F202,-F203	GE				
	01	PANEL LIGHT	230VAC @ 50Hz, 05W, Ord: YS-T8-30-5W			-H100	YONGSUNG				
F	01	DOOR SWITCH	230VAC @ 50Hz, 1 NO Contact, Ord: YS P3315GW-B + YS MS-C			-S100	YONGSUNG				
	01	THREE PIN SOCKET	1N+PE, 16A, 230VAC @ 50Hz			-X100	LOCAL				
	0	AS BUILT	19-10-2018	ASJ	Manufacturer  EPESOL 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 132kV LINE CONTROL PANEL (=E01+CP31) COMPONENT LIST	Drawing no. P60194-E-ELC-SC-002	
	REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type AC2	Sheet no. 05

	1	2	3	4	5	6	7	8		
	QTY.	DEVICE DESCRIPTION	DEVICE SPECIFICATIONS DEVICE TYPE ; TECHNICAL DATA / SPECIFICATIONS			DEVICE DESIGNITION	MANUFACTURER			
A	01	PANEL HEATER	240VAC @ 50Hz, 50W			-R100	E-LABS			
	01	HUMIDITY & TEMPERATURE CONTROLLER	40-90%RH, 25-50 deg.C, 240VAC @ 50Hz			-B100	E-LABS			
	01	HOOTER	RATED VOLTAGE 110VDC ORD: AH-101			-H1	E-LABS			
B	01	BELL	BELL, RATED VOLTAGE 240VAC, ORD: YSMB-722A			-B1	YONGSUNG			
	04	TERMINAL BLOCKS FOR AC SUPPLY	TYPE: CBD-4			-XAC	CABUR			
	02	TERMINAL BLOCKS FOR DC SUPPLY1	TYPE: CBD-4			-XDC-1	CABUR			
C	02	TERMINAL BLOCKS FOR DC SUPPLY2	TYPE: CBD-4			-XDC-2	CABUR			
	16	TERMINAL BLOCKS FOR METERING	TYPE: CBD-4			-X3	CABUR			
	08	TERMINAL BLOCKS FOR CB CONTROL CIRCUIT	TYPE: CBD-4			-X4	CABUR			
D	12	TERMINAL BLOCKS FOR CB CONTROL CIRCUIT	TYPE: CBD-4			-X5	CABUR			
	35	TERMINAL BLOCKS FOR DS+ES CONTACTOR MULTIPLICATION	TYPE: CBD-4			-X6	CABUR			
	08	TERMINAL BLOCKS FOR CB/DS CONTACTOR MULTIPLICATION	TYPE: CBD-4			-X7	CABUR			
E	40	TERMINAL BLOCKS FOR AUXIALARY MULTIPLICATION	TYPE: CBD-4			-X8	CABUR			
	15	TERMINAL BLOCKS FOR DISCRIPANCY INITIATION	TYPE: CBD-4			-X9				
	13	TERMINAL BLOCKS FOR ANNUNCIATOR-1	TYPE: CBD-4			-X11	CABUR			
F	16	TERMINAL BLOCKS FOR ANNUNCIATOR-2	TYPE: CBD-4			-X12	CABUR			
	18	TERMINAL BLOCKS FOR ANNUNCIATOR-3	TYPE: CBD-4			-X13	CABUR			
	24	TERMINAL BLOCKS FOR ANNUNCIATOR-4	TYPE: CBD-4			-X14	CABUR			
G	45	TERMINAL BLOCKS FOR EVENT RECORDER	TYPE: CBD-4			-XEV	CABUR			
	45	TERMINAL BLOCKS FOR SCADA	TYPE: CBD-4			-XSC	CABUR			
	30	TERMINAL BLOCKS FOR TRANSDUCER TO SCADA	TYPE: CBD-4			-XSA	CABUR			
H	30	TERMINAL BLOCKS FOR SCADA	TYPE: CBD-4			-XSP	CABUR			
	0	AS BUILT	19-10-2018	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 132kV LINE CONTROL PANEL (=E01+CP31) COMPONENT LIST	Drawing no. P60194-E-ELC-SC-002
	REV.	DESCRIPTION	DATE	DRAWER				Project no. P-60194	Sheet type AC3	Sheet no. 05a

	1	2	3	4	5	6	7	8			
A B C D E F	QTY.	DEVICE DESCRIPTION		DEVICE SPECIFICATIONS DEVICE TYPE ; TECHNICAL DATA / SPECIFICATIONS			DEVICE DESIGNITION		MANUFACTURER		
	08	TERMINAL BLOCKS FOR BELL AND HOOTER		TYPE: CBD-4			-XF		CABUR		
	08	TERMINAL BLOCKS FOR MERTERING CV		TYPE: SCB-6			-X2		CABUR		
	07	TERMINAL BLOCKS WITH DIODE TYPE IN-D4007, RATED MAXIMUM VOLTAGE 350VDC, RATED BREAK DOWN VOLTAGE 430VDC		TYPE: DAS.4/6			-XD		CABUR		
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0	AS BUILT	19-10-2018	ASJ	Manufacturer  EPESOL 21-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132KV LINE CONTROL PANEL (=E01+CP31) COMPONENT LIST	Drawing no. P60194-E-ELC-SC-002		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type AC3	Sheet no. 05b

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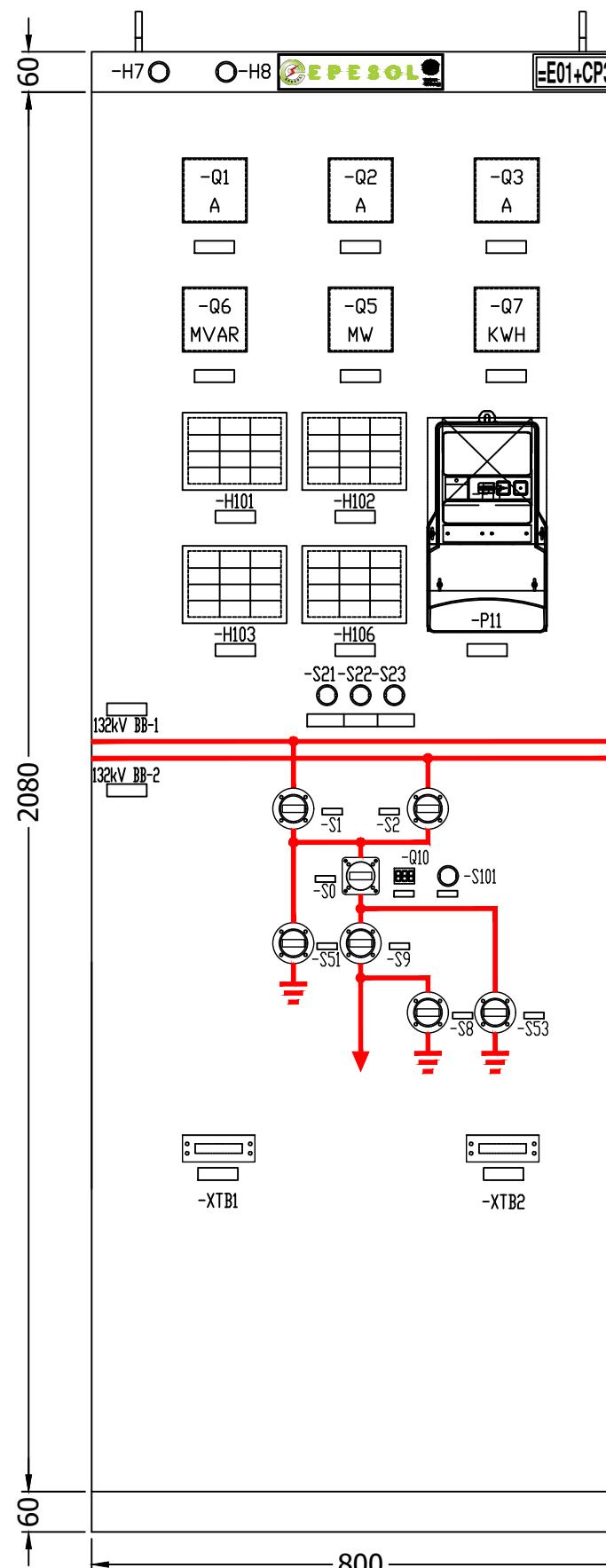
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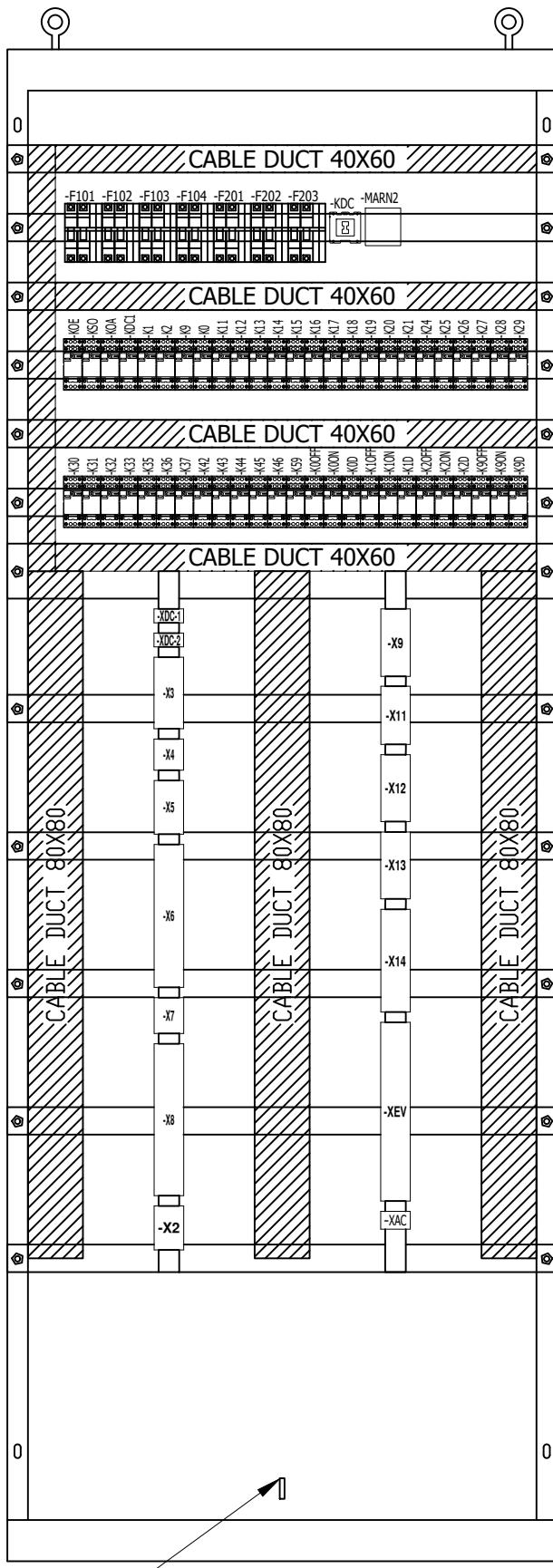
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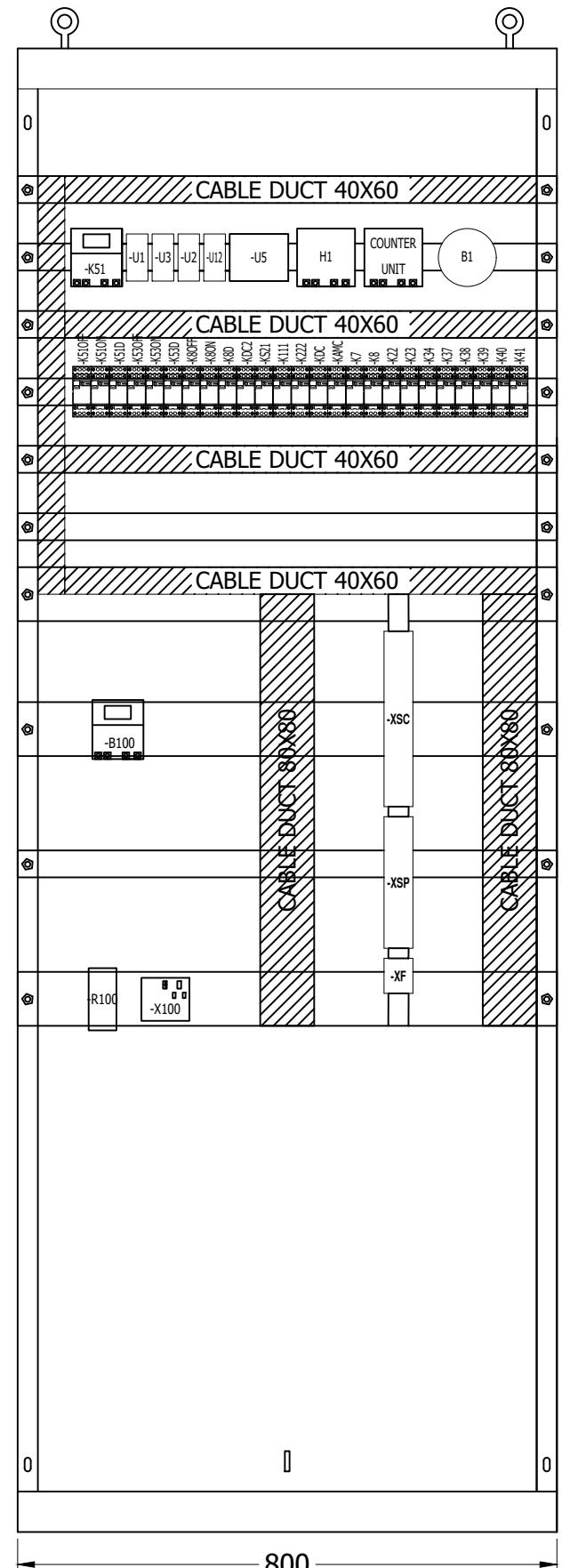
FRONT VIEW



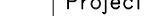
LEFT SIDE VIEW

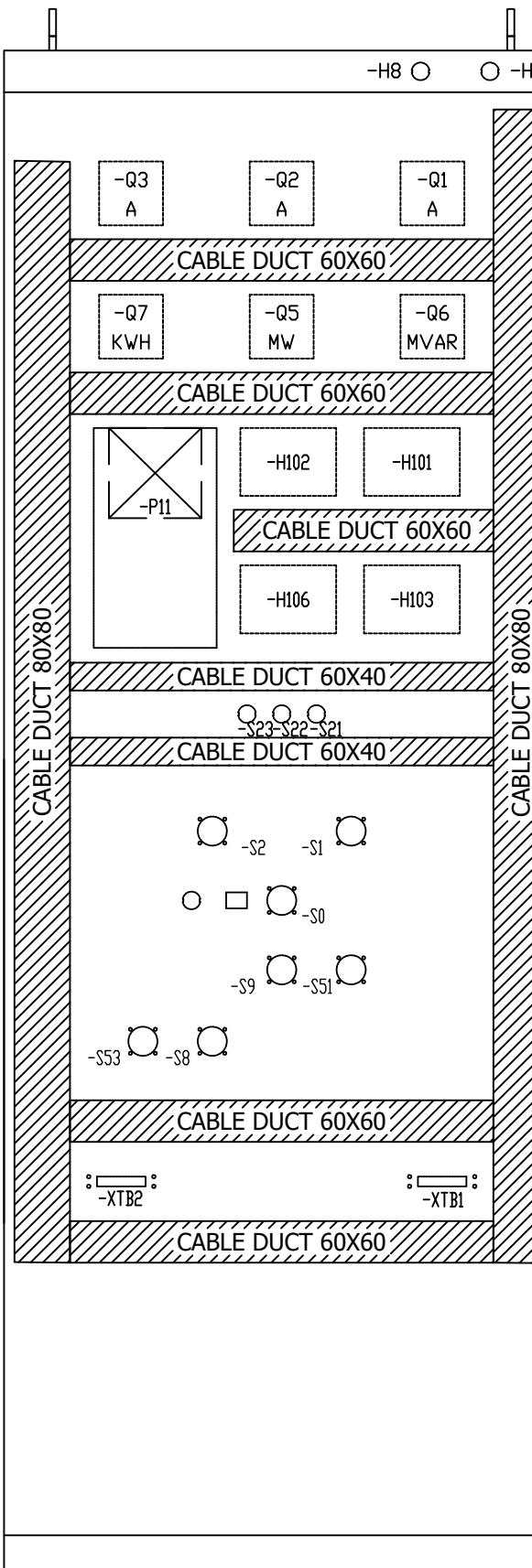
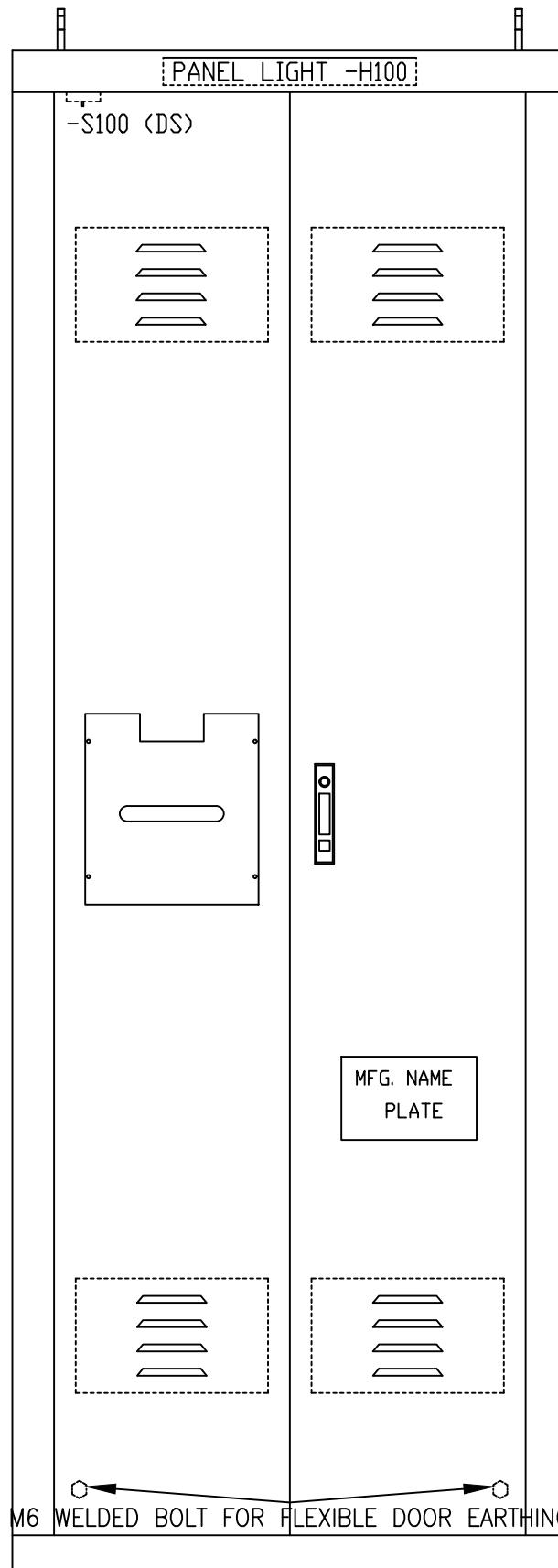
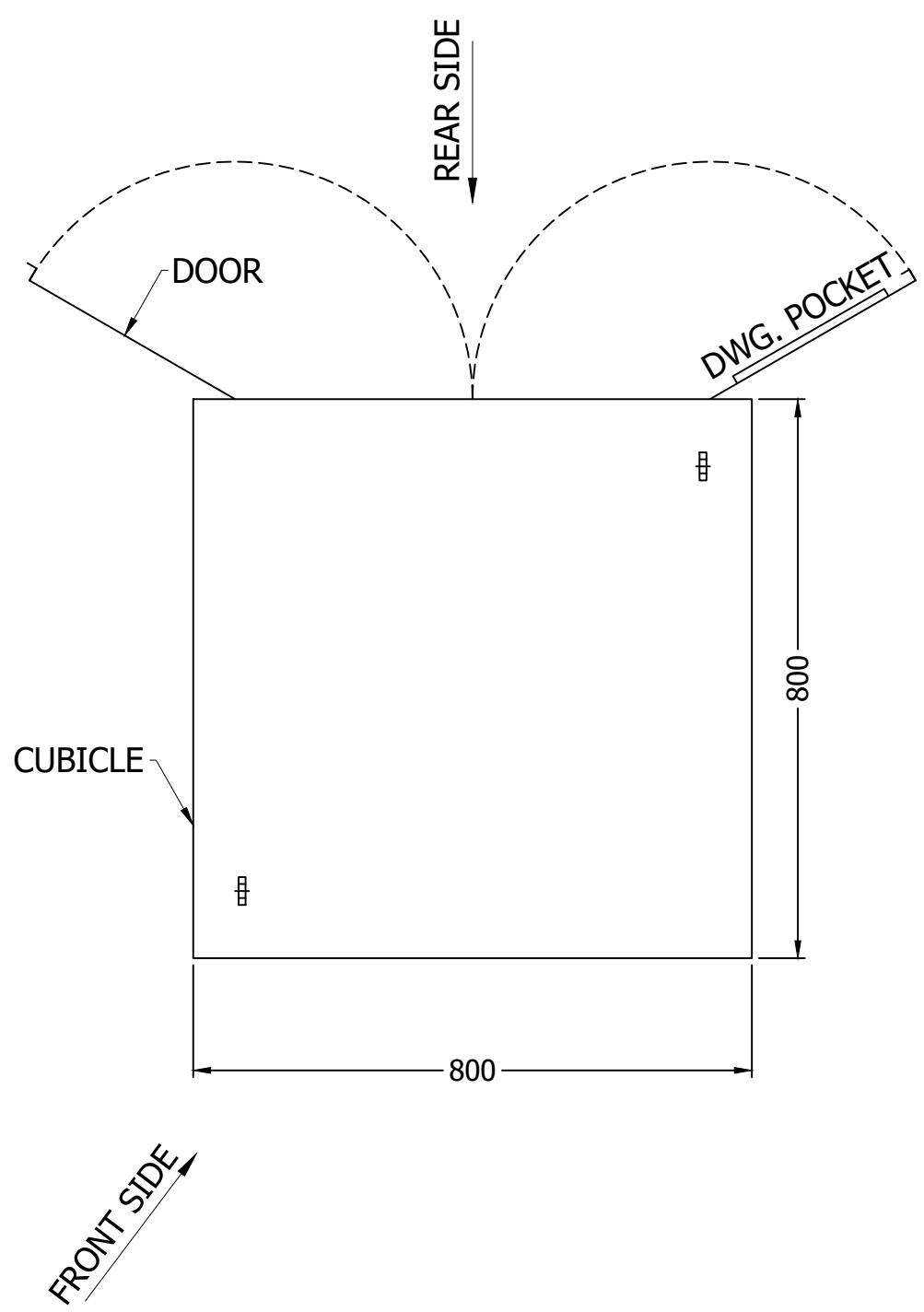


RIGHT SIDE VIEW



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									Project no.	Sheet type	
REV.	DESCRIPTION	DATE	DRAWER						P-60194	AD	06

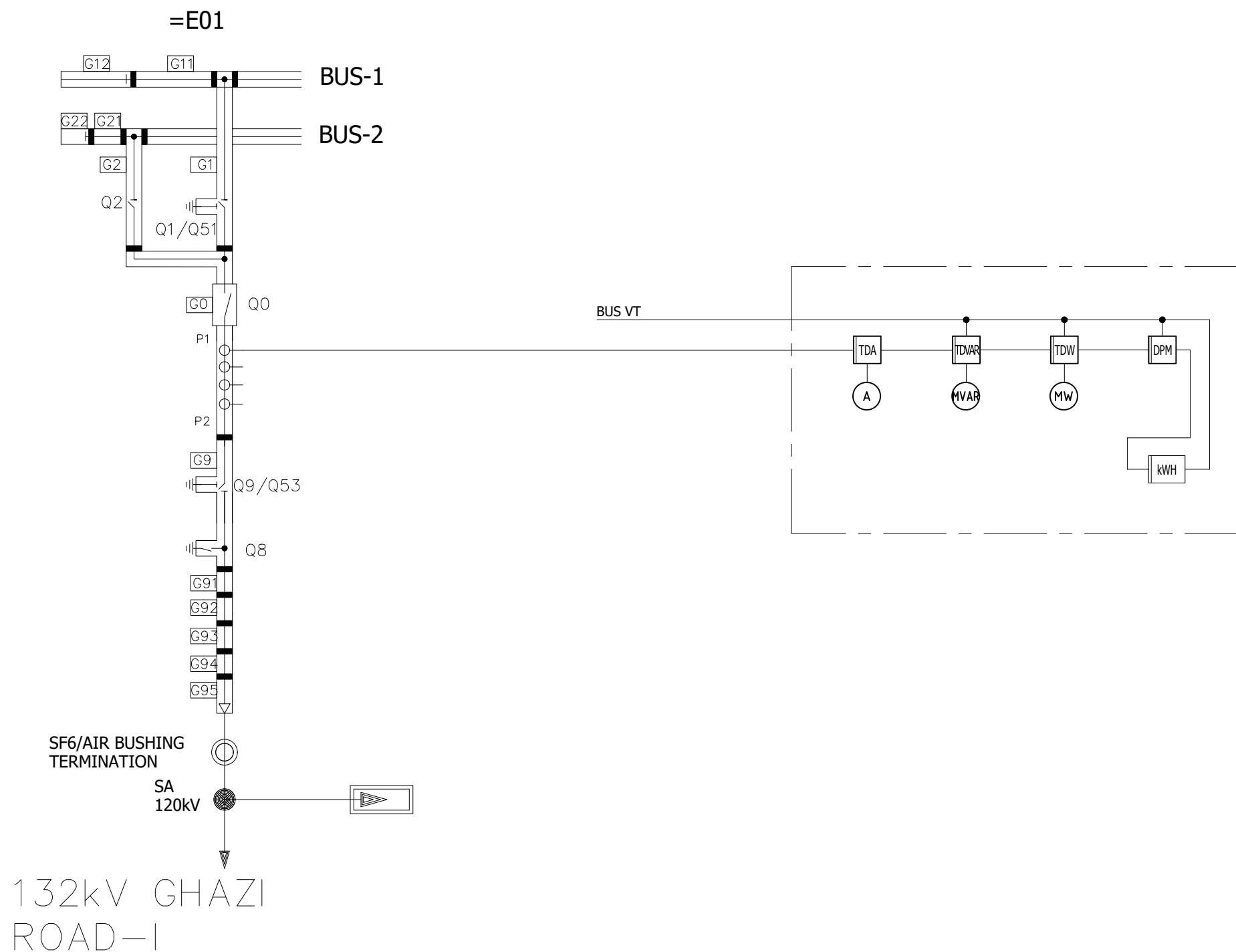
BACK VIEW WITHOUT DOORBACK VIEW WITH DOORTOP VIEWNOTE:-

- PANEL DIMENSION: 800 x 800 x 2200mm (WxDxH)
- COLOR : RAL 7032
- SHEET THICKNESS : 2-2.5 mm
- PROTECTION CLASS : IP-51 (INDOOR TYPE)
- ALL DOOR FITTED WITH 16mm EARTH STRAP & INSULATED WITH GREEN-YELLOW COLOUR.

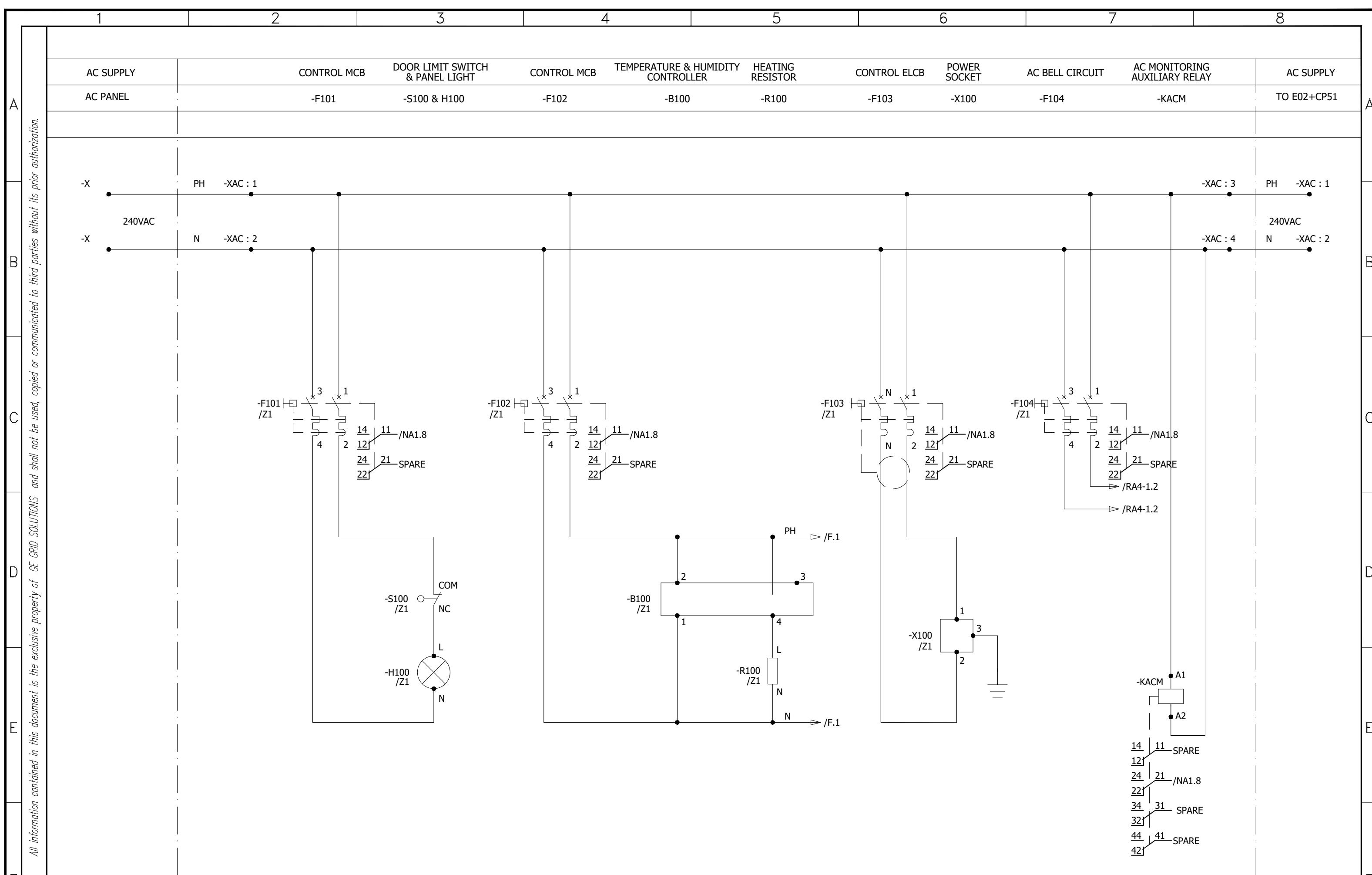
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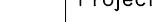
0	AS BUILT	19-10-2018	ASJ	Manufacturer EPE SOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor GE Grid Solutions A GE and Alstom joint venture	Client NTDC-WAPDA NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132KV LINE CONTROL PANEL (=E01+CP31) PANEL VIEWS	Drawing no. P60194-E-ELC-SC-002
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REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194



0	AS BUILT	19.10.2018	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 132kV LINE CONTROL PANEL (=E01+CP31) AC SUPPLY DISTRIBUTION CIRCUIT	Drawing no. P60194-E-ELC-SC-001	
REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type D	Sheet no. 08
1	2	3	4	5	6	7	8			

DC MCB FOR 132KV CB
CONTROL

-F201

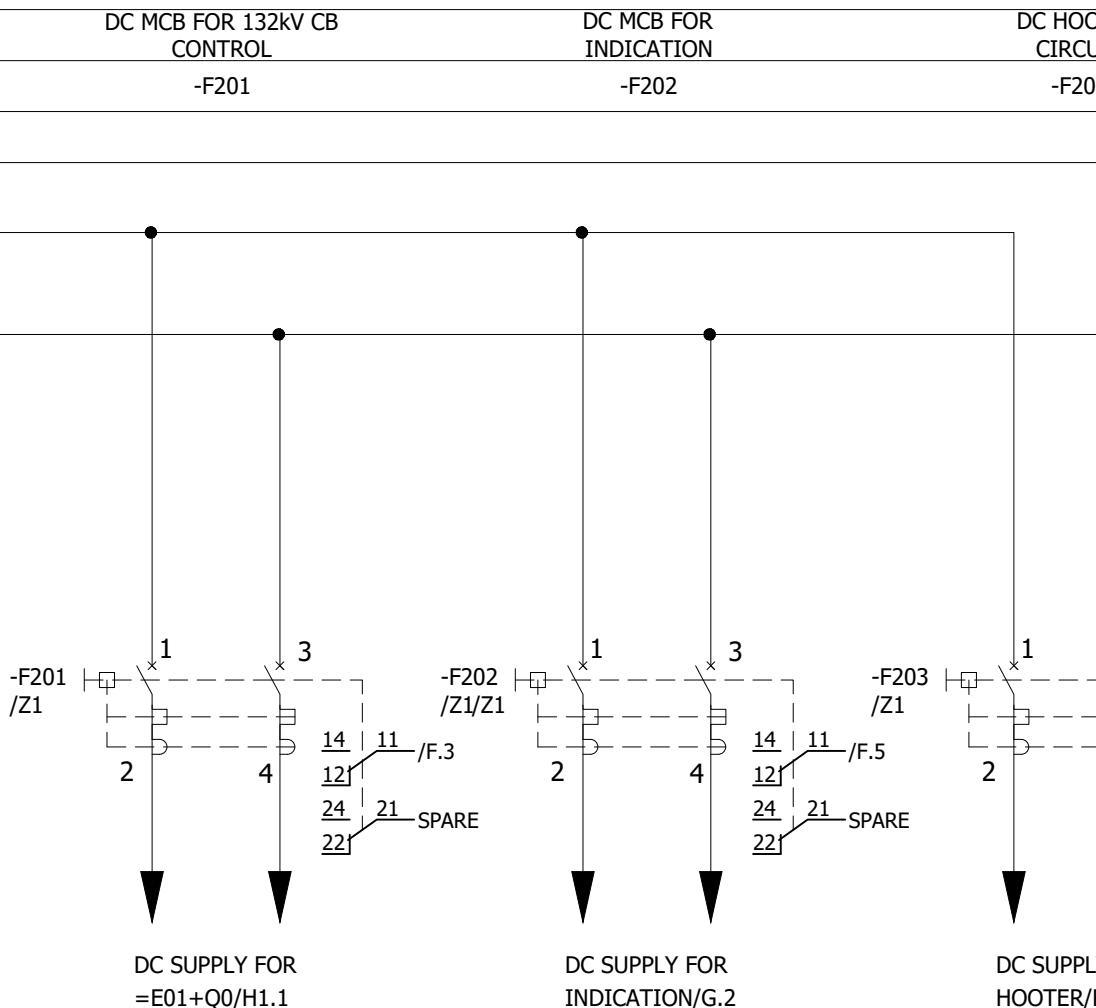
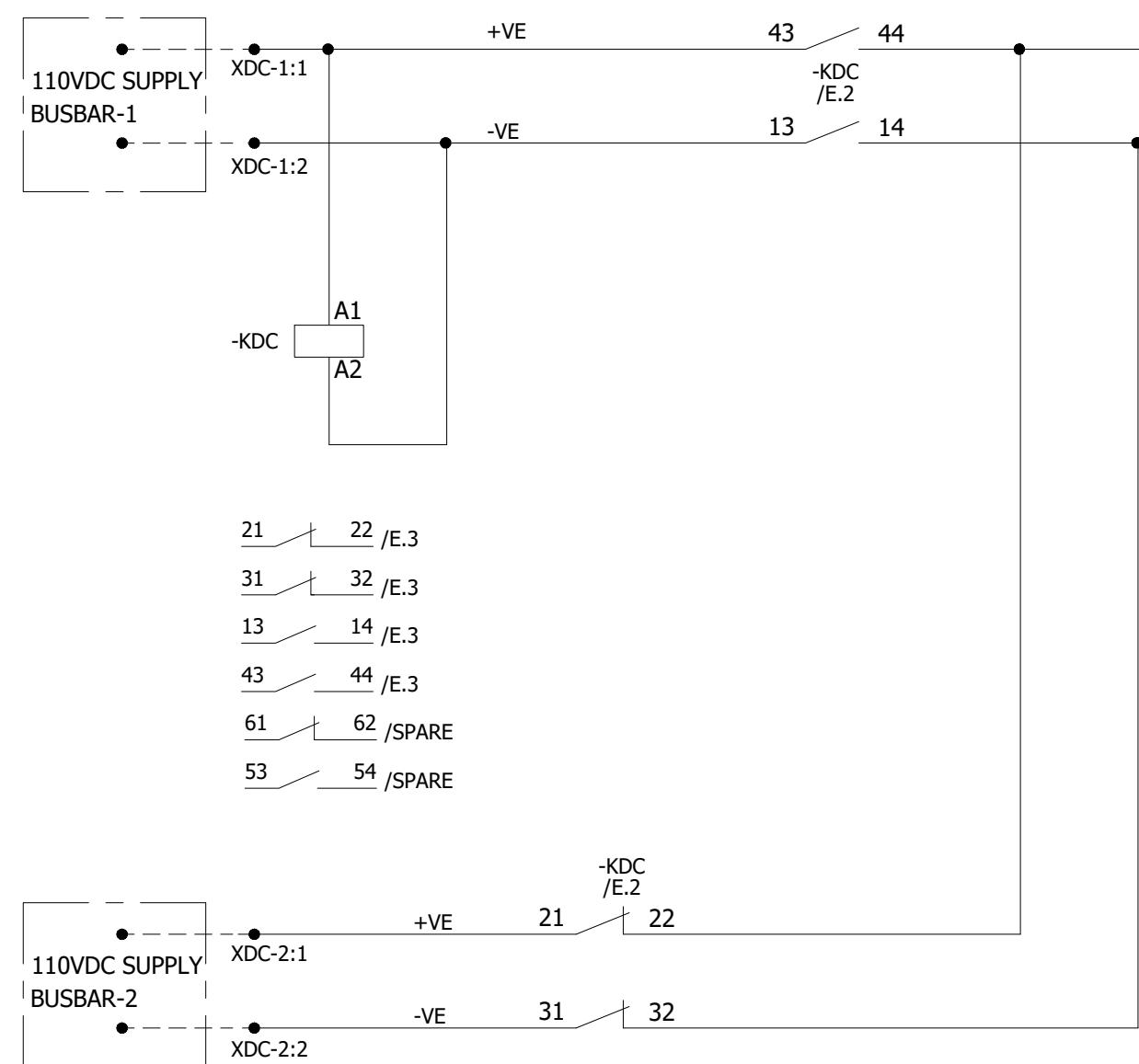
DC MCB FOR
INDICATION

-F202

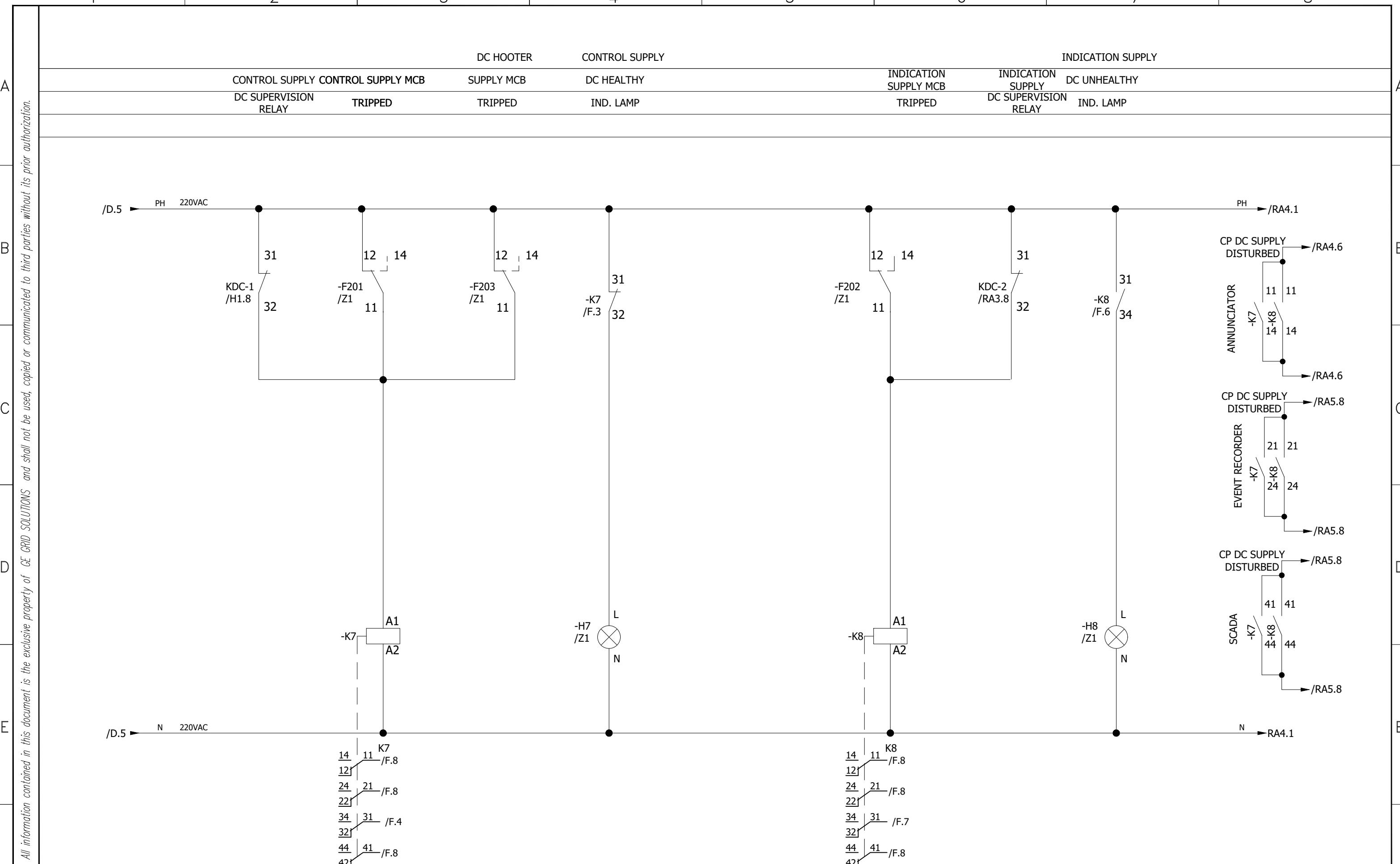
DC HOOTER
CIRCUIT

-F203

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0	AS BUILT	19.10.2018	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 132KV LINE CONTROL PANEL (=E01+CP31) DC SUPPLY DISTRIBUTION CIRCUIT	Drawing no. P60194-E-ELC-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type E
									Sheet no. 09



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0	AS BUILT	19.10.2018	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 132kV LINE CONTROL PANEL (=E01+CP31) DC SUPPLY FAILURE ALARM CIRCUIT	Drawing no. P60194-E-ELC-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type F
									Sheet no. 10

1 2 3 4 5 6 7 8

TEST BLOCK

AM METERS

MW METER (-Q5)

MVAR METER (-Q6)

DIGITAL POWER METER

REVENUE METER

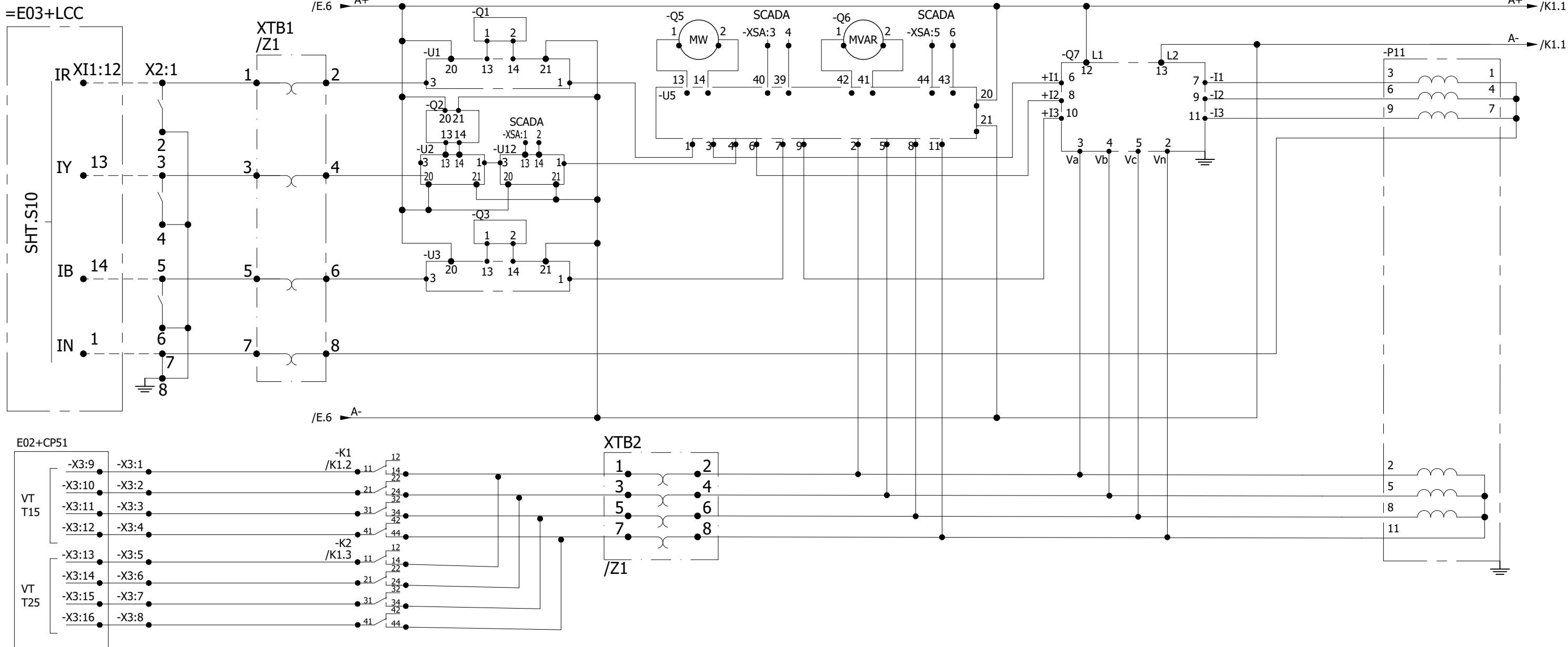
TS

(-Q1, -Q2, -Q3) WITH
TRANSDUCERS
(-U1, , -U2, -U3)

WITH TRANSDUCER (-U5)

(-Q7)

(-P11)



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0	AS BUILT	19-10-2018	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	132KV LINE CONTROL PANEL (-E01+CP31) METERING	P60194-E-ELC-SC-002		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type G	Sheet no. 11

1 2 3 4 5 6 7 8

1 2 3 4 5 6 7 8

C O N T R O L R O O M

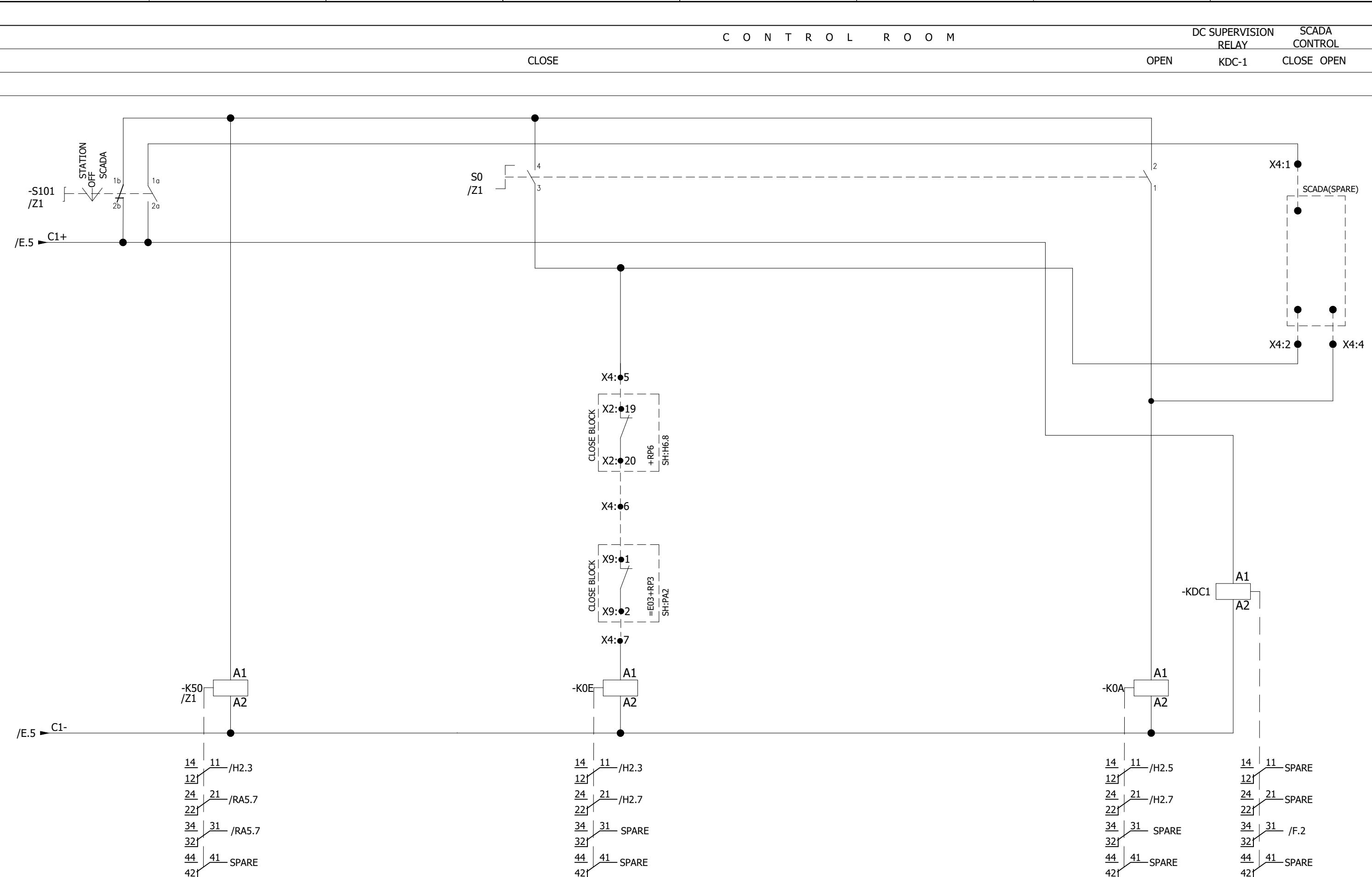
DC SUPERVISION
RELAYSCADA
CONTROL

OPEN KDC-1 CLOSE OPEN

CLOSE

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A



0	AS BUILT	19-10-2018	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 132kV LINE CONTROL PANEL (=E01+CP31) CB CONTROL CIRCUIT	Drawing no. P60194-E-ELC-SC-002
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type H1
									Sheet no. 12

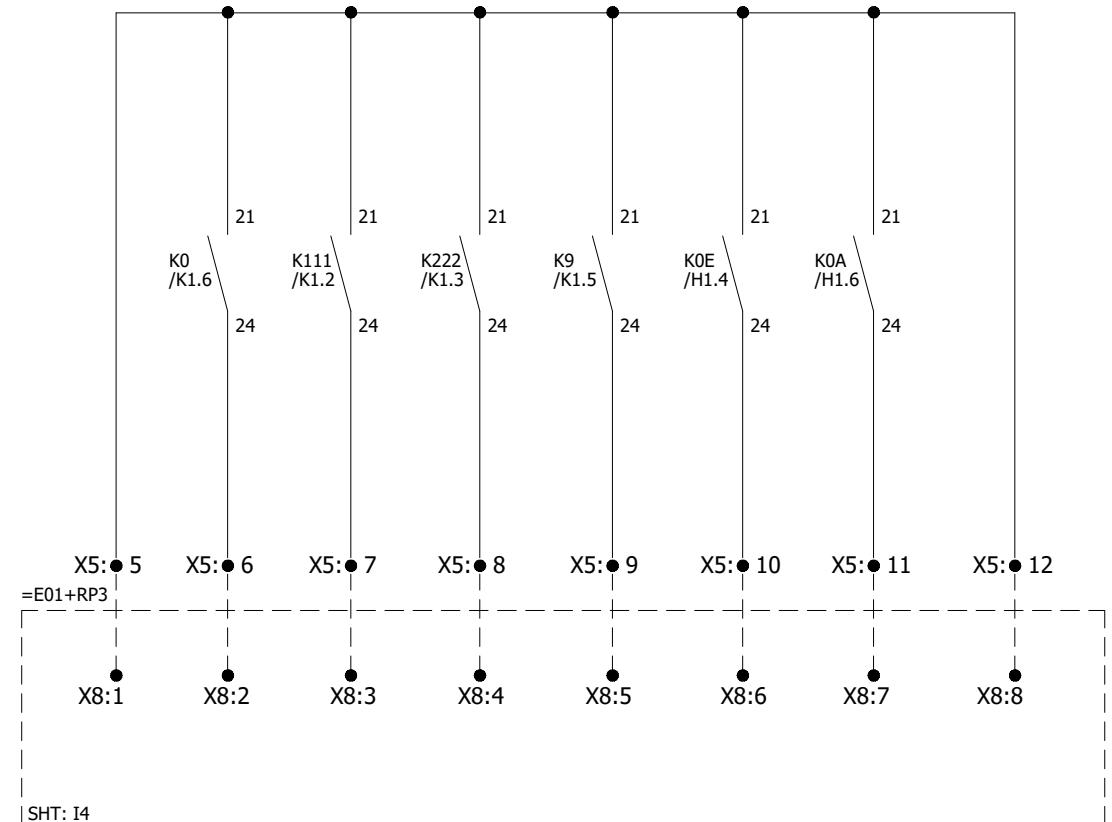
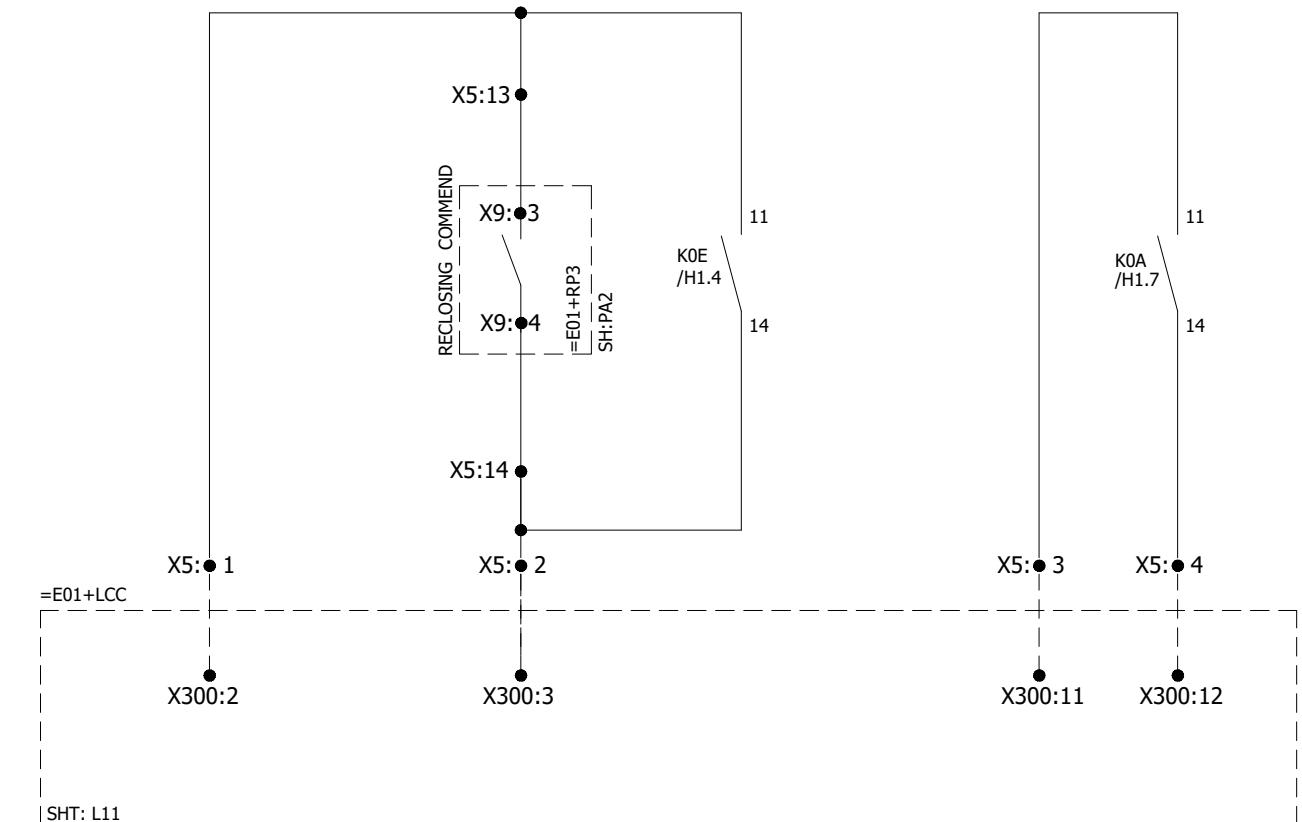
C O N T R O L R O O M C O N T R O L

AUTORECLOSE(SPARE)

CLOSE

OPEN

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CB CLOSE STATUS

Q1 CLOSE STATUS

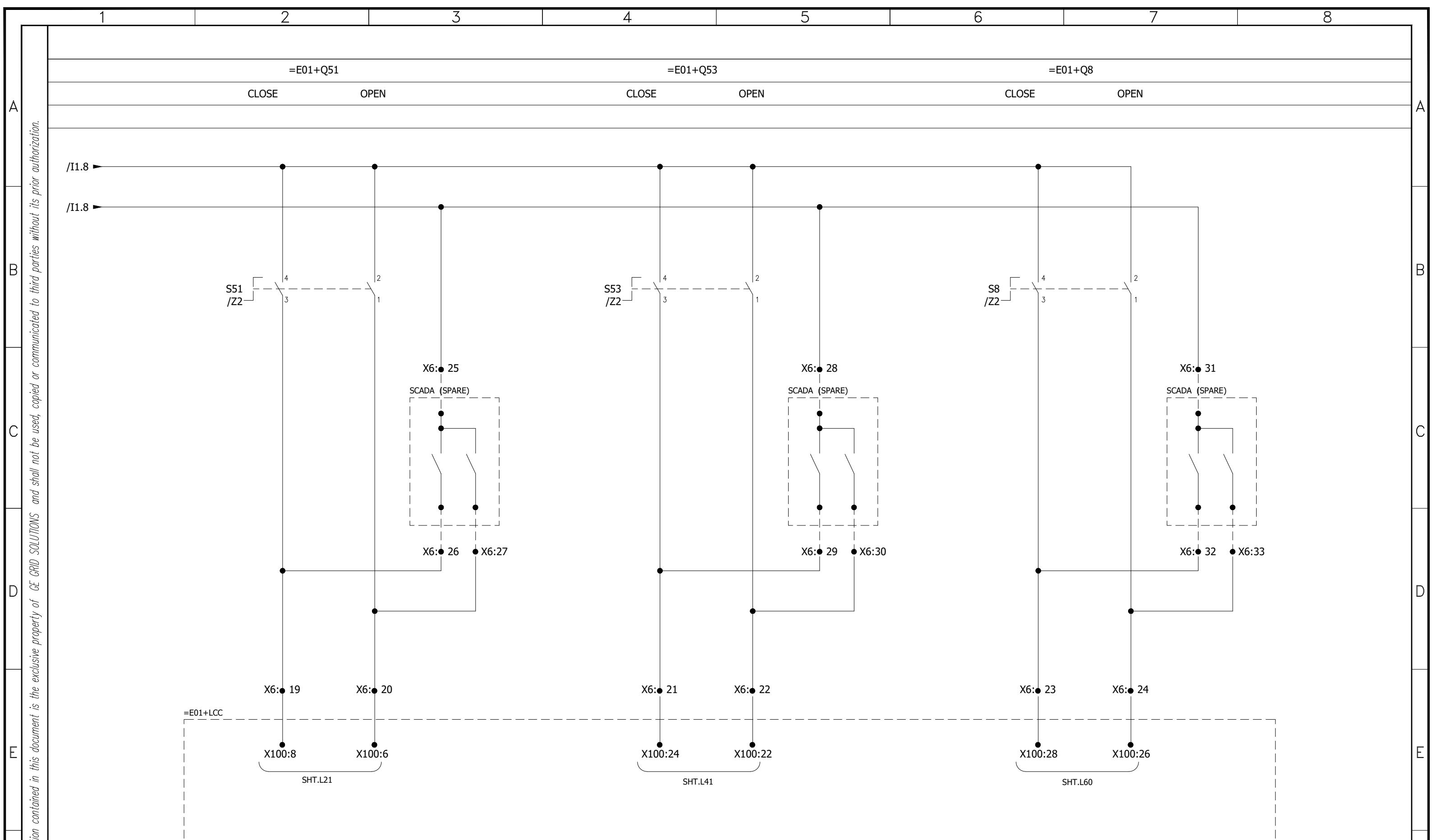
Q2 CLOSE STATUS

Q9 CLOSE STATUS

MANUAL CLOSE INPUT FOR
DISTANCE RELAY

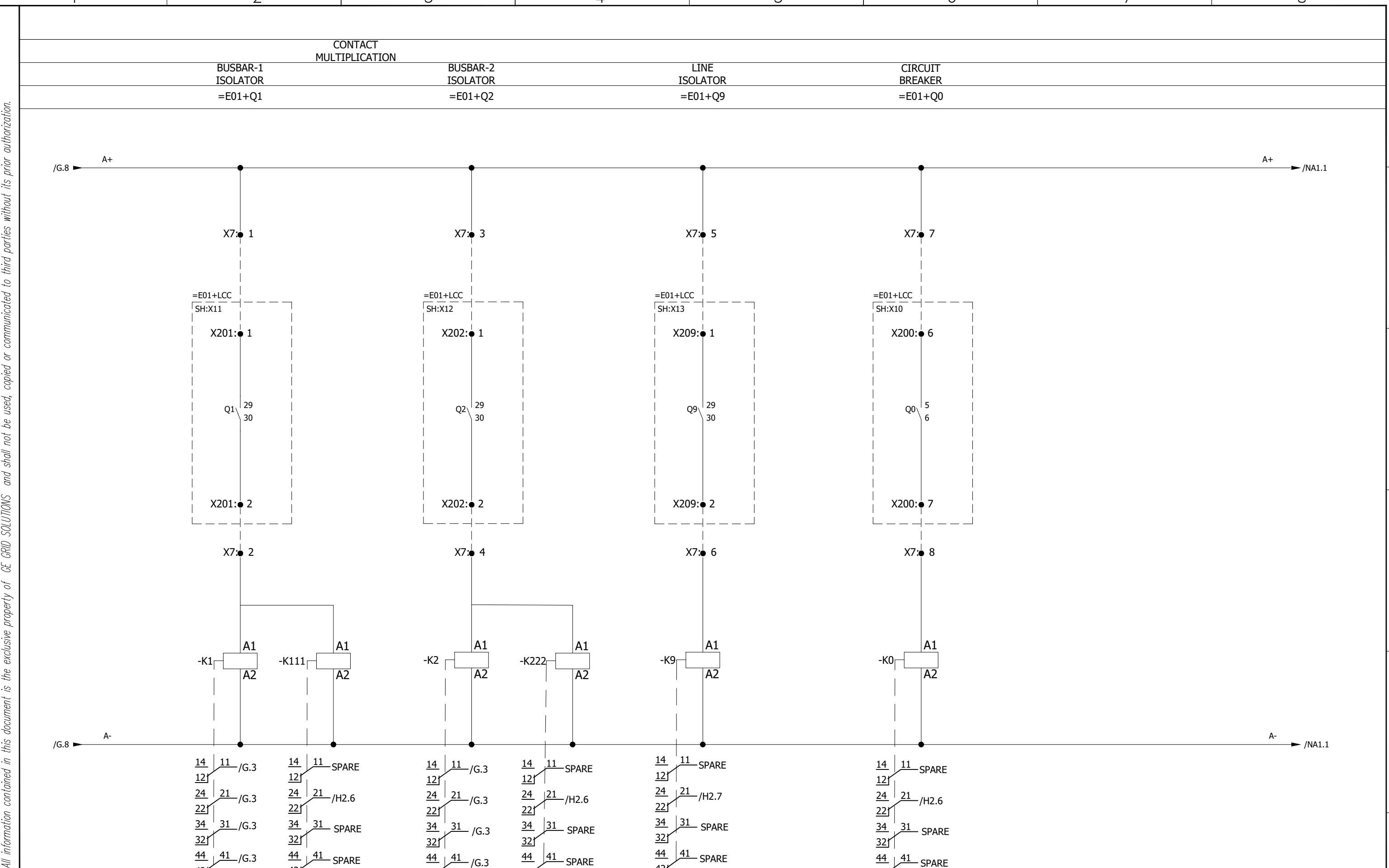
MANUAL OPEN INPUT FOR
DISTANCE RELAY

0	AS BUILT	19-10-2018	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 132kV LINE CONTROL PANEL (=E01+CP31) CB CONTROL CIRCUIT	Drawing no. P60194-E-ELC-SC-002
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type H2
									Sheet no. 13



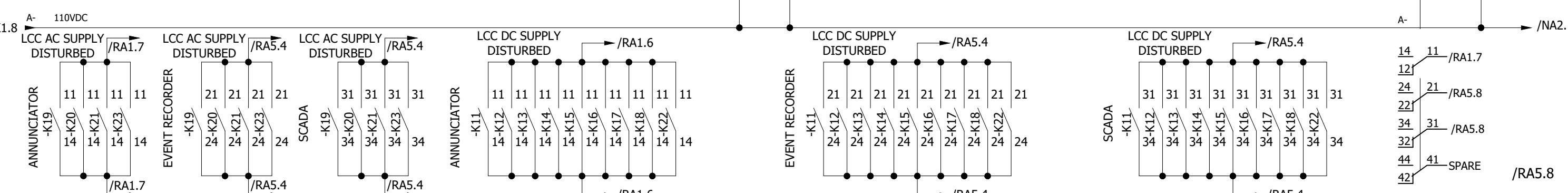
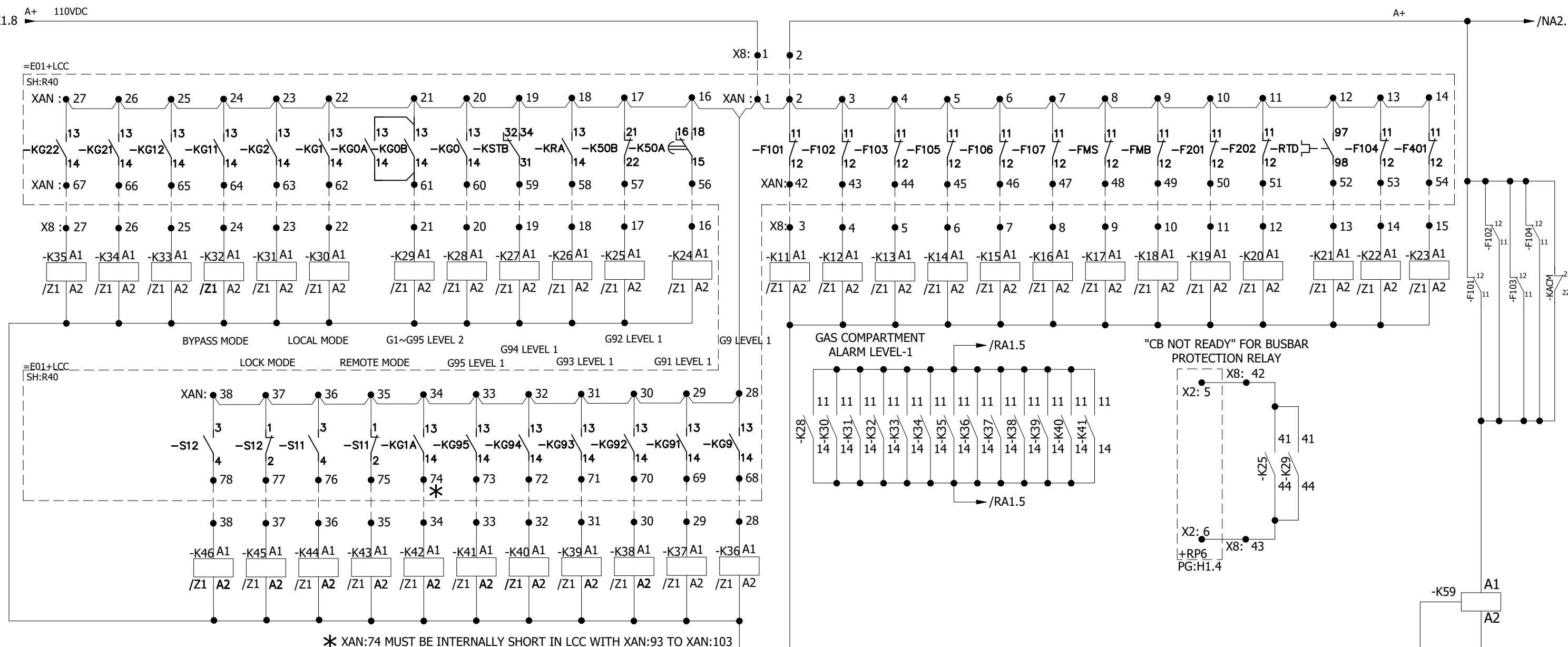
0	AS BUILT	19-10-2018	ASJ	Manufacturer EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor GE Grid Solutions A GE and Alstom joint venture	Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E01+CP31) DISCONNECTOR & EARTH SWITCH CONTROL	Drawing no. P60194-E-ELC-SC-002
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type I2
									Sheet no. 15

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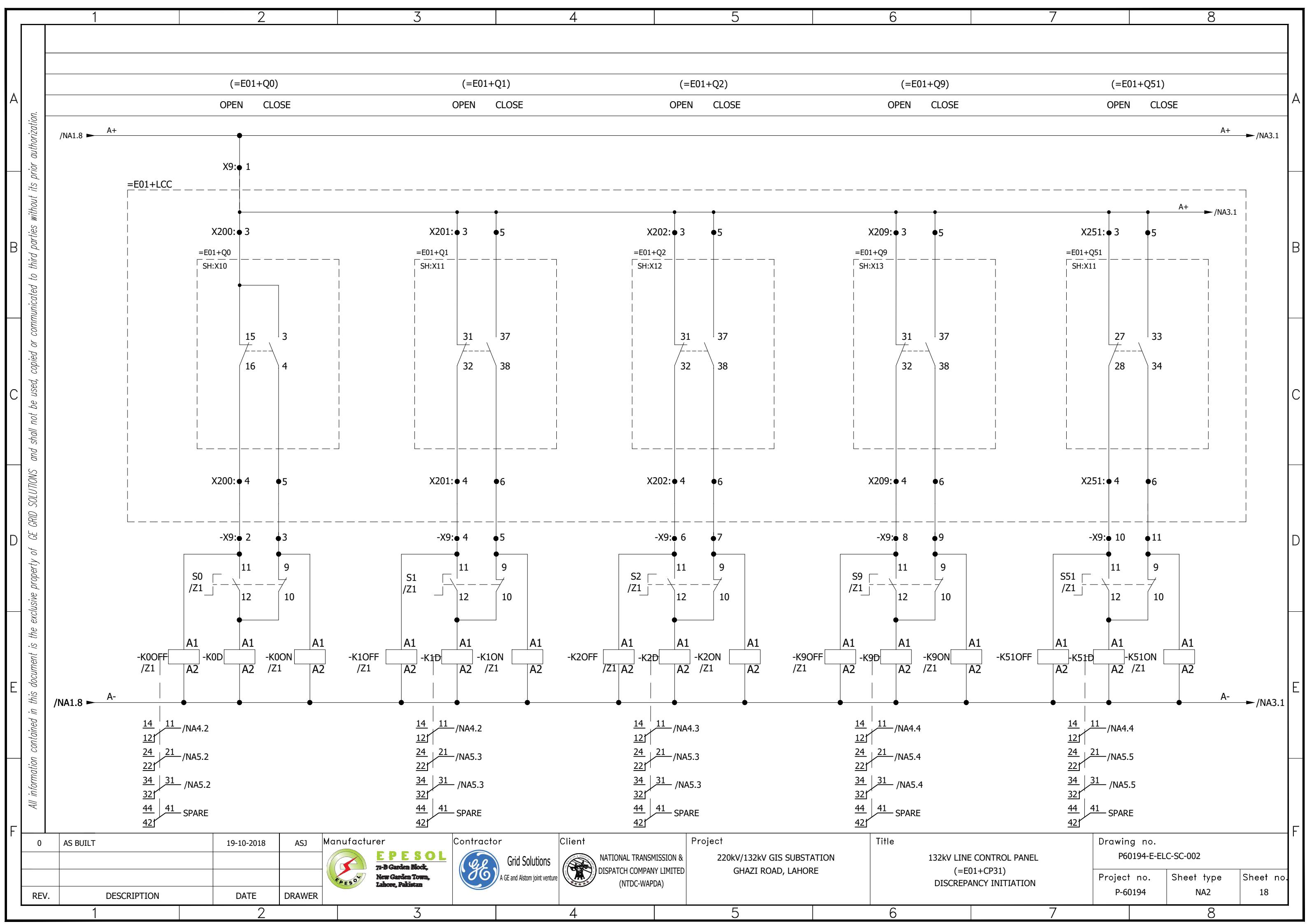
0	AS BUILT	19-10-2018	ASJ	Manufacturer	Contractor	Client	Project	Title	Drawing no.
REV.	DESCRIPTION	DATE	DRAWER	EPE SOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Grid Solutions A GE and Alstom joint venture	NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	132kV LINE CONTROL PANEL (=E01+CP31) CB/DISCONNECTOR CONTACT MULTIPLICATION	P60194-E-ELC-SC-002
									Project no. P-60194 Sheet type K1 Sheet no. 16

1	2	3	4	5	6	7	8
A	CONTACT MULTIPLICATION	POSITION	LONG SPRING CHARGING TIME	CONTROL SUPPLY MCB TRIPPED	GAS MONITOR MCB TRIPPED	CB TRIPPING 1 MCB TRIPPED	LIGHTING AC SUPPLY MCB TRIPPED
G21 ALARM 1	G11 ALARM 1	G1 LEVEL 1	G0 ALARM REPEAT ABNORMAL	DS/ES/HES OPERATION TIME ABNORMAL	SPRING DISCHARGED	DS/ES/HES MOTOR SUPPLY MCB TRIPPED	CB MOTOR THERMAL OVERLOAD
G22 LEVEL 1	G12 ALARM 1	G2 LEVEL 1	G0 LOCK		ALARM SUPPLY MCB TRIPPED	CB CLOSING MCB TRIPPED	CB TRIPPING 2 MCB TRIPPED
						CB MOTOR SUPPLY MCB TRIPPED	HEATING AC SUPPLY MCB TRIPPED
							IL SUPPLY MCB TRIPPED
							PANEL'S AC SUPPLY FAIL



0	AS BUILT	19-10-2018	ASJ	Manufacturer	Contractor	Client	Project	Title	Drawing no.
				EPEPSOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Grid Solutions A GE and Alstom joint venture	NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	132KV LINE CONTROL PANEL (=E01+CP31) ALARM MULTIPLICATION	P-60194-E-ELC-SC-001
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194 Sheet type NA1 Sheet no. 17

1 2 3 4 5 6 7 8



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(-E01+Q53)

OPEN CLOSE

(-E01+Q8)

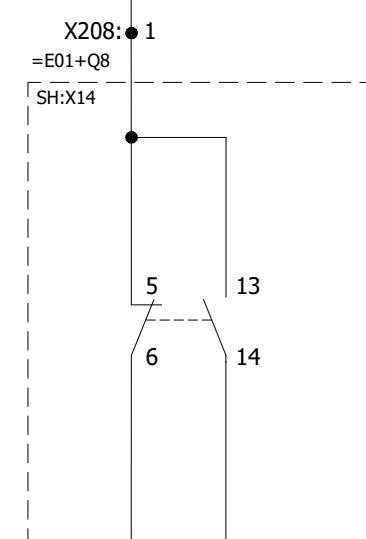
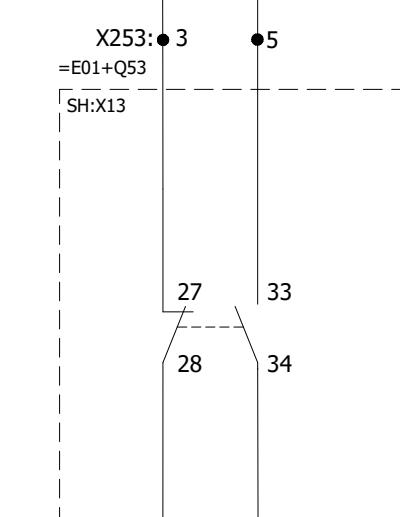
OPEN CLOSE

/NA2.8 A+

A+ /NA4.1

=E01+LCC

/NA2.8 A+



X253: 4

X9: 12

S53 /Z1

A1

-K53OFF /Z1

A2

-K53D

A2

-K53ON /Z1

A2

X208: 2

X9: 14

S8 /Z1

A1

-K8OFF /Z1

A2

-K8D

A2

-K8ON /Z1

A2

14
11 /NA4.5
121
24
21 /NA5.6
221
34
31 NA5.6
321
44
41 SPARE
421

14
11 /NA4.5
121
24
21 /NA5.7
221
34
31 /NA5.7
321
44
41 SPARE
421

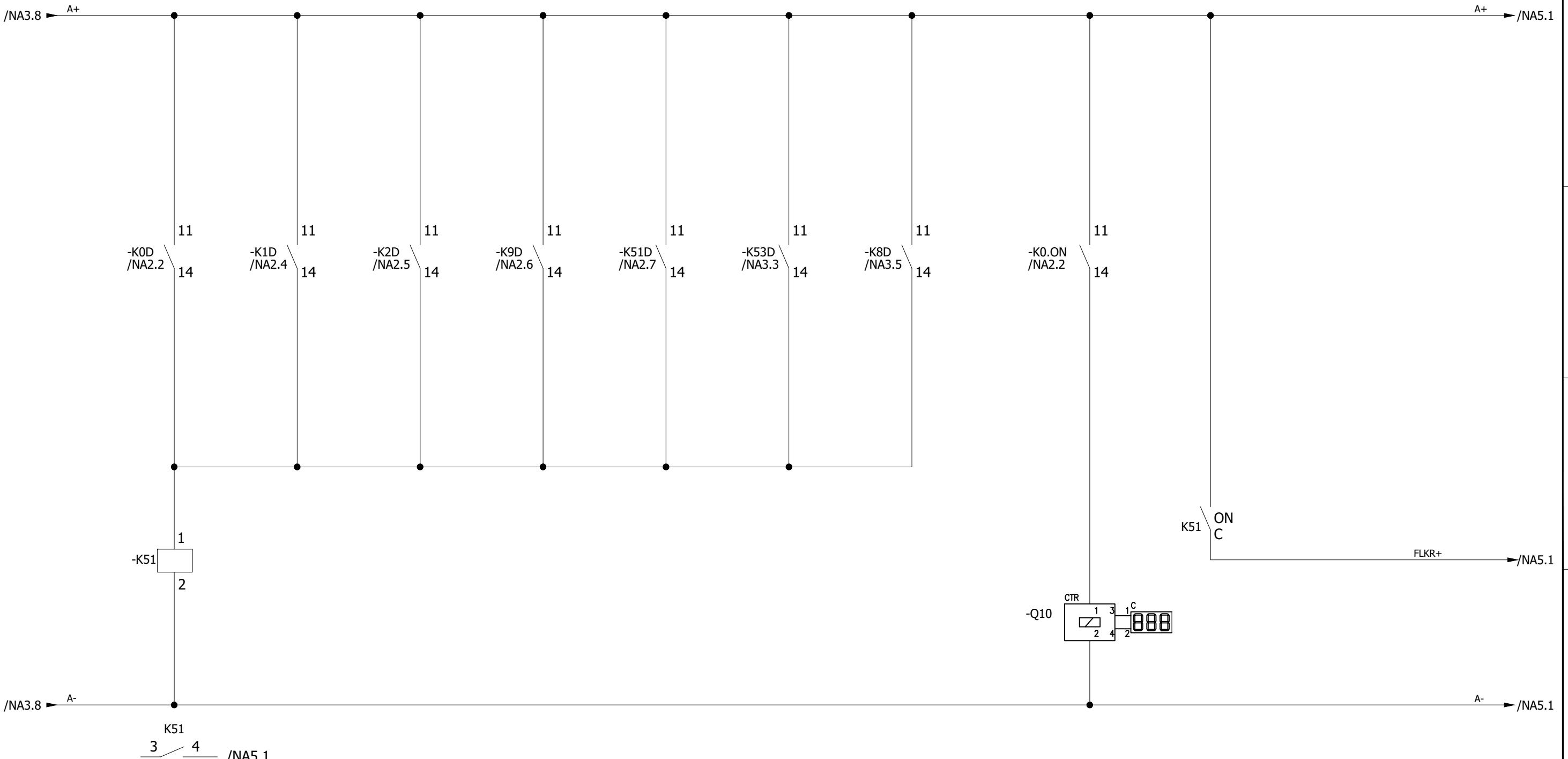
/NA2.8 A-

A- /NA4.1

0	AS BUILT	19-10-2018	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 132KV LINE CONTROL PANEL (=E01+CP31) DISCREPANCY INITIATION	Drawing no. P60194-E-ELC-SC-002
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type NA3
									Sheet no. 19

1 2 3 4 5 6 7 8

OFF/ON OFF/ON OFF/ON OFF/ON OFF/ON OFF/ON OFF/ON CIRCUIT BREAKER
 (=E01+Q0) (=E01+Q1) (=E01+Q2) (=E01+Q9) (=E01+Q51) (=E01+Q53) (=E01+Q8) OPERATION COUNTER
 (-Q10)



0	AS BUILT	19-10-2018	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 132kV LINE CONTROL PANEL (=E01+CP31) DISCREPANCY INITIATION	Drawing no. P60194-E-ELC-SC-002
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type NA4
									Sheet no. 20

1 2 3 4 5 6 7 8

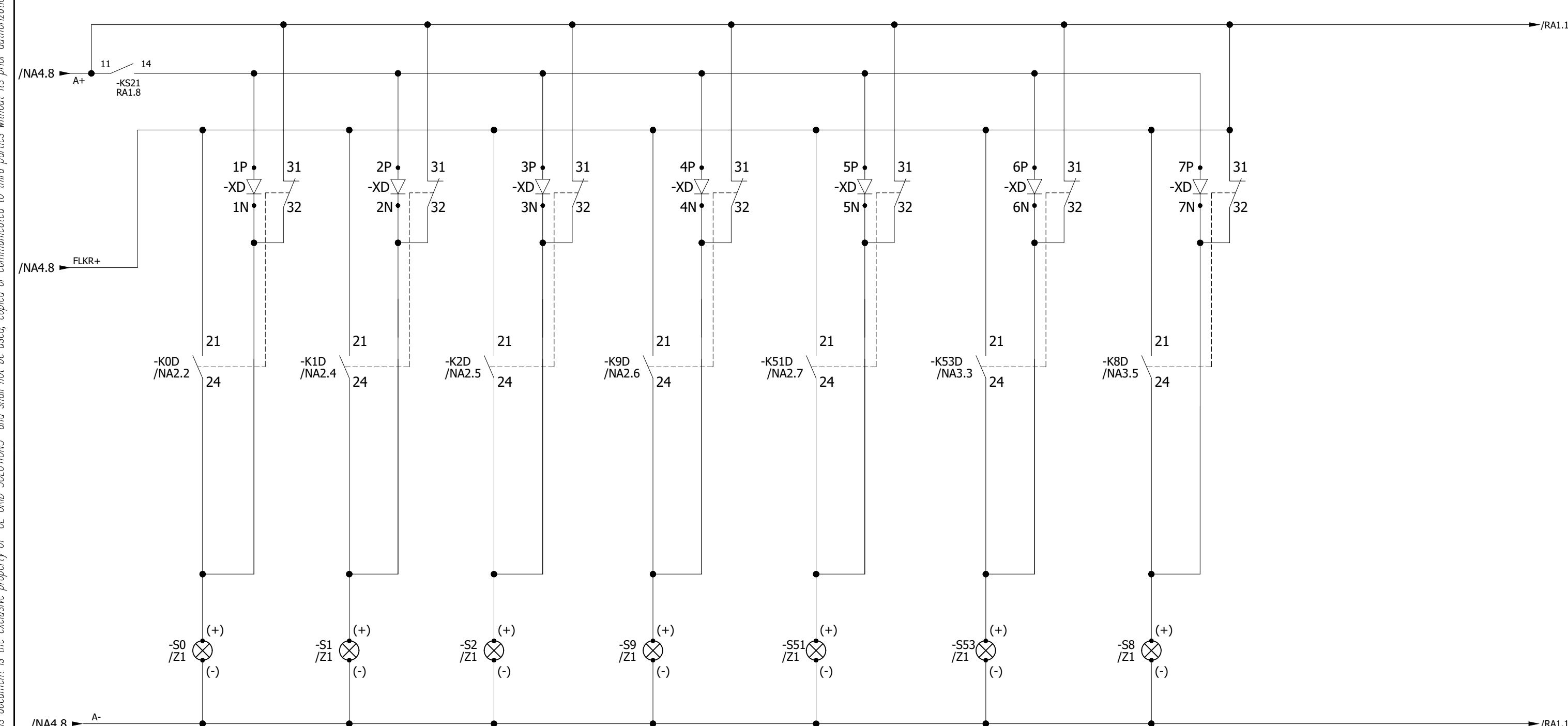
1 2 3 4 5 6 7 8

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(=E01+Q0) (=E01+Q1) (=E01+Q2) (=E01+Q9) (=E01+Q51) (=E01+Q53) (=E01+Q8)

A

A



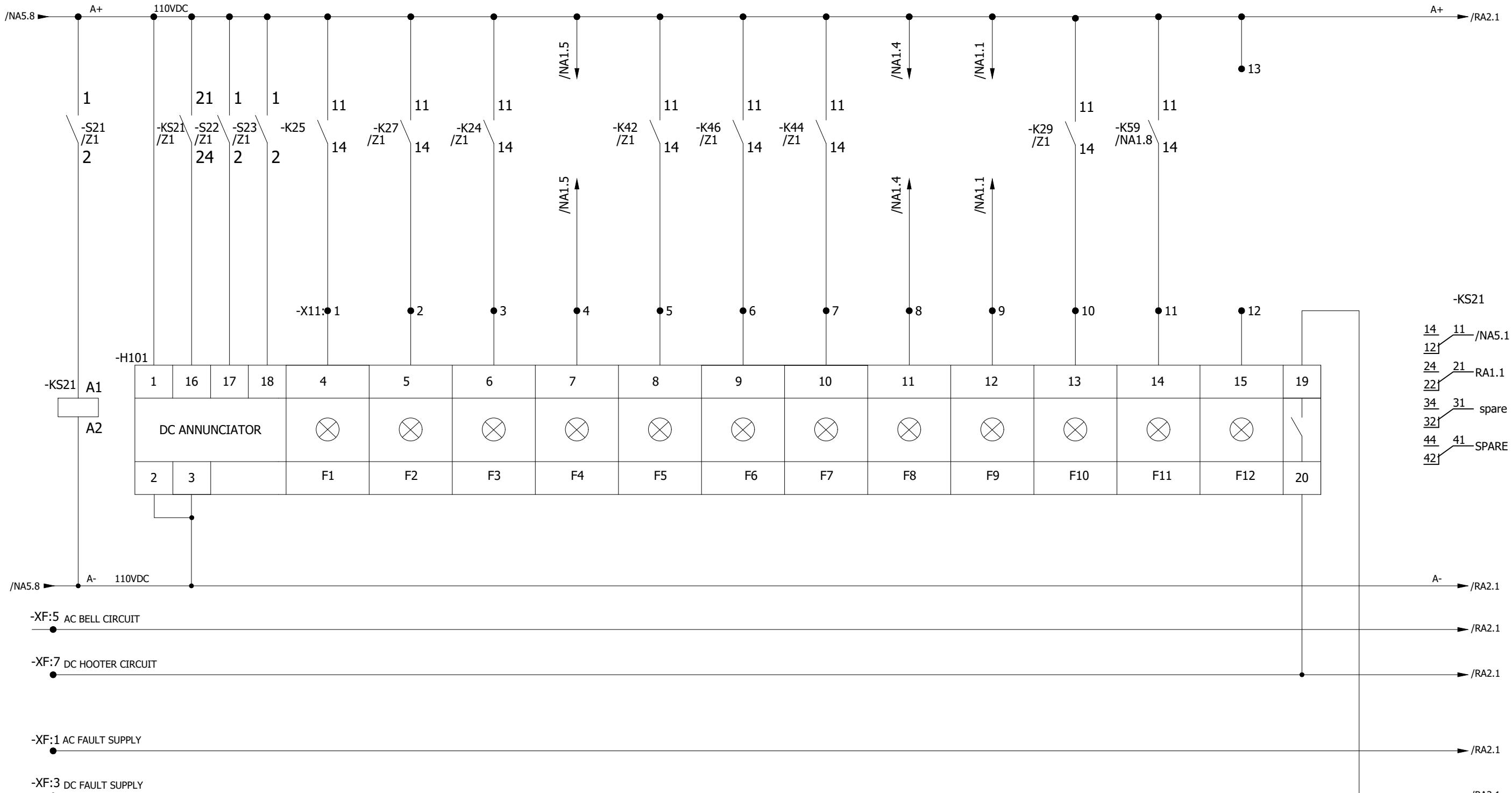
0	AS BUILT	19-10-2018	ASJ	Manufacturer E P E S O L 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor Grid Solutions A GE and Alstom joint venture	Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E01+CP31) DISCREPANCY INDICATIONS	Drawing no. P60194-E-ELC-SC-002
									Project no. P-60194
REV.	DESCRIPTION	DATE	DRAWER						Sheet type NA5

1 2 3 4 5 6 7 8

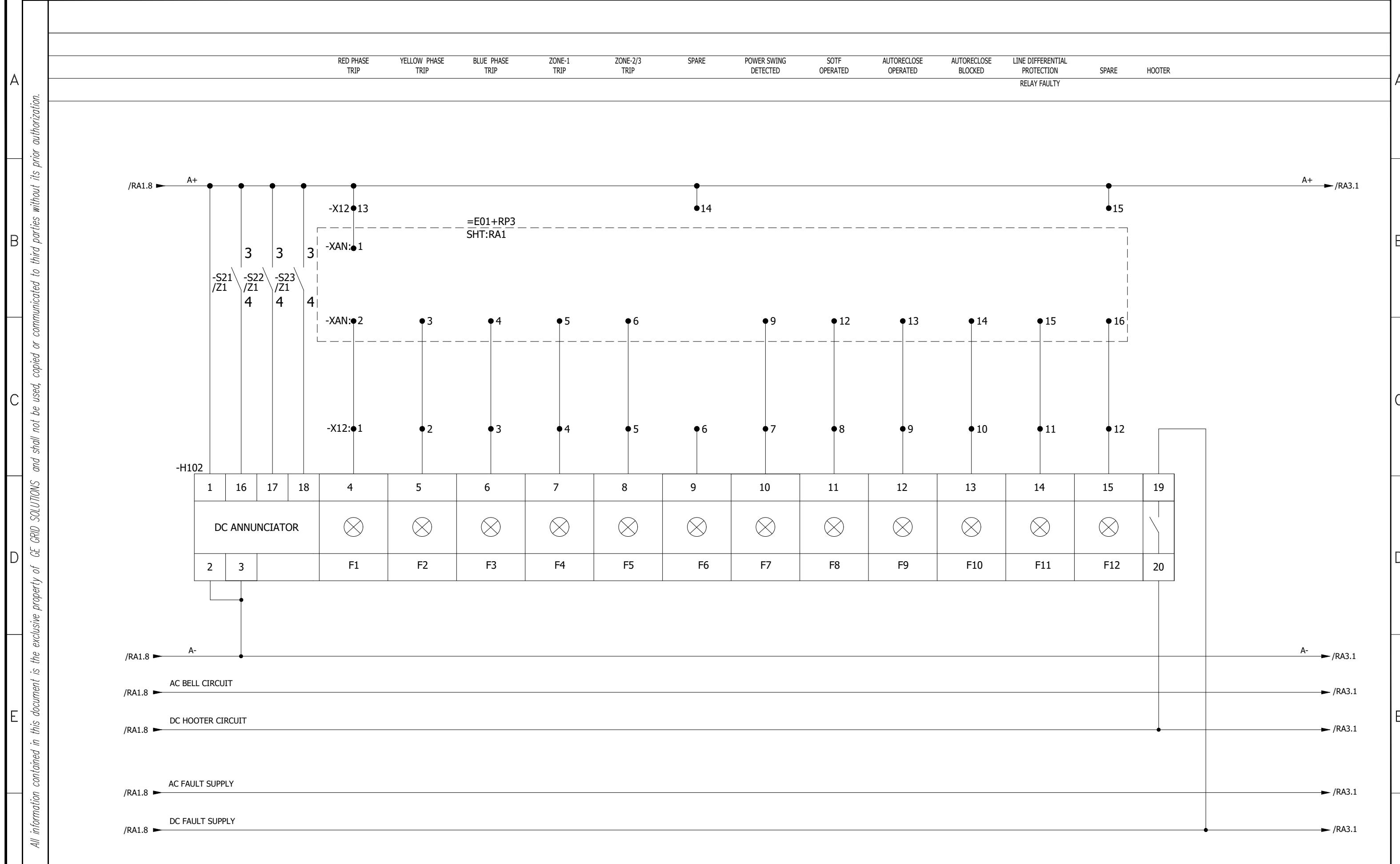
LCC

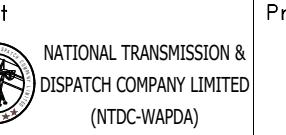
SPRING DISCHARGED DS/ES/HES OPERATION LONG SPRING CHARGING TIME GAS COMPARTMENT ALARM LEVEL-1 GAS COMPARTMENT ALARM LEVEL-2 LCC BYPASS MODE LCC LOCAL MODE DC SUPPLY DISTURBED AC SUPPLY DISTURBED GO LOCK CONTROL PANEL AC SUPPLY FAILURE SPARE HOOTER

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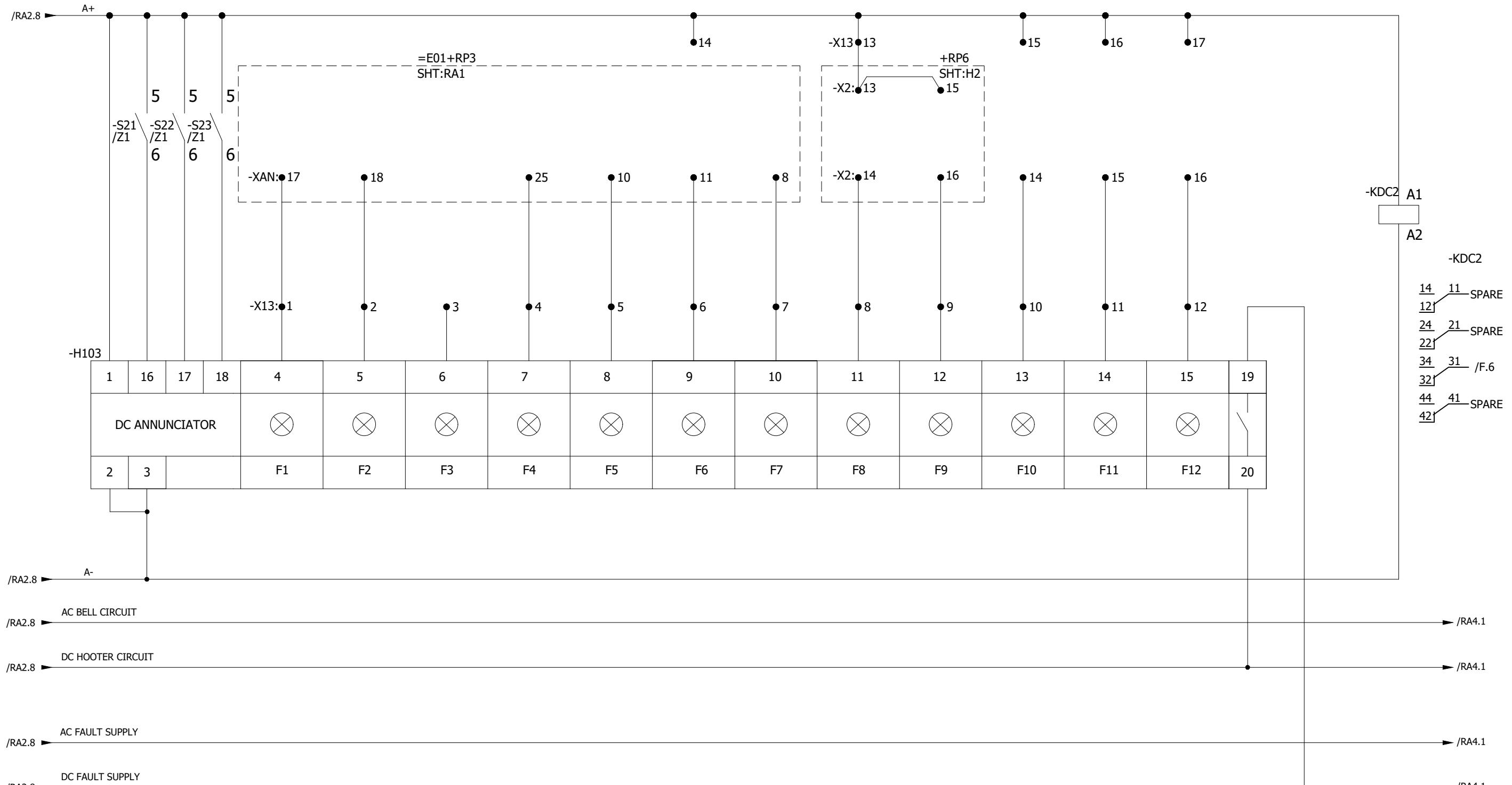


0	AS BUILT	19-10-2018	ASJ	Manufacturer EPE SOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor Grid Solutions A GE and Alstom joint venture	Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E01+CP31) ANNUNCIATOR-1 CIRCUIT	Drawing no. P60194-E-ELC-SC-002
									Project no. P-60194
REV.	DESCRIPTION	DATE	DRAWER						Sheet type RA1



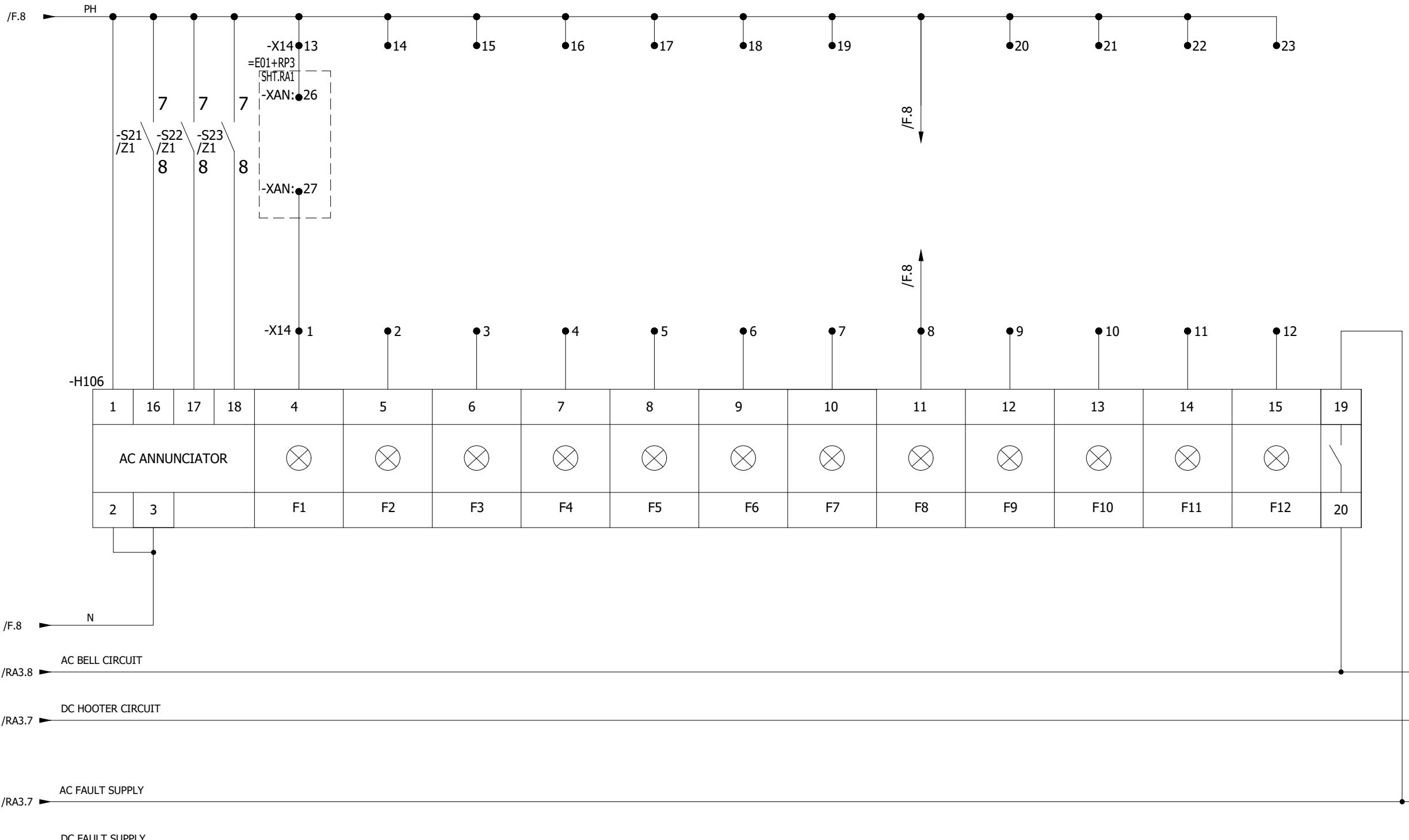
0	AS BUILT	19-10-2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E01+CP31) ANNUNCIATOR-2 CIRCUIT	Drawing no. P60194-E-ELC-SC-002
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type RA2
									Sheet no. 23

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LINE RELAY PANEL
110VDC
CIRCUIT/SUPPLY FAULTY SPARE SPARE SPARE SPARE SPARE SPARE CONTROL PANEL
DC FAIL SPARE SPARE SPARE SPARE AC BELL

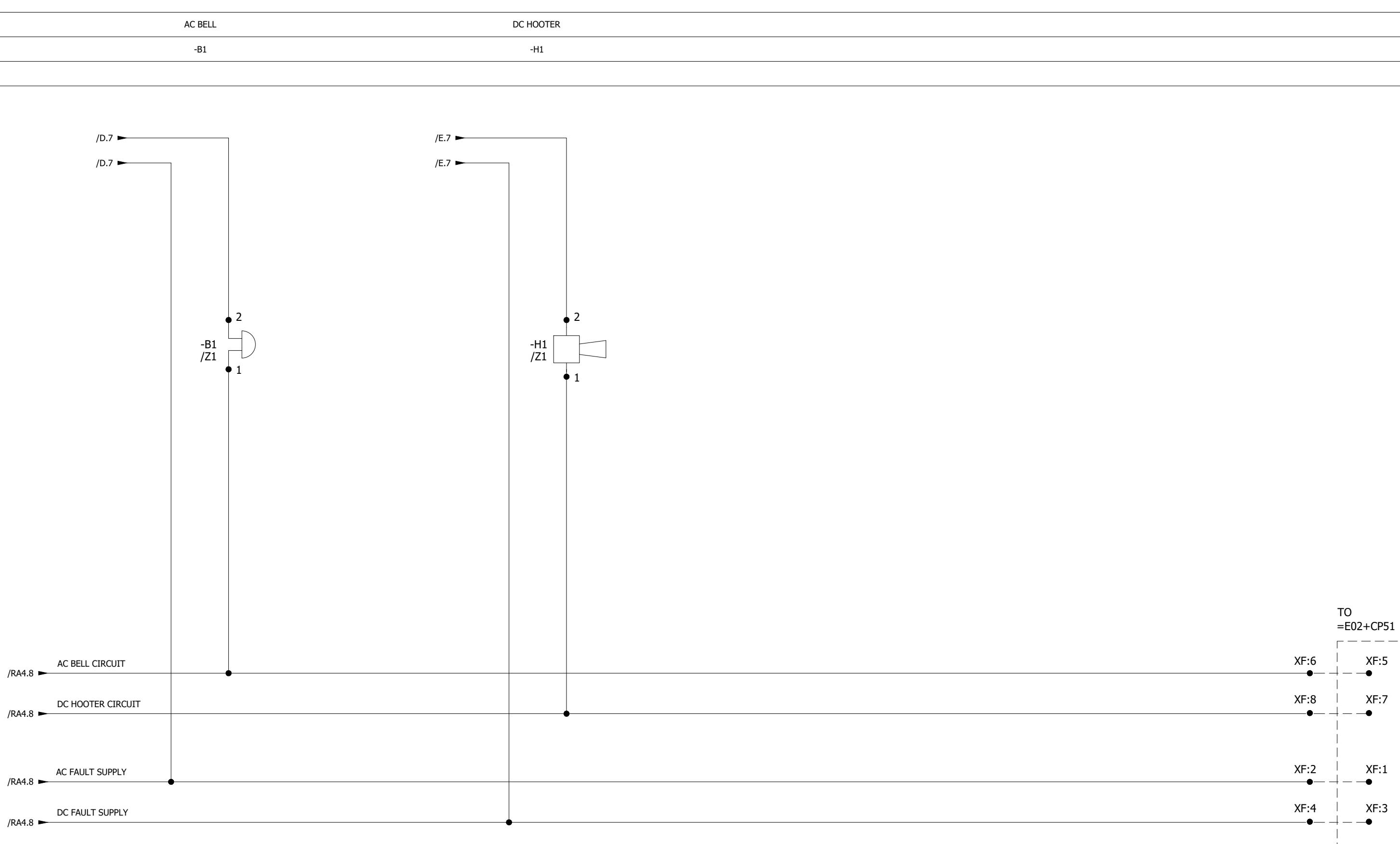
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0	AS BUILT		19-10-2018	ASJ	Manufacturer  EPE SOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132KV LINE CONTROL PANEL (=E01+CP31) ANNUNCIATOR-4 CIRCUIT	Drawing no. P60194-E-ELC-SC-002		
REV.	DESCRIPTION		DATE	DRAWER						Project no. P-60194	Sheet type RA4	Sheet no. 25
1	2	3	4	5	6	7	8	9	10	11	12	13

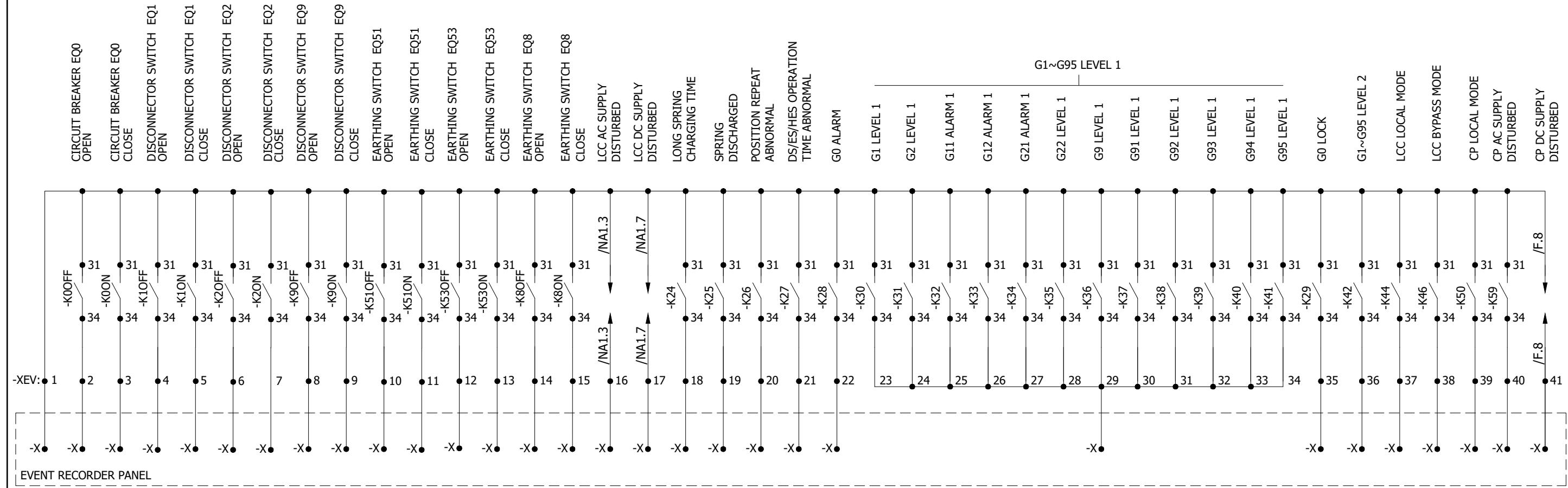
1 2 3 4 5 6 7 8

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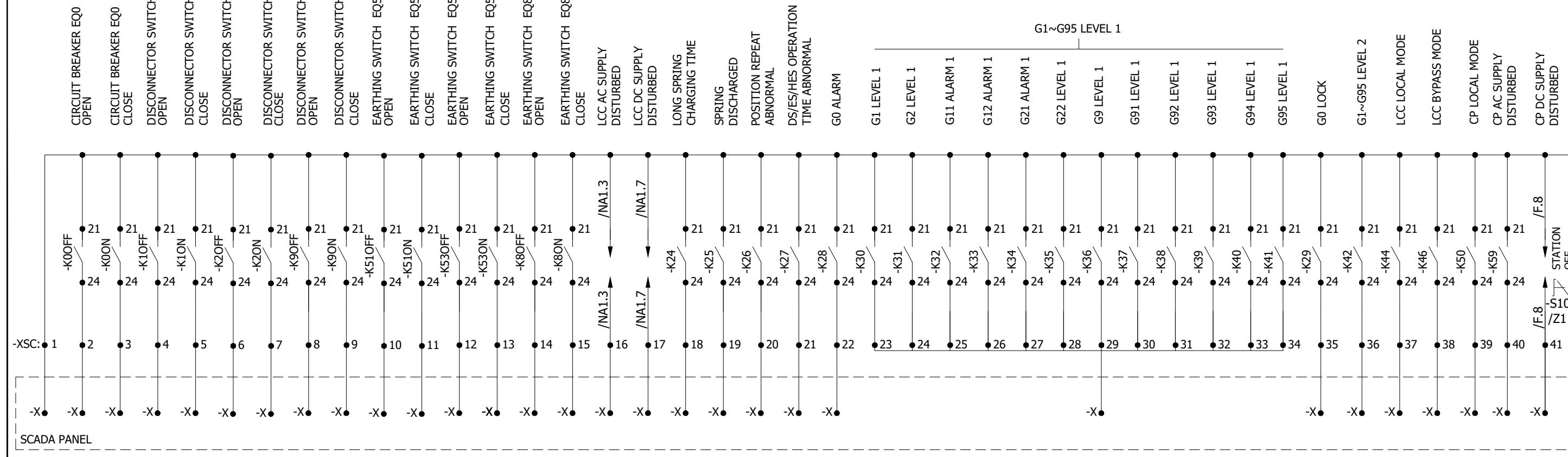


0	AS BUILT	19.10.2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E01+CP31) AC BELL & DC Hooter CIRCUIT	Drawing no.		
								P60194-E-ELC-SC-001			
								Project no. P-60194			
REV.	DESCRIPTION	DATE	DRAWER					Sheet type RA4-1			
								Sheet no. 26			

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EVENT RECORDER PANEL



SCADA PANEL

0	AS BUILT		19.10.2018	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 132kV LINE CONTROL PANEL (=E01+CP31) SCADA & ER SIGNALS	Drawing no. P60194-E-ELC-SC-001		
REV.	DESCRIPTION		DATE	DRAWER						Project no. P-60194	Sheet type RA5	Sheet no. 27
1	CIRCUIT BREAKER EQ0 OPEN		CIRCUIT BREAKER EQ0 CLOSE		DISCONNECTOR SWITCH EQ1 OPEN		DISCONNECTOR SWITCH EQ1 CLOSE		DISCONNECTOR SWITCH EQ2 OPEN		DISCONNECTOR SWITCH EQ2 CLOSE	
2	DISCONNECTOR SWITCH EQ9 OPEN		DISCONNECTOR SWITCH EQ9 CLOSE		DISCONNECTOR SWITCH EQ9 OPEN		DISCONNECTOR SWITCH EQ9 CLOSE		EARTHING SWITCH EQ51 OPEN		EARTHING SWITCH EQ51 CLOSE	
3	EARTHING SWITCH EQ53 OPEN		EARTHING SWITCH EQ53 CLOSE		EARTHING SWITCH EQ8 OPEN		EARTHING SWITCH EQ8 CLOSE		LCC AC SUPPLY DISTURBED		LCC DC SUPPLY DISTURBED	
4	LONG SPRING CHARGING TIME		SPRING DISCHARGED		POSITION REPEAT ABNORMAL		DS/ES/HES OPERATION TIME ABNORMAL		GO ALARM		G1 LEVEL 1	
5	G1~G95 LEVEL 1		G2 LEVEL 1		G11 ALARM 1		G12 ALARM 1		G21 LEVEL 1		G91 LEVEL 1	
6	G92 LEVEL 1		G93 LEVEL 1		G94 LEVEL 1		G95 LEVEL 1		G91 LEVEL 1		G92 LEVEL 1	
7	G93 LEVEL 1		G94 LEVEL 1		G95 LEVEL 1		G91 LEVEL 1		G92 LEVEL 1		G93 LEVEL 1	
8	G94 LEVEL 1		G95 LEVEL 1		GO LOCK		G1~G95 LEVEL 2		LCC LOCAL MODE		LCC BYPASS MODE	
	LCC LOCAL MODE		CP AC SUPPLY DISTURBED		CP DC SUPPLY DISTURBED		CP LOCAL MODE		CP AC SUPPLY DISTURBED		CP DC SUPPLY DISTURBED	

1

2

3

4

5

6

7

8

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	A1	12	14	22	24	32	34	42	44
-K11	NA1.5	NA1.3	NA1.5	NA1.6					
-K12	NA1.5	NA1.3	NA1.5	NA1.6					
-K13	NA1.5	NA1.3	NA1.5	NA1.7					
-K14	NA1.5	NA1.4	NA1.5	NA1.7					
-K15	NA1.6	NA1.4	NA1.5	NA1.7					
-K16	NA1.6	NA1.4	NA1.5	NA1.7					
-K17	NA1.6	NA1.4	NA1.5	NA1.7					
-K18	NA1.6	NA1.4	NA1.6	NA1.7					
-K19	NA1.7	NA1.1	NA1.2	NA1.3					
-K20	NA1.7	NA1.1	NA1.2	NA1.3					
-K21	NA1.7	NA1.1	NA1.2	NA1.3					
-K24	NA1.4	RA1.4	RA5.4	RA5.4					
-K25	NA1.4	RA1.3	RA5.4	RA5.4	NA1.7				
-K26	NA1.4		RA5.4	RA5.4					
-K27	NA1.3	RA1.4	RA5.5	RA5.5					
-K28	NA1.3	NA1.5	RA5.5	RA5.5					
-K29	NA1.3	RA1.7	RA5.7	RA5.7	NA1.7				
-K30	NA1.2	NA1.5	RA5.5	RA5.5					
-K31	NA1.2	NA1.5	RA5.5	RA5.5					
-K32	NA1.2	NA1.5	RA5.5	RA5.5					
-K33	NA1.1	NA1.5	RA5.6	RA5.5					
-K35	NA1.1	NA1.6	RA5.6	RA5.6					
-K36	NA1.4	NA1.6	RA5.6	RA5.6					
-K37	NA1.4	NA1.6	RA5.6	RA5.6					
-K42	NA1.3	RA1.5	RA5.7	RA5.7					
-K43	NA1.3	RA5.8							
-K44	NA1.2	RA1.6	RA5.7	RA5.7					
-K45	NA1.2								
-K46	NA1.2	RA1.5	RA5.8	RA5.7					
-K50	H1.2		RA5.8	RA5.8					
-K0OFF	NA2.2		RA5.1	RA5.1					
-K0ON	NA2.3	NA4.6	RA5.1	RA5.1					
-K1OFF	NA2.3		RA5.2	RA5.2					
-K1ON	NA2.4		RA5.2	RA5.2					
-K2OFF	NA2.5		RA5.2	RA5.2					
-K2ON	NA2.6		RA5.2	RA5.2					
-K9OFF	NA2.6		RA5.3	RA5.2					
-K9ON	NA2.7		RA5.3	RA5.3					
-K51OFF	NA2.7		RA5.3	RA5.3					
-K51ON	NA2.8		RA5.3	RA5.3					
-K53OFF	NA3.3		RA5.3	RA5.3					
-K53ON	NA3.4		RA5.4	RA5.3					
-K8OFF	NA3.4		RA5.4	RA5.3					
-K8ON	NA3.5		RA5.4	RA5.4					
-K38	NA3.4	NA1.6	RA5.7	RA5.6					
-K39	NA3.4	NA1.6	RA5.7	RA5.7					
-K40	NA3.4	NA1.6	RA5.7	RA5.7					
-K41	NA3.5	NA1.6	RA5.7	RA5.7					

3

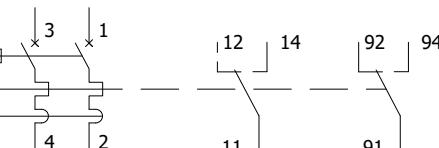
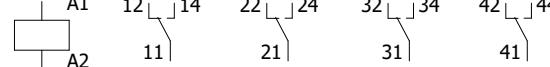
4

5

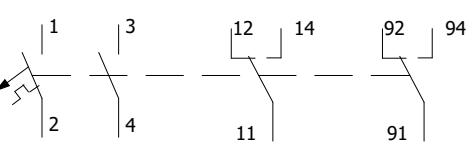
6

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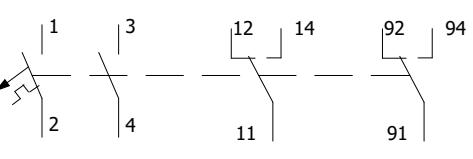
8



-F101	D.2	NA1.8	
-F102	D.4	NA1.8	
-F103	D.6	NA1.8	



-F201	E.5	F.3	
-F202	E.6	F.5	



-B100	D.4	
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-S100	D.3	
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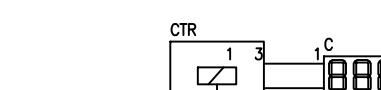
-X100	D.7	
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L
N

-R100	D.5	
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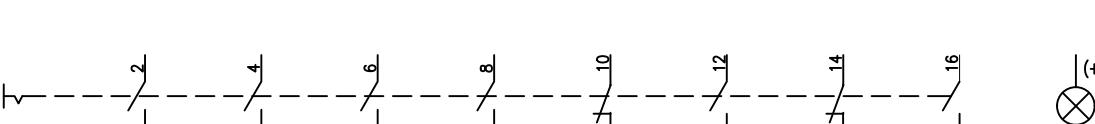
+ 1
3
- 2
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-K51	NA4.2	
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-Q10	NA4.6	
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-S0	H1.7	H1.4		NA2.2	NA5.1			NA5.2
-S1	I1.2	I1.3		NA2.4	NA5.2			NA5.2
-S2	I1.4	I1.5		NA2.5	NA5.3			NA5.3
-S9	I1.7	I1.7		NA2.6	NA5.3			NA5.3
-S51	I2.2	I2.3		NA3.1	NA5.5			NA5.5
-S53	I2.4	I2.5		NA3.3	NA5.5			NA5.5
-S8	I2.6	I1.7		NA3.4	NA5.6			NA5.6

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