



# Grid Solutions

A GE and Alstom joint venture

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

# 132kV LINE CONTROL PANEL SCHEMATIC DRAWINGS

REFERENCE DRAWINGS

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

REVISION HISTORY					
REV	DATE	DRW. BY	CHK. BY	APR. BY	REVISION DESCRIPTION
0	19-10-2018	ASJ	MFT	NAH	AS BUILT

Scale	NOT-TO-SCALE	Sheet size	A3
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Client	 NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)
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Contractor	Grid Solutions A GE and Alstom joint venture	Manufacturer
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Project	220kV / 132kV GIS SUBSTATION GHAZI ROAD , LAHORE
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Title	132kV LINE CONTROL PANEL (=E07+CP31) SCHEMATIC DRAWINGS
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Order no	Document no
P-60194	P60194-E-ELC-SC-005

Sheet type	Total sheets	Sheet no
A	27	1

	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												A
	02	AA	LIST OF CONTENTS													
	03	AB	SYMBOL AND LEGENDS													
	04	AC1	COMPONENT LIST													
	05	AC2	COMPONENT LIST													
B	06	AD	PANEL VIEW	X												B
	07	AE	SINGLE LINE DIAGRAM	X												
	08	D	AC SUPPLY DISTRIBUTION CIRCUIT	X												
	09	E	DC SUPPLY DISTRIBUTION CIRCUIT	X												
	10	F	DC SUPPLY FAILURE ALARM CIRCUIT	X												
C	11	G	METERING	X												C
	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												
D	17	NA1	ALARM MULTIPLICATION	X												D
	18	NA2	DISCREPANCY INITIATION	X												
	19	NA3	DISCREPANCY INITIATION	X												
	20	NA4	DISCREPANCY INITIATION	X												
	21	NA5	DISCREPANCY INDICATIONS	X												
E	22	RA1	ANNUNCIATOR-1 CIRCUIT	X												E
	23	RA2	ANNUNCIATOR-2 CIRCUIT	X												
	24	RA3	ANNUNCIATOR-3 CIRCUIT	X												
	25	RA4	ANNUNCIATOR-4 CIRCUIT	X												
	26	RA5	SCADA & ER SIGNALS	X												
F	27	Z1	COMPONENT DIAGRAM	X												F

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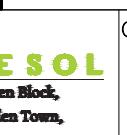
0	AS BUILT	19-10-2018	ASJ	Manufacturer  EPE SOL 71-B Garden Block, New Garden Town,	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132KV LINE CONTROL PANEL (=E07+CP31) LIST OF CONTANTS	Drawing no. P60194-E-ELC-SC-005
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	ASAJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town,	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E07+CP31) SYMBOL AND LEGENDS	Drawing no. P60194-E-ELC-SC-005
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+MVARH 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-E12-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: MCoup4			-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				
G	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,	Contractor  GE Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132KV LINE CONTROL PANEL (=E07+CP31) COMPONENT LIST	Drawing no. P60194-E-ELC-SC-005	
	REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type AC1	Sheet no. 04

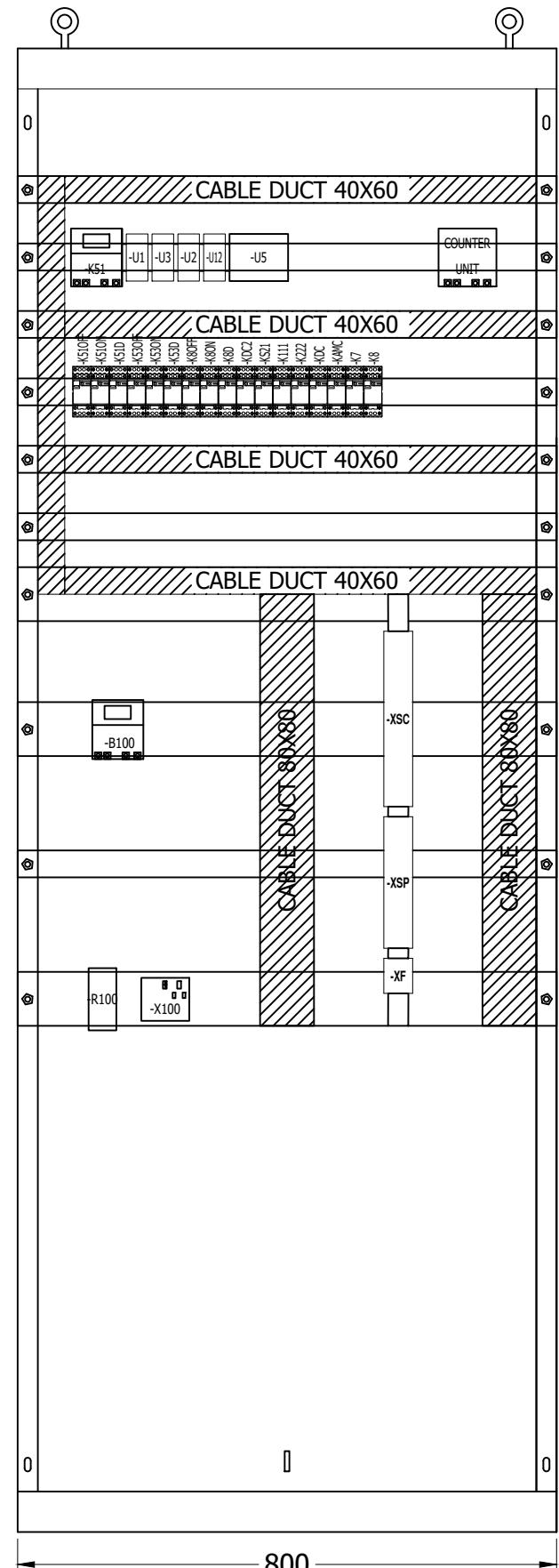
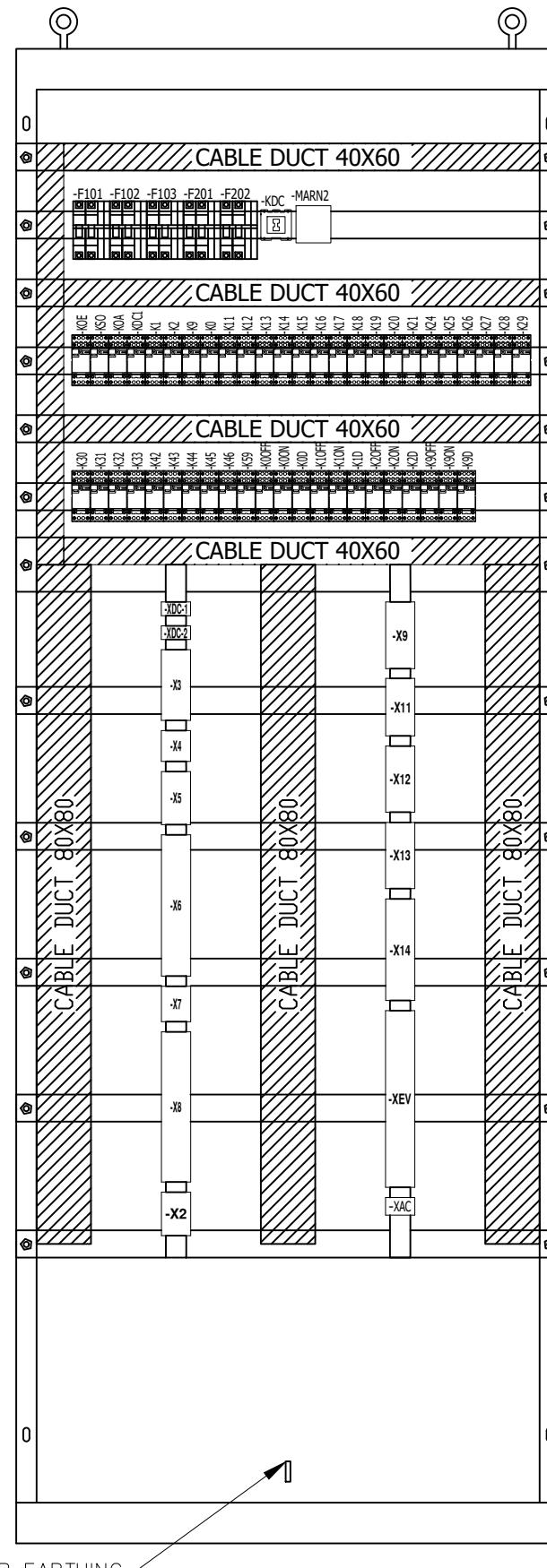
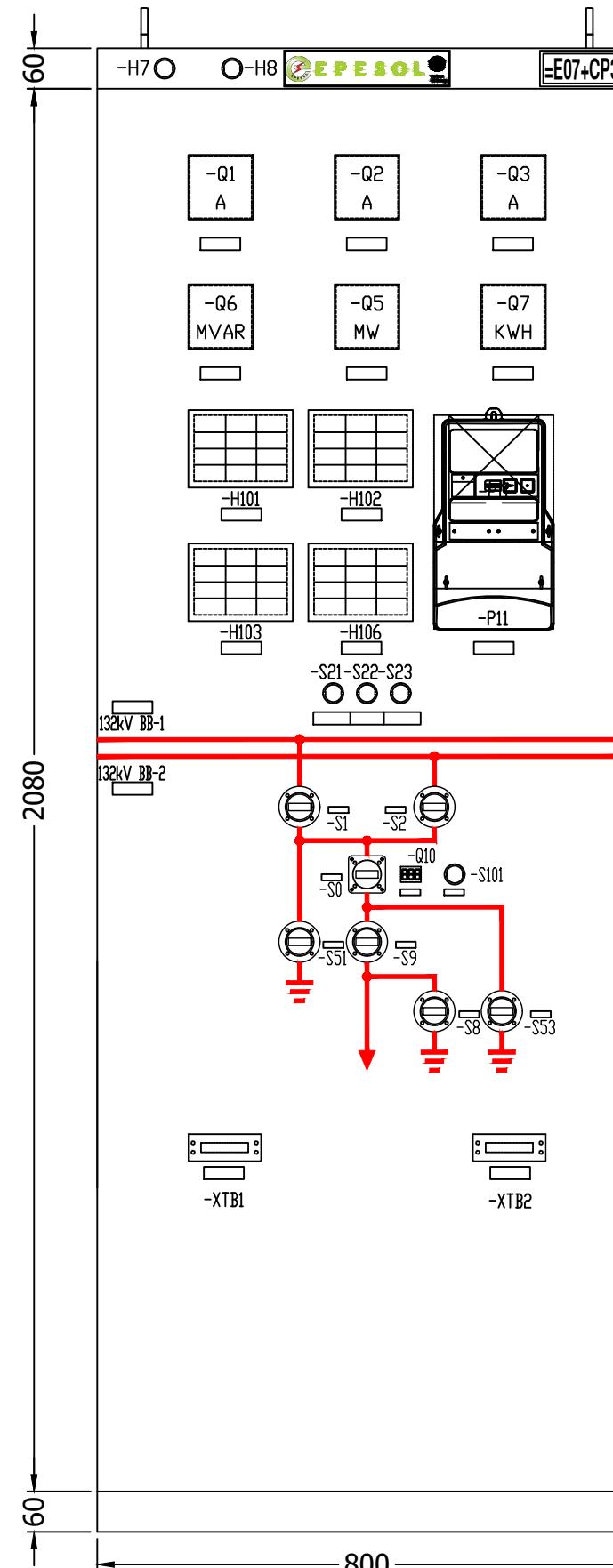
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	QTY.	DEVICE DESCRIPTION	DEVICE SPECIFICATIONS DEVICE TYPE ; TECHNICAL DATA / SPECIFICATIONS			DEVICE DESIGNITION	MANUFACTURER		
A	01	PUSH BUTTON - ALARM RESET	TYPE: SWITCH(A TYPE:), COLOR : GREEN , SUPPLY : 120VDC, Ord: YS-AP1-2-31-G-D-W			-S23	YONGSUNG		
	01	SELECTOR SWITCH - OPERATION (LOCAL-OFF-SCADA)	3-POSITION (STATION-OFF-SCADA), 110VDC, KEYLOCKABLE TYPE, ORD: YS-AK-2-3-44-D			-S101	YONGSUNG		
	60	AUXILIARY CONTACTOR	COIL VOLTAGE: 110VDC, 4 C/O CONTACTS, ORD: PRC4M40DCJL			-K0E, -K50, -K0A, -KDC-1, -K1, -K2, -K9, -K0, -K11 TO -K21, -K24 TO -K33, -K42 TO -K46, -K59 -K0OFF, -K0ON, -K0D, -K1OFF, -K1ON, -K1D, -K2OFF, -K2ON, -K2D, -K9OFF, -K9ON, -K9D, -K51OFF, -K51ON, -K51D, -K53OFF, -K53ON, -K53D, -K8OFF, -K8ON, -K8D, -KDC-2, -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		
	02	CONTROL MCB - PANEL LIGHT & HEATER	2-Pole, Ratings: 2A, 240VAC, 6kA @ 240VAC, 2 C/O Contacts, Ord: G62C02+CAH(2)			-F101, -F102	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		
	02	CONTROL MCB - DC DISTRIBUTION	2-Pole, Ratings: 4A, 250VDC, 10kA @ 250VDC, 2 C/O Contacts, Ord: EP102UCC04+CAH(2)			-F201,-F202	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  <b>EPESOL</b> 71-B Garden Block, New Garden Town,	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132KV LINE CONTROL PANEL (=E07+CP31) COMPONENT LIST
REV.	DESCRIPTION		DATE	DRAWER					

	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			
	04	TERMINAL BLOCKS FOR AC SUPPLY	TYPE: CBD-4			-XAC	CABUR			
B	02	TERMINAL BLOCKS FOR DC SUPPLY1	TYPE: CBD-4			-XDC-1	CABUR			
	02	TERMINAL BLOCKS FOR DC SUPPLY2	TYPE: CBD-4			-XDC-2	CABUR			
	16	TERMINAL BLOCKS FOR METERING	TYPE: CBD-4			-X3	CABUR			
C	08	TERMINAL BLOCKS FOR CB CONTROL CIRCUIT	TYPE: CBD-4			-X4	CABUR			
	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			
D	08	TERMINAL BLOCKS FOR CB/DS CONTACTOR MULTIPLICATION	TYPE: CBD-4			-X7	CABUR			
	40	TERMINAL BLOCKS FOR AUXIALARY MULTIPLICATION	TYPE: CBD-4			-X8	CABUR			
	15	TERMINAL BLOCKS FOR DISCRIPANCY INITIATION	TYPE: CBD-4			-X9				
E	13	TERMINAL BLOCKS FOR ANNUNCIATOR-1	TYPE: CBD-4			-X11	CABUR			
	16	TERMINAL BLOCKS FOR ANNUNCIATOR-2	TYPE: CBD-4			-X12	CABUR			
	18	TERMINAL BLOCKS FOR ANNUNCIATOR-3	TYPE: CBD-4			-X13	CABUR			
F	24	TERMINAL BLOCKS FOR ANNUNCIATOR-4	TYPE: CBD-4			-X14	CABUR			
	45	TERMINAL BLOCKS FOR EVENT RECORDER	TYPE: CBD-4			-XEV	CABUR			
	45	TERMINAL BLOCKS FOR SCADA	TYPE: CBD-4			-XSC	CABUR			
G	30	TERMINAL BLOCKS FOR TRANSDUCER TO SCADA	TYPE: CBD-4			-XSA	CABUR			
	30	TERMINAL BLOCKS FOR SCADA	TYPE: CBD-4			-XSP	CABUR			
	08	TERMINAL BLOCKS FOR BELL AND HOOTER	TYPE: CBD-4			-XF	CABUR			
	0	AS BUILT	19-10-2018	ASJ	Manufacturer  <b>EPESOL</b> 71-B Garden Block, New Garden Town,	Contractor  <b>Grid Solutions</b> A GE and Alstom joint venture	Client  <b>NATIONAL TRANSMISSION &amp; DISPATCH COMPANY LIMITED</b>	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E07+CP31) COMPONENT LIST	Drawing no. P60194-E-ELC-SC-005
									Project no. P-60194	
	REV.	DESCRIPTION	DATE	DRAWER					Sheet type AC2	Sheet no. 05

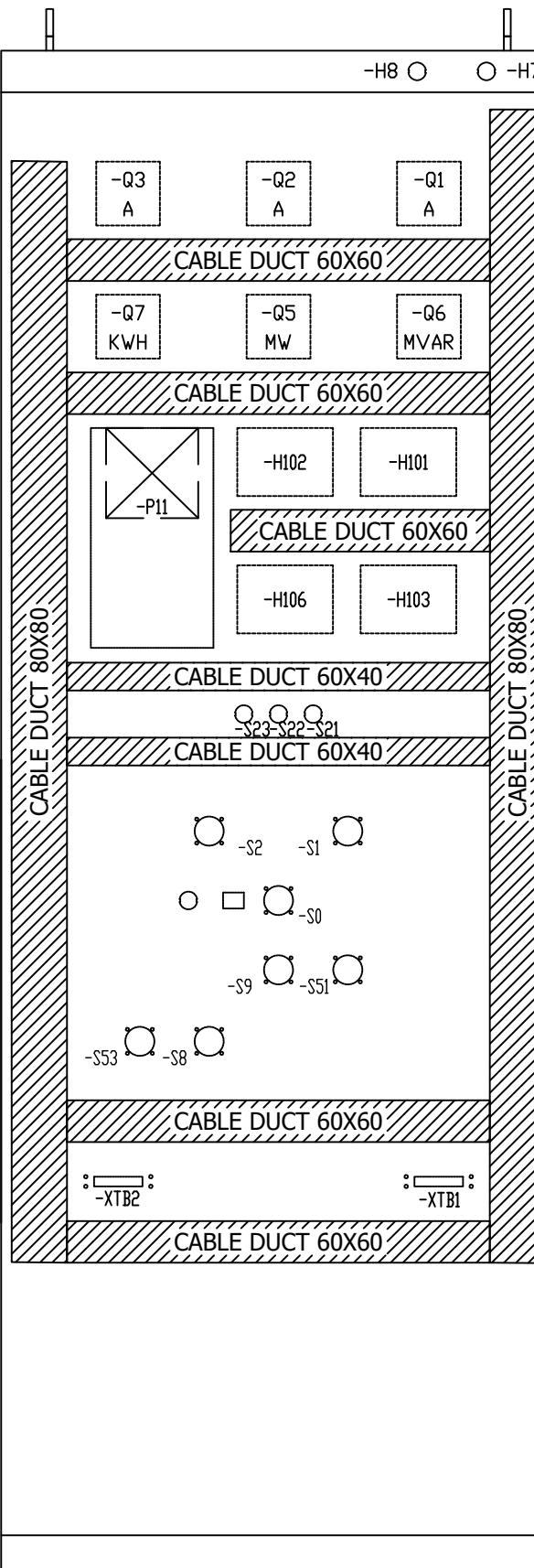
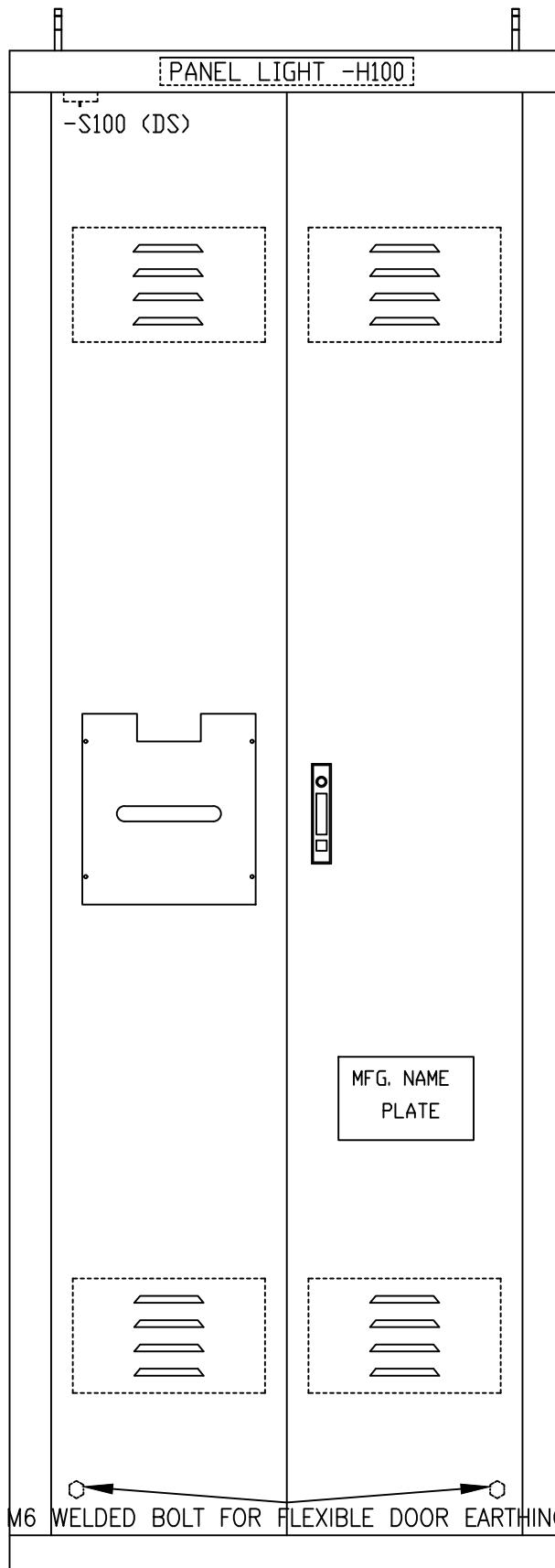
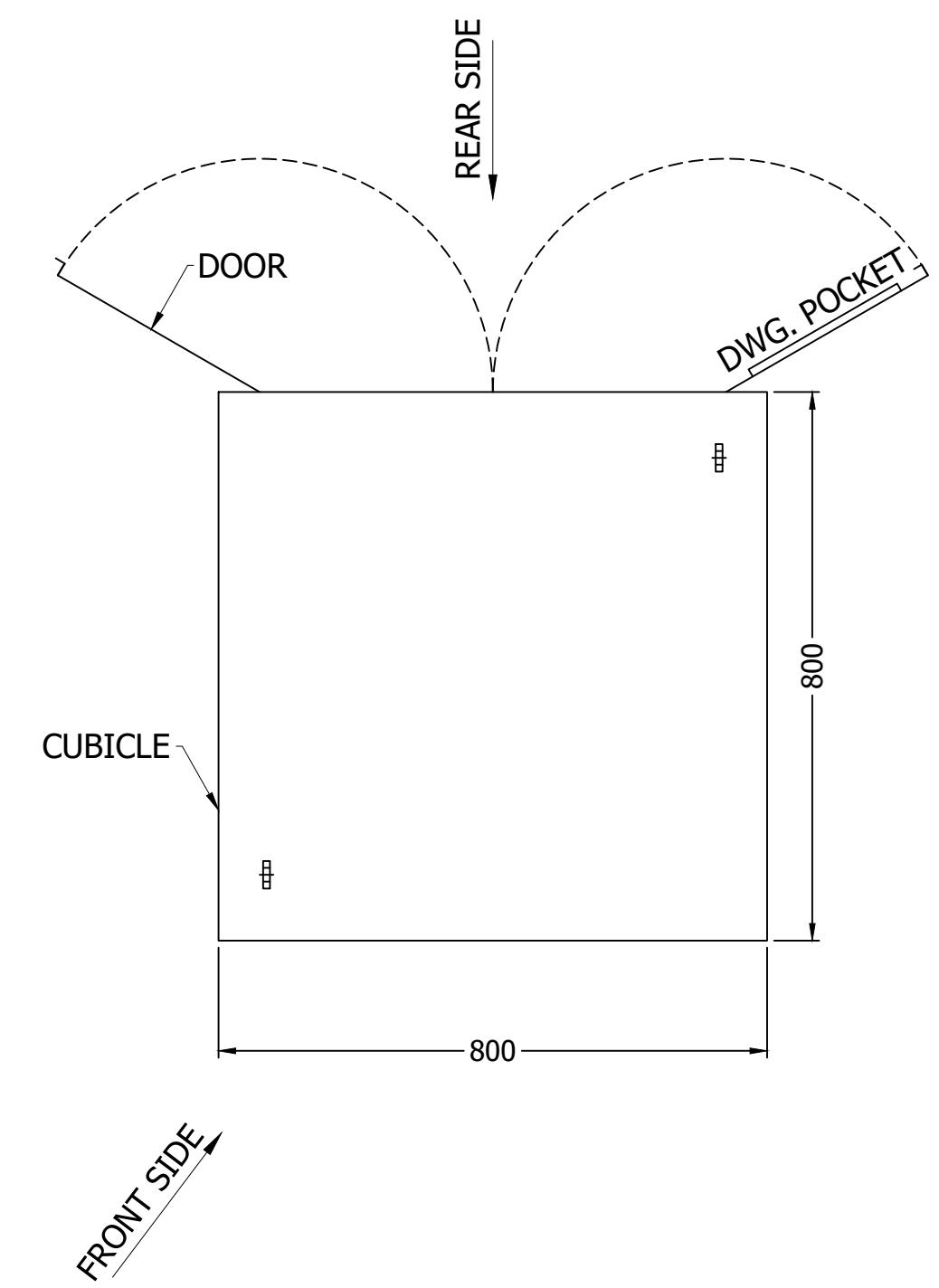
	1	2	3	4	5	6	7	8		
	QTY.	DEVICE DESCRIPTION	DEVICE SPECIFICATIONS DEVICE TYPE ; TECHNICAL DATA / SPECIFICATIONS			DEVICE DESIGNITION	MANUFACTURER			
A	08	TERMINAL BLOCKS FOR METERING CT	TYPE: SCB-6			-X2	CABUR	A		
B	07	TERMINAL BLOCKS WITH DIODE TYPE IN-D4007, RATED MAXIMUM VOLTAGE 350VDC, RATED BREAK DOWN VOLTAGE 430VDC	TYPE: DAS.4/6			-XD	CABUR	B		
C								C		
D								D		
E								E		
F								F		
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REV.	DESCRIPTION	DATE	DRAWER					Project no. P-60194	Sheet type AC2	Sheet no. 05

FRONT VIEWLEFT SIDE VIEWRIGHT SIDE VIEW

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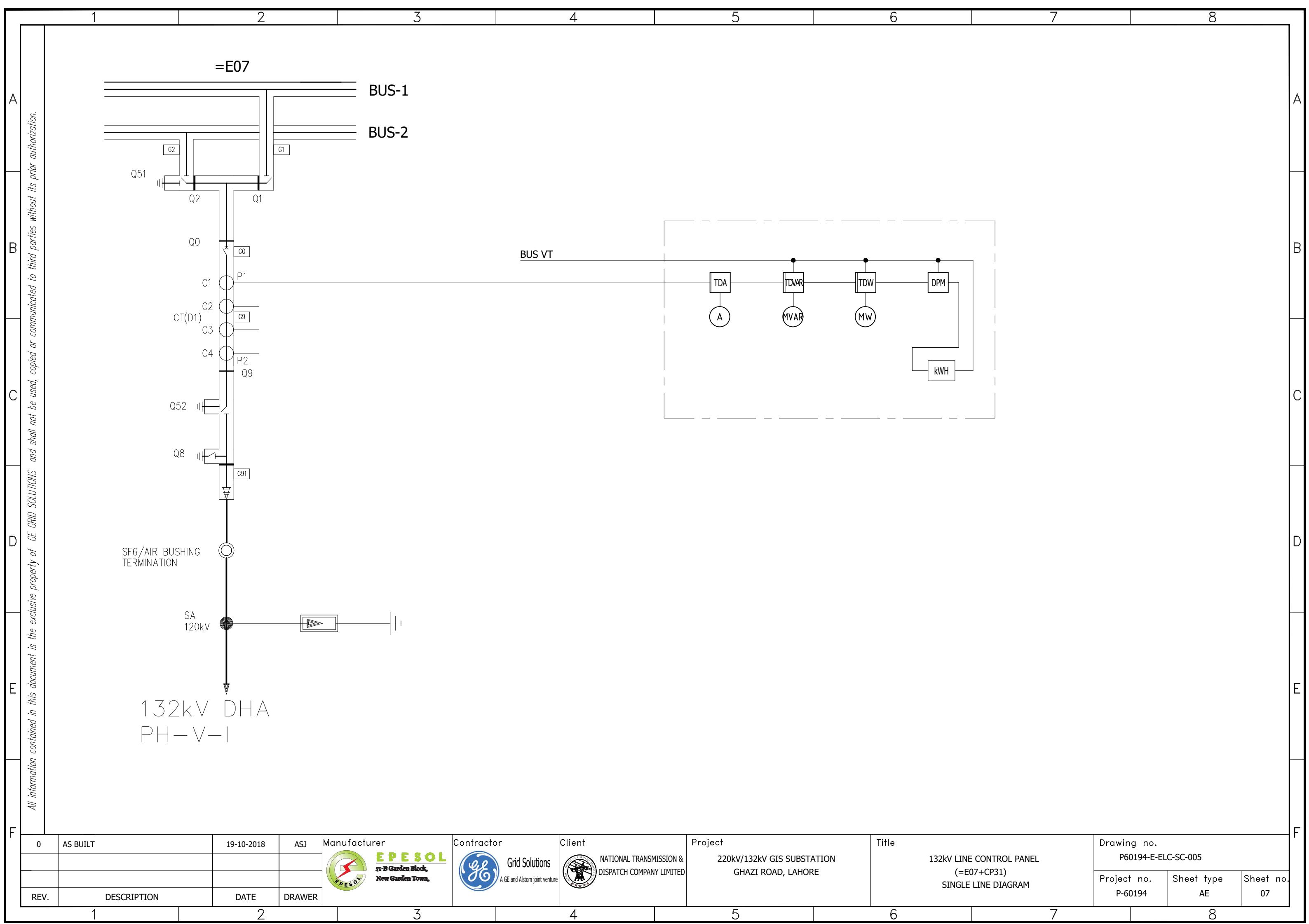
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REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type AD	Sheet no. 06
1	2	3	4	5	6	7	8				

BACK VIEW WITHOUT DOORBACK VIEW WITH DOORTOP VIEWNOTE:-

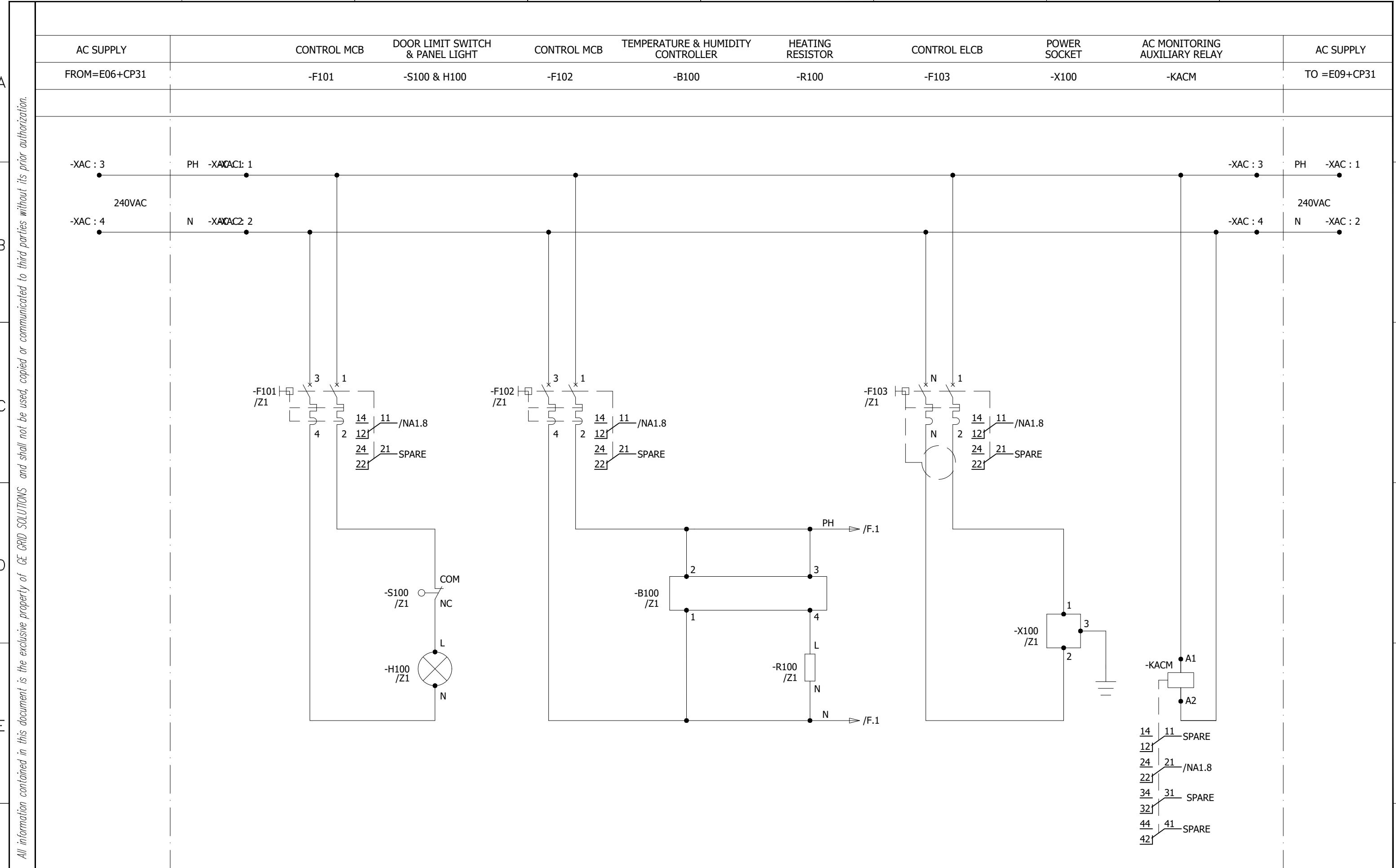
- 1 - PANEL DIMENSION: 800 x 800 x 2200mm (WxDxH)
- 2 - COLOR : RAL 7032
- 3 - SHEET THICKNESS : 2-2.5 mm
- 4- PROTECTION CLASS : IP-51 (INDOOR TYPE)
- 5 - ALL DOOR FITTED WITH 16mm EARTH STRAP & INSULATED WITH GREEN-YELLOW COLOUR.

0	AS BUILT	19-10-2018	ASJ	Manufacturer	Contractor	Client	Project	Title	Drawing no.
REV.	DESCRIPTION	DATE	DRAWER	EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan	Grid Solutions A GE and Alstom joint venture	NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	132KV LINE CONTROL PANEL (=E07+CP31) PANEL VIEWS	P60194-E-ELC-SC-005
									Project no. P-60194
									Sheet type AD
									Sheet no. 06

1 2 3 4 5 6 7 8



1 2 3 4 5 6 7 8



0	AS BUILT	19-10-2018	ASJ	Manufacturer <b>EPE SOL</b> 72-B Garden Block, New Garden Town,	Contractor <b>Grid Solutions</b> A GE and Alstom joint venture	Client <b>NATIONAL TRANSMISSION &amp; DISPATCH COMPANY LIMITED</b>	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E07+CP31) AC SUPPLY DISTRIBUTION CIRCUIT	Drawing no. P60194-E-ELC-SC-005
									Project no. P-60194
									Sheet type D
REV.	DESCRIPTION	DATE	DRAWER						Sheet no. 08

1 2 3 4 5 6 7 8

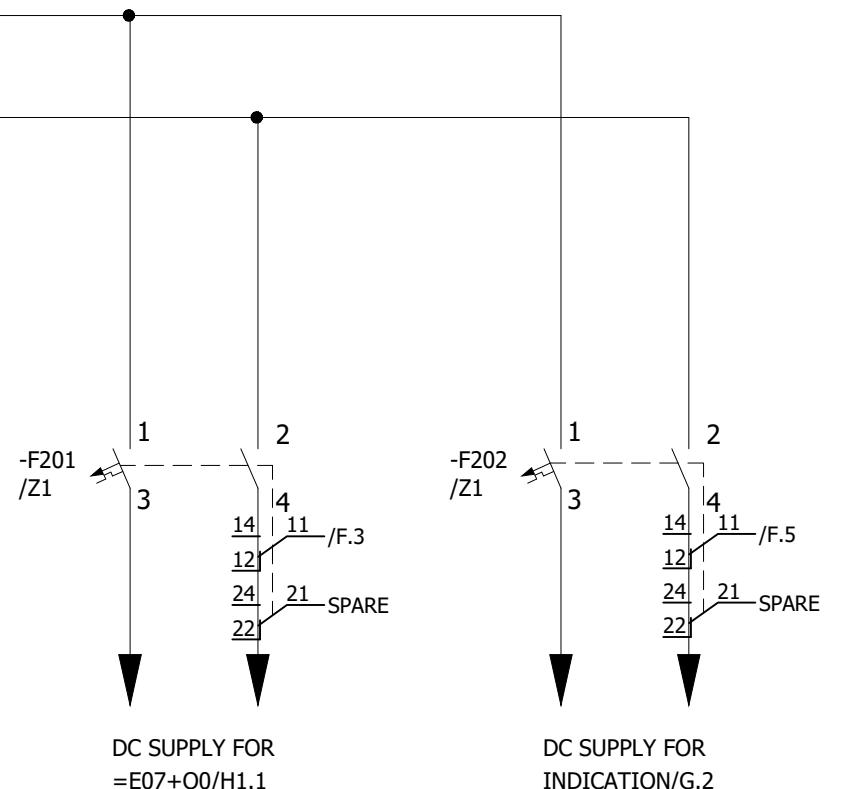
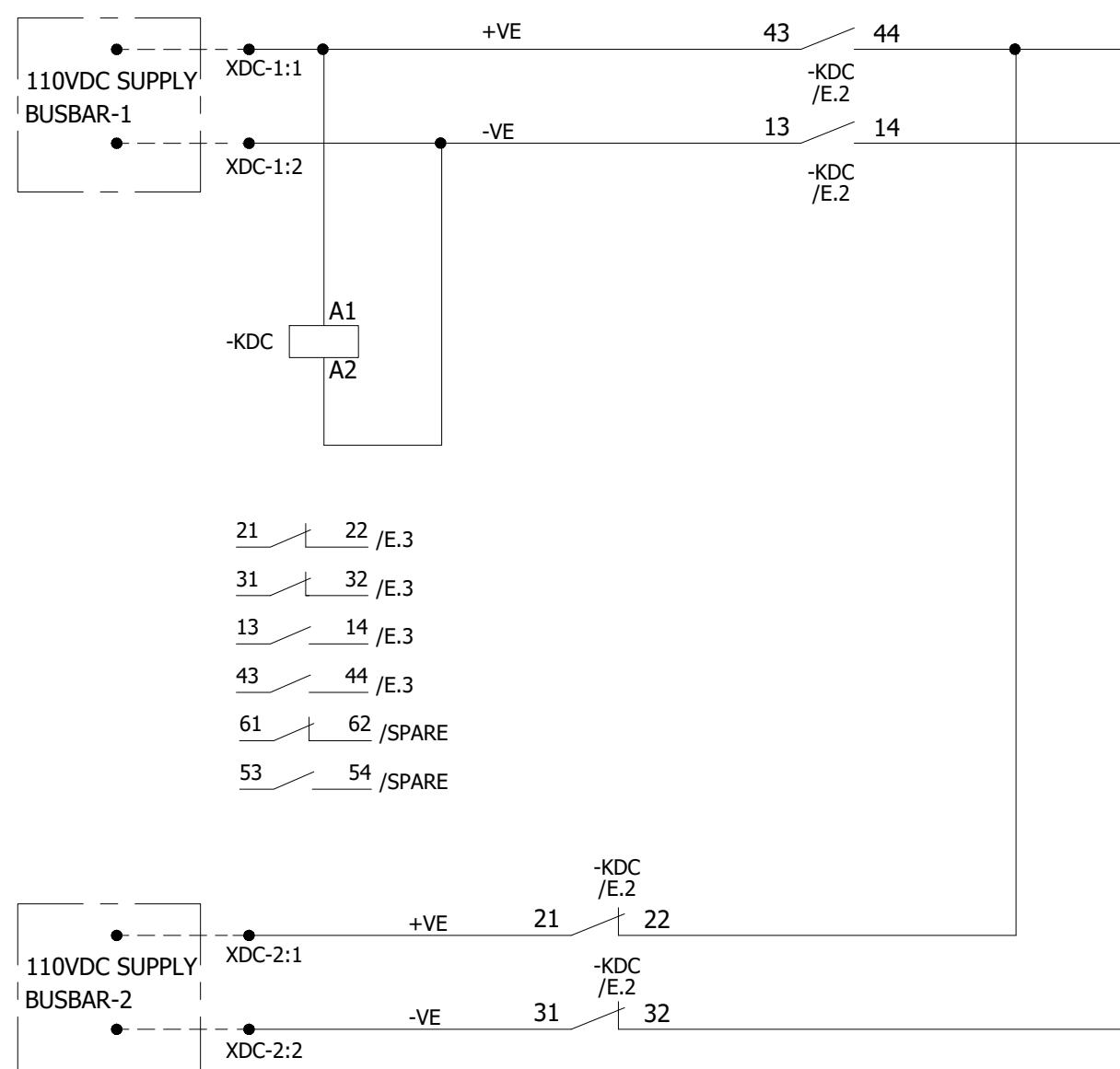
1 2 3 4 5 6 7 8

DC MCB FOR 132KV CB  
CONTROLDC MCB FOR  
INDICATION

-F201

-F202

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0	AS BUILT	19-10-2018	ASJ	Manufacturer  <b>EPESOL</b> 72-B Garden Block, New Garden Town,	Contractor  <b>Grid Solutions</b> A GE and Alstom joint venture	Client  <b>NATIONAL TRANSMISSION &amp; DISPATCH COMPANY LIMITED</b>	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132KV LINE CONTROL PANEL (=E07+CP31) DC SUPPLY DISTRIBUTION CIRCUIT	Drawing no. P60194-E-ELC-SC-005
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194 Sheet type E Sheet no. 09
1	2	3	4	5	6	7	8		

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## CONTROL SUPPLY

## INDICATION SUPPLY

CONTROL SUPPLY CONTROL SUPPLY MCB

DC SUPERVISION RELAY TRIPPED

DC HEALTHY

IND. LAMP

INDICATION SUPPLY MCB

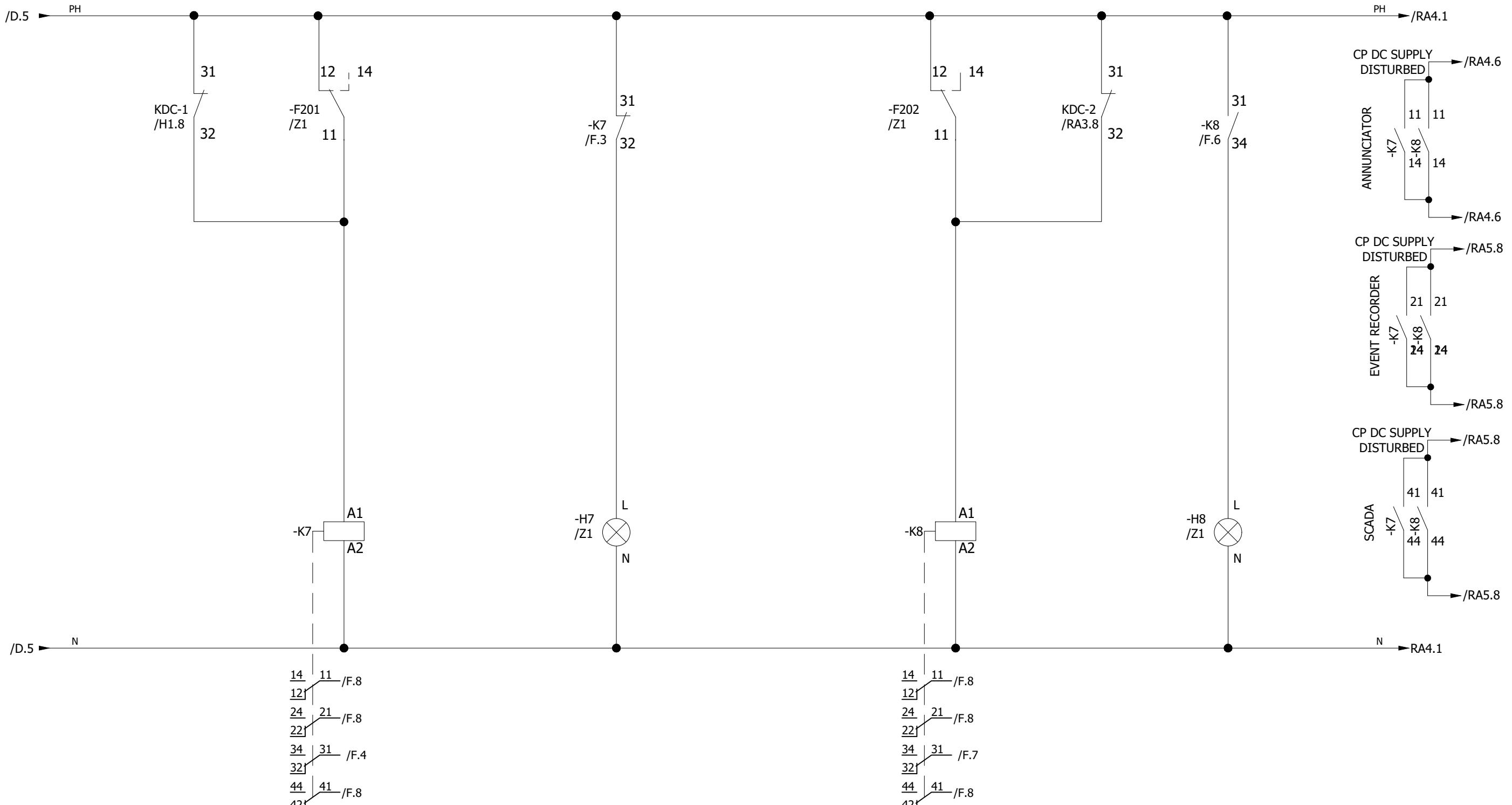
TRIPPED

INDICATION SUPPLY

DC SUPERVISION RELAY

DC UNHEALTHY

IND. LAMP



0	AS BUILT	19-10-2018	ASJ	Manufacturer <b>EPE SOL</b> 71-B Garden Block, New Garden Town,	Contractor <b>Grid Solutions</b> A GE and Alstom joint venture	Client <b>NATIONAL TRANSMISSION &amp; DISPATCH COMPANY LIMITED</b>	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E07+CP31) DC SUPPLY FAILURE ALARM CIRCUIT	Drawing no. P60194-E-ELC-SC-005
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

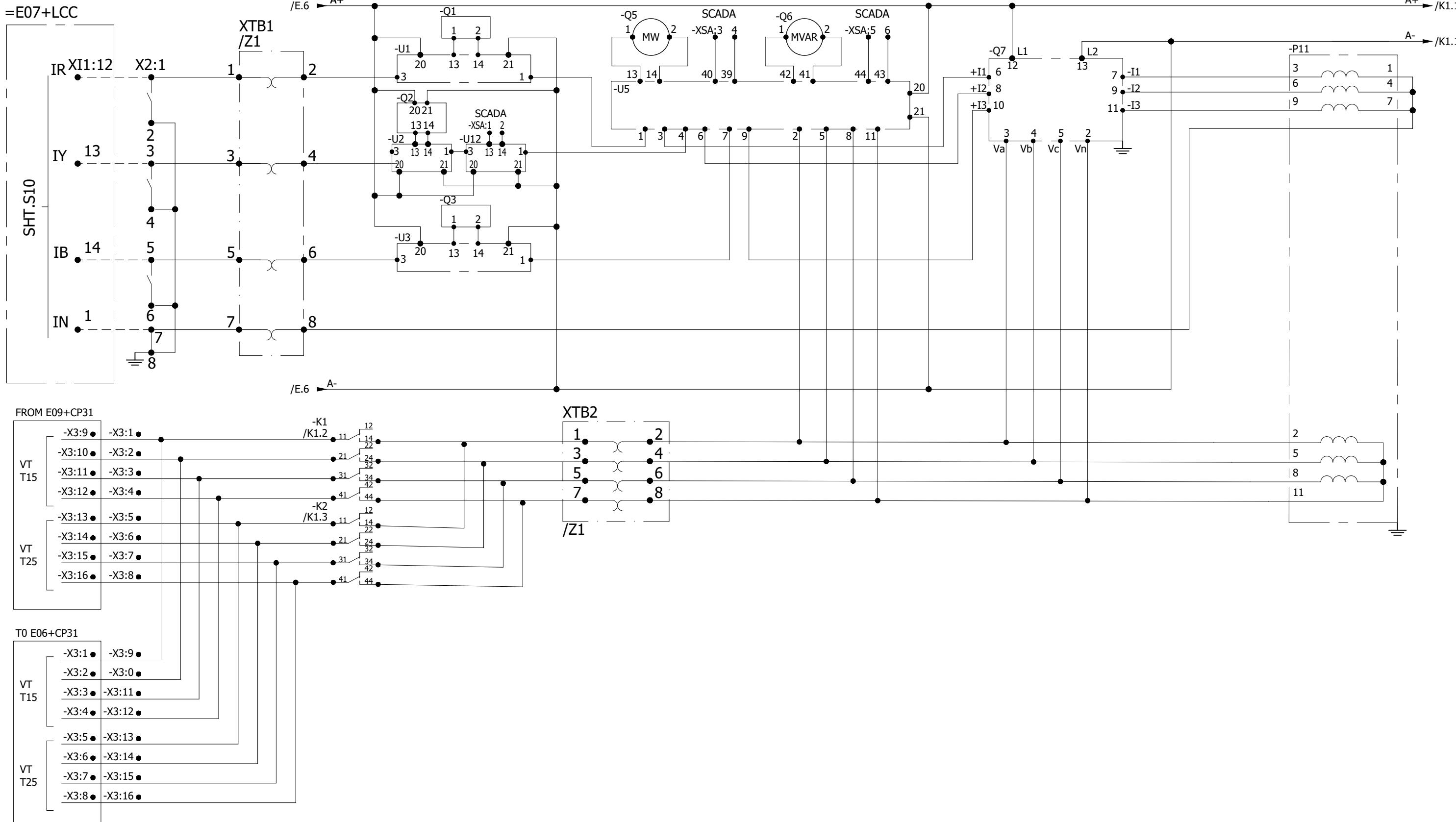
(-Q1, -Q2, -Q3) WITH  
TRANSDUCERS  
(-U1, , -U2, -U3)

WITH TRANSDUCER (-U5)

(-Q7)

(-P11)

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0	AS BUILT	19-10-2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town,	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (-E07+CP31) METERING	Drawing no. P60194-E-ELC-SC-005
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type G
									Sheet no. 11

1 2 3 4 5 6 7 8

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

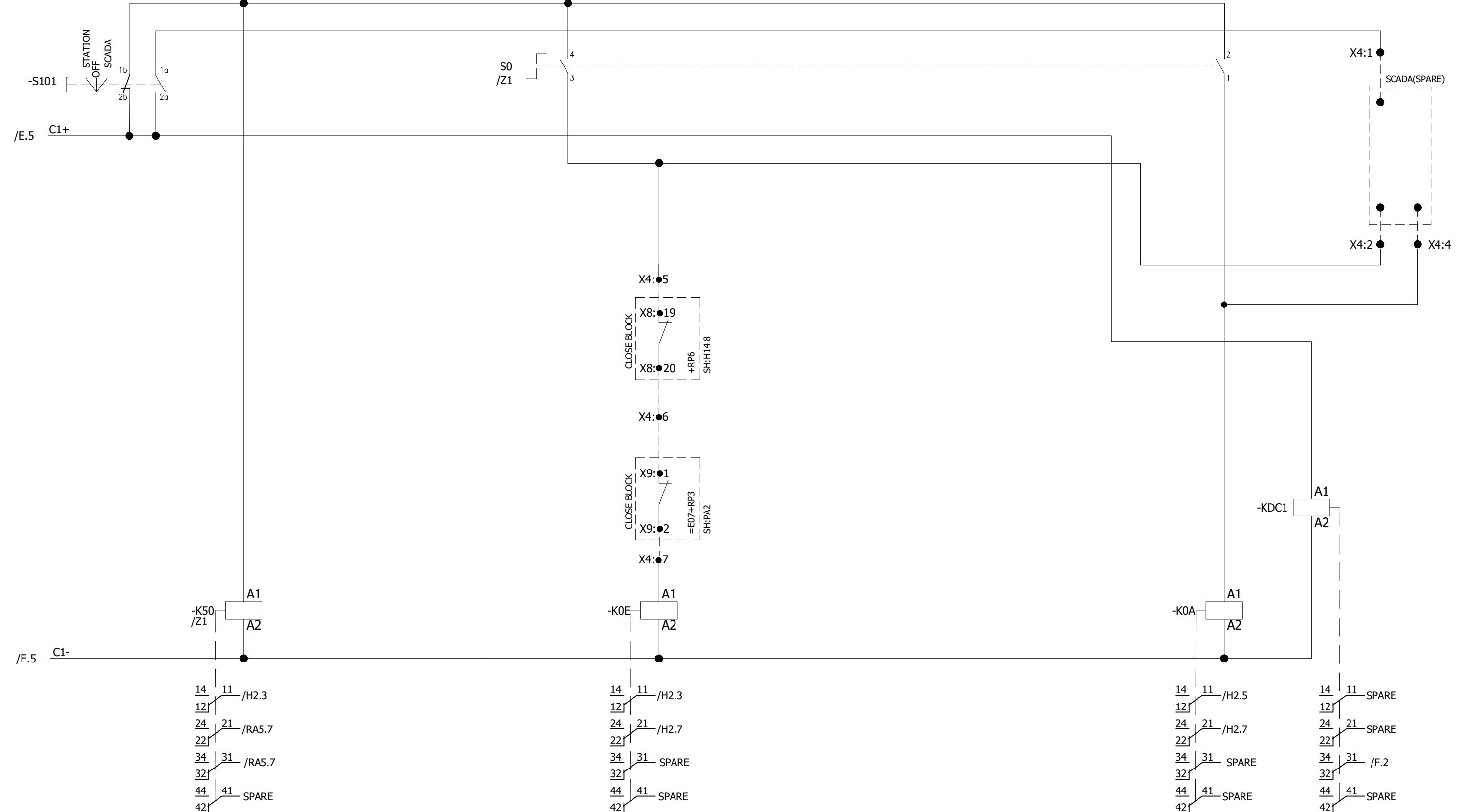
DC SUPERVISION  
RELAY SCADA  
CONTROL

CLOSE

OPEN KDC-1 CLOSE OPEN

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A



0	AS BUILT	19-10-2018	ASJ	Manufacturer <b>EPE SOL</b> 71-B Garden Block, New Garden Town,	Contractor <b>GE</b> Grid Solutions A GE and Alstom joint venture	Client <b>NATIONAL TRANSMISSION &amp; DISPATCH COMPANY LIMITED</b>	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E07+CP31) CB CONTROL CIRCUIT	Drawing no. P60194-E-ELC-SC-005
									Project no. P-60194
	DESCRIPTION	DATE	DRAWER						Sheet type H1
REV.									Sheet no. 12

1 2 3 4 5 6 7 8

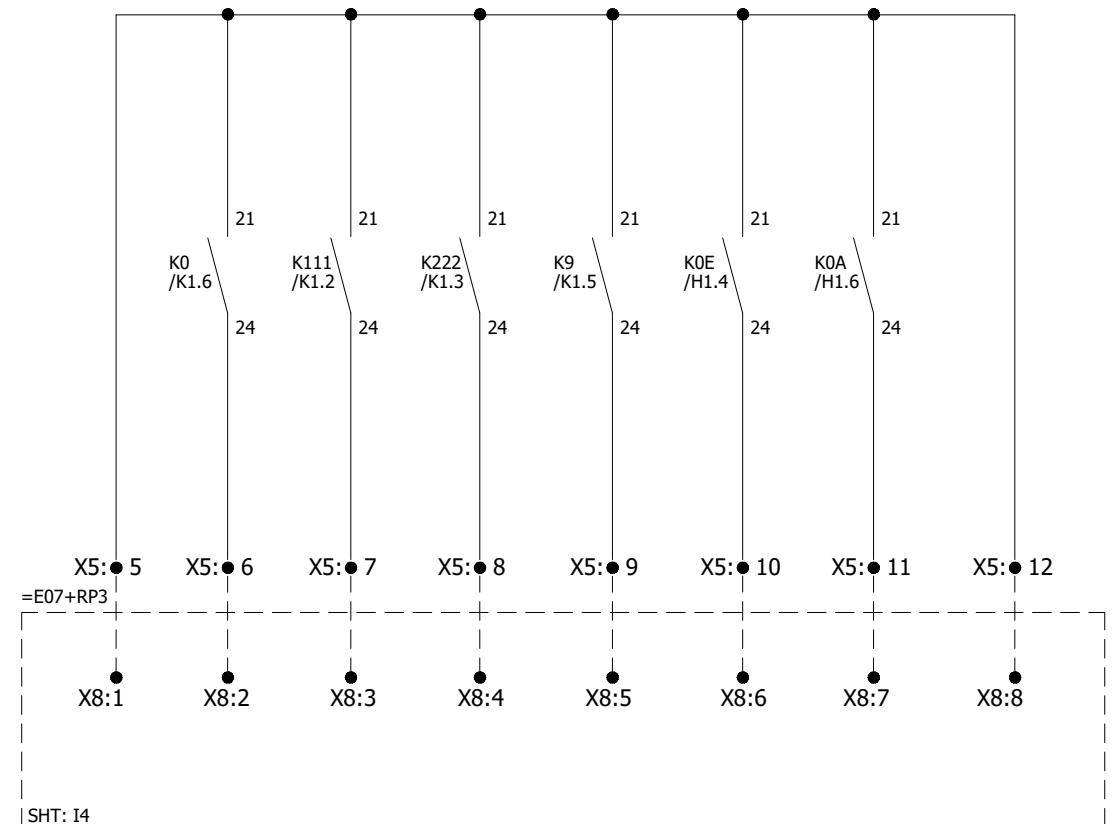
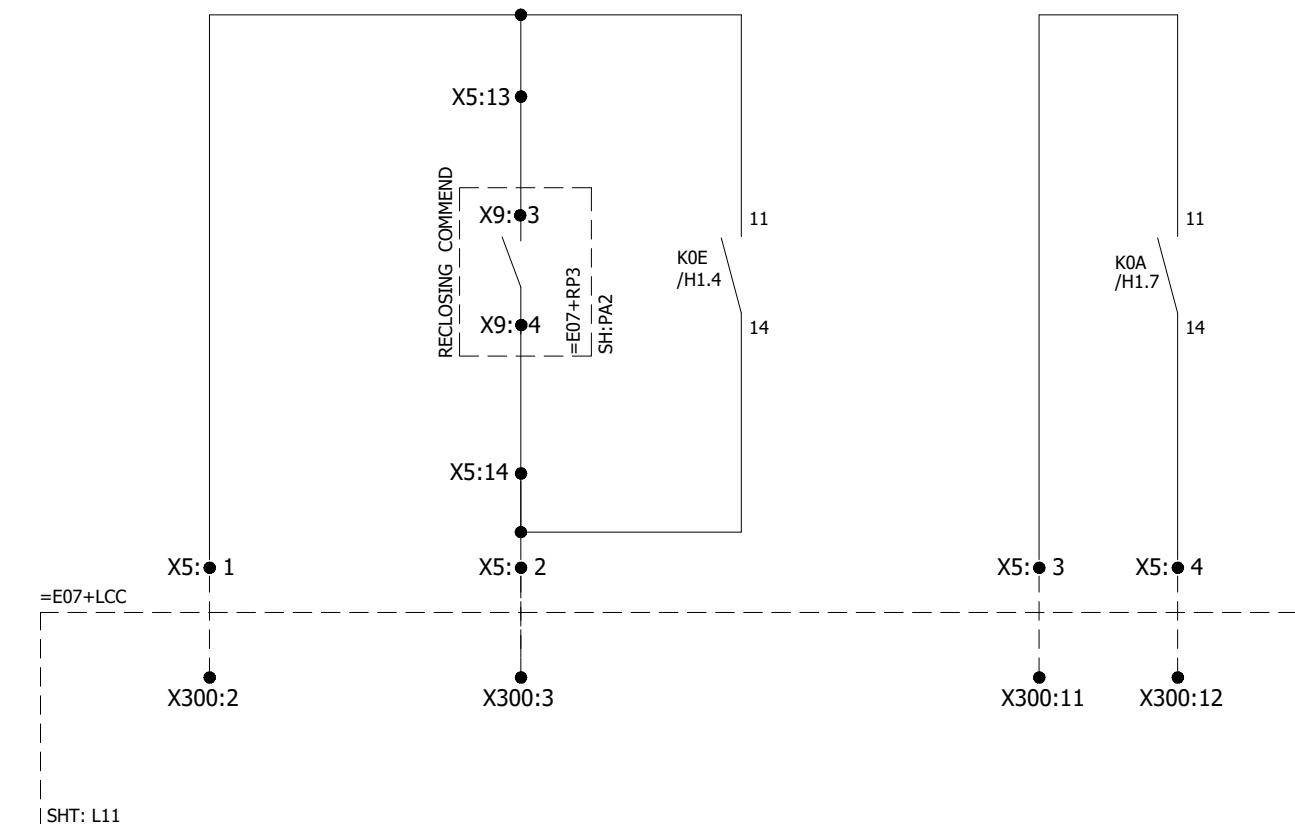
## C O N T R O L      R O O M      C O N T R O L

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 72-B Garden Block, New Garden Town,	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E07+CP31) CB CONTROL CIRCUIT	Drawing no. P60194-E-ELC-SC-005
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194 Sheet type H2 Sheet no. 13

$=E07+Q1$ 

CLOSE

OPEN

 $=E07+Q2$ 

CLOSE

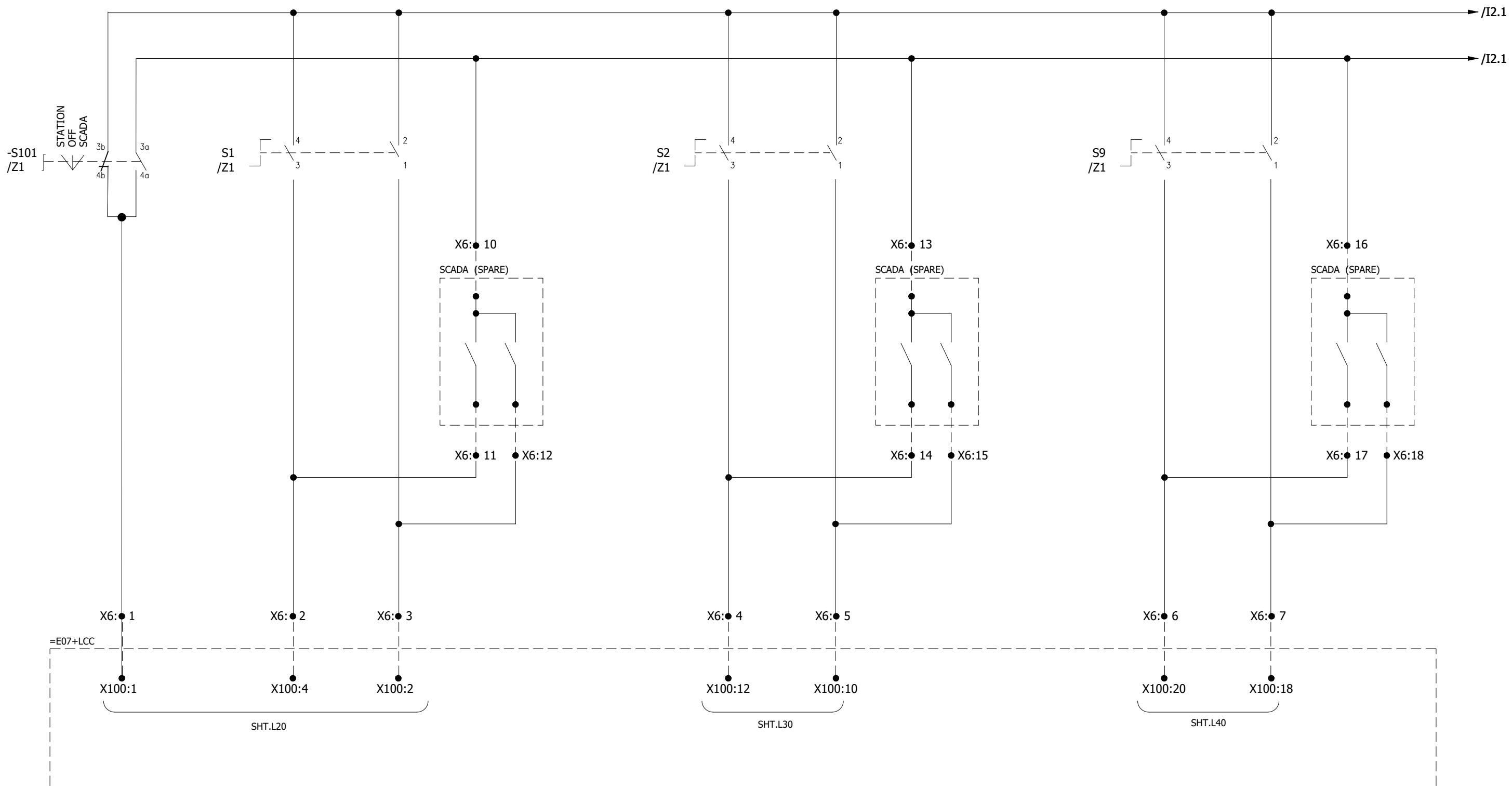
OPEN

 $=E07+Q9$ 

CLOSE

OPEN

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0	AS BUILT	19-10-2018	ASJ	Manufacturer  <b>EPESOL</b> 75-B Garden Block, New Garden Town,	Contractor  <b>Grid Solutions</b> A GE and Alstom joint venture	Client  <b>NATIONAL TRANSMISSION &amp; DISPATCH COMPANY LIMITED</b>	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132KV LINE CONTROL PANEL (=E07+CP31) DISCONNECTOR & EARTH SWITCH CONTROL	Drawing no. P60194-E-ELC-SC-005
									Project no. P-60194
	DESCRIPTION	DATE	DRAWER						Sheet type I1
REV.									Sheet no. 14

=E07+Q51

CLOSE

OPEN

=E07+Q53

CLOSE

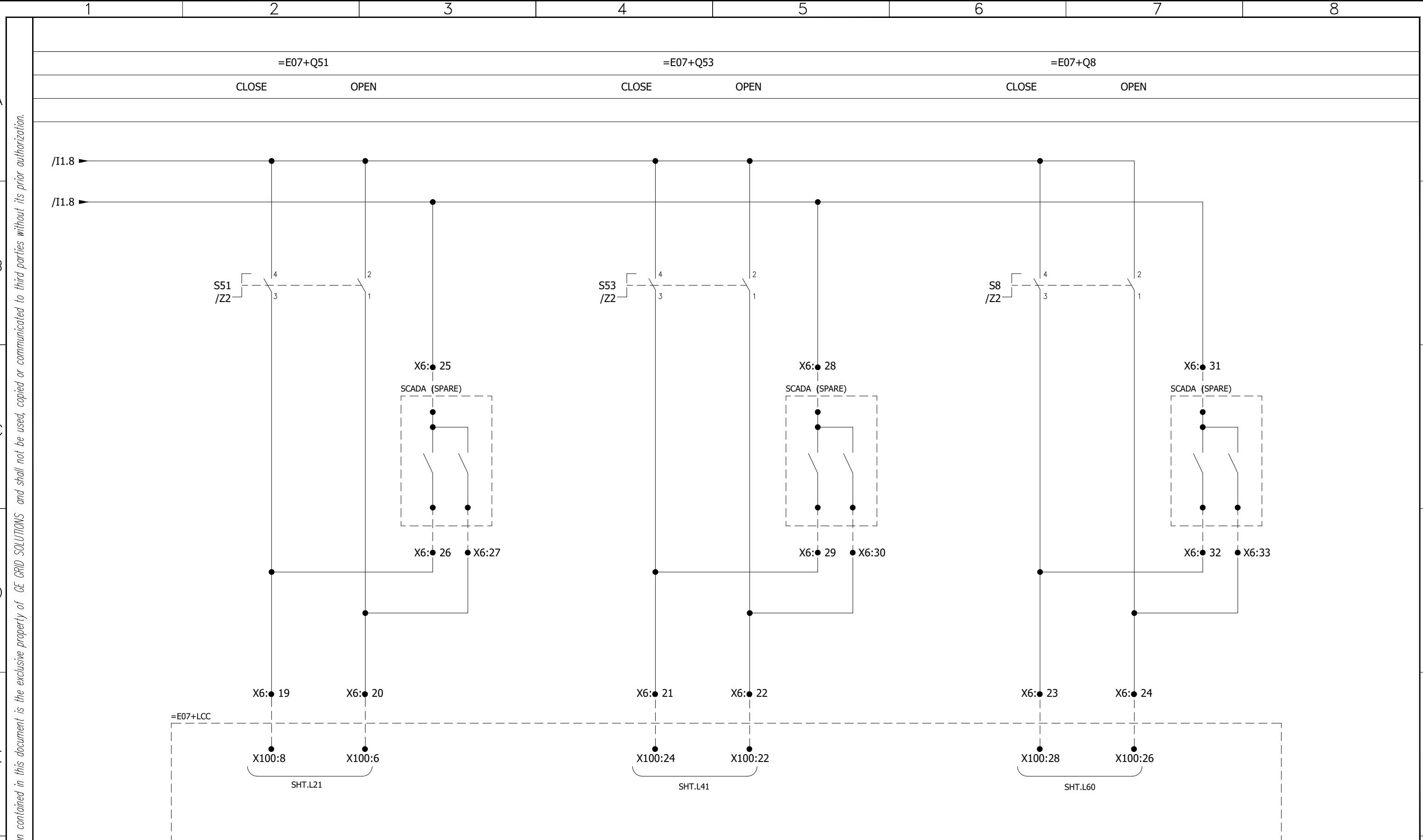
OPEN

=E07+Q8

CLOSE

OPEN

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0	AS BUILT	19-10-2018	ASJ	Manufacturer  EPESOL 7-B Garden Block, New Garden Town,	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED	Project 220KV/132KV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132KV LINE CONTROL PANEL (=E07+CP31) DISCONNECTOR & EARTH SWITCH CONTROL	Drawing no. P60194-E-ELC-SC-005
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type I2
									Sheet no. 15

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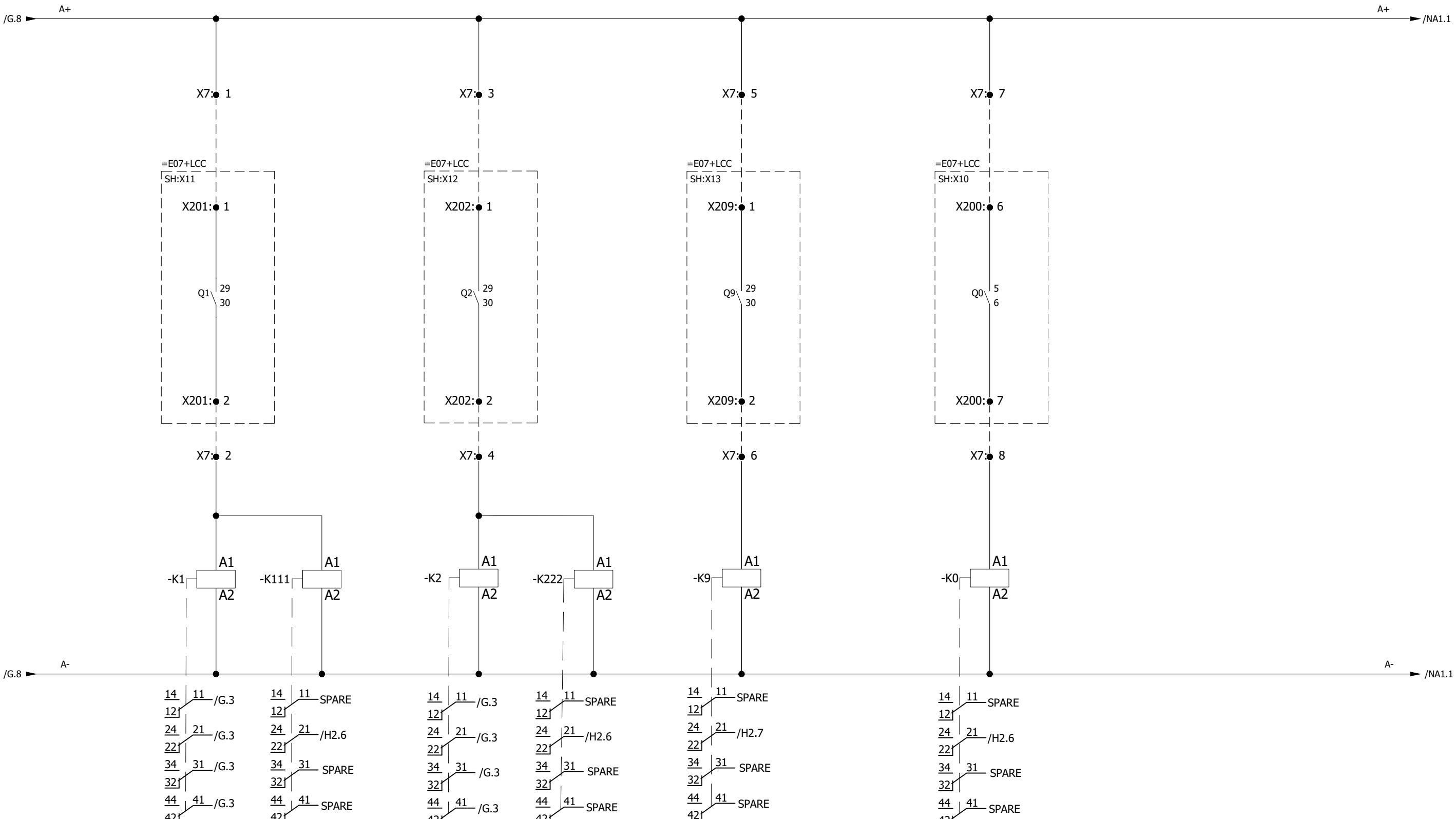
CONTACT  
MULTIPLICATION

BUSBAR-1  
ISOLATOR  
=E07+Q1

BUSBAR-2  
ISOLATOR  
=E07+Q2

LINE  
ISOLATOR  
=E07+Q9

CIRCUIT  
BREAKER  
=E07+Q0

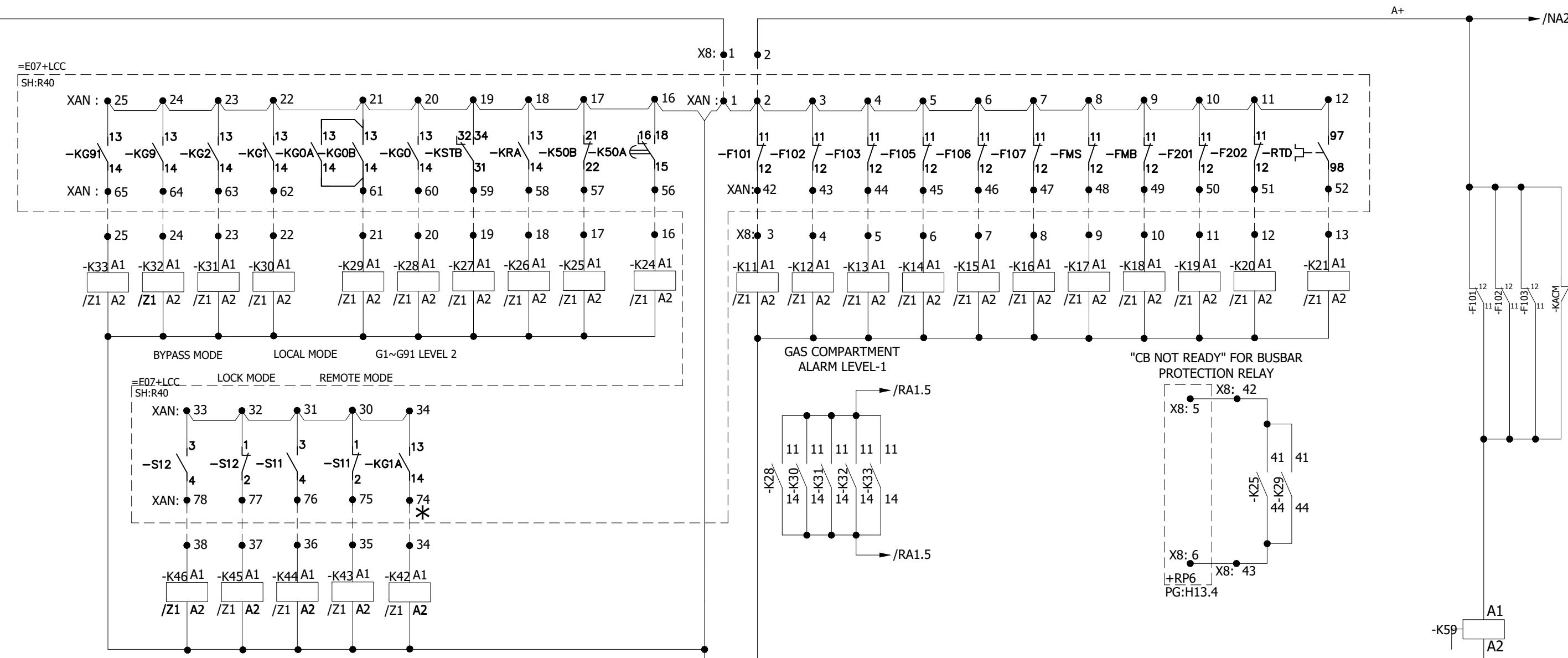


A  
A  
B  
B  
C  
C  
D  
D  
E  
E  
F  
F

0	AS BUILT	19-10-2018	ASJ	Manufacturer <b>EPE SOL</b> 71-B Garden Block, New Garden Town,	Contractor <b>GE Grid Solutions</b> A GE and Alstom joint venture	Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E07+CP31) CB/DISCONNECTOR CONTACT MULTIPLICATION	Drawing no. P60194-E-ELC-SC-005
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type K1
									Sheet no. 16

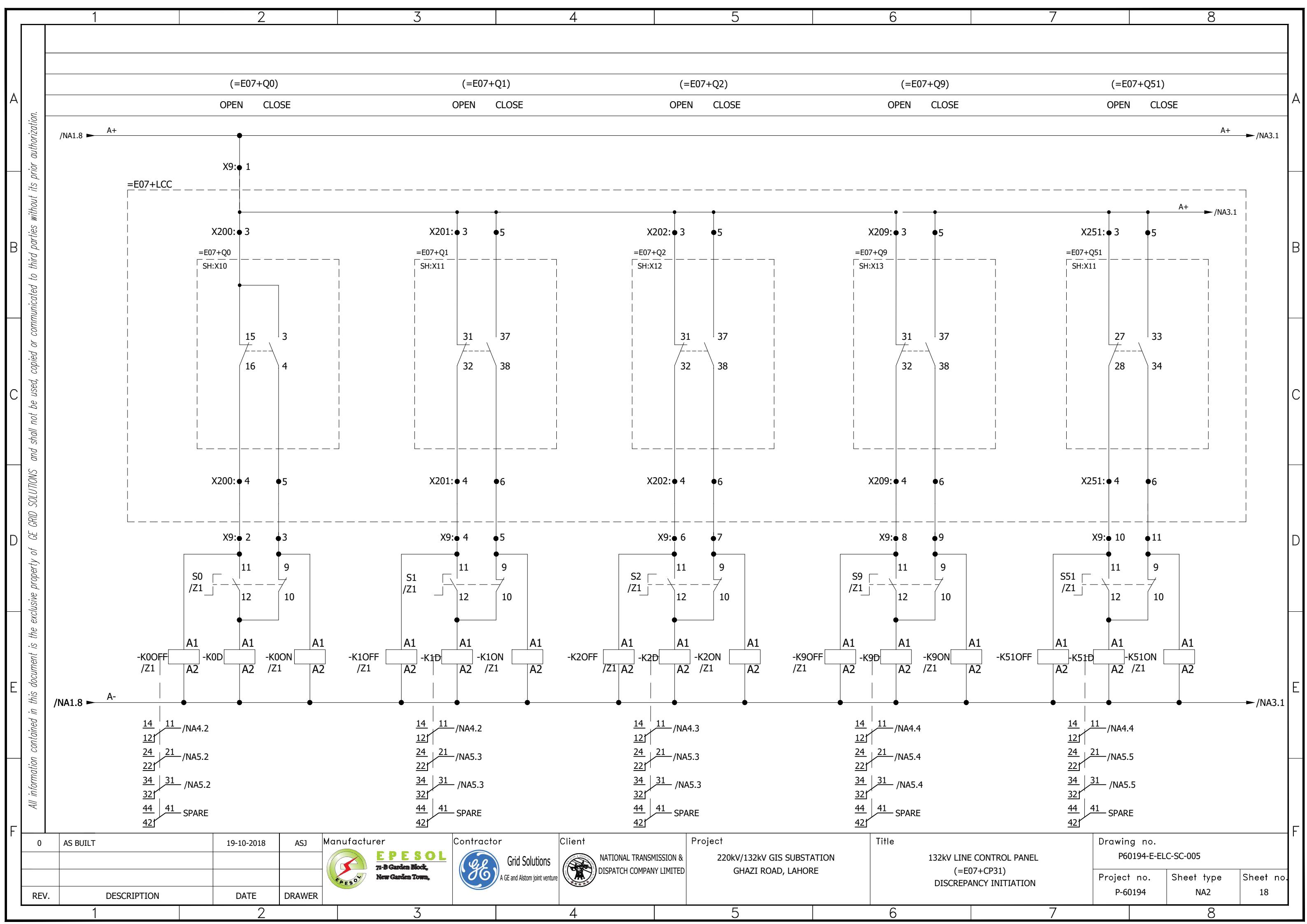
1	2	3	4	5	6	7	8
A	CONTACT MULTIPLICATION	POSITION	LONG SPRING CHARGING TIME	CONTROL SUPPLY MCB TRIPPED	GAS MONITOR MCB TRIPPED	CB TRIPPING 1 MCB TRIPPED	LIGHTING AC SUPPLY MOTOR SUPPLY MCB TRIPPED
G9 ALARM 1	G1 LEVEL 1	G0 ALARM	REPEAT ABNORMAL	DS/ES/HES OPERATION TIME ABNORMAL	SPRING DISCHARGED	ALARM SUPPLY MCB TRIPPED	CB CLOSING MCB TRIPPED
G91 ALARM 1	G2 LEVEL 1	G0 LOCK				CB TRIPPING 2 MCB TRIPPED	CB MOTOR SUPPLY MCB TRIPPED
						HEATING AC SUPPLY MCB TRIPPED	PANEL'S AC SUPPLY FAIL

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0	AS BUILT	19-10-2018	ASJ	Manufacturer <b>EPEPSOL</b> 71-B Garden Block, New Garden Town,	Contractor <b>GE</b> Grid Solutions A GE and Alstom joint venture	Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E07+CP31) ALARM MULTIPLICATION	Drawing no. P60194-E-ELC-SC-005
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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(=E07+Q53)

OPEN CLOSE

(=E07+Q8)

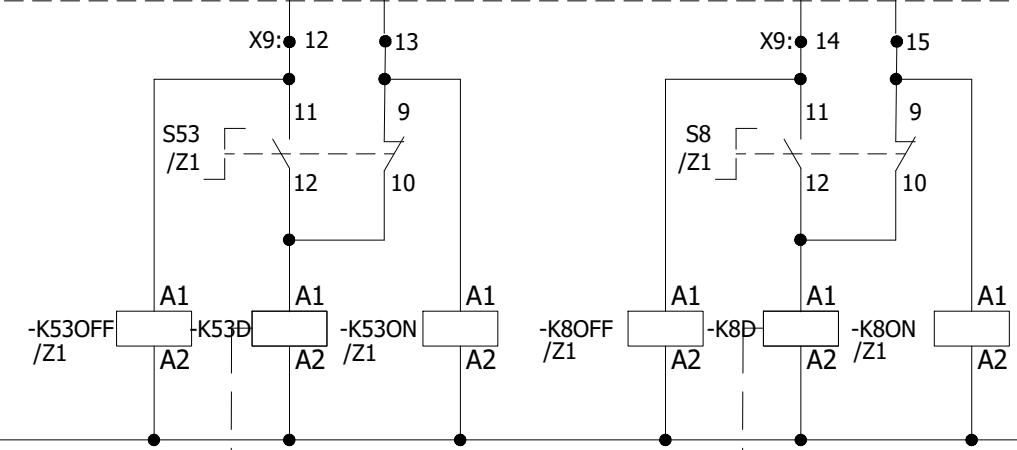
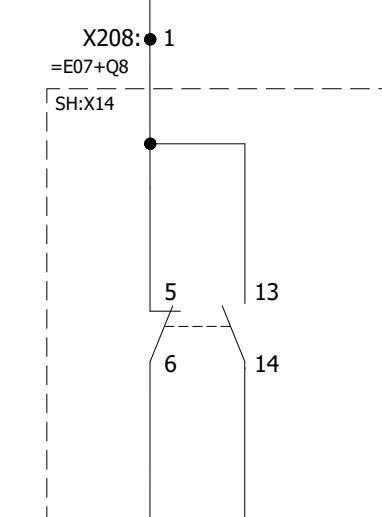
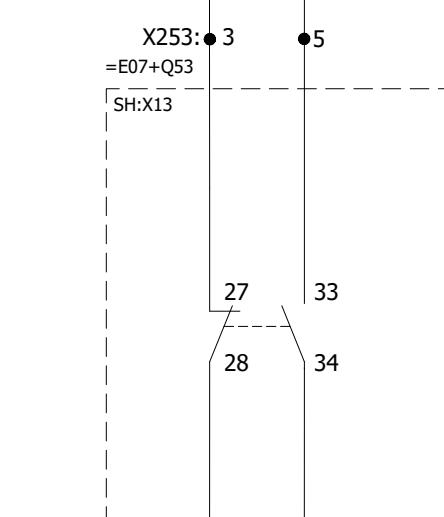
OPEN CLOSE

/NA2.8 A+

A+ /NA4.1

=E07+LCC

/NA2.8 A+



14 11 /NA4.5  
12 21 /NA5.6  
24 21 /NA5.6  
22 31 /NA5.6  
34 31 /NA5.7  
32 31 /NA5.7  
44 41 SPARE  
42 41 SPARE

14 11 /NA4.5  
12 21 /NA5.7  
24 21 /NA5.7  
22 31 /NA5.7  
34 31 /NA5.7  
32 31 /NA5.7  
44 41 SPARE  
42 41 SPARE

0 AS BUILT

19-10-2018

ASJ



Manufacturer

Contractor



Client



Project

220KV/132KV GIS SUBSTATION  
GHAZI ROAD, LAHORE

Title

132KV LINE CONTROL PANEL  
(=E07+CP31)  
DISCREPANCY INITIATION

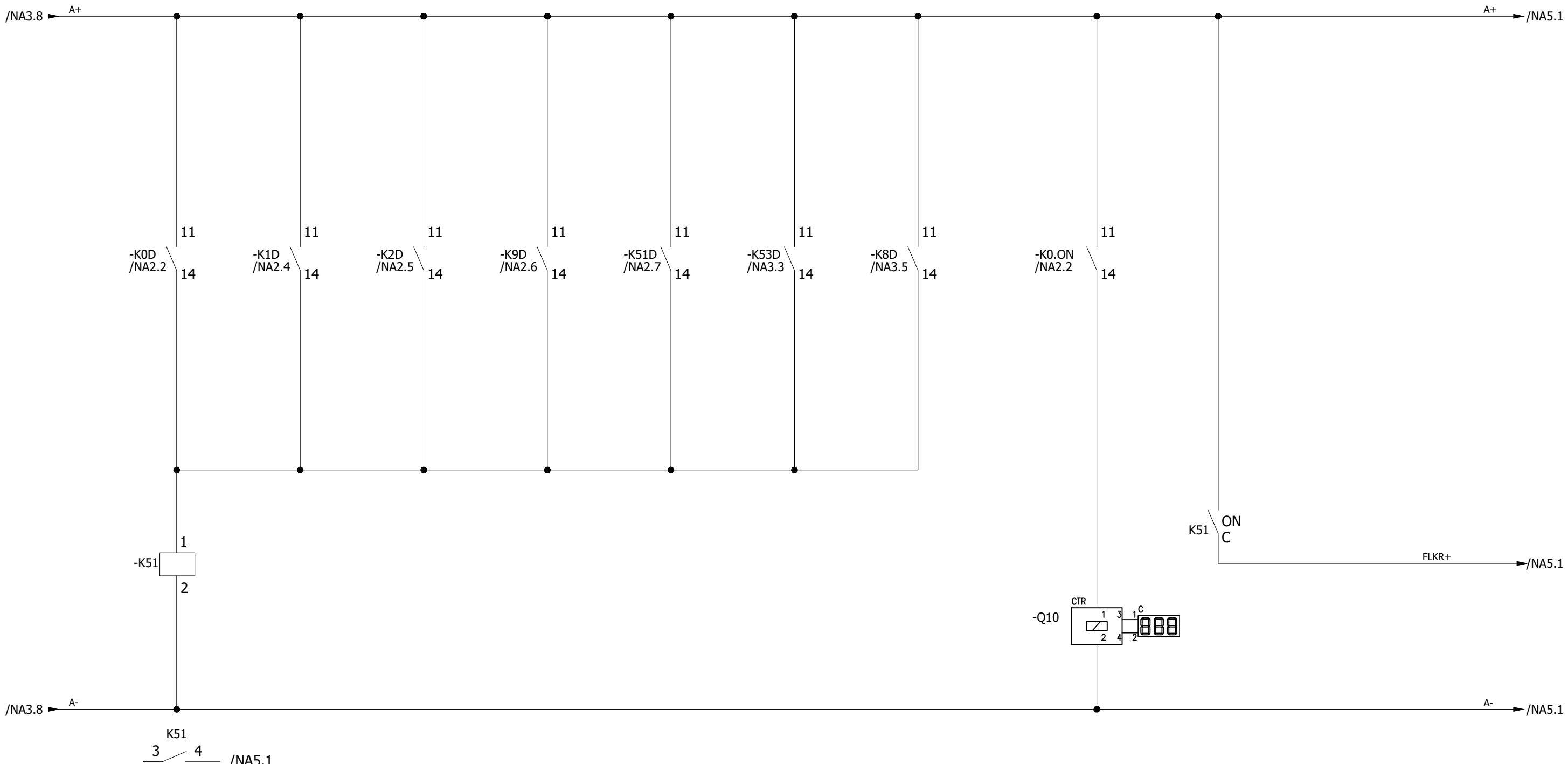
Drawing no.  
P60194-E-ELC-SC-005

Project no. P-60194 Sheet type NA3 Sheet no. 19

1 2 3 4 5 6 7 8

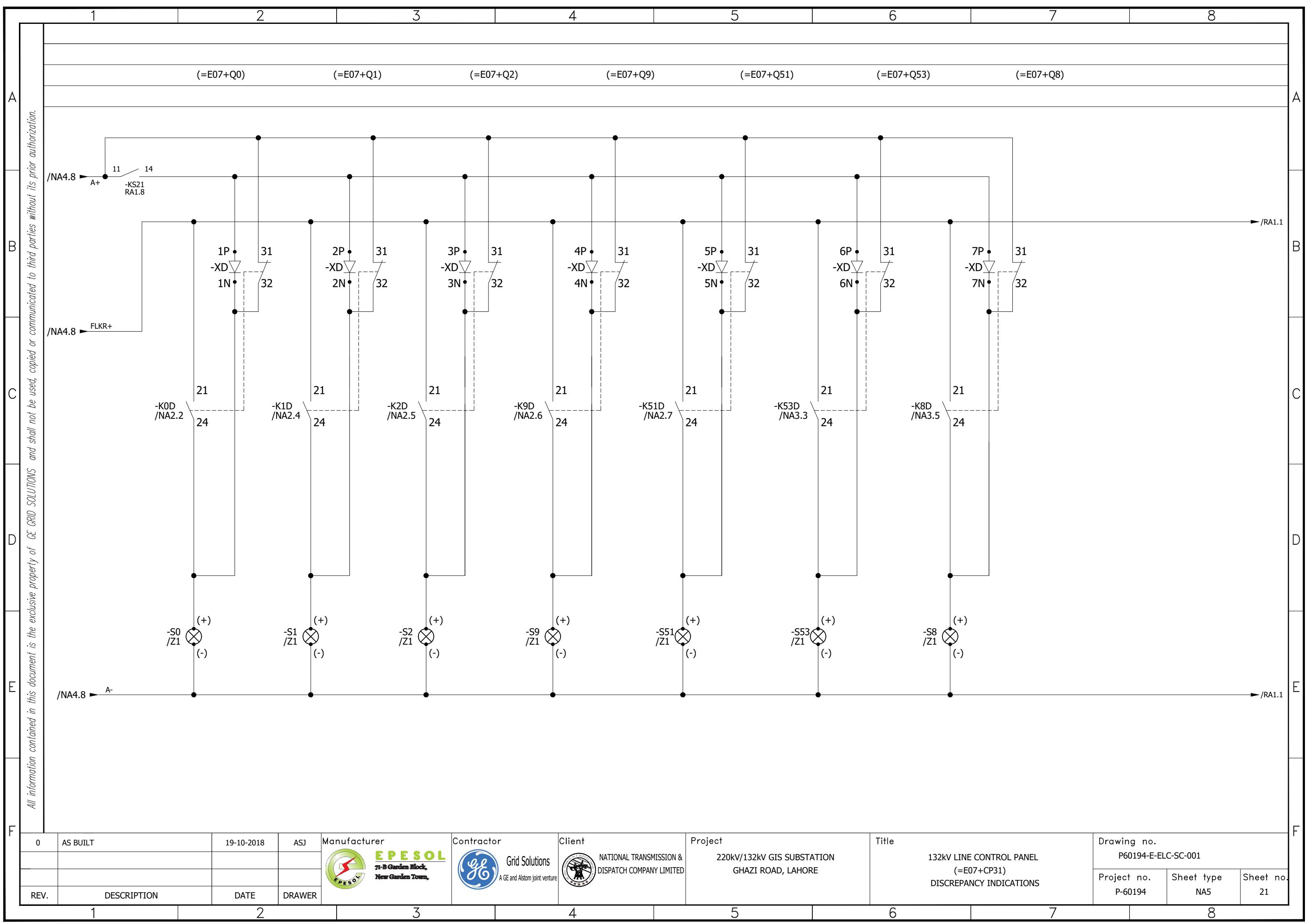
OFF/ON (=E07+Q0)	OFF/ON (=E07+Q1)	OFF/ON (=E07+Q2)	OFF/ON (=E07+Q9)	OFF/ON (=E07+Q51)	OFF/ON (=E07+Q53)	OFF/ON (=E07+Q8)	CIRCUIT BREAKER OPERATION COUNTER (-Q10)
---------------------	---------------------	---------------------	---------------------	----------------------	----------------------	---------------------	--

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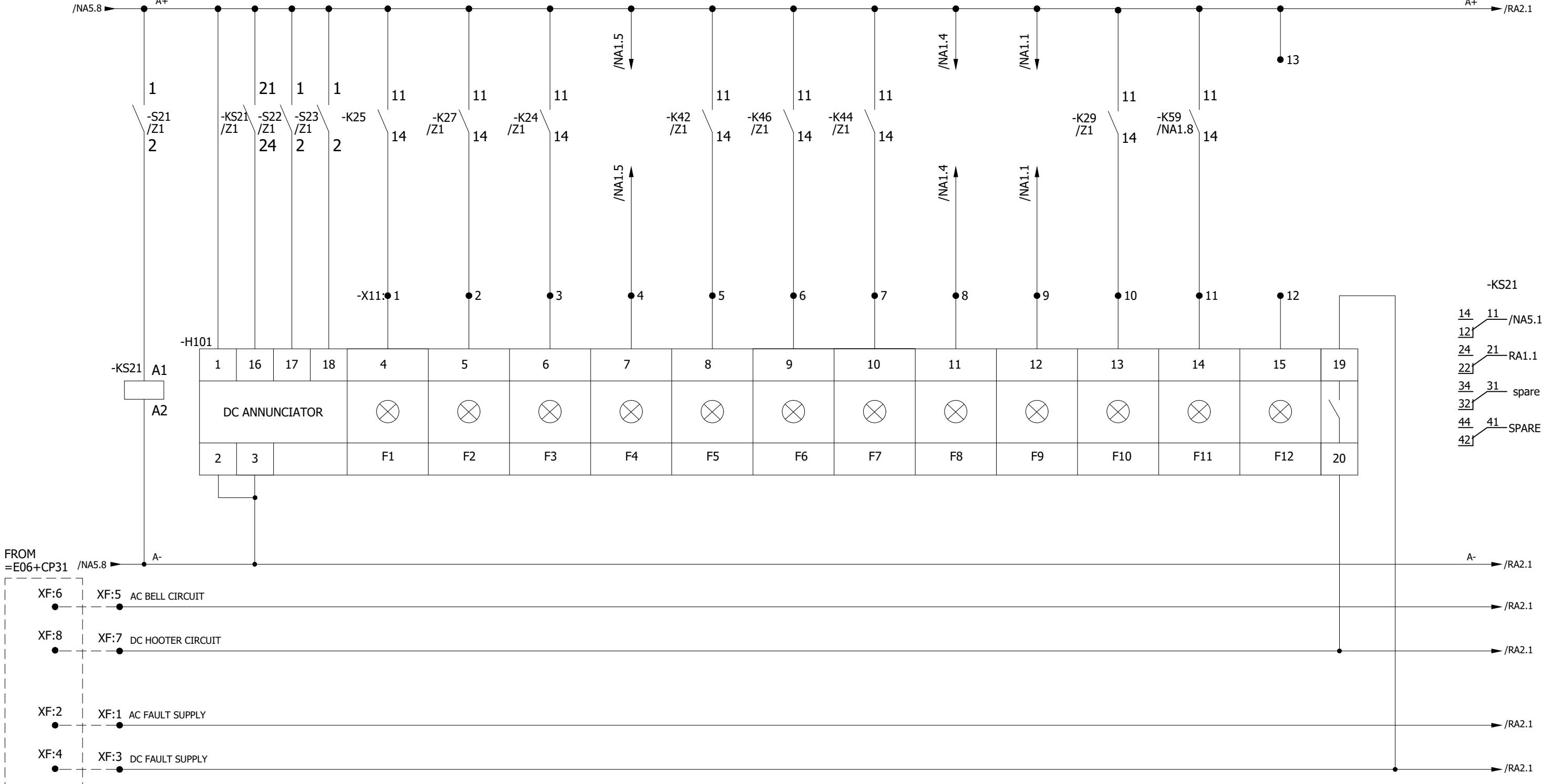
0	AS BUILT	19-10-2018	ASJ	Manufacturer  EPESOL 7-B Garden Block, New Garden Town,	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E07+CP31) DISCREPANCY INITIATION	Drawing no. P60194-E-ELC-SC-005		
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



SPRING DISCHARGED DS/ES/HES OPERATION LONG SPRING GAS COMPARTMENT GAS COMPARTMENT LCC BYPASS MODE LCC LOCAL MODE DC SUPPLY DISTURBED AC SUPPLY DISTURBED G0 LOCK CONTROL PANEL AC SUPPLY FAILURE SPARE HOOTER

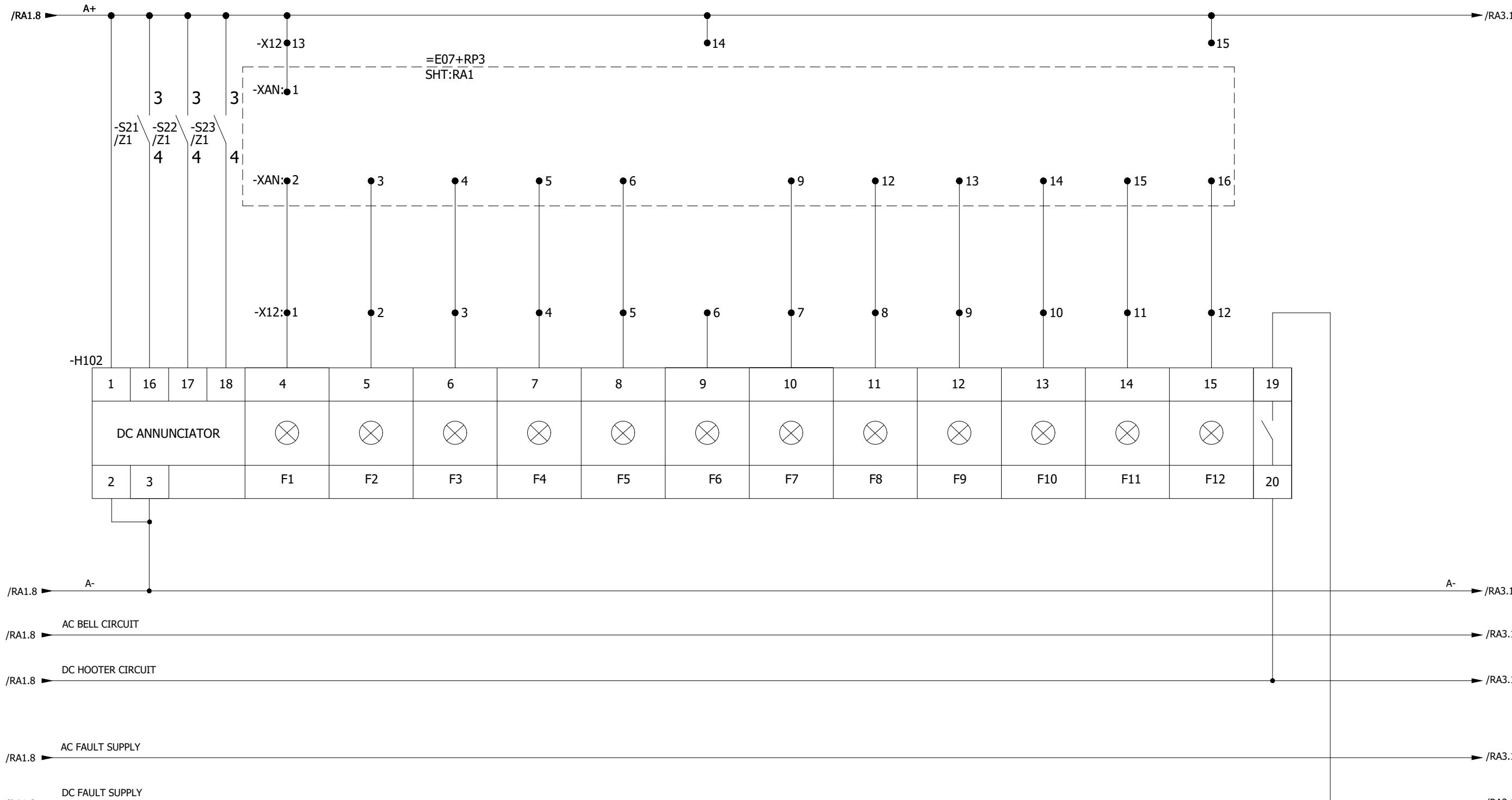
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RED PHASE TRIP	YELLOW PHASE TRIP	BLUE PHASE TRIP	ZONE-1 TRIP	ZONE-2/3 TRIP	SPARE	POWER SWING DETECTED	SOTF OPERATED	AUTORECLOSE OPERATED	AUTORECLOSE BLOCKED	LINE DIFFERENTIAL PROTECTION	SPARE	HOOTER
----------------	-------------------	-----------------	-------------	---------------	-------	----------------------	---------------	----------------------	---------------------	------------------------------	-------	--------

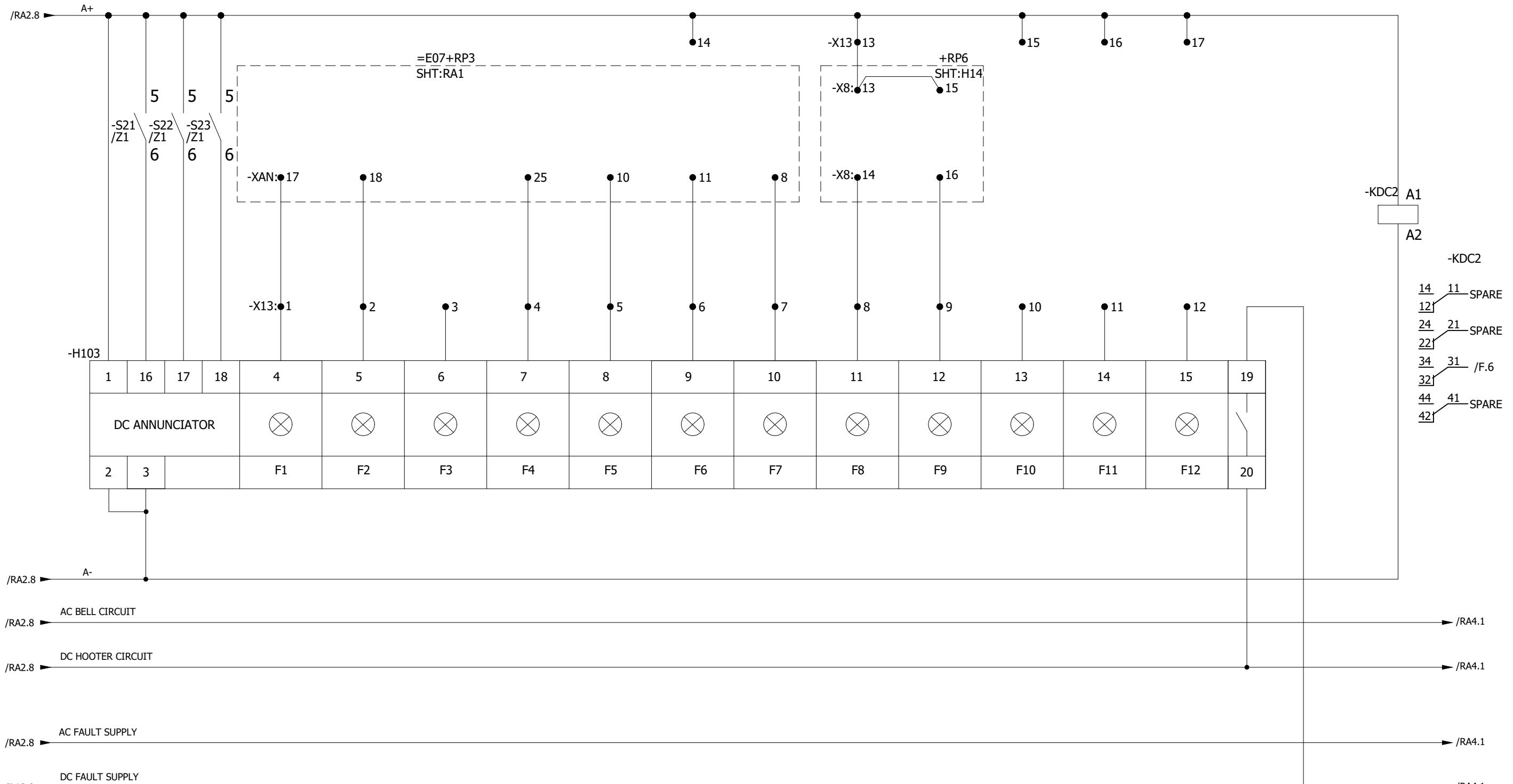
RELAY FAULTY

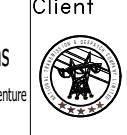


0	AS BUILT	19-10-2018	ASJ	Manufacturer  EPESOL 72-B Garden Block, New Garden Town,	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E07+CP31) ANNUNCIATOR-2 CIRCUIT	Drawing no. P60194-E-ELC-SC-005
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type RA2
									Sheet no. 23

BUS VT  
SECONDARY CIRCUIT  
MCB UNHEALTHY O/C & E/F PROT.  
RELAY FAULTY SPARE LINE RELAY PANEL 230VAC  
CIRCUIT/SUPPLY FAULTY TRIP CIRCUIT-1  
FAULTY TRIP CIRCUIT-2  
FAULTY O/C & E/F PROT.  
OPERATED DTT  
SEND CBF STG-1  
OPERATED SPARE SPARE SPARE HOOTER

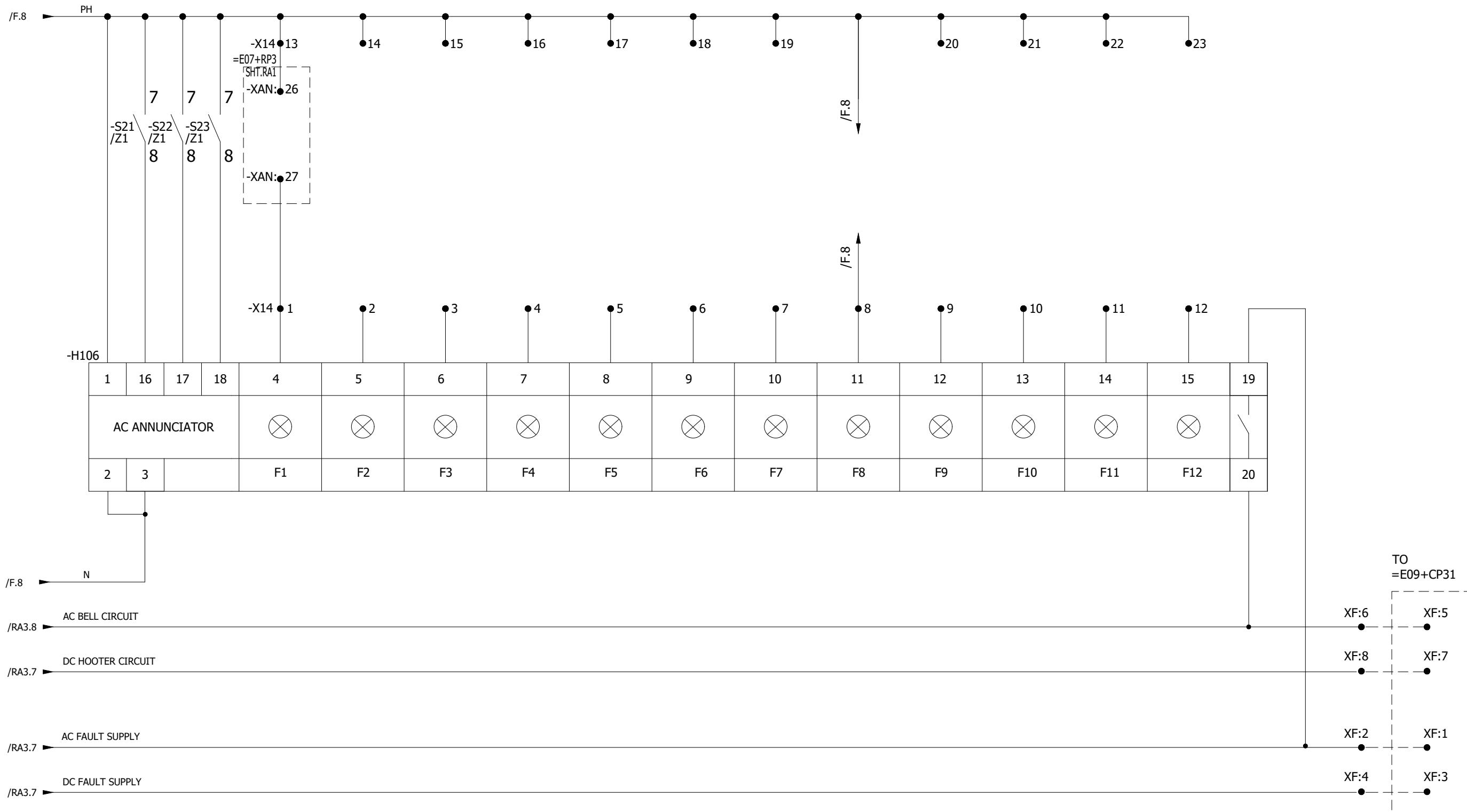
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0	AS BUILT	19-10-2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town,	Contractor  Grid Solutions A GE and Alstom joint venture	Client 	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E07+CP31) ANNUNCIATOR-3 CIRCUIT	Drawing no. P60194-E-ELC-SC-005
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
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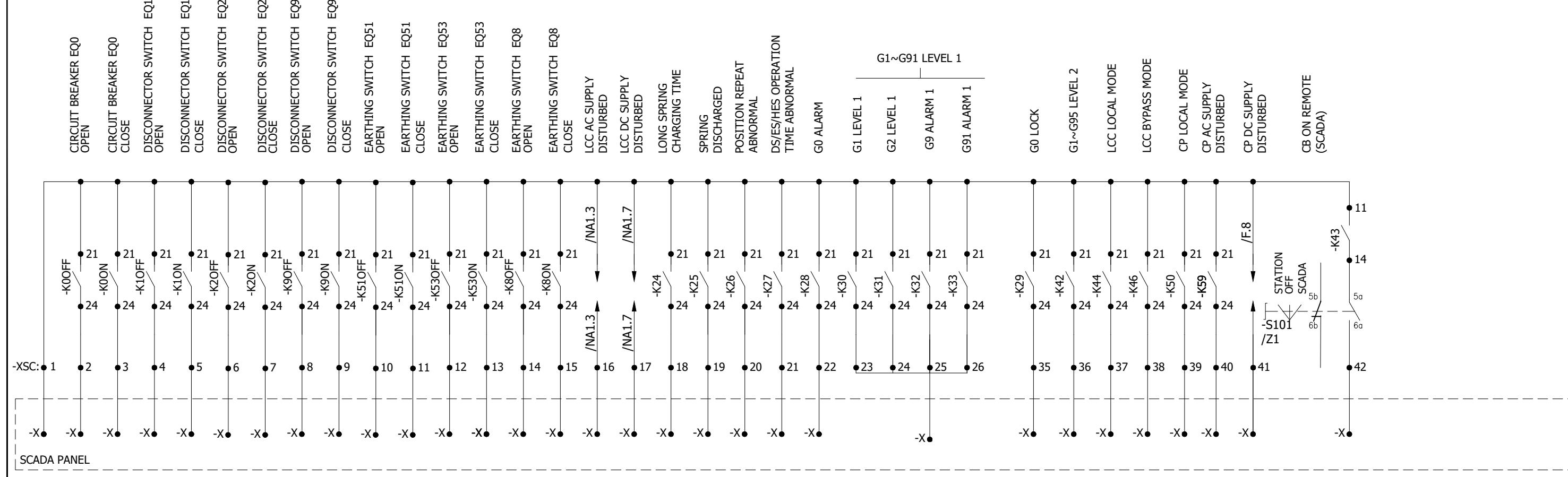
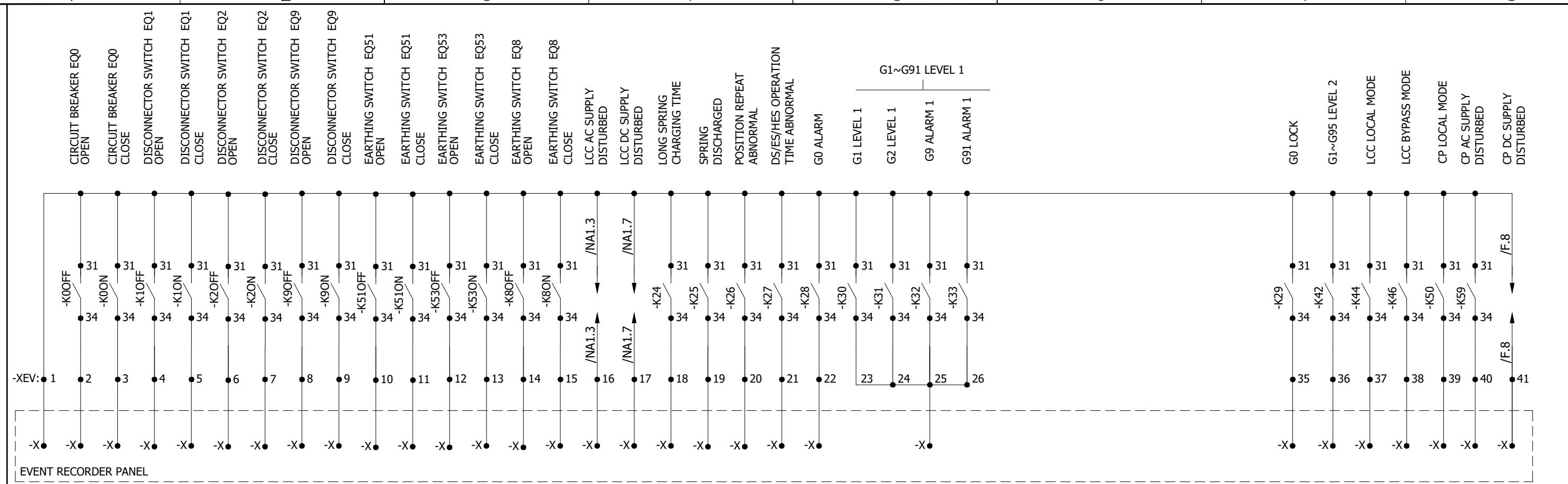
LINE RELAY PANEL 110VDC CIRCUIT/SUPPLY FAULTY	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	CONTROL PANEL DC FAIL	SPARE	SPARE	SPARE	SPARE	AC BELL
---	-------	-------	-------	-------	-------	-------	--------------------------	-------	-------	-------	-------	---------



A A  
B B  
C C  
D D  
E E  
F F

0	AS BUILT	19-10-2018	ASJ	Manufacturer  EPESOL 71-B Garden Block, New Garden Town,	Contractor  Grid Solutions A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 132kV LINE CONTROL PANEL (=E07+CP31) ANNUNCIATOR-4 CIRCUIT	Drawing no. P60194-E-ELC-SC-005
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194
									Sheet type RA4
									Sheet no. 25

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0	AS BUILT	19-10-2018	ASJ	<b>Manufacturer</b>  <b>EPESOL</b> 71-B Garden Block, New Garden Town,	<b>Contractor</b>  <b>Grid Solutions</b> A GE and Alstom joint venture	<b>Client</b>  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED	<b>Project</b> 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	<b>Title</b> 132kV LINE CONTROL PANEL (=E07+CP31) SCADA & ER SIGNALS	<b>Drawing no.</b>		
								P60194-E-ELC-SC-005			
								<b>Project no.</b> P-60194			
REV.	DESCRIPTION	DATE	DRAWER					<b>Sheet type</b> RA5			
								<b>Sheet no.</b> 26			

1

2

3

4

5

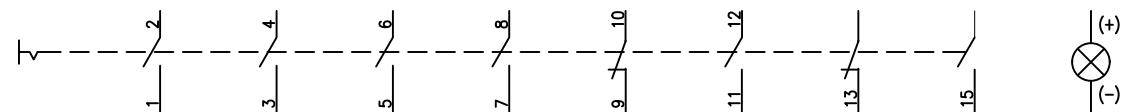
6

7

8

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-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						



-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	

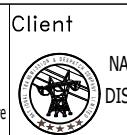
REV.	DESCRIPTION	DATE	DRAWER
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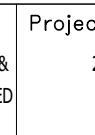
**EPESOL**  
7-B Garden Block,  
New Garden Town,



Grid Solutions  
A GE and Alstom joint venture



NATIONAL TRANSMISSION &  
DISPATCH COMPANY LIMITED



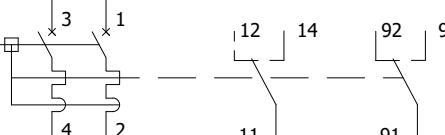
220kV/132kV GIS SUBSTATION  
GHAZI ROAD, LAHORE

Project  
Title

132kV LINE CONTROL PANEL  
(=E07+CP31)  
COMPONENT DIAGRAM

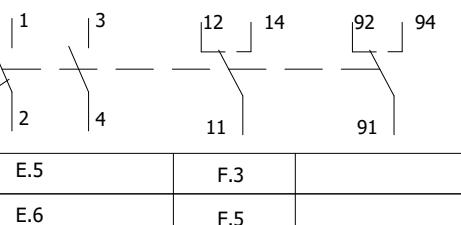
Drawing no.  
P60194-E-ELC-SC-005

Project no. P-60194 Sheet type Z1 Sheet no. 27

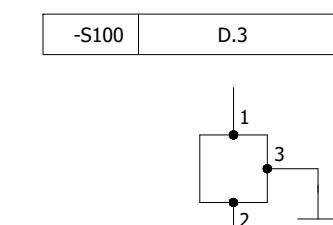


-F101	D.2	NA1.8	
-F102	D.4	NA1.8	
-F103	D.6	NA1.8	

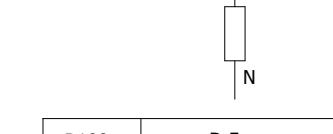
-F201	E.5	F.3	
-F202	E.6	F.5	



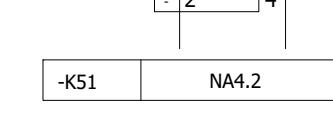
-B100	D.4		
-S100	D.3		



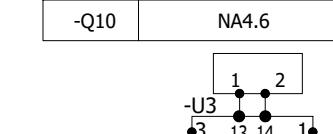
-X100	D.7		
-R100	D.5		



-K51	NA4.2		
-Q10	NA4.6		



-U3/Q3	G.3		
-XTB1	G.2		



-B1	RA4-1.2		
B1	RA4-1.2		



14	16		
-H100	D.3		



-H7	F.4	
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