



**Grid Solutions**  
A GE and Alstom joint venture


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



## 220kV Coupler Bay Relay Panel (=D06+R8) 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	18.08.2018	MUR	ABA	NAH	AS BUILT

Scale	NOT-TO-SCALE	Sheet size	A3
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Client	 <b>NATIONAL TRANSMISSION &amp; DISPATCH COMPANY LIMITED</b> (NTDC-WAPDA)
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Contractor	 <b>Grid Solutions</b> A GE and Alstom joint venture	Manufacturer	 <b>EPESOL</b> 71-B Garden Block, New Garden Town, Lahore, Pakistan
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Project	220kV / 132kV GIS SUBSTATION GHAZI ROAD , LAHORE
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Title	220kV Coupler Bay Relay Panel (=D06+R8) SCHEMATIC DRAWINGS
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Order no	P-60194	Document no	P60194-E-DCR-SC-001
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Sheet type	A	Total sheets	21	Sheet no	1
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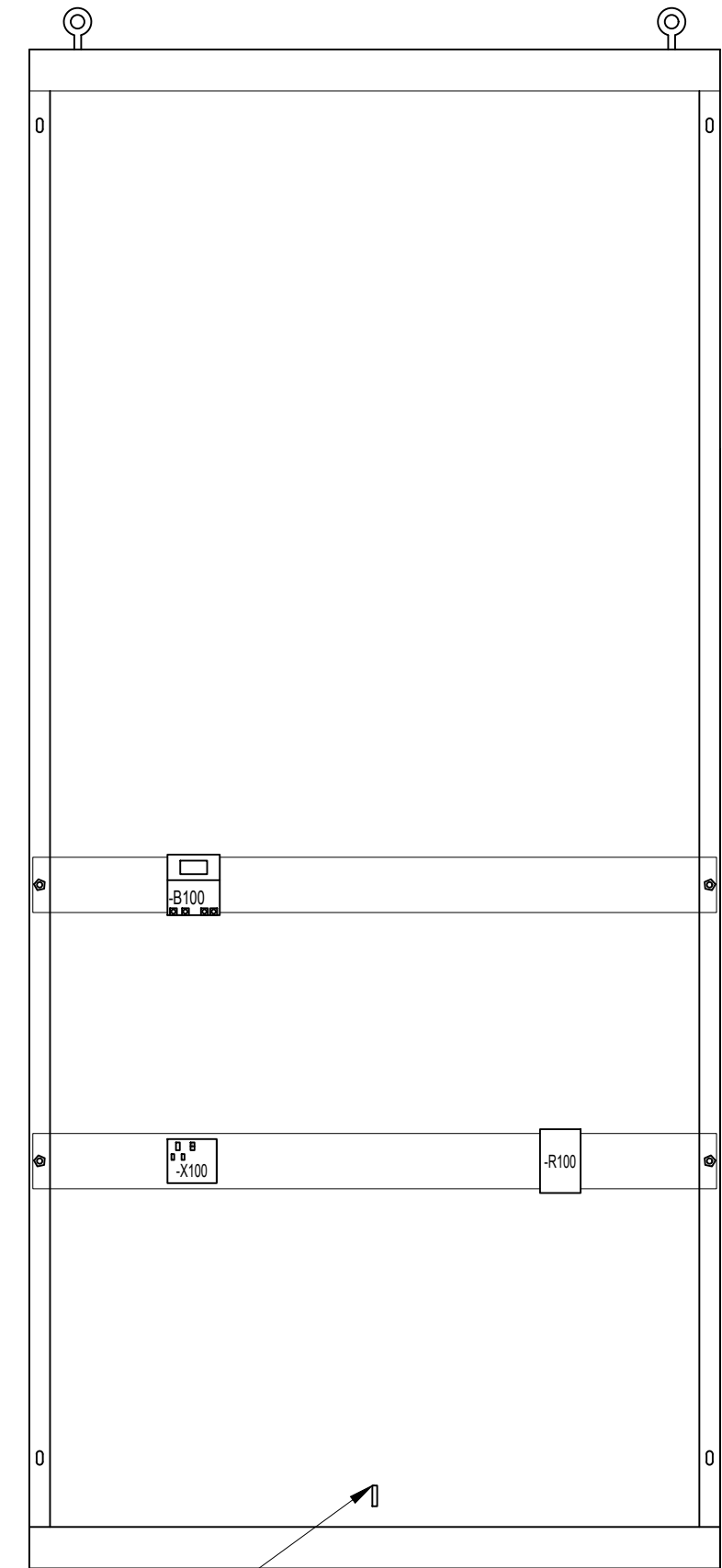
A	PAGE NO.	SHEET NAME	SHEET DESCRIPTION	ISSUE / REVISION											
				A	B	C	D	E	F	01	02	03	04	05	
B	01	A	Cover Sheet												
	02	AA	List Of Contents												
	03	AB	Symbols and Legends												
	04	AC	Component List												
	05	AD	Component List												
	06	AE	Panel View												
C	06	AE1	Panel View												
	07	AF	Bay Concept & Protection Logics												
	08	D	AC Supply Distribution Circuit												
	09	E	DC Supply Distribution Circuit												
	10	F	AC/DC Supply Failure Circuits												
	11	G1	Relay Control & Supply Circuits												
D	12	H1	OCP/EFP Relay CT Inputs												
	13	K1	Protection Trips Circuit												
	14	K11	Trip Circuit for Coil-1												
	15	K21	Trip Circuit for Coil-2												
	16	NA1	System Alarm Circuits												
	17	O1	Reset Circuit For Tripping Relays												
E	18	PA1	Protection Inter-Circuits												
	19	RA1	CP Annunciation, Event, FR AND SCADA Circuit												
	20, 21	Z1, Z2	Component Diagram												
F															
0	AS BUILT	18.08.2018	MUR	Manufacturer	Contractor	Client	Project	Title	Drawing no.						
				 <b>EPESOL</b> 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 Coupler Bay Relay Panel (=D06+R8) LIST OF CONTENTS	P60194-E-DCR-SC-001						
REV.	DESCRIPTION	DATE	DRAWER						Project no. Sheet type Sheet no.						
									P-60194 AA 02						

1		2		3		4		5		6		7		8									
A  B  C  D  E  F	SYMBOL		DESCRIPTION		SYMBOL		DESCRIPTION		SYMBOL		DESCRIPTION		SYMBOL		DESCRIPTION								
			CIRCUIT BREAKER				MINIATURE CIRCUIT BREAKER				AUXILIARY CONTACTOR NO+NC		21		DISTANCE								
			SWITCH/ISOLATOR				KEY OPERATED SELECTOR SWITCH				AMMETER		24		OVEREXCITATION								
			EARTHING				LIMITED SWITCH				VOLTMETER		25		SYNCHROCHECK								
			SF6 TO AIR BUSHING				HUMIDITY & TEMPERATURE CONTROLLER				POWER FACTOR METER		49		THERMAL OVERLOAD								
			LINE TRAP				PANEL HEATER				DIGITAL PANEL METER		50/51		PHASE INST./OVERCURRENT								
			SURGE ARRESTOR				THREE PIN SOCKET				ACTIVE POWER METER		50N/51N		EARTH INST./OVERCURRENT								
			CURRENT TRANSFORMER				INDICATION LIGHT				REACTIVE POWER METER		50BF		CIRCUIT BREAKER FAILURE								
			COUPLING CAPACITOR VOLTAGE TRANSFORMER				PUSH BUTTON				ENERGY METER		64		RESTRICTED EARTH FAULT								
			POWER TRANSFORMER				AUXILIARY CONTACTOR COIL						67N		DIRECTIONAL EARTH FAULT								
			AUTO TRANSFORMER				POWER SUPPLY AC/DC						68		POWER SWING BLOCKING								
							TERMINAL						24		OVER EXCITATION								
							OPTO CONTACTS						79		AUTO-RECLOSING								
							RELAY CONTACTS						49		THERMAL OVERLOAD								
							HOOTER						87T		TRAFO DIFFERENTIAL								
							AC BELL						87C		DIFFERENTIAL CONNECTION								
													87BB		DIFFERENTIAL BUSBAR								
0		AS BUILT		18.08.2018		MUR		Manufacturer		Contractor		Client		Project		Title		Drawing no.					
														220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE		220kV Coupler Bay Relay Panel (=D06+R8) SYMBOLS AND LEGENDS		P60194-E-DCR-SC-001					
								71-B Garden Block, New Garden Town, Lahore, Pakistan		A GE and Alstom joint venture		NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)						Project no. P-60194		Sheet type AB		Sheet no. 03	
REV.		DESCRIPTION		DATE		DRAWER																	
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	QTY.	DEVICE DESCRIPTION		DEVICE SPECIFICATIONS DEVICE TYPE ; TECHNICAL DATA / SPECIFICATIONS			DEVICE DESIGNITION		MANUFACTURER			
	01	OVERCURRENT EARTHFAULT RELAY		AGILE P14N, Cortec: P14N-B16A7C570A			-F51		GE GRID SOLUTIONS			
				Supply: 24-250VDC / 110-240VAC, 4 CT (1/5A) Inputs								
				8 Opto Inputs, 8 Relay Outputs								
	01	TEST BLOCK		MMLG01, Cortec: MMLG01-R1AA9002D			-XT51		GE GRID SOLUTIONS			
	2	TRIPPING RELAY (HAND/ELECTRICAL RESET)		MVAJ105, Cortec: MVAJ105-RA1002A			-F86-1, F86-2		GE GRID SOLUTIONS			
				Supply: 220-250VDC, 8 NO + 2 NC Contacts								
	02	CONTROL MCB - PANEL LIGHT & HEATER		G62C02+(CAH2) , 2-Pole, Ratings: 2A, 230VAC, 20kA @ 230VAC, 2 C/O Contacts			-F101-102		GE			
	01	CONTROL ELCB - PANEL SOCKET		DM100C16/030+(CAH2), 2-Pole, Ratings: 16A, 30mA, 230VAC, 10kA @ 230VAC, 2 C/O Contacts			-F103		GE			
	04	CONTROL MCB - DC DISTRIBUTION		EP102UCC04+(CAH2), 2-Pole, Ratings: 4A, 220VDC, 10kA @ 220VDC, 2 C/O Contacts			-F202, -F203, -F204 - F205		GE			
	01	PUSHBUTTON - TRIP RESET		YS-AP-1-2-40-B-D-W, Black button, Spring return, 2-Pole, Ratings: 12A, 220VDC			-S86		YONGSUNG			
	01	AUXILIARY CONTACTOR		MCRC022ATN+MARN211AT, Coil Voltage: 220VDC, 3 NO+3 NC Contacts			-KCS		GE			
	06	AUXILIARY CONTACTOR		PRC4M40DCML, Coil Voltage: 220VDC, 4 C/O Contacts			-KDCM,-KDC1/2,-K51T,K51F, -KAC		GE			
	02	AUXILIARY CONTACTOR		PRC4M40ANL, Coil Voltage: 230VAC, 4C/O Contacts			-KDC, -KACM		GE			
	01	INDICATION LAMP - DC SUPPLY FAILURE		YS-PL-2-AL-22-R-W, Type: Integrated LED , Color : RED , Supply : 230VAC @ 50Hz			-H200		YONGSUNG			
	01	PANEL LIGHT & DOOR SWITCH		YST8-30-5W+YSP3315GW-B, 260VAC @ 50Hz, 5W, with Door Limit Sw.			-H100, -S100		YONGSUNG			
	01	THREE PIN SOCKET		1N+PE, 16A, 230VAC @ 50Hz			-X100		LEAR			
	01	PANEL HEATER		240VAC @ 50Hz, 16A			-R100		E-LABS			
	01	HUMIDITY & TEMPERATURE CONTROLLER		ELH-220, Thermostat and Humidstat			-B100		E-LABS			
	08	DISCONNECTING TERMINAL BLOCK FOR CT CIRCUIT (SCREW TYPE)		Type: SCB-6			-X4		CABUR			
		WITH SHORTENING ARRANGEMENT										
	08	DISCONNECTING TERMINAL BLOCK FOR CT CIRCUIT (SCREW TYPE)		Type: SCB-6			-X5		CABUR			
		WITH SHORTENING ARRANGEMENT										
	06	TERMINAL BLOCK FOR AC SUPPLY DISTRIBUTION		Type: CBD-4			-XAC		CABUR			
	06	TERMINAL BLOCK FOR DC SUPPLY DISTRIBUTION		Type: CBD-4			-XDC		CABUR			
	0	AS BUILT		18.08.2018	MUR	Manufacturer	Contractor	Client	Project	Title		Drawing no.
					 <b>EPESOL</b> 71-B Garden Block, New Garden Town, Lahore, Pakistan	 <b>Grid Solutions</b> A GE and Alstom joint venture	 <b>NATIONAL TRANSMISSION &amp; DISPATCH COMPANY LIMITED</b> (NTDC-WAPDA)	220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	220kV Coupler Bay Relay Panel (=D06+R8) COMPONENT LIST		P60194-E-DCR-SC-001	
											Project no.	Sheet type
REV.	DESCRIPTION		DATE	DRAWER					P-60194		AC	04
1	2		3	4	5		6	7		8		

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	QTY.	DEVICE DESCRIPTION		DEVICE SPECIFICATIONS DEVICE TYPE ; TECHNICAL DATA / SPECIFICATIONS		DEVICE DESIGNITION		MANUFACTURER	
	12	TERMINAL BLOCK FOR TRIP CIRCUIT-1		Type: CBD-4		-XTC1		CABUR	
	12	TERMINAL BLOCK FOR TRIP CIRCUIT-2		Type: CBD-4		-XTC2		CABUR	
	05	TERMINAL BLOCK FOR CONTROL		Type: CBD-4		-X03		CABUR	
	03	TERMINAL BLOCK FOR CONTROL		Type: CBD-4		-X2		CABUR	
	07	TERMINAL BLOCK FOR ANNUNCIATION		Type: CBD-4		-XAN		CABUR	
	07	TERMINAL BLOCK FOR SCADA		Type: CBD-4		-XSC		CABUR	
	07	TERMINAL BLOCK FOR EVENT RECORDER		Type: CBD-4		-XEV		CABUR	
	03	TERMINAL BLOCK FOR FAULT RECORDER		Type: CBD-4		-XFR		CABUR	

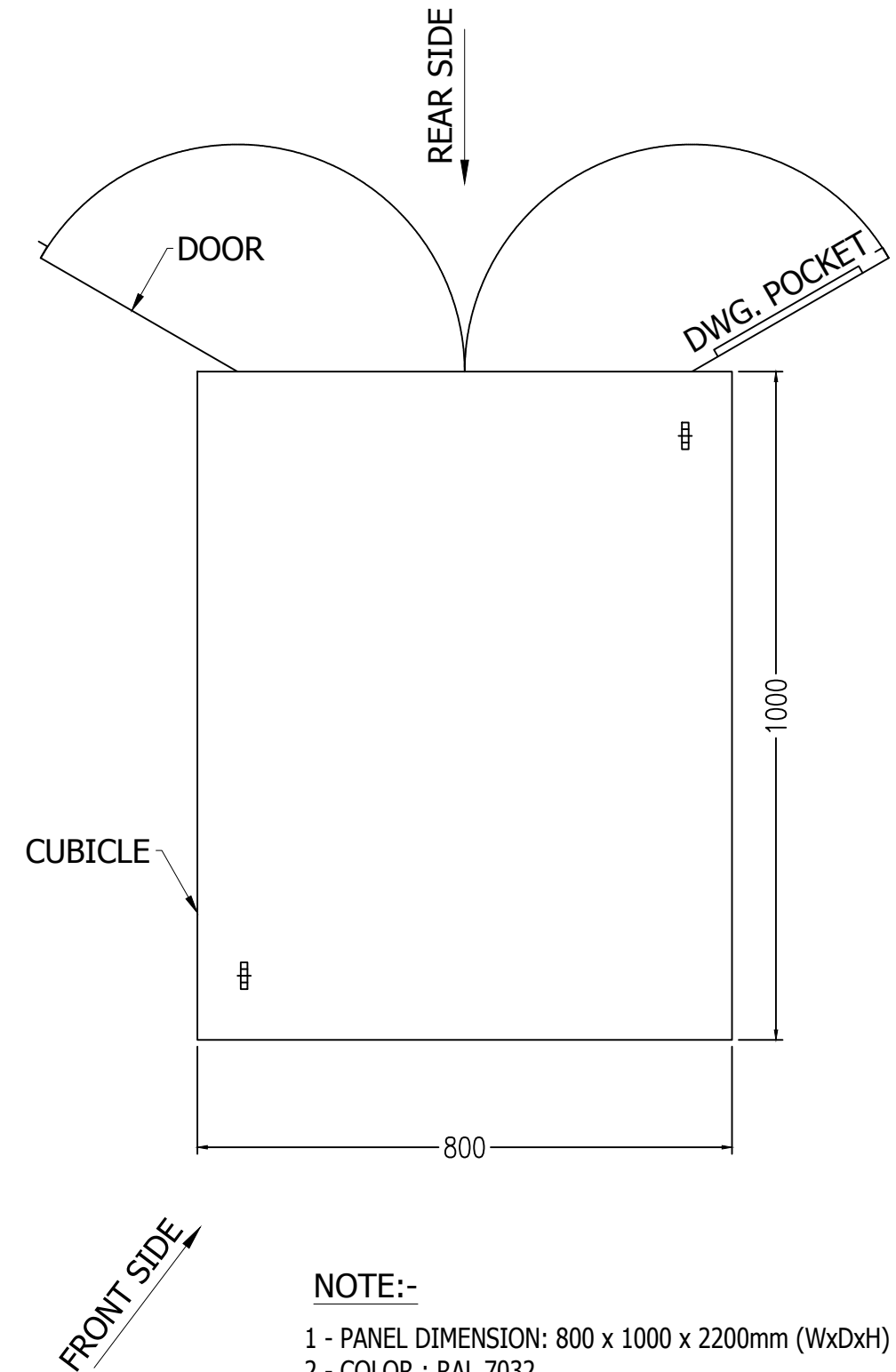
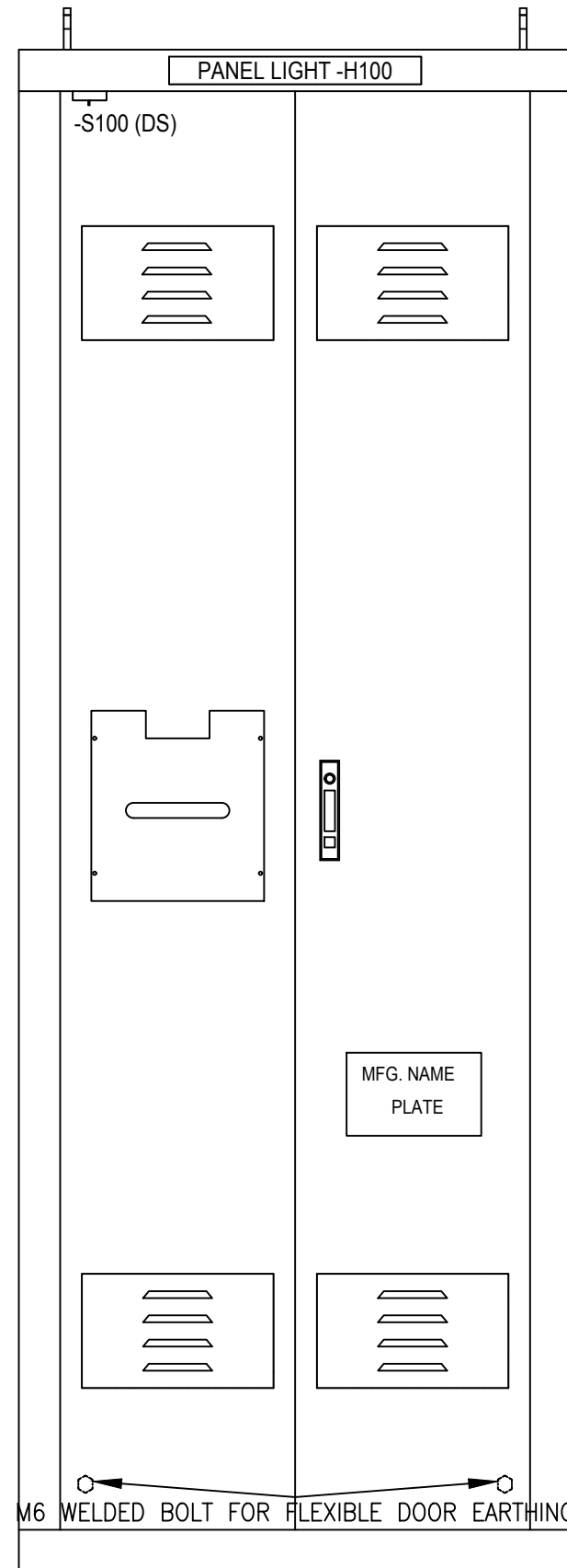
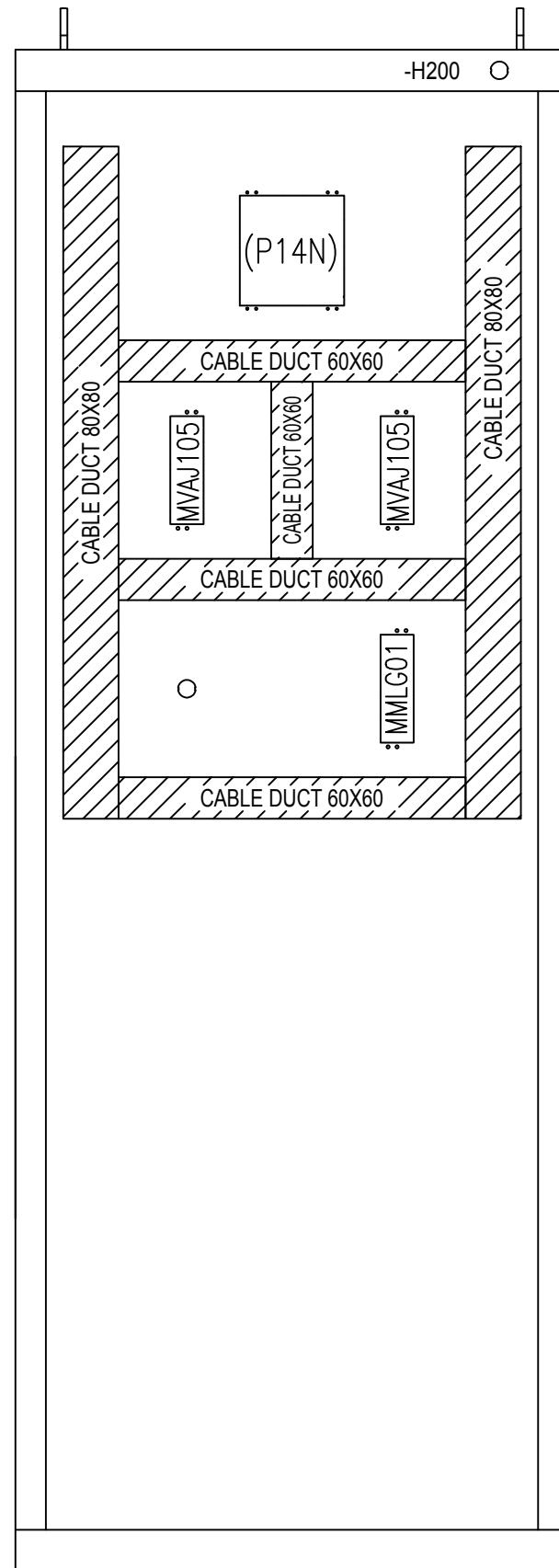
RIGHT SIDE VIEW




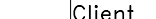

SLOT FOR EARTHING  
BUSBAR  
7X30mm

0	AS BUILT	18.08.2018	MUR	 <b>EPESOL</b> 71-B Garden Block, New Garden Town, Lahore, Pakistan	 <b>Grid Solutions</b> A GE and Alstom joint venture	 <b>NATIONAL TRANSMISSION &amp; DISPATCH COMPANY LIMITED</b> (NTDC-WAPDA)	<b>Project</b> 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	<b>Title</b> 220kV Coupler Bay Relay Panel (=D06+R8) PANEL VIEW	<b>Drawing no.</b> P60194-E-DCR-SC-001						
													<b>Project no.</b> P-60194	<b>Sheet type</b> AE	<b>Sheet no.</b> 06
REV.	DESCRIPTION	DATE	DRAWER												

TOP VIEW

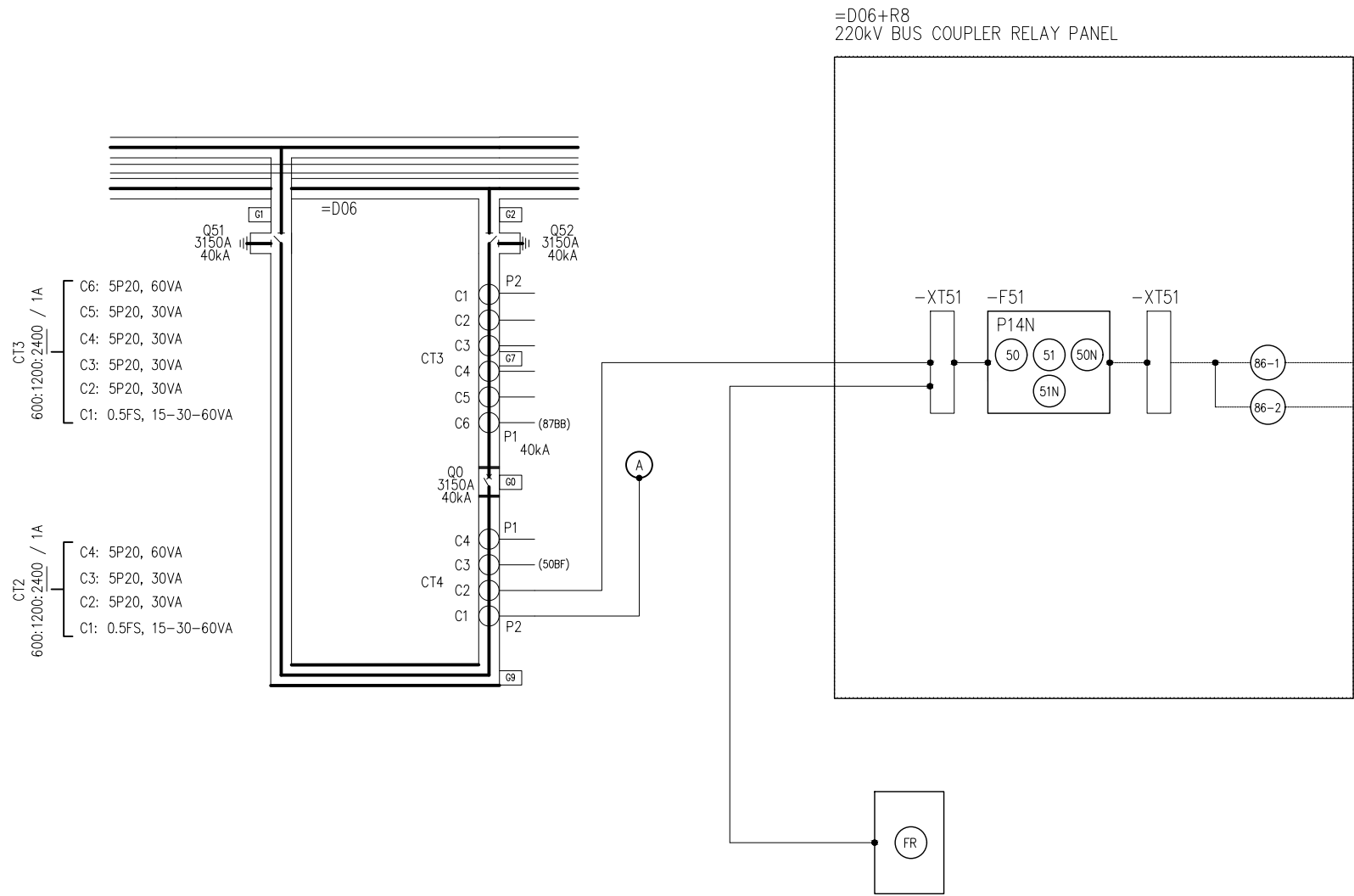


- 1 - PANEL DIMENSION: 800 x 1000 x 2200mm (WxDxH)
- 2 - COLOR : RAL 7032
- 3 - SHEET THICKNESS : 2-2.5 mm
- 4- PROTECTION CLASS : IP-51 (INDOOR TYPE)
- 5 - ALL DOOR FITTED WITH 16mm EARTH STRAP & INSULATED WITH GREEN-YELLOW COLOUR.




0	AS BUILT	18.08.2018	MUR	 <b>EPESOL</b> 72-B Garden Block, New Garden Town, Lahore, Pakistan	 Grid Solutions A GE and Alstom joint venture	 NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV Coupler Bay Relay Panel (=D06+R8) PANEL VIEW	Drawing no. P60194-E-DCR-SC-001							
REV.	DESCRIPTION	DATE	DRAWER											Project no. P-60194	Sheet type AE1	Sheet no. 06a



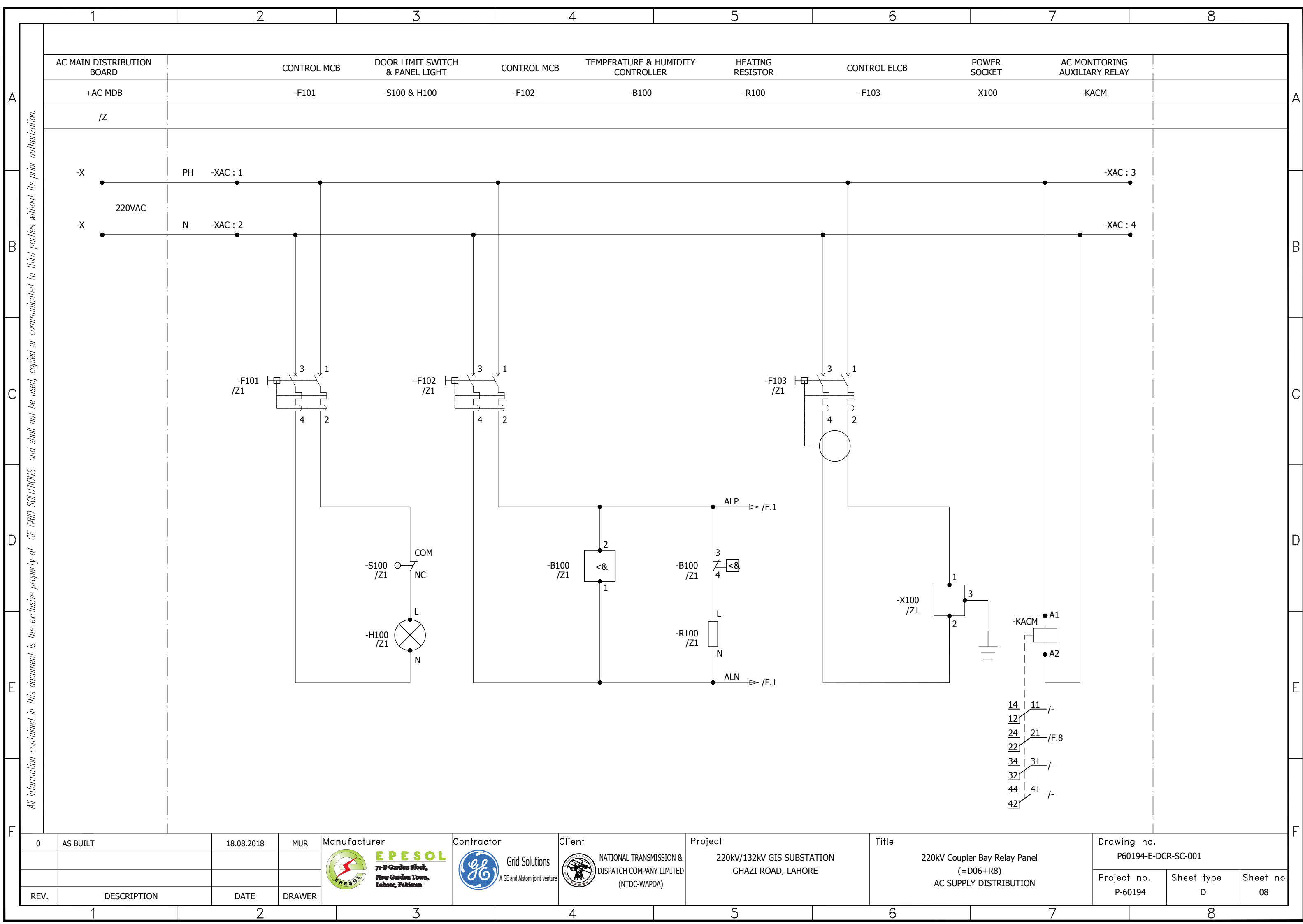
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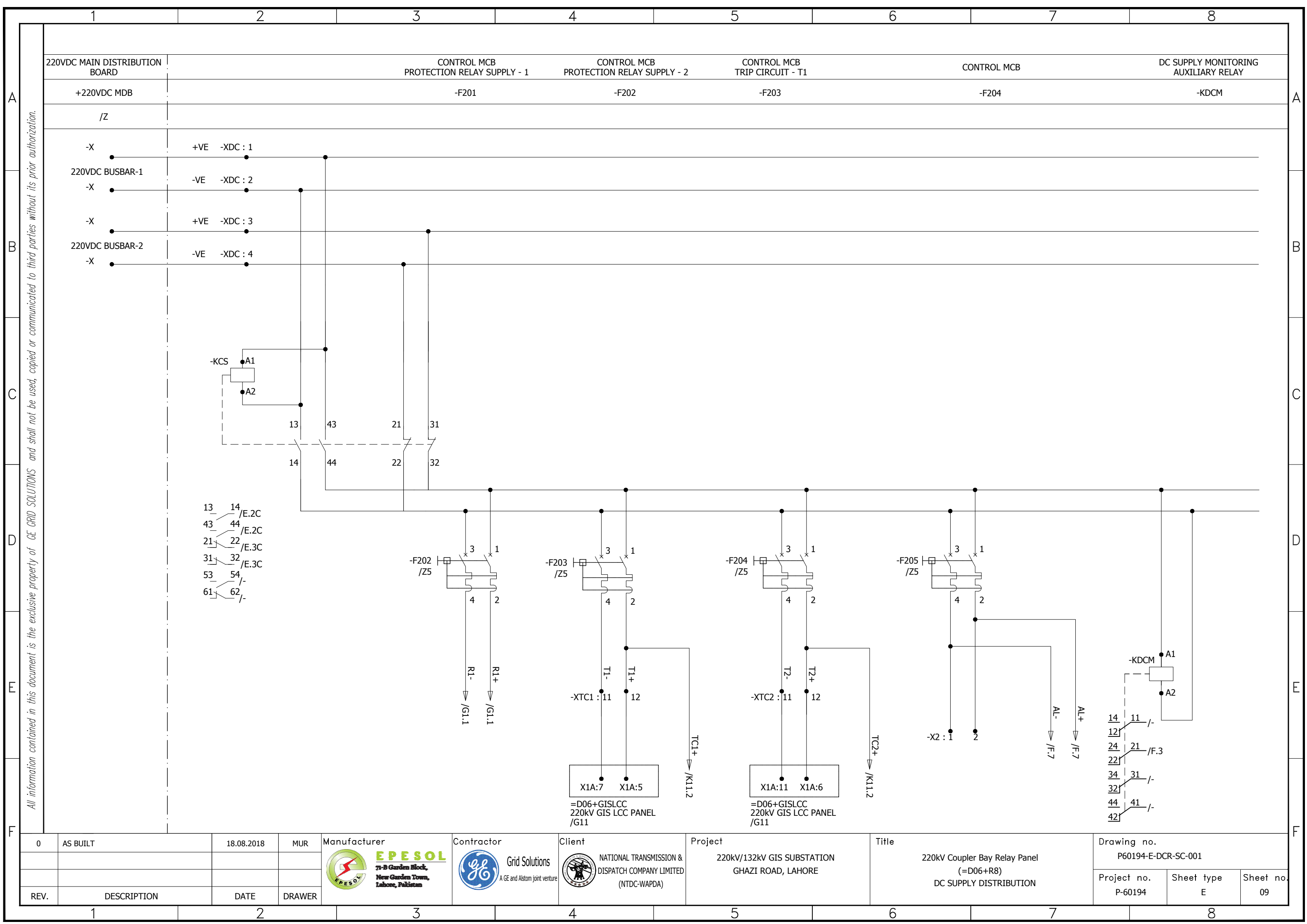


TRIP CIRCUIT-1 (D06+Q0)								
TRIP CIRCUIT-2 (D06+Q0)								
(=D06+Q0 BFI)								
ANNUNCIATOR								
NTDC SCADA								
EVENT RECORDER								
FAULT RECORDER								
=D04+Q0 CLOSE BLOCK								

0	AS BUILT	18.08.2018	MUR	Manufacturer  <b>EPESOL</b> 71-B Garden Block, New Garden Town, Lahore, Pakistan	Contractor  <b>Grid Solutions</b> A GE and Alstom joint venture	Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV Coupler Bay Relay Panel (=D06+R8) BAY CONCEPT & PROTECTION LOGICS	Drawing no. P60194-E-DCR-SC-001		
REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type AF	Sheet no. 07










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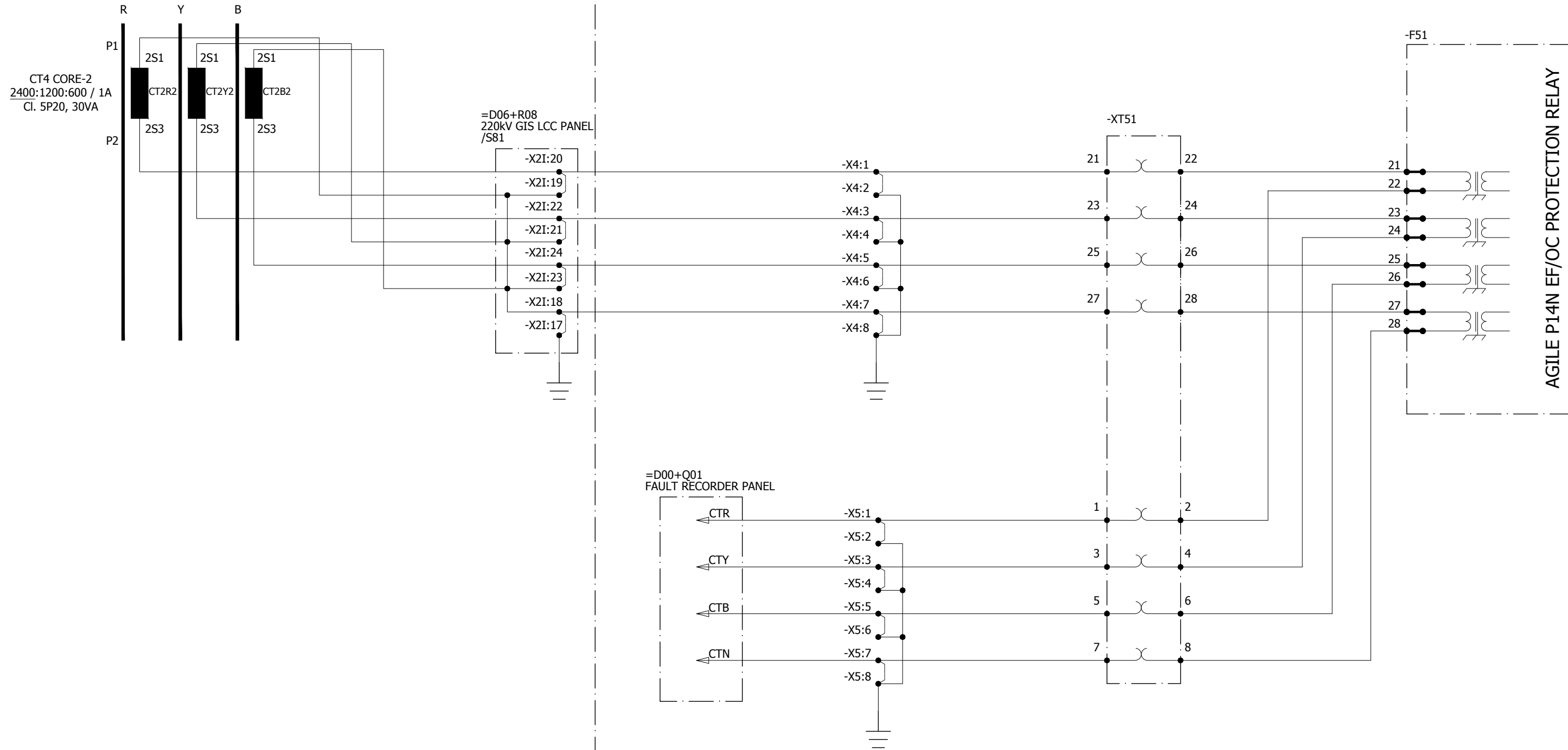





0	AS BUILT	18.08.2018	MUR	<div><div><b>EPESOL</b> 71-B Garden Block, New Garden Town, Lahore, Pakistan</div></div>	<div><div>Grid Solutions A GE and Alstom joint venture</div></div>	<div><div>NATIONAL TRANSMISSION &amp; DISPATCH COMPANY LIMITED (NTDC-WAPDA)</div></div>	Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	Title 220kV Coupler Bay Relay Panel (=D06+R8) AC/DC SUPPLY FAILURE CIRCUIT	Drawing no. P60194-E-DCR-SC-001				
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REV.	DESCRIPTION	DATE	DRAWER										



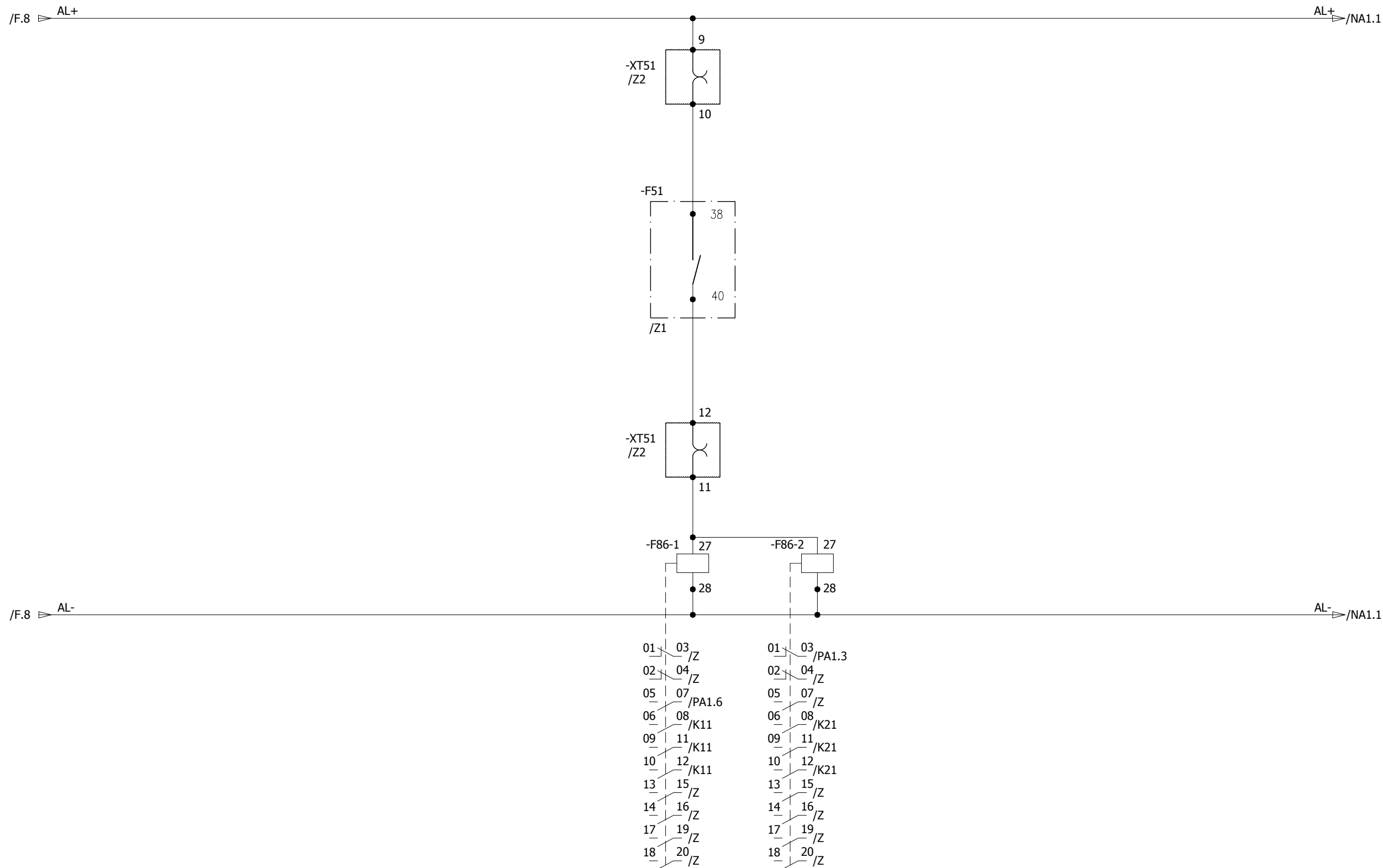
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220kV GIS HALL      CONTROL ROOM

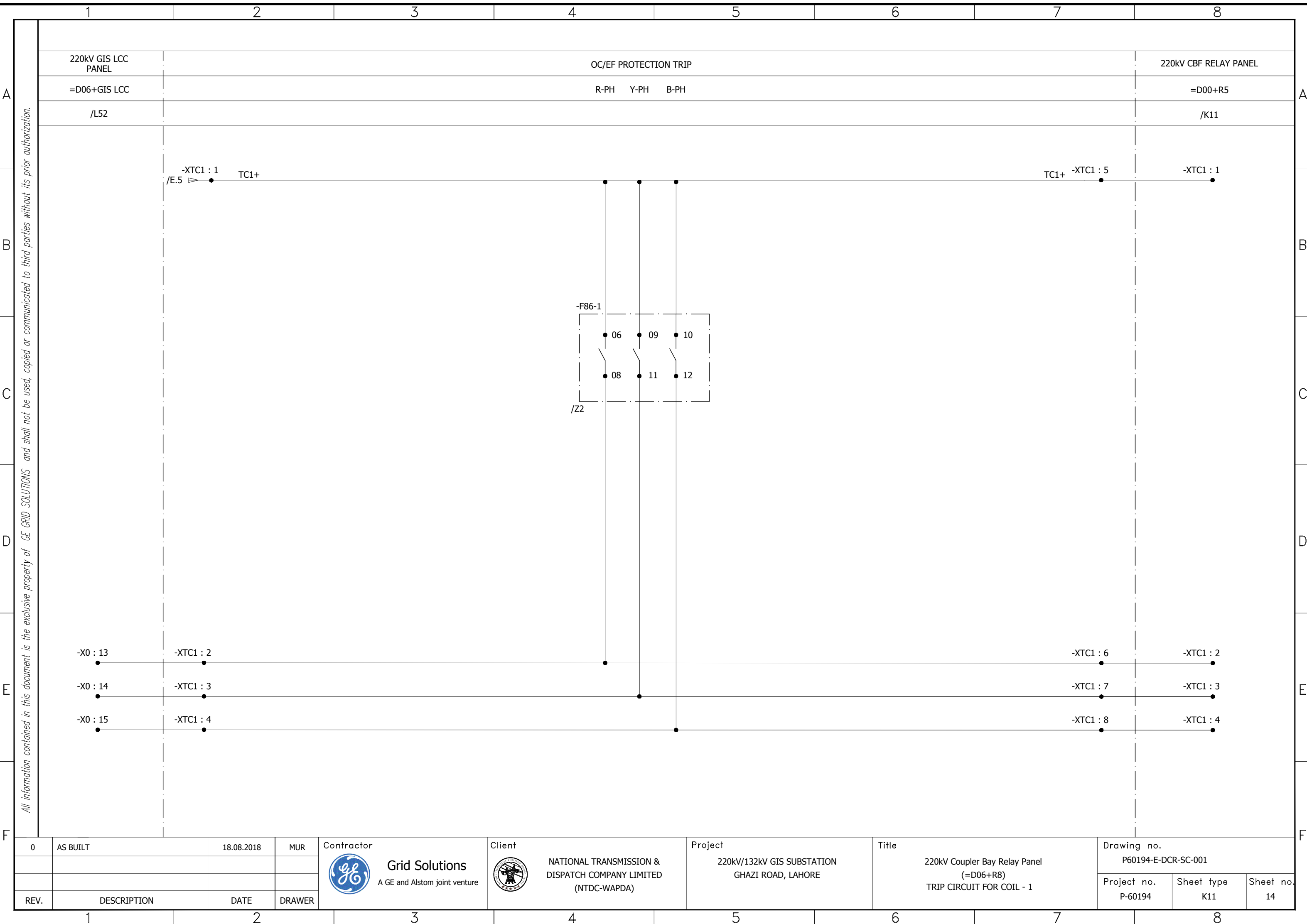


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REV.	DESCRIPTION	DATE	DRAWER						Project no. P-60194	Sheet type H1	Sheet no. 12

A
B
C
D
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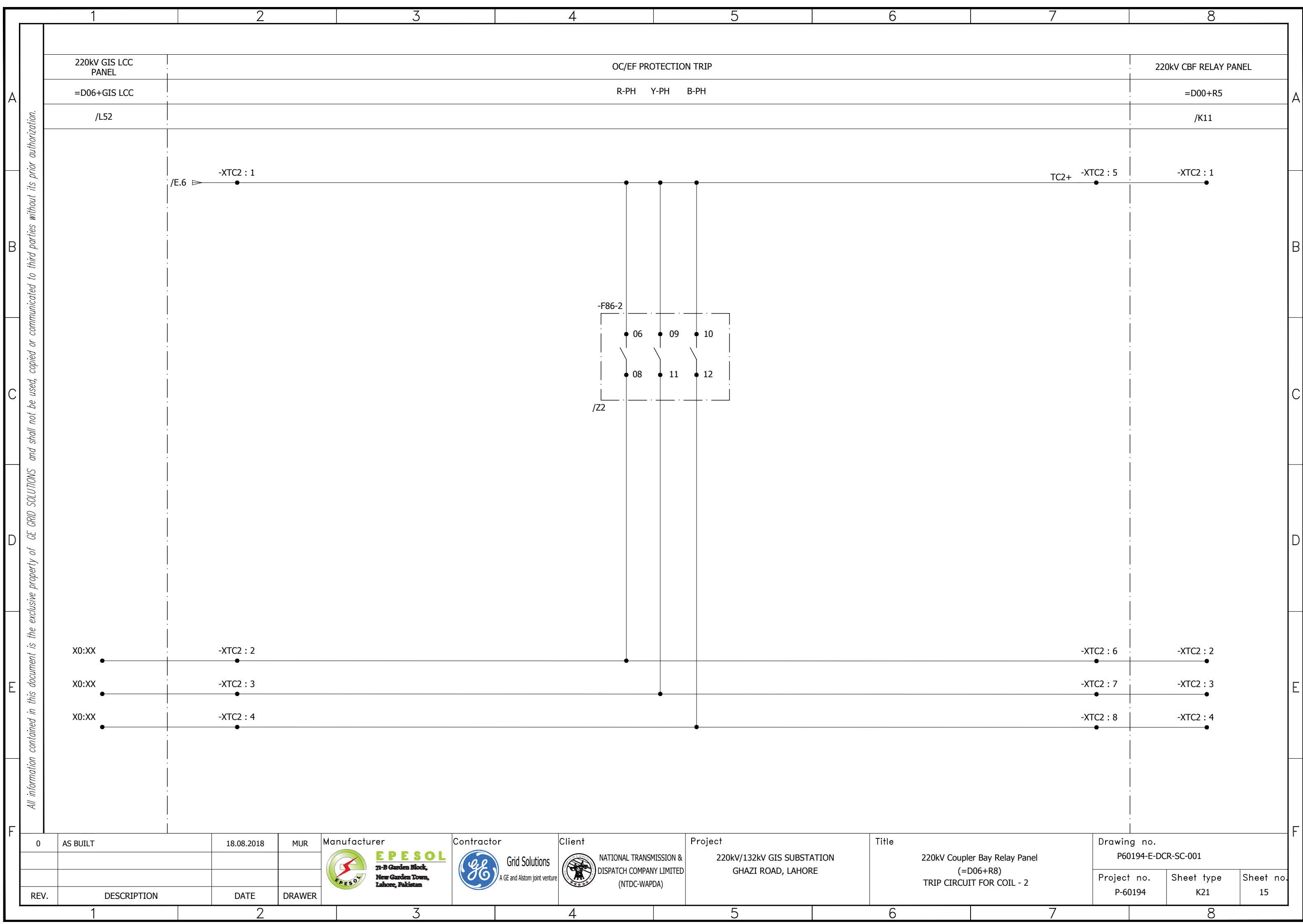


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REV.	DESCRIPTION	DATE	DRAWER						<b>Project no.</b> P-60194	<b>Sheet type</b> K1	<b>Sheet no.</b> 13

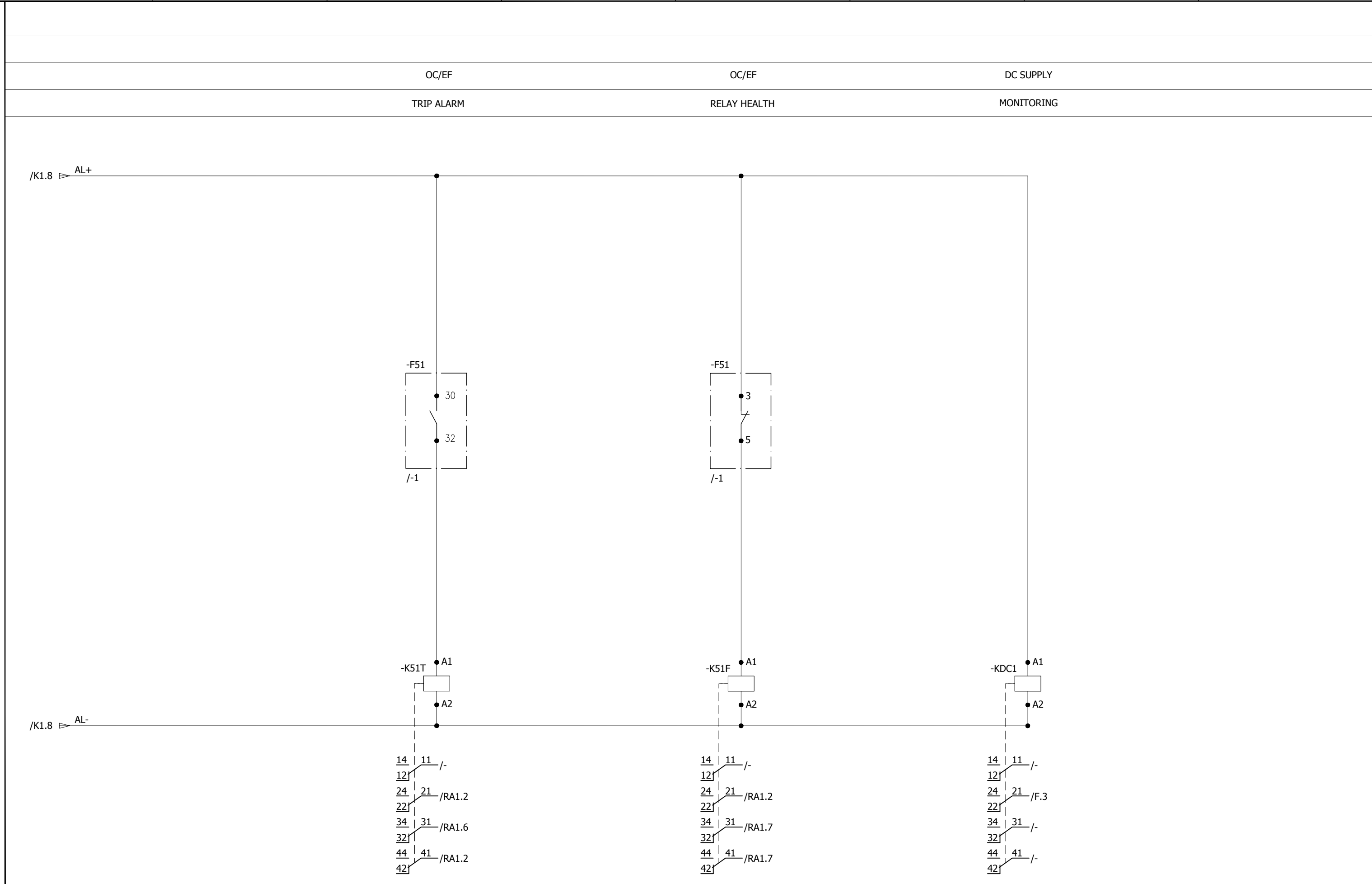





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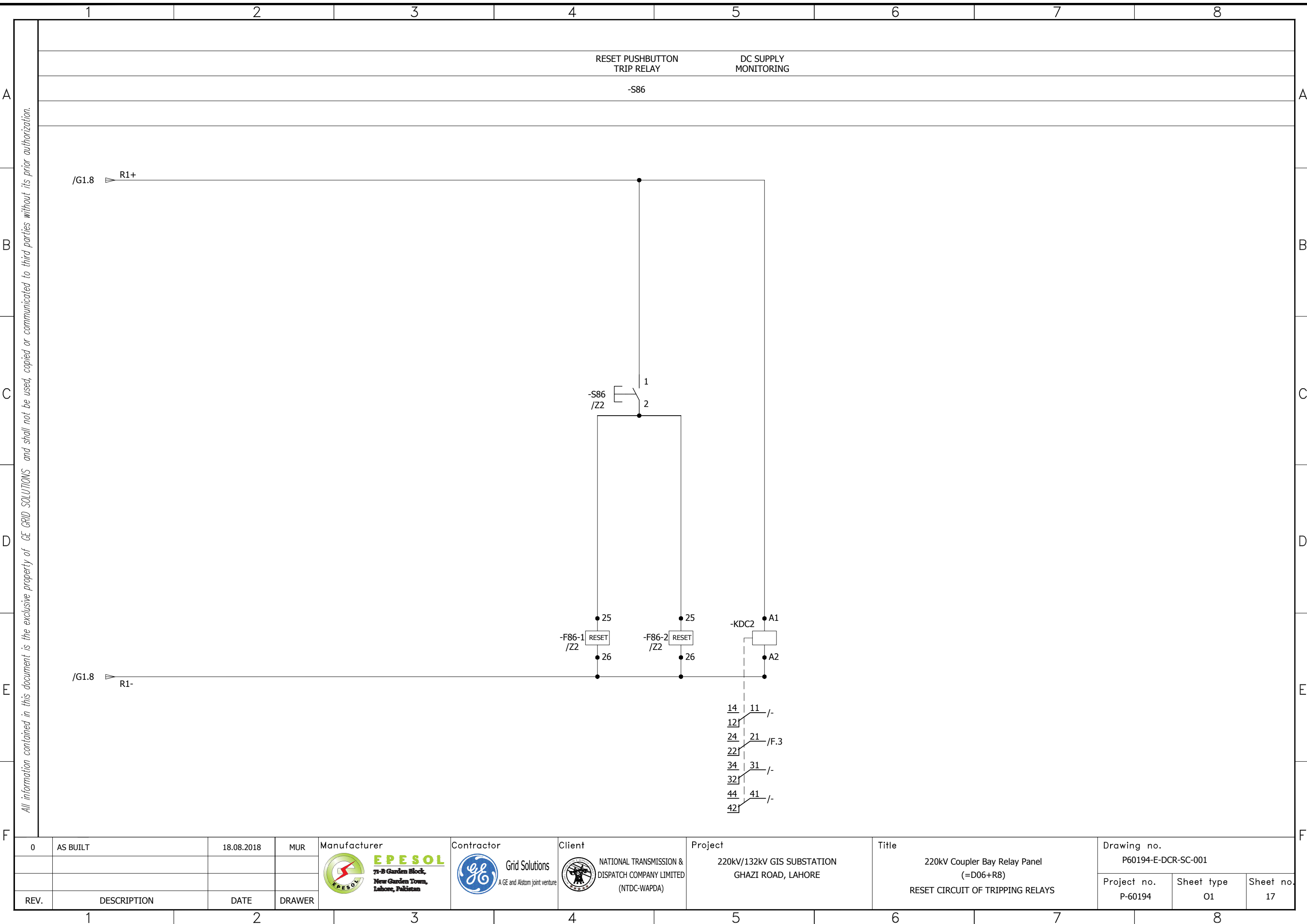




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				 <b>EPESOL</b> 71-B Garden Block, New Garden Town, Lahore, Pakistan	 Grid Solutions A GE and Alstom joint venture	 NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	220kV Coupler Bay Relay Panel (=D06+R8) SYSTEM ALARMS	P60194-E-DCR-SC-001		
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REV.	DESCRIPTION	DATE	DRAWER						P-60194	NA1	16



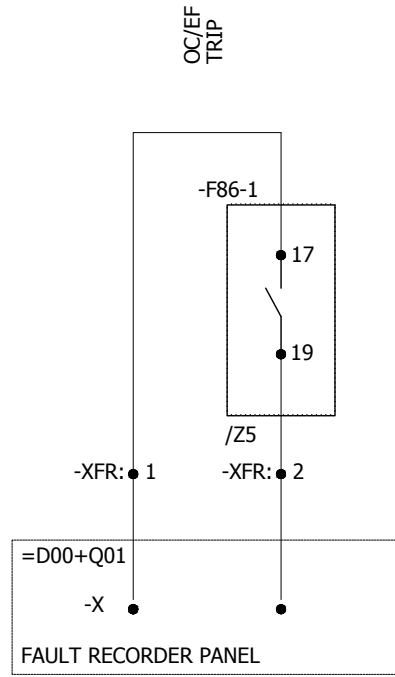
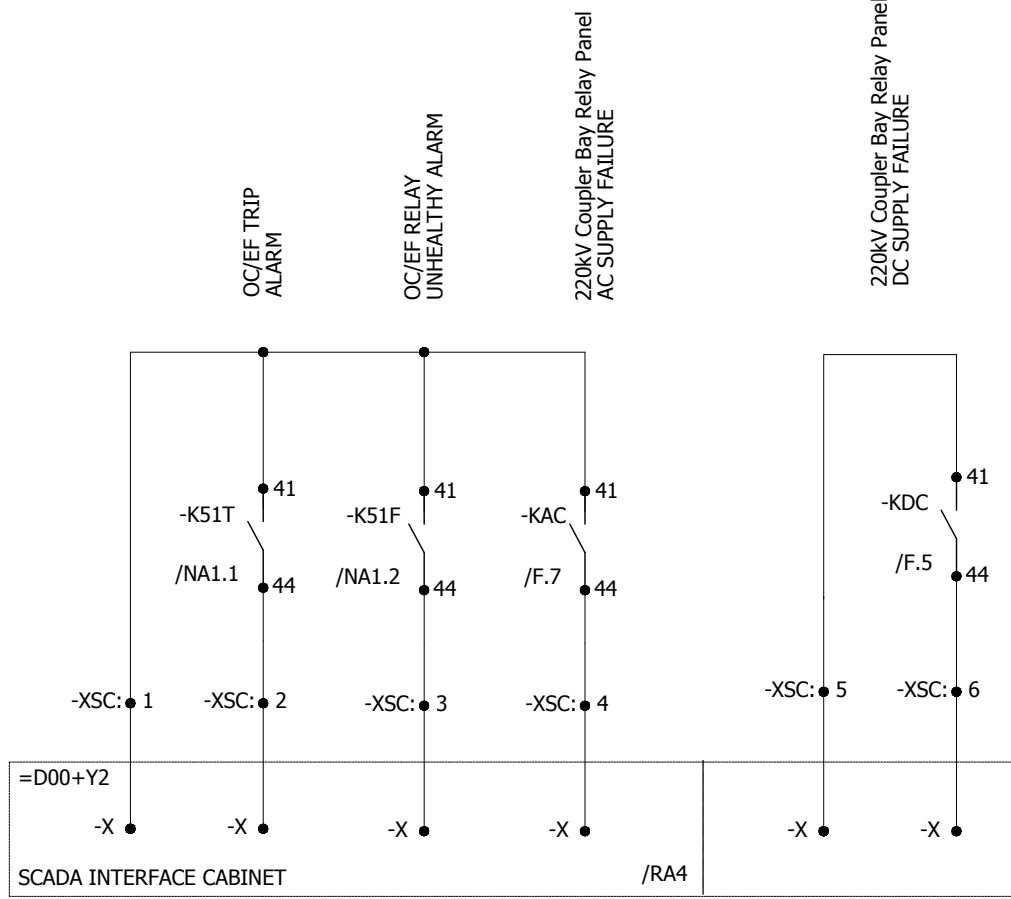
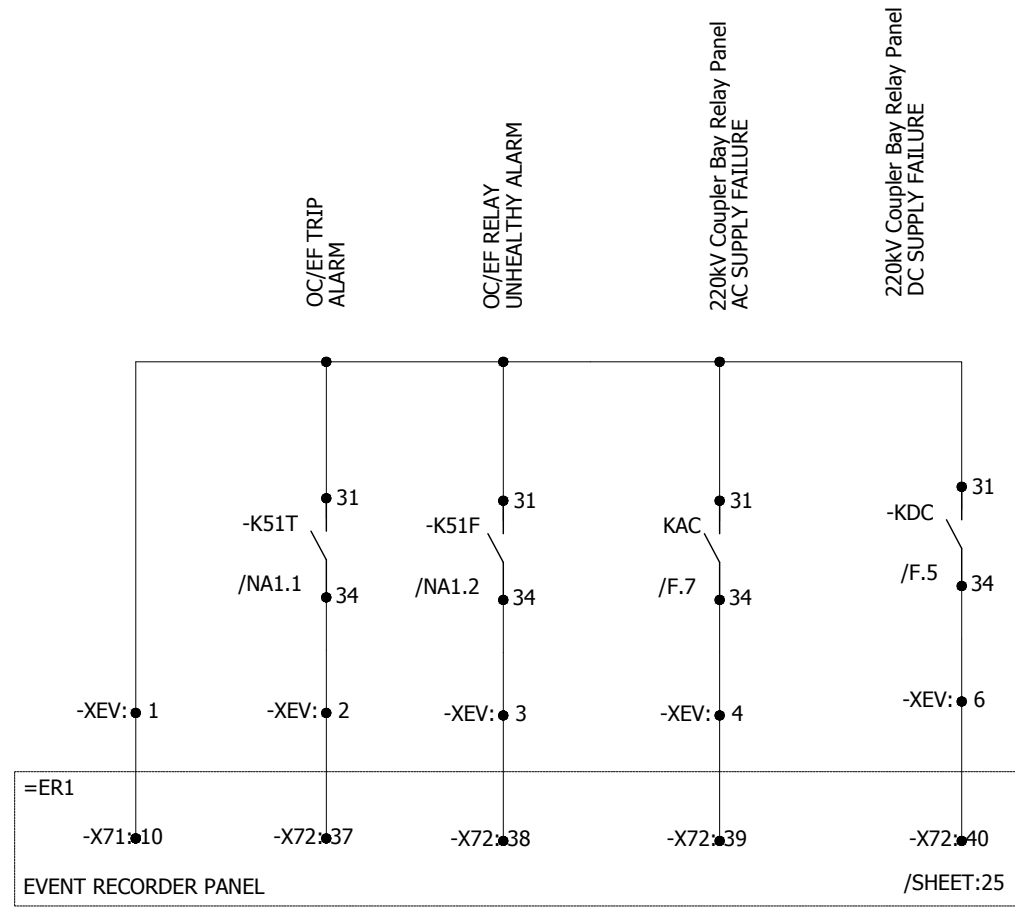
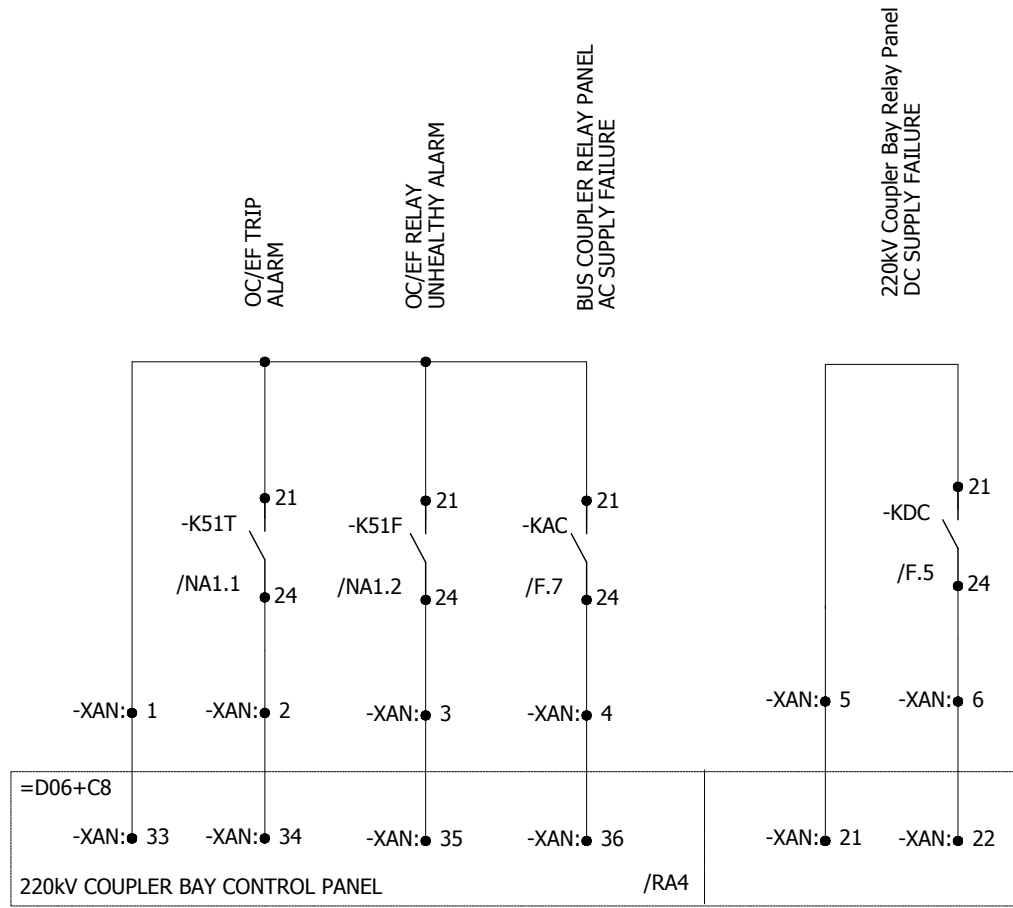
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220 kV CIRCUIT BREAKER FAILURE INITIATION SIGNAL

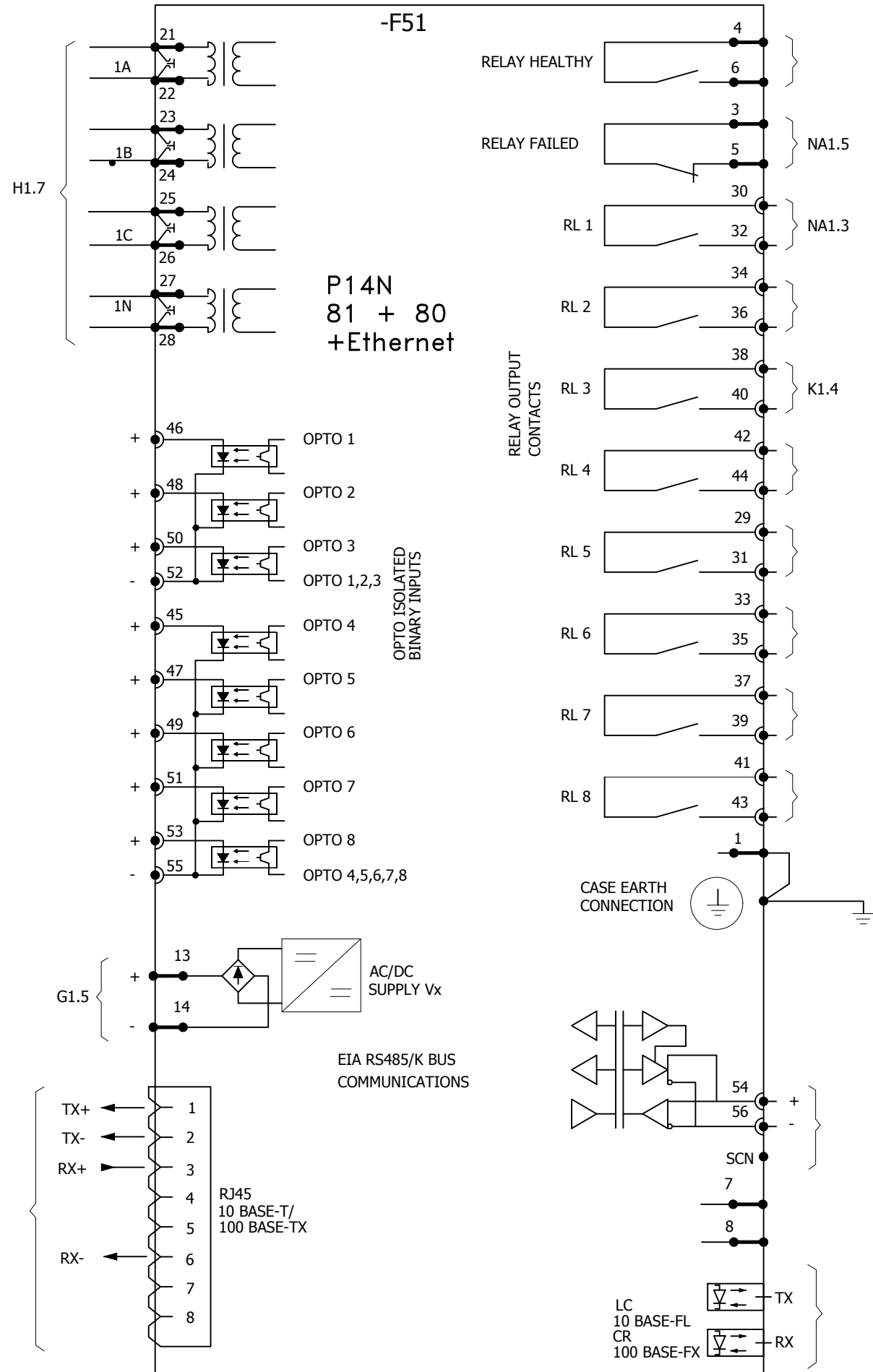
The diagram illustrates the 220 kV Circuit Breaker Failure Initiation Signal. It shows a vertical line representing the circuit breaker, with a switch symbol in the center. The switch is labeled with '05' and '07' at its contacts. The switch is controlled by a signal labeled '-F86-1'. The switch is connected to a busbar labeled '/Z5'. The busbar is connected to a terminal labeled '-X03: 3' and '-X03: 4'. The terminal is connected to a busbar labeled '/J2'. The busbar is connected to a terminal labeled '-X6: 3' and '-X6: 4'. The terminal is connected to a busbar labeled '=D00+R5B'. The busbar is connected to a terminal labeled '-X03: 3' and '-X03: 4'. The terminal is connected to a busbar labeled '/J2'. The busbar is connected to a terminal labeled '-X6: 3' and '-X6: 4'. The terminal is connected to a busbar labeled '=D00+R5B'.




0	AS BUILT	18.08.2018	MUR	<div><div></div><div><b>EPESOL</b> 71-B Garden Block, New Garden Town, Lahore, Pakistan</div></div>	<div><div></div><div>Grid Solutions A GE and Alstom joint venture</div></div>	<div><div></div><div>NATIONAL TRANSMISSION &amp; DISPATCH COMPANY LIMITED (NTDC-WAPDA)</div></div>	Project  220kv/132kv GIS SUBSTATION GHAZI ROAD, LAHORE	Title  220kv Coupler Bay Relay Panel (=D06+R8) PROTECTION INTER-CIRCUITS	Drawing no. P60194-E-DCR-SC-001		
REV.	DESCRIPTION	DATE	DRAWER								

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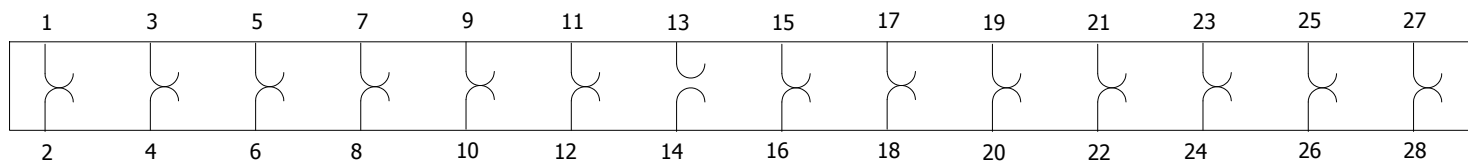


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				 <b>EPESOL</b> 71-B Garden Block, New Garden Town, Lahore, Pakistan	 Grid Solutions A GE and Alstom joint venture	 NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)	220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	220kV Coupler Bay Relay Panel (=D06+R8) ANNUNCIATION, FR,ER & SCADA CIRCUIT	Project no. P-60194	Sheet type RA1	Sheet no. 19
REV.	DESCRIPTION	DATE	DRAWER								

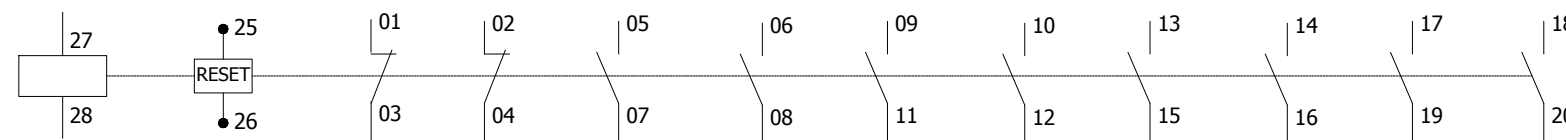


0	AS BUILT	18.08.2018	MUR	<b>Manufacturer</b>  <b>EPESOL</b> 77-B Garden Block, New Garden Town, Lahore, Pakistan	<b>Contractor</b>  <b>Grid Solutions</b> A GE and Alstom joint venture	<b>Client</b>  <b>NATIONAL TRANSMISSION &amp; DISPATCH COMPANY LIMITED</b> (NTDC-WAPDA)	<b>Project</b> 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	<b>Title</b> 220kV Coupler Bay Relay Panel (=D06+R8) COMPONENT DIAGRAM	<b>Drawing no.</b> P60194-E-DCR-SC-001		
REV.	DESCRIPTION	DATE	DRAWER						<b>Project no.</b> P-60194	<b>Sheet type</b> Z1	<b>Sheet no.</b> 20

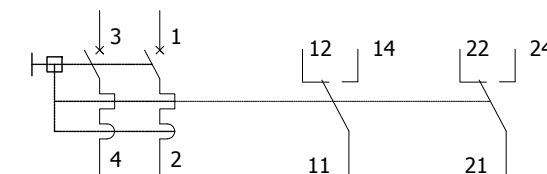
A
B
C
D
E
F



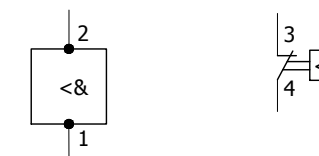
-XT51		K1.5	G1.5		H1.5
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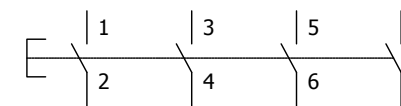
-F86-1	K1.2	O1.2			PA1.6	K11	K11	K11			RA1.7	
-F86-2	K1.3	O1.2	PA1.3			K21	K21	K21				



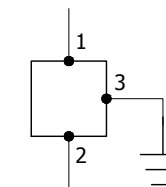
-F101	D.2	F.6	
-F102	D.4	F.6	
-F103	D.6	F.6	
-F202	E.2	F.2	
-F203	E.3	F.2	
-F204	E.4	F.2	
-F205	E.5	F.3	



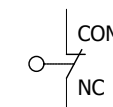
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-S86	01			
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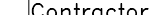

-X100	D.7
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-S100	D.3
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-H100	D.3
-H200	F.4

0	AS BUILT	18.08.2018	MUR	<b>Manufacturer</b>  <b>EPESOL</b> 77-B Garden Block, New Garden Town, Lahore, Pakistan	<b>Contractor</b>  <b>Grid Solutions</b> A GE and Alstom joint venture	<b>Client</b>  <b>NATIONAL TRANSMISSION &amp; DISPATCH COMPANY LIMITED</b> (NTDC-WAPDA)	<b>Project</b> 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE	<b>Title</b> 220kV Coupler Bay Relay Panel (=D06+R8) COMPONENT DIAGRAM	<b>Drawing no.</b> P60194-E-DCR-SC-001		
REV.	DESCRIPTION	DATE	DRAWER								