



Grid Solutions

A GE and Alstom joint venture

220kV/132kV GIS SUBSTATION GHAZI ROAD , LAHORE

220kV SYNCHRONIZING PANEL (=D00+C6)

SCHEMATIC DRAWINGS

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| F | | | | | | | | | | | | | | | |
| | 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer  EPESOL 7-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor  Grid Solutions A GE and Alstom joint venture | Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) LIST OF CONTENTS | Drawing no. P60194-E-DSC-SC-001 | | | | | |
| | 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 | | KEY OPERATED SELECTOR SWITCH | | AMMETER | 24 | OVEREXCITATION |
| C | | EARTHING | | LIMITED SWITCH | | VOLTMETER | 25 | SYNCHROCHECK |
| D | | SF6 TO AIR BUSHING | | HUMIDITY & TEMPERATURE CONTROLLER | | POWER FACTOR METER | 49 | THERMAL OVERLOAD |
| E | | LINE TRAP | | PANEL HEATER | | DIGITAL PANEL METER | 50/51 | PHASE INST./OVERCURRENT |
| F | | SURGE ARRESTOR | | THREE PIN SOCKET | | ACTIVE POWER METER | 50N/51N | EARTH INST./OVERCURRENT |
| G | | CURRENT TRANSFORMER | | INDICATION LIGHT | | REACTIVE POWER METER | 50BF | CIRCUIT BREAKER FAILURE |
| H | | COUPLING CAPACITOR VOLTAGE TRANSFORMER | | PUSH BUTTON | | ENERGY METER | 64 | RESTRICTED EARTH FAULT |
| I | | POWER TRANSFORMER | | AUXILIARY CONTACTOR COIL | | | 67N | DIRECTIONAL EARTH FAULT |
| J | | AUTO TRANSFORMER | | POWER SUPPLY AC/DC | | | 68 | POWER SWING BLOCKING |
| K | | | | TERMINAL | | | 24 | OVER EXCITATION |
| L | | | | OPTO CONTACTS | | | 79 | AUTO-RECLOSING |
| M | | | | RELAY CONTACTS | | | 49 | THERMAL OVERLOAD |
| N | | | | HOOTER | | | 87T | TRAFO DIFFERENTIAL |
| O | | | | AC BELL | | | 87C | DIFFERENTIAL CONNECTION |
| P | | | | | | | 87BB | DIFFERENTIAL BUSBAR |

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1 AS BUILT 18.08.2018 MSC Manufacturer EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan

Contractor Grid Solutions A GE and Alstom joint venture

Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA)

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

Title 220kV SYNCHRONIZING PANEL (=D00+C6) SYMBOLA AND LEGENDS

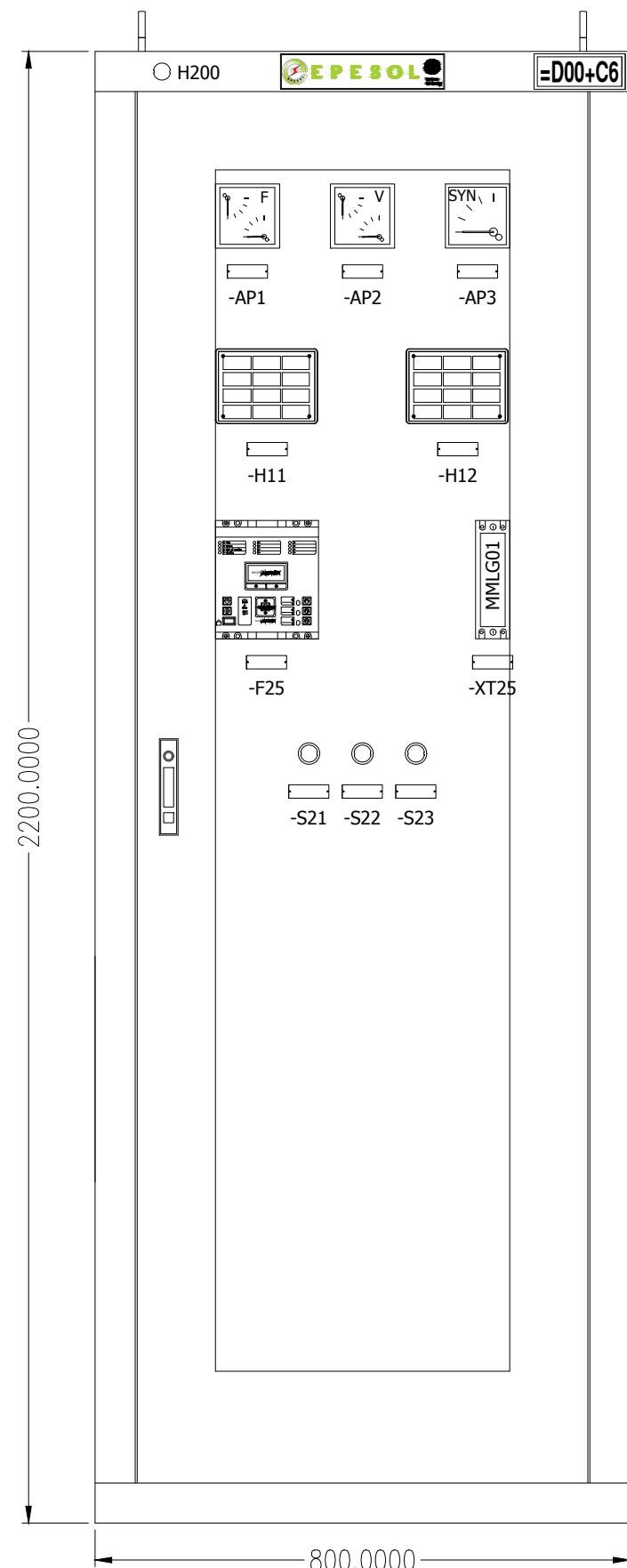
Drawing no. P60194-E-DSC-SC-001

Project no. P-60194 Sheet type AB Sheet no. 03

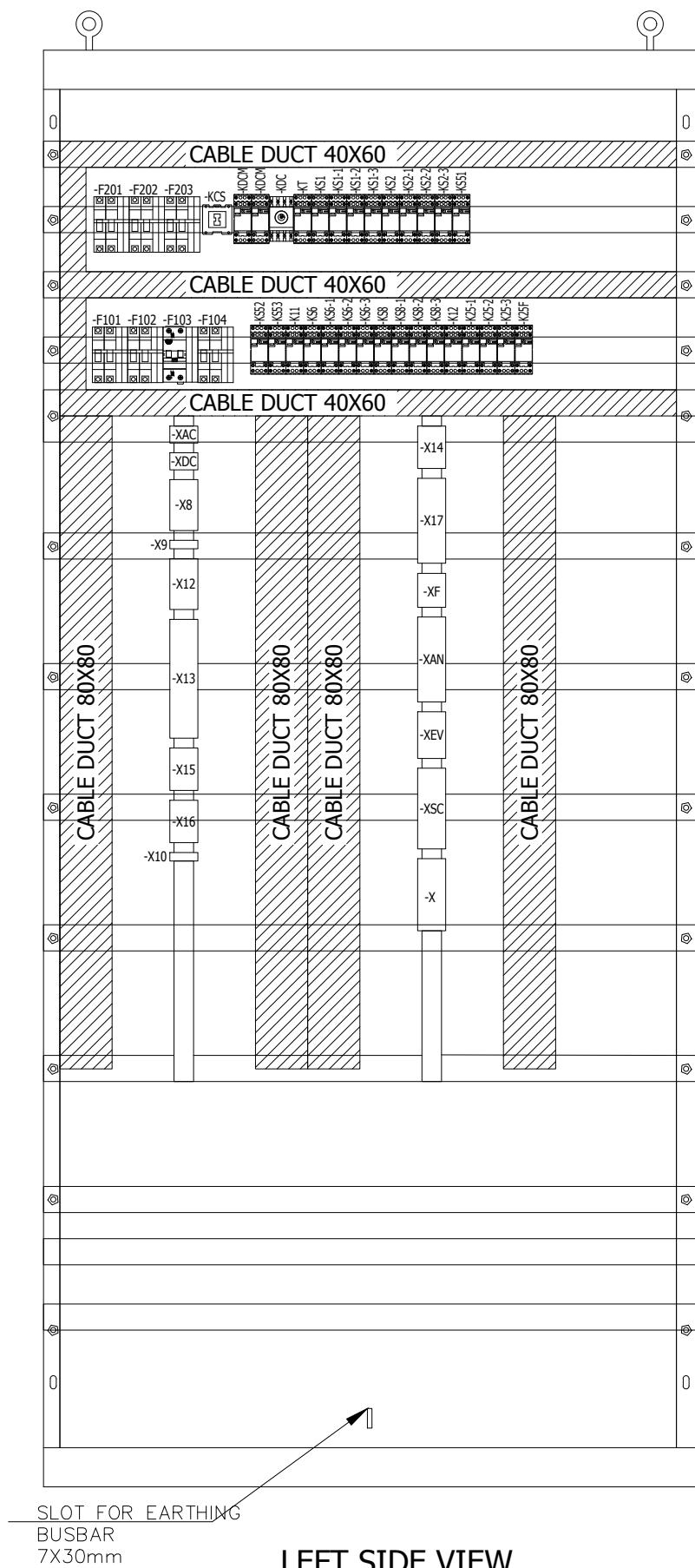
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | |
|---|------|-----------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------------|------------------------------------|
| | QTY. | DEVICE DESCRIPTION | | DEVICE SPECIFICATIONS DEVICE TYPE ; TECHNICAL DATA / SPECIFICATIONS | | | DEVICE DESIGNITION | | MANUFACTURER | | |
| | | | | | | | | | | | |
| A | 01 | SYNCHRO CHECK RELAY | | AGILE P94V, Cortec: P94VP16A7C0520A Supply: 24-250VDC / 110-240VAC, 4 VT Inputs, 8 Opto Inputs, 8 Relay Outputs 8 Opto Inputs, 8 Relay Outputs | | | -F25 | | GE | | |
| | 01 | TEST BLOCK | | MMLG01, Cortec: MMLG01-R1AA9002D | | | -XT25 | | GE | | |
| | 02 | CONTROL MCB - PANEL LIGHT & HEATER | | 2-Pole, Ratings: 2A, 240VAC, 10kA @ 240VAC, 2 C/O Contacts, Ord: G62C02+CAH(2) | | | -F101-102 | | GE | | |
| B | 01 | CONTROL MCB - AC BELL CIRCUIT | | 2-Pole, Ratings: 2A, 240VAC, 10kA @ 240VAC, 2 C/O Contacts, Ord: G62C02+CAH(2) | | | -F104 | | GE | | |
| | 01 | CONTROL ELCB - PANEL SOCKET | | 2-Pole, Ratings: 16A, 30mA, 240VAC, 1P+N, 2 C/O Contacts, Ord: DM100C16/030+CAH(2) | | | -F103 | | GE | | |
| | 02 | CONTROL MCB - DC DISTRIBUTION | | 2-Pole, Ratings: 4A, 250VDC, 10kA @ 250VDC, 2 C/O Contacts, Ord: EP102UCC04+CAH(2) | | | -F201-202 | | GE | | |
| | 01 | CONTROL MCB - DC HOOTER CIRCUIT | | 2-Pole, Ratings: 4A, 250VDC, 10kA @ 250VDC, 2 C/O Contacts, Ord: EP102UCC04+CAH(2) | | | -F203 | | GE | | |
| C | 02 | CONTACTOR RELAY | | Coil Voltage: 230VAC @ 50/60 Hz, 6A, 4 C/O Contacts, Ord: PRC4M40ANL | | | -KACM, -KDC | | GE | | |
| | 01 | AUXILIARY CONTACTOR - SUPPLY CHANGEOVER | | Coil Voltage: 220VDC, 16A, 3 NO + 3 NC Contacts, Ord: MCRC022ATWN+MARN211AT | | | -KCS | | GE | | |
| | 39 | CONTACTOR RELAY | | Coil Voltage: 220VDC, DIODE, 4 C/O Contacts, Ord: PRC4M40DCML | | | -KDCM, -KAC, -KS1, -KS1-1, -KS1-2, -KS1-3, -KS2, -KS2-1, -KS2-2, -KS2-3, -KS5, -KS5-1, -KS5-2, -KS5-3, -K11, -KS6, -KS6-1, -KS6-2, -KS6-3, -KS8, -KS8-1, -KS8-2, -KS8-3, -K12, -K25-1, -K25-2, -K25-3, -K25F, -K101, -K102, -K103, -K104, -K105, -KSCU1, -KSCU2, -KSCU5, -KSCU6, -KSCU8, -KDC1 | | GE | | |
| | 01 | TIMER | | Type: 220VDC, 0-60s, 2 C/O Contacts, Ord: AT8N | | | -KT | | AUTONICS | | |
| | 01 | INDICATION LAMP - DC SUPPLY FAILURE | | Type: Integrated LED, Color : RED , Supply : 230VAC @ 50Hz, Ord: YS-PL-2-AL-22-R-W | | | -H200 | | YONGSUNG | | |
| D | 01 | PUSH BUTTON - ACKNOWLEDGE | | Type: Switch (A Type), Color : BLACK , Supply : 220VDC, Ord: YS-AP1-2-31-B-D-W | | | -S21 | | YONGSUNG | | |
| | 01 | PUSH BUTTON - LAMP TEST | | Type: Switch (A Type), Color : RED , Supply : 220VDC, Ord: YS-AP1-2-31-R-D-W | | | -S22 | | YONGSUNG | | |
| | 01 | PUSH BUTTON - RESET | | Type: Switch (A Type), Color : GREEN , Supply : 220VDC, Ord: YS-AP1-2-31-G-D-W | | | -S23 | | YONGSUNG | | |
| E | 01 | PANEL LIGHT | | 230VAC @ 50Hz, 05W, Ord: YS-T8-30-5W | | | -H100 | | YONGSUNG | | |
| | 01 | DOOR SWTICH | | 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 | | |
| F | 01 | PANEL HEATER | | 230VAC @ 50Hz, 60W | | | -R100 | | E-LABS | | |
| | 01 | HUMIDITY & TEMPERATURE CONTROLLER | | 40-90%RH, 25-50 deg.C, 230VAC @ 50Hz | | | -B100 | | E-LABS | | |
| | 01 | DUAL VOLT METER | | METER: 90 DEGREE ANALOGUE DOUBLE VOLT METER, INPUT 0...110/165 VAC (L-L), ACCURACY CLASS 1 SCALE 0...220/330 KV (MARKED RED AT 220 KV), Ord: F96YVE | | | -AP2 | | FRER | | |
| G | 01 | DUAL FREQUENCY METER | | METER: 90 DEGREE ANALOGUE DOUBLE FREQUENCY METER, INPUT 0...110/165 VAC (L-L), ACCURACY CLASS 0.1, SCALE 45...55 Hz, Ord: F96VFE | | | -AP1 | | FRER | | |
| | 01 | SYNCHROSCOPE | | SIZE: 96X96 mm, Ord: F96YX | | | -AP3 | | FRER | | |
| | 02 | ANNUNCIATORS | | 12-WINDOW, SUPPLY: 100-275VAC/ 100-375 VDC | | | -H11, -H12 | | E-LABS | | |
| H | 0 | AS BUILT | | 18.08.2018 | MSC | Manufacturer  EPESOL 7-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor  GE Grid Solutions A GE and Alstom joint venture | Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) COMPONENT LIST | Drawing no. P60194-E-DSC-SC-001 |
| | | | | | | | Project no. P-60194 | | | | |
| | 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 | AC BELL | | Type: Exposure, 220VAC, Ord: YS MB7-22A | | | -B1 | YONGSUNG | | | | |
| | 01 | DC HOOTER | | Type: AH-101, 220VDC | | | -H1 | E-LABS | | | | |
| B | 04 | TERMINAL BLOCKS - AC SUPPLY DISTRIBUTION | | Screw-type, Feed Through Terminal, CBD-4 | | | -XAC | CABUR | | | | |
| | 04 | TERMINAL BLOCKS - DC SUPPLY DISTRIBUTION | | Screw-type, Feed Through Terminal, CBD-4 | | | -XDC | CABUR | | | | |
| | 36 | TERMINAL BLOCKS - SYNC VT CIRCUIT | | Screw-type, Feed Through Terminal, SCB-6 | | | -X2, -X3, -X4, -X5, -X6, -X7 | CABUR | | | | |
| | 02 | TERMINAL BLOCKS - TIMER CIRCUIT | | Screw-type, Feed Through Terminal, CBD-4 | | | -X9 | CABUR | | | | |
| | 20 | TERMINAL BLOCKS - SYNC CIRCUIT | | Screw-type, Feed Through Terminal, CBD-4 | | | -X12 | CABUR | | | | |
| | 40 | TERMINAL BLOCKS - BUS VT HEALTH STATUS | | Screw-type, Feed Through Terminal, CBD-4 | | | -X13, -X8 | CABUR | | | | |
| | 20 | TERMINAL BLOCKS - COMMON ALARM SIGNALS | | Screw-type, Feed Through Terminal, CBD-4 | | | -X15, -X16 | CABUR | | | | |
| | 30 | TERMINAL BLOCKS - CB CLOSING PERMISSION | | Screw-type, Feed Through Terminal, CBD-4 | | | -X17, -X14 | CABUR | | | | |
| | 20 | TERMINAL BLOCKS - AC ANNUNCIATION | | Screw-type, Feed Through Terminal, CBD-4 | | | -XAN | CABUR | | | | |
| | 08 | TERMINAL BLOCKS - BELL/HOOTER CIRCUIT | | Screw-type, Feed Through Terminal, CBD-4 | | | -XF | CABUR | | | | |
| C | 30 | TERMINAL BLOCKS - ER, SCADA SIGNALS | | Screw-type, Feed Through Terminal, CBD-4 | | | -XEV, -XSC | CABUR | | | | |
| | 18 | TERMINAL BLOCKS - SPARE | | Screw-type, Feed Through Terminal, CBD-4 | | | -X | CABUR | | | | |
| D | 04 | TERMINAL BLOCKS - SPARE | | Screw-type, Feed Through Terminal, SCB-6 | | | -X | CABUR | | | | |
| | | | | | | | | | | | | |
| E | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| F | 0 | AS BUILT | | 18.08.2018 | MSC | Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor  Grid Solutions A GE and Alstom joint venture | Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) COMPONENT LIST | Drawing no. P60194-E-DSC-SC-001 | |
| | | | | | | | | | | | | |
| REV. | DESCRIPTION | | DATE | DRAWER | | | | | Project no. P-60194 | Sheet type AC1 | Sheet no. 04a | |

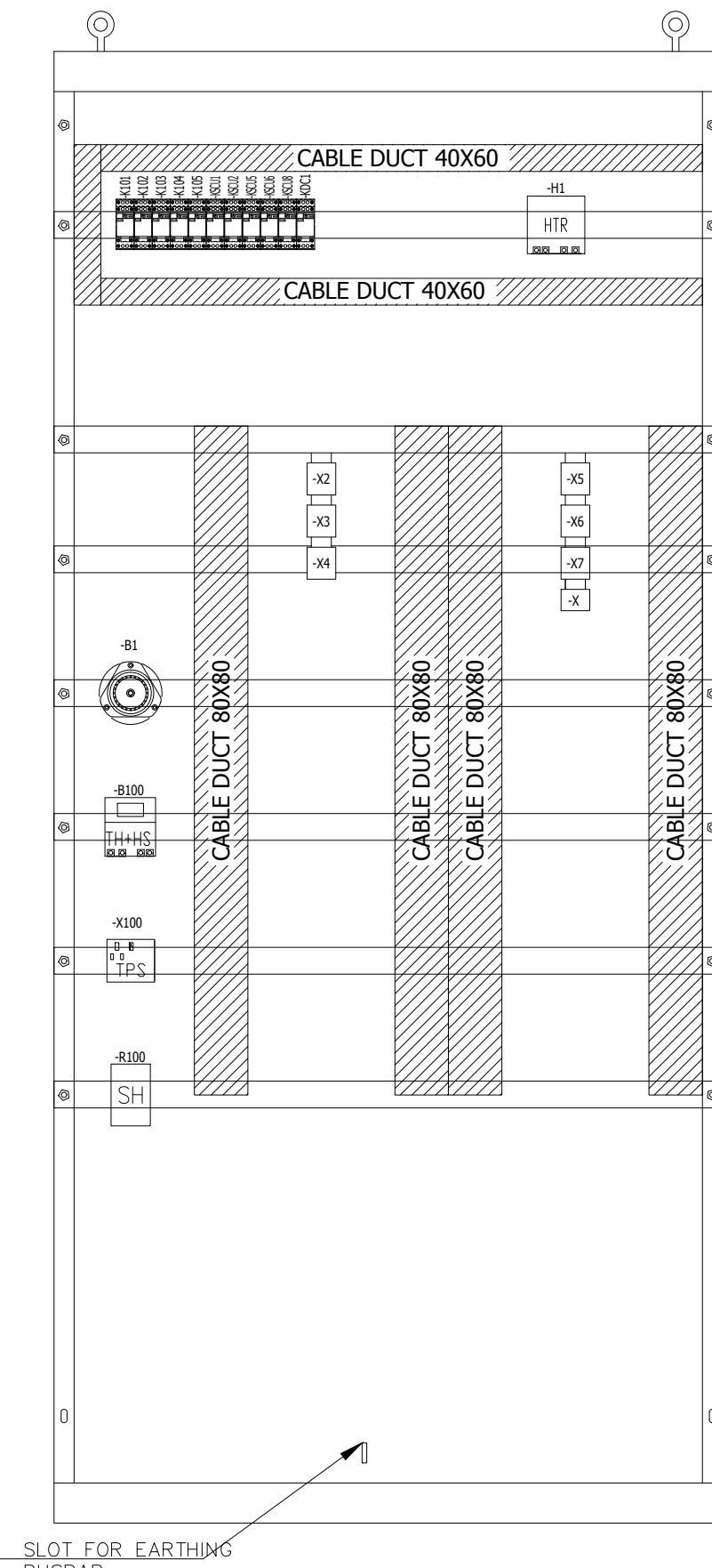
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FRONT VIEW

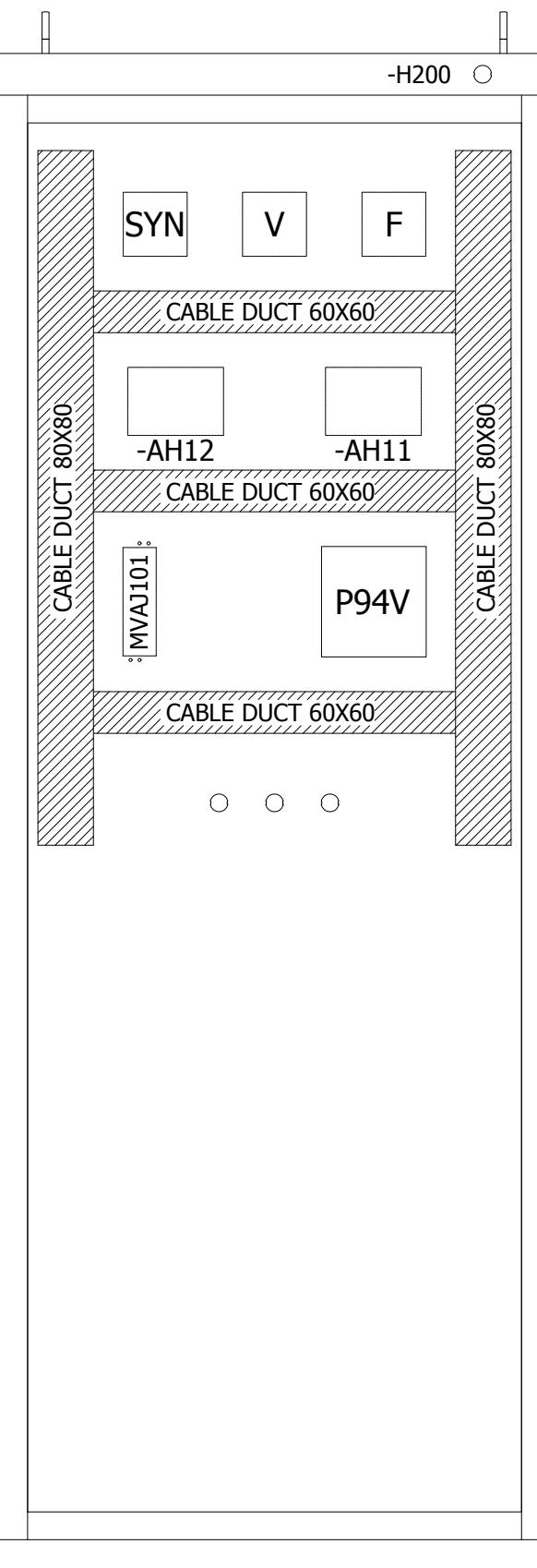
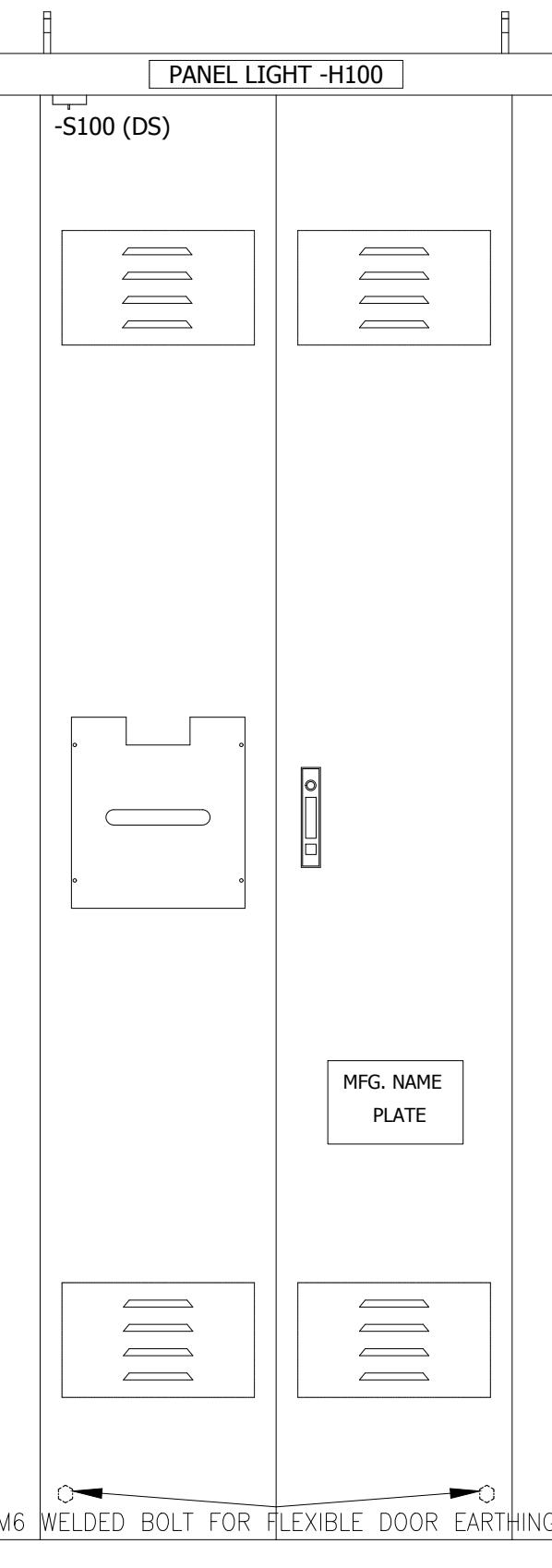
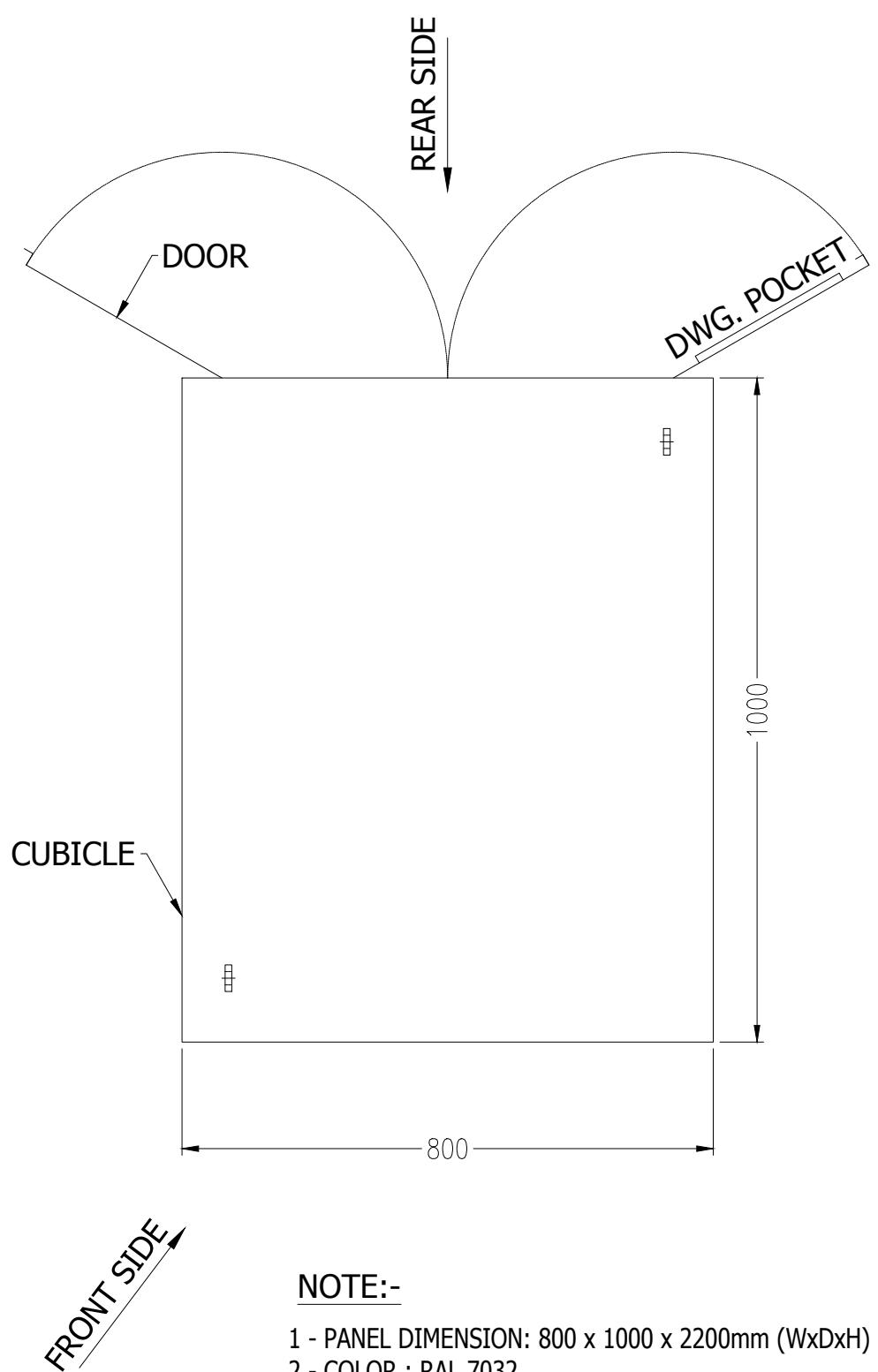


LEFT SIDE VIEW



RIGHT SIDE VIEW

| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer  EPESOL 7-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor  Grid Solutions A GE and Alstom joint venture | Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) PANEL VIEW | Drawing no. P60194-E-DSC-SC-001 | | |
|------|-------------|------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------|------------------------------------|------------------|-----------------|
| REV. | DESCRIPTION | DATE | DRAWER | | | | | | Project no. P-60194 | Sheet type AD | Sheet no. 05 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |

BACK VIEWBACK VIEWTOP VIEW

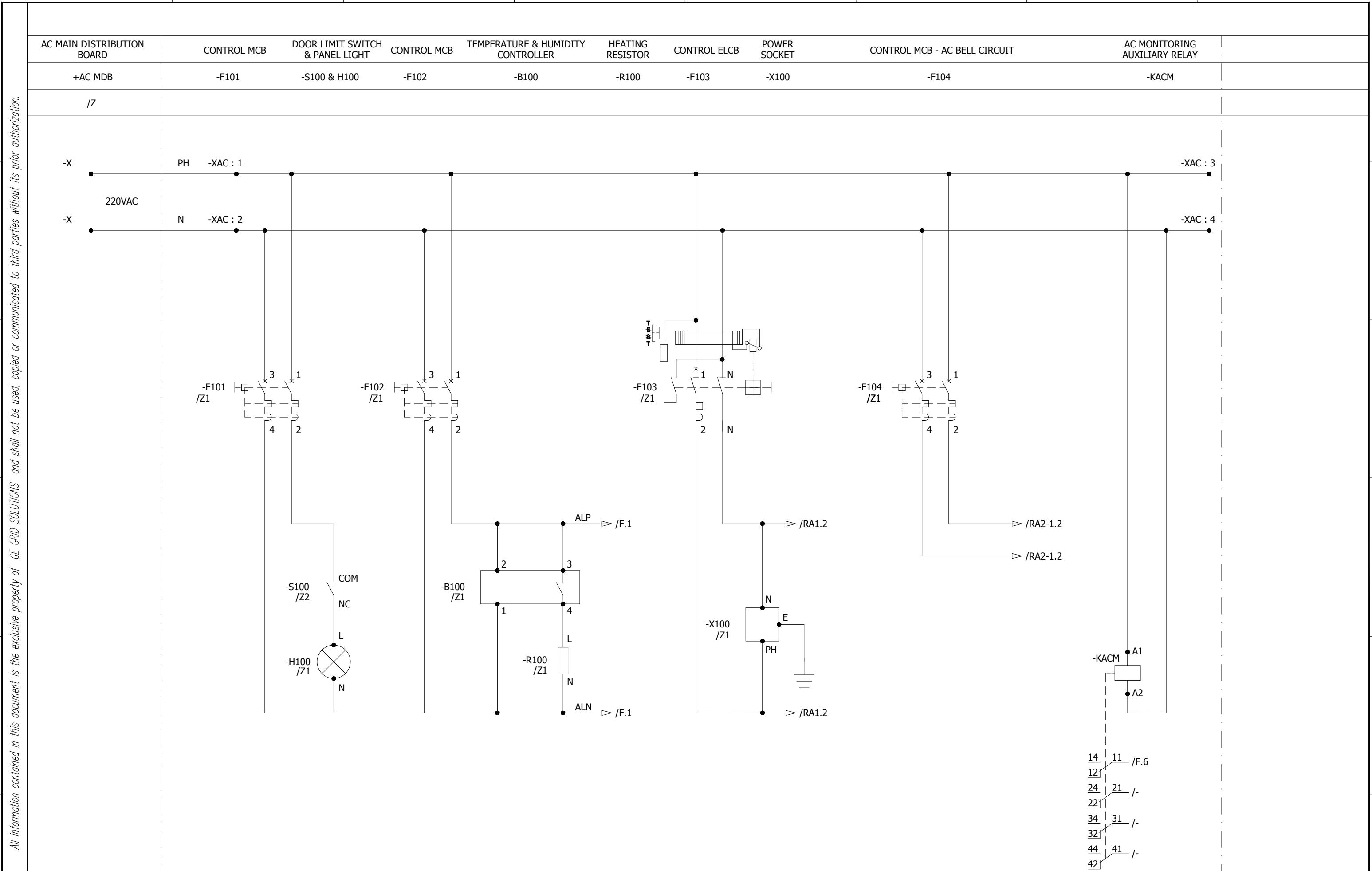
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| REV. | DESCRIPTION | DATE | DRAWER | | | | | | Project no. P-60194 |

NOTE:-

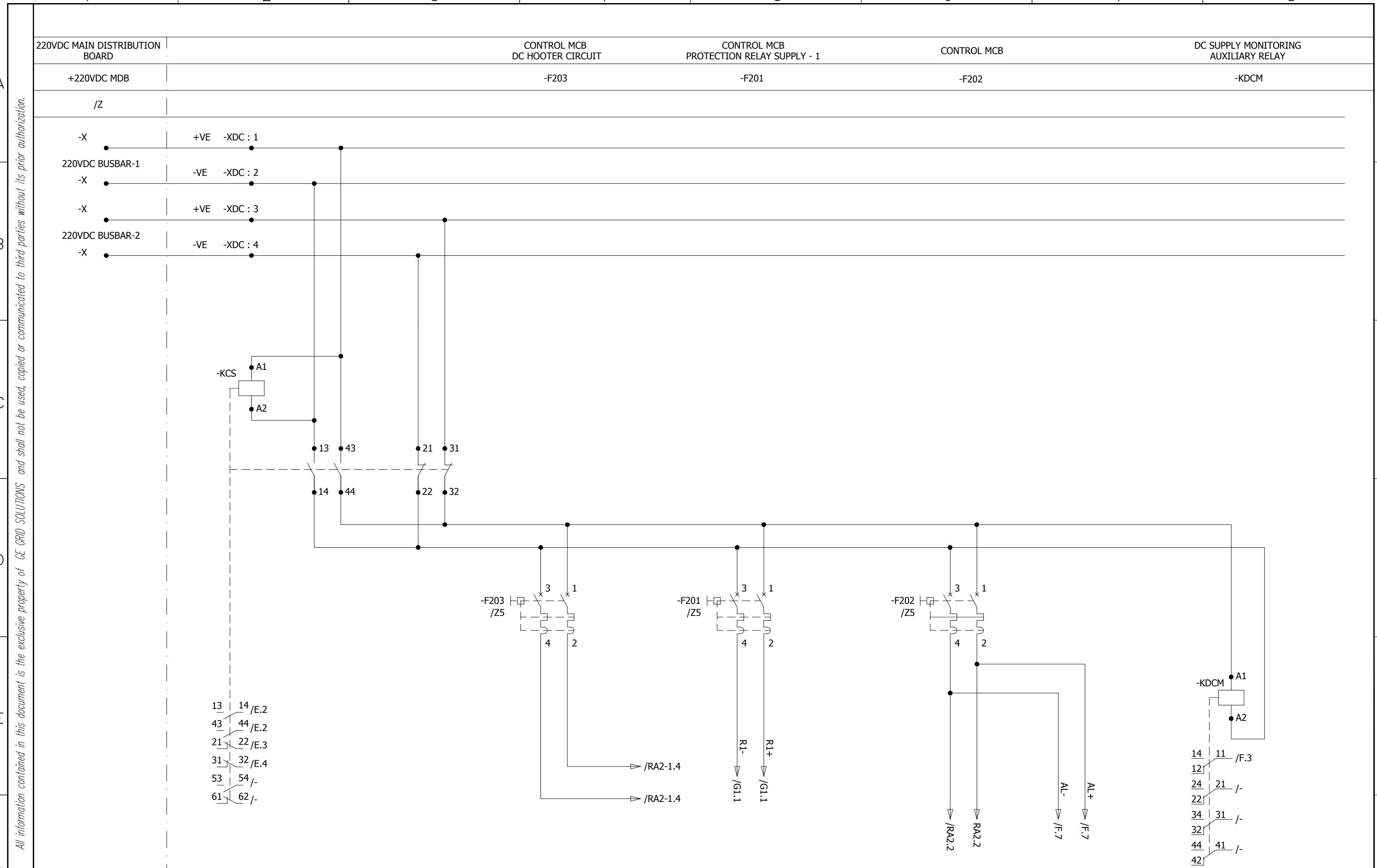
- 1 - PANEL DIMENSION: 800 x 1000 x 2200mm (WxDxH)
- 2 - COLOR : RAL 7032
- 3 - SHEET THICKNESS : 2-2.5 mm
- 4- PROTECTION CLASS : IP-51 (INDOOR TYPE)
- 5 - ALL DOOR FITTED WITH 16mm EARTH STRAP & INSULATED WITH GREEN-YELLOW COLOUR.

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

14 11 /F.6
 12 21 /-
 24 31 /-
 22 32 /-
 34 41 /-
 32 42 /-



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|------|-------------|------------|--------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------|
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| REV. | DESCRIPTION | DATE | DRAWER | | | | | | Project no. P-60194 |
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| | | | | | | | | | Sheet no. 07 |

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220V DC CIRCUIT FAULTY

220V DC CIRCUIT FAULTY INDICATION

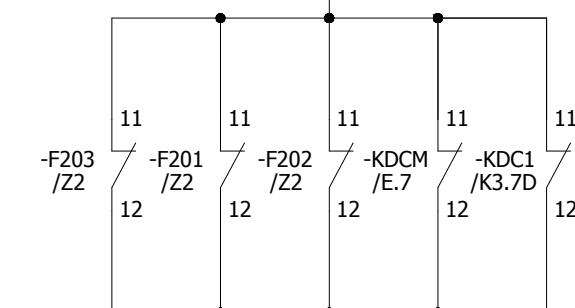
220V AC CIRCUIT FAULTY

-KDC

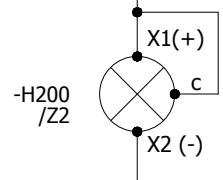
-H200

-KAC

/D.4 ➤ ALP



-KDC
/F.3
41
44



/D.4 ➤ ALN

-KDC

A1

A2

14 11 /RA1.4
12
24 21 /RA3.7
22
34 31 /RA3.8
32
44 41 /5C
42

-F203
/Z2

-F201
/Z2

-F202
/Z2

-KDCM
/E.7

-KDC1
/K3.7D

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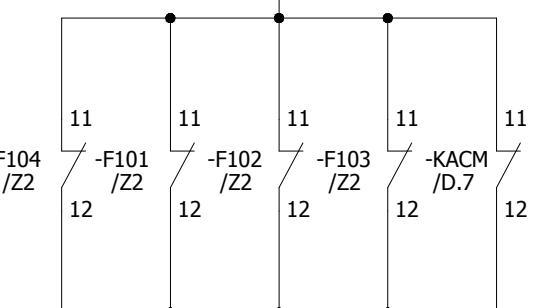
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/E.7 ➤ AL+

➡ /I1.1



/E.7 ➤ AL-

➡ /I1.1

-KAC

A1

A2

14 11 /RA2.3
12
24 21 /RA3.6
22
34 31 /RA3.8
32
44 41 /-
42

14 11 /RA2.3
12

24 21 /RA3.6
22

34 31 /RA3.8
32

44 41 /-

42

Project
220kV/132kV GIS SUBSTATION
GHAZI ROAD, LAHORE
Title
220V SYNCHRONIZING PANEL
(=D00+C6)
AC/DC SUPPLY FAILURE CIRCUIT

Drawing no.
P60194-E-DSC-SC-001

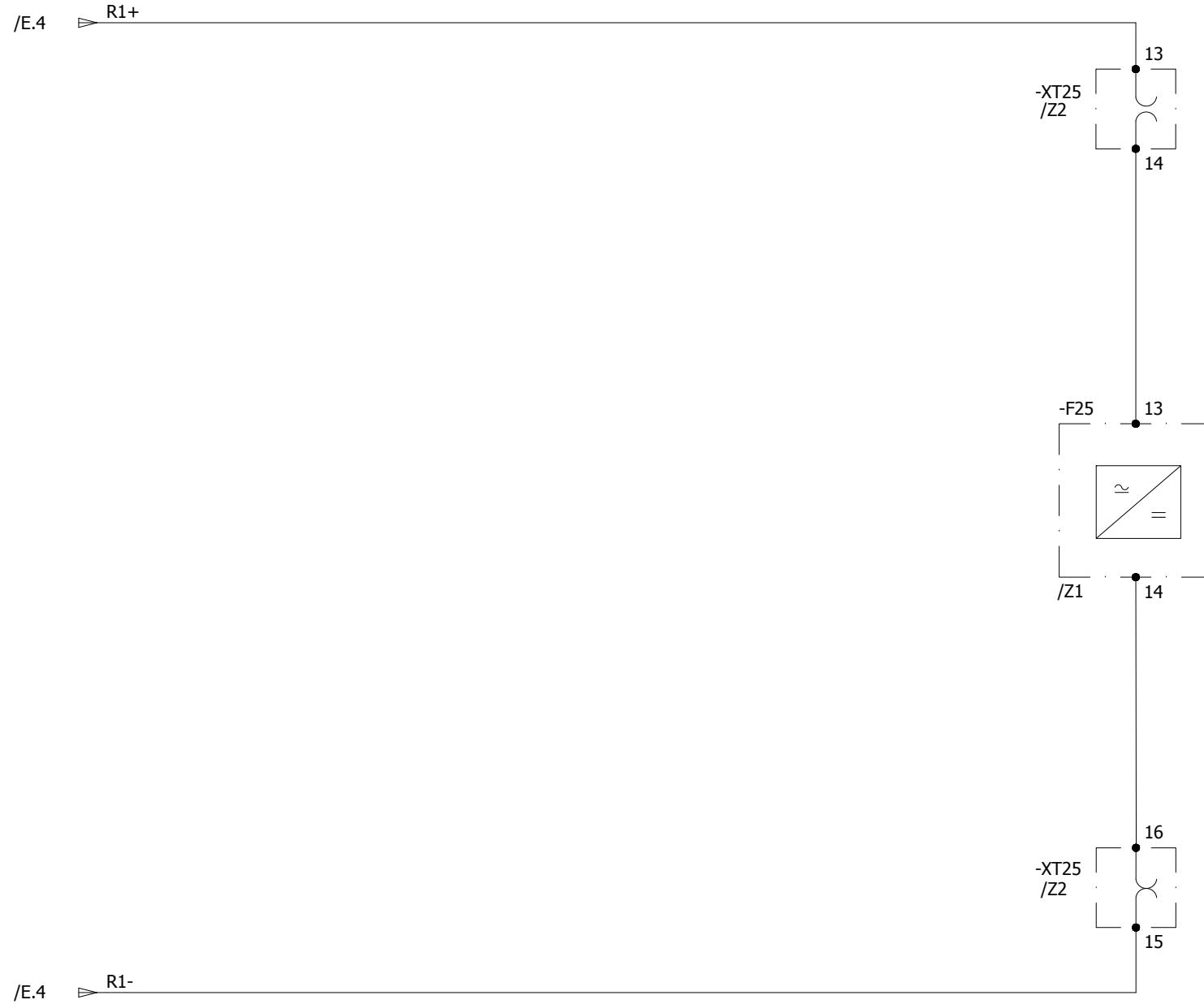
Project no.
P-60194

Sheet type
F

Sheet no.
08

SYNC CHECK

RELAY SUPPLY



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A

A

B

B

C

C

D

D

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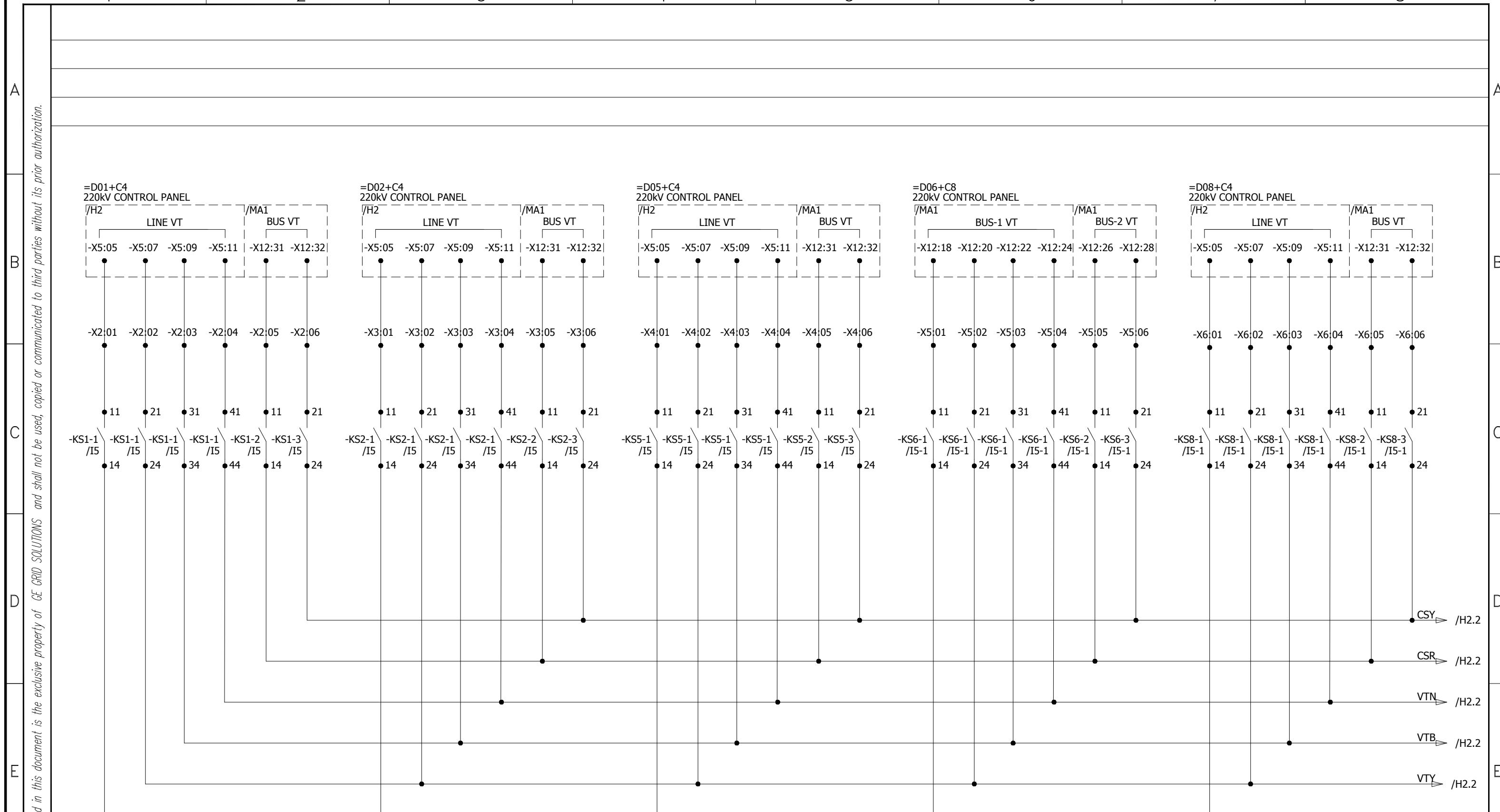
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| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer | Contractor | Client | Project | Title | Drawing no. | |
| | | | |  EPESOL 7-8 Garden Block, New Garden Town, Lahore, Pakistan |  Grid Solutions A GE and Alstom joint venture |  | NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE | 220kV SYNCHRONIZING PANEL (=D00+C6) RELAY CONTROL & SUPPLY | P60194-E-DSC-SC-001 |
| REV. | DESCRIPTION | DATE | DRAWER | | | | | | Project no. P-60194 Sheet type G1 Sheet no. 09 | |

1 2 3 4 5 6 7 8



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|------|-------------|------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------|------------------------------------|------------------|-----------------|
| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor  Grid Solutions A GE and Alstom joint venture | Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) SYNC VT CIRCUIT | Drawing no. P60194-E-DSC-SC-001 | | |
| REV. | DESCRIPTION | DATE | DRAWER | | | | | | Project no. P-60194 | Sheet type H1 | Sheet no. 10 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |

TEST BLOCK

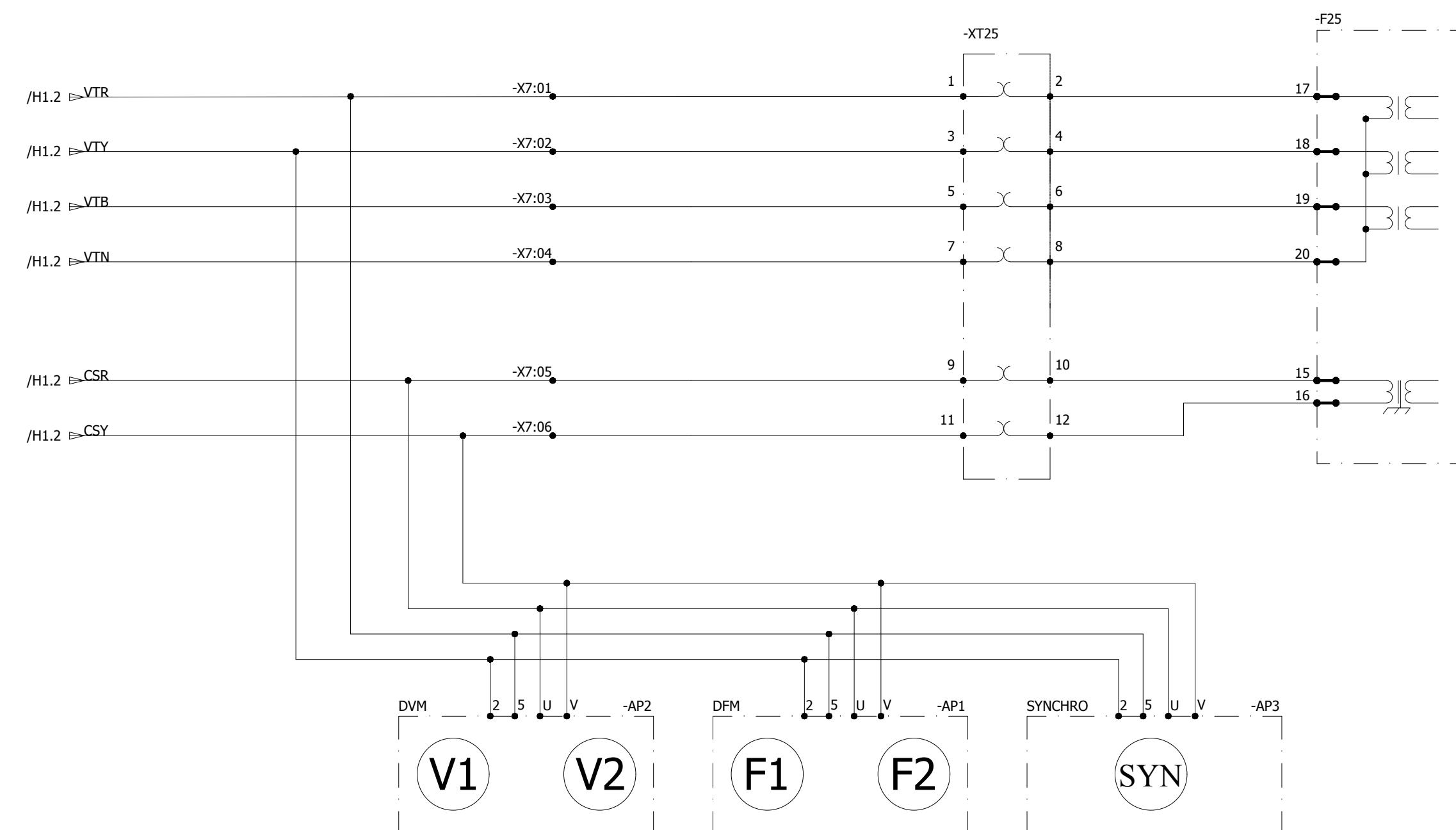
SYNC CHECK
RELAY

-XT25

-F25

/Z2

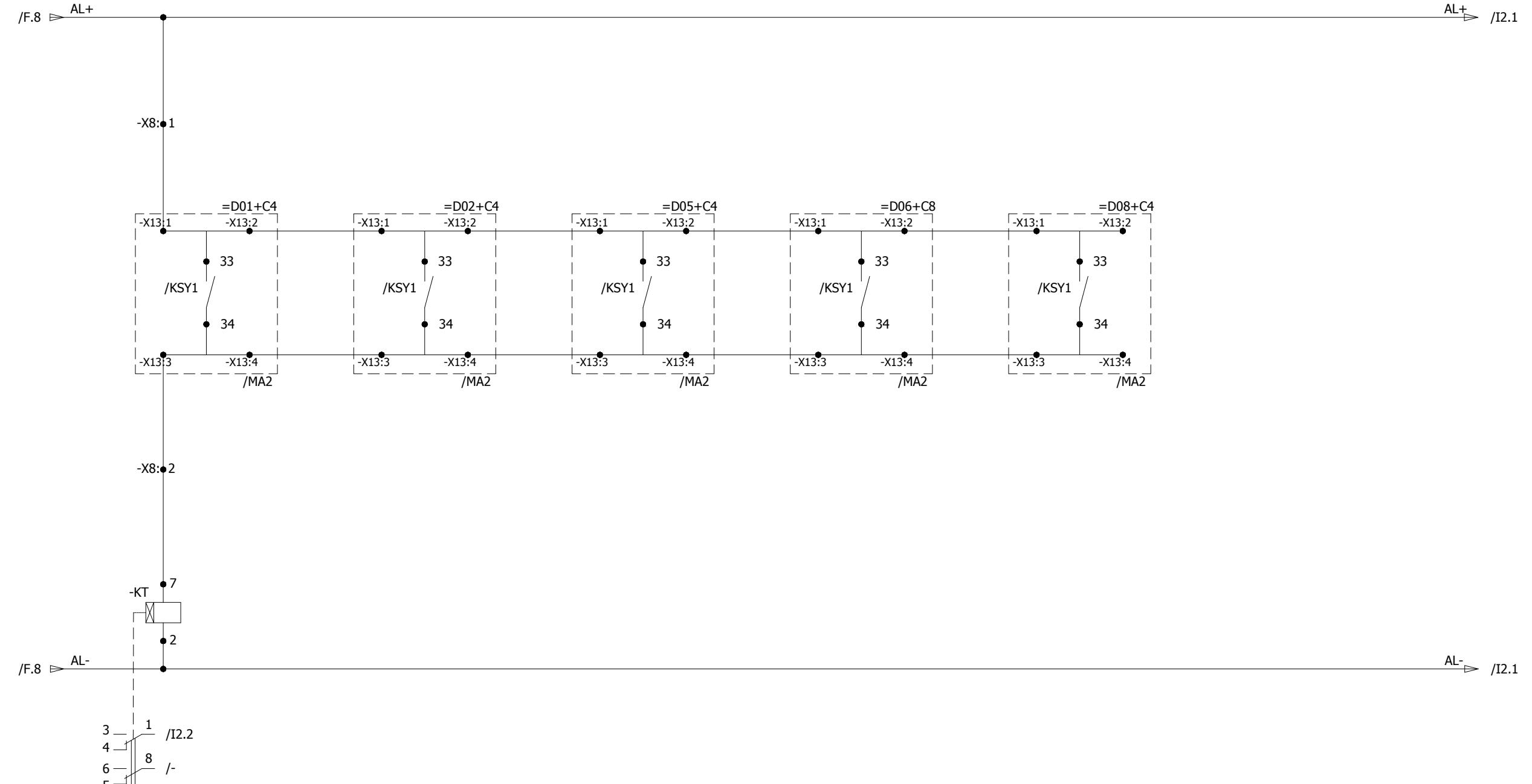
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|------|-------------|------------|--------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------|------------------------------------|
| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer EPESOL 7-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor GE Grid Solutions A GE and Alstom joint venture | Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) SYNC VT CIRCUIT | Drawing no. P60194-E-DSC-SC-001 |
| REV. | DESCRIPTION | DATE | DRAWER | | | | | | Project no. P-60194 |
| | | | | | | | | | Sheet type H2 |
| | | | | | | | | | Sheet no. 11 |

TIMER INITIALIZATION ON ANY CB SELECTION

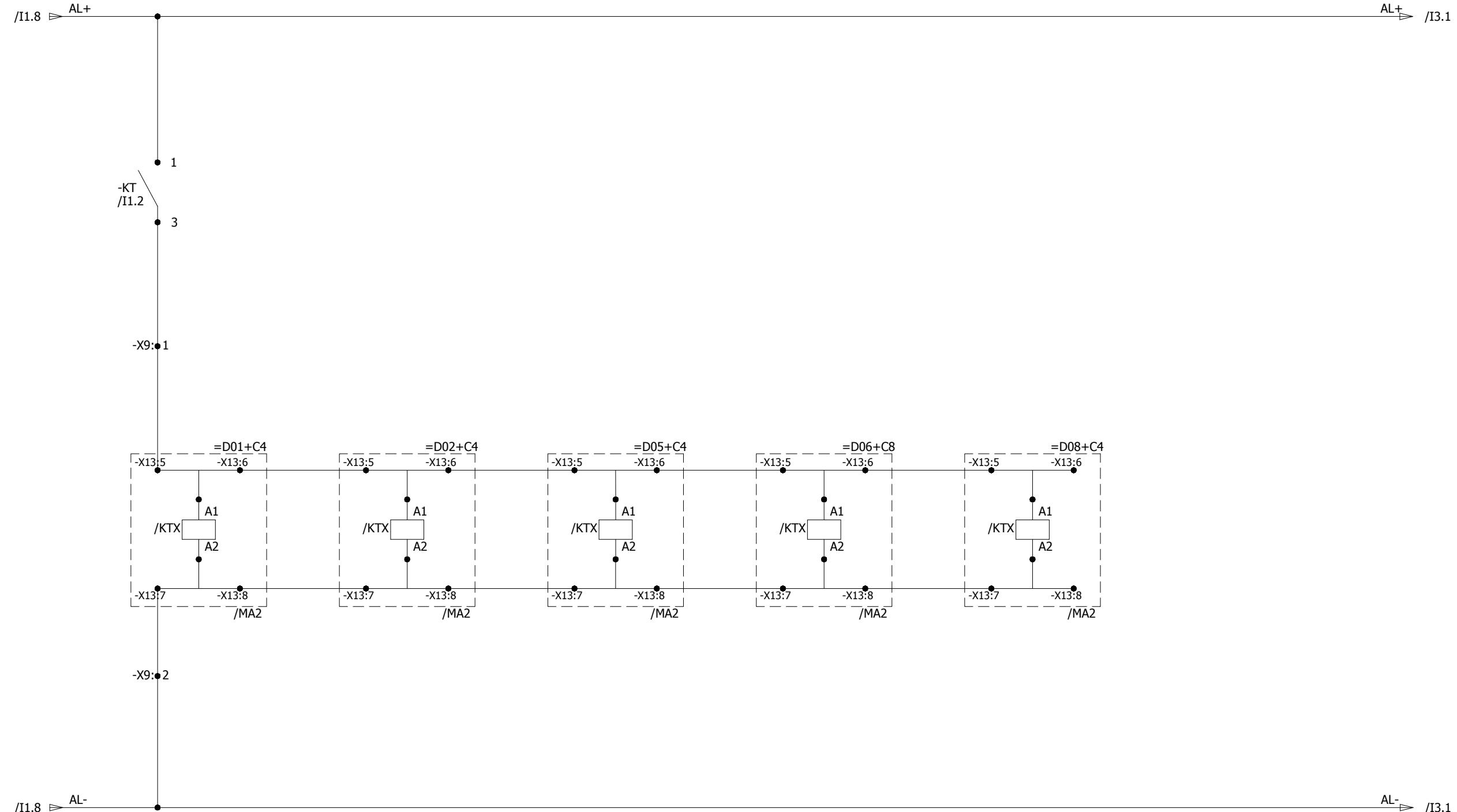
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|------|-------------|------------|--------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------------|------------------------------------|
| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer EPESOL 77-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor Grid Solutions A GE and Alstom joint venture | Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) TIMER CIRCUIT | Drawing no. P60194-E-DSC-SC-001 |
| | | | | | | | | | Project no. P-60194 |
| REV. | DESCRIPTION | DATE | DRAWER | | | | | | Sheet type I1 |

TIMER CONTACT MULTIPLICATION

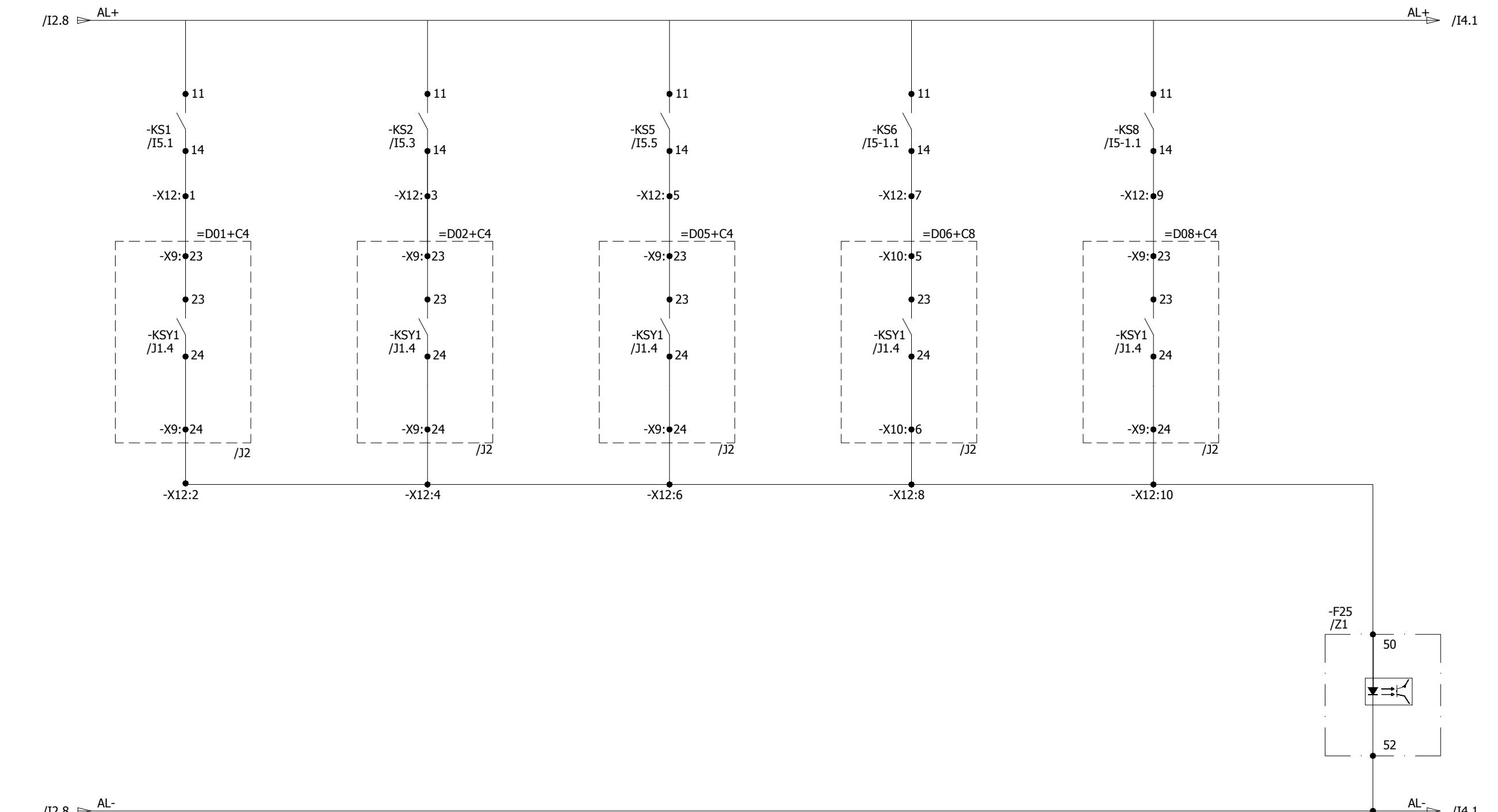
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| | | | | | | | | | |
|------|-------------|------------|--------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------------|------------------------------------|
| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor Grid Solutions A GE and Alstom joint venture | Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) TIMER CIRCUIT | Drawing no. P60194-E-DSC-SC-001 |
| | | | | | | | | | Project no. P-60194 |
| | DESCRIPTION | DATE | DRAWER | | | | | | Sheet type I2 |
| REV. | | | | | | | | | Sheet no. 13 |

SYNCHRO CHECK ENABLE

LOGIC INPUT



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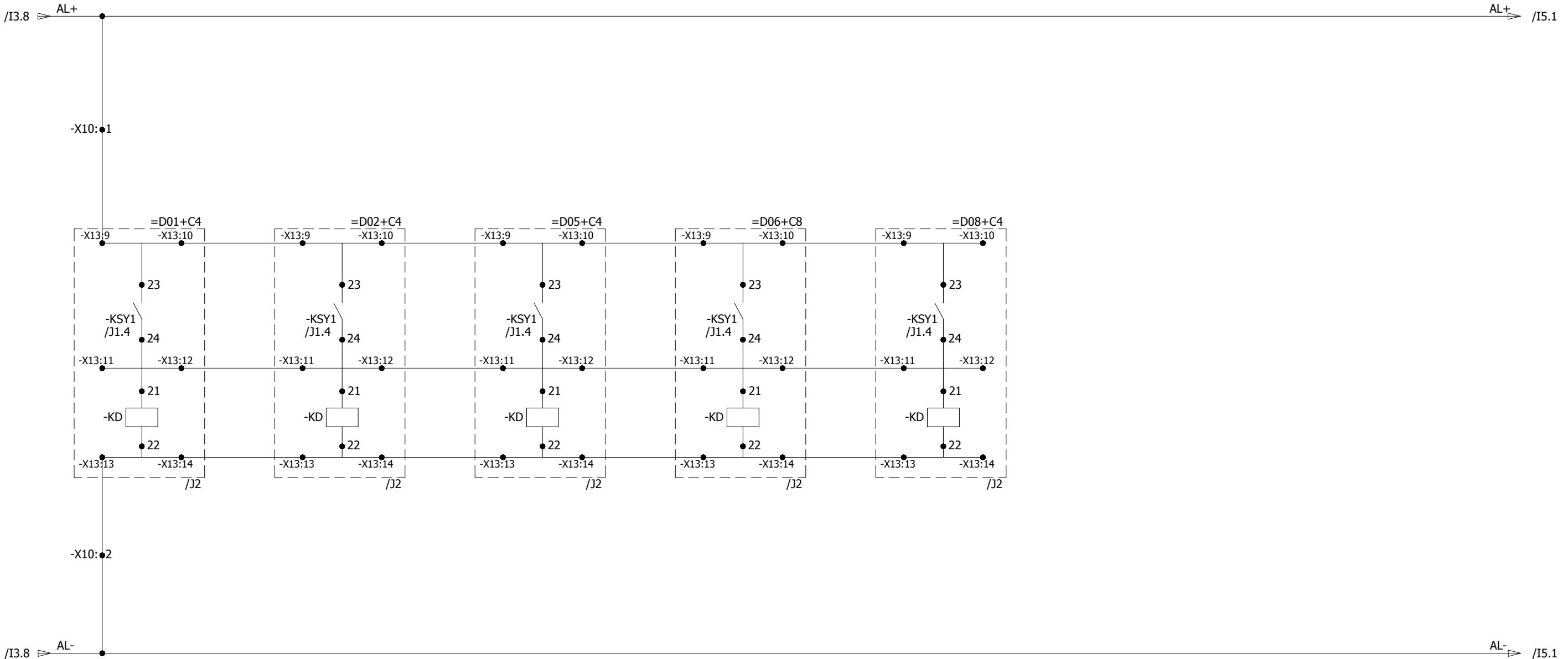
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| | | | | | | | | | |
|------|-------------|------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------|
| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer  EPESOL 27-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor  Grid Solutions A GE and Alstom joint venture | Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) SYNC ENABLE CIRCUIT | Drawing no. P60194-E-DSC-SC-001 |
| REV. | DESCRIPTION | DATE | DRAWER | | | | | | Project no. P-60194 |
| | | | | | | | | | Sheet type I3 |
| | | | | | | | | | Sheet no. 14 |

DE SELECTION OF CIRCUIT AFTER SELECTION OF ANY CB

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|------|-------------|------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|----------------------------------------------------------------------------------|------------------------------------|
| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer  EPESOL 27-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor  Grid Solutions A GE and Alstom joint venture | Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) CB SELECTION CIRCUIT FOR SYNC | Drawing no. P60194-E-DSC-SC-001 |
| REV. | DESCRIPTION | DATE | DRAWER | | | | | | Project no. P-60194 |

1

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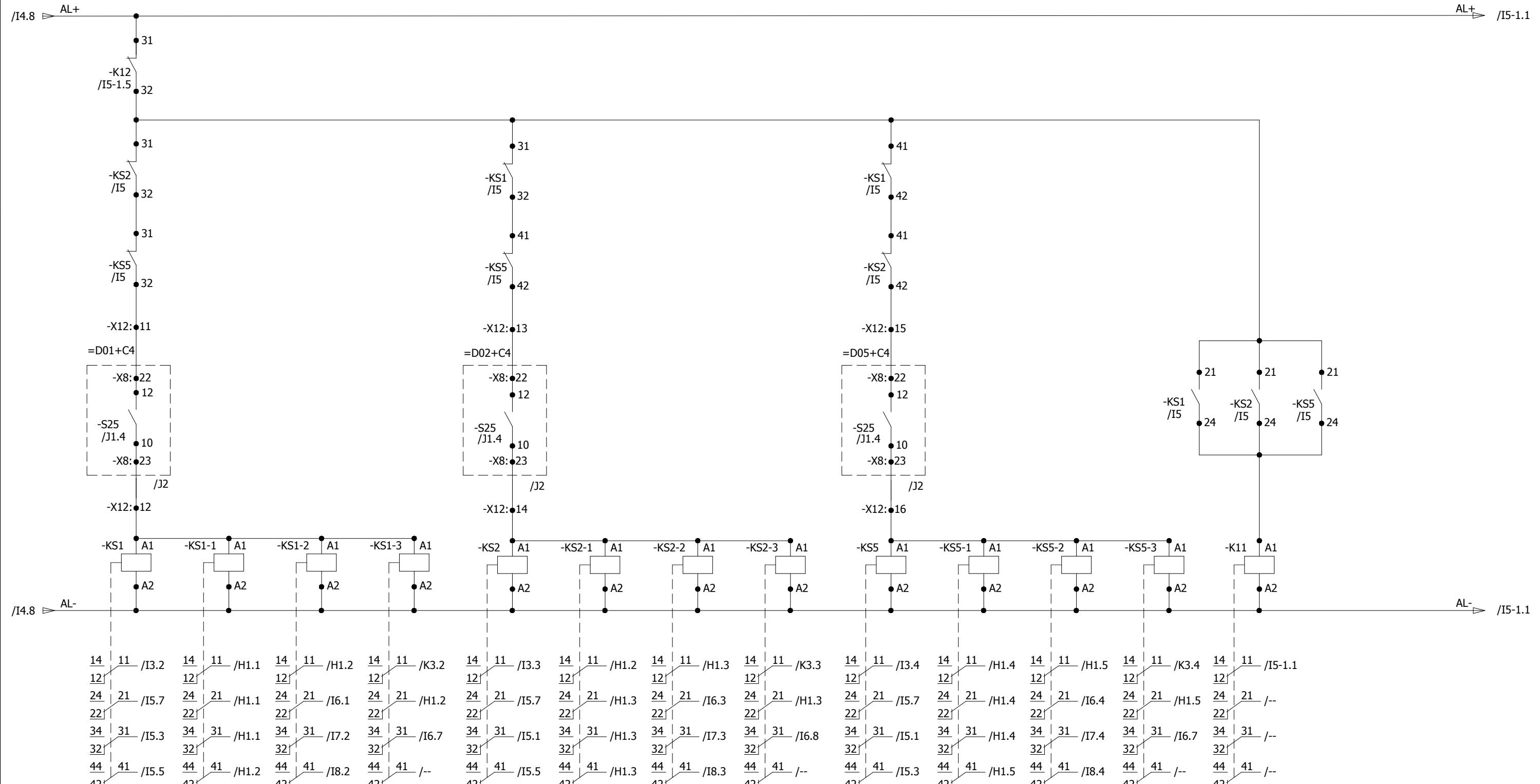
8

SYNC KEY INTERLOCKING CIRCUIT

=D01

=D0]

=D05



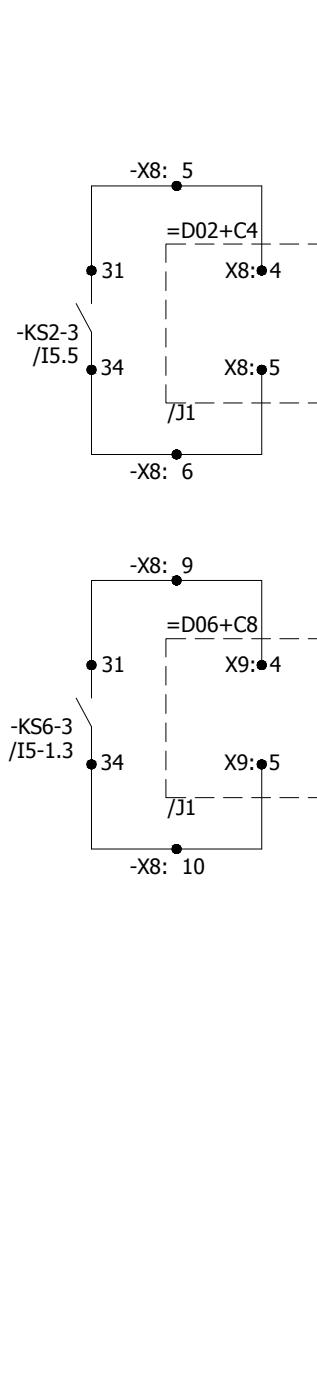
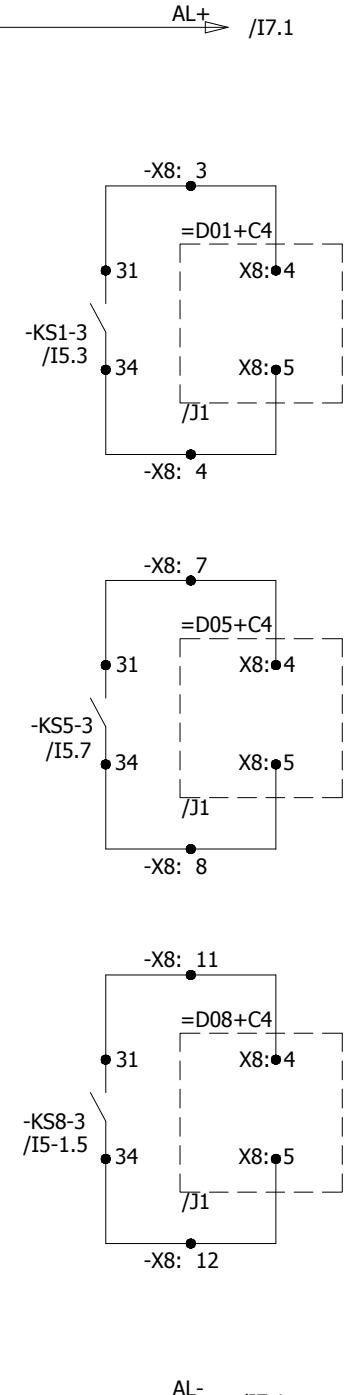
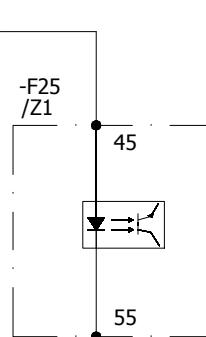
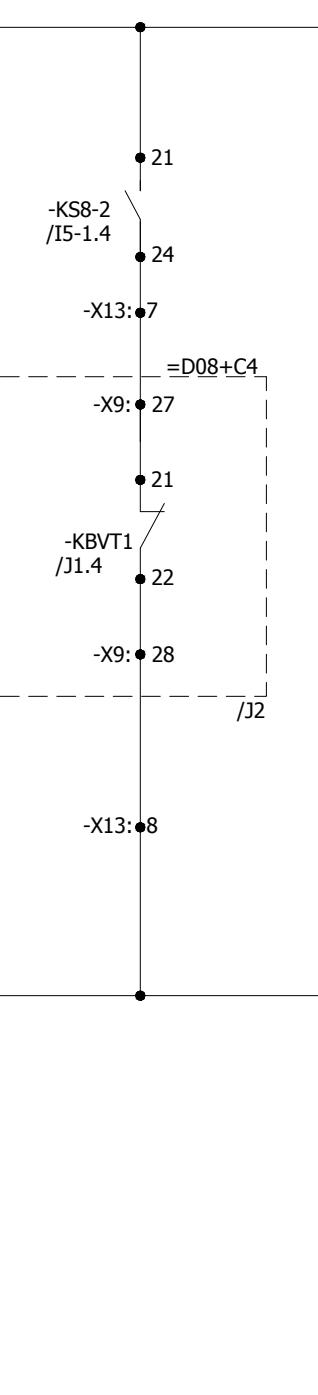
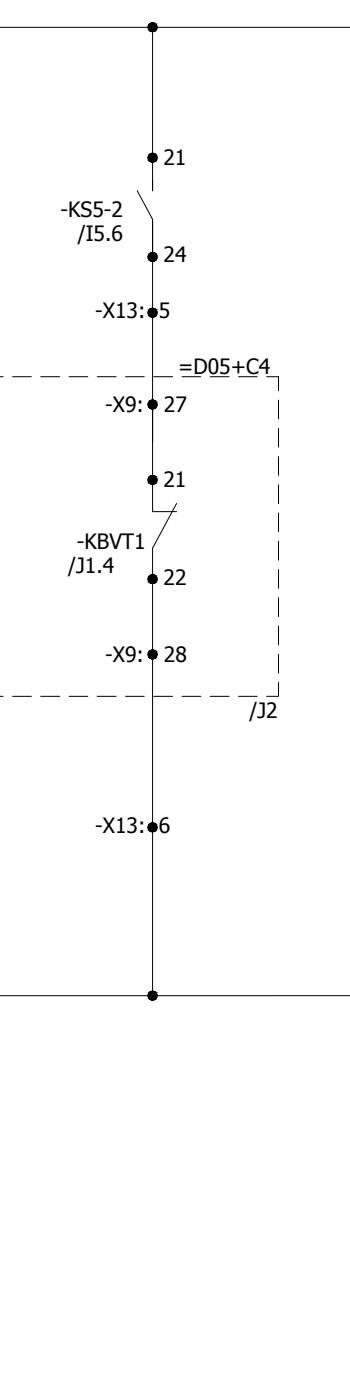
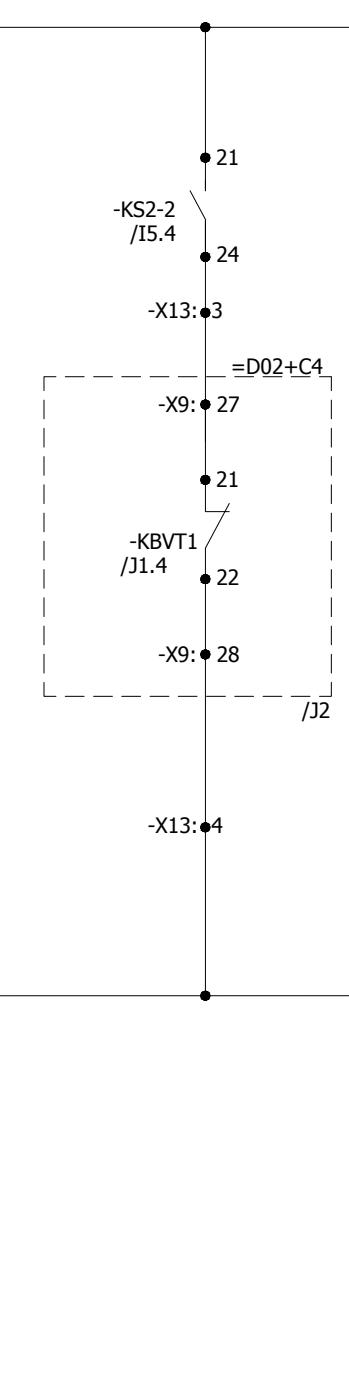
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BUS-1 VT STATUS

BUS-1 VT STATUS

LOGIC INPUT

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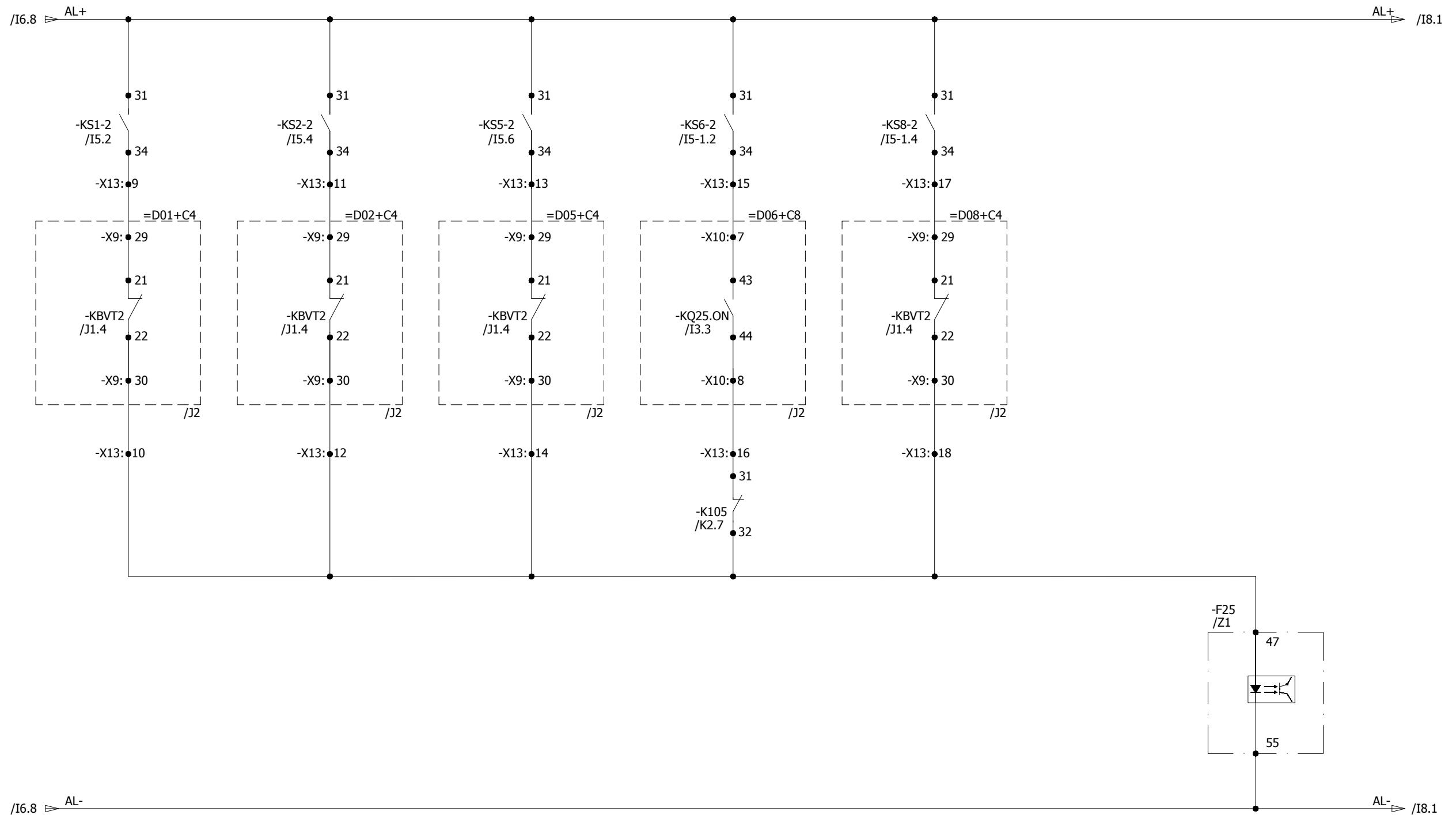
| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer  EPESOL 27-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor  Grid Solutions A GE and Alstom joint venture | Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) BUS-1 VT HEALTH STATUS | Drawing no. P60194-E-DSC-SC-001 | | |
|------|-------------|------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------|------------------|-----------------|
| REV. | DESCRIPTION | DATE | DRAWER | | | | | | Project no. P-60194 | Sheet type I6 | Sheet no. 17 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |

BUS-2 VT STATUS

BUS-2 VT STATUS

LOGIC INPUT

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/I6.8 ▷ AL-

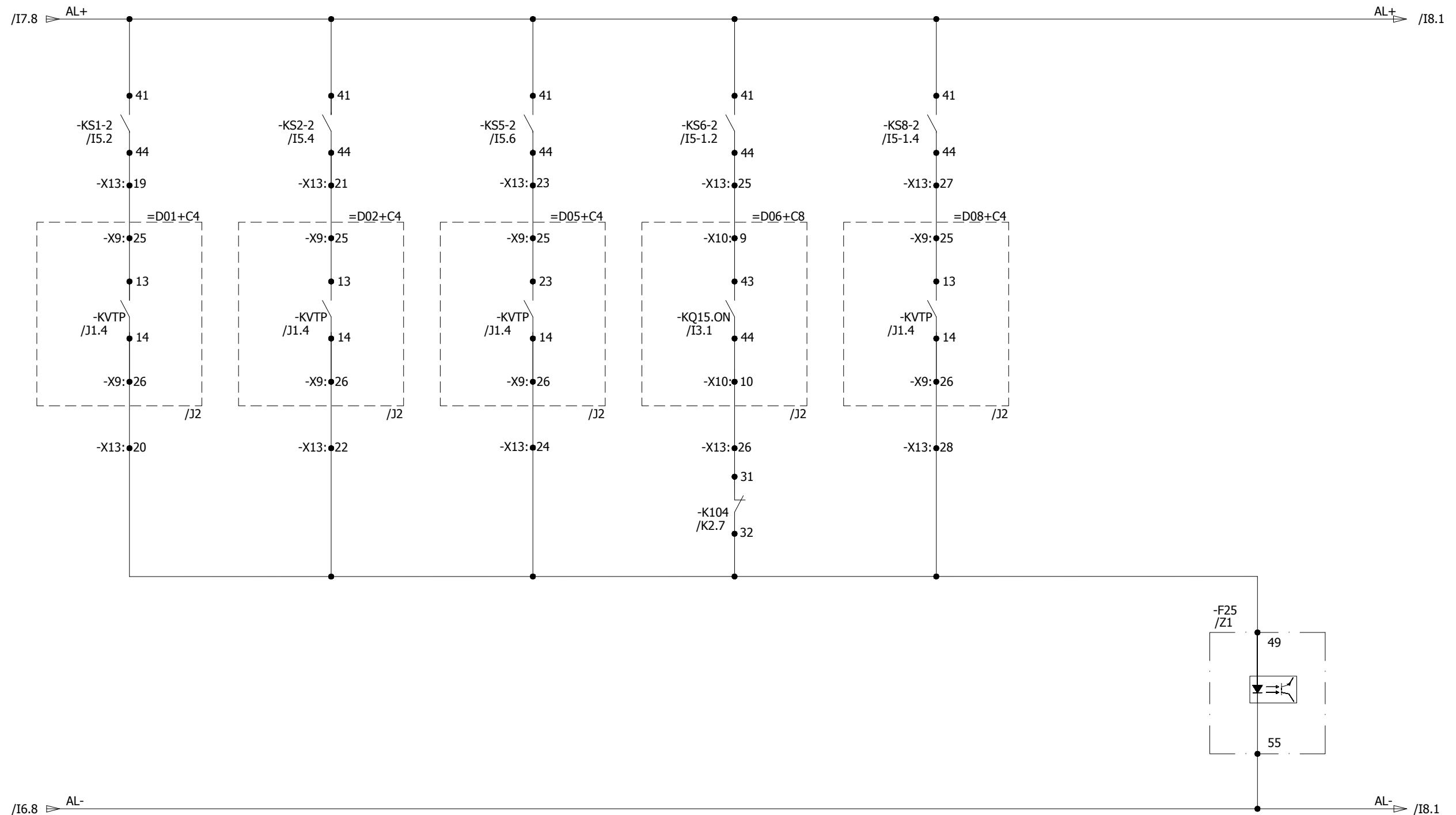
AL- ▷ /I8.1

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|------|-------------|------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------|
| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer  EPESOL 7-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor  Grid Solutions A GE and Alstom joint venture | Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) BUS-2 VT HEALTH STATUS | Drawing no. P60194-E-DSC-SC-001 |
| REV. | DESCRIPTION | DATE | DRAWER | | | | | | Project no. P-60194 |
| | | | | | | | | | Sheet type I7 |
| | | | | | | | | | Sheet no. 18 |

LINE VT STATUS

LINE VT STATUS

LOGIC INPUT

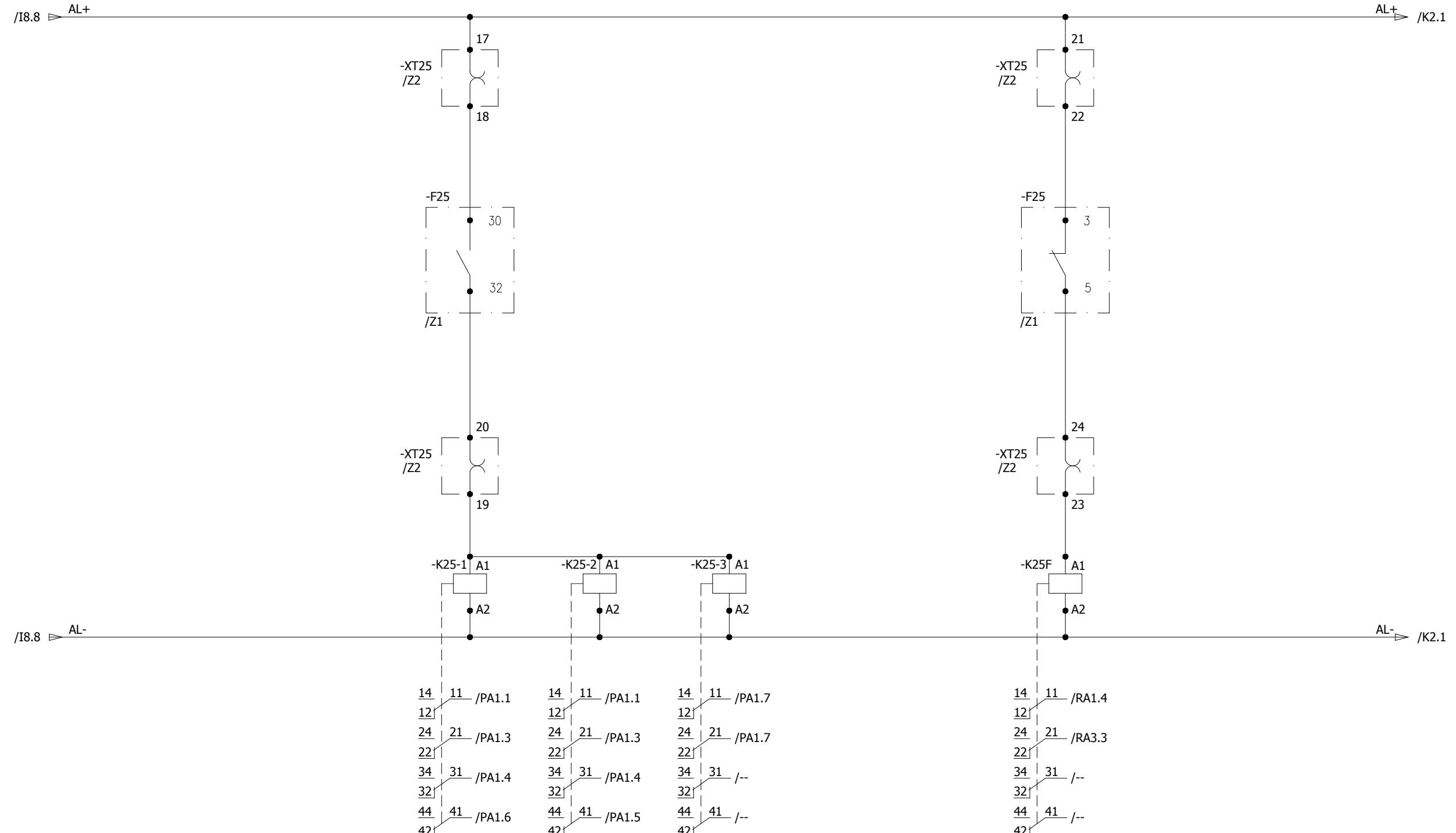


SYNC CHECK CONTACT

SYNCH CHECK RELAY

HEALTH STATUS

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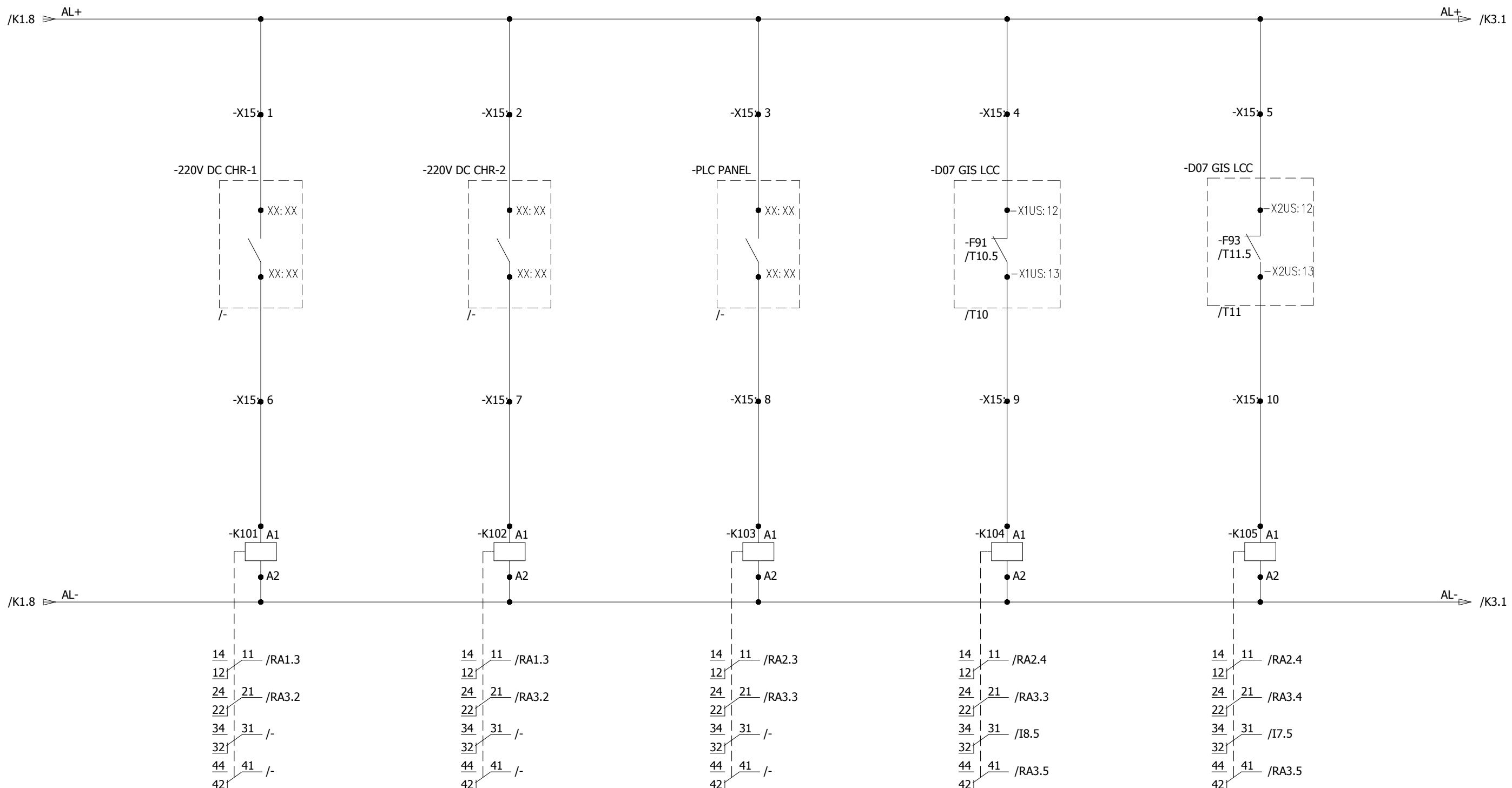
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|------|-------------|------------|--------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------------------------------------------------|--------------------------------------------------------------------------------|------------------------------------|
| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor Grid Solutions A GE and Alstom joint venture | Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) SYNCHRO CHECK RELAY CONTACT | Drawing no. P60194-E-DSC-SC-001 |
| REV. | DESCRIPTION | DATE | DRAWER | | | | | Project no. P-60194 | Sheet type K1 |
| | | | | | | | | | Sheet no. 20 |

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| | | | | |
|-------------|-------------|-----------|---------------|---------------|
| E/F 220V DC | E/F 220V DC | PLC PANEL | 220KV BB-1 VT | 220KV BB-2 VT |
| SYSTEM 1 | SYSTEM 2 | FAILURE | FAILURE | FAILURE |



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

| | | | | | | | | | |
|------|-------------|------------|--------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------|
| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer EPESOL 7-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor Grid Solutions A GE and Alstom joint venture | Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220KV/132kV GIS SUBSTATION GAZI ROAD, LAHORE | Title 220KV SYNCHRONIZING PANEL (=D00+C6) COMMON ALARM SIGNALS | Drawing no. P60194-E-DSC-SC-001 |
| REV. | DESCRIPTION | DATE | DRAWER | | | | | | Project no. P-60194 |
| | | | | | | | | | Sheet type K2 |
| | | | | | | | | | Sheet no. 21 |

SYNC UNSUCCESSFUL SIGNALS

DC MONITORING

=D01+Q0

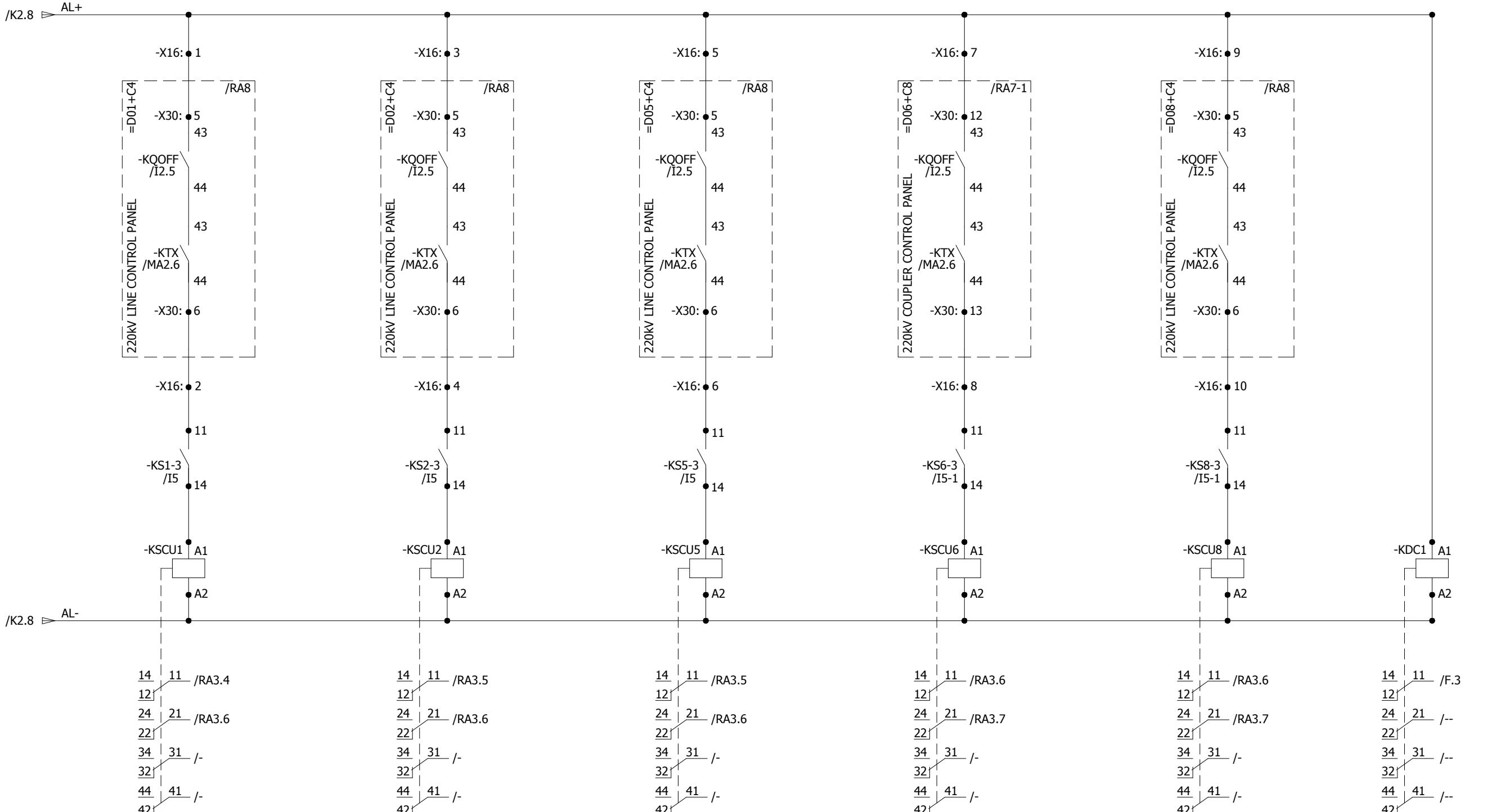
=D02+Q0

=D05+Q0

=D06+Q0

=D08+Q0

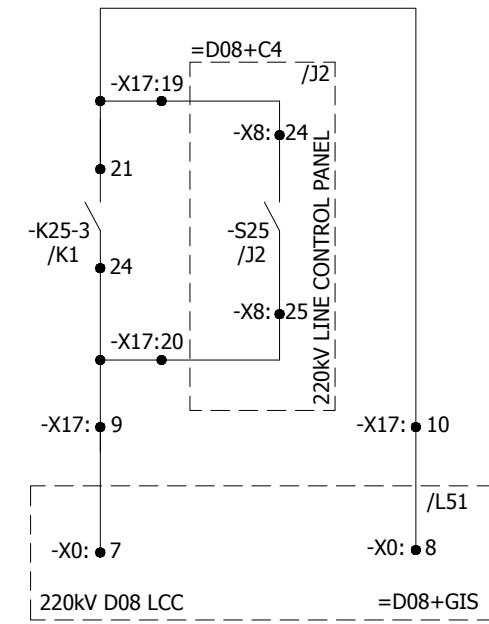
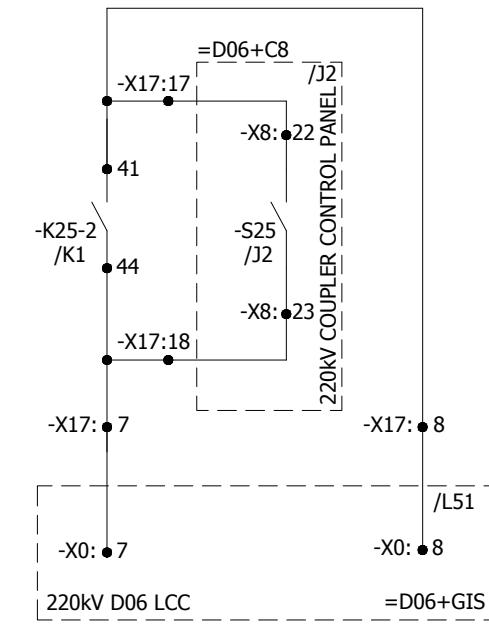
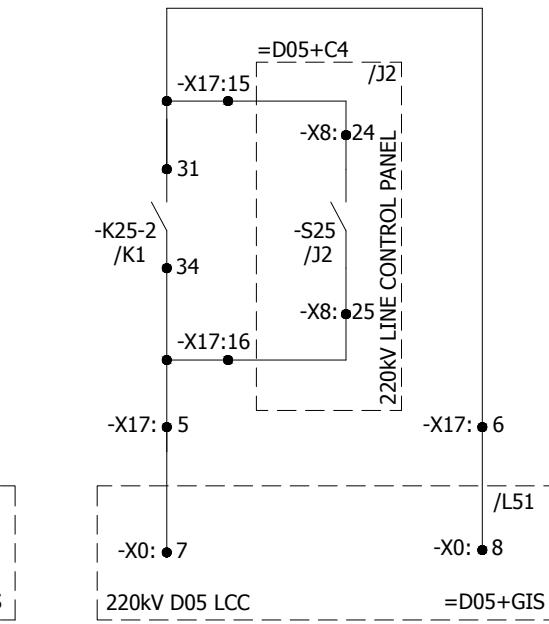
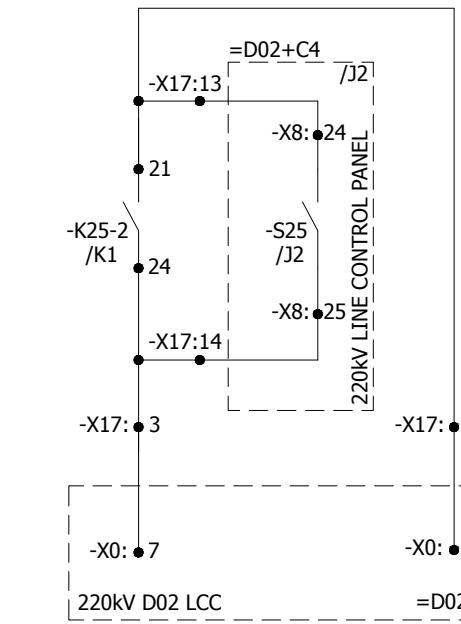
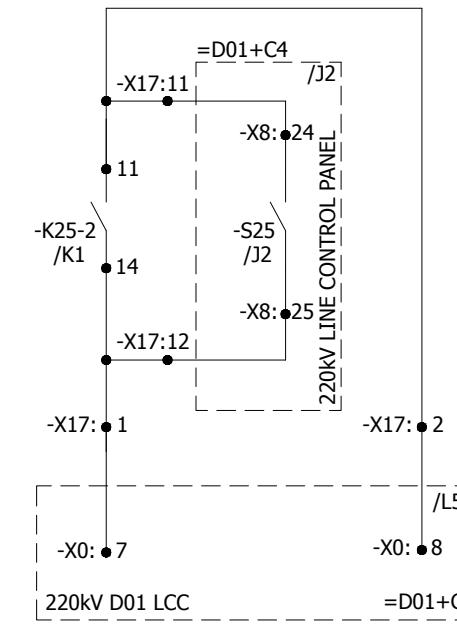
CIRCUIT



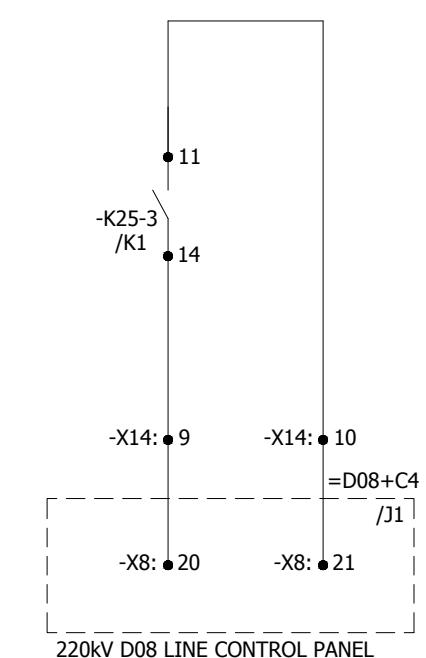
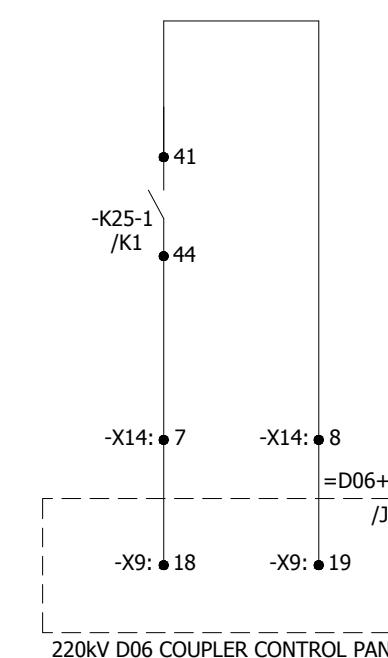
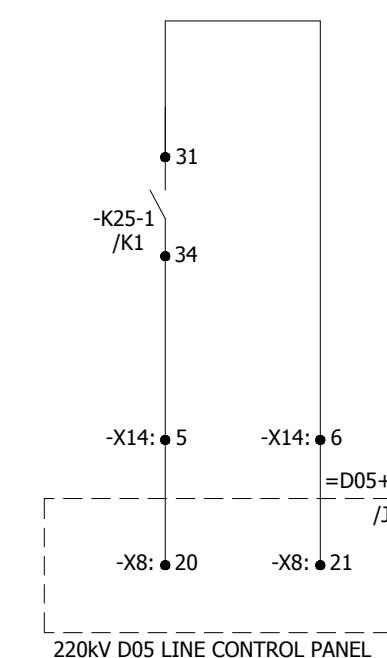
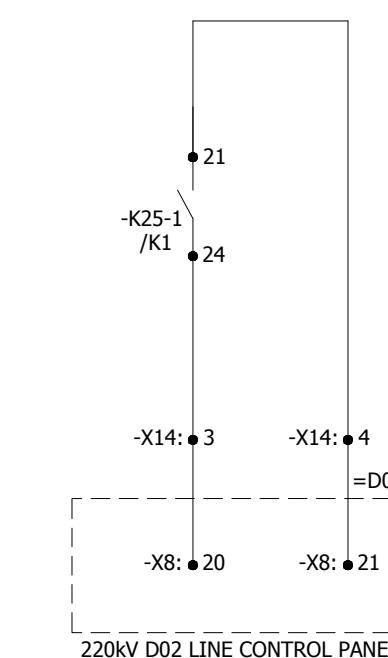
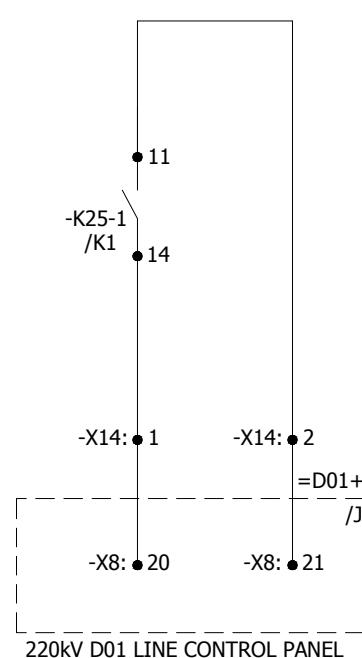
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|------|-------------|------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------|
| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor  Grid Solutions A GE and Alstom joint venture | Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) COMMON ALARM SIGNALS | Drawing no. P60194-E-DSC-SC-001 |
| REV. | DESCRIPTION | DATE | DRAWER | | | | | | Project no. P-60194 |
| | | | | | | | | | Sheet type K3 |
| | | | | | | | | | Sheet no. 22 |

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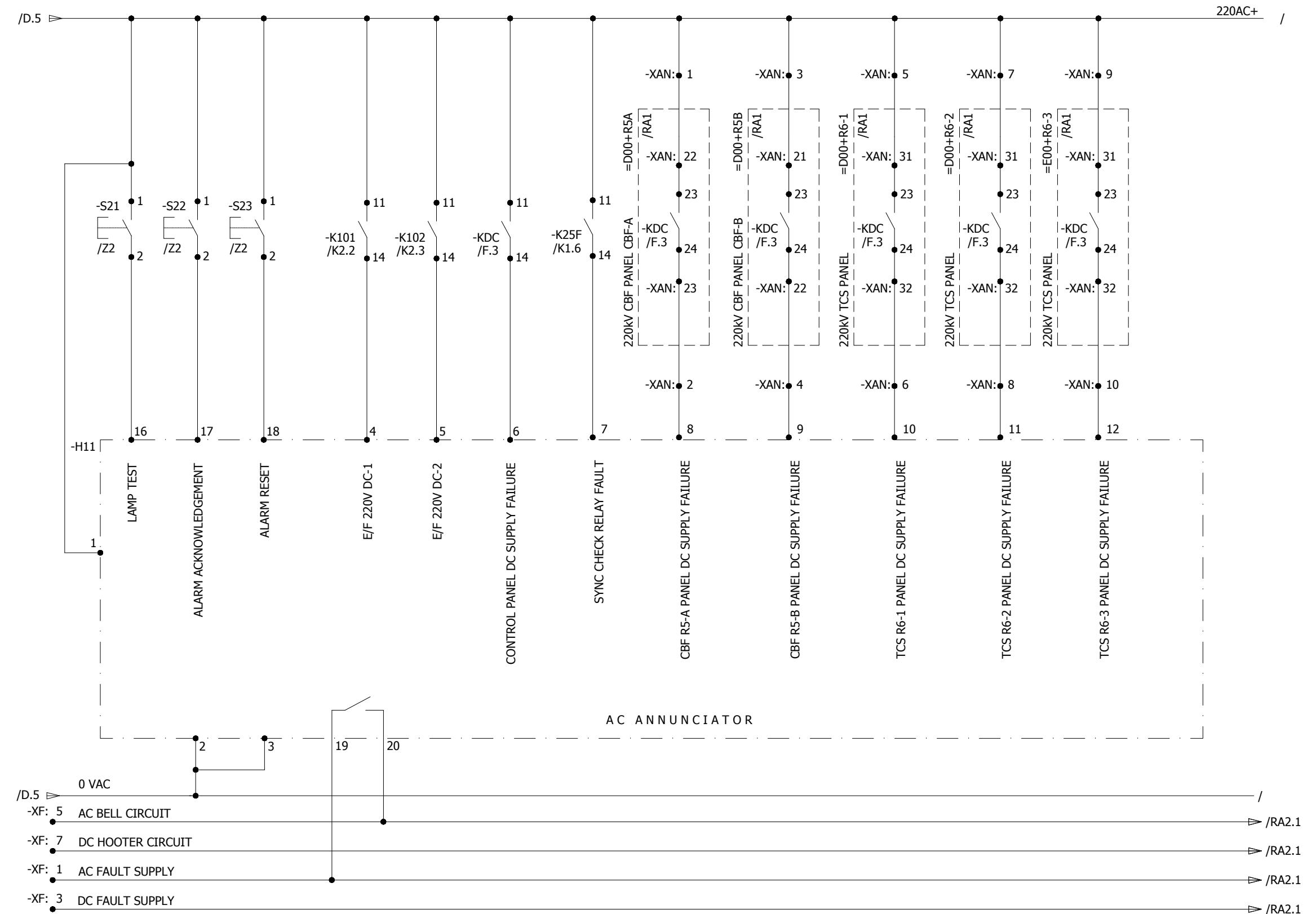
CB CLOSING PERMISSION
FROM SYNCHRO CHECK



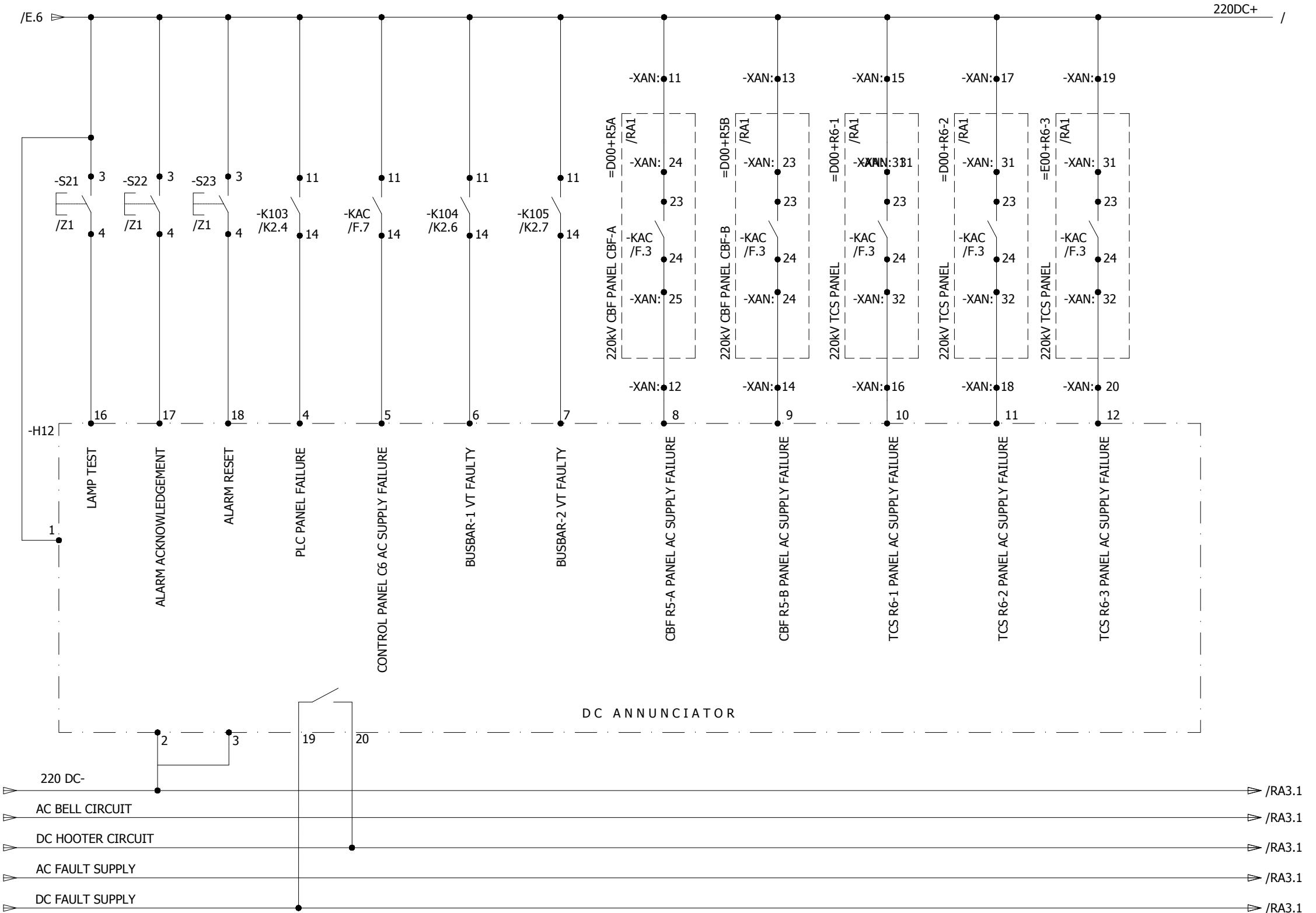
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|------|-------------|------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------------|------------------------------------|------------|-----------|
| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer  EPESOL 7-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor  Grid Solutions A GE and Alstom joint venture | Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) CB CLOSING PERMISSION | Drawing no. P60194-E-DSC-SC-001 | | |
| | | | | | | | | | Project no. | Sheet type | Sheet no. |
| REV. | DESCRIPTION | DATE | DRAWER | | | | | | P-60194 | PA1 | 23 |

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ANNUNCIATION CIRCUIT

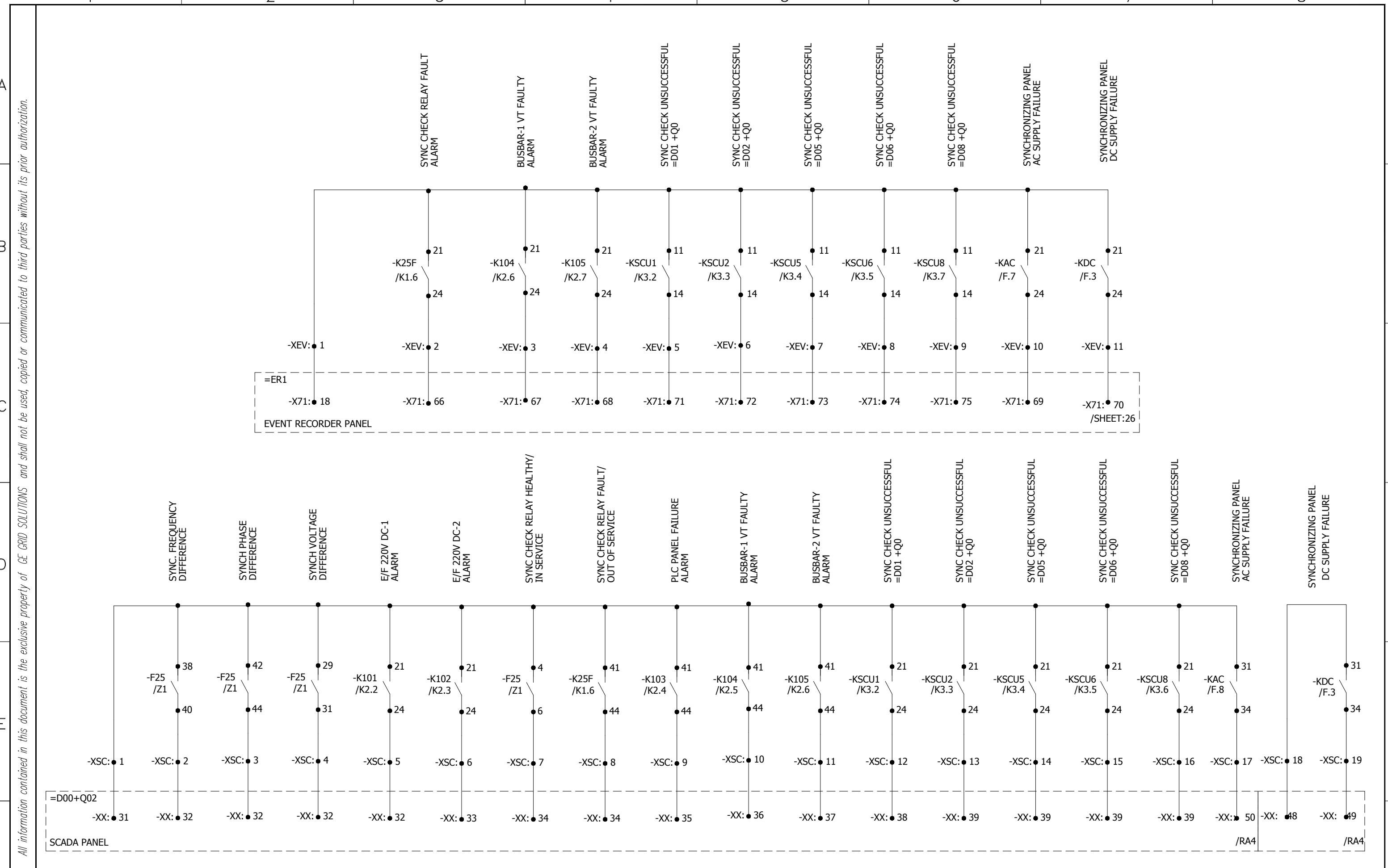


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|------|-------------|------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------|------------------------------------|------------|-----------|
| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor  Grid Solutions A GE and Alstom joint venture | Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) AC ANNUNCIATIONS | Drawing no. P60194-E-DSC-SC-001 | | |
| | | | | | | | | | Project no. | Sheet type | Sheet no. |
| | | | | | | | | | P-60194 | RA1 | 24 |
| REV. | DESCRIPTION | DATE | DRAWER | | | | | | | | |



| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor  Grid Solutions A GE and Alstom joint venture | Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) DC ANNOUNCEMENTS | Drawing no. P60194-E-DSC-SC-001 | | |
|------|-------------|------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------------------------------|------------------------------------|-------------------|-----------------|
| REV. | DESCRIPTION | DATE | DRAWER | | | | | | Project no. P-60194 | Sheet type RA2 | Sheet no. 25 |

| | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------------------------------|------------------------------------|-----------------|
| All information contained in this document is the exclusive property of GE GRID SOLUTIONS and shall not be used, copied or communicated to third parties without its prior authorization. | AC BELL | | DC HOOTER | | 220kV LINE CONTROL PANEL | | | | | |
| | -B1 | | -H1 | | =D01+C4 | | | | | |
| | | | | | /RA1 | | | | | |
| B | | | C | D | E | F | | | | |
| C | -XF: 5 AC BELL CIRCUIT -XF: 7 DC Hooter CIRCUIT -XF: 1 AC FAULT SUPPLY -XF: 3 DC FAULT SUPPLY | -XF: 6 -XF: 8 -XF: 2 -XF: 4 -XF: 5 -XF: 7 -XF: 1 -XF: 3 | F | | | | | | | |
| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer  EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor  Grid Solutions A GE and Alstom joint venture | Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) AC ANNOUNCEMENTS | Drawing no. P60194-E-DSC-SC-001 | |
| REV. | DESCRIPTION | DATE | DRAWER | | | | | Project no. P-60194 | Sheet type RA2-1 | Sheet no. 26 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | |



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|------|-------------|------------|--------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------------|------------------------------------|
| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer EPESOL 75-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 GAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) SCADA CIRCUIT | Drawing no. P60194-E-DSC-SC-001 |
| REV. | DESCRIPTION | DATE | DRAWER | | | | | | Project no. P-60194 |
| | | | | | | | | | Sheet type RA3 |

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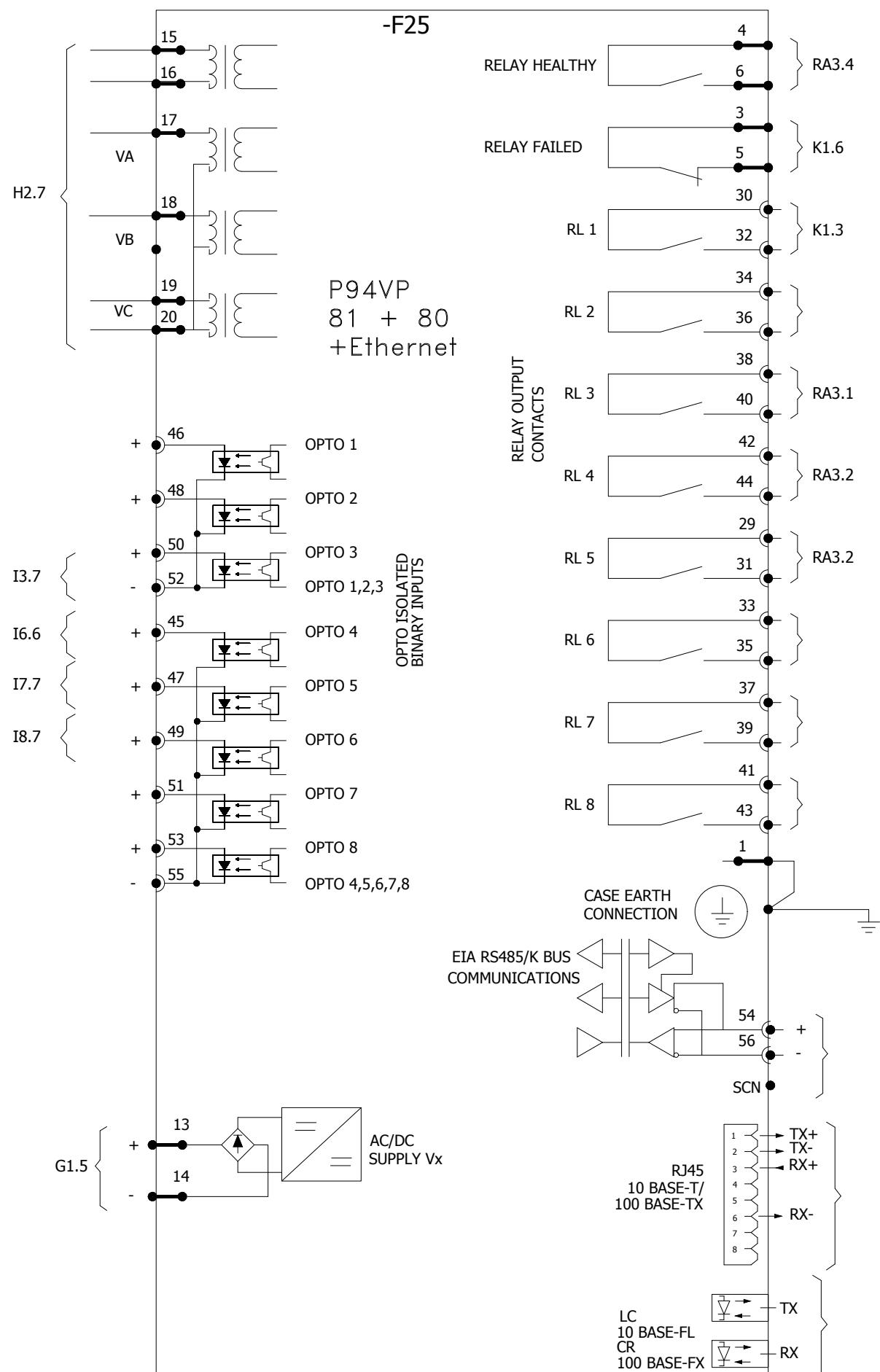
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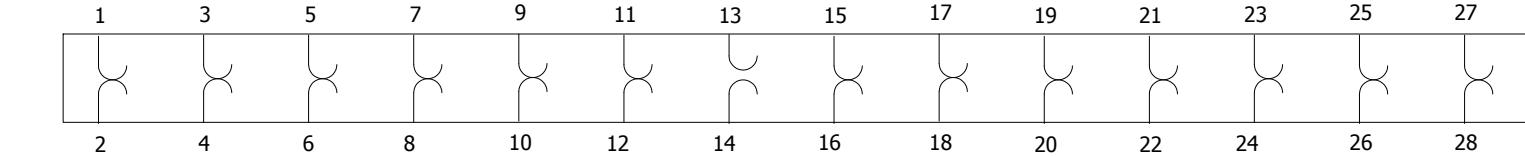
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| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer EPESOL 71-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor GE Grid Solutions A GE and Alstom joint venture | Client NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) COMPONENT DIAGRAM | Drawing no. P60194-E-DSC-SC-001 |
|------|-------------|------------|--------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------|------------------------------------|
| REV. | DESCRIPTION | DATE | DRAWER | | | | | Project no. P-60194 | Sheet type Z1 |
| 1 | | 2 | | | | | | Sheet no. 28 | |

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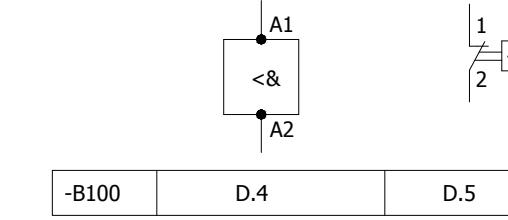
A



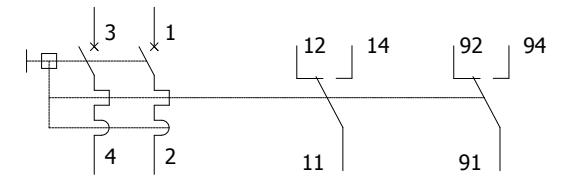
B

| | | | | | | |
|-------|------|------|------|------|------|------|
| -XT25 | H2.5 | H2.5 | G1.5 | K1.3 | K1.6 | K3.4 |
|-------|------|------|------|------|------|------|

C

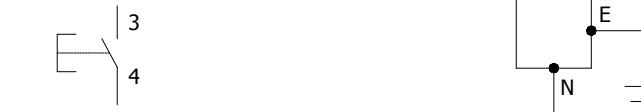


| | | |
|-------|-----|-----|
| -B100 | D.4 | D.5 |
|-------|-----|-----|

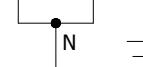


| | | | |
|-------|-----|-----|--|
| -F101 | D.2 | F.6 | |
| -F102 | D.4 | F.6 | |
| -F103 | D.6 | F.6 | |
| -F104 | D.6 | F.2 | |
| -F201 | E.3 | F.2 | |
| -F202 | E.4 | F.2 | |
| -F203 | E.3 | F.3 | |

D



| | | | |
|------|----|-------|-----|
| -S6D | O1 | -X100 | D.7 |
|------|----|-------|-----|



| | | | |
|-------|-----|-----|--|
| -F101 | D.2 | F.6 | |
| -F102 | D.4 | F.6 | |
| -F103 | D.6 | F.6 | |
| -F104 | D.6 | F.2 | |
| -F201 | E.3 | F.2 | |
| -F202 | E.4 | F.2 | |
| -F203 | E.3 | F.3 | |

E

21

22

| | |
|-------|-----|
| -S100 | D.3 |
|-------|-----|



| | |
|-------|-----|
| -H100 | D.3 |
| -H200 | F.4 |

| | | | | | | | | | |
|------|-------------|------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|----------------------------------------------------------------------|------------------------------------|
| 0 | AS BUILT | 18.08.2018 | MSC | Manufacturer  EPESOL 7-B Garden Block, New Garden Town, Lahore, Pakistan | Contractor  Grid Solutions A GE and Alstom joint venture | Client  NATIONAL TRANSMISSION & DISPATCH COMPANY LIMITED (NTDC-WAPDA) | Project 220kV/132kV GIS SUBSTATION GHAZI ROAD, LAHORE | Title 220kV SYNCHRONIZING PANEL (=D00+C6) COMPONENT DIAGRAM | Drawing no. P60194-E-DSC-SC-001 |
| REV. | DESCRIPTION | DATE | DRAWER | | | | | | Project no. P-60194 |
| | | | | | | | | | Sheet type Z2 |

| |
|-----------------|
| Sheet no. 29 |
|-----------------|

F

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