

स्विचगियर अभियांत्रिकी प्रभाग/ SWITCHGEAR ENGINEERING DIVISION

बीएचईएल, भोपाल/BHEL, BHOPAL

PURCHASE SPECIFICATION FOR PROCUREMENT OF SEMI-FURNISHED, WIRED
CONTROL & RELAY PANEL WITH FRONT AND REAR DOOR FOR OUTDOOR CIRCUIT BREAKER

Annexure-A FOR PI 240962024

Rev-00

Sl. No.	REQUIREMENTS	COMPLIANCE (Yes/No)
Item-001	Designed, manufactured, assembled & wired outdoor CRP cubicle with front and rear door with fixed plate for mounting of devices, for 11kV/33kV outdoor VCB. The detail specification is as detailed below:	
1.0	General Conditions	
1.1	Outdoor, sheet steel CRP Cubicle for 11/33kV VCB shall be designed, manufactured, assembled & wired with all fitments mounted (Except for items mentioned in clause-1.2 below) as per Table-1 bill of material and OGA drawing No. 35610051866 (Typical drawing for understanding, project specific drawing shall be provided during order execution) . The cubicle shall comply with the specification and drawings in totality. <u>Sheet Steel make acceptable are Tata, Essar, Jindal and Raymond.</u>	
1.2	Supply of Protection Relay, Master trip Relay, Trip circuit supervision relay, Auxiliary relays, Modem, Ammeter, Voltmeter and Energy Meter (TVM) as applicable is not in the scope of vendor. The mounting of these items along with termination of wires shall be in the scope of BHEL. However, necessary wiring for these items is to be provided by vendor at their works in line with BHEL scheme/wiring diagram 35620062352 (Typical drawing for understanding, project specific drawing shall be provided during order execution)	
1.3	Make of all BOM items shall be as per OGA drawing (35610051866 For reference only) , therefore vendor to prepare list of all items (along with type, make and model no.) mounted on each panel and furnish to BHEL for approval before bulk manufacturing.	
1.4	Equipment conforming to other internationally accepted standards, which ensure equal or higher quality than the standards mentioned would also be acceptable subject to BHEL approval for same.	
1.5	Panel and all items mounted on the panel shall be guaranteed for satisfactory operation for 60 months from the date of receipt of last consignment against each PO. If during the guarantee period, the materials are found defective or sub-standard, the same will have to be repaired or replaced free of cost by the vendor within 30 days of intimation.	
1.6	Drawing mentioned in clause 1.1 and 1.2 are typical drawing for understanding & preparation of offer. In the event of order it is the vendor's responsibility to take latest drawings from BHEL during detailed engineering stage, before bulk manufacturing.	
1.7	Discrepancy if any, found at any stage among drawings and tender specification shall be brought out to the notice of BHEL for resolution.	
1.8	Compliance to each clause of the specification shall be submitted along with the offer, else it will be deemed as complied by the vendor.	
1.9	The offer shall be submitted in 2 separate bids (Technical and price). If found necessary the bidder shall depute his technical representative for discussions and on the spot finalization/ confirmations of technical points at the time of technical bid opening.	
1.10	Vendor to submit detailed quality plan for approval by BHEL before start executing order.	
1.11	Vendor to provide Type-test report for IP55 with in 1 month of Placement of order. Only Type Tested panels shall be accepted by BHEL.	
1.12	Vendor shall manufacture a proto-type model of the ordered CRP as per specification and offer the same for inspection and routine test by BHEL/Customer's representative at vendor's works or BHEL Bhopal works. Also, stage-wise progress of the panels shall be informed to BHEL for arranging BHEL/ customer's representatives for stage inspection at vendor's works.	

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Rev-00

1.13	In case the end customer inspection at vendor works is waived-off, then vendor shall depute his representative to BHEL Bhopal works to demonstrate testing/functioning of scheme during inspection.	
1.14	All the fitments to be provided on the panel shall be flush mounted.	
1.15	All the indicating meters shall be of 96 sq mm size (if applicable).	
1.16	All relays shall conform to IS 3231/1966 along with all latest amendments.	
1.17	Other standard accessories, which are not specifically mentioned but are necessary for scheme completion shall be provided.	
1.18	AC Auxiliary Power Supply: 250V with + 10 or – 20% variation, 50Hz with +/- 5% variation, effectively earthed system.	
1.19	DC Auxiliary Power Supply: **VDC with + 20 or – 20% variation.	
1.20	The Vendor will be held responsible for any damages and/or losses of all and any kind that may occur by not following the specification.	
2.0	Construction	
2.1	Dimensions of sheet steel cubicle shall be 1750mm(height) X (650+50)mm(depth) X (700+100)mm(width) resting on 200 / 250 mm / 300mm high legs as per OGA drawing No. (Exact dimensions within the limits will be finalised during order execution stage).	
2.2	Suitable stiffeners shall be provided at the back of front panel to avoid buckling & waviness after cut outs are made and fitments are mounted. PVC troughs shall be provided for neat wiring.	
2.3	Lift off type front doors shall be provided. Vendor to ensure that device Door shall be fitted preferably on external channel and not on internal channel as per OGA drawing.	
2.4	Proper polyurethane or neoprene rubber gasket & door pocket shall be provided. Door of cubicle shall be connected to earth bar using 2.5sqmm Green PVC flexible wire.	
2.5	Concealed handle with built-in lock & shooting bolts with 3 point latching at top, middle & bottom shall be provided.	
2.6	Fixed type internal mounting plate of the cubicle shall be manufactured from 3 mm Thk. C.R.S. sheet, Cable gland plate by 4 mm and 2 mm for rest.	
2.7	Door Details : The panel shall have front door and Single Leaf Door on rear.	
2.8	Lifting lugs shall be provided at the 4 top corners of cubicle for lifting of panels.	
2.9	Powder coated, Plain Finish as per Corporate Standard AA0674124 & AA56159 enclosed. Thickness of coating shall be 70-90 microns. Exterior shade Shall be informed during detailed Engineering Stage while Interior shall be White	
2.10	All ferrous components like internal mounting plates, C channels, fuse panels, brackets etc. shall be painted, same as interior finish, to prevent any kind of rusting or corrosion.	
2.11	Surface treatment shall follow seven tank process. Painting shall be done through process of powder coating with pure polyester base grade A structure finish with UV resistant. The powder coated sheet steel fabrication shall fulfill 700Hrs of Salt spray test. Suitable rust resisting primer shall be applied on the interior and exterior surface of steel, which shall be followed by application of an undercoat suitable to serve as base and binder forth finishing coat. The paint shall be guaranteed for 5 years from the date of receipt of material in BHEL.	
2.12	Cubicle should be suitable for IP:55 degree of protection to IS:13947.	
2.13	Cable entry shall be from bottom. Undrilled cable gland plate with proper gasket shall be provided.	

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Annexure-A FOR PI 240962024

Rev-00

2.14	All non-ferrous items shall be tin plated.	
2.15	Each and every mounted equipment shall have anodised label (front and back) as detailed in OGA.	
2.16	All the Device labels, MCL/BCL, Fuse labels etc. shall be in vendor scope and shall be mounted by vendor before dispatch to BHEL. Details of all the labels shall be provided in OGA drg.	
2.17	Panel interior shall be illuminated by CFL lamps/LED BULB OF 9 Watts connected to 240V single phase AC supply.	
2.18	Earth Bar : 3 mm X 25 mm cross section tin plated copper bar shall be provided at the bottom of the panel across the depth of the cubicle.	
2.19	Earthing of metallic parts or body of equipment on panel shall be done with using 2.5sqmm Green PVC flexible wire.	
2.20	Schematic diagram of CT, PT, CB circuitry along with protection circuitry giving terminal nos. and bus wire shall be printed page-wise in laminated durable stickers and pasted inside the panel door of respective panel and remaining circuit diagrams such as AC, DC Ckt, illumination and annunciation Ckt. Stc., shall be kept in pocket	
2.21	Provision for mounting of modem near to energy meter of size 20cmX20cmX5cm shall be provided (If required).	
2.22	Device Mounting fixed plate of cubicle shall be connected to earth bar using 2.5sqmm Green PVC flexible wire.	
3.0	Wiring	
3.1	Terminal blocks shall be of 1100V grade, clip-on to channel, screw driver operated stud type, disconnecting type for CT & PT circuits, non-disconnecting type for rest of the circuits. Disconnecting terminal blocks suitable for taking two lugged wires with conductor cross section of upto 6 sqmm size. Non-disconnecting terminal block shall be suitable for taking two lugged wires with conductor cross section of upto 4 sqmm size. All current carrying part of TBs shall be of tinned brass. The screws shall be of brass & the washers, nuts etc. used for terminal connectors shall also be of tin plated brass.	
3.2	All TBs shall be shrouded by easily removable shrouds made of transparent dielectric material. At least 20% extra terminal block of each type shall be provided in each panel. All terminals shall be provided with ferrules indelibly marked or numbered as per relevant wiring drg. Terminal blocks shall be rated for not less than 15A.	
3.3	Panel wiring for all circuits shall be done with 2.5 sq mm, PVC insulated, 1100V grade FRLS, vermin proof & stranded copper conductor wire (ISI mark) conforming to IEC:227, 502 & IS:1554 using solder less crimping tinned copper lugs. Insulated sleeves shall be provided to all the wire termination. Termination shall be such that no strand of a conductor shall left loose or overhanging. CT/PT wiring shall be terminated through ring type lugs. <u>Make of Wires to be used – KEI, Polycab, Finolex, Havels, RR Kabel.</u>	
3.4	All the internal wiring shall be securely supported, neatly arranged, readily accessible and connected to equipment terminals and TBs. Wiring gutters & troughs shall be used for this purpose. Wiring connected to Space Heaters in the cubicles shall be suitably insulated over safe length from the heater terminals in order to avoid burning of insulation of wire.	

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Rev-00

3.5	Colour of wires: 1 phase AC circuit (Phase & Neutral): Black DC circuits (Positive & Negative): Grey Earth: Green Spare contacts: Grey 3phase CT & PT circuits: A phase: Red, B phase: Yellow, C phase: Blue and Neutral: Black	
3.6	For identification of wires numbered ferrules with black letter/ digit over white surface at both ends of wire are to be provided. Tubular ferrules is also acceptable.	
3.7	There shall be a minimum clearance of 250mm between the first terminal block and associated cable gland plate. Also the minimum clearance between edges of two adjacent columns of terminal blocks shall be 150mm. All internal wiring to be connected to external equipment shall terminate on vertically mounted terminal blocks on each side of the cubicle.	
3.8	Vendor to specifically note that sequence of wiring termination shall be strictly in line with BHEL wiring tables.	
4.0	Testing and Inspection	
4.1	Serial nos. & Routine test reports of all the items mounted shall be provided to BHEL before Inspection.	
4.2	Panels shall be subjected to the following tests during inspection:	
(i)	Functional and sequence tests shall be carried out for all equipment to verify schematic drawing.	
(ii)	Panel wiring shall be tested for High voltage power frequency withstand test by applying 2.0 kV, 50Hz, between all terminals shorted and earth, for one minute.	
(iii)	IR value test shall be performed. Panel wiring shall be tested for insulation resistance between all terminals shorted and earth, using a 500V DC Megger for IR value greater than 1 Mega Ohm.	
(iv)	Verification of wiring as per approved drawings.	
(v)	Electrical control, Interlock and sequential operation tests as per approved schematic drawings.	
4.3	Vendor Representative shall be present during testing at BHEL to rectify the defective components of vendor scope and to rectify wiring mistakes, if any.	
4.4	Routine test certificates (as per relevant standard) of all fitments mounted on panel shall be furnished during inspection of these panels.	
4.5	Panels will be inspected and test witnessed by BHEL/Customer's representative at vendor's works or BHEL Bhopal works. In case the end customer denies to inspect the panels at vendor works, the vendor shall depute his representative to BHEL Bhopal works to demonstrate testing/functioning of scheme during inspection. Inspection will be carried out in lots separately.	
5.0	Packing and Despatch	
5.1	The vendor is responsible for the correct and adequate packing of each unit so that these panels will arrive at destination undamaged.	
5.2	The quality of packing of panels shall provide maximum protection against damage, breakage and pilferage during transport, storage and multiple handling, including handling by e.g. hoisting, lifting devices and forklift trucks	
5.3	Wiring table, GA drawing and schematic drawings (prepared by BHEL) are to be supplied in duplicate copies along with each unit and are to be housed in a proper weather proof enclosure (pocket) on the rear of the control panel door.	

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Rev-00

Table-I to Annexure-A: Bill of Material (to be mounted in panel by vendor) Reference drg : As per provided OGA and Schematics

Item	Bill of material	Device Ref	Qty of fitments for Item-001	Compliance (Yes/No)
1.	Panel wiring of CRP cubicle with ferrules as per BHEL prepared wiring tables and with suitable copper lugs and end sleeves.	-	1 set	
2.	Heavy duty Switch for CB control, having Trip / Neutral / Close positions, spring return to neutral type. Pistol grip handle.	CS	1	
3.	LED type (One Red and one Green) indicating lamp for breaker Close and Trip positions respectively, rated for **VDC supply.	IL	2	
4.	LED type blue colour indicating lamp rated for 240V AC supply for control supply healthy.	IL	1	
5.	LED type white colour indicating lamp rated for **VDC supply for CB spring charged indication.	IL	1	
6.	LED type Amber colour indicating lamp rated for **VDC supply for Autotrip indication.	IL	1	
7.	LED type Yellow lamp for healthy trip indication rated for **VDC	IL	2	
8.	Screw & back connected type Test terminal block, 3 phase, 4 wire, for use with the energy meter.	TBTVM	1	
9.	Auxiliary Contactor/Plug in relay for DC Supply monitoring, **VDC.	80D	1	
10.	**VDC DC, 16A MCB as per IS-8828 for incoming DC supply to the CRP. AC & DC MCBs are of Different Colour for Easy identification	MCBDC	1	
11.	240V AC, 16A MCB as per IS-8828 for incoming AC supply to the CRP. AC & DC MCBs are of Different Colour for Easy identification	MCBAC	1	
12.	Socket and plug top (5-15A, 250 VAC) with 15A switch.	SKTS	1	
13.	CFL Illumination lamp (40W, 230 VAC).	CFL	1	
14.	Door operated switch	DS1 & DS2	2	
15.	Panel space heater (75W, 240VAC) with heater switch and thermostat.	H	1 set	
16.	Alarm cancellation scheme comprising two auxiliary contactors/Plug in relay rated for **VDC, one LED type amber indicating lamp rated for **VDC, two push button switches with black actuator for alarm Accept & Reset and one static buzzer rated for **VDC.	75A/75B+ PBA&PBR+ BZ	1 Set	
17.	Necessary rear connected LT Fuses for Protection and Control Circuits as per drawings.	-	1 set	
18.	Necessary earth link assembly as per drawings.	-	1 set	

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Rev-00

19.	1 Set - Brass Cable glands a) CT cable - 5 Core, 2.5 sqmm - 3 Nos. b) PT cable - 4 Core, 2.5 sqmm - 1 No. c) Control cable - 10 Core, 2.5 sqmm - 1 No d) Control cable - 4 Core, 2.5 sqmm - 2 No.	-	1 set	
20.	Stud type (Bolt and nut) terminal blocks for disconnecting type for CT and PT circuits. Non-disconnecting type for other circuits. 20% spare terminals shall be provided for both type.	-	1 set	
21.	Suitable copper earth strip of 25 x 3 mm size with adequate number of holes with suitable nuts and bolts(Stainless steel).	-	1 set	

**** Auxiliary DC supply voltage is 24V DC +20% (To be reconfirmed during order execution)**

Following additional instructions to be taken care -

A/ List of material with model no, serial no, make etc in the below format for each panel shall be furnished before despatch.

<u>Sl No.</u>	<u>Device Ref</u>	<u>Brief Description</u>	<u>Type/Model</u>	<u>Make</u>	<u>Serial No.</u>	<u>Remarks</u>

B/ For CRP, following to be separately embossed in a name plate on the outer front door.

"P.O. No. (Will be informed during order execution stage)"

C/ Guarantee name plate on front door to be provided as per **Sh-02 of Drg 35610051866** as provided for different project.

35620062352

NO.	DRG.
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SCHEMATIC DRAWING OF OUTDOOR CONTROL & RELAY PANELS FOR 11KV, 24V DC FEEDER VCBs FOR

SOUTHERN POWER DISTRIBUTION COMPANY OF TELANGANA LTD.

WO	CRP UNIT SI. NOS.	QTY	Customer PO NO	CT DETAILS
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=CRP +CRP										PROJECT: OUTDOOR CRP FOR 11KV, 24V DC FEEDER VCBs CUSTOMER: TGSPDCL CONSULTANT:										REV. NO. 00											
SIGN & DATE										W. O. NO.										<div>बीएचईएल BHEL</div>	BHARAT HEAVY ELECTRICALS LIMITED										CARD CODE --
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FROM PREVIOUS SHEET

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400-200-100/1A

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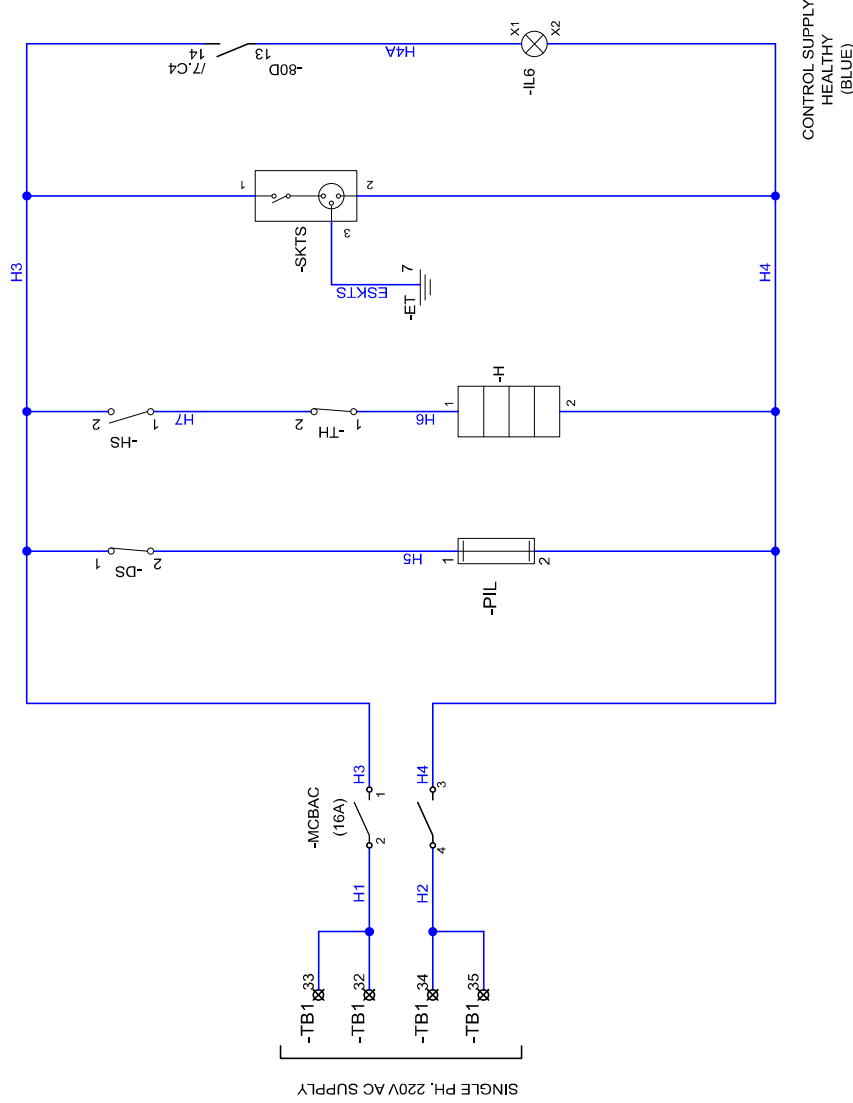
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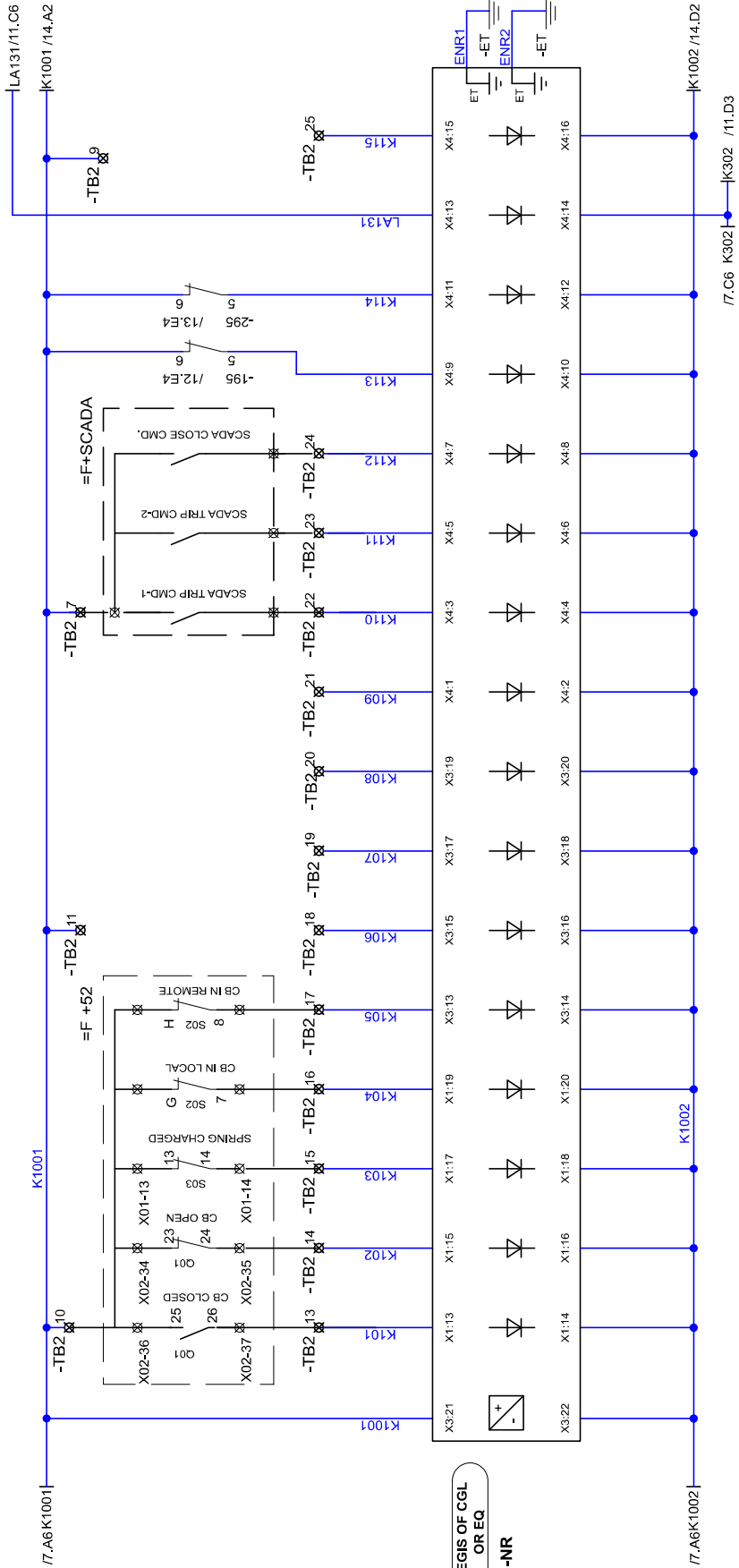
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35620062352
NO.
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Note -

- 1) Contacts shown are tentative and will change according to make of relays. These will be reflected in as-manufactured drawings.

PROJECT: OUTDOOR CRP FOR 11KV, 24V DC FEEDER VCBs
CUSTOMER: TGSPDCL
CONSULTANT:

W.O. NO.	NAME	SIGN.	DATE
DRAWN	KS	sd/-	15.04.26
CRD	AK	sd/-	15.04.26
APPD	DP	sd/-	15.04.26
DISTRIBUTION OF PRJ'S	1 NO. ENGINEER	1 NO. CUSTOMER	1 NO.
DIAGRAM	1 NO. ENGINEER	1 NO. CUSTOMER	6 NOS.
SWM	1 NO. ENGINEER	1 NO. CUSTOMER	6 NOS.
on 04/05/2026 12:22 pm			

REV	DATE	ALTERED	REV	DATE	ALTERED
CRD.		CRD.			CRD.
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ZONE		ZONE			ZONE

REV. NO.	CARD CODE	THIS SHEET	NEXT SHEET
00	--	8	9

TITLE	OUTDOOR CONTROL & RELAY PANEL
SCALE	N.T.S
DEPT.	CODE
SWE	409
DRG. NO.	35620062352

CONFIGURATION OF DIGITAL INPUTS NR RELAY

SR. NO.	BINARY INPUTS	FUNCTION
BI-01	(X1:13-X1:14)	CB CLOSED
BI-02	(X1:15-X1:16)	CB OPEN
BI-03	(X1:17-X1:18)	SPRING CHARGED
BI-04	(X1:19-X1:20)	CB IN LOCAL
BI-05	(X3:13-X3:14)	CB IN REMOTE
BI-06	(X3:15-X3:16)	SPARE
BI-07	(X3:17-X3:18)	SPARE
BI-08	(X3:19-X3:20)	SPARE
BI-09	(X4:1-X4:2)	SPARE
BI-10	(X4:3-X4:4)	SCADA TRIP CMD-1
BI-11	(X4:5-X4:6)	SCADA TRIP CMD-2
BI-12	(X4:7-X4:8)	SCADA CLOSE CMD.
BI-13	(X4:9-X4:10)	TC-1 FAULTY
BI-14	(X4:11-X4:12)	TC-2 FAULTY
BI-15	(X4:13-X4:14)	MASTER TRIP OPERATED(86)
BI-16	(X4:15-X4:16)	SPARE

PROJECT: OUTDOOR CRP FOR 11KV, 24V DC FEEDER VCBs
CUSTOMER: TGSPDCL

CONSULTANT:

REV. NO.	CARD CODE	REV. NO.
00	--	00
9	THIS SHEET	9
10	NEXT SHEET	10











BHARAT HEAVY ELECTRICALS LIMITED
BHOPAL
TITLE . OUTDOOR CONTROL & RELAY PANEL

DEPT. CODE
SWE 409
SCALE N.T.S
DI CONFIGURATION-NR RELAY

DRG. NO. 35620062352

35620062352
NO.
DRG.

CONFIGURATION OF DIGITAL OUTPUT NR RELAY

SR. NO.	BINARY OUTPUTS	FUNCTION	REMARKS
BO-1	X1:1 	WATCHDOG	TO BUZZER
BO-2	X1:5 	SPARE	SPARE
BO-3	X1:9 	SPARE	SPARE
BO-4	X1:11 	UNUSED	UNUSED
BO-5	X3:2 	SCADA TRIP CMD OR HMI TRIP CMD.	TO TRIP COIL-1
BO-6	X3:4 	SCADA TRIP CMD OR HMI TRIP CMD.	TO TRIP COIL-2
BO-7	X3:6 	SCADA CLOSE CMD. OR HMI CLOSE CMD.	TO CLOSING COIL
BO-8	X3:8 	SPARE	SPARE
BO-9	X4:18 	PROTN. TRIP	TO 86 TRIP RELAY
BO-10	X4:20 	PROTN. TRIP	TO BUZZER

LED CONFIGURATION

LED NO	DESCRIPTION
1	POWER ON
2	GEN PICKUP-TRIP
3	TRIP R-PH O/C
4	TRIP Y-PH O/C
5	TRIP B-PH O/C
6	E/F TRIP
7	CB OPEN
8	CB CLOSE
9	TC-1 FAIL
10	TC-2 FAIL
11	CB IN LOCAL
12	CB IN REMOTE
13	CB SPRING CHARGED
14	SPARE
15	SPARE
16	SPARE

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SIGN & DATE

ENTRY NO.

File No. HEP-SCROSWEMisc/161/2026-HEP-SWE40905 (Computer No. 300257)
Generated from eOffice by Pradeep Kumar Agrawal

ENGINEER(PKA-HW)33702-HEP, ENGINEER, HEP-HEAVY ELECTRICALS PLANT (HEP) on 04/05/2026 12:22 pm

1 NO. ENGINEER, 1 NO. CUSTOMER

1 NO. ENGINEER, 6 NOS. CUSTOMER

1 NO. ENGINEER, 6 NOS. CUSTOMER

PROJECT: OUTDOOR CRP FOR 11KV, 24V DC FEEDER VCBs
CUSTOMER: TGSPDCL
CONSULTANT:

BHARAT HEAVY ELECTRICALS LIMITED
BHOPAL

TITLE . OUTDOOR CONTROL & RELAY PANEL

DO CONFIGURATION-NR RELAY

DRG. NO. 35620062352

35620062352

NO. DRG.

/7.B6 J1A

=F +52

X02-01

(+24V DC)

(CLOSE CMD.)

-NR /10.B2

X3:6

X3:5

-CS /15.A7

T=0

O B

11

12

-86 /14.E3

K14

K15

-TB2_26

X02-11

(REMOTE CLOSE)

X02-10

(REMOTE TRIP-1 (MANUAL))

X02-9

(PROTECTION TRIP)

X02-7

(POST CLOSE SUPERVISION)

X02-12

(PRE CLOSE SUPERVISION)

X02-02

(-24V DC)

J2A

-TB2_5

-195

J1A

-195 /12.E4

AVANA OR EQ.

TRIP CIRCUIT SUPERVISION RELAY

1 13 3

2

4

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C

14

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6 /8.A6

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9 /10

/11.B5

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PROJECT: OUTDOOR CRP FOR 11KV, 24V DC FEEDER VCBs

CUSTOMER: TGSPDCL

CONSULTANT:

W.O. NO. 15.04.26

NAME KS

SIGN. sd/-

DATE 15.04.26

DRWN CRD

APPD DP

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DIST. OF PRS

DIAGRAM 1 NO. ENGINEER 1 NO. CUSTOMER 6 NOS.

SWM 1 NO. CUSTOMER 6 NOS.

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ENGINEER(PKA-HMW33702-HEP, ENGINEER, HEP-HEAVY ELECTRICALS PLANT (HEP) on 04/05/2026 12:22 pm

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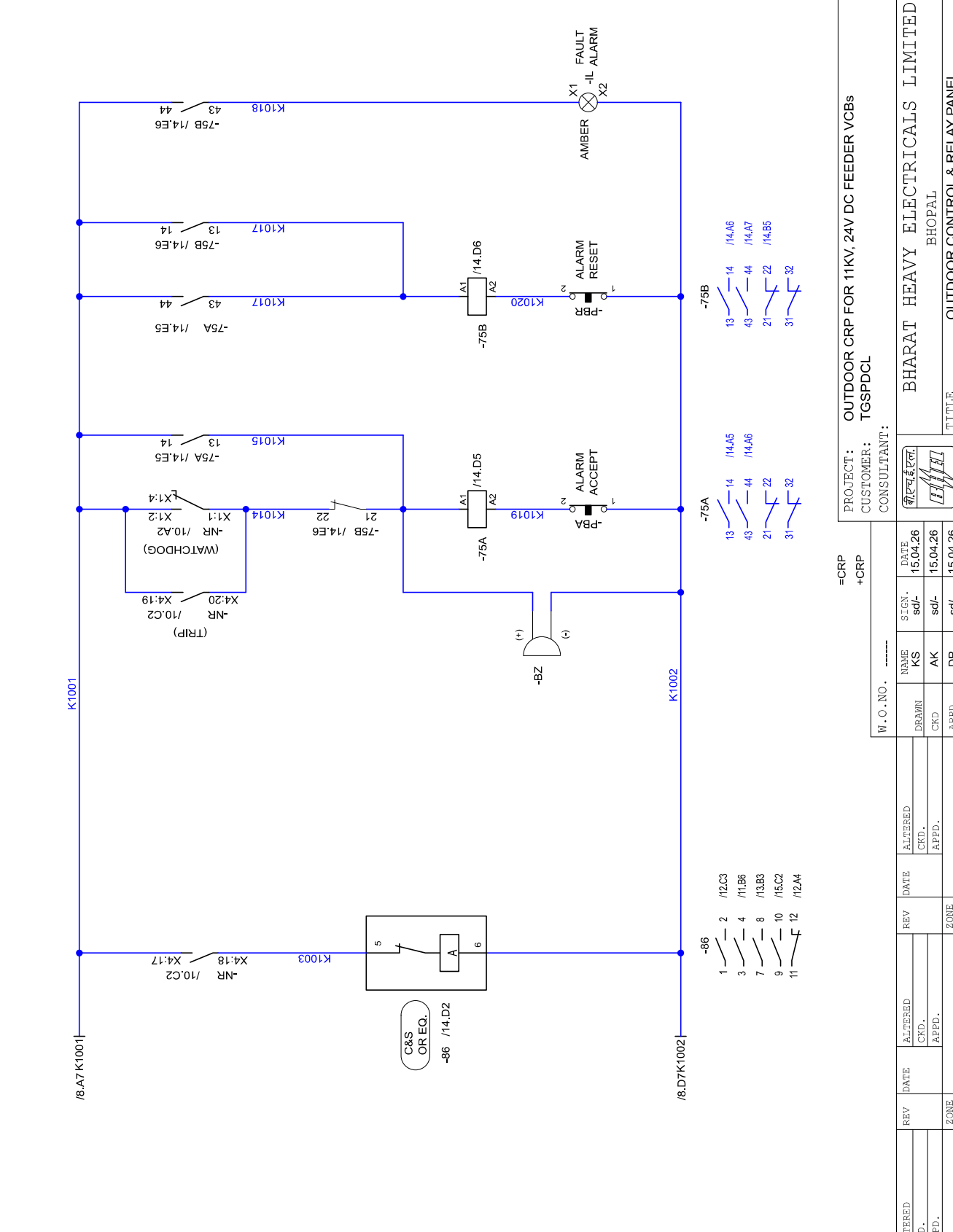
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