

Bharat Heavy Electricals Limited

High Pressure Boiler Plant, Tiruchirappalli-620 014.

Technical Delivery Conditions For Sub - Delivery Components of Controls and Instrumentation / FB

SPECIFICATION NO:TCI:310(EMC):RCP-PIR

TECHNICAL SPECIFICATION
for
REMOTE & LOCAL CONTROL PANEL
(EMC COMPLIANT)
of
GRAVIMETERIC FEEDER CONTROL SYSTEM

REV. NO.	DATE	DESCRIPTION	PREPARED	REVIEWED	APPROVED
00	01/01/19	Initial release	Sd/- (SK)	Sd/- (KV)	Sd/- (TK)
01	15/11/19	Revised to update specification & BOM	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>

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Clause No.	REQUIREMENT
1.	<u>GENERAL REQUIREMENTS:</u>
	a) This specification covers general requirements of Remote Control Panel (RCP) & Local control panel (LCP) for gravimetric feeder control system. b) Bill of Materials shall be as per annexure 1.
2.	<u>SCOPE OF WORK:</u>
2.1	Manufacture and supply of EMC RCP & EMC LCP panel to BHEL (T) works, after inspection at vendor works.
2.2	On receipt of panels at BHEL (T) works, vendor to mount and wire BHEL's free issue components as per annexure-2 (BHEL free issue items to be mounted by vendor at BHEL works). For mounting of BHEL (T) supplied free issue items, panel assembly & wiring works at BHEL (T) premises by vendor, separate price shall be indicated by vendor in the main offer.
2.3	<u>TYPE TESTS</u>
	a) One no. RCP and one no. LCP after integrating with BHEL's free issue components at BHEL (T) works shall be type tested as per test requirements indicated in this specification Clause no. 8.0. To carry out the same, the vendor to consider the following points: - b) Vendor to indicate separate charges for conducting type tests listed in clause no.8.0 of this specification i.e. at CPRI / Bangalore (for conducting type tests indicated sl. nos. (a) to (d) of clause no. 8.0) & SAMEER/Chennai (for conducting type tests indicated sl. nos. (e) to (l) of clause no. 8.0). Separate quotations shall be obtained from SAMEER by bidders for tests (e) to (l). c) Packing at BHEL works, Transportation & handling of packed assembled panels from BHEL(T)'s works to SAMEER/Chennai (for conducting type tests indicated sl. nos. (e) to (l) of clause

Clause No.	REQUIREMENT
	no. 8.0) & Repacking then to CPRI / Bangalore (for conducting type tests indicated sl. nos. (a) to (d) of clause no. 8.0) d) Co-ordination with test centres for carrying out the above tests and obtaining test reports on behalf of BHEL (T). These type tests will be witnessed by BHEL (T) at the respective Test Houses. Vendor to arrange workmen to move panels inside SAMEER & CPRI labs for different test locations. e) Vendor to consider contingency charges for carrying out re-testing of panels in case of any problem / failure encountered during testing. f) After successful testing of panels, re-packing of panels, transportation and delivery to BHEL (T) works. g) Vendor shall quote with break-up price for 1. Test charges at SAMEER 2. Test charges at CPRI 3. Logistics 4. Handling
	NOTE: The responsibility of conducting type tests (as per clause No.8.0 of this specification) successfully rest with the vendor and in this respect, the vendor may contact BHEL (T) for getting clarifications if any.
3.	<u>CONTROL PANEL FABRICATION & CONSTRUCTION DETAILS:</u>
3.1	All Electrical & Electronic components are to be mounted and wired inside a weatherproof EMC cabinet as per schematic diagram and annexure BOM.
3.2	The cabinet shall be of professional quality welded / modular construction made from CRCA Grade-D sheet steel (branded make) as per IS-513 (or) GI Sheet steel 2mm (min.) thick for door, 2mm (min.) thick for sides and shall be rigid freestanding, neat in appearance. Component mounting plate shall be rigidly fixed and made from 3mm

Clause No.	REQUIREMENT
	thick GI sheet steel (branded make) or Zinc passivated to 15-20 microns. Necessary stiffeners / supports shall be provided to avoid bowing and bending. Component mounting plate shall not be fixed directly on to the cabinet enclosure.
3.3	The cabinet construction shall have adequate strength to support mounted components during shipment.
3.4	For routing the cables coming from outside, the cabinet shall have bottom removable cable gland plate of 3mm thick GI (or) CRCA Grade-D sheet steel fixed with conductive gasket. The mating surface shall be made conductive surface first and then conductive gasket shall be fixed using conductive glue.
3.5	GI strip of 1mm thick shall be welded to inner side of door that is mating with the conductive gasket. Enclosure doors should be connected to inside of the side panels at regular intervals using thick braid or metal strips.
3.6	Two numbers brass bolt size M8x25mm / M6x20mm with nut for connecting customer's GI earth flat shall be provided on back side of the panel.
3.7	SS wiring accessories such as plate screws, washer, spring washer and serrated washers as required shall be used for fixing of all components.
3.8	Self-adhesive poly-carbonate nomenclature labels of thickness 175 microns are provided for both front & rear sides of cabinet. For inscription details and name plate specification, refer annexure-3 (Name plates with inscription to be fixed / supplied by vendor) & annexure-4 (BHELFEED Name Plate details) .
3.9	The terminals shall be identified with number strip with legible numbering as per schematics.
3.10	Wire dressing spiral of polyethylene material of adequate size shall be used for neat dressing of door-mounted components wiring.

Clause No.	REQUIREMENT
3.11	Painting: The finished cabinet surfaces shall be free from all waves, bellies and other imperfections. All cabinet exterior steel surfaces shall be pre-treated by 7-tank process (or) pretreatment (Spray line) & Primer (Dip coat). Surface preparation shall be done by power tool cleaning after degreasing and rinsing. Powder coating (Epoxy based powder) shall be done for both exterior and interior of the control panel. Thickness of painting for exterior, interior shall be 75 microns.
3.12	All the mating surfaces including cable gland plates etc. shall be made electrically conductive surface and conductive gaskets shall be fixed using conductive glue.
3.13	Power/control/signal cables used in the cabinet shall be as per annexure BOM.
3.14	Vendor has to mount and wire the components supplied by BHEL at BHEL's works. Annexure-2 (BHEL free issue item to be mounted by vendor at BHEL works) to this specification gives the list of wiring to be done. Vendor shall arrange required cable for carrying out this wiring. All the required accessories for mounting the BHEL free issue items shall be in vendor scope and shall be dispatched along with panel to BHEL works. The plug-in connectors at module/electronic card (arranged by BHEL) shall be connected to one end of the shielded cable and the other end shall be neatly dressed, ferruled, lugged and terminated in the terminal blocks.
3.15	All exposed conductive parts like HMI door frame shall be connected to ground through low impedance conductor.
3.16	Shielded type cables for interconnecting the electronic module up to the terminal block shall be neatly dressed, ferruled and lugged at both sides.
3.17	One document pocket at suitable location shall be provided. Preferably at back side of the door.

Clause No.	REQUIREMENT
3.18	A caution sticker of anodized aluminium for handling electronic cards shall be fixed at back side of the door at suitable location.
3.19	OGA, IGA & wiring Schematics will be furnished after PO placement.
4.	REMOTE CONTROL PANEL SPECIFIC POINTS
4.1	Panel dimension: {2000+15+50(H)x750(W)x750(D)}mm
4.2	The cabinet shall be with single door type.
4.3	The cabinet shall be mounted on anti-vibration pad, 15 mm thick suitable for fixing to the ISMC channel/plinth of 50mm height with self-drilling anchor bolts together with all required accessories.
4.4	Flush type ergo form lock shall be provided for door locking.
4.5	The cabinet enclosure shall be suitable for IP-32 degree of protection as per IEC 60529.
4.6	Removable screw type canopy shall be provided on top to prevent ingress dripping of water.
5.	LOCAL CONTROL PANEL SPECIFIC POINTS
5.1	The LCP size shall be {600(W) X 750/ 760(H) X 350(D)} mm.
5.2	The LCP shall be provided with mounting brackets at the back to facilitate mounting onto the feeder. The LCP shall have continuous hinge/die-cast with stainless steel pin and single door arrangement.
5.3	The cabinet enclosure shall be suitable for IP-55 degree of protection as per IEC 60529. Canopy shall be provided on top to prevent ingress dripping of water.
5.4	The door shall be suitable for opening of 120 deg.
5.5	CAM type door locking with two keys (multi lever type) with SS handle on the door for opening and closing (or) Ergo form locking system shall be supplied for door locking to meet IP-55 enclosure protection.

Clause No.	REQUIREMENT
5.6	Fixing clamp with spring loaded nuts (6 Nos./ panel) for mounting the panel onto the feeder shall be supplied along with each LCP.
5.7	The mating part of the door shall be provided with GI strip of 1mm thick to ensure conductive path. Also braided wire of adequate size shall be provided between the door and the panel.
6.	<u>DOCUMENTATION:</u>
6.1	Documents to be submitted along with the offer:
	Signed No deviation this specification. No deviation format shall address this specification reference, Quality Plan reference and packing procedure reference.
6.2	Documents to be submitted for BHEL's approval within 15 days from PO.
	Bill of material with makes and model number of components, vendor OGA & internal arrangement drawings.
7.	<u>INSPECTION:</u>
7.1	Applicable quality plan: QA:CI:STD:QP: 71 /Rev.00
7.2	Inspection will be carried out by BHEL (T) at vendor works. Advance information of one week shall be given to BHEL for arranging inspection.
8.	<u>TESTING REQUIREMENTS</u> The complete RCP and LCP shall be designed suitable for the following type test requirements:- a) Dry heat test as per IEC 60068-2-2, Type Bd b) Damp heat test as per IEC 60068-2-30, Type Db c) Vibration test as per IEC 60068-2-6, Type Fc d) Cold Test IEC 600068-2-1 Ad e) Electrostatic Discharge Immunity Test as per IEC 61000-4-2, 2008 f) Radiated Susceptibility Test as per IEC 61000-4-3, 2010 g) Conducted RF Immunity Test as per IEC 61000-4-6, 2013

Clause No.	REQUIREMENT
	h) Damped Oscillatory Test as per IEC 61000-4-18, 2011 i) Electric Fast Transients Test as per IEC IEC 61000-4-4,2012 j) High Energy Surge Immunity Test as per IEC 61000-4-5, 2014 k) Conducted Emission Test IEC 61000-6-4 l) Radiated Emission Test IEC 61000-6-4
	Test levels for type tests to be conducted for above tests are indicated below for reference.
8.1	Dry heat test as per IEC 60068-2-2, Type Bd Temperature: 55°C Duration: 2 Hrs.
8.2	Damp heat test as per IEC 60068-2-30, Type Db (Variant-1) Temperature: 55°C No. of cycles: 1
8.3	Cold Test IEC 60068-2-1 Ad Temperature -5°C Duration: 2Hrs.
8.4	Vibration Test as per IEC 60068-2-6, Test Fc Frequency Range: 10HZ to 55HZ Displacement: 0. 35 mm No. of sweeps: 20 No. of axis: 3
8.5	Electrostatic discharge test as per IEC 61000-4-2 Contact discharge up to $\pm 4\text{kV}$ Air discharge up to $\pm 8\text{kV}$
8.6	Radiated Susceptibility as per IEC 61000-4-3 80 MHz - 1000 MHz : 10 V/m 1400 MHz - 2000 MHz : 10 V/m 1 kHz, 80%AM
8.7	Conducted RF immunity test as per IEC 61000-4-6 0.15 MHz - 80 MHz : 10Vrms 1 kHz, 80%AM 230V AC, 50 Hz Power Port

Clause No.	REQUIREMENT
8.8	Damped Oscillatory Wave test as per IEC 61000-4-18 Upto ± 1 kV for Differential mode Upto ± 2 kV for common mode 100KHz & 1 MHz for 230V AC, 50 Hz Power Port Upto ± 1 kV for Shielded cable 100KHz & 1 MHz for 3 Channels of signal line.
8.9	Electrical fast Transient test IEC 61000-4-4 Upto ± 1 kV, 5/50 ns 230V AC, 50 Hz Power Port
8.10	High Energy Surge Immunity Test IEC 61000-4-5 ± 2 kV, 1.2/50 μ s for common mode ± 1 kV, 1.2/50 μ s for differential mode 230V AC, 50 Hz Power Port
8.11	Conducted Emission Test IEC 61000-6-4 Conducted emission applicable to 230V AC, 50 Hz Power Port Conducted emission Basic Standard CISPR22, Class A Range 150 kHz to 30 MHz.
8.12	Radiated Emission Test IEC 61000-6-4 Radiated Emission Basic Standard CISPR22, Class A Range 30 MHz – 1 GHz and 1 GHz – 6 GHz
9.	<u>PACKING:</u> As per Packing procedure QA:CI:STD:PR:02 /Rev 03
10.	<u>SPECIAL INSTRUCTION TO VENDOR:</u>
	Nothing in this specification shall be construed to relieve the vendor from their responsibility. This specification covers briefly the requirements of the system. It is the responsibility of the vendor to take care of other basic and essential requirement, to make the system a complete one.

Annexure-1

Bill of Material – EMC - Remote Control Panel (RCP)

SL. NO	SCHEMATIC REFERENCE	Description	RATING	MAKE	CAT./TYPE NO	QTY./ PANEL
1.	MCB1	Miniature circuit breaker,240VAC, double pole, suitable for din rail mounting	2A	MDS/INDOASIAN/ SIEMENS/L&T- HAGER/INDOKOPP/ SCHNEIDER ELECTRIC	LEXIC 603261/ SIEMENS 5SL4202-7RC	1
2.	MCB2	Miniature circuit breaker,240VAC, single pole, suitable for din rail mounting	6A	MDS/INDOASIAN/ SIEMENS/L&T- HAGER/INDOKOPP/ SCHNEIDER ELECTRIC	LEXIC 603231 / SIEMENS 5SL41067RC	1
3.	MCB3	Miniature circuit breaker,240VAC, double pole, suitable for din rail mounting	6A	MDS/INDOASIAN/ SIEMENS/L&T- HAGER/INDOKOPP/ SCHNEIDER ELECTRIC	LEXIC 603265	1 1
4.	MCB4	Miniature circuit breaker,240VAC , double pole, suitable for din rail mounting	4A	MDS/INDOASIAN/ SIEMENS/L&T- HAGER/INDOKOPP/ SCHNEIDER ELECTRIC ELECTRIC	LEXIC 603263	1
5.	TR	Control transformer, with protective shrouding of suitable size and warning sticker. Primary 230v (or) 240v, secondary 1x110VAC,50Hz. Secondary rated for 1x350 VA. Mounting accessories 8nos. Mounting screw M6x20 with nut Plate washer 8nos. Serrated washer 8nos. Mounting “L” clamps to support transformer at bottom.	1X350VA	AE /KAPPA / INDCOIL PRECISE / PRAGATI/ JYOTHI		1

Annexure-1

6.	CSS	Flush mounted selector switch 2 position stay put 1NO 1NC screw clamp cp grey legend 0ff-run		SCHNEIDER ELECTRIC	XB5FD25C0	1
7.	TPM	Off delay timer, 24VDC with 1NO+1NC time delay contact and 2NO+2NC instantaneous contact	0.1-30 SEC	SCHNEIDER ELECTRIC	SCHNEIDER PART NO: CONTACTOR BASIC BLOCK # CA3KN22BD (4NO) CONTACTOR AUX BLOCK # LADR2 (1NO+1NC) SURGE SUPPRESSOR VARISTOR WITH LED 12-24VDC PART NO LA4 KE1B	1
8.	FFS,FRS	Contactor 6NO+2NC coil Voltage: 24VDC		SCHNEIDER/SIMENS	SIEMENS PART NO: CONTACTOR BASIC BLOCK # 3RH2140-1BB40 (4NO) CONTACTOR AUX BLOCK # 3RH2911-1HA22 (2NO+ 2NC) SURGE SUPPRESSOR VARISTOR WITH LED 24-70VDC / 48-127VAC PART NO 3RT2916-1JK00 SCHNEIDER PART NO: CONTACTOR BASIC BLOCK # CA3KN40BD (4NO) CONTACTOR AUX BLOCK # LA1 KN22 (2NO+2NC) SURGE SUPPRESSOR VARISTOR WITH LED 12-24VDC PART NO LA4 KE1B	2

Annexure-1

9.	TFS, RM,LM,CR, FR,R3A,FR R,MRS, COB,FDP, PFMA, BCFM	Contactor 6NO+2NC coil Voltage: 24VDC		SCHNEIDER/SIMENS	SIEMENS PART NO: CONTACTOR BASIC BLOCK # 3RH2140-1BB40 (4NO) CONTACTOR AUX BLOCK # 3RH2911-1HA22 (2NO+ 2NC) SURGE SUPPRESSOR VARISTOR WITH LED 24- 70VDC / 48-127VAC PART NO 3RT2916-1JK00 SCHNEIDER PART NO: CONTACTOR BASIC BLOCK # CA3KN40BD (4NO) CONTACTOR AUX BLOCK # LA1 KN22 (2NO+2NC) SURGE SUPPRESSOR VARISTOR WITH LED 12-24VDC PART NO LA4 KE1B	12
10.	LTR	Contactor 8NO coil Voltage: 24VDC		SCHNEIDER/SIMENS	SIEMENS PART NO: CONTACTOR BASIC BLOCK # 3RH2140-1BB40 (4NO) CONTACTOR AUX BLOCK # 3RH2911-1HA40 (4NO) SURGE SUPPRESSOR VARISTOR WITH LED 24- 70VDC / 48-127VAC PART NO 3RT2916-1JK00 SCHNEIDER PART NO: CONTACTOR BASIC BLOCK # CA3KN40BD (4NO) CONTACTOR AUX BLOCK # LA1 KN40 (4NO) SURGE SUPPRESSOR VARISTOR WITH	2

Annexure-1

					LED 12-24VDC PART NO LA4 KE1B	
11.	LR1-LR9	Flush mounted pilot lights with integral led for ø 30 mm	24VDC	SCHNEIDER	XB5FVB4C0 (RED) XB5FVB3C0 (GREEN) XB5FVB5C0(ORANGE)	6 1 2
12.	MRS	Flush mounted blue flush caps pushbutton 1NO screw clamp cp grey		SCHNEIDER	XB5FA61C0	1
13.	PS1	Power supply, switch-mode power supply unit, 24 V		WEIDMULLER	PRO ECO 240W 24V 10A 1469490000	1
14.	PS3 (RACK)	Power supply, switch-mode power supply unit, 24 V		WEIDMULLER	PRO ECO 120W 24V 5A 1469480000	1
15.	PS2 (CPU)	Power supply, switch-mode power supply unit, 12 V		WEIDMULLER	PRO ECO 72W 12V 6A 1469570000	1
16.	FAN	Cooling fan with accessories, suitable for 240VAC size 6 inch with wire mess	240V AC	REXNORD-RITTAL/RALLI-WOLF/KAITON/USHA	6 INCH (REC21725A2) AIR FLOW-CFM-173	1
17.	LOUVER	EMI compatible louver with honey comb filters and perforated brass mesh screen at the bottom at top & bottom of single door		REPUTED		2
18.	TBRP	Terminal blocks with required accessories for power circuit wiring with screw type end stopper (terminal & fasteners shall be SS)		ELMEX /ESSEN DEINKI /PHOENIX/ WAGO/	KUT35(POWER)	TBRP-10

Annexure-1

				CONNECT WELL		
19.	TBRU	Terminal blocks with required accessories for power circuit wiring with screw type end stopper (terminal & fasteners shall be SS)		ELMEX /ESSEN DEINKI /PHOENIX/ WAGO/ CONNECT WELL	KUT35(POWER)	TBRP-8
20.	TBR1, TBR2, TBR3, TBR4, TBR5 TBR0	Terminal blocks with required Accessories for power circuit Wiring with cage clamp type end Stopper (terminal&fasteners Shall be SS)		WAGO	280-641 (grey)	TBR1-1(5Nos.wi th short links 280- 483) TBR1-2(5Nos.wi th short links 280- 483) TBR1-3 to 60
					280-651 (Blue)	TBR2-45
					280-313 (Orange)	SEPARAT OR-1
					280-651(Blue)	TBR3-45
					280-654 (Orange)	TBR4-45
					280-355 (light grey)	SEPARAT OR-1
					280-654 (Orange)	TBR5-45

Annexure-1

					280-641(grey)	TBR0-1to5(5 Nos. with short links 280-483)
						TBR0-6to10(5 Nos. with short links 280-483)
21.		Plug in connector for electronic module TB's		PHOENIX PHOENIX PHOENIX	MSTB-2.5/3-ST5.08 (3-WAY) - 3 NOS. MSTB-2.5/8-ST5.08 (8-WAY) - 1 NOS. MSTB-2.5/9-ST5.08 (9-WAY) - 4 NOS.	3 1(SPARE) 4
22.	DOS	Door operating limit switches for front & rear	5A	ESSEN/IEC		1
23.	LED	LED cubicle illumination light suitable for 240VAC with fixture		PHILIPS/ BAJAJ/CROMPTION GREAVES/ MYSORE LAMPS/ HMT		1
24.	RCPR	5-pin, 15/5a switch socket suitable,240v ac with surge protection, switch and fuse. With warning sticker.	15/5A	ELCOM	EP-15/S3 EXT	1
25.		1.0 sq.mm, single core cable, 1100V grade multi stranded annealed tinned copper, FRLS PVC insulated (BIS approved vendors)colour-grey (control wiring), yellow (output contacts), green (earthing)		BIS APPROVED VENDORS		As required
26.		1.5sq.mm,two pair shielded cable {individually and collectively shielded}with multi stranded		BIS APPROVED VENDORS		As required

Annexure-1

		annealed tinned copper, FRLS PVC insulated[BIS approved vendors 1100V grade.				
27.		2.5sq.mm, single core cable, 1100V grade, multi-stranded annealed tinned copper, FRLS with PVC insulation Earthing (green)	---	BIS APPROVED VENDORS		As required
28.		Wire duct 60(W) x 60(H) mm & 25(W) x 25(H)mm		SALZER		As required
29.		Wire tie length 100mm material: PVC		MAYFAIR	MCT-100	As required
30.		Wire tie mount 25x25mm material: PVC		MAYFAIR	MCTA-25	As required
31.		Wire dressing materials spiral, material-polyethylene internal diameter-8mm		MICROSIGN/ CONNECTWELL	EFC-8G	As required
32.		Ferrules		MICROSIGN/ MAYFAIR/OESER/ SMV		As required
33.		Lugs		DOWELL/3D/ CHETNA		As required
34.		"L" clamp with 4.5mm hole for terminal block suitable for NS35 TB		MANUFACTURER STANDARD		15
35.		Mounting clamp for double euro rack		MANUFACTURER STANDARD		2
36.		Mounting rail-NS35 x 7.5mm steel, yellow chromate, perforated		MANUFACTURER STANDARD		As required

Annexure-1

37.		BHEL FEED name plate & name plates for panel mounted sub items as per annexure 3 & 4 in technical specification for remote control panel		MANUFACTURER STANDARD		1 SET
38.	EL-BUS	Electrical earth bus bar 25 x 3 x 350 mm, tinned cu with 8 termination screws for different cable size varying from 2.5 sq.mm to 16 sq.mm		MANUFACTURER STANDARD		1
39.	EN-BUS	Electronic earth bus bar 25 x 3 x 300 mm, tinned cu with mounting insulated bush. Termination screws for different cable size up to 2.5 sq.mm.		MANUFACTURER STANDARD		1
40.		Three point lock		DIRAK/RITTAL		1
41.		M6 x 20 bolt,nut and star washers m4 x 10 screws		REPUTED		20
42.		Loop powered current isolator		PHOENIX/ P&F	PHOENIX Model No. MINI MCR-SL-1CP-I-I-2864419) / P&F FKD0-CS-1.50	9
43.	R1 TO R12	Relay module 24VDC		PHOENIX	PLC-RSC- 24DC/21-21 - 2967060	12
44.	PR	Solid state relay module		PHOENIX	PLC-OSC- 24DC/ 24DC/ 2 - 2966634	1
45.	RLTPB	Flush mounted pushbutton - white - 1NO - spring return cp grey		SCHNEIDER	XB5FA11C0	
46.		Panel identification sticker		MANUFACTURER STANDARD	As per drawing BHELFEED:RCP:STICKER	1

Annexure-1

47.		Shrouding plate with danger sticker for power TB & door limit switch		MANUFACTURER STANDARD		1
48.	EMI 240	EMI/RFI filter suitable for 240VAC,50Hz,10A		EMI SOLUTION	MF420,10A	2
49.	EMI 110	EMI/RFI filter suitable for 110VAC,50Hz,10A		EMI SOLUTION		1
50.		Brass earth bolts with nut at panel back	M8X25M M	REPUTED	---	2
51.		M12 or m16 lifting eye bolts with washer and unit	---	MANUFACTURER STANDARD	---	4
52.	HMI WINDOW	SS window with toughened glass for HMI cut-out. Mating surface of window and panel is with conductive gasket		MANUFACTURER STANDARD		1
53.		EMC brass cable gland with long thread with suitable EMC brass lock nuts for 2px1.5 sq.mm pair and overall shielded cable. Unarmoured od size-16mm		CONTROLWELL		5
54.		EMC brass cable gland with long thread with suitable EMC brass lock nuts for 19cx1.5 sq.mm pair and overall shielded cable. Unarmoured od size-22.5mm		CONTROLWELL		3
55.		EMC brass cable gland with long thread with suitable EMC brass lock nuts for 2cx2.5 sq.mm pair and overall shielded cable. Unarmoured od size-14mm		CONTROLWELL		3
56.		EMC brass cable gland with long thread with suitable EMC brass lock nuts for 3cx16sq.mm		CONTROLWELL		1

Annexure-1

		pair and overall shielded cable. Unarmoured od size-19mm				
57.		EMC brass cable gland with long thread with suitable EMC brass lock nuts for 3cx2.5 sq.mm pair and overall shielded cable. Unarmoured od size-14.5mm		CONTROLWELL		1

Note to Vendor: Any technical equivalent make of above part numbers are acceptable provided, equivalents proposed by vendor shall match technical data & approvals (certifications) of item datasheet in all respect. Vendor shall get BHEL approval before proceeding with equivalent makes.

Bill of Material – EMC - Local Control Panel (LCP)

SL. NO	SCHEMATIC REFERENCE	Description	RATING	MAKE	CAT./TYPE NO	QTY./ PANEL
1.	FRSL	2pole 2 way with OFF – 3position rotary selector switch (lockable & removable in forward position) with front legend plate engraved with REV – OFF – FWD	16A, 24VDC	SALZER	61152	1
2.	MSL	3pole 3 way with OFF – 4position rotary selector switch with front legend plate engraved WITH REMOTE – OFF – LOCAL – CAL	16A, 24VDC	SALZER	61100	1
3.	WSL	1pole ON/OFF rotary selector switch (feeder work light selector switch)	16A, 240VAC, 50HZ	SALZER	61002	1
4.	LL1-LL8	Flush mounted pilot lights with integral led for ø 30 mm	24VDC	SCHNEIDER	XB5FVB5C0(ORANGE)LL1,LL2, LL8 XB5FVB4C0 (RED) LL3,LL4,LL6	3 3 2

Annexure-1

					XB5FVB3C0 (GREEN) LL5,LL7	
5.	LLTPB	Flush mounted pushbutton - white - 1NO - spring return cp grey		SCHNEIDER	XB5FA11C0	1
6.	LTL	Contactor 8NO coil Voltage: 24VDC		SCHNEIDER/SIMENS	SIEMENS PART NO: CONTACTOR BASIC BLOCK # 3RH2140-1BB40 (4NO) CONTACTOR AUX BLOCK # 3RH2911-1HA40 (4NO) SURGE SUPPRESSOR VARISTOR WITH LED 24- 70VDC / 48-127VAC PART NO 3RT2916-1JK00 SCHNEIDER PART NO: CONTACTOR BASIC BLOCK # CA3KN40BD (4NO) CONTACTOR AUX BLOCK # LA1 KN40 (4NO) SURGE SUPPRESSOR VARISTOR WITH LED 12-24VDC PART NO LA4 KE1B	2
7.	LED	LED cubicle illumination light suitable for 240VAC with fixture	240V AC	PHILIPS/ BAJAJ/CROMPTION GREAVES/ MYSORE LAMPS/ HMT	---	1
8.	DOS	Door operated switch	2A	ESSEN		1
9.	---	5-pin, 15/5A switch socket suitable,240VAC with surge protection, switch and fuse. with warning sticker.	15/5A	ELCOM	EP-15/S1 EXT	1

Annexure-1

10.	TBL1	Terminal block		WAGO	280-641 (grey)	40
11.	TBL2	Terminal block		WAGO	280-651 (Blue)	30
12.	TBLU, TBLP	Terminal block (with shrouding and warning sticker)		ELMEX/ESSEN DEINKI/ /PHOENIX/ WAGO/ CONNECT WELL	KUT10	20
13.	EL-BUS	Electrical earth bus bar with 8 termination screws for different cable size varying from 2.5 sq.mm to 16 sq.mm	25X3mm	MANUFACTURER STANDARD	LENGTH - 250mm	1
14.	---	1.0sq.mm, single core cable, 1.1kv grade, multi- stranded annealed tinned copper, FRLS with PVC insulation	---	BIS APPROVED VENDORS	COLOUR GREY (CONTROL WIRING)	As required
15.	---	2.5sq.mm, single core cable, 1.1kv grade, multi- stranded annealed tinned copper, FRLS with PVC insulation green (earthing)	---	BIS APPROVED VENDORS	COLOUR RED, BLACK FOR ENERGISING ELECTRONIC CARD IN LCP	As required
16.	---	6sq.mm, single core cable, 1.1kv grade, multi- stranded annealed tinned copper, FRLS with PVC insulation	---	BIS APPROVED VENDORS	COLOUR YELLOW,BLUE FOR POWER WIRING	As required
17.	---	1.5sq.mm, 2pair twisted shielded with aluminium foil {individually and collectively shielded}, 1.1kv grade, annealed tinned copper, FRLS with PVC insulation	---	BIS APPROVED VENDORS	---	As required
18.	---	Wire duct	45X45m m	SALZER	PVC	As required

Annexure-1

19.	---	Wire dressing material spiral	---	CONNECTWELL	MATERIAL-POLYETHYLENE INTERNAL DIA. 8MM	As required
20.	---	Wire tie	LENGTH - 100mm MATERIA L - PVC	MAYFAIR	MCT-100	As required
21.	---	Wire tie mount	25X25m m	MAYFAIR	MCTA-25	As required
22.	---	Ferrules	---	MICROSIGN/ MAYFAIR/ DESER	---	As required
23.	---	Lugs	---	DOWELL/ 3D/DIVYA JOTHI/ CHETNA / AINSONS	---	As required
24.	---	Brass earth bolts with nut at panel side	M8X25M M	REPUTED	---	2
25.	---	Cam lock with lever key	--	REPUTED	---	2
26.	---	Spring loaded fixing clamp (bolts, nuts, springs, washers)	---	MANUFACTURER STANDARD	---	6
27.	---	Mounting rail	---	PHOENIX	NS35 X 7.5 mm STEEL YELLOW CHROMATE	AS REQD.
28.	---	SS handle for door	---	MANUFACTURER STANDARD	---	1
29.	---	M12 or m16 lifting eye bolts with washer and unit	---	MANUFACTURER STANDARD	---	2
30.	---		---	MANUFACTURER STANDARD	AS PER ANNEXTURE	AS REQD.

Annexure-1

		Aluminium anodised name plates				
31.		Neoprene /EPDM conductive gaskets		REPUTED		AS REQD.
32.	---	Connectors for scm A.) 3way B.) 6way C.) 8way	---	PHOENIX	MSTB-2.5/3-ST5.08 MSTB-2.5/6-ST5.08 MSTB-2.5/8-ST5.08	1 2 1
33.	---	“L” clamp with 4.5mm hole for terminal block suitable for NS35 TB	---	MANUFACTURER STANDARD		AS REQD.
34.	---	Panel identification sticker	---	MANUFACTURER STANDARD	AS PER DRAWING NO. BHELFEED:LCP: STICKER	1

Note to Vendor: Any technical equivalent make of above part numbers are acceptable provided, equivalents proposed by vendor shall match technical data & approvals of item datasheet in all respect. Vendor shall get BHEL approval before proceeding with equivalent makes.

ANNEXURE – 2

BHEL FREE ISSUE ITEM TO BE MOUNTED BY VENDOR AT BHEL WORKS

REMOTE CONTROL PANEL MODULES

- 1.) CPU (MOUNTING BUSH TO BE SUPPLIED BY VENDOR)
- 2.) ELECTRONIC MODULES FOR I/O RACK
- 3.) SIGNAL INTERFACE MODULE
- 4.) CPU TO I/O RACK INTERFACE MODULE
- 5.) KEYBOARD ASSEMBLY

LOCAL CONTROL PANEL MODULE

- 1.) SIGNAL CONDITIONING MODULE

ANNEXURE-3

NAME PLATES WITH INSCRIPTION TO BE FIXED / SUPPLIED BY VEDOR

SL.NO.	DESCRIPTION	SCH REF	TAG / INSCRIPTION
Remote control panel			
1.	Miniature circuit breaker	MCB1 MCB2 MCB3 MCB4	UPS I/P 110V UTILITY FAN
2.	Transformer	TRX	TRX
3.	Feeder forward starter relay	FFS	FFS
4.	Feeder reverse starter relay	FRS	FRS
5.	FFS overload relay	FFS O/L	FFS O/L
6.	Feeder starter	TFS	TFS
7.	Time delay control power monitor	TPM	TPM
8.	Remote mode	RM	RM
9.	Local mode	LM	LM
10.	Calibration relay	CR	CR
11.	Feeder run	FR	FR
12.	Feeder in remote	R3A	R3A
13.	Feeder running remote	FRR	FRR
14.	Master reset relay	MRS	MRS
15.	Coal on belt relay	COB	COB
16.	Feeder discharge plugged relay	FDP	FDP
17.	Phase failure monitor aux. Relay	PFMA	PFMA
18.	Bunker coal flow monitor relay	BCFM	BCFM

19.	24VDC power supply 10A	PS1	CONROL POWER 24V
20.	24VDC power supply 5A	PS3(RACK)	KB/RACK/DI 24V
21.	12VDC power supply 6A	PS2(CPU)	CPU 12V
22.	EMI filter	EMI 240	EMI 240
23.	EMI filter	EMI 110	EMI 110
24.	Signal interface module	SIM	SIM
25.	Euro rack	I/O RACK	I/O RACK
26.	Central processing unit	CPU	CPU
27.	CPU to I/O rack interface module	I/F CARD	I/F CARD
28.	Pulse relay module	PR	PR
29.	Relay interface module	RIM	RIM
30.	Relays	R1,R2,R3,R4A,R4B,R5,R6,R7,R9,R10,R11 & R12	R1,R2,R3,R4A,R4B,R5,R6,R7,R9,R10,R11 & R12
31.	Led cubicle illumination lamp	LED	LED
32.	Door operating switch	DOS	DOOR SWITCH
33.	Remote control panel receptacle	RCPL	230V UTILITY
34.	COC motor overload(A)	LR1	LR1
35.	Feeder motor overload (A)	LR2	LR2
36.	No coal flow (R)	LR3	LR3
37.	Feeder discharge plugged (R)	LR4	LR4
38.	Phase failure (R)	LR5	LR5
39.	COC run (R)	LR6	LR6
40.	COC off (G)	LR7	LR7
41.	Bunker no coal flow (R)	LR8	LR8

42.	Reverse enable	LR9	LR9
43.	Master reset push button	MRS	PFM LAMP RESET
44.	Lamp test push button	RLTPB	LAMP TEST
45.	Lamp test circuit gate module	RLTG	LAMP TEST GATE
46.	COC off/run selector switch	CSS	COC ON/OFF
47.	LR1	COC O/L	COC O/L
48.	LR2	FEEDER MOTOR O/L	FEEDER MOTOR O/L
49.	LR3	NO COAL FLOW	NO COAL FLOW
50.	LR4	FEEDER DISCHARGE PLUGGED	FEEDER DISCHARGE PLUGGED
51.	LR5	PHASE FAILURE	PHASE FAILURE
52.	LR6	COC RUN	COC RUN
53.	LR7	COC OFF	COC OFF
54.	LR8	BUNKER NO COAL FLOW	BUNKER NO COAL FLOW
55.	LR9	REVERSE ENABLED	REVERSE ENABLED
56.	CSS	COC OFF/RUN	COC OFF/RUN
57.	Inlet fan with filter	FAN	
58.	Terminal blocks	TBR-0, TBR-1, TBR-2, TBR-3, TBR-4, TBR-5, TBR-P, TBR-U	TBR-0, TBR-1, TBR-2, TBR-3, TBR-4, TBR-5, TBR-P, TBR-U
59.	Keyboard & display unit	KEYBOARD & DISPLAY UNIT	HMI UNIT
60.	Fan louver	LOUVER	LOUVER

61.	Earth	Earth Symbol	EARH SYMBOL
62.		ELECTRONIC EARTH BUS	ELECTRONIC EARTH
63.		ELECTRICAL EARTH BUS	ELECTRICAL EARTH
Local control panel			
1.	3position rotary selector	FRSL	REV-OFF-FWD SELECTOR
2.	4position rotary selector	MSL	MODE SELECTOR
3.	ON/OFF rotary selector switch	WSL	FEEDER WORKLIGHT SWITCH
4.	COC motor overload(A)	LL1	LL1
5.	Feeder motor overload (A)	LL2	LL2
6.	No coal flow (R)	LL3	LL3
7.	Feeder discharge plugged (R)	LL4	LL4
8.	Phase failure (R)	LL5	LL5
9.	COC run (R)	LL6	LL6
10.	COC off (G)	LL7	LL7
11.	Bunker no coal flow (R)	LL8	LL8
12.	Lamp test push button	RLTPB	LAMP TEST
13.	Lamp test circuit gate module	RLTG	LAMP TEST GATE
14.	LL1	Local	LOCAL
15.	LL2	Remote	REMOTE
16.	LL3	Feeder run forward	FEEDER RUN FORWARD
17.	LL4	Feeder run reverse	FEEDER RUN REVERSE
18.	LL5	Feeder off	FEEDER OFF

19.	LL6	Cleanout conveyor run	CLEANOUT CONVEYOR RUN
20.	LL7	Cleanout conveyor off	CLEANOUT CONVEYOR OFF
21.	LL8	Calibrating	CALIBRATING
22.	Door operating switch	DOS	DOOR SWITCH
23.	Local control panel receptacle	RCPL	230V UTILITY
24.	Terminal blocks	TBL1, TBL2	TBL1, TBL2
25.	Terminal blocks	TBLU, TBLP	TBLU, TBLP

NOTE:-

1. Inscription details in the name plate will be limited to maximum 2 rows.
2. The letter font will be Arial font.