



**BHARAT HEAVY ELECTRICALS LIMITED**  
**ELECTRO PORCELAINS DIVISION**  
BANGALORE : 560 012

**TENDER DOCUMENT**  
(PART-A)

**WIRING CONTRACT FOR IPCL HALDIA PROJECT AND IB VALLEY PROJECT**

DOCUMET REF. NO.: EP/CPBG/WC/2015-16/01 Rev 00

DEPARTMENT : CPBG  
SECTION : ENGINNERING



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BHARAT HEAVY ELECTRICALS LIMITED,  
Electroporcelains Division, IISc Post  
Bangalore - 560 012

**PART-A**  
**TENDER**  
**DOCUMENT**

**1.0 NOTICE INVITING TENDER**

Sealed bids are invited from the registered contractors in single stage two part bid for the following works as detailed below:

Sl. No.	Work Description	Tender Enquiry No. / Date	EMD (in Rs.)	CONTRACT VALUE
1	Wiring contract for IPCL Haldia project and IB Valley project	EP/CPBG/WC/2015-16/01, 08.04.2015	Rs. 1,50,000/-	Rs. 60Lacs.

Contract completion time : Three Months.

Cost of Tender documents : Rs. 100.00 (Rupees One Hundred only)

Issue of tender documents : From 28.07.2015 onwards

**Last date and time of Issue of tender documents : Up to 2-00 PM of 18.08.2015**

**Last date and time for submission of tender documents : Up to 2-30 PM of 18.08.2015**

**Date of opening of Tender (part – A) : 2-30 PM of 18.08.2015**

**Note:**

1. A set of tender documents (Non-transferable) may be purchased on any working day (Monday to Saturday) between 09:00 hours and 12.00 hours from CPBG Department, BHEL-EPD, Bangalore – 560 012 by paying the prescribed tender fee of Rs.100/= only in cash through Pay in Slip issued by BHEL or a crossed demand draft in favor of BHEL payable at Bangalore.
2. In case tender documents are requested by post, BHEL-EPD shall not be responsible for any delay due to any reasons (including postal delay) either in receiving the contractors request nor receipt of tender documents by the contractor.
3. EMD is to be paid in Pay order or Demand draft only.
4. Contract will be governed by all statutory requirements amended from time to time & General terms & conditions of the contract of BHEL.
5. BHEL reserves the right to reject any or all the tenders without assigning any reasons whatsoever. Decision of BHEL in this regard shall be final & binding to all parties.

Name: Trinath L  
Designation: Sr.Engineer/ CPBG Engg.  
BHEL-EPD, Bangalore

Date – 28.07.2015



**PART – A**

**1a. BID APPLICATION**

To

Engineer/ CPBG Engg  
Bharat Heavy Electricals Limited  
Electroporcelains Division,  
IISc Post, Bangalore – 560 012

Dear Sir,

I / We hereby offer to carry out the work.....  
Against Tender Enquiry No..... dated.....

I /We have carefully perused the following documents connected with the above mentioned work and agree to abide with the same.

- |     |                                      |   |            |
|-----|--------------------------------------|---|------------|
| 1.  | Notice Inviting Tender               | } | (Part – A) |
| 2.  | Bid Application                      |   |            |
| 3.  | Bid Questionnaire – A                |   |            |
| 4.  | Bid Questionnaire – B                |   |            |
| 5.  | Declaration by Bidder                |   |            |
| 6.  | Instructions to bidder               |   |            |
| 7.  | General terms and conditions         |   |            |
| 8.  | Specific terms and conditions        |   |            |
| 9.  | Evaluation of price bid              |   |            |
| 10. | Scope of Work                        |   |            |
| 11. | Price Bid Format as per Schedule - A |   | (Part – B) |

// We further agree to execute all the works referred to in the said documents as per the General terms and conditions.

I / We are in possession of independent ESI & PF Code and License under CL (R&A) Act.

I declare that, there was never / is no litigation or charge under investigation / enquiry / trial against me / us, nor conviction in a court of law or suspended or blacklisted by any organization on any grounds.

Signature of Bidder  
Date:



**1b. BID QUESTIONNAIRE - A**

Tender Enquiry No: -

Date:

**Details of the Contractor**

a) Name and address of the Firm:

b) Name and address of the proprietor:

c) Is any contract being operated under the control of the bidder in BHEL. Yes / No  
(If yes furnish the details) :

<u>Location/ Address</u>	<u>Value</u>	<u>Date of Completion</u>
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1.

2.

3.

4.

d) Is any relative of bidder employed in BHEL Yes / No

(If yes furnish the detail)  
Name

Staff no

Location / Area

Signature of the Bidder  
Date:



**1c. BID QUESTIONNAIRE - B:**

01	ESI Code No	
02	License under CL (R&A) Act	
03	PAN No.	
04	PF Code No	
05	Service Tax Registration No.	
06	Banker's Name & Address	
07	Bank A/C No.	
08	Have you quoted rates for all the activities, as indicated in the price bid (Part – B)	
09	Bank Solvency Certificate Details:	
09	Any other comments	

**Note:**

- I. Photocopy in support of above wherever applicable should be attached.
- II. Please note that if answer of SI No. 08 is 'NO' then the bid is liable to be rejected.
- III. *I declare that I have read the tender document completely and have understood the scope of work and terms & conditions governing the contract. I agree to abide by the same and other terms & conditions and guidelines issued by BHEL during the course of execution of the work as per the contract.*

Signature of the Bidder  
Date:



1d.

**DECLARATION BY THE BIDDER -B**

I, -----, aged-----Yrs., S/o -----,  
residing at -----  
-----

Hereby declare as follows:

- (i) That my nationality is \_\_\_\_\_.
- (ii) That I am a major and eligible to enter into contract / my firm / my company is competent to enter into an agreement.
- (iii) I shall employ only such personnel who have not been found unfit for employment in Organizations such as Central / state / Public undertaking by the Police Authorities.
- (iv) I shall not employ persons against whom Criminal cases are pending or under investigation.
- (v) I shall also not employ persons found guilty of offences involving moral turpitude for executing work in BHEL contracts.
- (vi) That there are no Criminal cases pending or under investigation against me or my firm or company.
- (vii) I have not been found guilty of offences involving moral turpitude nor any of the company directors / partners of my firm have been found guilty of offences involving moral turpitude.
- (viii) Neither I nor my firm nor my company has been declared insolvent in the past.
- (ix) I have taken due care and efforts to furnish only information which are true in the tender document.
- (x) I shall employ labors who are more than 18 years of age and having sound physical and mental health.
- (xi) I shall keep Photograph / identity proof / residential proof of the labourers to be employed against this tender and arrange for police verification.

[Signature with Name & seal of the Bidder]

Date :  
Place :



## 2.0 INSTRUCTOINS TO BIDDER

2.1 Tender is a two part bid system. The tender documents consist of Part – A and Part - B as detailed below:

Part 'A': Techno-commercial Bid (To be submitted in sealed cover enabling us to open on **at 3-00 pm**)

Part 'B': Price Bid to be quoted as per Tender conditions in the schedule given by BHEL.

2.2 Part 'A' must be duly completed and sealed along with the undertaking in a separate envelope super scribed "**Tender Enquiry No. EP/CPBG/WC/2015-16/01 Rev 00, Part 'A' - Techno-commercial Bid**"

**2.3 The bidder must not indicate the price or rate in the PART-A (Techno-commercial bid).**

2.4 Part 'B' must be duly completed with reference to the tender conditions and put in a separate sealed envelope super scribed "**Tender EP/CPBG/WC/2015-16/01 Rev 00, Part 'B' – Price Bid**".

2.5 Tender documents consisting of Part 'A' & 'B' duly sealed in a separate envelopes should be sealed in another envelope and should be deposited in the WEX - Tender Box kept at Reception so as to reach **on or before 14:30-00 Hrs Dt. 18/08/2015**. Part 'A' of tender form i.e. **Techno-commercial Bid will be opened on Dt. 18/08/2015 at 14:30-00 hours** the same day in the presence of bidders or their representatives who are present for the tender opening. Bidders who qualify in the Techno-commercial Bid will be intimated to attend the tender opening of part 'B' - price bid at a date to be notified separately. Part 'B' i.e. price Bid will be opened at the specified date in the presence of the bidders or their representative who are notified to attend the tender opening. The tender documents may also be sent either by registered post / Speed Post / Courier so as to reach on or before the said date and time.

2.6 The Techno commercial Bid (Part - A) and general terms and conditions shall form part of Techno-commercial offer. **Each page should be duly signed by the bidder as a token of acceptance. If not signed it is understood that party has read and agreed for the terms and conditions.**

2.7 Part 'B' – the price Bid (Schedule-A) should not carry any conditions. Price / rate should be quoted in clear terms in the format given by BHEL. Part 'B' Price bid will be opened only in respect of those bidders who are qualified in Techno- Commercial Bid.

2.8 The bidder shall accept all the terms and conditions of the tender.

2.9 The tender forms both Part 'A' & 'B' duly filled in all respects shall be signed on each page by the bidder. Any alteration, erasure or over-writing will render the tender invalid. Alteration neatly carried out and duly attested over with the full signature of the bidder however is permitted.

2.10 Name of the bidder should be written or the contractors seal to be put on the sealed envelope.

2.11 Before making the offer the bidders are advised to carefully go through the terms and conditions, which form part of the agreement.

2.12 All entries in the tender document should be in one Ink. Corrections, over writing, cuttings etc. are not permitted. All the columns in the tender form should be filled without leaving any column blank in any page of the tender. In case any of the columns are left blank, the tender can be rejected.

2.13 For any further details required, tender issuing officer of BHEL/EPD, Bangalore may be contacted in person or through TELEPHONE NOS. **080-22182446 or 2218 2427**.

2.14 BHEL reserves the right to assess the capacity and capability of the parties for pre-qualification as per various parts of NIT. The company also reserves the right to accept or reject any or all the tenders or any part thereof at any stage of process without assigning any reason whatsoever. The company has no obligation to accept the lowest tender. Offer of the Bidder if prima-facie found not comparable with the quantum of work envisaged and the bid is an effort to be L1, then the offer is liable to be rejected. BHEL's decision in this regard shall be final and binding.



- 2.15 **PRICE BID** - The bidders are required to submit their quotation for **all the items listed in Part "B" in the price bid format SCHEDULE-A** given along with the tender documents. The price should be quoted for each activity after careful study of the actual job requirement so that, in case the contract awarded, contractor should not express any difficulties in execution of the contract.
- 2.16 The bidders should note that the Income Tax as applicable will be deducted from the bills of contractor.
- 2.17 **VALIDITY OF RATES** - The rates quoted should be valid for 90 days initially from the date of price bid opening.
- 2.18 BHEL reserves the right to reject any bid, which is technically unacceptable and unworkable. Further BHEL also reserves the right to reject any or all bids without assigning any reasons thereof.
- 2.19 BHEL reserves the right to cancel the contract at the initial stage or during the contract period without assigning any reason to the bidder.
- 2.20 Successful bidders shall enter into an agreement on stamp paper of Rs.100/= as a token of having accepted the rates, terms and conditions of the contract as per the Performa given by BHEL.
- 2.21 Any written communication required to be sent to the contractor in writing shall be sent at the address mentioned on the tender form or to any other address subsequently intimated by contractor in writing to BHEL EPD for the contract purposes.

### **3.0 GENERAL TERMS AND CONDITIONS**

#### **3.1 General.**

- 3.1.1 Bidder should have the essential License under Contract Labour (Regulation & Abolition) Act 1970. A copy of the license should be submitted along with the bid documents. Successful bidder has to get the endorsement in the license for the areas and nature of work which they will be performing as part of the contract.
- 3.1.2 Bidder should have independent ESI Employer code under ESI Act 1948, copy of the certificate to this effect shall be submitted along with the bid documents.
- 3.1.3 Bidder should have independent PF code under Employee Provident Fund and Miscellaneous Provisions Act 1952, copy of the certificate to this effect shall be submitted along with the bid documents.
- 3.1.4 The bidder shall also mention the PAN Number issued by Income Tax Department, copy the PAN card or PAN number allotment letter shall be submitted along with the bid documents.
- 3.1.5 There should be no litigation or charge under investigation / enquiry / trial against the Bidder, or conviction in a court of law or suspended or blacklisted by any organization on any ground.
- 3.1.6 The opinion / decision of BHEL regarding the bid shall be final and conclusive. BHEL reserves the right to reject any or all the bids at any time without assigning any reason.
- 3.1.7 In case the bidder has a relative employed in BHEL, the authority inviting tender shall be informed of this fact in writing at the time of submission of tender, failing which the tender may be disqualified, or if such fact comes to light subsequently, the contract may be terminated.
- 3.1.8 If the bidder gives wrong information in his tender or creates conditions favorable for the acceptance of his tender, BHEL reserves the right to reject such tender at any stage.
- 3.1.9 BHEL reserves the right to award the contract to one or more contractor simultaneously as deemed fit at the initial stage or during the contract period.
- 3.1.10

#### **3.2 EARNEST MONEY DEPOSIT (EMD):**

Earnest Money Deposit as indicated in the NIT is to be submitted along with tender documents. EMD is payable in Cash (as permissible under Income Tax Act), Pay order or Demand Draft favouring BHEL payable at Bangalore. EMD by the Tenderer will be forfeited as per Tender Documents if:

- i) After opening the tender, the tenderer revokes his tender within the validity period or increases his earlier quoted rates.
- ii) The tenderer does not commence the work within the period as per LOI /Contract. In case the LOI / contract is silent in this regard then within 15 days after award of contract.

EMD given by all unsuccessful tenderers shall be refunded normally within fifteen days of acceptance of award of work by the successful tenderer. EMD shall not carry any interest.



### 3.3 **SECURITY DEPOSIT (SD) :**

3.3.1 Successful bidder has to submit Security deposit at a rate of 10% of the contract value before commencement of the work.

3.3.2 Security Deposit is accepted in any one of the following forms:

- i) Cash (as permissible under the Income Tax Act)
- ii) Pay Order, Demand Draft in favour of BHEL
- iii) Local cheques of scheduled banks, subject to realization.
- iv) Securities available from Post Offices such as National Savings Certificates, Kisan Vikas Patras etc. (Certificates should be held in the name of Contractor furnishing the security and duly pledged in favour of BHEL and discharged on the back).
- v) Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format should have the approval of BHEL.
- vi) Fixed Deposit Receipt issued by Scheduled Banks/ Public Financial Institutions as defined in the Companies Act. The FDR should be in the name of the contractor, A/C BHEL, duly discharged on the back.
- vii) Security deposit can also be recovered at the rate of 10% from the running bills. However in such cases at least 50% of the Security Deposit should be collected before start of the work and the balance 50% may be recovered from the running bills.  
(Note: In case of small value contracts not exceeding Rs. 10 lakhs and all SAS jobs, work can be started before Security Deposit is collected. However, payment can be released only after collection/ recovery of initial 50% Security Deposit).
- viii) EMD of the successful tenderer can be converted and adjusted against the security deposit.
- ix) The security deposit shall not carry any interest.  
(Note: Acceptance of Security Deposit against Sl. No. (iv) and (vi) above will be subject to hypothecation or endorsement on the documents in favour of BHEL. However, BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith).

3.3.3 Failure to pay the security deposit shall be treated as failure to discharge the duties under the contract and shall result in cancellation of the contract awarded and the bidder shall be liable to compensate the losses if any incurred by BHEL on this account. The security deposit shall be refunded within a six months after the date of expiry of the contract period subject to the contractor fulfilling all obligations and operations as required under the contract.

3.3.4 BHEL reserves the right to appropriate the whole or any part of the amount of the security deposit without prejudice to other claims against the contractor for losses suffered by BHEL due to failures on the part of the contractor or due to termination of contract or contractor becoming disqualified because of liquidation and other reasons. Such losses, damages, charges, expenses or cost, as assumed by BHEL shall be final and binding the contractor and shall not be called into question.

### 3.4 **STATUTORY REQUIREMENTS:**

While quoting the rate, the bidders are advised to take note of minimum wages payable to workmen. The present rate is provided for each category of skill as defined in the scope of work given in Annexure - I

The bidder will be required to comply with all the statutory provisions such as Bonus, PF, EDLI, ESI, Gratuity, Service Tax, minimum wages prevailing at the time of payment or arrears thereof, declared Holidays, leave, night shift working allowance, transport allowance etc. The Income Tax as applicable will be deducted from the bill of contractor.

The contractor shall submit the documentary evidence of payment on account of submission of statutory payments made to the concerned agencies before clearance of bill of next month.

3.4.1 The bidder shall comply with the provisions of the Factories Act 1948, Contract Labour (Regulation and Abolition) Act 1970, ESI Act, Employees Provident Fund and Miscellaneous Act 1952, Minimum Wages Act 1948, Payment of Gratuity Act 1972, Industrial Disputes Act, 1947, Employers Liability Act 1938, Inter State Migrants Workmen (Regulation of employment and conditions of Service) Act 1979 and or any other Laws and Rules that may be applicable from time to time to the workers engaged by him. The bidder, when required by the Company shall produce the registers and records for verification and comply with other directions issued by the company for compliance of the statutory provisions.



- 3.4.2 The Bidder shall fully indemnify the loss if any caused to BHEL due to any default or non-observance of any of the laws, or any omission or commission or inability on the part of the Bidder or his representative.
- 3.4.3 The Bidder shall, keep and produce for inspection at all times, forms, registers and other records required to be maintained under various statutes in order go through them by the Company whenever required.
- 3.4.4 The Bidder shall produce to the Company, the documentary proof of payment of the said statutory dues. Non-observance of the provisions will be construed as default by the Bidder in making such payment, and payment of his bill will be deferred.
- 3.4.5 Each bidder will be required to maintain the daily attendance of his labours in the prescribed Proforma for accounting payment of minimum wages, deduction towards ESI & PF Contributions, payment of Bonus, leave etc.
- 3.4.6 The bidder will have to follow the provisions of Payment of Bonus Act 1965 and Rules 1975, and is liable to pay Bonus to his workers as per the guidelines issued by BHEL time to time. Minimum prescribed bonus at present is 8.33% of annual wages subject to a maximum ceiling of Rs.3500/= per month. In the event of bonus being declared above 8.33%, the increase in bonus % will be reimbursed by BHEL.
- 3.4.7 The bidder will have to extend paid National Holidays and Festival Holidays to their workmen as per the provisions of Act and the Rules thereof. However, if due to exigencies of work the contractor engages his workmen on National Holidays or Festival Holidays contractor shall pay additional wages as prescribed under the provisions of the Act.

### **3.5 MANPOWER**

- 3.5.1 The contractor shall be responsible for safety of his laborers while they are engaged for work connected with BHEL contract. Contractor has to obtain work permit from Safety Officer while carrying out certain type of works such as digging, working at heights (above 3 meter), working in enclosed space etc., as per the directions of section-in-charge.
- 3.5.2 The bidder, as the employer of his workmen, shall manage them. In the event of any dispute arising between the Bidder and his employees, the Bidder alone is solely responsible for resolving the dispute between them and BHEL will in no way be responsible for settling the dispute either statutory or otherwise.
- 3.5.3 The bidder will be solely responsible for executing the agreed work and the employees of BHEL will only oversee the proper execution of work. The contractor or his representatives shall be available in the factory to control his workers and take down instructions from the designated officials of BHEL.
- 3.5.4 The Bidder shall have full control over his employees including w.r.t determining service conditions, discharge, dismiss, or otherwise terminate their services at any time. The bidder shall be solely responsible for any claim arising out of employment or termination of employment of his employees and for statutory payments.
- 3.5.5 The bidder shall employ only such personnel who are medically fit. The company has right to direct the bidder to remove from the premises such of his personnel who may be physically, hygienically, clinically or medically unfit.
- 3.5.6 Contractor shall not employ workmen who are less than 18 years of age.
- 3.5.7 Contractor has to ensure presence of his supervisor who should be capable of managing of his workforce, carry out the job smoothly, maintaining and submitting all statutory records and co-ordination with designated BHEL officials.

### **3.6 FAILURE TO COMPLY WITH CONTRACT**

- 3.6.1 Notwithstanding anything contained in any other clause, BHEL reserves the right to terminate the contract due to any failure on the part of the Bidder in discharging his obligations under the contract or in the event of his becoming insolvent or going into liquidation. The decision of the BHEL about the failure on the part of the Bidder shall be final and binding on the bidder.



- 3.6.2 In case of any damage to the existing building, structures, materials, tools, furniture and fixtures, machines etc., caused from contractor's end, the cost of its repairs or replacement will be recovered from the contractor. If there is any stoppage of production in any area of the plant due to the fault of the bidder, the bidder is liable to compensate the same.
- 3.6.3 In the event of any failure on the part of the bidder, BHEL shall have the right without prejudice to any other right or remedies, to get the work done through any other agency and the Bidder shall be liable to compensate BHEL for any losses on this account. The additional cost, loss, if any incurred by BHEL will be recovered from the bills, security deposits, other dues as well as directly from the bidder.
- 3.6.4 The cancellation of contract may be either whole or part of the contract at BHEL's option. However the contractor shall continue to operate that part of contract which has not been terminated.
- 3.6.5 The decision of BHEL regarding interpretation of any terms and conditions set forth in the agreement shall be final and binding on the contractor.

3.6.6 **LD CLAUSE**

Contract completion time is indicated in NIT. Bidders to confirm their acceptance for completing the work as specified. The successful bidder has to provide a schedule of activities indicating the period. Failure of the contractor to complete the work as agreed up on will attract liquidated damages (LD) at the rate 0.5% per week subject to a maximum of 5%. For delay beyond 10 weeks, BHEL may at its discretion, cancel the contract and recover the damages including for delays from the security deposit and other out standings due to the contractor.

3.7 **PAYMENT TO THE CONTRACTOR**

The payment to the contractor will be done after the completion of the work in stages for the work carried out. Payment will be made by E – Payment only and for which the bidders are to provide the following information along with their offers in their letter head duly signed:

1. Bank Name, 2. Bank Address, 3. Bank Phone, 4. IFSC Code (NEFT), 5. Bank Account Number, 6. PAN, 7. Service Tax Number, 8. TIN, 9. E-mail ID.

3.8 **SUB-CONTRACTING**

The contractor shall not sub-contract or transfer or assign the contract in full or in part or any part thereof to any other person or firm or company.

The contract will be governed by the Laws of India for the time being in force and as amended or made from time to time.

All disputes shall be settled in accordance with the Laws of India for the time being in force and as amended from time to time.

3.10 **LEGAL JURISDICTION:**

In respect of all matters arising out of or pertaining to the contract, the cause of action thereof shall be deemed to have arisen only at Bangalore, where BHEL - EPD is situated. All legal proceedings pertaining to the above matters or dispute shall be instituted only in courts having territorial jurisdiction over the place where BHEL-EPD is situated and no other court shall have the jurisdiction.

3.11 **DUTIES AND RESPONSIBILITIES OF THE CONTRACTOR :**

The duties and responsibilities and obligation of the contractor including statutory responsibilities mentioned in this document is indicative and not exhaustive. Contractors are required to confirm with the concerned authorities for proper and complete compliance.

- 3.11.1 The contractor will not engage any child labour (i.e. any workers below the age of 18 years) and the contractor will abide by the provisions of child labour (Prohibition & Regulation) Rules 1988. He should issue appropriate appointment Letter to his Workmen.



- 3.11.2 The following documents / forms under Contract Labour (Regulation & Abolition) Act 1970 and relevant rules therein shall be maintained by the contractor:
- (i) A notice showing the wage period and the place and time of disbursement of wages to be displayed at the place of work and a copy sent by the contractor to the HR Department (Rule 75).
  - (ii) A register of workman From XIII (Rule 75)
  - (iii) Employment card From XIV (Rule 76)
  - (iv) Service Certificate From XV (Rule 77)
  - (v) Muster Roll, Wage Register, Deductions Register, overtime Register Etc.
  - (vi) Half yearly return to be sent (In duplicate) by the contractor to the licensing officer. From – XXIV (Rule 82 (I) with a copy to HRM Department regularly.
  - (vii) All statutory registers and records shall be preserved in original for a period of Ten years and should be made available even after the contract is over for verification.
- 3.11.3 The contractor shall comply with the provisions of Contract Labour (R & A) Act including provisions relating to welfare and Health facilities as provided under the Contract Labour (R& A) Act 1970 and relevant rules.
- 3.11.4 All the registered contractors shall submit the returns required under contract Labour (Regulation & Abolition) Act 1970 and forward a copy to HR Department.
- 3.11.5 EPD – Bangalore is a Notified Area under the provisions for ESI Act 1948, the contractor shall comply with the provision of ESI Act, and will be responsible for any liability arising during the tenure of the work contract under the Act, The contractor should ensure ESI coverage and facilities to his workers (i.e. ESI code no. and ESI card etc.,) as per ESI Scheme from ESI authorities including Medical Benefit etc.,. The contractor shall arrange for filling of family declaration forms in respect of their contract labors and deposit the same in ESI office for issue of Identity card by ESI authorities. The contractor may deduct required ESI contribution from the wages of their employees as per law and deposit the same (Employees share) along with his contribution to the ESI authorities.
- 3.11.6 Workmen insured under ESI Act only shall be deployed in contract work.
- 3.11.7 The bidder shall submit bi-annual return in Form 6 along with monthly Challans to the appropriate authority under the provisions of Employee's State Insurance Act 1948, under intimation to HR Dept.
- 3.11.8 Not with standing anything contrary to this, in the event of accident the contractor shall be required to submit injury report to the concerned authorities with a copy of the same to the designated BHEL Executive immediately and ensure the compliance of the ESI Act and rules made therein.
- 3.11.9 The bidder shall submit the following returns to the appropriate authority under the provisions of Employee's Provident Fund and Misc. Provisions Act 1952, Employees Pension Scheme 1995 under intimation to HR Dept.
- 3.11.9.1 Monthly return in Form 12 A along with form 5 & 10 (addition and deletion) and monthly Chalan.
  - 3.11.9.2 Annual Return in Form 6A along with Form 3A.
- 3.11.10 The Contractor shall maintain the following records as required under the Employees Provident Fund And Miscellaneous Provisions Act 1952, Employee's Pension Scheme 1995
- (i) Declaration of Nomination, Form No.2 Para 33 and 61 (1).
  - (ii) Pass Book.
  - (iii) Cash Book.
  - (iv) Attendance.
  - (v) Wage Register.
- 3.11.11 The contractor shall regularly pay the amount of contribution (employer's contribution as well as the employee's contribution) as per the Employee's Provident Fund and Miscellaneous Provisions Act 1952, Employees Pension Scheme 1995 and Employee's State Insurance Act 1948.



- (i) The contractor may recover from his workmen, the employee's contribution in accordance with the provision of the said act and the Scheme but shall not recover the employer's contribution or the other charges from his employees in any manner.
- (ii) The contractor shall submit along with monthly bills to BHEL, statement showing the recoveries of contributions in respect of employees employed by or through him along with the proof of Deposit of such contribution with the Concerned Authority and shall also furnish to BHEL such information, in the capacity of principal Employer, as required to furnish under the provisions of the schemes under the Employees P.F. and Misc. provisions Act 1952 and ESI Act 1948 to the authorities under the said acts.

- 3.11.12 In case of revision of Minimum Wage by the State Govt. after the award of work by BHEL, the contractor will be liable to pay the difference of increased wages for such period. Any failure to comply with the statutory requirements on the part of contractor shall disqualify such contractor from all contracts awarded to him and his name shall be black listed for further tenders / contracts. In addition, the contractor's security deposit shall be forfeited apart from consequential legal action against him.
- 3.11.13 The contractor shall maintain Form D as per Rule 5 of the PAYMENT OF BONUS ACT 1965. The contractor is further liable to pay bonus to his employees in accordance with the payment of Bonus Act 1965 and to keep all the records in Form C as per the said Act.
- 3.11.14 Contractor shall Supervise the work allotted to him and to be carried out by his employees.
- 3.11.15 Contractor to ensure that the employees deployed in the premises of BHEL are physically and mentally fit and do not have any criminal records.
- 3.11.16 In case contractor fails to make payment of wages to his employees or remittance of contribution to the concerned authorities, the Security deposit / other dues payable under the contract can be utilized by BHEL to discharge the liability of the contractor.
- 3.11.17 The liability for compensation on account of injury sustained by an employee of the contractor will be exclusively that of the contractor.
- 3.11.18 **NATIONAL & FESTIVAL HOLIDAYS:** (as declared by BHEL): The contractor will give paid National Holidays and Festival Holidays to the workers as per Section 5 of National and Festival Holidays Act. However, if due to the exigency of work if any of his workmen is required to work on National Holiday or Festival Holiday, the contractor has to pay wages as per Section 5, sub section 2 and 3 of the said act.
- 3.11.19 Besides the three national holidays 15th August, 26th January and 2nd October, if Govt. declares any other day as a national holiday same will be treated as paid holiday for the purpose of this contract. Accordingly the contractor shall be required to provide paid holiday to its workers for the same. If any of the contract workers works on such additional declared national holiday, he will be entitled to additional wage for the said day.
- 3.11.20 **GENERAL ELECTIONS:** If the general elections are held for State Assembly / Parliament and Government declares a public holiday for exercising the franchise, the contractor shall give their workmen half day leave in "First" shift only. The contractor's workmen working in B and C shifts will be required to exercise their franchise during their own time.
- 3.11.21 The Contractor shall maintain the following Documents, Registers, Forms as required under the FACTORIES Act 1948 and Rules 1969.
- |      |            |                        |
|------|------------|------------------------|
| (I)  | Leave Book | Form No. 15 (Rule 121) |
| (II) | Nomination | Form No. 25 (Rule 127) |
- 3.11.22 The contractor will extend leave with wage to his workers who have worked for a period of 240 days or more during a calendar year. To facilitate the proper execution of the Factories Act, these leaves shall be allowed during the same calendar year, at the rate of one day for every 20 working days. A worker commencing service on a day other than the 1<sup>st</sup> day of the January shall be entitled to leave with wages at the above rate (one day for every 20 days of work) only if he has worked for 2/3 of total no. of days in the remaining year. The contractor will pay the un-availed portion of leave in cash every Six month from the start of the contract.



- 3.11.23 Contractor has to ensure that all his workmen are granted one day weekly off after every 48 hrs. of working.
- 3.11.24 The contractor shall follow safety rules and regulations as per provisions of Factories Act 1948, and Rules at his own expense and arrange for the safety provisions as appended to these conditions or rules framed by the government from time to time.
- 3.11.25 Security deposit money of contractor will be refunded only after expiry of (6) six months from the date of completion of the contract and Inspection report by ESI Authorities. In case any dues are claimed by the ESI Authorities, the dues of the contractor will be settled only after NOC from ESI Authorities.
- 3.11.26 The Contractor shall be required to deposit service tax as applicable as assessed by Central Excise Authority (Service tax cell) Bangalore before 15<sup>th</sup> of the following month, if same is applicable as per rules in force from time to time. The amount so spent can be claimed from BHEL after submitting the proof of the same.
- 3.11.27 Contractor shall inform his PAN to BHEL. Income tax as applicable will be deducted at source by BHEL from the bill of contractor.
- 3.11.28 All the Registers and Records, forms, Notices maintained under the relevant Acts and Rules should be produced on demand before the Inspector or any other authority under the Act, failing which the contract may be terminated without any notice.
- 3.11.29 Contractor shall be required to submit a list of his workers to be deployed for the works contract giving details regarding Name of contract worker Fathers Name, permanent and Present Address, Date of Birth, Qualification, Caste-SC/ST/OBC ESI No, PF No. and the workmen family member details.
- 3.11.30 The contractor shall promptly furnish all information and document required by BHEL authorities for the purpose of complying with the responsibilities of Occupier of the factory and shall render all the necessary assistance for the same.
- 3.11.31 The contractor will maintain proper discipline of his workmen and will ensure that his workers do not cause any loss or theft or damage to any company's property. The contractor will also be responsible for the good conduct of his workmen.
- 3.11.32 The contractor or his authorized representative shall be required to be present at the work place / site during working hours for the purpose of supervising the work and executing as per contract.
- 3.11.33 The contractor shall ensure and maintain uninterrupted progress of the work in accordance with instructions given to him on behalf of BHEL from time to time.
- 3.11.34 In case the contractor makes default in commencing the work within the time specified by BHEL without any reasonable cause, disputes any of the terms and conditions of the contract or refuses to execute the contract or any part thereof at any stage, the contract shall, without prejudice to any other right or remedies available to BHEL, be liable to be canceled / terminated in part or in whole. In the event of such cancellation / termination of contract, the contractor shall be liable; to compensate BHEL for all losses incurred by BHEL including the loss suffered on account of having the work executed through any other contractor or department as may be convenient to BHEL, in accordance with the exigencies of the work. In case only a part of the contract is canceled, the remaining portion of contract may be allowed be executed by the contractor.
- 3.11.35 Whenever any sum of money is found to be recoverable from or payable by the contractor, the same will be deducted from any sum that may due or which at any time there after becomes due to the contractor under this contract or under any other contract or from his security deposit. In case the recoveries are not complete even after such deduction, the contractor shall pay the same or the balance thereof from the security deposit. The contractor shall immediately thereafter pay such further sums as may be required to replenish the shortage caused by such recoveries in the amount of security deposit.
- 3.11.36 During the currency of contract, if the contractor is awarded any other work contract in BHEL, the contractor will have to inform the designated BHEL official before accepting the other work.
- 3.11.37 In case of failure on the part of the contractor to execute the work awarded to him within the stipulated time the sum equivalent to the earnest money deposit as per BHEL Works Policy shall be forfeited as per the undertaking provided by bidders, after a week notice issued by the awarding officer and BHEL may in its discretion award the contract to any other party.
- 3.11.38 In case of any extra work executed by the contractor, the contractor will paid on pro-rata basis as per the provisions of extant policies.
- 3.11.39 All the terms and conditions as mentioned in work order will also form a part of the agreement.
- 3.11.40 BHEL shall have the right to deduct any sum from the bill of the contractor for making good the loss suffered by a worker or workers by reason of non fulfillment of the conditions of the contract, Non- payment of wages or of deduction made from his or their wages which are not justified by the terms of the contract or non observance of the said contract Labour regulations.
- 3.11.41 The contractor shall be responsible for observance of local laws, employment of personnel, payment of taxes etc. As far as possible, workers shall be engaged from the local areas in which the work is being executed.
- 3.11.42 The contractor shall be wholly responsible for the behavior of the workmen at the work place and outside, in the BHEL premises.
- 3.11.43 The contractor shall be responsible for safe custody of BHEL's property like materials, tools etc., entrusted to him and if necessary arrange insurance at his own expense.



3.11.44 BHEL officer In-charge shall have the right to stop the work at any stage or at any time by giving the contractor the seven days notice in writing and the measurement of the work shall be made by the officer or his authorized representative at any time after due notice at the time of measurement to the contractor. When the payment is made to the contractor based on such measurement, whether or not the contractor or his agent was present at the time of measurement, he shall have no further claim against BHEL.

3.11.45 NON DISCLOSURE AGREEMENT: Vendor/Lessor shall sign a Non-Disclosure Agreement (NDA) as per BHEL format (Copy enclosed) in compliance to Information Security Management System.

3.11.46 **ARBITRATION:**

If at any time, any question, dispute or difference on matter connected with this work order should arise, the same shall be referred for arbitration to a person nominated in this behalf by Head of Unit, BHEL Electroporcelains Division, Bangalore, the award shall be final and binding on both parties.

3.11.47 In any matter pertaining to law, the agreement shall be subject to limits of local jurisdiction.

4.0 **EVALUATION OF PRICE BID:**

- (i) Rate must be quoted for all the activities mentioned in the price bid Proforma as the job would be awarded to successful bidder on Turnkey basis. In case bidder does not quote rates for all activities, BHEL reserves the right to reject such offer.
- (ii) Evaluation of the L-1 bidder shall be computed on overall basis (Grand Total Price indicated in the schedule).
- (iii) In the event of two or more bidders becoming L1, the selection of the bidder for the purpose of awarding contract will be on the basis of LOTTERY to be held in presence of representatives of L1 bidders.
- (iv) The rates quoted by the bidder should be workable and comply with all statutory requirements.

**IMPORTANT NOTE:**

- (v) No prices to be filled up in this format. All prices are to be filled up only in price bid.
- (vi) The commercial terms and all tax structure shall be given with Technical bid. Non – acceptance of our commercial terms may lead to rejection of your offer.
- (vii) During technical scrutiny, CPBG Dept. of BHEL EPD may ask further clarification. The technical reply may be sent directly to the concerned person. But additional or revised price bid, if any due to technical changes or price negotiation must be sent in separate sealed cover to CPBG department only.

5.0 **SCOPE OF WORK AND SPECIAL TERMS & CONDITIONS.**

SCOPE OF WORK FOR WIRING:

1. Wires, Terminal Blocks, Lugs, Ferrules Tubes, Cable Ties, Ferrule Ink rolls and Component identification stickers are in scope of Vendor.
2. Power Wiring and Control wiring and Earth wiring for all modules at BHEL EPD are in scope of Vendor.
3. TBs for Non D/O module are in scope of Vendor.
4. Cable Alley space heater wiring is not in scope of vendor.
5. Wiring shall be of Bunch Type and for bunching Cable Ties/Belt buttons Type shall be used.
6. Ferrules at both ends of wire shall be provided. Ferrules shall be of white tubes. Ferrule shall be provided for each individual wire even two or more wires are terminating at same point. BHEL will provide Ferrule printing Machine however Tube and ink roll are in scope of Vendor. Make of Machine is Letawin.



7. Cables Ties shall be provided at regular intervals as per requirement of BHEL.
8. Spirals shall be used at doors.
9. Saddles with necessary screws shall be considered for holding the wire bunch to mounting plate.
10. One Module of each type shall be made ready and BHEL acceptance shall be obtained before going ahead with wiring of all modules.
11. Mounting of Components provided by BHEL in all types of modules are in scope of vendor.
12. Power wiring sizes shall be submitted for BHEL approval before start of wiring.
13. More than two wires shall not be terminated at any terminal block or component.
14. All the necessary tools required to complete the job shall be arranged by vendor only. BHEL will not provide any tools for wiring job.
15. Shrouding of Modules at O/G side terminals in Cable Alley, CST feeder, Bus PT feeder, Incoming side terminals, Rear side of Breaker verticals and front side of Breaker Chamber shall be considered in scope of vendor. Material shall be of Acrylic sheet or of FRP sheet.
16. The schemes attached with this tender document is tentative, minor changes may be possible during the time of wiring. Same shall be carried out without price implication.

SCOPE OF WORK FOR TESTING:

1. All the modules shall be tested for continuity, HV, IR and Functional as per BHEL drawing and check list and certification shall be obtained from BHEL representative at BHEL EPD.
2. 415V AC supply, 220V DC supply, HV Kit and Megger will be provided by BHEL EPD.
3. Supply testers, Multifunction meters and Continuity testers shall be arranged by vendor.
4. Any modification carried out during testing in the wiring shall be informed to BHEL representative and updated drawing will be released by BHEL for the same.
5. The workmen deputed will be parallelly supervised by BHEL, the contract is bound to replace the workmen if found workmanship is not satisfactory.
6. Two rooms will be provided on chargeable basis for stay of workmen.



MATERIAL SPECIFICATION AND SCOPE OF WORK FOR WIRING CONTRACT

WIRES:

1. Wires shall be of Flexible 1100V grade, PVC insulated Switch Board Wires with Stranded copper wires of 2.5mm Sq.
2. Make of Wire and shall be of Finolex and Polycab.
3. Colour coding Control Circuit and power circuit: AC (control circuit)-Black; DC-Grey; CT & PT and Power wiring: R, Y, B and Black.

LUGS:

1. Lugs shall be of insulated type. Make shall be 3D/Dowell's/Hex.
2. Wherever required ring type/U type/Pin Type/Snap Type shall be selected by vendor.

TERMINAL BLOCKS:

1. Terminal blocks shall be of Flexible type, Screw type, Din rail mounting with both ends possible for terminating Voltage grade: 1100V.
2. Make shall be of Connectwell/Elmex
3. For 2.5Sqmm. wire TB size shall be 4Sq.mm, For 4Sq.mm wire TB size shall be 6Sq.mm
4. For CT circuits CTTBs of Disconnecting type shall be used.
5. End plates and End clamps shall be provided at starting and end of TB series.
6. TB markers of Strip type on both sides shall be provided.

CABLE TIES:

1. Make of Cable Ties shall be of KSI, KSS, KEI.

COMPONENT IDENTIFICATION STICKERS:

1. Component identification stickers shall be provided and they shall be of yellow colour and height of 9mm. Ink rolls required shall be considered in vendor scope.

QUALIFICATION CRITERIA:

1. **THE VENDOR WOULD HAVE COMPLETED ATLEAST TWO PROJECTS IN LAST 2 YEARS, WHERE IN EACH PROJECT A MINIMUM OF 75 VERTICALS ARE PRESENT.**
2. **A SOLVENCY CERTIFICATE FROM A NATIONALIZED BANK SHOULD BE PRODUCED FOR A VALUE OF 0.2 TIMES OF TENDER ESTIMATED VALUE REGARDING THE TENDERER'S FINANCIAL POSITION.**
3. **VENDOR SHALL HAVE A LOCAL OFFICE WITH REPRESENTATIVE IN BANGALORE FOR EASE OF COMMUNICATION.**
4. **VENDOR SHALL HAVE A MINIMUM OF 6000 Sq.Ft. SHOP FLOOR SPACE AT HIS WORKS.**
5. **VENDOR SHALL HAVE TOOLS AS PER ATTACHED ANNEXURE A.**



SCOPE OF BOARDS:

LIST OF BOARDS FOR HALDIA AND IB VALLEY PROJECTS			
SL.NO.	DESCRIPTION OF BOARD	QUANTITY	UOM
1	LTMSB PANEL FOR HALDIA PROJECT	3	no.s
2	AUXILLIARY CONTROL PANEL FOR HALDIA PROJECT	6	no.s
SL.NO.	DESCRIPTION OF BOARD	QUANTITY	UOM
3	LTMSB PANEL FOR IB VALLEY PROJECT	8	no.s
4	AUXILLIARY CONTROL PANEL FOR IB VALLEY PROJECT	8	no.s

DETAILED MODULES LIST AND DRAWINGS ARE ATTACHED AS ANNEXURE-1

1. THE MODULES LIST FURNISHED IS TENTATIVE.
2. THE FINAL LIST OF MODULES MAY HAVE VARIATION UPTO +/-30% OF CONTRACT VALUE.
3. WORK ORDER WILL BE AMMENDED ACCORDINGLY.
4. UNIT RATES SHALL BE DULY FILLED IN THE FORMAT GIVEN IN ANNEXURE 1.
5. WIRE LENGTH AND MAN HOURS TO BE CONSIDERED AS PER DRAWINGS, HOWEVER VENDOR HAS TO DECLARE WIRE LENGTH AND NO. ODF MAN HOURS CONSIDERED.

PAYMENT TERMS:

1. PAYMENT WILL BE MADE BOARD WISE AFTER SUCCESSFUL COMPLETION OF WORK AND TESTING.
2. THE TEST CERTIFICATE OF BOARD SHALL BE DULY CERTIFIED BY BHEL QUALITY DEPARTMENT FOR RELEASE OF PAYMENT.

WORK COMPLETION TERMS:

1. COMPLETION OF ALL BOARDS SHALL BE DONE WITH IN THREE MONTHS FROM THE DATE OF CLEARANCE OF PROTO MODULE, RELEASE OF ALL MATERIALS AND WIRING DRAWINGS. LD WILL BE APPLICABLE FOR THE BALANCE ITEMS WHICH ARE NOT COMPLETED WITH IN THREE MONTHS.
2. FAILING TO COMPLY ABOVE WILL BE CONSIDERED UNDER LD AND LD CLAUSE WILL BE OPERATED.

NOTE:

1. Contractor has to ensure that the workmen deployed for the above said works must be covered under ESI and have valid PF account.
2. Contractors are advised to meet the engineer-in-charge, discuss and completely understand the scope of work before quoting.
3. Taxes and duties, if any, may be quoted separately at the space provided in Schedule – A. If not, the rates will be considered as inclusive of all taxes and no additional claims in this regard will be entertained later.



**6.0 PRICE BID FORMAT:**

As per Schedule - A (Part – B) (Should be kept in a separate envelope and submitted)

<b>UNPRICED FORMAT FOR WORKS CONTRACT FOR HALDIA AND IB VALLEY PROJECTS(CST)</b>					
<b>SL.NO.</b>	<b>DESCRIPTION OF BOARD</b>	<b>QUANTITY</b>	<b>UOM</b>	<b>UNIT PRICE</b>	<b>TOTAL PRICE</b>
1	LTMSB PANEL FOR HALDIA PROJECT	3	no.s		
2	AUXILLIARY CONTROL PANEL FOR HALDIA PROJECT	6	no.s		
<b>TOTAL COST FOR HALDIA PROJECT</b>					
<b>SL.NO.</b>	<b>DESCRIPTION OF BOARD</b>	<b>QUANTITY</b>	<b>UOM</b>	<b>UNIT PRICE</b>	<b>TOTAL PRICE</b>
3	LTMSB PANEL FOR IB VALLEY PROJECT	8	no.s		
4	AUXILLIARY CONTROL PANEL FOR IB VALLEY PROJECT	8	no.s		
<b>TOTAL COST FOR IB VALLEY PROJECT</b>					
<b>TOTAL COST FOR HALDIA AND IB VALLEY PROJECTS</b>					
CONSIDERING SUPPLY PORTION 40%					
With ED applicable on 40% of Total estimated Value					
With CST applicable on 40% Total eaitimated value					
With ED benefit and 40% supply portion Total cost with Taxes					
CONSIDERING SERVICE PORTION 60%					
With Service Tax applicable on 60% of Total estimated Value					
<b>TOTAL VALUE WITH TAXES</b>					

<b>UNPRICED FORMAT FOR WORKS CONTRACT FOR HALDIA AND IB VALLEY PROJECTS(VAT)</b>					
<b>SL.NO.</b>	<b>DESCRIPTION OF BOARD</b>	<b>QUANTITY</b>	<b>UOM</b>	<b>UNIT PRICE</b>	<b>TOTAL PRICE</b>
1	LTMSB PANEL FOR HALDIA PROJECT	3	no.s		
2	AUXILLIARY CONTROL PANEL FOR HALDIA PROJECT	6	no.s		
<b>TOTAL COST FOR HALDIA PROJECT</b>					
<b>SL.NO.</b>	<b>DESCRIPTION OF BOARD</b>	<b>QUANTITY</b>	<b>UOM</b>	<b>UNIT PRICE</b>	<b>TOTAL PRICE</b>
3	LTMSB PANEL FOR IB VALLEY PROJECT	8	no.s		
4	AUXILLIARY CONTROL PANEL FOR IB VALLEY PROJECT	8	no.s		
<b>TOTAL COST FOR IB VALLEY PROJECT</b>					
<b>TOTAL COST FOR HALDIA AND IB VALLEY PROJECTS</b>					
CONSIDERING SUPPLY PORTION 40%					
With ED applicable on 40% of Total estimated Value					
With VAT applicable on 40% Total estimated value					
With ED benefit and 40% supply portion Total cost with Taxes					



BHARAT HEAVY ELECTRICALS LIMITED,  
Electroporcelains Division, IISc Post  
Bangalore - 560 012

**PART-A**  
**TENDER**  
**DOCUMENT**

With VAT benefit and 40% supply portion Total cost with Taxes	
CONSIDERING SERVICE PORTION 60%	
With Service Tax applicable on 60% of Total estimated Value	
TOTAL VALUE WITH TAXES	

1. **FOR THE VENDORS REGISTERED IN KARNTAKA VAT WILL BE CONSIDERED.**
2. **FOR THE VENDORS REGISTERED OTHER THAN IN KARNATAKA CST WILL BE CONSIDERED.**
3. **L1 WILL BE DECIDED WITH LANDED COST TO BHEL.**

**NOTE: DETAILED MODULES LIST AND DRAWINGS ARE ATTACHED AS ANNEXURE-1**

1. **THE MODULES LIST FURNISHED IS TENTATIVE.**
2. **THE FINAL LIST OF MODULES MAY HAVE VARIATION UPTO +/-30% OF CONTRACT VALUE.**
3. **WORK ORDER WILL BE AMMENDED ACCORDINGLY.**
4. **UNIT RATES SHALL BE DULY FILLED IN THE FORMAT GIVEN IN ANNEXURE 1.**
5. **WIRE LENGTH AND MAN HOURS TO BE CONSIDERED AS PER DRAWINGS, HOWEVER VENDOR HAS TO DECLARE WIRE LENGTH AND NO. ODF MAN HOURS CONSIDERED.**

**PAYMENT TERMS:**

1. **PAYMENT WILL BE MADE BOARD WISE AFTER SUCCESSFUL COMPLETION OF WORK AND TESTING.**
2. **THE TEST CERTIFICATE OF BOARD SHALL BE DULY CERTIFIED BY BHEL QUALITY DEPARTMENT FOR RELEASE OF PAYMENT.**
3. **PAYMENT WILL BE MADE WITHIN 30DAYS FROM THE DATE OF CLEARANCE.**

**WORK COMPLETION TERMS:**

3. **COMPLETION OF ALL BOARDS SHALL BE DONE WITH IN THREE MONTHS FROM THE DATE OF CLEARANCE OF PROTO MODULE, RELEASE OF ALL MATERIALS AND WIRING DRAWINGS.**
4. **FAILING TO COMPLY ABOVE WILL BE CONSIDERED UNDER LD AND LD CLAUSE WILL BE OPERATED.**



## 7.0 AGREEMENT BETWEEN CONTRACTOR AND BHEL- EPD

This Agreement made on this \_\_\_\_\_ day of \_\_\_\_\_ Two Thousand and Nine between M/s / Shri \_\_\_\_\_ aged about \_\_\_\_\_ years S/O of Shri \_\_\_\_\_, residing at \_\_\_\_\_, hereinafter called the "**Contractor**" (which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include its successors and permitted assigns ) of the First part.

### AND

**BHARAT HEAVY ELECTRICALS LIMITED, ELECTROPORCELAINS DIVISION**, Prof. CNR Circle, P.B.1245, IISc Post, Malleswaram, BANGALORE-560012, a Company incorporated under the Companies Act 1956 and having its registered office at BHEL House, Siri Fort New Delhi - 110049, **hereinafter called " BHEL-EPD "** (which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include its successors and permitted assigns) of the second part.

Whereas

1. BHEL, EPD is desirous of entrusting to the said contractor to engage and carryout the contract job of Canteen & Housekeeping Services of BHEL, EPD more specifically mentioned in the Annexure (hereinafter called the Contract work) to this Agreement.
2. The Contractor who is a specialized agency in the type of contract work in different establishments has agreed to undertake the said contract work on job contract basis.

NOW THEREFORE IT IS AGREED BETWEEN THE PARTIES:

The Terms and conditions of this agreement are as stipulated in:

- (i) Notice Inviting Tender
- (ii) Scope of Work
- (iii) Proforma for Offering Techno-Commercial Bid
- (iv) Special Terms & Conditions of the Contract
- (v) General Terms and Conditions
- (vi) Duties and Responsibilities of Contractor
- (vii) Price Bid Format
- (viii) Declaration By Contractor
- (ix) Work Orders and Work Instructions issued to the Contractor
- (x) Agreement between Contractor and BHEL-EPD



BHARAT HEAVY ELECTRICALS LIMITED,  
Electroporcelains Division, IISc Post  
Bangalore - 560 012

**PART-A**  
**TENDER**  
**DOCUMENT**

Shall form part and parcel of this agreement.

IN WITNESS WHEREOF THE PARTIES HERETO through their authorized Representatives have signed these presents on the day, month and year mentioned above.

For and on behalf of M/s-----

[Authorized signatory]  
Name & Designation

Witness : 1  
Signature :  
Designation :  
Address :

For and on behalf of  
Bharat Heavy Electricals Limited  
Electroporcelains Division,  
Bangalore 560012.

[Authorized signatory]  
Name & Designation

Witness : 2  
Signature :  
Designation :  
Address :



**8.0 THIRD PARTY NON-DISCLOSURE AGREEMENT**

I, \_\_\_\_\_ on behalf of the \_\_\_\_\_ (Name of Company),

acknowledge that the information received or generated, directly or indirectly, while working with BHEL on contract is confidential and that the nature of the business of the BHEL is such that the following conditions are reasonable, and therefore:

I warrant and agree as follows:

I, or any other personnel employed or engaged by our company, agree not to disclose, directly or indirectly, any information related to the BHEL. Without restricting the generality of the foregoing, it is agreed that we will not disclose such information consisting but not necessarily limited to:

- Technical information: Methods, drawings, processes, formulae, compositions, systems, techniques, inventions, computer programs/data/configuration and research projects.
- Business information: Customer lists, project schedules, pricing data, estimates, financial or marketing data,

On conclusion of contract, I, or any other personnel employed or engaged by our company shall return to BHEL all documents and property of BHEL, including but not necessarily limited to: drawings, blueprints, reports, manuals, computer programs/data/configuration, and all other materials and all copies thereof relating in any way to BHEL's business, or in any way obtained by me during the course of contract. I further agree that I, or any others employed or engaged by our company shall not retain copies, notes or abstracts of the foregoing.

This obligation of confidence shall continue after the conclusion of the contract also.

I acknowledge that the aforesaid restrictions are necessary and fundamental to the business of the BHEL, and are reasonable given the nature of the business carried on by the BHEL. I agree that this agreement shall be governed by and construed in accordance with the laws of country.

I enter into this agreement totally voluntarily, with full knowledge of its meaning, and without duress.

Dated at....., this.....day of .....20 .

Name

Company

Signature

## TOOLS

1	HEAT SHRINK GUN	BOSCH GHG 500-2 PROF.	HS	1
2	MULTIMETER	TAKUMI PALMISZE	MM	1
3	DIGITAL CLAMP METER	MASTECH M266 SERIES	DCM	1
4	MEEGER	RISHABH INSU20	MG	1
5	HT KIT 5KV		HT	1
6	INSULATED CRIMPING TOOL	ASWINI HT 960	ICT	1
7		VAPS YAC5	ICT	1
8	NON-INSULATED CRIMPING TOOL	3D	NICT	1
9	POWER CABLE CUTTER 25SQ.MM		PCC	1
10	PNUEMATIC GUN	SLI ST 553A	PG	1
11	TORQUE WRENCH 20 TO 100LBFT	TORQUE MASTER TM100R	TW	1
12	RATCHET KIT 8 TO 32MM	UNISON 4528MR02US	RK	1
13	DRILL GUN UPTO 10MM	BOSCH GSB10RE	DLG	1
14	DRILL GUN UPTO 13MM	HITACHI DB13VSS	DLG	1
15	JICKSAW 400W	SKIL 4170	JS	1
16	BATTERY OPERATED SCREW TIGHT GUN	DUROGOLD	BOS	1
17	BUSBAR/TRUF CUTTING MACHINE	HITACHI CC14STD	BCM	1
18	POWER CRIMPING TOOL 25 TO 75SQ.MM		PCT	1
19	TUBULAR SPANNER 7MM		TS	1
20	TUBULAR SPANNER 8MM			1
21	TUBULAR SPANNER 9MM			1
22	TUBULAR SPANNER 11MM			1
23	TUBULAR SPANNER 12MM			1
24	TUBULAR SPANNER 13MM			1
25	RING SPANNER 6-7MM		RS	1
26	RING SPANNER 8-9MM			3

27	RING SPANNER10-11MM			1
28	RING SPANNER12-13MM			1
29	RING SPANNER13-14MM			1
30	RING SPANNER16-17MM			1
31	RING SPANNER18-19MM			2
32	RING SPANNER20-22MM			1
33	OPEN SPANNER 6-7MM		OS	1
34	OPEN SPANNER 8-9MM			2
35	OPEN SPANNER10-11MM			2
36	OPEN SPANNER12-13MM			6
37	OPEN SPANNER13-14MM			1
38	OPEN SPANNER16-17MM			1
39	OPEN SPANNER18-19MM			1
40	OPEN SPANNER20-22MM			1
41	OPEN RING SPANNER 12-12MM		ORS	1
42	OPEN RING SPANNER 15-15MM			1
43	OPEN RING SPANNER 18-18MM			1
44	MALLET HAMMER		MH	1
45	TAPARIA SCREW DRIVER SET		SDK	2
46	6SQ.MM WIRE STRIPPER		WS	4
47	6SQ.MM SIDE CUTTER		SC	3
48	6SQ.MM POWER CABLE CUTTER		PCC	2
49	CONNECTOR 902		CN	12
50	CONNECTOR 912			3
51	CONNECTOR 211			3
52	CONNECTOR 825			1
53	ALLIGN KEY SET		AK	1

54	LETAWIN FERRULE PRINTING MACHINE		FPRN	1
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### UNPRICE FORMAT FOR LTMSB IB VALLEY PANEL

SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL NO. OF MODULES
1	<b>INCOMER 1, INCOMER 2 &amp; Buscoupler</b>	2.5sqmm. Wire Control	As Required	mtrs			3	8	24
2		CTTBS	20	no.s					
		4Sqmm TB	55	no.s					
3		Neutral Links	5	no.s					
4		HARDWARE & ACCESSORIES	1	LOT					
5		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL NO. OF MODULES
1	<b>Bus PT module</b>	2.5sqmm. Wire	As Required	mtrs			2	8	16
		4SQMM TB	40	no.s					
		HARDWARE & ACCESSORIES	1	LOT					
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL NO. OF MODULES
1	<b>ACB OG FOR ACP</b>	2.5sqmm. Wire	As Required	mtrs			3	8	24
		CTTBS	10	no.s					
		4SQMM TB	55	no.s					
		NEUTRAL LINKS	5	no.s					
		HARDWARE & ACCESSORIES	1	LOT					
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL NO. OF MODULES
	<b>400A MCCB</b>	HARDWARE & ACCESSORIES	1	LOT			26	8	208
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							

SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL NO. OF MODULES
2	250A MCCB	HARDWARE & ACCESSORIES	1	LOT			4	8	32
		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL NO. OF MODULES
2	125A MCCB	25SQMM. Copper Cable	As Required	mtrs			2	8	16
		HARDWARE & ACCESSORIES	1	LOT					
		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL NO. OF MODULES
2	63A MCCB	16SQMM. Copper Cable	As Required	mtrs			2	8	16
		HARDWARE & ACCESSORIES	1	LOT					
		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL NO. OF MODULES
2	SPACE HEATER SUPPLY SUPPLY TRANSFORMER	6Sqmm. Wire	As Required	mtrs			1	8	8
		2.5SQ.MM Wire	As Required	mtrs					
		10sqMM TB	20	no.s					
		NEUTRAL LINK	4	no.s					
		HARDWARE & ACCESSORIES	1	LOT					
		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
<b>TOTAL COST PER PANEL</b>								<b>TOTAL FOR 8 PANELS</b>	

## UNPRICE FORMAT FOR ACP IB VALLEY PANEL

SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL MODULES
1	<b>INCOMER 1, INCOMER 2 &amp; Buscoupler</b>	2.5sqmm. Wire Control	As Required	mtrs			3	8	24
2		CTTBS	20	no.s					
		4Sqmm TB	55	no.s					
3		Neutral Links	5	no.s					
4		HARDWARE & ACCESSORIES	1	LOT					
5		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL MODULES
1	<b>Bus PT module</b>	2.5sqmm. Wire	As Required	mtrs			2	8	16
		4SQMM TB	40	no.s					
		HARDWARE & ACCESSORIES	1	LOT					
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL MODULES
1	<b>0.37KW RAPPING MOTOR</b>	6Sqmm. Wire	As Required	mtrs			51	8	408
		2.5sqmm. Wire	As Required	mtrs					
		HARDWARE & ACCESSORIES	1	LOT					
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL MODULES
1	<b>12KW HOPPER HEATER</b>	6 Sqmm. Wire	As Required	mtrs			24	8	192
		2.5sqmm. Wire	As Required	mtrs					
		CTTBS	10	no.s					
		NEUTRAL LINK	1	no.s					
		HARDWARE & ACCESSORIES	1	LOT					

2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
<b>SI.No.</b>	<b>MODULE NAME</b>	<b>DESCRIPTION OF ITEM</b>	<b>QTY</b>	<b>UOM</b>	<b>UNIT RATE</b>	<b>TOTAL RATE</b>	<b>TOTAL NO OF MODULES</b>	<b>NO . OF PANELS</b>	<b>TOTAL MODULES</b>
1	40KW SUPPORT INSULATOR HEATER	25 Sqmm. Wire	As Required	mtrs			3	8	24
		2.5sqmm. Wire	As Required	mtrs					
		CTTBS	10	no.s					
		NEUTRAL LINK	1	no.s					
		HARDWARE & ACCESSORIES	1	LOT					
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
<b>SI.No.</b>	<b>MODULE NAME</b>	<b>DESCRIPTION OF ITEM</b>	<b>QTY</b>	<b>UOM</b>	<b>UNIT RATE</b>	<b>TOTAL RATE</b>	<b>TOTAL NO OF MODULES</b>	<b>NO . OF PANELS</b>	<b>TOTAL MODULES</b>
1	10KW SHAFT INSULATOR HEATER	6 Sqmm. Wire	As Required	mtrs			3	8	24
		2.5sqmm. Wire	As Required	mtrs					
		CTTBS	10	no.s					
		NEUTRAL LINK	1	no.s					
		HARDWARE & ACCESSORIES	1	LOT					
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
<b>SI.No.</b>	<b>MODULE NAME</b>	<b>DESCRIPTION OF ITEM</b>	<b>QTY</b>	<b>UOM</b>	<b>UNIT RATE</b>	<b>TOTAL RATE</b>	<b>TOTAL NO OF MODULES</b>	<b>NO . OF PANELS</b>	<b>TOTAL MODULES</b>
1	1.1KW OPACITY MONITOR	6Sqmm. Wire	As Required	mtrs			2	8	16
		2.5sqmm. Wire	As Required	mtrs					
		HARDWARE & ACCESSORIES	1	LOT					
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
<b>SI.No.</b>	<b>MODULE NAME</b>	<b>DESCRIPTION OF ITEM</b>	<b>QTY</b>	<b>UOM</b>	<b>UNIT RATE</b>	<b>TOTAL RATE</b>	<b>TOTAL NO OF MODULES</b>	<b>NO . OF PANELS</b>	<b>TOTAL MODULES</b>
	CONTROL	6Sqmm. Wire	As Required	mtrs			2		16
		2.5SQ.MM Wire	As Required	mtrs					
		10sqMM TB	8	no.s					
		4sQMM. TB	10	no.s					

	<b>SUPPLY SUPPLY TRANSFORMER</b>	NEUTRAL LINK	4	no.s			4	8	10
		HARDWARE & ACCESSORIES	1	LOT					
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
<b>Sl.No.</b>	<b>MODULE NAME</b>	<b>DESCRIPTION OF ITEM</b>	<b>QTY</b>	<b>UOM</b>	<b>UNIT RATE</b>	<b>TOTAL RATE</b>	<b>TOTAL NO OF MODULES</b>	<b>NO . OF PANELS</b>	<b>TOTAL MODULES</b>
		6Sqmm. Wire	As Required	mtrs					

	SPACE HEATER SUPPLY SUPPLY TRANSFORMER	2.5SQ.MM Wire	As Required	mtrs			1	8	8
		10sqMM TB	20	no.s					
		NEUTRAL LINK	4	no.s					
		HARDWARE & ACCESSORIES	1	LOT					
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
<b>SI.No.</b>	<b>MODULE NAME</b>	<b>DESCRIPTION OF ITEM</b>	<b>QTY</b>	<b>UOM</b>	<b>UNIT RATE</b>	<b>TOTAL RATE</b>	<b>TOTAL NO OF MODULES</b>	<b>NO . OF PANELS</b>	<b>TOTAL MODULES</b>
	WIRELESS CONTROLLER MODULE FOR RM	3CX1.5SQMM WIRE	As Required	mtrs			2	8	16
		2.5Sqmm Wire	As Required	mtrs					
		4SQMM. TBS	120	no.s					
		HARDWARE & ACCESSORIES	1	LOT					
		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
<b>SI.No.</b>	<b>MODULE NAME</b>	<b>DESCRIPTION OF ITEM</b>	<b>QTY</b>	<b>UOM</b>	<b>UNIT RATE</b>	<b>TOTAL RATE</b>	<b>TOTAL NO OF MODULES</b>	<b>NO . OF PANELS</b>	<b>TOTAL MODULES</b>
	WIRELESS CONTROLLER MODULE FOR HH	2Cx1.5SQMM WIRE	As Required	mtrs			2	8	16
		2.5Sqmm Wire	As Required	mtrs					
		4SQMM. TBS	40	no.s					
		HARDWARE & ACCESSORIES	1	LOT					
		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
<b>SI.No.</b>	<b>MODULE NAME</b>	<b>DESCRIPTION OF ITEM</b>	<b>QTY</b>	<b>UOM</b>	<b>UNIT RATE</b>	<b>TOTAL RATE</b>	<b>TOTAL NO OF MODULES</b>	<b>NO . OF PANELS</b>	<b>TOTAL MODULES</b>
		4Cx1.5SQMM WIRE	As Required	mtrs					
		4SQMM. TBS	As Required	mtrs					

	<b>MARSHALLING FOR RM</b>	HARDWARE & ACCESSORIES	1	LOT			2	8	16
		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
		<b>TOTAL COST PER PANEL</b>							<b>TOTAL FOR 8</b>

## UNPRICE FORMAT FOR LTMSB HALDIA PANEL

SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL NO. OF MODULES
1	<b>INCOMER 1, INCOMER 2 &amp; Buscoupler</b>	2.5sqmm. Wire Control	As Required	mtrs			3	3	9
2		CTTBS	20	no.s					
		4Sqmm TB	55	no.s					
3		Neutral Links	5	no.s					
4		HARDWARE & ACCESSORIES	1	LOT					
5		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL NO. OF MODULES
1	<b>Bus PT module</b>	2.5sqmm. Wire	As Required	mtrs			2	3	6
		4SQMM TB	40	no.s					
		HARDWARE & ACCESSORIES	1	LOT					
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL NO. OF MODULES
	<b>400A MCCB</b>	HARDWARE & ACCESSORIES	1	LOT			18	3	54
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL NO. OF MODULES
	<b>250A MCCB</b>	HARDWARE & ACCESSORIES	1	LOT			3	3	9
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL NO. OF MODULES
		16SQMM. Copper Cable	6	mtrs					

	<b>63A MCCB</b>	HARDWARE & ACCESSORIES	1	LOT			3	3	9
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
<b>SI.No.</b>	<b>MODULE NAME</b>	<b>DESCRIPTION OF ITEM</b>	<b>QTY</b>	<b>UOM</b>	<b>UNIT RATE</b>	<b>TOTAL RATE</b>	<b>TOTAL NO OF MODULES</b>	<b>NO . OF PANELS</b>	<b>TOTAL NO. OF MODULES</b>
	<b>SPACE HEATER SUPPLY SUPPLY TRANSFORMER</b>	6Sqmm. Wire	As Required	mtrs			1	3	3
		2.5SQ.MM Wire	As Required	mtrs					
		10sqMM TB	20	no.s					
		NEUTRAL LINK	4	no.s					
		HARDWARE & ACCESSORIES	1	LOT					
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
<b>TOTAL COST PER PANEL</b>								<b>TOTAL FOR 3 PANELS</b>	

## UNPRICE FORMAT FOR ACP HALDIA PANEL

SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES/PANEL	NO . OF PANELS	TOTAL MODULES
1	<b>INCOMER</b>	2.5sqmm. Wire Control	As Required	mtrs			1	6	6
2		CTTBS	10	no.s					
3		Neutral Links	2	no.s					
4		HARDWARE & ACCESSORIES	1	LOT					
5		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL MODULES
1	<b>0.37KW RAPPING MOTOR</b>	6Sqmm. Wire	As Required	mtrs			18	6	108
		2.5sqmm. Wire	As Required	mtrs					
		HARDWARE & ACCESSORIES	1	LOT					
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL MODULES
1	<b>12KW HOPPER HEATER</b>	6 Sqmm. Wire	As Required	mtrs			8	6	48
		2.5sqmm. Wire	As Required	mtrs					
		CTTBS	10	no.s					
		NEUTRAL LINK	1	no.s					
		HARDWARE & ACCESSORIES	1	LOT					
2		LABOUR COST	As Required	Hrs					
	<b>TOTAL COST PER MODULE</b>								
SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL MODULES
1	<b>28KW SUPPORT INSULATOR HEATER</b>	16 Sqmm. Wire	As Required	mtrs			2	6	12
		2.5sqmm. Wire	As Required	mtrs					
		CTTBS	10	no.s					
		NEUTRAL LINK	1	no.s					
		HARDWARE & ACCESSORIES	1	LOT					

2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
<b>SI.No.</b>	<b>MODULE NAME</b>	<b>DESCRIPTION OF ITEM</b>	<b>QTY</b>	<b>UOM</b>	<b>UNIT RATE</b>	<b>TOTAL RATE</b>	<b>TOTAL NO OF MODULES</b>	<b>NO . OF PANELS</b>	<b>TOTAL MODULES</b>
1	<b>7KW SHAFT INSULATOR HEATER</b>	6 Sqmm. Wire	As Required	mtrs			2	6	12
		2.5sqmm. Wire	As Required	mtrs					
		CTTBS	10	no.s					
		NEUTRAL LINK	1	no.s					
		HARDWARE & ACCESSORIES	1	LOT					
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
<b>SI.No.</b>	<b>MODULE NAME</b>	<b>DESCRIPTION OF ITEM</b>	<b>QTY</b>	<b>UOM</b>	<b>UNIT RATE</b>	<b>TOTAL RATE</b>	<b>TOTAL NO OF MODULES</b>	<b>NO . OF PANELS</b>	<b>TOTAL MODULES</b>
1	<b>1.1KW OPACITY MONITOR</b>	6Sqmm. Wire	As Required	mtrs			2	6	12
		2.5sqmm. Wire	As Required	mtrs					
		HARDWARE & ACCESSORIES	1	LOT					
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
<b>SI.No.</b>	<b>MODULE NAME</b>	<b>DESCRIPTION OF ITEM</b>	<b>QTY</b>	<b>UOM</b>	<b>UNIT RATE</b>	<b>TOTAL RATE</b>	<b>TOTAL NO OF MODULES</b>	<b>NO . OF PANELS</b>	<b>TOTAL MODULES</b>
	<b>CONTROL SUPPLY SUPPLY TRANSFORMER</b>	6Sqmm. Wire	As Required	mtrs			1	6	6
		2.5SQ.MM Wire	As Required	mtrs					
		10sqMM TB	8	no.s					
		4sQMM. TB	10	no.s					
		NEUTRAL LINK	4	no.s					
		HARDWARE & ACCESSORIES	1	LOT					
2		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
<b>SI.No.</b>	<b>MODULE NAME</b>	<b>DESCRIPTION OF ITEM</b>	<b>QTY</b>	<b>UOM</b>	<b>UNIT RATE</b>	<b>TOTAL RATE</b>	<b>TOTAL NO OF MODULES</b>	<b>NO . OF PANELS</b>	<b>TOTAL MODULES</b>
	<b>SPACE HEATER</b>	6Sqmm. Wire	As Required	mtrs			1		6
		2.5SQ.MM Wire	As Required	mtrs					
		10sqMM TB	2	no.s					
		4sQMM. TB	10	no.s					



SI.No.	MODULE NAME	DESCRIPTION OF ITEM	QTY	UOM	UNIT RATE	TOTAL RATE	TOTAL NO OF MODULES	NO . OF PANELS	TOTAL MODULES
	<b>MARSHALLING FOR RM</b>	4Cx1.5SQMM WIRE	As Required	mtrs			1	6	6
		4SQMM. TBS	75	no.s					
		HARDWARE & ACCESSORIES	1	LOT					
		LABOUR COST	As Required	Hrs					
		<b>TOTAL COST PER MODULE</b>							
	<b>TOTAL COST PER PANEL</b>							<b>TOTAL FOR 6 PANELS</b>	

<b>UNPRICED FORMAT FOR WORKS CONTRACT FOR HALDIA AND IB VALLEY PROJECTS</b>					
<b>SL.NO.</b>	<b>DESCRIPTION OF BOARD</b>	<b>QUANTITY</b>	<b>UOM</b>	<b>UNIT PRICE</b>	<b>TOTAL PRICE</b>
1	LTMSB PANEL FOR HALDIA PROJECT	3	no.s		
2	AUXILLIARY CONTROL PANEL FOR HALDIA PROJECT	6	no.s		
<b>TOTAL COST FOR HALDIA PROJECT</b>					
<b>SL.NO.</b>	<b>DESCRIPTION OF BOARD</b>	<b>QUANTITY</b>	<b>UOM</b>	<b>UNIT PRICE</b>	<b>TOTAL PRICE</b>
3	LTMSB PANEL FOR IB VALLEY PROJECT	8	no.s		
4	AUXILLIARY CONTROL PANEL FOR IB VALLEY PROJECT	8	no.s		
<b>TOTAL COST FOR IB VALLEY PROJECT</b>					
<b>TOTAL COST FOR HALDIA AND IB VALLEY PROJECTS</b>					
CONSIDERING SUPPLY PORTION 40%					
With ED applicable on 40% of Total estimated Value					
With CST applicable on 40% Total eatimated value					
With ED benefit and 40% supply portion Total cost with Taxes					
CONSIDERING SERVICE PORTION 60%					
With Service Tax applicable on 60% of Total estimated Value					
<b>TOTAL ESTIMATED VALUE WITH TAXES</b>					

<b>UNPRICED FORMAT FOR WORKS CONTRACT FOR HALDIA AND IB VALLEY PROJECTS</b>					
<b>SL.NO.</b>	<b>DESCRIPTION OF BOARD</b>	<b>QUANTITY</b>	<b>UOM</b>	<b>UNIT PRICE</b>	<b>TOTAL PRICE</b>
1	LTMSB PANEL FOR HALDIA PROJECT	3	no.s		
2	AUXILLIARY CONTROL PANEL FOR HALDIA PROJECT	6	no.s		
<b>TOTAL COST FOR HALDIA PROJECT</b>					
<b>SL.NO.</b>	<b>DESCRIPTION OF BOARD</b>	<b>QUANTITY</b>	<b>UOM</b>	<b>UNIT PRICE</b>	<b>TOTAL PRICE</b>
3	LTMSB PANEL FOR IB VALLEY PROJECT	8	no.s		
4	AUXILLIARY CONTROL PANEL FOR IB VALLEY PROJECT	8	no.s		
<b>TOTAL COST FOR IB VALLEY PROJECT</b>					
<b>TOTAL COST FOR HALDIA AND IB VALLEY PROJECTS</b>					
CONSIDERING SUPPLY PORTION 40%					
With ED applicable on 40% of Total estimated Value					
With VAT applicable on 40% Total eatimated value					
With ED benefit and 40% supply portion Total cost with Taxes					
With VAT benefit and 40% supply portion Total cost with Taxes					
CONSIDERING SERVICE PORTION 60%					
With Service Tax applicable on 60% of Total estimated Value					
<b>TOTAL ESTIMATED VALUE WITH TAXES</b>					

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# INDIA POWER CORPORATION (HALDIA) LIMITED HALDIA

PROJECT:

## 3x150 MW COAL BASED POWER PLANT HALDIA

CUSTOMER CONSULTANT:



DEVELOPMENT CONSULTANT PVT LTD

### DEVELOPMENT CONSULTANT PVT LTD KOLKATA

INVENTORY NO. :	SIGN. & DATE :	REF. DRG. NO. :	
REV. 01   DATE :	REV.   DATE :	REV.   DATE :	ALTERED :
ALTERED :	ALTERED :	ALTERED :	ALTERED :

JOB NO.:						<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPROCELAIN DIVISION BANGALORE	
CR-14-019						TITLE :	
DEGND.	NAME	SIGN.	DATE	DEPT.	CODE	MASTER DRAWING LIST AUXILIARY CONTROL PANEL	
	TRINATH	<i>Trinath</i>	26.06.14				
DRN.							
CHKD.	TRINATH	<i>Trinath</i>	26.06.14			DRG. NO. :	REV. NO. : 00
APPD.	KS BALA	<i>Ks Bala</i>	26.06.14			EP-4-MD-019-001	
				SCALE :	SHEET NO. :	NO. OF SHEETS :	02
				N.T.S.	01		

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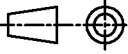
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in any way detrimental to the interest of the Company.

REF. DRG. NO. :	ALTERED :
REV. DATE :	ALTERED :

SIGN. & DATE :	ALTERED :
REV. DATE :	ALTERED :

INVENTORY NO. :	ALTERED :
REV. 01 DATE: 22.07.14	ALTERED :

SL NO.	DRAWING NO.	TITLE	NO OF SHTS	REV NO.
1	EP-4-MD-019-001	MASTER DRAWING LIST	02	00
2	EP-3-GA-019-001	OGA OF 415V, 400A, 3PHASE, 50HZ AUXILIARY CONTROL PANEL	03	0B
3	EP-3-SL-019-001	SLD OF 415V, 400A, 3PHASE, 50HZ AUXILIARY CONTROL PANEL	06	0C
4	EP-3-CS-019-001	POWER & CONTROL SCHEME FOR INCOMER-1	02	0B
5	EP-3-CS-019-002	POWER & CONTROL SCHEME FOR 0.37KW RAPPER MOTOR FEEDER	02	0A
6	EP-3-CS-019-003	POWER & CONTROL SCHEME FOR 12KW HOPPER HEATER FEEDER	02	0A
7	EP-3-CS-019-004	POWER & CONTROL SCHEME FOR 28KW SUPPORT INSULATOR HEATER FEEDER	02	0B
8	EP-3-CS-019-005	POWER & CONTROL SCHEME FOR 7KW SHAFT INSULATOR HEATER FEEDER	02	0B
9	EP-3-CS-019-006	POWER & CONTROL SCHEME FOR 1.1KW OPACITY MONITOR	02	0B
10	EP-3-CS-019-007	CONTROL SUPPLY TRANSFORMER	02	0B
11	EP-3-CS-019-008	SPACE HEATER TRANSFORMER	02	0B
12	EP-3-CS-019-009	ASH LEVEL INDICATOR MODULE	07	0A
13	EP-3-CS-019-010	WIRELESS MODULE FOR RAPPER MOTORS	03	0B
14	EP-3-CS-019-011	WIRELESS MODULE FOR HI&HS HEATERS	02	0A

JOB NO.:						<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPROCELAIN DIVISION BANGALORE			
DEGND.	NAME	SIGN.	DATE	DEPT.	CODE	TITLE :  MASTER DRAWING LIST AUXILIARY CONTROL PANEL			
	TRINATH	<i>S. Trinath</i>	26.06.14						
DRN.						DRG. NO. : EP-4-MD-019-001 REV. NO. : 0A			
CHKD.	TRINATH	<i>S. Trinath</i>	26.06.14						
APPD.	KS BALA	<i>M. Bala</i>	26.06.14			SCALE : N.T.S.	SHEET NO. : 02	NO. OF SHEETS : 02	



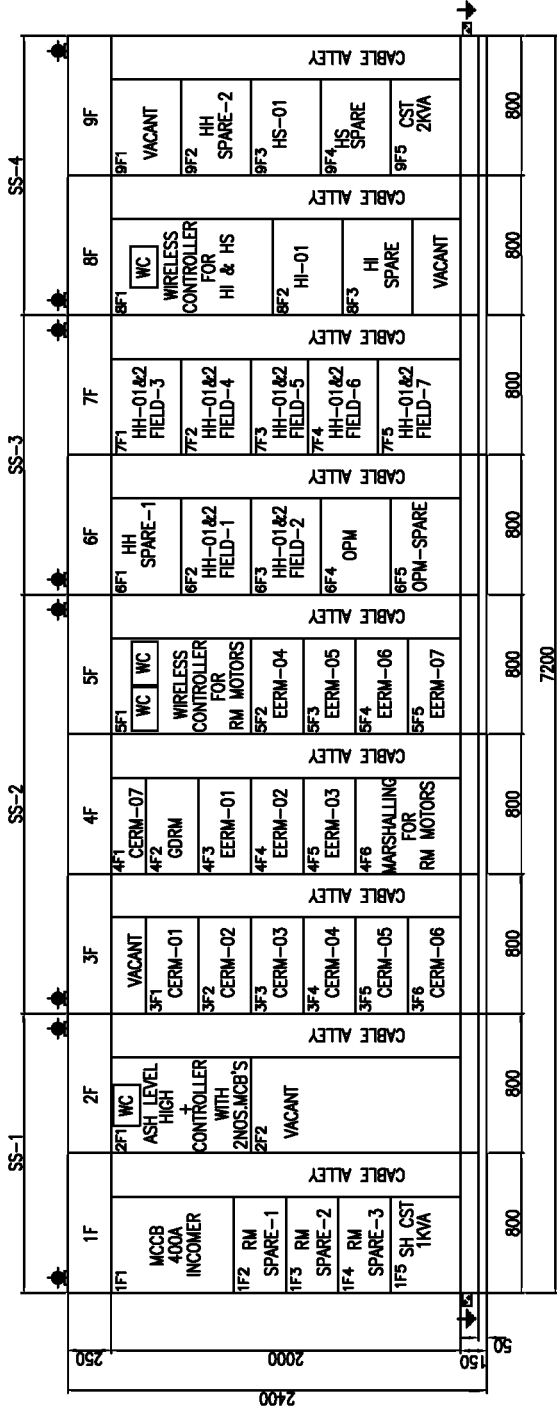
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DRG. NO. EP-3-GA-018-001

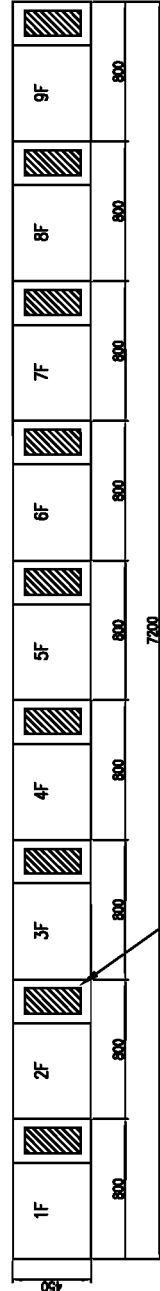
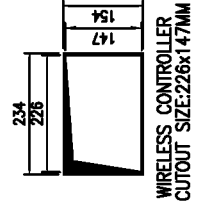
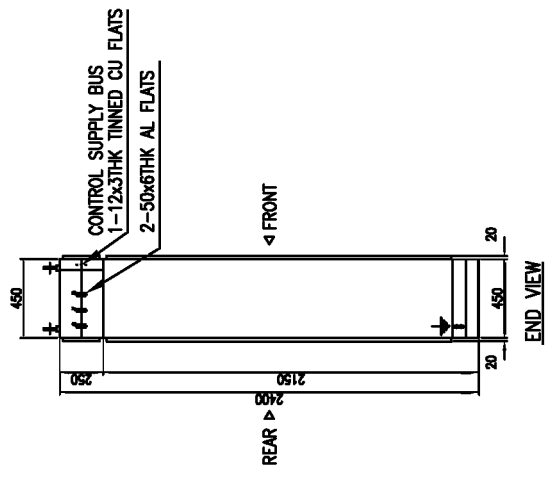
FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

1	2	3	4	5	6	7	8
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FRONT VIEW



POWER & CONTROL CABLE ENTRY

FOUNDATION PLAN

07				NAME		SIGN.		DATE		Bharat Heavy Electricals Limited	
08				DESIGNED		UAGADISH		31.05.14		ELECTROPORCELAIN DIVISION, BANGALORE	
09				DRAWN						GENERAL ARRANGEMENT	
10		REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015		CHECKED		TRINATH		31.05.14		AUXILIARY CONTROL PANEL	
11		REVISED 13.12.14		APPROVED		KS BALA		31.05.14		EP-3-GA-019-001	
12		REVISED MARKED 'QA'		BY						JOB NO. CR-14-019	
13		DESCRIPTION		APPD.						DRG. NO. EP-3-GA-019-001	
14				REV. DATE						SCALE	
15				INVENTORY NO.						NO. OF SHEETS 02	
16				REV. NO.						SHEET NO. 02	
17				REV. DATE						REV. NO. 02	




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DRG. NO. EP-3-SL-019-001

INVENTORY NO. \_\_\_\_\_  
REV. NO. \_\_\_\_\_

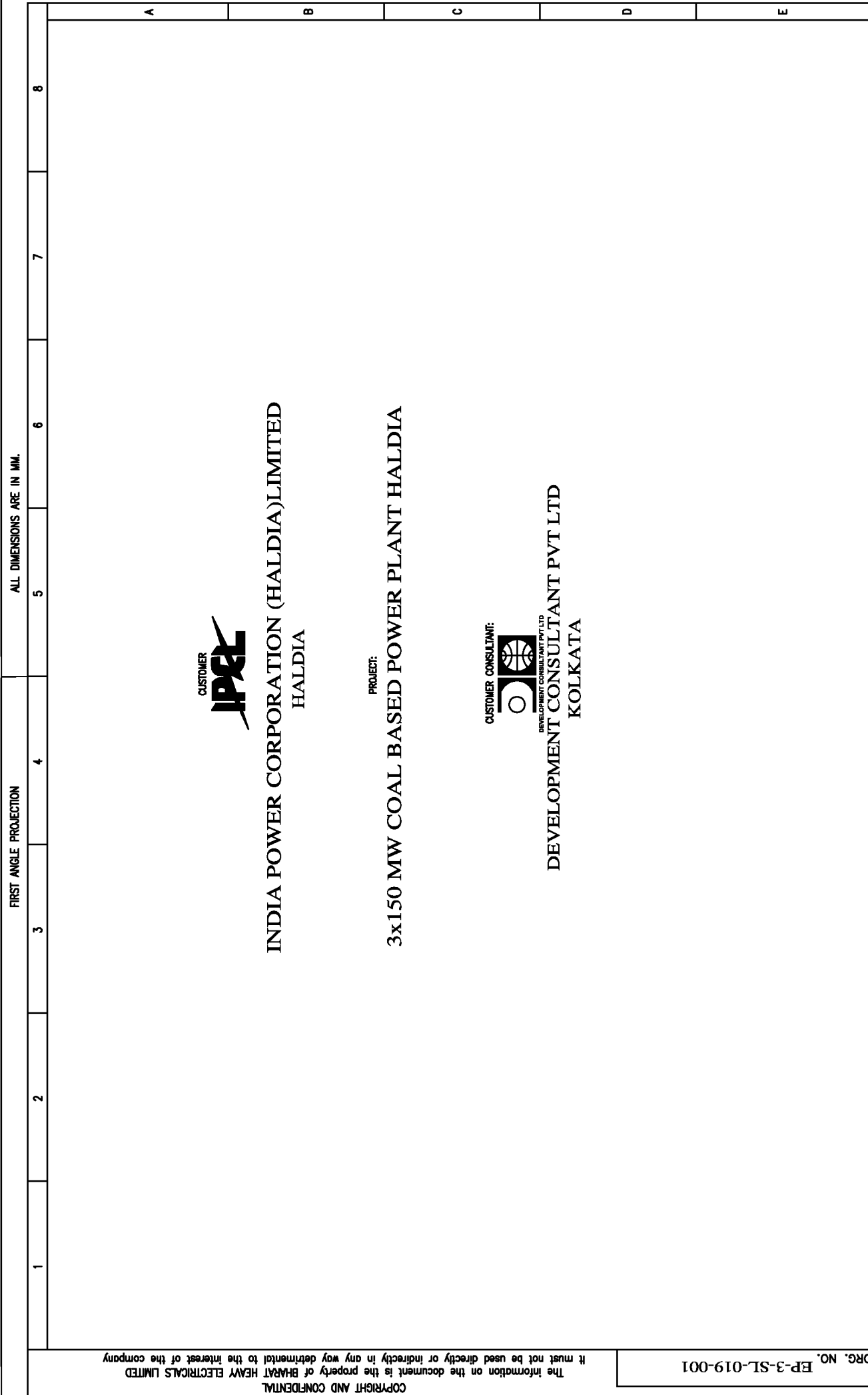
REV. NO.	DATE	DESCRIPTION
07		
06		
05		
04	27.02.15	REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015
03	18.10.14	HHI & HS CABLE SIZE WAS 1-3C $\times$ 10SQMM AL XLPE
02	24.07.14	REVISED

DESIGNED	DRAWN	CHECKED	APPROVED
JAGADISH	TRINATH	KS BALA	

NAME	SIGN.	DATE
JAGADISH		23.06.14
TRINATH		23.06.14
KS BALA		23.06.14

	DIR NO. _____
	FILE NO. _____

BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE	NO. OF SHEETS 07
SINGLE LINE DIAGRAM AUXILIARY CONTROL PANEL	SHEET NO. 01
SCALE	REV. 00
JOB NO. CR-14-019	DRG. NO. EP-3-SL-019-001



FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

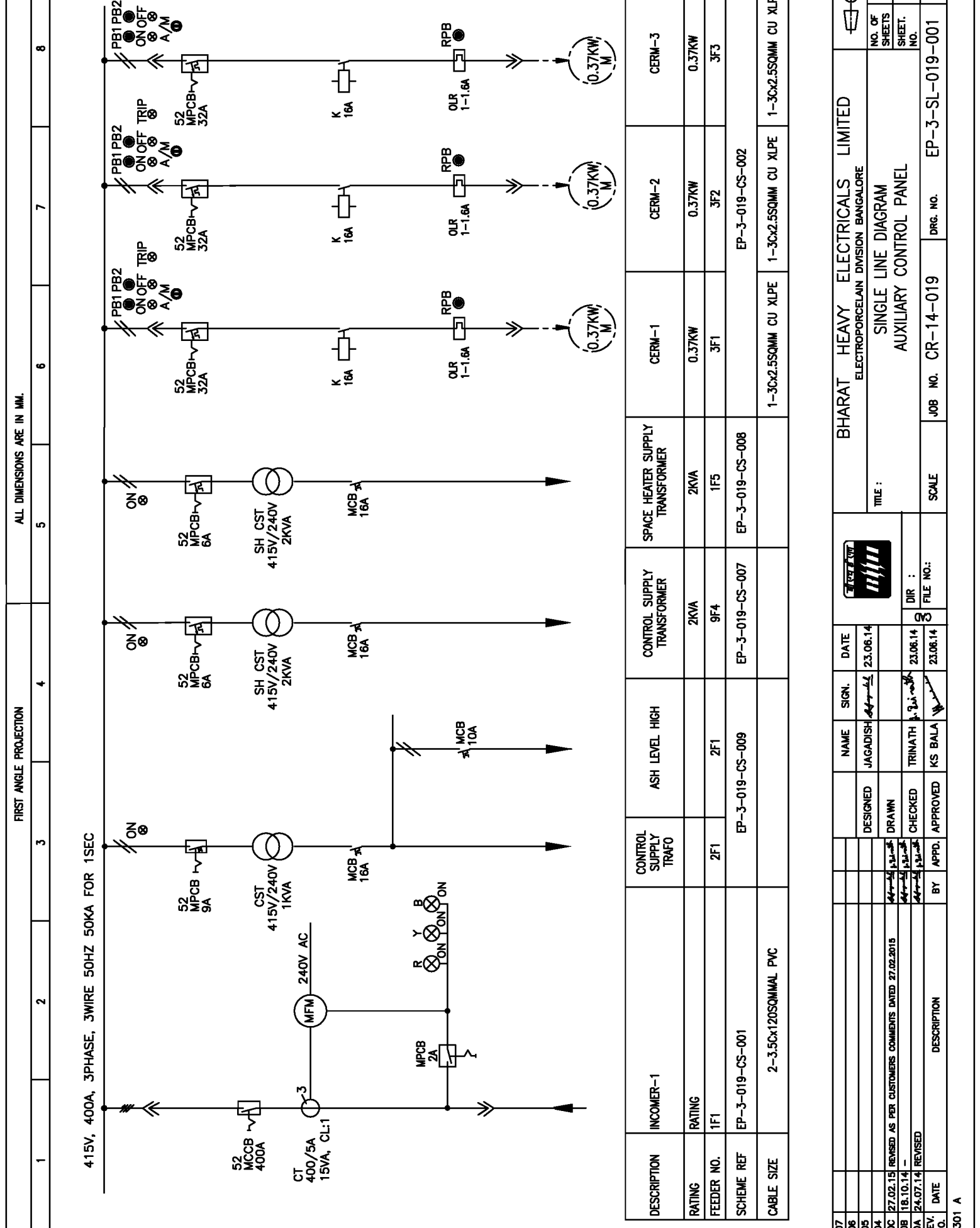
CUSTOMER  
**IPSEL**  
INDIA POWER CORPORATION (HALDIA) LIMITED  
HALDIA

PROJECT:  
3x150 MW COAL BASED POWER PLANT HALDIA

CUSTOMER CONSULTANT:  
  
DEVELOPMENT CONSULTANT PVT LTD  
KOLKATA

ALL DIMENSIONS ARE IN MM.

FIRST ANGLE PROJECTION



DESCRIPTION	INCOMER-1	CONTROL SUPPLY TRAFU	ASH LEVEL HIGH	CONTROL SUPPLY TRANSFORMER	SPACE HEATER SUPPLY TRANSFORMER	CERM-1	CERM-2	CERM-3
RATING				2KVA	2KVA	0.37KW	0.37KW	0.37KW
FEEDER NO.		2F1	2F1	9F4	1F5	3F1	3F2	3F3
SCHEME REF	EP-3-019-CS-001	EP-3-019-CS-009	EP-3-019-CS-007	EP-3-019-CS-008	EP-3-019-CS-002			
CABLE SIZE	2-3.5Cx120SQMM PVC				1-3Cx2.5SQMM CU XLPE			1-3Cx2.5SQMM CU XLPE

DRG. NO. EP-3-SL-019-001

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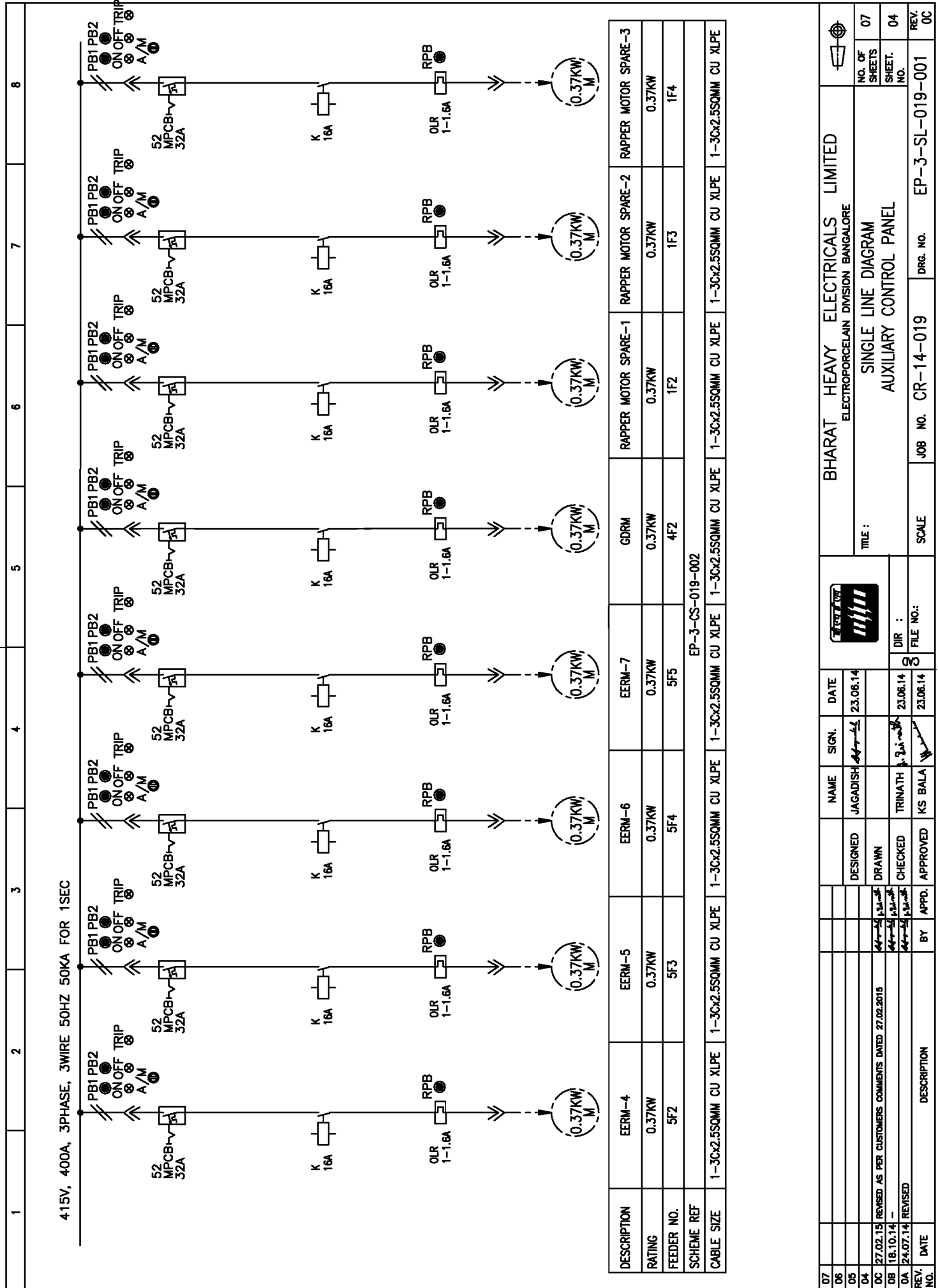
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FORM 66-301 A

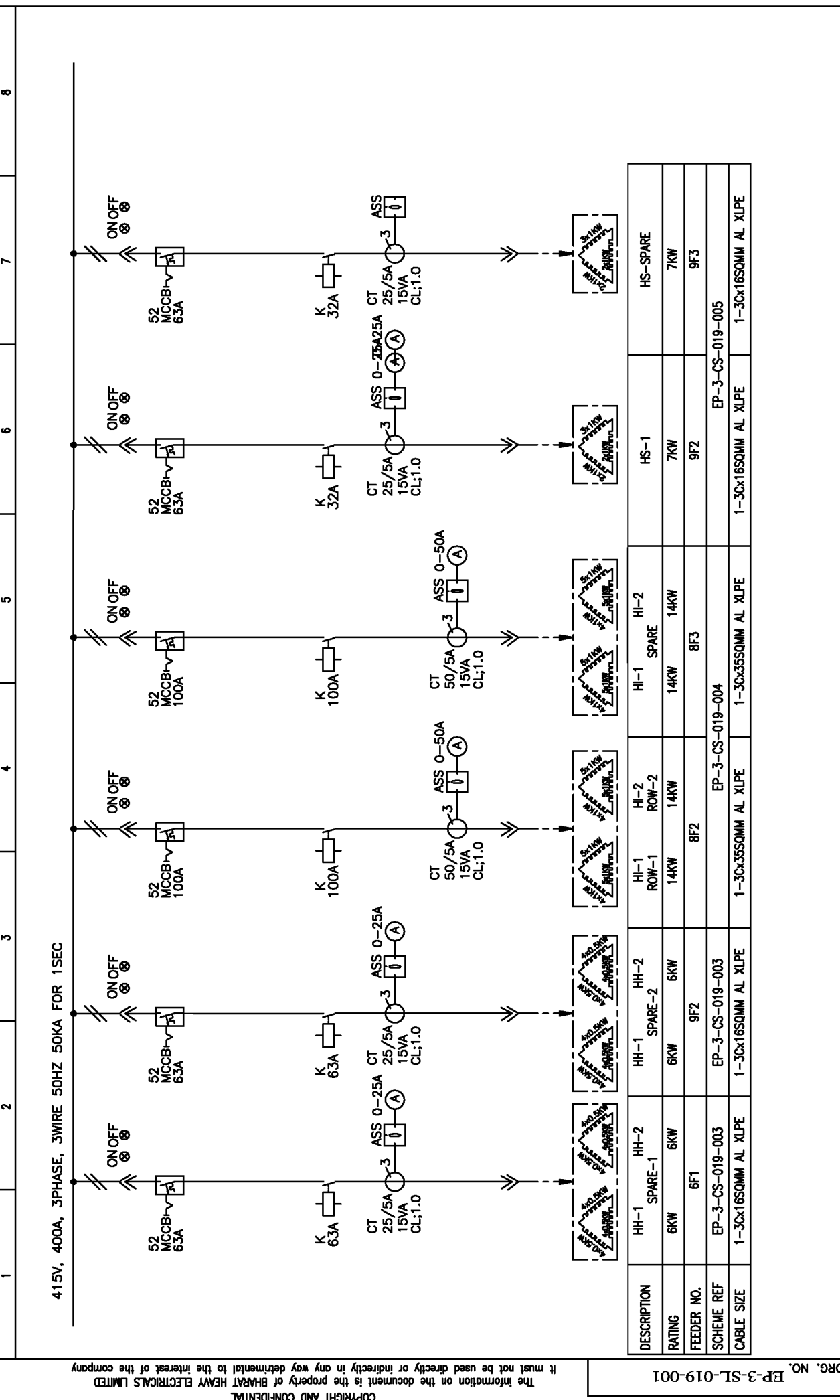
ALL DIMENSIONS ARE IN MM.

FIRST ANGLE PROJECTION



BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE		TITLE : SINGLE LINE DIAGRAM AUXILIARY CONTROL PANEL	
NO. OF SHEETS	07	JOB NO.	CR-14-019
SHEET NO.	04	DRG. NO.	EP-3-SL-019-001
REV. NO.	0C	SCALE	REV. NO.

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NO.	DATE	BY	APPD.	CHECKED	DRAWN	DESIGNED	NAME	SIGN.	DATE
07							JAGADISH		23.06.14
06									
05									
04									
OC	27.02.15								
DB	18.10.14								
DA	24.07.14								
REV. NO.	DATE	DESCRIPTION							
		DESCRIPTION							

DRG. NO.	EP-3-SL-019-001
INVENTORY NO.	
NO. OF SHEETS	07
SHEET. NO.	06
REV. NO.	
DRG. NO.	EP-3-SL-019-001
SCALE	
JOB NO.	CR-14-019
FILE NO.:	
DIR :	
APPROVED	
CHECKED	
DRAWN	
DESIGNED	

BHARAT HEAVY ELECTRICALS LIMITED	
ELECTROPORCELAIN DIVISION BANGALORE	
TITLE :	SINGLE LINE DIAGRAM
	AUXILIARY CONTROL PANEL

DESCRIPTION	HH-1 SPARE-1	HH-2 SPARE-2	HH-1 ROW-1	HH-2 ROW-2	HI-1 SPARE	HI-2	HS-1	HS-SPARE
RATING	6KW	6KW	14KW	14KW	14KW	14KW	7KW	7KW
FEEDER NO.	6F1	9F2	8F2	8F3		9F2	9F3	
SCHEME REF	EP-3-CS-019-003	EP-3-CS-019-003	EP-3-CS-019-004	EP-3-CS-019-004	EP-3-CS-019-005			
CABLE SIZE	1-3Cx16SQMM AL XLPE	1-3Cx16SQMM AL XLPE	1-3Cx35SQMM AL XLPE	1-3Cx35SQMM AL XLPE	1-3Cx35SQMM AL XLPE	1-3Cx16SQMM AL XLPE	1-3Cx16SQMM AL XLPE	1-3Cx16SQMM AL XLPE

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DRG. NO. EP-3-SL-019-001

INVENTORY NO. \_\_\_\_\_

REV. NO. \_\_\_\_\_

FORM 66-301 A

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

8

7

6

5

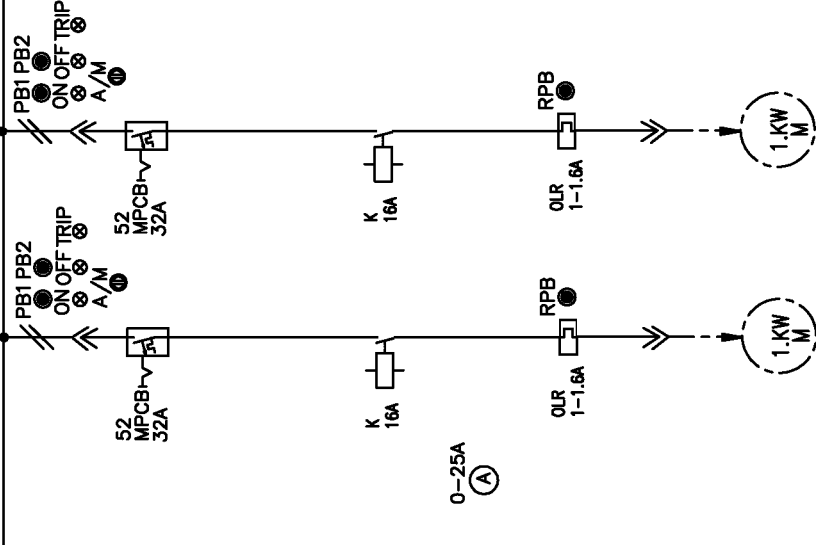
4

3

2

1

415V, 400A, 3PHASE, 3WIRE 50HZ 50KA FOR 1SEC



DESCRIPTION	OPACITY MOTOR	OPACITY MOTOR- SPARE
RATING	1.1KW	1.1KW
FEEDER NO.	6F4	6F5
SCHEME REF	EP-3-CS-019-006	
CABLE SIZE	1-3Cx2.5SQMM CU XLPE	1-3Cx2.5SQMM CU XLPE

NO. OF SHEETS 07

REV. NO. 06

SCALE

JOB NO. CR-14-019

DRG. NO. EP-3-SL-019-001

BHARAT HEAVY ELECTRICALS LIMITED

ELECTROPORCELAIN DIVISION BANGALORE

TITLE : SINGLE LINE DIAGRAM  
AUXILIARY CONTROL PANEL

DIR : \_\_\_\_\_

FILE NO. : \_\_\_\_\_

DATE 23.06.14

NAME SIGN. JAGADISH

DESIGNED

TRINATH

CHECKED

APPROVED

KS BALA

BY APPD.

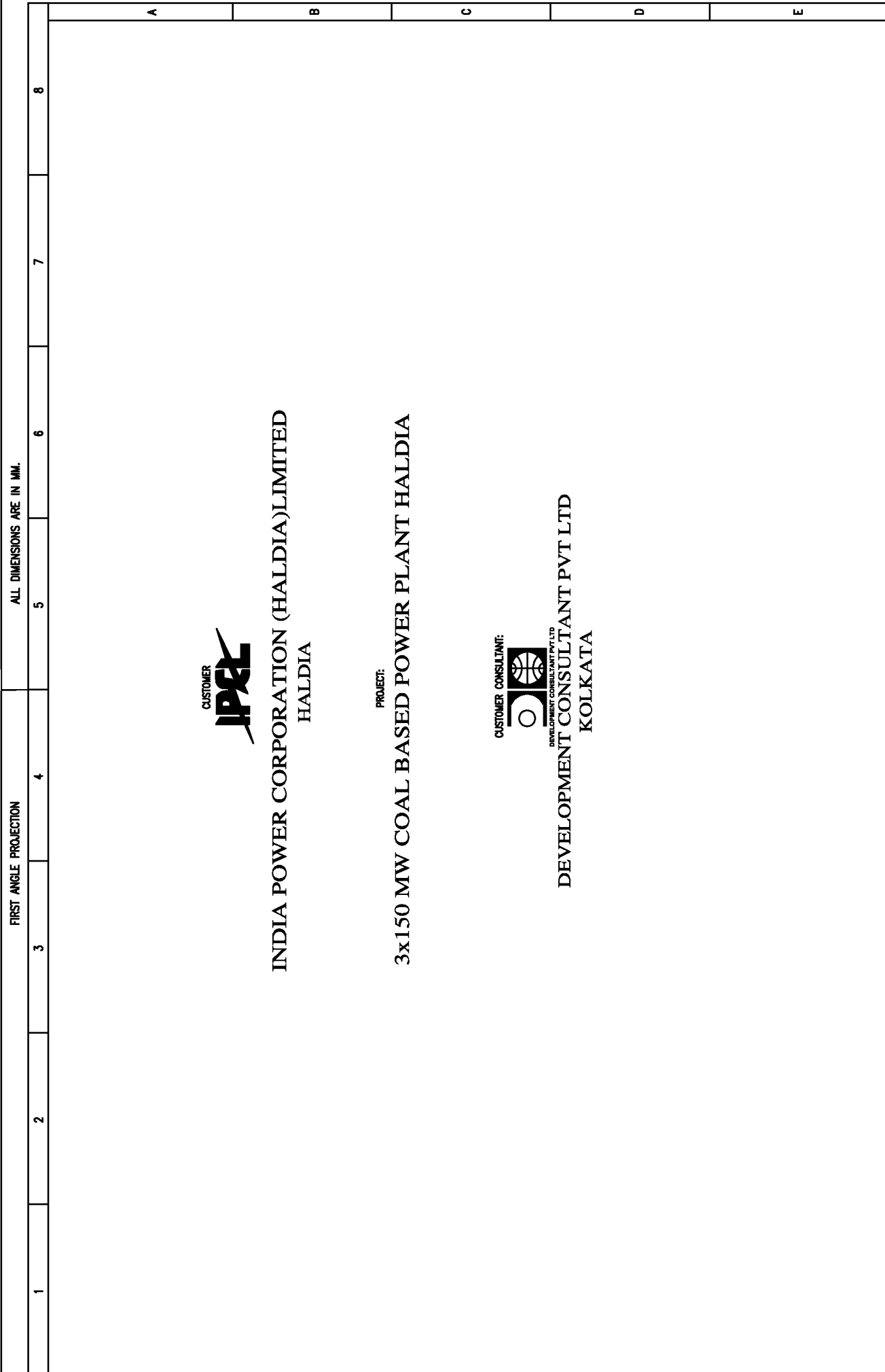
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DRG. NO. EP-3-CS-019-001

INVENTORY NO.	DESCRIPTION	BY	APPD.	DATE
07				
06				
05				
04				
03				
02	REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015			
01	REVISED			24.07.14

DESIGNED	JAGADISH	23.06.14
DRAWN		
CHECKED	TRINATH	23.06.14
APPROVED	KS BALA	23.06.14

BHARAT HEAVY ELECTRICALS LIMITED	NO. OF SHEETS	02
ELECTROPORCELAIN DIVISION BANGALORE	SHEET. NO.	01
CONTROL SCHEME	SCALE	JOB NO. CR-14-019
AUXILIARY CONTROL PANEL INCOMER	DRG. NO.	EP-3-CS-019-001
REV. NO.	REV.	OB



FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

**CUSTOMER**  
  
**INDIA POWER CORPORATION (HALDIA) LIMITED**  
 HALDIA

**PROJECT:**  
**3x150 MW COAL BASED POWER PLANT HALDIA**

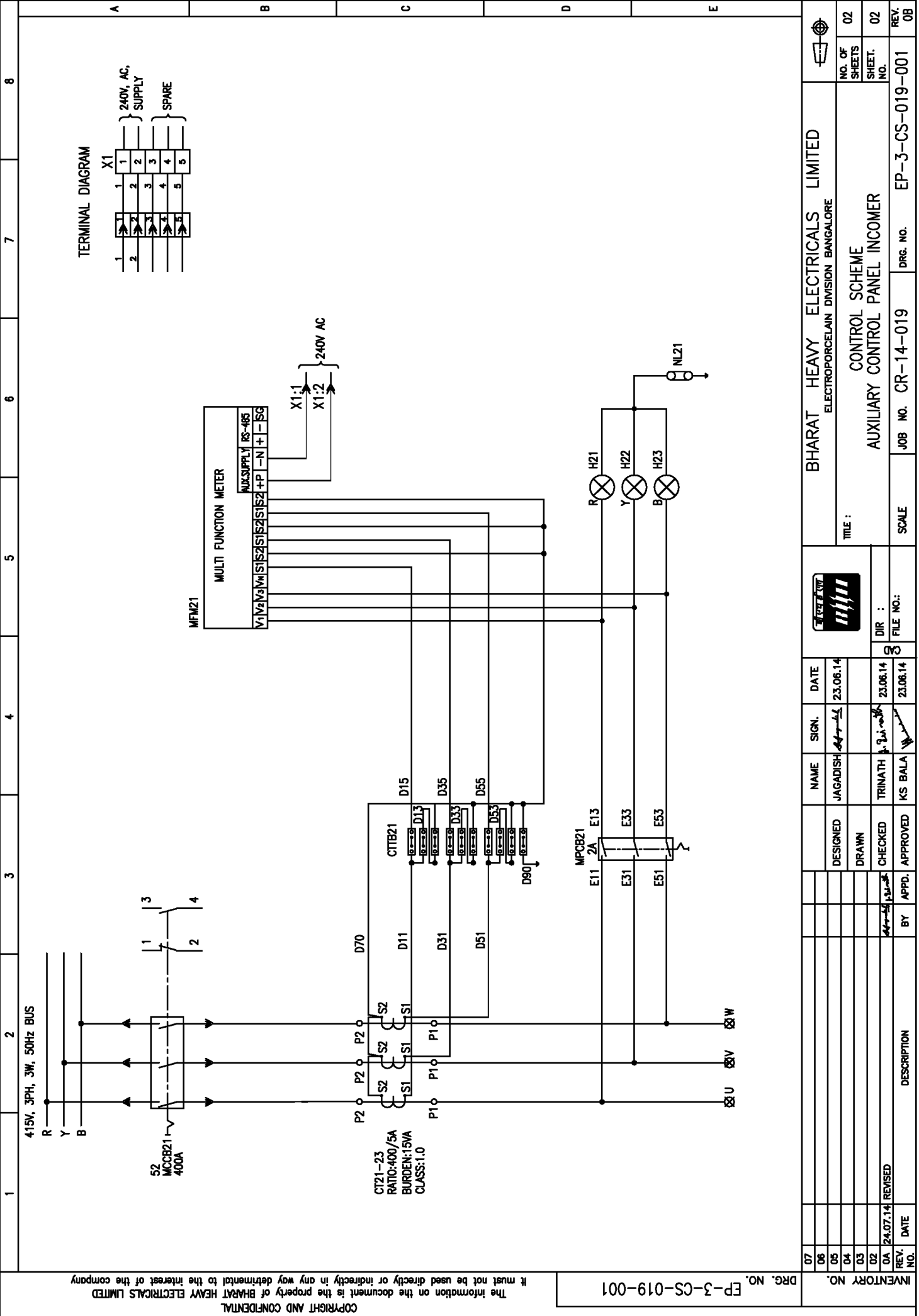
**CUSTOMER CONSULTANT:**  
  
**DEVELOPMENT CONSULTANT PVT LTD**  
 KOLKATA

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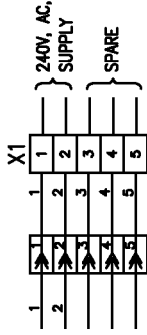
DRG. NO. EP-3-CS-019-001

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.



TERMINAL DIAGRAM



BHARAT HEAVY ELECTRICALS LIMITED  
ELECTROPORCELAIN DIVISION BANGALORE

CONTROL SCHEME  
AUXILIARY CONTROL PANEL INCOMER

TITLE :

SCALE

JOB NO. CR-14-019

DRG. NO.

EP-3-CS-019-001

REV. NO.

NO. OF SHEETS 02

SHEET. NO. 02

DRG. NO.

JOB NO. CR-14-019

SCALE

FILE NO. :

DIR. :

APPROVED

CHECKED

DRAWN

DESIGNED

DATE

DESCRIPTION

BY

APPD.

DATE

REV. NO.

NO.

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DRG. NO. EP-3-CS-019-002

INVENTORY NO.	DATE	DESCRIPTION	BY	APPD.
07				
06				
05				
04				
03	27.02.15	REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015		
02	14.02.15	REVISED		
01				

REV. NO.	DATE	DESCRIPTION	BY	APPD.
07				
06				
05				
04				
03	27.02.15	REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015		
02	14.02.15	REVISED		
01				

DESIGNED	JAGADISH	20.05.14
DRAWN	TRINATH	20.05.14
CHECKED	KS BALA	20.05.14
APPROVED		

DIR :	FILE NO.:

SCALE	JOB NO. CR-14-019	DRG. NO. EP-3-CS-019-002
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TITLE :	BHARAT HEAVY ELECTRICALS LIMITED
	ELECTROPORCELAIN DIVISION BANGALORE

NO. OF SHEETS	03
SHEET. NO.	01

REV. NO.	00
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NO. OF SHEETS	03
SHEET. NO.	01

REV. NO.	00
----------	----

NO. OF SHEETS	03
SHEET. NO.	01

REV. NO.	00
----------	----

NO. OF SHEETS	03
SHEET. NO.	01

REV. NO.	00
----------	----

NO. OF SHEETS	03
SHEET. NO.	01

REV. NO.	00
----------	----

NO. OF SHEETS	03
SHEET. NO.	01

REV. NO.	00
----------	----

NO. OF SHEETS	03
SHEET. NO.	01

REV. NO.	00
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NO. OF SHEETS	03
SHEET. NO.	01

REV. NO.	00
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NO. OF SHEETS	03
SHEET. NO.	01

REV. NO.	00
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NO. OF SHEETS	03
SHEET. NO.	01

REV. NO.	00
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NO. OF SHEETS	03
SHEET. NO.	01

REV. NO.	00
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NO. OF SHEETS	03
SHEET. NO.	01

REV. NO.	00
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NO. OF SHEETS	03
SHEET. NO.	01

REV. NO.	00
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NO. OF SHEETS	03
SHEET. NO.	01



REV. NO.	00
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NO. OF SHEETS	03
SHEET. NO.	01

REV. NO.	00
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NO. OF SHEETS	03
SHEET. NO.	01

REV. NO.	00
----------	----

FIRST ANGLE PROJECTION					ALL DIMENSIONS ARE IN MM.							
1	2	3	4	5	6	7	8	A	B	C	D	E
<p><b>CUSTOMER</b></p>  <p><b>INDIA POWER CORPORATION (HALDIA)LIMITED</b> HALDIA</p> <p><b>PROJECT:</b></p> <p><b>3x150 MW COAL BASED POWER PLANT HALDIA</b></p> <p><b>CUSTOMER CONSULTANT:</b></p>  <p><b>DEVELOPMENT CONSULTANT PVT LTD</b> KOLKATA</p>												

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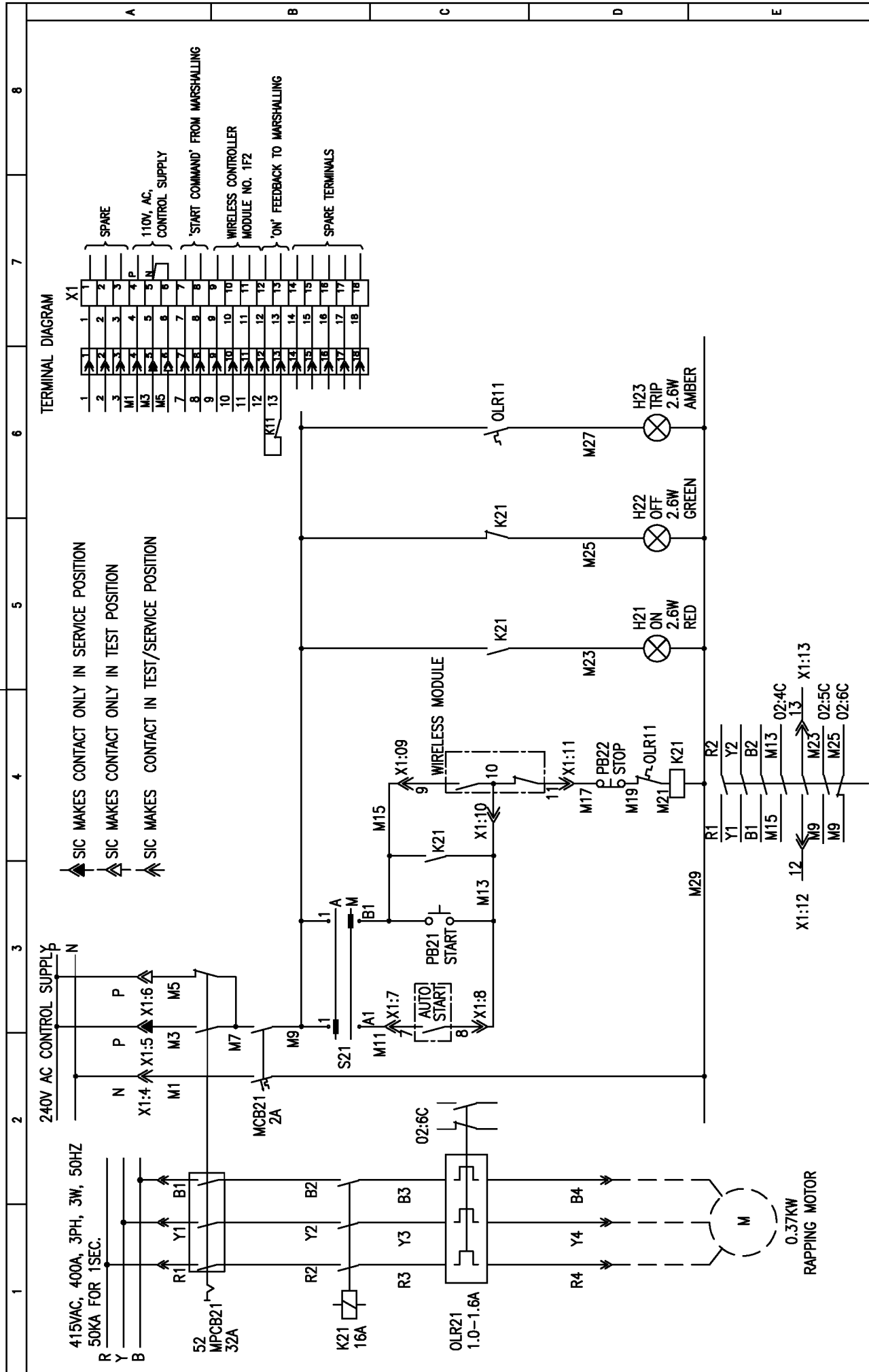
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DRG. NO. EP-3-CS-019-002

REV. NO.	DATE	DESCRIPTION
07		
06		
05		
04		
03	27.02.15	REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015
02	14.02.15	REVISED
01	24.07.14	REVISED

INVENTORY NO.	DATE	DESCRIPTION

FORM 66-301 A



NAME	SIGN.	DATE
JAGADISH	[Signature]	20.06.14
TRINATH	[Signature]	20.06.14
KS BALA	[Signature]	20.06.14

BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE		
TITLE : POWER & CONTROL SCHEME FOR 0.37KW RAPPING MOTOR		
NO. OF SHEETS	03	
SHEET. NO.	02	
SCALE	JOB NO. CR-14-019	DRG. NO. EP-3-CS-019-002

BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE		
TITLE : POWER & CONTROL SCHEME FOR 0.37KW RAPPING MOTOR		
NO. OF SHEETS	03	
SHEET. NO.	02	
SCALE	JOB NO. CR-14-019	DRG. NO. EP-3-CS-019-002

ALL DIMENSIONS ARE IN MM. FIRST ANGLE PROJECTION.

1 2 3 4 5 6 7 8

TERMINAL	FUNCTION
1	SPARE
2	SPARE
3	SPARE
M1	110V, AC, CONTROL SUPPLY
M3	110V, AC, CONTROL SUPPLY
M5	110V, AC, CONTROL SUPPLY
7	'START COMMAND' FROM MARSHALLING
8	'START COMMAND' FROM MARSHALLING
9	'START COMMAND' FROM MARSHALLING
10	WIRELESS CONTROLLER MODULE NO. 1F2
11	WIRELESS CONTROLLER MODULE NO. 1F2
12	WIRELESS CONTROLLER MODULE NO. 1F2
13	'ON' FEEDBACK TO MARSHALLING
14	'ON' FEEDBACK TO MARSHALLING
15	'ON' FEEDBACK TO MARSHALLING
16	SPARE TERMINALS
17	SPARE TERMINALS
18	SPARE TERMINALS

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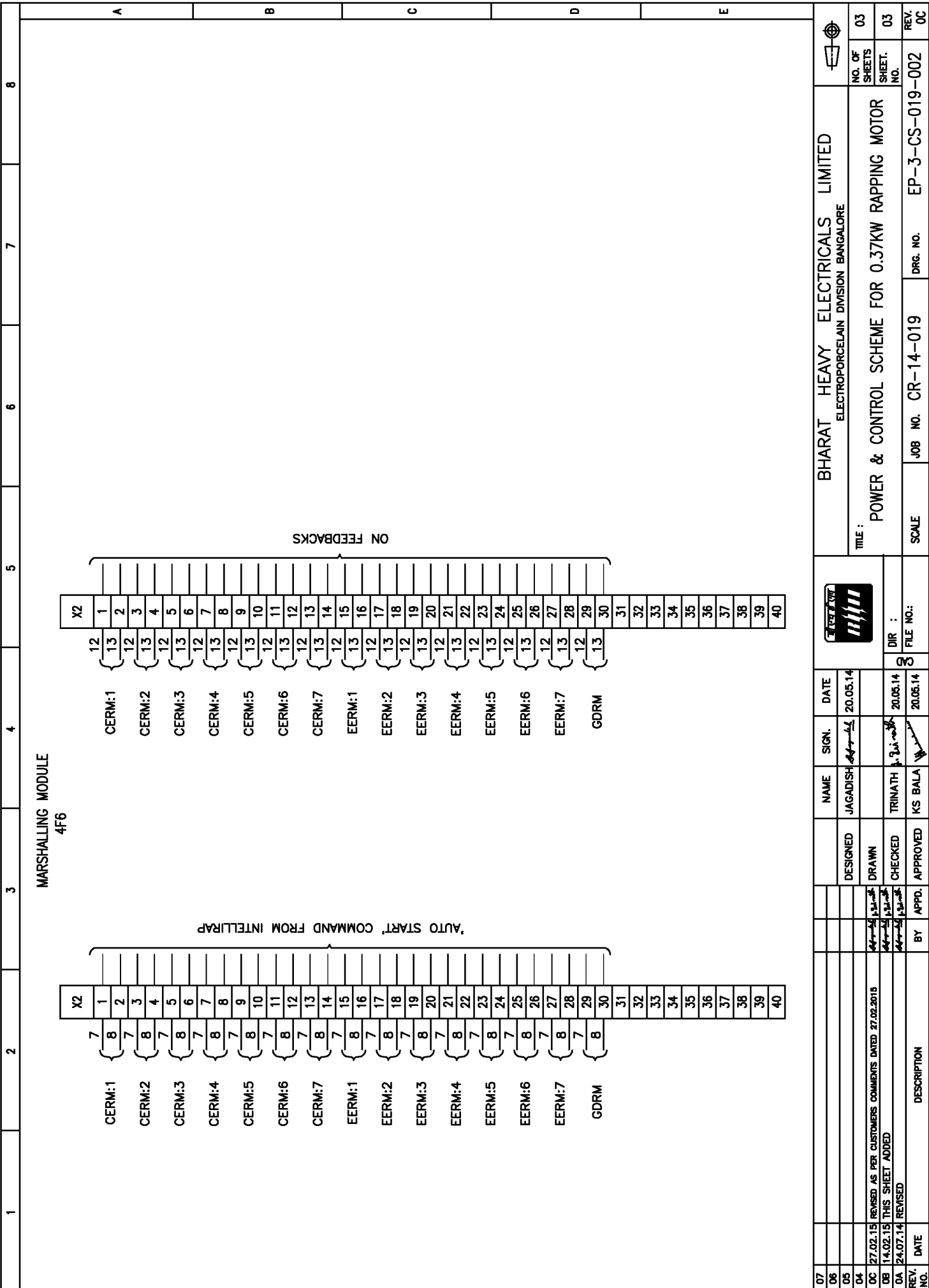
DRG. NO. EP-3-CS-019-002

REV. NO.	DATE	DESCRIPTION
07		
06		
05		
04		
03	27.02.15	REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015
02	14.02.15	THIS SHEET ADDED
01	24.07.14	REVISED

FORM 66-301 A

ALL DIMENSIONS ARE IN MM.

FIRST ANGLE PROJECTION



**BHARAT HEAVY ELECTRICALS LIMITED**  
ELECTROPORCELAIN DIVISION BANGALORE

TITLE : **POWER & CONTROL SCHEME FOR 0.37KW RAPPING MOTOR**

NO. OF SHEETS	03
SHEET. NO.	03
SCALE	JOB NO. CR-14-019
DRG. NO.	EP-3-CS-019-002
REV. NO.	03

DESIGNED	NAME	SIGN.	DATE
DESIGNED	JAGADISH	<i>Jagadish</i>	20.05.14
DRAWN	CHECKED	APPROVED	BY
DRAWN	CHECKED	APPROVED	BY

REV. NO.	DATE	DESCRIPTION
07		
06		
05		
04		
03	27.02.15	REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015
02	14.02.15	THIS SHEET ADDED
01	24.07.14	REVISED

INVENTORY NO. \_\_\_\_\_

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DRG. NO. EP-3-CS-019-003

INVENTORY NO. \_\_\_\_\_  
 REV. NO. \_\_\_\_\_

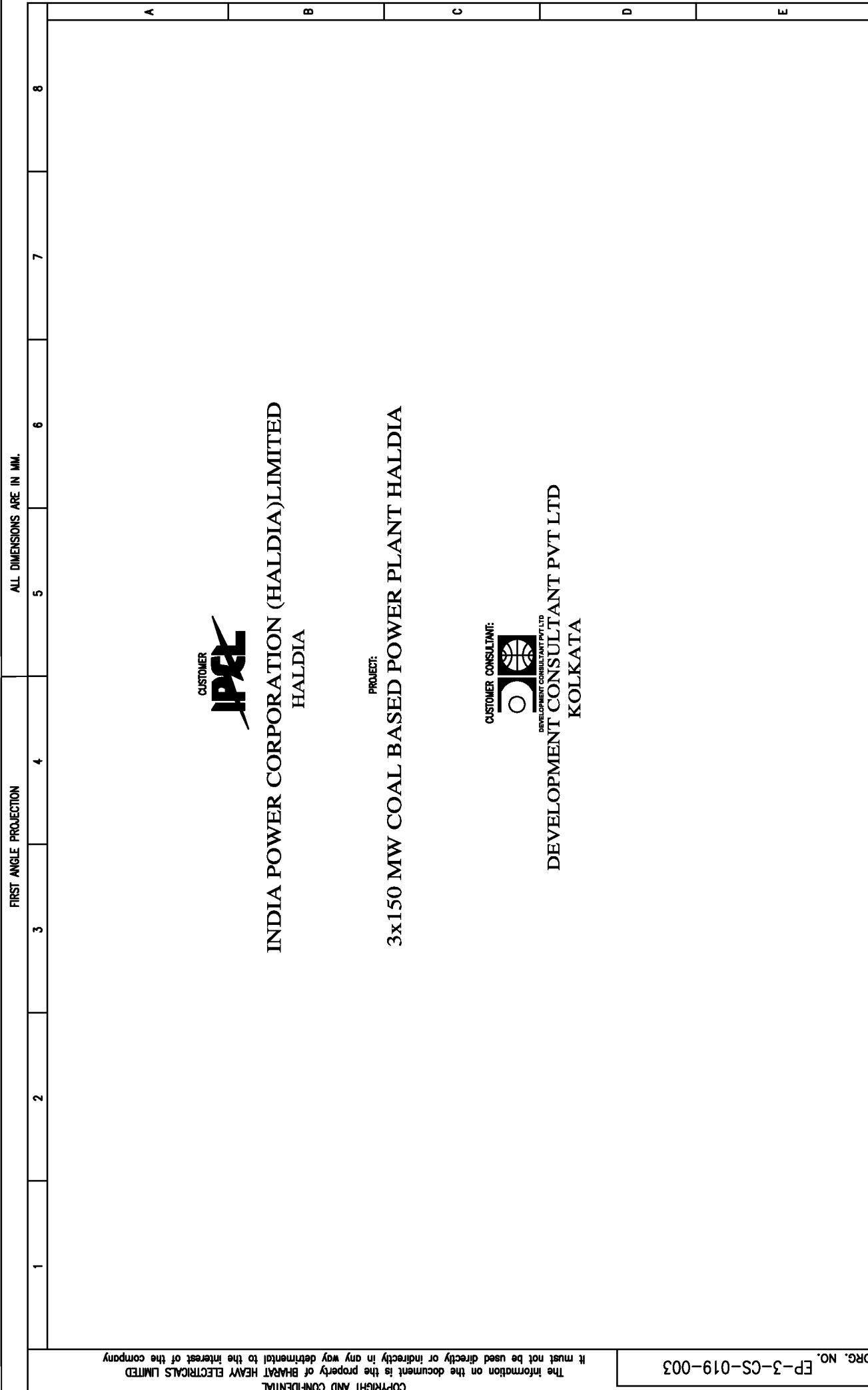
REV. NO.	DATE	DESCRIPTION	BY	APPD.
02	27.02.15	REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015		
04	24.07.14	REVISED		

DESIGNED	CHECKED	APPROVED
JAGADISH	TRINATH	KS BALA

NAME	SIGN.	DATE
JAGADISH		20.05.14
TRINATH		20.05.14
KS BALA		20.05.14

BHARAT HEAVY ELECTRICALS LIMITED  
 ELECTROPORCELAIN DIVISION BANGALORE  
 TITLE : POWER & CONTROL SCHEME FOR HOPPER HEATER  
 SCALE : JOB NO. CR-14-019 DRG. NO. EP-3-CS-019-003 REV. 02  
 SHEETS 01

NO. OF SHEETS 02  
 SHEET. NO. 01  
 REV. 00



A B C D E

1 2 3 4 5 6 7 8

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

CUSTOMER  
**IPSEL**  
 INDIA POWER CORPORATION (HALDIA) LIMITED  
 HALDIA

PROJECT:  
 3x150 MW COAL BASED POWER PLANT HALDIA

CUSTOMER CONSULTANT:  
  
 DEVELOPMENT CONSULTANT PVT LTD  
 KOLKATA

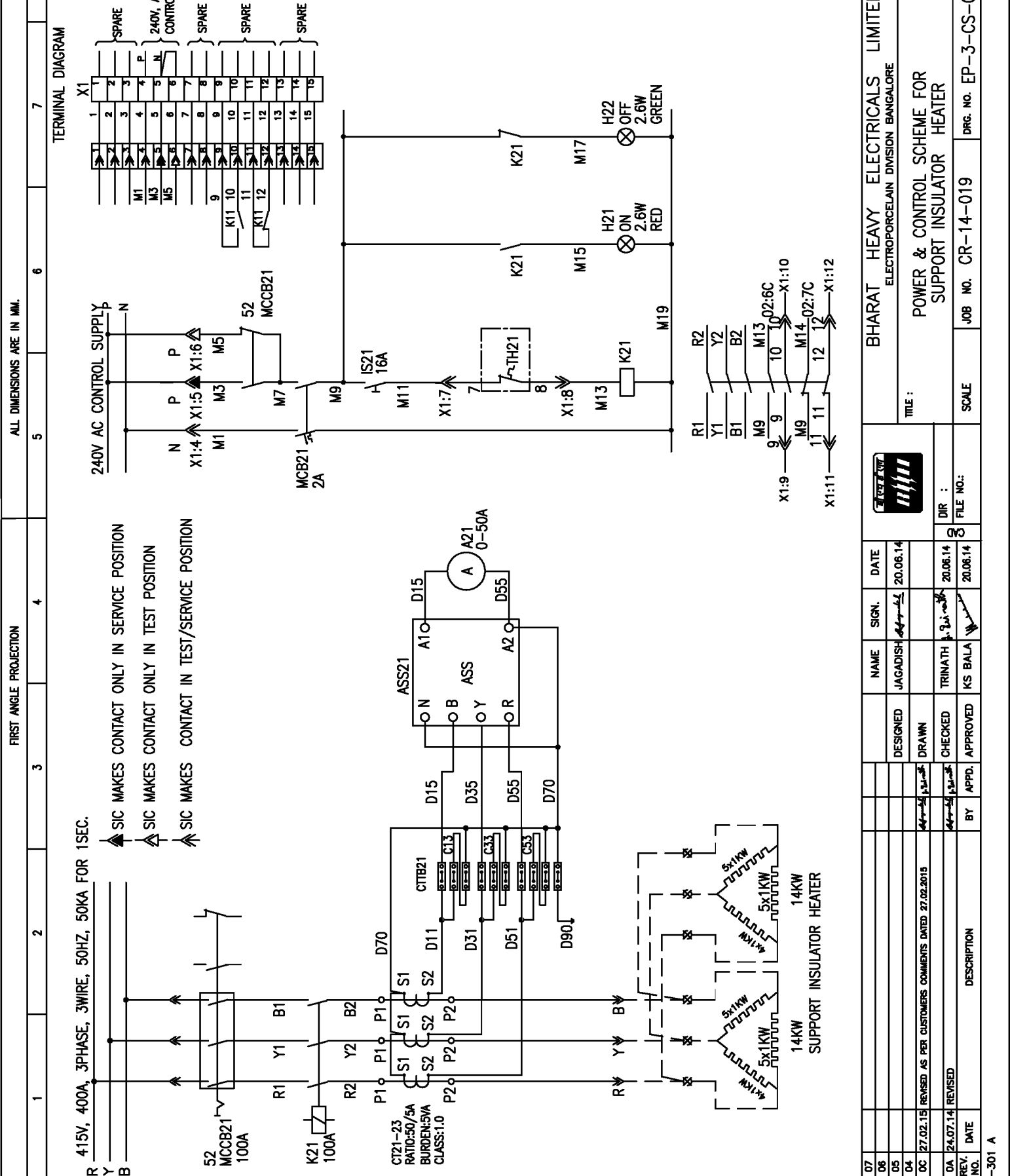


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DRG. NO. EP-3-CS-019-004

INVENTORY NO. \_\_\_\_\_  
REV. NO. \_\_\_\_\_

1	2	3	4	5	6	7	8
<p><b>FIRST ANGLE PROJECTION</b></p> <p style="text-align: center;">ALL DIMENSIONS ARE IN MM.</p>							
<p><b>CUSTOMER</b></p> <p style="font-size: 2em; font-weight: bold; letter-spacing: 0.5em;">IPSEL</p> <p><b>INDIA POWER CORPORATION (HALDIA) LIMITED</b></p> <p><b>HALDIA</b></p>							
<p><b>PROJECT:</b></p> <p><b>3x150 MW COAL BASED POWER PLANT HALDIA</b></p>							
<p><b>CUSTOMER CONSULTANT:</b></p> <div style="display: flex; align-items: center; justify-content: center;"> <p><b>DEVELOPMENT CONSULTANT PVT LTD</b> <b>KOLKATA</b></p> </div>							
<p><b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPORCELAIN DIVISION BANGALORE</p>							
<p><b>TITLE :</b></p> <p><b>POWER &amp; CONTROL SCHEME FOR SUPPORT INSULATOR HEATER</b></p>							
<p><b>SCALE</b></p> <p><b>JOB NO. CR-14-019</b></p>							
<p><b>DRG. NO. EP-3-CS-019-004</b></p>							
<p><b>REV. NO. _____</b></p>							
<p><b>DESCRIPTION</b></p>							
<p><b>BY</b></p>							
<p><b>APPD.</b></p>							
<p><b>CHECKED</b></p>							
<p><b>DRAWN</b></p>							
<p><b>DESIGNED</b></p>							
<p><b>NAME</b></p>							
<p><b>SIGN.</b></p>							
<p><b>DATE</b></p>							
<p><b>DIR NO. :</b></p>							
<p><b>FILE NO. :</b></p>							
<p><b>NO. OF SHEETS</b></p>							
<p><b>SHEET. NO.</b></p>							
<p><b>DRG. NO. EP-3-CS-019-004</b></p>							
<p><b>REV. REV. 00</b></p>							







REV. NO.	DATE	DESCRIPTION	BY	APPD.	CHECKED	DRAWN	DESIGNED	NAME	SIGN.	DATE
07								JAGADISH		20.06.14
06										
05										
04										
03	27.02.15	REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015								
02	24.07.14	REVISED						TRINATH		20.06.14
01								KS BALA		20.06.14

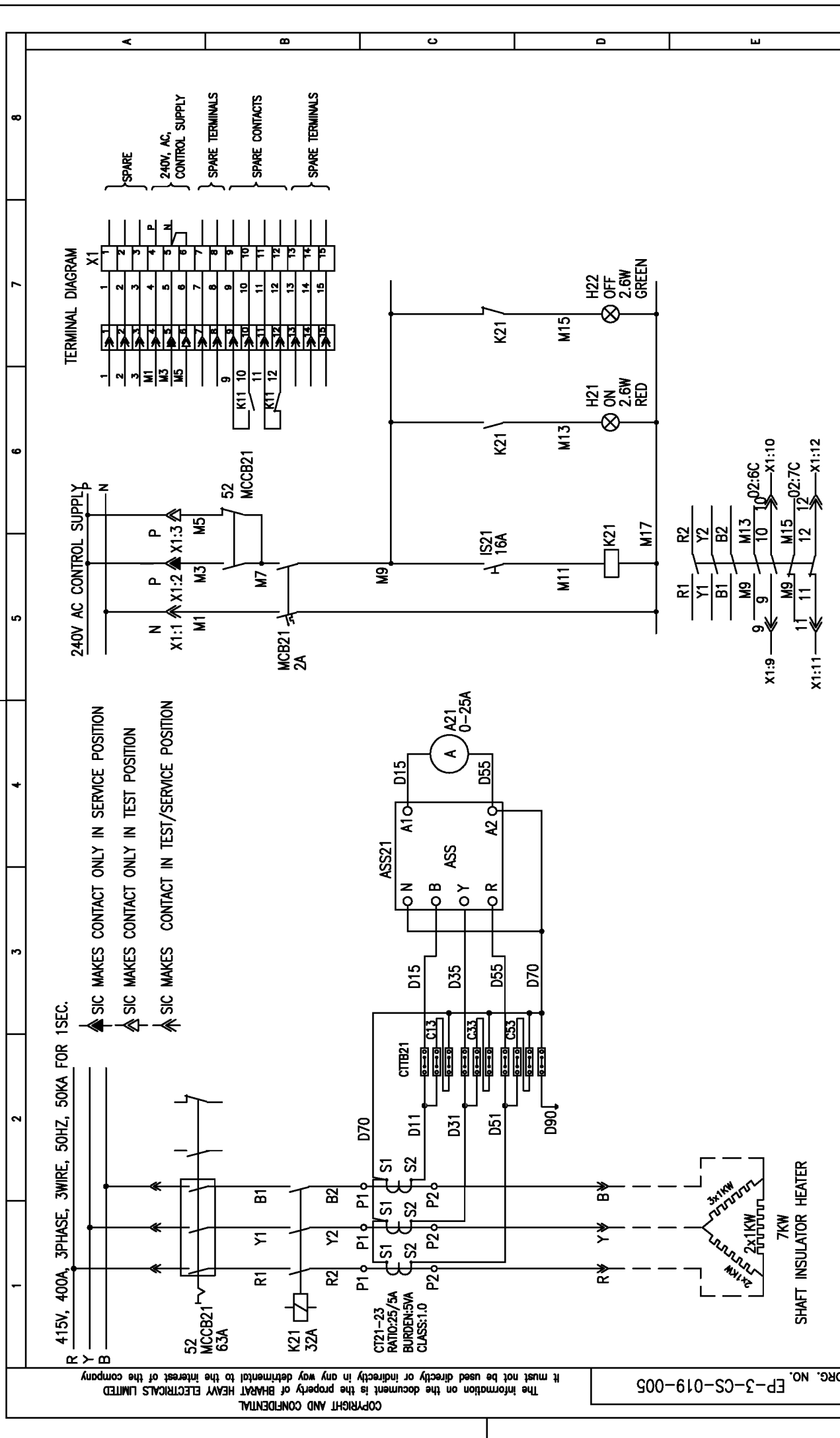
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DRG. NO. EP-3-CS-019-005

INVENTORY NO. \_\_\_\_\_  
REV. NO. \_\_\_\_\_

1	2	3	4	5	6	7	8
<p><b>FIRST ANGLE PROJECTION</b></p> <p style="text-align: right;">ALL DIMENSIONS ARE IN MM.</p>							
<p><b>CUSTOMER</b></p>  <p><b>INDIA POWER CORPORATION (HALDIA) LIMITED</b> HALDIA</p>							
<p><b>PROJECT:</b></p> <p><b>3x150 MW COAL BASED POWER PLANT HALDIA</b></p>							
<p><b>CUSTOMER CONSULTANT:</b></p>  <p><b>DEVELOPMENT CONSULTANT PVT LTD</b> KOLKATA</p>							
<p><b>DRG. NO. EP-3-CS-019-005</b></p>							

07	DATE	BY	APPD.	APPROVED	DIR NO.:		
06							
05	20.05.14	JAGADISH		DESIGNED			
04				DRAWN			
03	27.02.15			CHECKED	TRINATH	20.05.14	
02	REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015			APPROVED	KS BALA	20.05.14	
01	REVISED						
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	DIR NO.:	
<p><b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPORCELAIN DIVISION BANGALORE</p>							<p>NO. OF SHEETS: 02</p> <p>SHEET NO.: 01</p>
<p>SCALE: JOB NO. CR-14-019</p>							<p>DRG. NO. EP-3-CS-019-005</p>
<p>REV. NO. _____</p>							<p>REV. NO. _____</p>



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NO.	REV. DATE	DESCRIPTION	BY	APPD.	CHECKED	DESIGNED	NAME	SIGN.	DATE
07									
06							JAGADISH		20.06.14
05									
04									
03	27.02.15	REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015							
02	24.07.14	REVISED					TRINATH		20.06.14
01							KS BALA		20.06.14

DRG. NO. EP-3-CS-019-005

INVENTORY NO. \_\_\_\_\_

SHAFT INSULATOR HEATER

DIR :

FILE NO. : 8

SCALE

JOB NO. CR-14-019

DRG. NO. EP-3-CS-019-005

BHARAT HEAVY ELECTRICALS LIMITED

ELECTROPORCELAIN DIVISION BANGALORE

TITLE :

POWER & CONTROL SCHEME FOR



SHAFT INSULATOR HEATER


	NO. OF SHEETS	02
	SHEET. NO.	02
	REV. NO.	00

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DRG. NO. EP-3-CS-019-006

INVENTORY NO. \_\_\_\_\_  
REV. NO. \_\_\_\_\_

1	2	3	4	5	6	7	8
<p><b>FIRST ANGLE PROJECTION</b></p> <p style="text-align: right;">ALL DIMENSIONS ARE IN MM.</p>							
<p><b>CUSTOMER</b></p>  <p><b>INDIA POWER CORPORATION (HALDIA) LIMITED</b> HALDIA</p>							
<p><b>PROJECT:</b></p> <p><b>3x150 MW COAL BASED POWER PLANT HALDIA</b></p>							
<p><b>CUSTOMER CONSULTANT:</b></p>  <p><b>DEVELOPMENT CONSULTANT PVT LTD</b> KOLKATA</p>							
<p><b>DRG. NO. EP-3-CS-019-006</b></p>							

07							
06							NO. OF SHEETS 02
05							
04							SHEET NO. 01
03							TITLE : BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE POWER & CONTROL SCHEME FOR OPACITY MONITOR
02							
01							SCALE : JOB NO. CR-14-019     DRG. NO. EP-3-CS-019-006 REV. 0C
00							

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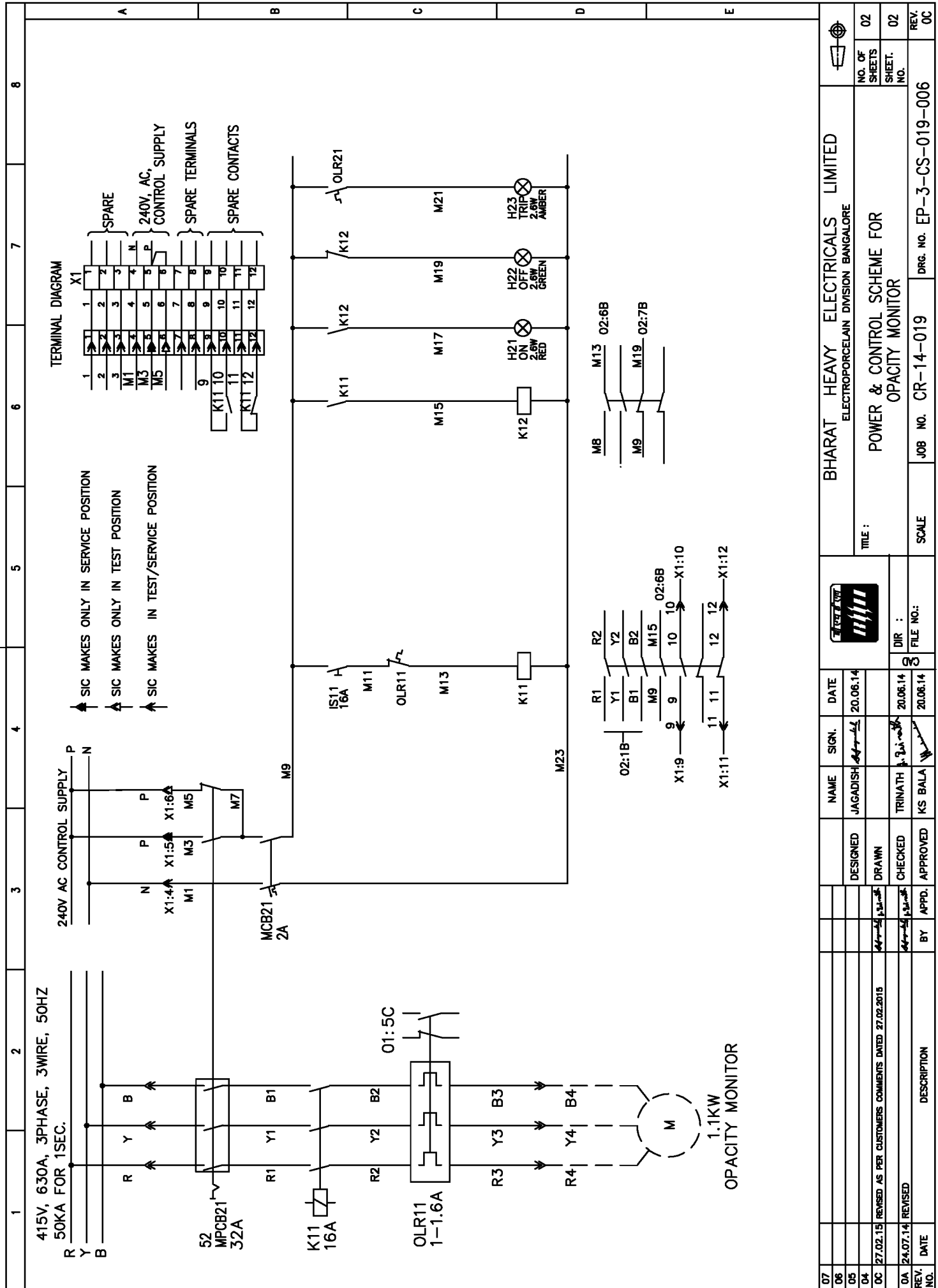
DRG. NO. EP-3-CS-019-006

REV. NO.	DATE	DESCRIPTION
07		
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03	27.02.15	REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015
02	24.07.14	REVISED

FORM 66-301 A

ALL DIMENSIONS ARE IN MM.

FIRST ANGLE PROJECTION




REV. NO.	DATE	BY	APPD.	CHECKED	DRAWN	DESIGNED	NAME	SIGN.	DATE
07							JAGADISH		20.06.14
06									
05									
04									
03	27.02.15						TRINATH		20.06.14
02	24.07.14						KS BALA		20.06.14

BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE	
TITLE : POWER & CONTROL SCHEME FOR OPACITY MONITOR	
NO. OF SHEETS	02
SHEET. NO.	02
SCALE	JOB NO. CR-14-019
DRG. NO. EP-3-CS-019-006	REV. NO. 00

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DRG. NO. EP-3-SL-019-007

INVENTORY NO. \_\_\_\_\_  
REV. NO. \_\_\_\_\_ DATE \_\_\_\_\_

1	2	3	4	5	6	7	8
<p><b>FIRST ANGLE PROJECTION</b></p> <p style="text-align: center;">ALL DIMENSIONS ARE IN MM.</p>							
<p><b>CUSTOMER</b></p> <p style="font-size: 2em; font-weight: bold; letter-spacing: 0.5em;">IPSEL</p> <p><b>INDIA POWER CORPORATION (HALDIA) LIMITED</b></p> <p><b>HALDIA</b></p>							
<p><b>PROJECT:</b></p> <p><b>3x150 MW COAL BASED POWER PLANT HALDIA</b></p>							
<p><b>CUSTOMER CONSULTANT:</b></p>  <p><b>DEVELOPMENT CONSULTANT PVT LTD</b></p> <p><b>KOLKATA</b></p>							
<p><b>BHARAT HEAVY ELECTRICALS LIMITED</b></p> <p><b>ELECTROPORCELAIN DIVISION BANGALORE</b></p>							
<p><b>CONTROL SUPPLY TRANSFORMER</b></p>							
<p><b>SCALE</b></p> <p><b>JOB NO. CR-14-019</b></p> <p><b>DRG. NO. EP-3-CS-019-007</b></p>							
<p><b>REV. NO.</b></p> <p><b>DATE</b></p> <p><b>DESCRIPTION</b></p>							
07							
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04							
03	27.02.15	REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015					
02	24.07.14	REVISED					
01							

NO. OF SHEETS 02  
SHEET. NO. 01  
REV. NO. 00

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DRG. NO. EP-3-CS-019-007

07									
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03									
02									
0A	24.07.14	REVISED							
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	CHECKED	DRAWN	DESIGNED	NAME

INVENTORY NO.	
NO. OF SHEETS	02
SHEET. NO.	02
REV. NO.	00

DIR :	
FILE NO.:	

DATE	23.06.14
SIGN.	<i>[Signature]</i>
NAME	JAGADISH

DATE	23.06.14
SIGN.	<i>[Signature]</i>
NAME	TRINATH

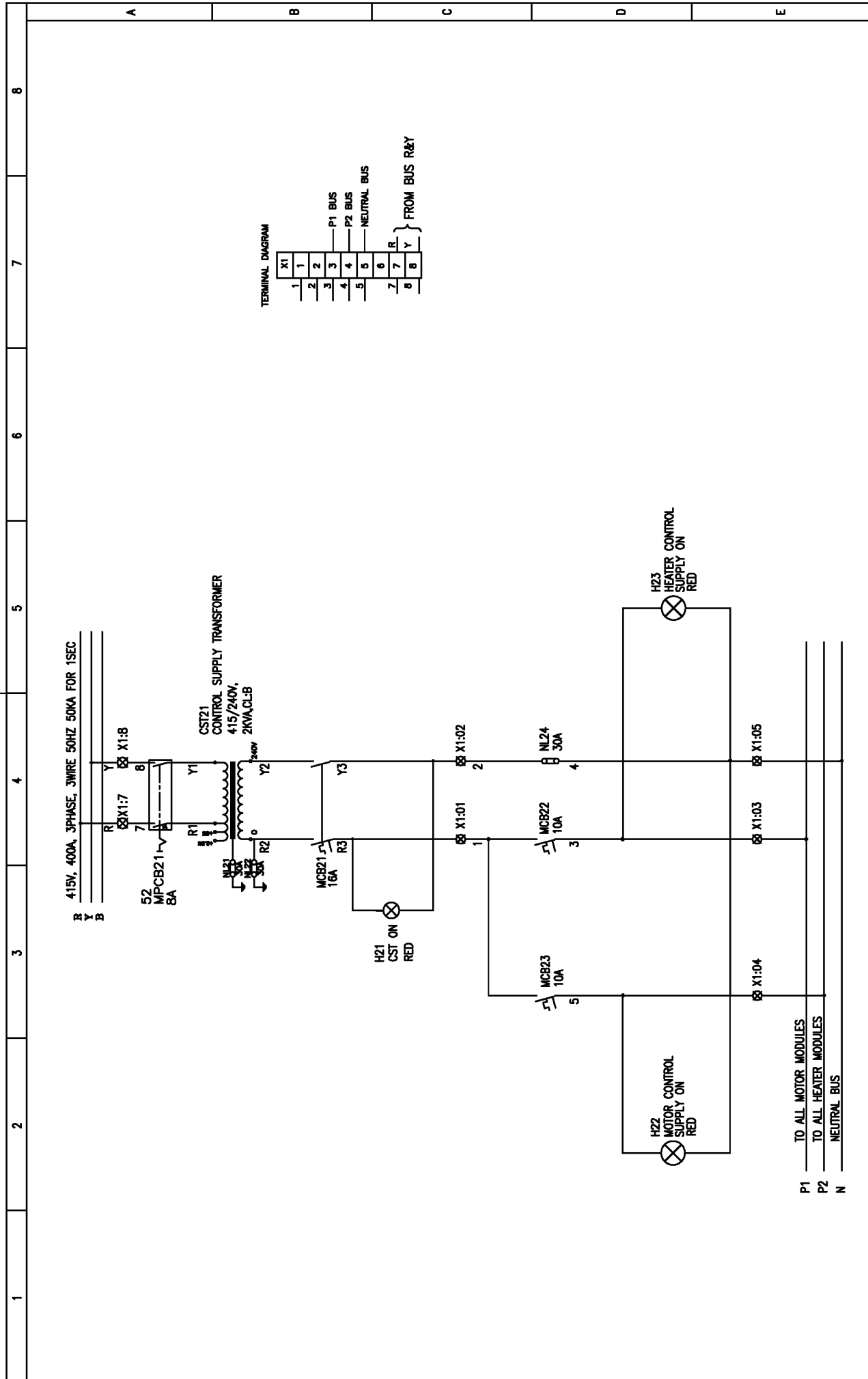
DATE	23.06.14
SIGN.	<i>[Signature]</i>
NAME	KS BALA

SCALE	JOB NO. CR-14-019
DRG. NO.	EP-3-CS-019-007
TITLE :	CONTROL SUPPLY TRANSFORMER

BHARAT HEAVY ELECTRICALS LIMITED	
ELECTROPORCELAIN DIVISION BANGALORE	

NO. OF SHEETS	02
SHEET. NO.	02
REV. NO.	00

NO. OF SHEETS	02
SHEET. NO.	02
REV. NO.	00



1 2 3 4 5 6 7 8

ALL DIMENSIONS ARE IN MM.

FIRST ANGLE PROJECTION

8

7

6

5

4

3

2

1

A

B

C



D

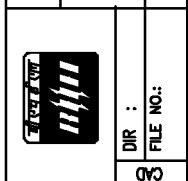
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DRG. NO. EP-3-SL-019-008

INVENTORY NO. \_\_\_\_\_  
REV. NO. \_\_\_\_\_

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<p><b>FIRST ANGLE PROJECTION</b></p> <p style="text-align: right;">ALL DIMENSIONS ARE IN MM.</p>							
<p><b>CUSTOMER</b></p> <p><b>IPSEL</b></p> <p><b>INDIA POWER CORPORATION (HALDIA) LIMITED</b></p> <p><b>HALDIA</b></p>							
<p><b>PROJECT:</b></p> <p><b>3x150 MW COAL BASED POWER PLANT HALDIA</b></p>							
<p><b>CUSTOMER CONSULTANT:</b></p> <p></p> <p><b>DEVELOPMENT CONSULTANT PVT LTD</b></p> <p><b>KOLKATA</b></p>							
<p><b>EPC CONTRACTOR</b></p> <p></p> <p><b>BF INFRASTRUCTURE LIMITED</b></p> <p><b>NOIDA, INDIA</b></p>							
<p><b>BHARAT HEAVY ELECTRICALS LIMITED</b></p> <p><b>ELECTROPORCELAIN DIVISION BANGALORE</b></p>							
<p><b>SPACE HEATER SUPPLY TRANSFORMER</b></p>							
<p><b>SCALE</b></p> <p><b>JOB NO. CR-14-019</b></p> <p><b>DRG. NO. EP-3-CS-019-008</b></p>							
<p><b>REV. DATE</b></p> <p><b>DESCRIPTION</b></p>							
07							
06							
05							
04							
03	27.02.15	REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015					
02	24.07.14	REVISED					
01							
00							



NAME	SIGN.	DATE
JAGADISH		20.05.14
TRINATH		20.05.14
KS BALA		20.05.14

DESIGNED	CHECKED	APPROVED

BY	APPD.	DATE
		20.05.14

**DIR :** \_\_\_\_\_  
**FILE NO.:** \_\_\_\_\_

**NO. OF SHEETS** 02  
**SHEET. NO.** 01  
**REV.** 00



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
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DRG. NO. EP-3-CS-019-009


INVENTORY NO. \_\_\_\_\_



REV. NO.	DATE	DESCRIPTION
01	14.02.13	REVISED
0C	27.02.15	REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015
04		
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07		

BY	APPD.	DATE
		20.05.14
		20.05.14
		20.05.14
		20.05.14

DESIGNED	NAME	SIGN.	DATE
	JAGADISH		20.05.14
	TRINATH		20.05.14
	KS BALA		20.05.14

	DIR :
	FILE NO.:

BHARAT HEAVY ELECTRICALS LIMITED		
ELECTROPORCELAIN DIVISION BANGALORE		
TITLE :		NO. OF SHEETS 04
CONTROL SCHEME FOR ASH LEVEL INDICATOR HIGH		SHEET. NO. 01
SCALE	JOB NO. CR-14-019	REV. 0C
	DRG. NO. EP-3-CS-019-009	

1	2	3	4	5	6	7	8
<p>FIRST ANGLE PROJECTION</p> <p>ALL DIMENSIONS ARE IN MM.</p>							
<p>CUSTOMER</p>  <p>INDIA POWER CORPORATION (HALDIA) LIMITED HALDIA</p> <p>PROJECT:</p> <p>3x150 MW COAL BASED POWER PLANT HALDIA</p> <p>CUSTOMER CONSULTANT:</p>  <p>DEVELOPMENT CONSULTANT PVT LTD KOLKATA</p>							

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DRG. NO. EP-3-CS-019-009

07			
06			
05			
04			
03			
02			
01			
00			

REV. NO.	DATE	BY	APPD.	APPROVED	DATE
01	27.02.15				21.06.14
00	14.02.13				21.06.14

INVENTORY NO.	DESCRIPTION
	REVISIONS AS PER CUSTOMERS COMMENTS DATED 27.02.2015
	REVISIONS

NAME	SIGN.	DATE
JAGADISH		21.06.14
TRINATH		21.06.14
KS BALA		21.06.14

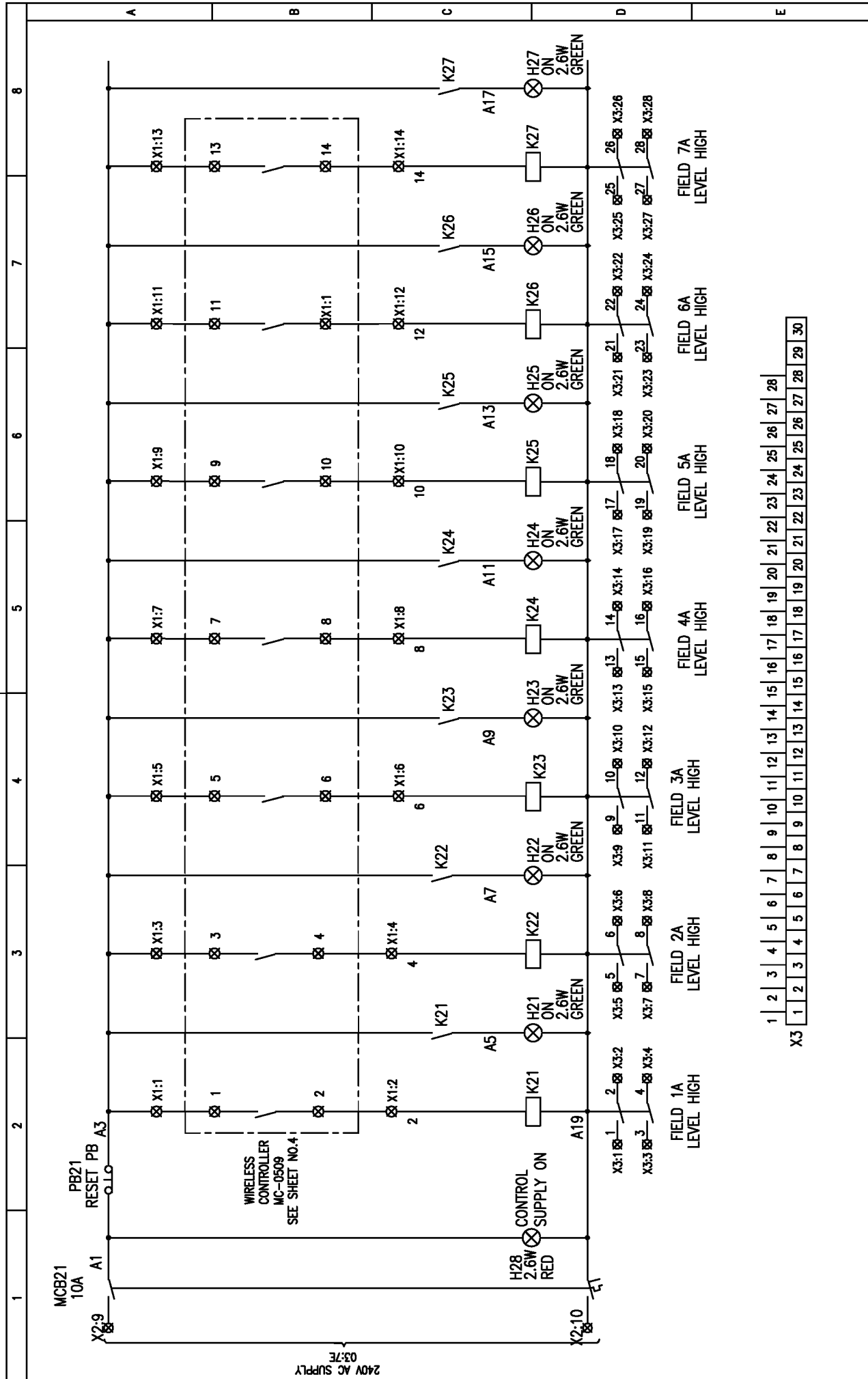
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DRAWN		

DIR :	FILE NO.:

BHARAT HEAVY ELECTRICALS LIMITED	
ELECTROPORCELAIN DIVISION BANGALORE	
TITLE :	
CONTROL SCHEME FOR ASH LEVEL INDICATOR HIGH	
SCALE	JOB NO. CR-14-019
DRG. NO. EP-3-CS-019-009	REV. NO. 00

NO. OF SHEETS	04
SHEET. NO.	02

REV. NO.	00
SHEET. NO.	02
NO. OF SHEETS	04



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
X3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

ALL DIMENSIONS ARE IN MM.

FIRST ANGLE PROJECTION

8

7

6

5

4

3

2

1

A

B

C

D

E

FIELD 1A

FIELD 2A

FIELD 3A

FIELD 4A

FIELD 5A

FIELD 6A

FIELD 7A

LEVEL HIGH

LEVEL HIGH

LEVEL HIGH

LEVEL HIGH

LEVEL HIGH

LEVEL HIGH

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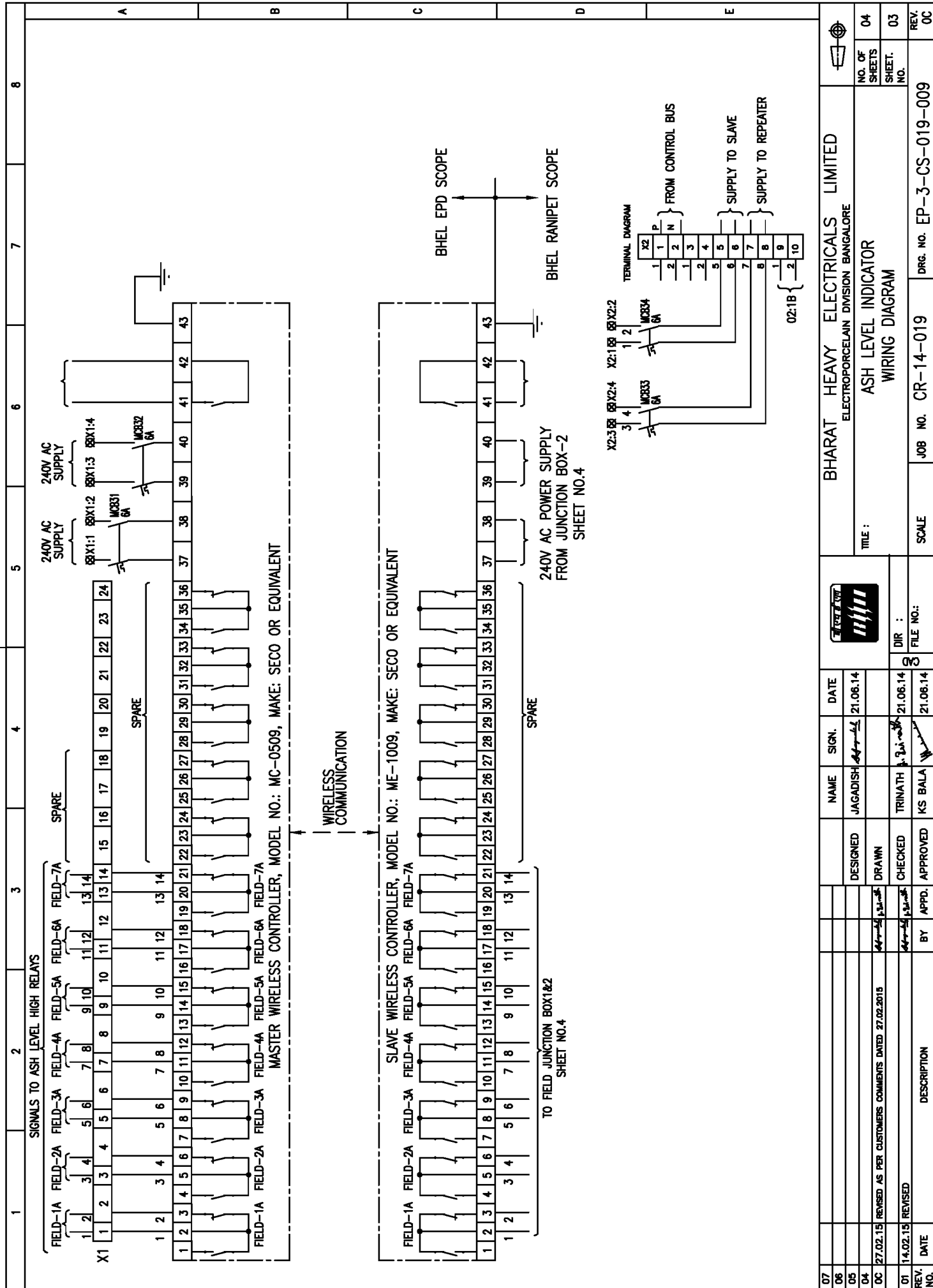
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DRG. NO. EP-3-CS-019-009

ALL DIMENSIONS ARE IN MM.

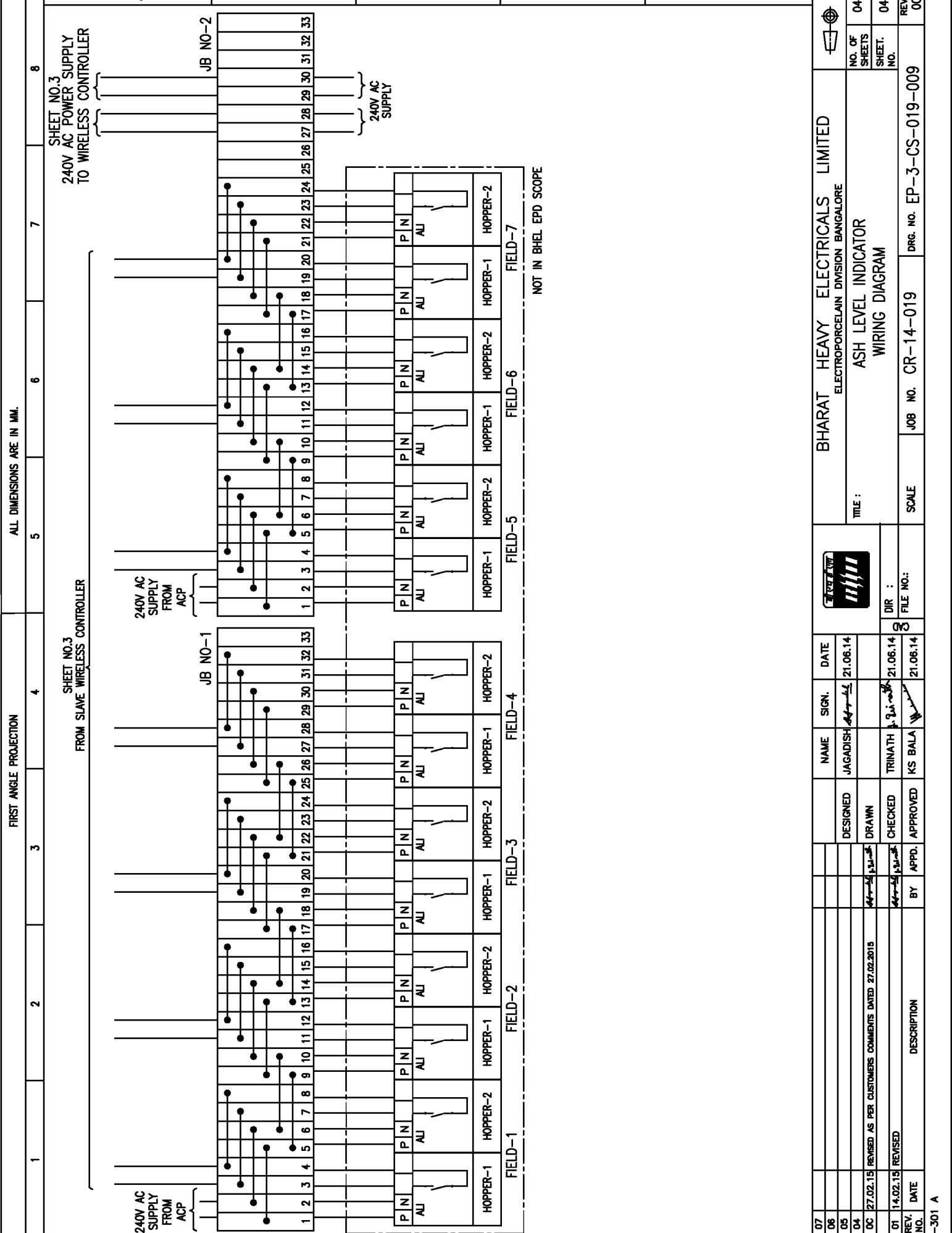
FIRST ANGLE PROJECTION



07	
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02	
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00	

INVENTORY NO.	DRG. NO. EP-3-CS-019-009
REV. NO.	REV. NO.
DATE	DATE
DESCRIPTION	DESCRIPTION
BY	BY
APPD.	APPD.
CHECKED	CHECKED
DRAWN	DRAWN
DESIGNED	DESIGNED
NAME	NAME
SIGN.	SIGN.
DATE	DATE
FILE NO.	FILE NO.
DIR	DIR
SCALE	SCALE
JOB NO. CR-14-019	JOB NO. CR-14-019
DRG. NO. EP-3-CS-019-009	DRG. NO. EP-3-CS-019-009





BHARAT HEAVY ELECTRICALS LIMITED	
ELECTROPORCELAIN DIVISION BANGALORE	
TITLE : ASH LEVEL INDICATOR WIRING DIAGRAM	
NO. OF SHEETS 04	
SHEET. NO. 03	
REV. NO. 00	



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DRG. NO. EP-3-CS-019-010

INVENTORY NO. \_\_\_\_\_

FIRST ANGLE PROJECTION	ALL DIMENSIONS ARE IN MM.	4	5	6	7	8
1	2	3	4	5	6	7
A	B	C	D	E		
<p><b>CUSTOMER</b></p>  <p><b>INDIA POWER CORPORATION (HALDIA) LIMITED</b> HALDIA</p> <p><b>PROJECT:</b></p> <p><b>3x150 MW COAL BASED POWER PLANT HALDIA</b></p> <p><b>CUSTOMER CONSULTANT:</b></p>  <p><b>DEVELOPMENT CONSULTANT PVT LTD</b> KOLKATA</p>						
07	06	05	04	03	02	01
REV. NO.	DATE	BY	APPD.	APPROVED	CHECKED	DRAWN
0A	24.07.14	[Signature]	[Signature]	[Signature]	[Signature]	[Signature]
0C	27.02.15	[Signature]	[Signature]	[Signature]	[Signature]	[Signature]
04	REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015					
05						
06						
07						
			NAME	SIGN.	DATE	DIR. FILE NO.:
			DESIGNED	JAGADISH	20.05.14	S
			DRAWN	[Signature]	[Signature]	[Signature]
			CHECKED	TRINATH	20.05.14	S
			APPROVED	KS BALA	20.05.14	S
						
			<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPORCELAIN DIVISION BANGALORE			
			<b>TITLE :</b> WIRELESS CONTROLLER FOR RAPPER MOTORS WIRING DIAGRAM			
			SCALE	JOB NO. CR-14-019	DRG. NO. EP-3-CS-019-010	REV. NO. 03
						

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DRG. NO. EP-3-CS-019-010

INVENTORY NO.

REV. DATE

BY APPD. APPROVED

REVISIONS AS PER CUSTOMERS COMMENTS DATED 27.02.2015

REVISED 24.07.14

REVISED 20.06.14

DESIGNED JAGADISH

DRAWN

CHECKED TRINATH

APPROVED KS BALA

DATE 20.06.14

DATE 20.06.14

FILE NO. 8

DIR :

SCALE

JOB NO. CR-14-019

DRG. NO. EP-3-CS-019-010

REV. NO. 03

SHEET. NO. 02

NO. OF SHEETS 03

REV. OC

REV. 02

REV. 03

REV. 04

REV. 05

REV. 06

REV. 07

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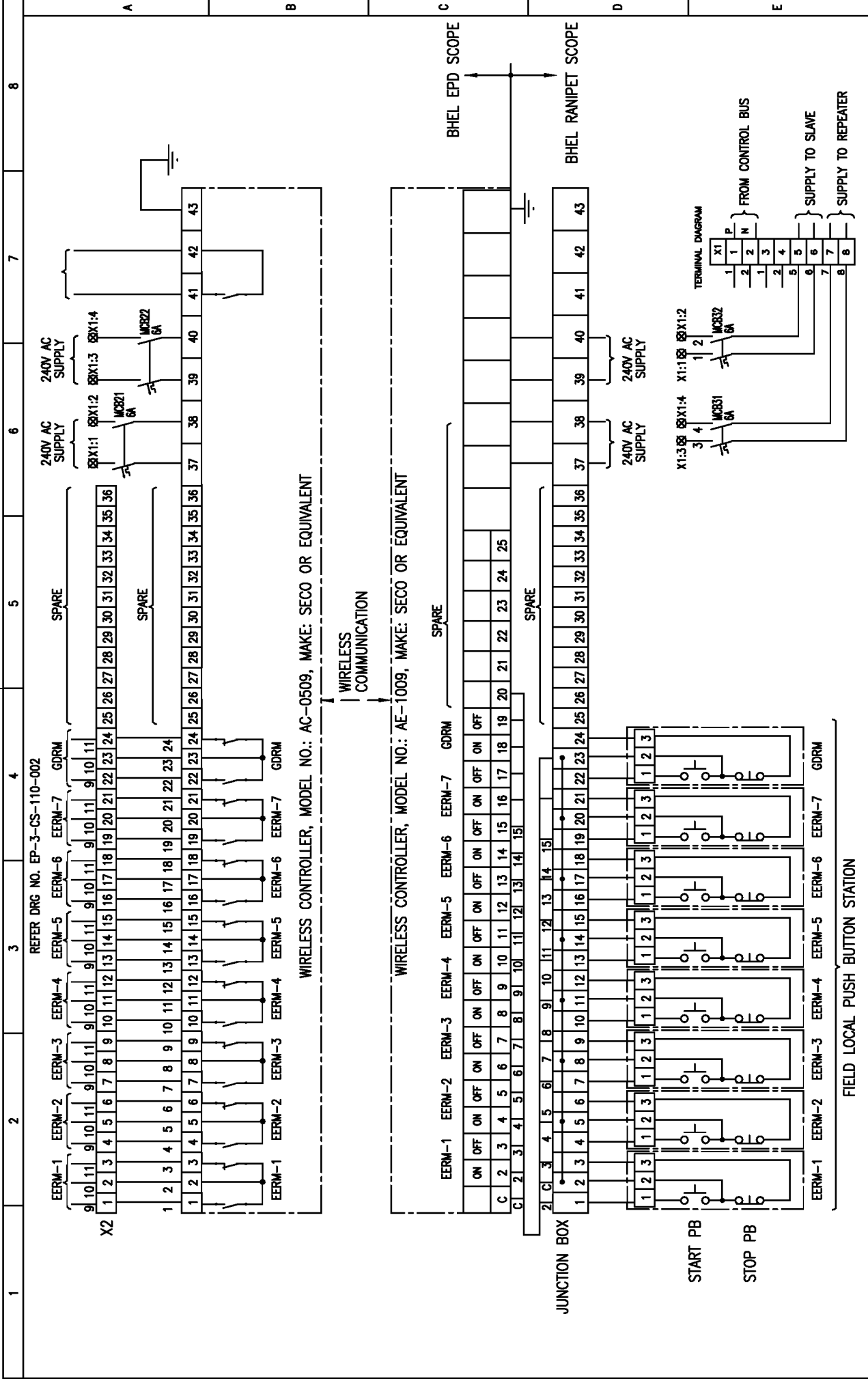
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FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.



07	NAME	SIGN.	DATE
06	DESIGNED	JAGADISH	20.06.14
05	DRAWN		
04	CHECKED	TRINATH	20.06.14
03	APPROVED	KS BALA	20.06.14
02	BY		
01	DESCRIPTION		
REV. NO.	DATE		
OC	27.02.15	REVISED AS PER CUSTOMERS COMMENTS DATED 27.02.2015	
0A	24.07.14	REVISED	
INVENTORY NO.			
DRG. NO.	EP-3-CS-019-010		
BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE			
TITLE : WIRELESS CONTROLLER FOR RAPPER MOTORS WIRING DIAGRAM			
NO. OF SHEETS	03		
SHEET. NO.	03		
SCALE	JOB NO.	CR-14-019	DRG. NO.
REV. NO.	EP-3-CS-019-010		

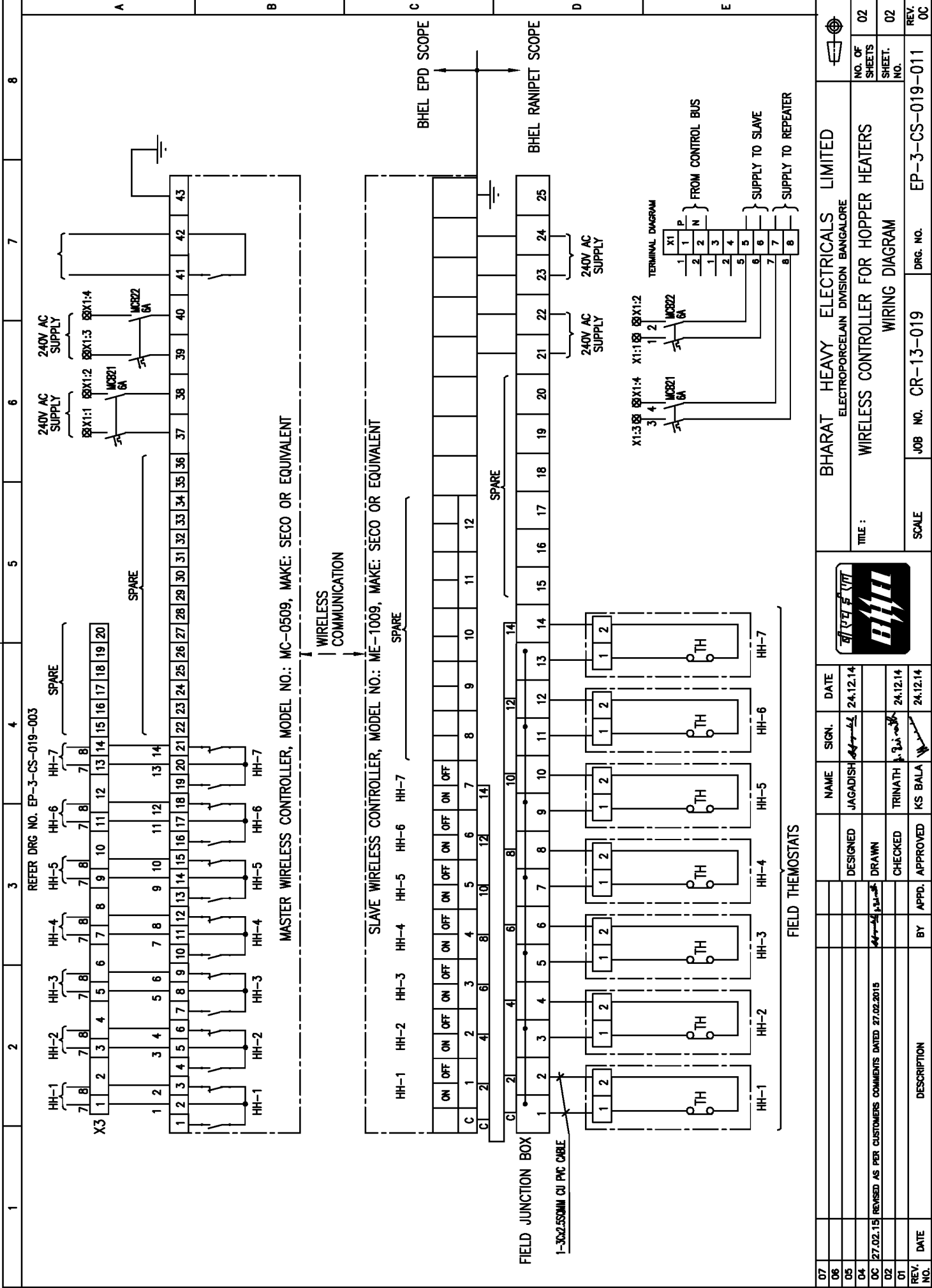


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FIRST ANGLE PROJECTION



**BHARAT HEAVY ELECTRICALS LIMITED**  
ELECTROPORCELAIN DIVISION BANGALORE

DRG. NO. EP-3-CS-019-011

NO. OF SHEETS 02

SHEET. NO. 02

REV. NO. 00

REV. NO.	DATE	DESCRIPTION
07		
06		
05		
04		
03		
02		
01		

DESIGNED	NAME	SIGN.	DATE
JAGADISH	JAGADISH	[Signature]	24.12.14
DRAWN	TRINATH	[Signature]	24.12.14
CHECKED	KS BALA	[Signature]	24.12.14
APPROVED			

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	REV. 01 DATE :		REV. DATE :
			ALTERED :



**INDIA POWER CORPORATION (HALDIA) LIMITED  
HALDIA**

PROJECT:

**3x150 MW COAL BASED POWER PLANT HALDIA**

CUSTOMER CONSULTANT:



DEVELOPMENT CONSULTANT PVT LTD

**DEVELOPMENT CONSULTANT PVT LTD  
KOLKATA**


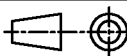
JOB NO.:						BHARAT HEAVY ELECTRICALS LIMITED	
CR-14-018						ELECTROPROCELAIN DIVISION BANGALORE	
DEGND.	NAME	SIGN.	DATE	DEPT.	CODE	TITLE : MASTER DRAWING LIST LT MAIN SWITCH BOARD	
	TRINATH	<i>P. Trinath</i>	20.05.14				
DRN.						DRG. NO. : EP-4-MD-018-001 REV. NO. : 00	
CHKD.	TRINATH	<i>P. Trinath</i>	20.05.14				
APPD.	KS BALA	<i>M. K. Bala</i>	20.05.14			SCALE : N.T.S.	SHEET NO. : 01
						NO. OF SHEETS : 02	

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	REV. 01 DATE :		REV. DATE :		REV. DATE :

SL NO.	DRAWING NO.	TITLE	NO OF SHTS	REV NO.
1	EP-4-MD-018-001	MASTER DRAWING LIST	02	00
2	EP-4-TS-018-001	TECHNICAL SPECIFICATIONS-LT SWITCHGEAR	20	00
3	EP-4-TS-018-002	TECHNICAL SPECIFICATIONS-ELECTRICAL COMPONENTS	06	00
4	EP-4-MC-018-001	MAKE OF COMPONENTS	03	00
5	EP-4-SY-018-001	LIST OF SYMBOLS	05	00
6	EP-3-GA-018-301	OGA OF 415V, 2500A, 3PHASE, 50HZ LT MAIN SWITCH BOARD	04	0B
7	EP-3-SL-018-301	SLD OF 415V, 2500A, 3PHASE, 50HZ LT MAIN SWITCH BOARD	06	0B
8	EP-3-CS-018-001	CONTROL SCHEME FOR INCOMER-1	09	0A
9	EP-3-CS-018-002	CONTROL SCHEME FOR BUSCOUPLER	10	0A
10	EP-3-CS-018-003	CONTROL SCHEME FOR INCOMER-2	09	0A
11	EP-3-CS-018-004	CONTROL SCHEME FOR OUTGOING FEEDERS	02	0A
12	EP-3-CS-018-005	CONTROL SCHEME FOR SPACE HEATER SUPPLY TRAF0	02	0A
13	EP-3-CS-018-006	CONTROL SCHEME FOR BUS PT	02	0A

JOB NO.:						<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPROCELAIN DIVISION BANGALORE			
DEGND.	NAME	SIGN.	DATE	DEPT.	CODE	TITLE : <b>MASTER DRAWING LIST</b> <b>LT MAIN SWITCH BOARD</b>			
DRN.	TRINATH	<i>T. Trinath</i>	20.05.14						
CHKD.	TRINATH	<i>T. Trinath</i>	20.05.14						
APPD.	KS BALA	<i>K. Bala</i>	20.05.14						
						DRG. NO. : EP-4-MD-018-001		REV. NO. : 00	
SCALE : N.T.S.		SHEET NO. : 02		NO. OF SHEETS : 02					

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	REV. 01 DATE :		REV. DATE :
			ALTERED :



**INDIA POWER CORPORATION (HALDIA) LIMITED  
HALDIA**

PROJECT:

**3x150 MW COAL BASED POWER PLANT HALDIA**

CUSTOMER CONSULTANT:



DEVELOPMENT CONSULTANT PVT LTD

**DEVELOPMENT CONSULTANT PVT LTD  
KOLKATA**

JOB NO.:						BHARAT HEAVY ELECTRICALS LIMITED ELECTROPROCELAIN DIVISION BANGALORE	
CR-14-018						TITLE :	
DEGND.	NAME	SIGN.	DATE	DEPT.	CODE	TECHNICAL SPECIFICATIONS LT SWITCHGEAR	
	TRINATH	<i>T. Trinath</i>	20.05.14				
DRN.							
CHKD.	TRINATH	<i>T. Trinath</i>	20.05.14			DRG. NO. :	EP-4-TS-018-001
APPD.	KS BALA	<i>K. S. Bala</i>	20.05.14			REV. NO. :	00
SCALE :		N.T.S.		SHEET NO. :		01	
				NO. OF SHEETS :		20	


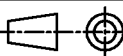
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REV. 01   DATE :	REV.   DATE :	REV.   DATE :	ALTERED :

**TECHNICAL SPECIFICATION**

<b>LT SWITCHGEAR</b>	
<b>1. POWER SUPPLY SYSTEM:-</b>	
VOLTAGE	415V, ±10% 3PH, 3W, 50Hz. ±5% SOLIDLY EARTHED, 220V DC UNEARTHED
FAULT LEVEL	50KA FOR 1 SEC. FOR AC 50KA FOR 1 SEC. FOR DC
AUXILIARIES SUPPLIES	220V DC CONTROL SUPPLY: FROM STATION BATTERY BY CUSTOMER AC CONTROL SUPPLY: 240V AC PANEL & MOTOR SPACE SUPPLY: 240V AC
AMBIENT TEMPERATURE	50°C
MAX. PERMISSIBLE TEMPERATURE	90°C
<b>2. DESIGN SUPPORT:-</b>	
APPLICABLE STANDARDS	IEC60439-1
TYPE TEST CERTIFICATES	1. SC TEST FOR 50KA RMS PER SEC, 105KA PEAK. 2. HEAT RUN TEST MAIN BUS LINK INCLUDING ALL POWER DRAW OUT CONTACTS WHEN CARRYING 90% OF RATED CURRENT ALONG THE FULL RUN IS 55 DEGREE CENTIGRADE WITH SILVER PLATED JOINTS AND 40 DEGREE CENTIGRADE WITH ALL OTHERS TYPES OF JOINTS OVER AN AMBIENT OF 50 DEGREE CENTIGRADE

JOB NO.:		<b>CR-14-018</b>				<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPROCELAIN DIVISION BANGALORE			
DEGND.	TRINATH	<i>S. Trinath</i>	20.05.14	DEPT.	CODE	TITLE : <b>TECHNICAL SPECIFICATIONS LT SWITCHGEAR</b>			
DRN.									
CHKD.	TRINATH	<i>S. Trinath</i>	20.05.14			DRG. NO. : <b>EP-4-TS-018-001</b>		REV. NO. : 00	
APPD.	KS BALA	<i>M. Bala</i>	20.05.14			SCALE : N.T.S.	SHEET NO. : 02	NO. OF SHEETS : 20	

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REV. DATE : ALTERED :

SIGN. & DATE :

REV. DATE : ALTERED :

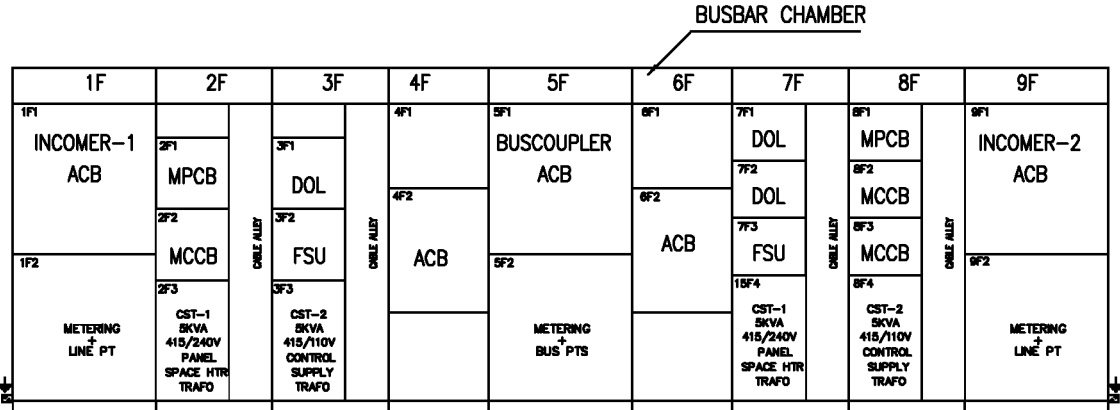
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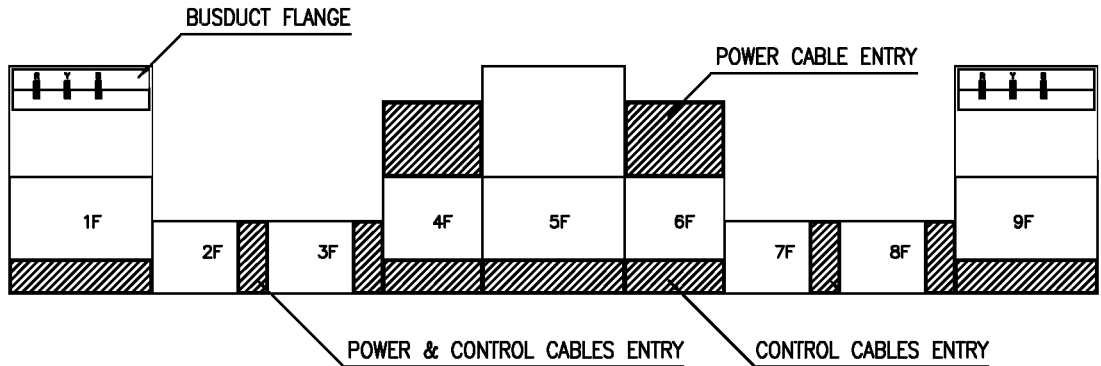
TECHNICAL SPECIFICATION

3. OVERVIEW OF LT SWITCHGEAR:-


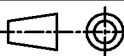
TYPICAL SINGLE FRONT LT SWITCHGEAR PANELS



FRONT VIEW



FOUNDATION PLAN

JOB NO.:		CR-14-018				<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPROCELAIN DIVISION BANGALORE		
NAME	SIGN.	DATE	DEPT.	CODE	TITLE :			
DEGND. TRINATH	<i>T. Trinath</i>	20.05.14			TECHNICAL SPECIFICATIONS LT SWITCHGEAR			
DRN.					DRG. NO. :			
CHKD. TRINATH	<i>T. Trinath</i>	20.05.14			<b>EP-4-TS-018-001</b>		REV. NO. : 00	
APPD. KS BALA	<i>K. Bala</i>	20.05.14			SCALE :	N.T.S.	SHEET NO. : 03	NO. OF SHEETS : 20

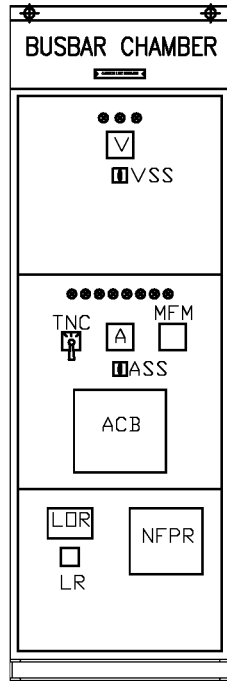
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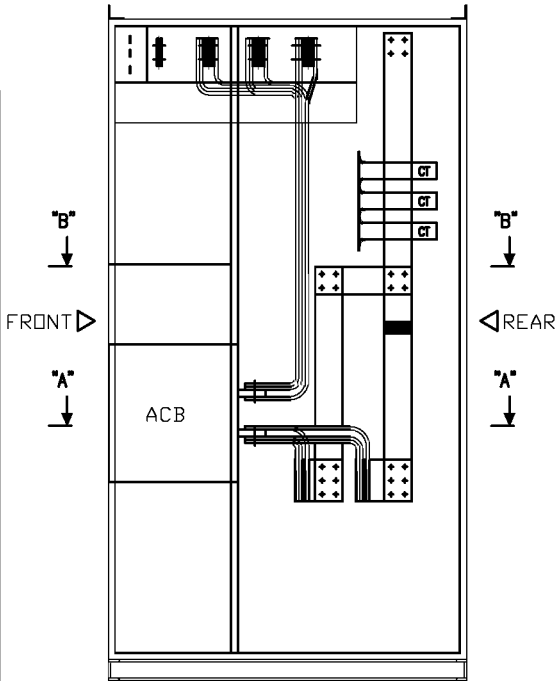
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	REV. DATE :	ALTERED :
REV. 01 DATE :	SIGN. & DATE :	ALTERED :
	REV. DATE :	ALTERED :

TECHNICAL SPECIFICATION

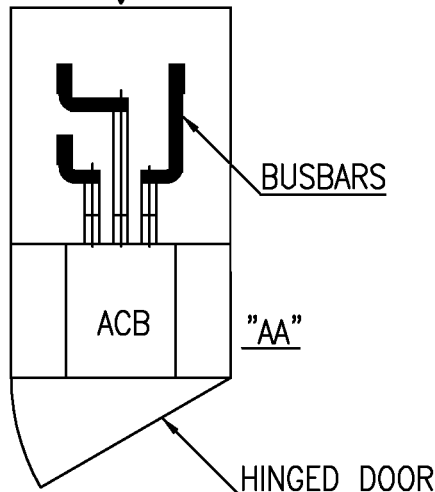
TYPICAL ACB PANELS



ELEVATION  
 REAR

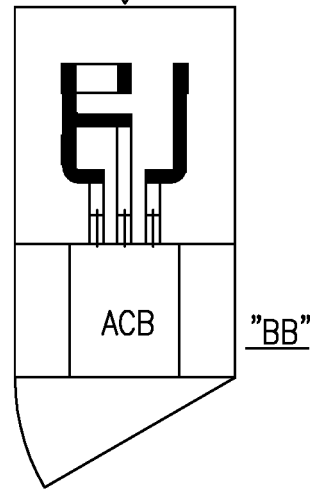


SECTIONAL END VIEW  
 REAR




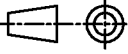
SECTION-AA

FRONT



SECTION-BB

FRONT

JOB NO.:							<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPROCELAIN DIVISION BANGALORE		
CR-14-018							TITLE :		
							TECHNICAL SPECIFICATIONS LT SWITCHGEAR		
DEGND.	TRINATH	<i>T. Trinath</i>	20.05.14			DRG. NO. :		EP-4-TS-018-001	REV. NO. : 00
DRN.						SCALE :		N.T.S.	
CHKD.	TRINATH	<i>T. Trinath</i>	20.05.14			SHEET NO. :		04	NO. OF SHEETS : 20
APPD.	KS BALA	<i>K. S. Bala</i>	20.05.14						

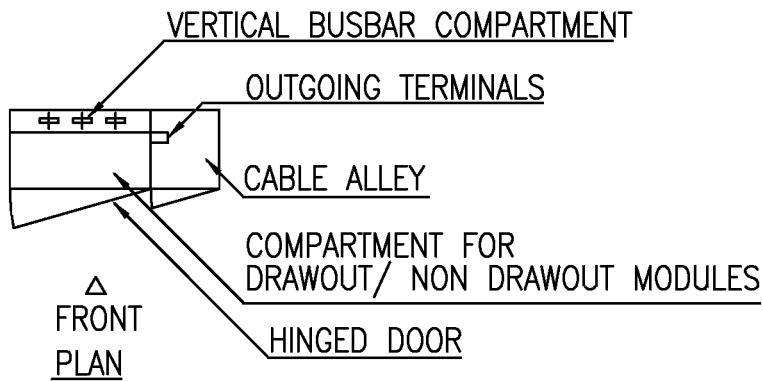
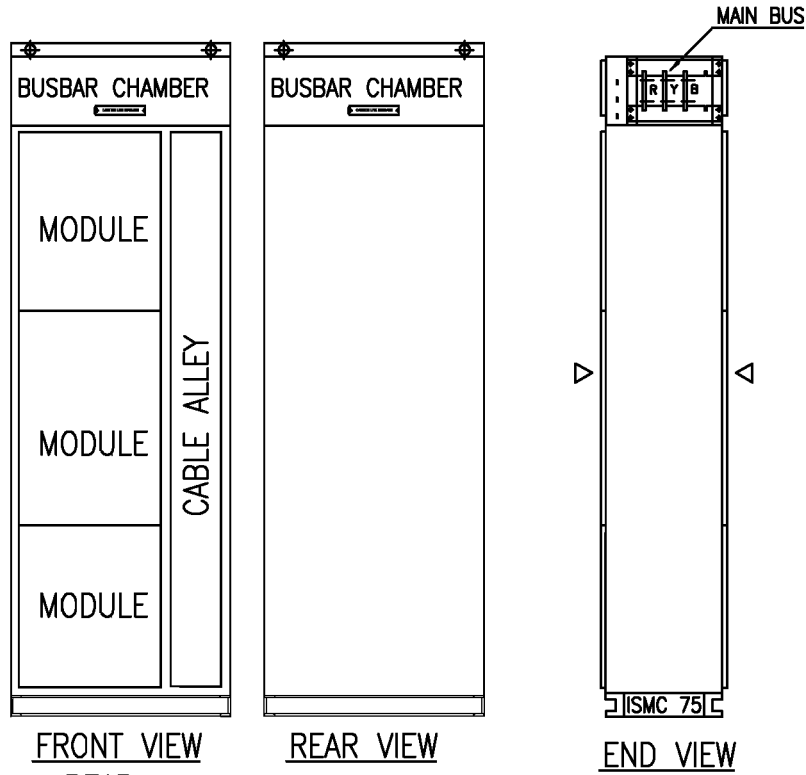
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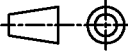
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	REV. DATE :	ALTERED :
REV. 01 DATE :	SIGN. & DATE :	ALTERED :
	REV. DATE :	ALTERED :

TECHNICAL SPECIFICATION

DRAWOUT TYPE MODULES HOUSING MCCB, MPCB, ETC.  
 FEEDERS IN SINGLE FRONT PANELS  
 (TYPICAL)



JOB NO.:						<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPROCELAIN DIVISION BANGALORE	
CR-14-018						TITLE :	
DEGND.	TRINATH	<i>J. Trinath</i>	20.05.14	DEPT.	CODE	TECHNICAL SPECIFICATIONS LT SWITCHGEAR	
DRN.						DRG. NO. :	
CHKD.	TRINATH	<i>J. Trinath</i>	20.05.14			EP-4-TS-018-001	
APPD.	KS BALA	<i>M. K. Bala</i>	20.05.14			REV. NO. : 00	
SCALE : N.T.S.		SHEET NO. : 05		NO. OF SHEETS : 20			

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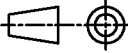
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INVENTORY NO. :  
REV. 01] DATE : ALTERED :

**TECHNICAL SPECIFICATION**

<b>4. PANEL FABRICATION:-</b>	
BASE FRAME	ISMC75
FRAME (LOAD BEARING MEMBER)	2.0 MM CRCA
DOORS & COVERS	1.6 MM CRCA
GLAND PLATES (FOR SINGLE CORE CABLE)	4 MM AL. DRILLED.
GLAND PLATES (FOR MULTI CORE CABLE)	3 MM HR. DRILLED.
<b>5. PANEL DESIGN:-</b>	
INSTALLATION	INDOOR
MOUNTING	FLOOR MOUNTED
ACB FEEDERS	SINGLE FRONT, DRAWOUT
MCCB/MPCB FEEDERS	SINGLE FRONT, DRAWOUT
TRF FEEDERS	SINGLE FRONT, NON DRAWOUT
OTHERS	SINGLE FRONT, NON DRAWOUT
DOOR INTERLOCK & PAD LOCKING ARRANGEMENT	ACB RACKING HANDLE MANUAL PUSH BUTTONS WILL BE PAD LOCKABLE.
INTERCHANGEABILITY	ALL IDENTICAL EQUIPMENT & CORRESPONDING PARTS INCLUDING CHASIS OF DRAWOUT MODULES OF SAME TYPE & RATING ARE INTERCHANGABLE WITHOUT HAVING TO CARRY OUTMODIFICATIONS
EXTENSIBILITY	BOTH THE ENDS ARE EXTENSIBLE
OPERATING HEIGHT	MINIMUM: 250MM & MAXIMUM: 1800MM
ENCLOSURE	TOTALLY DUST & VERMIN PROOF
DEGREE OF PROTECTION	UP TO 1600A IP-54 ABOVE 1600A IP42 AS PER IS-13947
GASKET	NEOPRENE/EPDM GASKETS ARE PROVIDED AROUND DOORS COVERS AND OTHER CUTOUT EDGES.
LOUVERS	PROVIDED AT RATED ABOVE 1600A ACB PANELS AT FRONT & REAR OF BUSBAR CHAMBER AND REAR DOORS BACKED WITH FINE WIREMESH
CABLE ALLEY	WIDTH: 250MM CABLE ALLEY WILL BE PROVIDED ADJECENT TO THE MODULAR PORTION ON THE RIGHT HAND SIDE AND WILL HAVE FRONT ACCESS. CABLE ALLEY WILL HAVE DOORS WITH HINGES AND SCREWS/HALF TURN CAMS FOR LOCKING. THE SCREW HEAD WILL BE SLOTTED OR WITH MOULDED METAL KNOBS.  OUTGOING TERMINALS WILL BE SEEN WHEN CABLE ALLEY DOOR OPENED. MOST IMPARTENCE WILL BE GIVEN TO VISIBILITY, IDENTIFICATION & FOR EASY TERMINATION.  CABLE ALLEY WILL BE PROVIDED WITH THE FOLLOWINGS; i. 1NO. THERMOSTATICALLY CONTROLLED SPACE HEATER ii. 1NO. 5A, 3PIN PLUG SOCKET FOR EACH SHIPPING SECTION iii. 1NO. ILLUMINATION LAMP WITH DOOR SWITCH
BUSBAR COMPARTMENT FOR DOUBLE FRONT PANEL	SEPARATE VERTICAL BUSBAR COMPATMENT WILL BE PROVIDED FOR FRONT AND REAR PANEL. COMMON BUSBAR COMPARTMENT FOR BOTH FRONT AND REAR PANEL IS NOT ACCEPTABLE

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						ELECTROPROCELAIN DIVISION BANGALORE			
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DEGND.	TRINATH	<i>J. Trinath</i>	20.05.14			TECHNICAL SPECIFICATIONS LT SWITCHGEAR			
DRN.									
CHKD.	TRINATH	<i>J. Trinath</i>	20.05.14			DRG. NO. : <b>EP-4-TS-018-001</b>		REV. NO. : 00	
APPD.	KS BALA	<i>M. Bala</i>	20.05.14			SCALE : N.T.S.	SHEET NO. : 06	NO. OF SHEETS : 20	

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TECHNICAL SPECIFICATION

INTERLOCKING

INTERLOCKING BETWEEN COMPARTMENT DOOR AND MODULES WILL BE PROVIDED SUCH THAT THE DOOR CAN NOT BE OPENED WITH OUT SWITCHING OFF THE POWER SUPPLY TO THE MODULE. DEFEAT INTERLOCK WILL BE PROVIDED FOR THE UNITS COMPRISING OF SWITCH OR MCCB OR MPCB AS A MEANS ISOLATION, SUCH THAT IT IS POSSIBLE TO OPEN THE DOOR WITH DEVICE ON AND THE UNIT IN SERVICE POSITION. THE FOLLOWING WILL APPLY UNDER THESE CONDITIONS:-

1. IT WILL NOT BE POSSIBLE TO CLOSE THE DOOR TILL THE INTERLOCK HAS BEEN REINSTATED.
2. ATTEMPTED WITHDRAWAL OF THE UNIT UNDER SUCH CONDITIONS WILL BE CAUTIONED AGAINST BY PROVIDING WARNING LABEL AFFIXED AT AN APPROPRIATE PLACE.

LOCKING FACILITY

LOCKING FACILITIES WILL BE PROVIDED TO PREVENT THE CLOSING OF CIRCUIT BREAKER WHEN IT IS OPEN AND FROM BEING MANUALLY TRIPPED WHEN IT IS CLOSED. IN CASE IT IS NOT POSSIBLE TO PROVIDE LOCKING FACILITY TO PREVENT MANUAL TRIPPING SUITABLE SHROUD OR FLAP WILL BE PROVIDED ON THE MANUAL TRIP ACTUATOR TO PREVENT ITS INADVERTENT OPERATION. PROVISION WILL BE MADE TO ENSURE THAT WHEN MANUAL OPERATING MECHANISM FOR MAINTENANCE PURPOSE IS BEING USED, IT WILL NOT BE POSSIBLE TO ELECTRICALLY CLOSE THE BREAKER.

INTERPHASE BARRIERS

INTERPHASE BARRIERS WILL BE PROVIDED TO PREVENT POSSIBILITIES OF PHASE TO PHASE FAULT IN THE SWITCH.

SHROUDING

THE SWITCH WILL ALSO BE SHROUDED FROM ALL SIDES TO PREVENT ACCESS TO LIVE PARTS ON THE SWITCH AFTER OPENING THE UNIT DOOR. THE BARRIERS SHROUDING WILL EXTEND UPTO THE HEIGHT OF SWITCH TO FULLY ENCLOSE BOTH THE LINE SIDE TERMINALS OF THE DEVICE. THE ARRANGEMENT WILL PERMIT EASY MAINTENANCE WHERE ONE ISOLATION SWITCH IS USED AS THE INCOMING DEVICE, THE INCOMING SIDE FIXED CONTACTS WILL BE SHROUDED TO ENSURE THAT MAINTENANCE CAN BE CARRIED OUT WITH THE RELEVANT FUSE AND SWITCH CLOSED. SWITCHBOARD COVERS WILL BE BOLTED OUT SIDE SUCH THAT TO GIVE ACCESS TO INDIVIDUAL CIRCUITS WITH OUT EXPOSING OTHER CIRCUITS WHICH MAY BE LIVE. ALTERNATIVELY CIRCUITS EXPOSED BY THE REMOVABLE OF COVER WILL BE INDIVIDUALLY SHROUDED.

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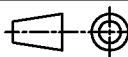


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CHKD.	TRINATH	<i>J. Trinath</i>	20.05.14		
APPD.	KS BALA	<i>M. K. Bala</i>	20.05.14		

TITLE :  
**TECHNICAL SPECIFICATIONS  
 LT SWITCHGEAR**

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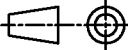
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TECHNICAL SPECIFICATION

SHROUDING	MCCB, MPCB TERMINALS WILL BE SHROUDED AND DESIGNED TO RECEIVE CABLE LUGS FOR RELEVANT TO CIRCUIT RATINGS. LIVE TERMINALS OF FUSE BASES WILL BE SHROUDED TO PREVENT CONTACT WITH PERSONNEL WHERE FUSE LINKS ARE NOT MOUNTED IN CARRIERS AND ARE DIRECTLY PLUGGED INTO THE FUSE BASE. INTERPHASE BARRIERS EXTENDING THROUGHOUT THE LENGTH OF THE FUSE BASE WILL BE PROVIDED TO PREVENT INTERPHASE SHORT CIRCUIT. THEY WILL BE SHROUDED FROM ALL SIDES TO PREVENT ACCIDENTAL CONTACT.
CURRENT TRANSFORMER SECONDARY SIDE SHORTING TERMINAL BOARD	CT SECONDARY WILL NEVER BE KEPT OPEN WHEN WHOLE CIRCUITRY IS NOT CONNECTED. CT SHORTING TERMINAL WILL BE PROVIDED TO SHORT THE CT WHEN REMOTE CIRCUIT ARE NOT CONNECTED.
REMOVABLE LIFTING FACILITY	EACH TRANSPORT WILL BE PROVIDED WITH REMOVABLE LIFTING FACILITY.
PANEL SEPARATION	EACH PANEL WILL BE FULLY SEPARATED FROM THE ADJACENT PANELS BY SHEET STEEL PARTITION EXCEPT FOR THE OPENINGS IN THE HORIZONTAL CHAMBERS AT TOP AND BOTTOM TO ENABLE BUSES AND CABLES TO PASS THROUGH.

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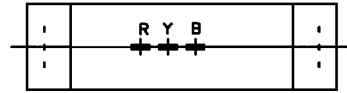
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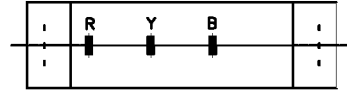
TECHNICAL SPECIFICATION

6. TOP MAIN BUSBAR CHAMBER:-

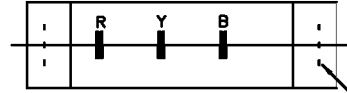
BUSBAR ARRANGEMENT IN TOP MAIN BUSBAR CHAMBER  
 (TYPICAL)



BUSBAR ARRANGEMENT-1  
 UP TO 600A

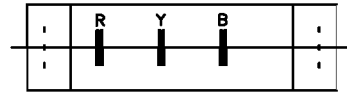


BUSBAR ARRANGEMENT-2  
 600A

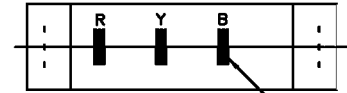


BUSBAR ARRANGEMENT-3  
 800A

CONTROL SUPPLY  
 BUSBARS

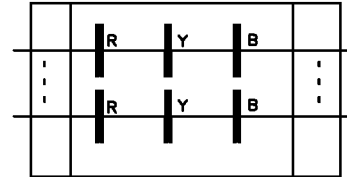


BUSBAR ARRANGEMENT-4  
 1000/1250A

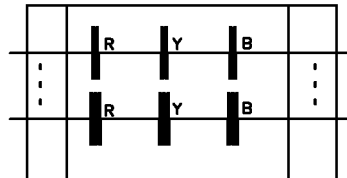


BUSBAR ARRANGEMENT-5  
 1600A

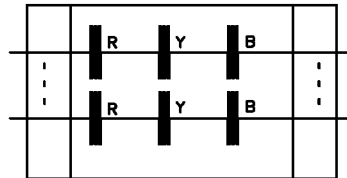
MAIN BUSBARS



BUSBAR ARRANGEMENT-6  
 2500A



BUSBAR ARRANGEMENT-7  
 3200A



BUSBAR ARRANGEMENT-8  
 4000A

SEPARATION

BUSBAR CHAMBER WILL BE SEPARATED FROM THE  
 BOTTOM SUCH THAT IT WILL NOT BE ACCESSABLE

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TITLE :  
 TECHNICAL SPECIFICATIONS  
 LT SWITCHGEAR

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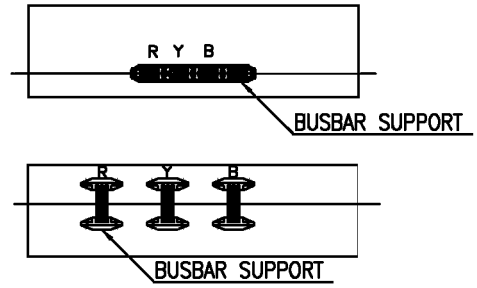
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TECHNICAL SPECIFICATION

ACCESSABILITY TO THE BUSBARS & BUSBAR JOINTS FROM MODULER CHAMBER  
 BUSBARS & BUSBAR JOINTS WILL BE ACCESSABLE FROM TOP, FRONT & REAR AFTER OPENING THEIR COVERS FOR PERIODIC MAINTENANCE

7. BUSBAR SUPORTING ARRANGEMENT

BUSBAR SUPORTING ARRANGEMENT (TYPICAL)



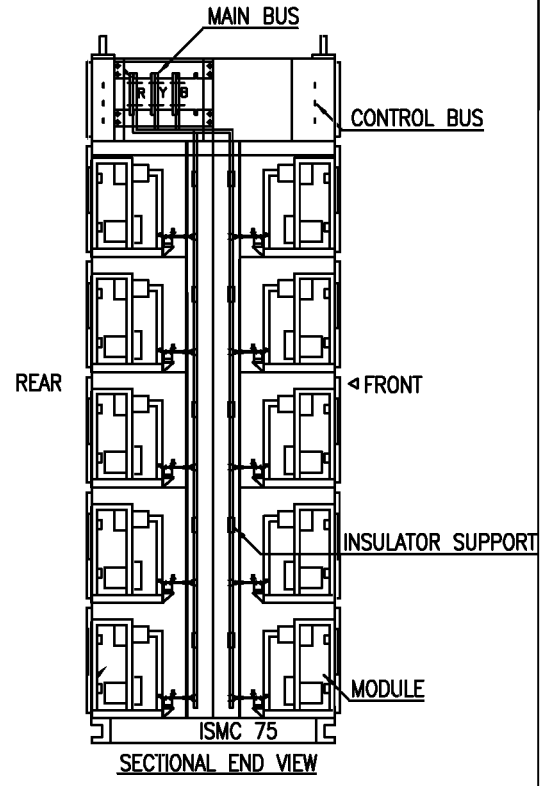
MATERIAL NON HYGROSCOPIC NON CORBORISING CORROSION RESISTANT SMC/POLYAMIDE


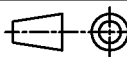
STRESS WITHSTANDABILITY SUPPORTS WILL WITH STAND THE STRESS ARISING OUT OF FULL SYSTEM FAULT CURRENT AS SPECIFIED FOR A PERIOD OF 1SECOND.

BUSBAR FIXING BUSBARS WILL BE SUPPORTED ON SMC SUPPORT WITH OUT BEING BOLTED TO THE SUPPORTS

8. VERTICAL BUSBAR CHAMBER:-

BUSBAR ARRANGEMENT IN VERTICAL BUSBAR CHAMBER (TYPICAL)



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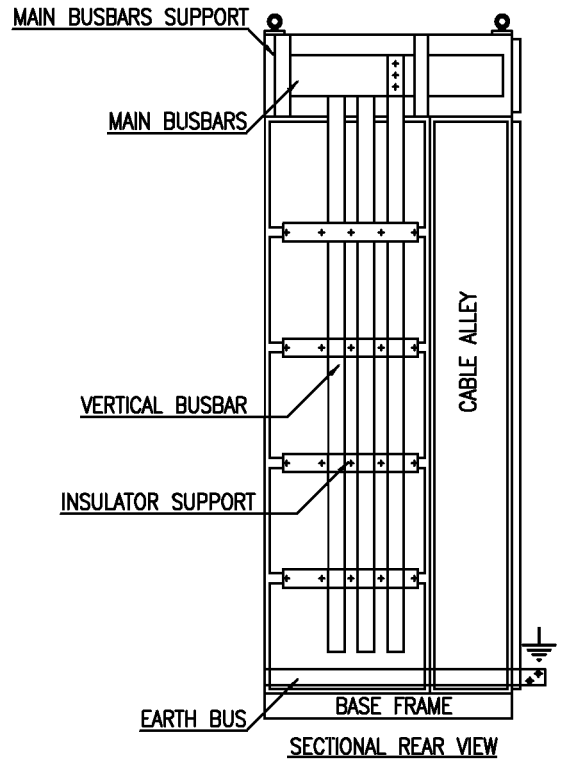
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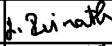
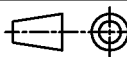
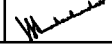
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TECHNICAL SPECIFICATION

BUSBAR ARRANGEMENT IN VERTICAL BUSBAR CHAMBER  
 (TYPICAL)



SEPARATION	VERTICAL BUSBAR CHAMBER WILL BE SEPARATED FROM THE CABLE ALLEY
STRESS WITHSTANDABILITY	SUPPORTS WILL WITH STAND THE STRESS ARISING OUT OF FULL SYSTEM FAULT CURRENT AS SPECIFIED FOR A PERIOD OF 1SECOND.
BUSBAR FIXING	BUSBARS WILL BE SUPPORTED ON SMC SUPPORT WITH OUT BEING BOLTED TO THE SUPPORTS

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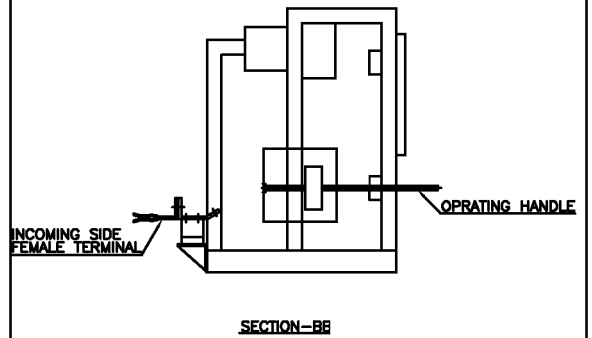
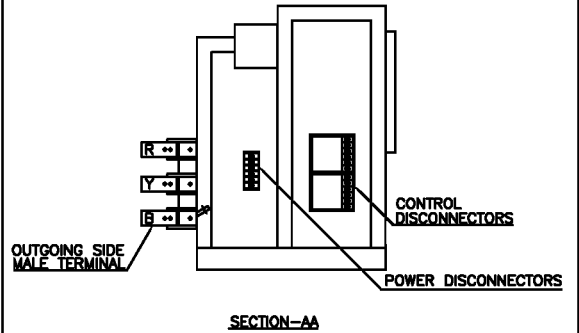
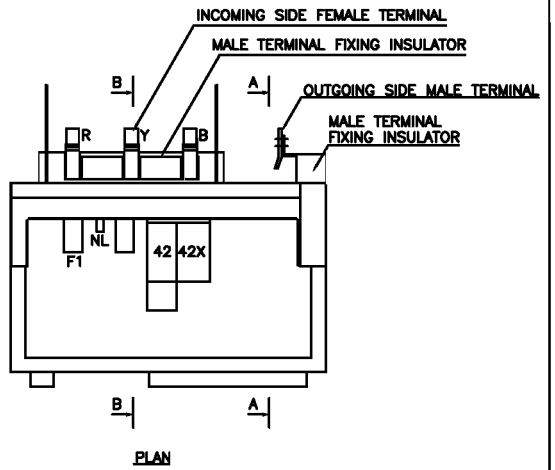
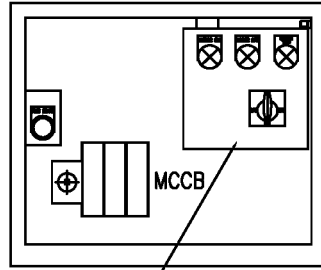
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TECHNICAL SPECIFICATION

9. DRAWOUT MODULES:-

DRAWOUT MODULES  
 (TYPICAL)



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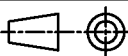
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TECHNICAL SPECIFICATION

FABRICATION MATERIAL	2MM THICK CRCA SHEET TO THE REQUIRED SHAPE
MODULE SIZES	MODULES SIZES WILL BE MULTIPLE ON BASIC MODULE SIZE HOWEVER MIN HEIGHT WILL BE 230MM
DRAWOUT FACILITY	MODULES WILL MOVE ON SLIDING RAILS PROVIDED BALL BEARING
INTERCHANGEABILITY	ALL IDENTICAL EQUIPMENT & CORRESPONDING PARTS INCLUDING CHASIS OF DRAWOUT MODULES OF SAME SIZE ARE INTERCHANGABLE WITHOUT HAVING TO CARRY OUT MODIFICATIONS
POWER DRAWOUT CONTACTS	MINIMUM RATING OF POWER DRAWOUT CONTACTS WILL BE 125A CONTACTS WILL BE ADEQUATELY SILVER PLATED
MAKING & BREAKING CONTACTS	AREA OF MAKING & BREAKING CONTACTS WILL BE PROVIDED WITH ENCLOSURE WITH SMC/EPOXY SHROUDS. RYB PHASES WILL ALSO BE SEPARATED BY THE SMC/EPOXY SHROUDS TO PREVENT ARC & HEAT TRAVEL FROM ONE PHASE TO OTHER
ISOLATED, TEST & SERVICE POSITIONS	DRAWOUT MODULES WILL BE PROVIDED THREE DISTINCT POSITIONS NAMED ISOLATED, TEST & SERVICE POSITIONS.
MODULES EARTHING	EFFECTIVE EARTHING OF THE MODULES WILL BE ESTABLISHED BEFORE THE MODULE IS TAKEN TO TEST TEST POSITION FROM ISOLATED POSITION
CONTROL DRAWOUT CONTACTS	PROVIDED WITH SELF ISOLATING, SLIDING TYPE CONTACTS THESE CONTACTS WILL BE COPPER DULY SILVER PLATED. ANTI TRACKING BARRIER WILL BE PROVIDED BETWEEN ADJECENT CONTACTS. CONTACTS WILL BE INDIVIDUALLY COVERTIBLE BETWEEN 1.CONTACTS WHICH MAKE CONTACT ONLY IN SERVICE POS. 2.CONTACTS WHICH MAKE CONTACT BOTH IN SERVICE POS. & TEST POSITION. 3.CONTACTS WHICH MAKE CONTACT ONLY IN TEST POS.

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TECHNICAL SPECIFICATION

INSTRUMENT PANEL

THE WITHDRAWABLE MODULES WILL BE PROVIDED WITH A SWING-OUT INSTRUMENT PANEL AT THE FRONT. IT WILL HINGED ON ITS RIGHT EDGE TO PROVIDE ACCESS TO THE COMPONENTS MOUNTED BEHIND IT. THE PLATE WILL BE OPENED UPTO AN ANGLE OF 110 DEGREE. A CUTOUT WILL BE PROVIDED IN THE COMPARTMENT DOOR TO ENABLE TO READ THE FLUSH MOUNTED METERS, RESET THE OVER LOAD RELAY ETC.

TROLLEY EARTHING

PHOSPHOR BRONZE EARTHING OR EQUIVALENT SYSTEM WILL BE USED TO PROVIDE POSITIVE DOUBLE EARTHING. THE CONTACTS WILL SCRAPE AGAINST THE ELECTRO PLATED EARTH PLATE CONNECTED TO THE EARTH BUS. THE SYSTEM WILL ENSURE EARTHING BEFORE THE MAIN CONTACTS MAKE AND BREAKING AFTER THE MAIN CONTACTS BREAK.

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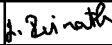
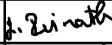
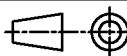

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TECHNICAL SPECIFICATION

10. MAIN BUSBARS:-			
MATERIAL		ALUMINIUM ALLOY 63401WP(E91E) AS PER IS:5082	
MAKE		HINDALCO/JINDAL	
NO OF BUSBARS & CROSS SECTION THROUGH OUT THE SWITCHBOARD		NO OF BUSBARS & SIZE WILL BE PROVIDED AS PER TYPE TESTED. BUSBAR CROSS SECTION WILL BE OF SAME THROUGH OUT THE LENGTH OF THE SWITCH BOARD. DIFFERENT CROSS SCTIONS IS NOT ACCEPTABLE	
RATING	NOS	SIZE PER PHASE WIDTH x THICK	
4000A	8	150MMx6MM	
3000A	6	150MMx6MM	
2500A	4	150MMx6MM	
1600A	3	100MMx6MM	
1000A	2	100MMx6MM	
630A	2	50.8MMx6.35MM	
UPTO 600A	1	50.8MMx12.7MM	
MAXIMUM TEMP RISE		BUSBAR CONTACTS & DROPPERS AT AN AMBIENT OF 50°C WILL NOT EXCEED 40°C AT 90% OF RATED CURRENT	
BUSBAR SLEEVES		1100V GRADE HEAT SHRINKABLE PVC COLOUR: BLACK WITH RYB BANDS AT REGULAR INTERVALS	
BUSBAR JOINTING		BUSBAR JOINTS WILL BE PROVIDED WITH HIGH TENSILE STEEL BOLTS, NUTS & WASHERS	
SHROUDS		ALL ACCESSIBLE BUSBAR JOINTS WILL BE PROVIDED WITH REMOVABLE SHROUDS OF SMC/DMC/POLYAMIDE. ENTIRE TAP OFFS & FISH PLATE JOINTS WHERE THE SLEEVES ARE REMOVED FOR MAKING CONNECTIONS ARE COVERED BY CLIP ON TYPE EPOXY/ SMC SHROUDS	
LIVE CONNECTIONS		ALL LIVE CONNECTIONS FROM BUSBAR UPTO SWITCHES	
UNWANTED DRILLING		BUSBARS WILL NOT BE DRILLED ANY WHERE EXCEPT FOR THE FISH PLATE CONNECTIONS	
BUSBAR CLEARANCE		1. PHASE TO PHASE: 25MM 2. PHASE TO NEUTRAL: 25MM 3. PHASE TO EARTH: 25MM 4. NEUTRAL TO EARTH: 25MM	

JOB NO.:		CR-14-018				<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPROCELAIN DIVISION BANGALORE	
DEGND.	TRINATH		20.05.14	DEPT.	CODE	TITLE :	
DRN.						TECHNICAL SPECIFICATIONS LT SWITCHGEAR	
CHKD.	TRINATH		20.05.14			DRG. NO. :	EP-4-TS-018-001
APPD.	KS BALA		20.05.14	REV. NO. :		00	
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REV. 01 DATE :  
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TECHNICAL SPECIFICATION

11. VERTICAL BUSBARS:-

MATERIAL	ALUMINIUM ALLOY 63401WP(E91E) AS PER IS:5082		
MAKE	HINDALCO/JINDAL		
NO OF BUSBARS & SIZE APPLICABLE FOR ALL PANELS IRRESSPECTIVE OF NOS AND RATING OF MODULES	NO OF BUSBARS & SIZE WILL BE PROVIDED AS PER TYPE TESTED		
	NOS	SIZE PER PHASE WIDTH x THICK(MIN)	NOS
	1	50MMx12MM	4
MAXIMUM TEMP RISE	BUSBAR CONTACTS & DROPPERS AT AN AMBIENT OF 50°C WILL NOT EXCEED 40°C AT 90% OF RATED CURRENT		
BUSBAR SUPPORT	NON HYGROSCOPIC NON CORBORISING CORROSION RESISTANT SMC/POLYAMIDE		
BUSBAR SLEEVES	1100V GRADE HEAT SHRINKABLE PVC COLOUR: BLACK WITH RYB BANDS		
BUSBAR JOINTING	BUSBAR JOINTS WILL BE PROVIDED WITH HIGH TENSILE STEEL BOLTS, NUTS & WASHERS		
SHROUDS	ALL ACCESSIBLE BUSBAR JOINTS WILL BE PROVIDED WITH REMOVABLE SHROUDS OF SMC/DMC/POLYAMIDE.		
LIVE CONNECTIONS	ALL LIVE CONNECTIONS FROM BUSBAR UPTO SWITCHES WILL BE SHROUDED IN ORDER TO AVOID ACCIEDENTS		
BUSBAR CLEARENCE	1. PHASE TO PHASE: 25MM 2. PHASE TO NEUTRAL: 25MM 3. PHASE TO EARTH: 25MM 4. NEUTRAL TO EARTH: 25MM		
COPPER BUSBARS	COPPER BUSBARS ARE ALSO ACCEPTABLE IF THE SAME IS THE MANUFACTURERS STANDARD IN THAT CASE THE TAP OFF JOINTS WILL BE PROVIDED WITH BIMETALLIC STRIPS AND THE COPPER PART OF THE JOINT IS SILVER/TIN PLATED		

12. CONTROL BUS & SPACE HEATER BUS:-

MATERIAL	TINNED COPPER
SIZE FOR SPACE HEATER, MOTOR SPACE HEATER BUS 240V AC/110V	MINIMUM 6MMx3MM THK FOR PHASE & NEUTRAL
SIZE FOR BREAKER CONTROL, INDICATION, ELR BUS 220V DC	MINIMUM 6MMx3MM THK FOR +VE & -VE
SIZE FOR MOTOR WINDING HEATING BUS 24V AC	6MMx3MM THK FOR PHASE & NEUTRAL

13. EARTH BUS:-

MATERIAL	GI FLAT
	50MMx10MM

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CR-14-018

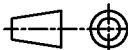


BHARAT HEAVY ELECTRICALS LIMITED  
ELECTROPROCELAIN DIVISION BANGALORE

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DEGND.	TRINATH	<i>J. Trinath</i>	20.05.14		
DRN.					
CHKD.	TRINATH	<i>J. Trinath</i>	20.05.14		
APPD.	KS BALA	<i>M. K. Bala</i>	20.05.14		

TITLE :  
TECHNICAL SPECIFICATIONS  
LT SWITCHGEAR

DRG. NO. : EP-4-TS-018-001  
REV. NO. : 00



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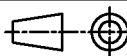
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**TECHNICAL SPECIFICATION**

<b>14. EARTHING:-</b>	
<b>EARTHING</b>	MAIN EARTH BUS WILL BE BROUGHT THROUGH OUT THE LENGTH OF THE PANEL & EXTENDED ON BOTH ENDS TO FACILITATE CUSTOMER EARTH CONNECTION WITH M10 BOLTS AND NUTS.
	EVERY METAL PART OTHER THAN THOSE FORMING PARTS OF AN ELECTRICAL CIRCUIT WILL BE CONNECTED TO THE EARTH BUS BY MEANS OF HIGH CONDUCTIVITY CU WIRE.
	THE CORE OF TRANSFORMER BUS PT, LINE PT CONTROL SUPPLY PT 24V WINDING HEATING PT ETC WILL BE EARTHED THROUGH COPPER WIRE.
	METALLIC CASES OF INSTRUMENTS, RELAYS, SWITCHES AND OTHER ASSOCIATED COMPONENTS MOUNTED IN THE SWITCHBOARD WILL BE CONNECTED TO THE EARTH BUSBAR BY COPPER WIRE NOT LESS THAN 2.5 SQMM.
	EARTHING OF CIRCUIT BREAKER WILL BE SLIDING TYPE OF ROBUST SPRING LOADED TINNED COPPER CONTACT. ONE SIDE OF CONTACT WILL BE CONNECTED MAIN EARTH BUSBAR.
	DOORS WILL HAVE A FLEXIBLE COPPER WIRE CONNECTED TO THE FIXED UNIT.

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CHKD.	TRINATH	<i>J. Trinath</i>	20.05.14			DRG. NO. :	<b>EP-4-TS-018-001</b>		REV. NO. : 00
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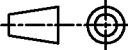
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<b>15. POWER WIRING:-</b>			
<b>MATERIAL</b>		ALUMINIUM/COPPER ELECTROLYTIC GRADE	
<b>MAKE</b>		ANY ISI APPROVED MAKE	
<b>NO OF BUSBARS &amp; CROSS SECTION IN INCOMER &amp; BUSCOUPLER PANELS</b>		NO OF BUSBARS & SIZE WILL BE PROVIDED AS PER TYPE TESTED. BUSBAR CROSS SECTION WILL BE OF SAME FROM MAIN BUSBAR TAPPING TO THE OUTGOING CONNECTION. DIFFERENT CROSS SECTIONS IS NOT ACCEPTABLE	
<b>RATING AMPS</b>	<b>NOS</b>	<b>SIZE PER PHASE WIDTH x THICK</b>	
4000A	8	150MMx6MM	
3000A	6	150MMx6MM	
2500A	4	150MMx6MM	
1600A	3	100MMx6MM	
1000A	2	100MMx6MM	
630A	2	50.8MMx6.35MM	
<b>ACB CONTROLLED MOTOR FEEDERS</b>		<b>NOS</b>	<b>SIZE PER PHASE WIDTH x THICK</b>
<b>KW RATING</b>			
125-160KW	2	50MMx6MM	
<b>BI-DIRECTIONAL &amp; UNIDIRECTIONAL MOTOR FEEDERS</b>			
124.9-110.1	1	50.8MMx12.7MM	
110.0-80.1	1	50.8MMx6.35MM	
80.0-55.1	1	25MMx6MM	
55.0-37.1	1	19MMx6MM	
37.0-30.1	1	19MMx6MM	
<b>KW RATING</b>	<b>NOS</b>	<b>SIZE OF PVC COPPER CABLE PER PHASE</b>	
29.9-24.1	1	16SQMM	
24.0-13.1	1	16SQMM	
13.0-7.1	1	6SQMM	
7.0-5.6	1	6SQMM	
UP TO 5.6	1	4SQMM	
<b>SFU &amp; SFC FEEDERS</b>		<b>RATING AMPS</b>	<b>NOS</b>
		<b>SIZE PER PHASE WIDTH x THICK</b>	
400A	1	50.8MMx12.7MM	
250A	1	50.8MMx6.35MM	
200A	1	38MMx6MM	
125A	1	19MMx6MM	
100A	1	19MMx6MM	
<b>KW RATING</b>	<b>NOS</b>	<b>SIZE OF PVC COPPER CABLE PER PHASE</b>	
63A&32A	1	16 SQMM	
25A&16A	1	10 SQMM	
<b>DC FEEDERS</b>		<b>RATING AMPS</b>	<b>NOS</b>
		<b>SIZE FOR +VE &amp; -VE WIDTH x THICK</b>	
400A	1	50.8MMx6.35MM	
200A	1	38MMx6MM	
125A	1	19MMx6MM	
50A	1	16 SQMM PVC COPPER CABLE	
UPTO 32A	1	10 SQMM PVC COPPER CABLE	

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<b>DEGND.</b>	<b>NAME</b>	<b>SIGN.</b>	<b>DATE</b>	<b>DEPT.</b>	<b>CODE</b>	<b>TITLE :</b>					
	TRINATH	<i>J. Trinath</i>	20.05.14			TECHNICAL SPECIFICATIONS					
<b>DRN.</b>						LT SWITCHGEAR					
<b>CHKD.</b>	TRINATH	<i>J. Trinath</i>	20.05.14			<b>DRG. NO. :</b>	<b>EP-4-TS-018-001</b>		<b>REV. NO. :</b>	00	
<b>APPD.</b>	KS BALA	<i>M. K. Bala</i>	20.05.14			<b>SCALE :</b>	N.T.S.	<b>SHEET NO. :</b>	18	<b>NO. OF SHEETS :</b>	20

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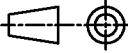
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TECHNICAL SPECIFICATION

16. CONTROL WIRING:-	
TYPE OF WIRE SIZE	1100 VOLT GRADE MULTI STRANDED FLEXIBLE FLAME RETARDANT, PVC INSULATED COPPER CONDUCTOR WIRE.
	CONTROL CIRCUITS:- 1.5 SQ. MM
	C.T. & P.T. CIRCUITS: 2.5 SQ. MM
	SPACE HEATER CIRCUITS: 2.5 SQ. MM
	AC & DC CIRCUITS: 1.5 SQ. MM
	EARTH WIRE: 2.5 SQ. MM
COLOUR	CONTROL CIRCUITS:- BLACK FOR AC, GREY FOR DC AS PER CUSTOMER APPROVAL
	C.T. & P.T. CIRCUITS: R, Y, B & BLACK
	SPACE HEATER CIRCUITS: BLACK
	AC & DC CIRCUITS: BLACK FOR AC, GREY FOR DC
	EARTH WIRE: GREEN
TYPE OF POWER TERMINALS	CLAMP TYPE UP TO 10 SQMM, BOLTED (STUD) TYPE FOR ABOVE 10 SQMM CABLES
TYPE OF CONTROL TERMINALS	SELF ALIGNING TYPE FOR DRAWOUT TYPE MODULES
	CAGE CLAMP TYPE FOR NON DRAWOUT TYPE MODULES
	DISCONNECTING TYPE FOR CT CIRCUITS
CABLE TERMINATION	20% SPARE TERMINALS ARE PROVIDED
	INTERPANEL WIRING WILL BE IDENTIFIED AT BOTH ENDS BY SINGLE SLEEVE FERRULES GIVEN DETAIL AS PER DRAWINGS
	SPARE CONTACTS OF ALL CONTACTORS & RELAYS WILL BE WIRED TO THE TERMINAL BOARD
	ALL SPARE CONTACTS OF ALL CONTACTOR AND RELAY WILL BE WIRED UP TO THE TERMINAL BLOCK.
CABLE GLANDS(SUPPLIED LOOSE)	MATERIAL: BRASS, NICKEL PLATED
	TYPE: DOUBLE COMPRESSION
TERMINAL LUGS(SUPPLIED LOOSE)	MATERIAL: ANNEALED TINNED COPPER
TECHNICAL SPECIFICATION ELECTRICAL COMPONENTS	REFER DRG NO. BHEL DRAWING NO.: EP-4-TS-018-002
MAKE OF COMPONENTS	REFER DRG NO. BHEL DRAWING NO.: EP-4-MC-018-001
LABELS	REFER DRG NO. BHEL DRAWING NO.: EP-4-LL-018-001

JOB NO.:						BHARAT HEAVY ELECTRICALS LIMITED		
CR-14-018						ELECTROPROCELAIN DIVISION BANGALORE		
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	TRINATH	<i>J. Trinath</i>	20.05.14			TECHNICAL SPECIFICATIONS LT SWITCHGEAR		
DRN.								
CHKD.	TRINATH	<i>J. Trinath</i>	20.05.14			DRG. NO. :	REV. NO. : 00	
APPD.	KS BALA	<i>M. Bala</i>	20.05.14			EP-4-TS-018-001		
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TECHNICAL SPECIFICATION

17. PAINTING:-

FRAME STRUCTURES, DOORS, COVERS ETC.  
 CHASSIS, GLAND PLATE, PARTITIONS & SHROUDS

PAINT: EPOXY POWDER COATING.  
 EXTERIOR AND INTERIOR SHADE:  
 LIGHT GREY SHADE IS:631 AS PER IS:5-1994  
 FINISH: SEMI GLOSSY

BASE CHANNEL

PAINT: SYNTHETIC ENAMEL, SHADE: BLACK

JOB NO.:

CR-14-018



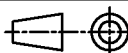
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 ELECTROPROCELAIN DIVISION BANGALORE

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DEGND.	TRINATH	<i>J. Trinath</i>	20.05.14		
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CHKD.	TRINATH	<i>J. Trinath</i>	20.05.14		
APPD.	KS BALA	<i>M. K. Bala</i>	20.05.14		

TITLE :  
 TECHNICAL SPECIFICATIONS  
 LT SWITCHGEAR

DRG. NO. : **EP-4-TS-018-001**

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	REV. DATE :	ALTERED :



**INDIA POWER CORPORATION (HALDIA)LIMITED  
HALDIA**

PROJECT:

**3x150 MW COAL BASED POWER PLANT HALDIA**

CUSTOMER CONSULTANT:



DEVELOPMENT CONSULTANT PVT LTD

**DEVELOPMENT CONSULTANT PVT LTD  
KOLKATA**

JOB NO.:						BHARAT HEAVY ELECTRICALS LIMITED ELECTROPROCELAIN DIVISION BANGALORE	
CR-14-018						TITLE :	
DEGND.	NAME	SIGN.	DATE	DEPT.	CODE	MAKE OF COMPONENTS	
	JAGADISH	<i>Jagadish</i>	20.05.14				
DRN.							
CHKD.	TRINATH	<i>Trinath</i>	20.05.14			DRG. NO. :	REV. NO. : 02
APPD.	KS BALA	<i>Ks Bala</i>	20.05.14			EP-4-MC-018-001	
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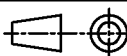
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MAKE OF COMPONENTS	
COMPONENTS DESCRIPTION	MAKE
AIR CIRCUIT BREAKER	SCHNEIDER
	L&T
	SEIMENS
	ABB
AMMETER VOLTMETER	AUTOMATIC ELECTRIC
	SECURE
	RISHAB INDUSTRIAL
CONTACTOR	SCHNEIDER
	L&T
	SEIMENS
	ABB
CURRENT TRANSFORMER CONTROL TRANSFORMERS POTENTIAL TRANSFORMERS	KAPPA ELECTRICALS
	PRAGATI ELECTRICALS
	PRECISE ELECTRICALS
	AUTOMATIC ELECTRIC
CABLE LUGS CABLE GLANDS	REPUTED MAKE
ENERGY METER MULTIFUNCTION METER	AUTOMATIC ELECTRIC
	SECURE
	RISHAB INDUSTRIAL

MAKE OF COMPONENTS	
COMPONENTS DESCRIPTION	MAKE
FUSE BASE	GE POWER
	L&T
	SIEMENS
	SCHNEIDER
	ABB
ETHERNET SWITCH	REPUTED MAKE
FUSE	GE POWER
	SIEMENS
	L&T
	SCHNEIDER
	ABB
	COPPER BUSSMANN
INDICATING LAMPS(LED)	REPUTED MAKE
INTERPOSING RELAYS	OEN
MCCB MOULDED CASE CIRCUIT BREAKER	SCHNEIDER
	L&T
	SEIMENS
	ABB
MPCB MOTOR PROTECTION CIRCUIT BREAKER	SCHNEIDER
	L&T
	SEIMENS
	ABB
MCB MINIATURE CIRCUIT BREAKER	SCHNEIDER
	L&T
	SEIMENS
	ABB

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DRN.						MAKE OF COMPONENTS	
CHKD.	TRINATH	<i>Trinath</i>	20.05.14			DRG. NO. :	EP-4-MC-018-001
APPD.	KS BALA	<i>Ks Bala</i>	20.05.14			REV. NO. :	02
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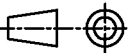
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REV. DATE :	ALTERED :

INVENTORY NO. :	ALTERED :
REV. 01 DATE :	ALTERED :

MAKE OF COMPONENTS	
COMPONENTS DESCRIPTION	MAKE
PUSH BUTTON	REPUTED MAKE
RELAYS (NUMERICAL)	ABB
	ALSTOM LTD
	GE
RELAYS (ELECTRO MECHANIC)	ABB
	ALSTOM LTD
SELECTOR SWITCH	KAYCEE
	SALZER (L&T)
TRANSDUCER	AUTOMATIC ELECTRIC
	SECURE
	RISHAB INDUSTRIAL
THERMAL OVER LOAD RELAY	SCHNEIDER
	L&T
	SEIMENS
	ABB
FUSE SWITCH UNIT	L&T
	GE POWER
	SIEMENS
	SCHNEIDER
	ABB
THERMOSTAT	REPUTED MAKE

JOB NO.:						<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPROCELAIN DIVISION BANGALORE	
CR-14-018						TITLE :  MAKE OF COMPONENTS	
DEGND.	JAGADISH	<i>Jagadish</i>	20.05.14	DEPT.	CODE	DRG. NO. : <b>EP-4-MC-018-001</b> REV. NO. : 02	
DRN.							
CHKD.	TRINATH	<i>Trinath</i>	20.05.14			SCALE : N.T.S.      SHEET NO. : 03      NO. OF SHEETS : 03	
APPD.	KS BALA	<i>Ks Bala</i>	20.05.14				



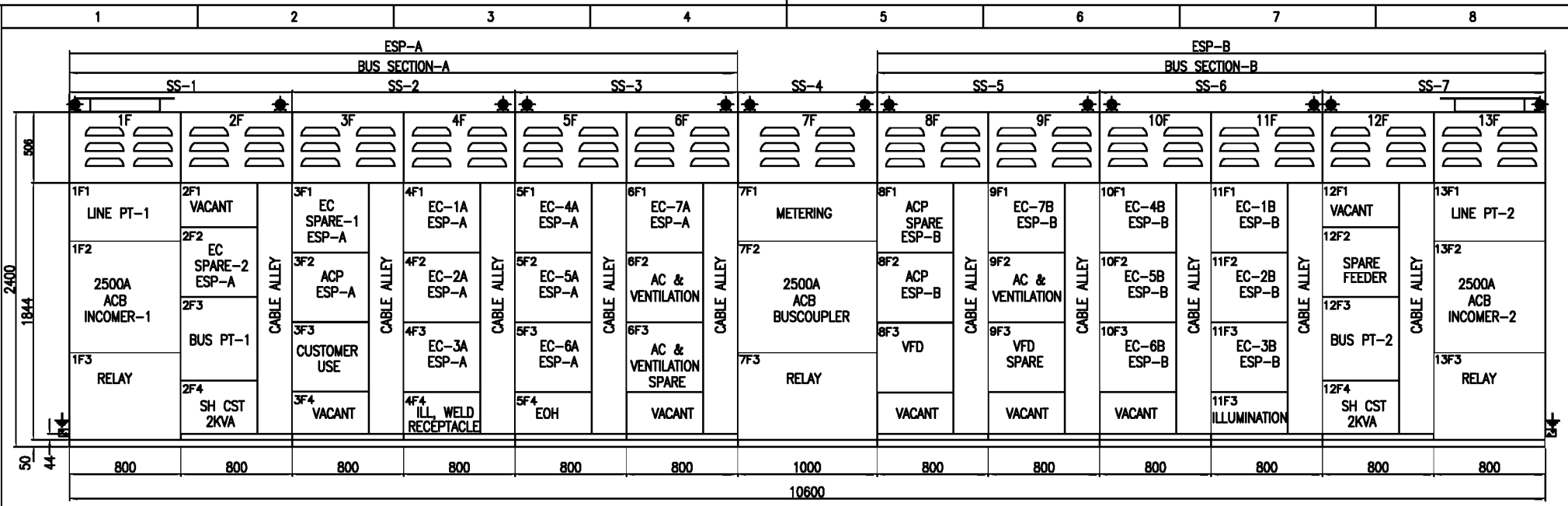
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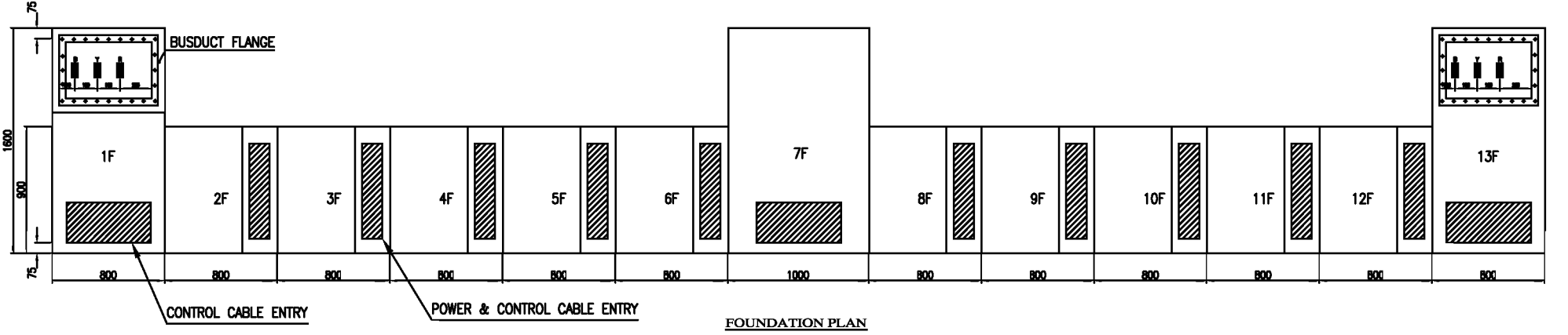
DRG. NO.

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.



FRONT VIEW



FOUNDATION PLAN

INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
07									
08									
05							DESIGNED	JAGADISH	31.05.14
04							DRAWN		
03							CHECKED	TRINATH	31.05.14
02									
01	05.08.14		REVISED				CHECKED	TRINATH	31.05.14
							APPROVED	KS BALA	31.05.14



DIR :  
FILE NO.:

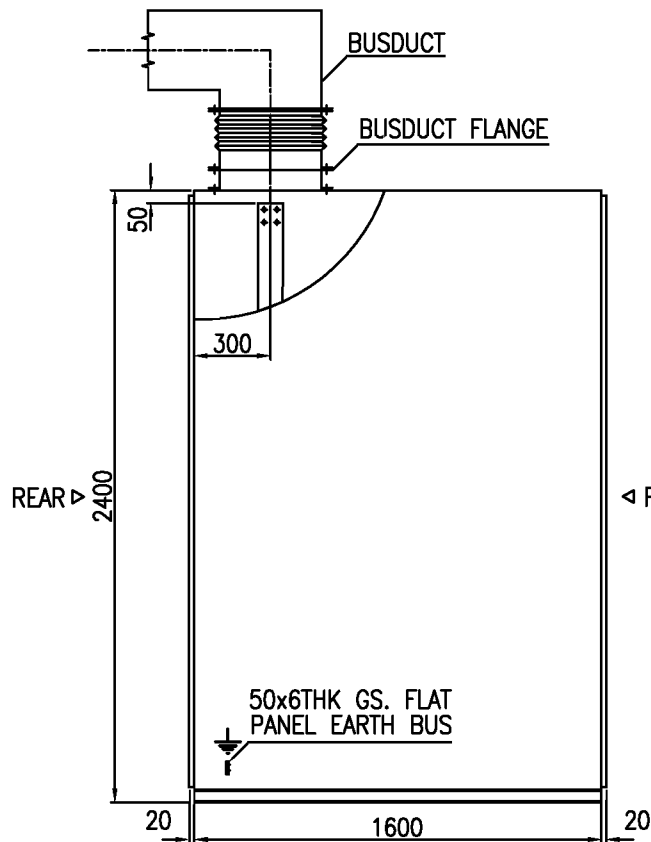
BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION, BANGALORE		NO. OF SHEETS 03	
		SHEET. NO. 02	
TITLE : GENERAL ARRANGEMENT LT MAIN SWITCH BOARD		REV. 0B	
SCALE	JOB NO. CR-14-018	DRG. NO.	EP-3-GA-018-001

FIRST ANGLE PROJECTION

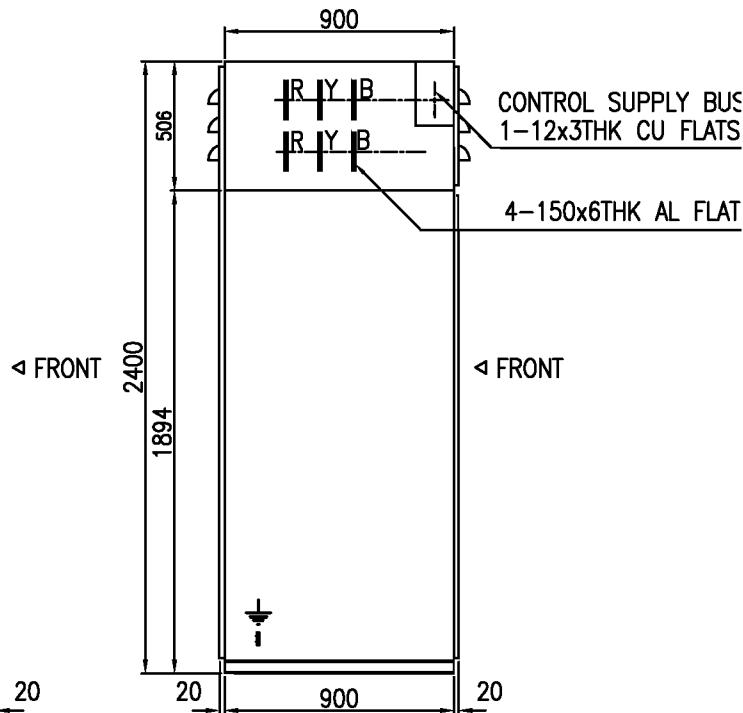
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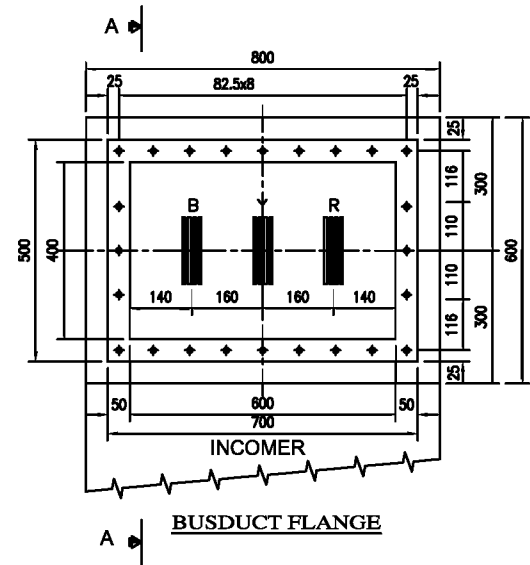
DRG. NO. EP-3-GA-018-001



END VIEW  
INCOMER



END VIEW  
OUTGOING FEEDERS



BUSDUCT FLANGE

INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
07									
06									
05							DESIGNED	JAGADISH	22.05.14
04							DRAWN		
03							CHECKED	TRINATH	22.05.14
02							APPROVED	KS BALA	22.05.14
01	05.08.14		REVISED						



BHARAT HEAVY ELECTRICALS LIMITED  
ELECTROPORCELAIN DIVISION, BANGALORE

TITLE : GENERAL ARRANGEMENT  
LT MAIN SWITCH BOARD



NO. OF SHEETS	03
SHEET. NO.	03

SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-GA-018-001	REV. 08
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FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

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INDIA POWER CORPORATION (HALDIA)LIMITED  
 HALDIA

PROJECT:



3x150 MW COAL BASED POWER PLANT HALDIA

CUSTOMER CONSULTANT:



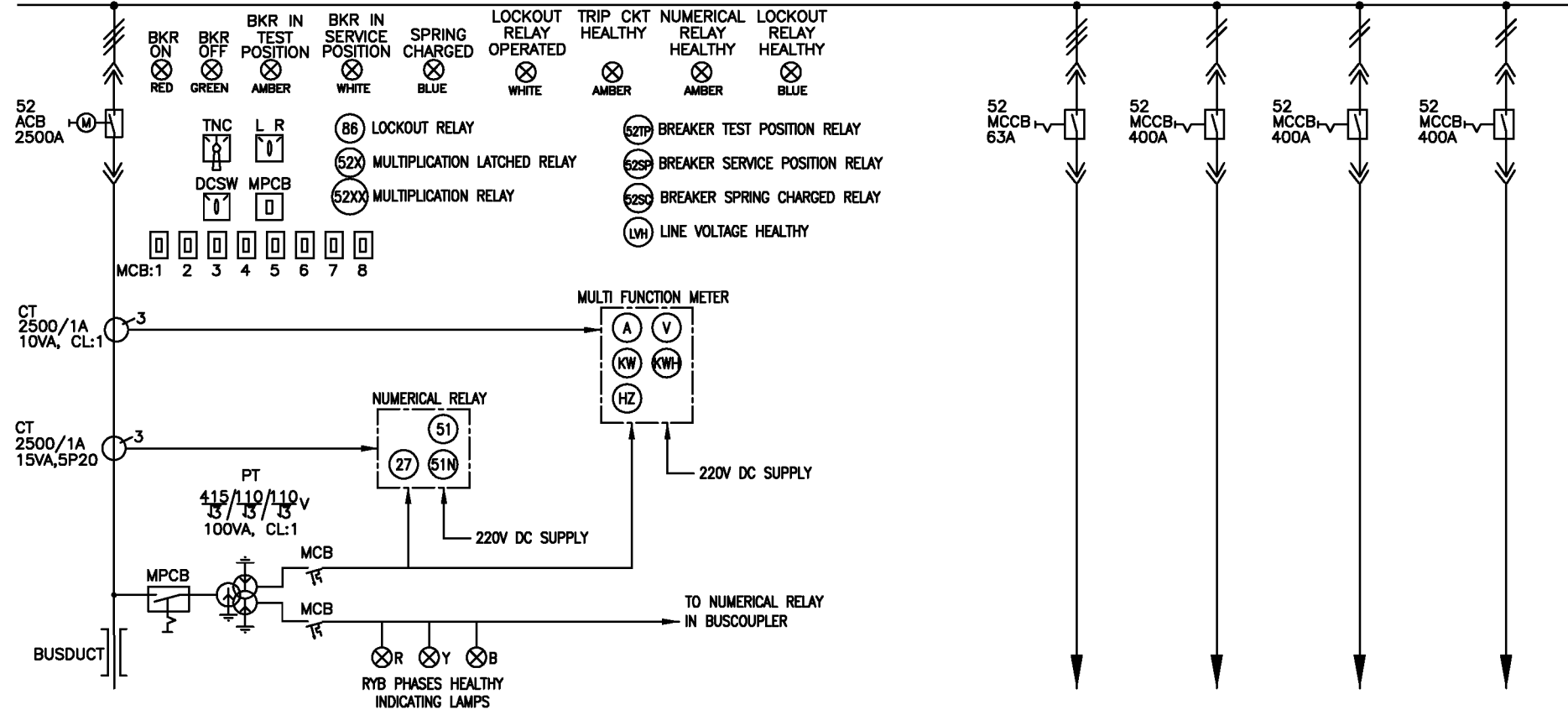
DEVELOPMENT CONSULTANT PVT LTD  
 KOLKATA

DRG. NO. EP-3-SL-018-001

INVENTORY NO.	07										BHARAT HEAVY ELECTRICALS LIMITED				
	06										ELECTROPORCELAIN DIVISION BANGALORE				
	05										TITLE : SINGLE LINE DIAGRAM				NO. OF SHEETS 06
	04										LT MAIN SWITCH BOARD				SHEET. NO. 01
03										DIR :					
02										FILE NO.:					
0A	05.08.14	REVISED									SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-SL-018-001	REV. 0A	
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA									

1 2 3 4 5 6 7 8

415V, 2500A, 3PHASE, 3WIRE, 50HZ, 50KA FOR 1SEC ALUMINIUM MAIN BUS-A



DESCRIPTION	INCOMER-1	LIGHTING, WELDING & RECEPTACLE	CUSTOMER USE	EC-1A, ESP-A	EC-2A, ESP-A
RATING	2500A	63A	250A	183A	183A
FEEDER NO.	1F2	4F4	3F3	4F1	4F2
SCHEME REF.	EP-3-CS-018-001			EP-3-CS-018-004	

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DRG. NO. EP-3-SL-018-001

INVENTORY NO.	07									
	06									
	05									
	04									
	03									
02										
0A	05.08.14	REVISED								
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA				

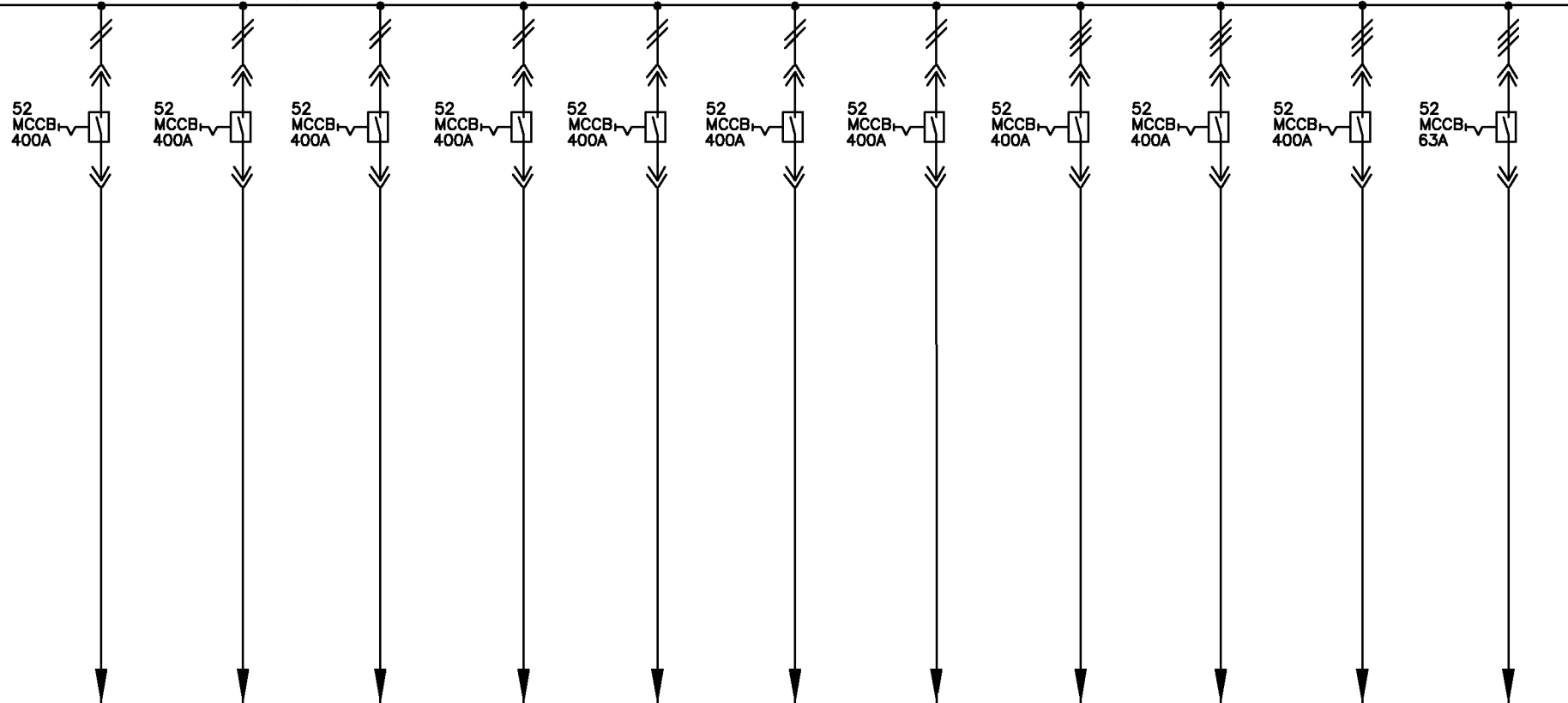
BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE		TITLE : SINGLE LINE DIAGRAM LT MAIN SWITCH BOARD		NO. OF SHEETS	06
				SHEET. NO.	02
SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-SL-018-001	REV. 0A		

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

1 2 3 4 5 6 7 8

415V, 2500A, 3PHASE, 3WIRE, 50HZ, 50KA FOR 1SEC ALUMINIUM MAIN BUS-A





DESCRIPTION	EC-3A, ESP-A	EC-4A, ESP-A	EC-5A, ESP-A	EC-6A, ESP-A	EC-7A, ESP-A	EC-SPARE-1 ESP-A	EC-SPARE-2 ESP-A	ACP, ESP-A	AC & VENTILATION	AC & VENTILATION SPARE	ELECTRIC HOIST
RATING	183A	183A	183A	183A	183A	183A	183A	182A			7.5KW
FEEDER NO.	4F3	5F1	5F2	5F3	6F1	3F1	2F2	3F2	6F2	6F3	5F4
SCHEME REF	EP-3-CS-018-004										EP-3-CS-018-004

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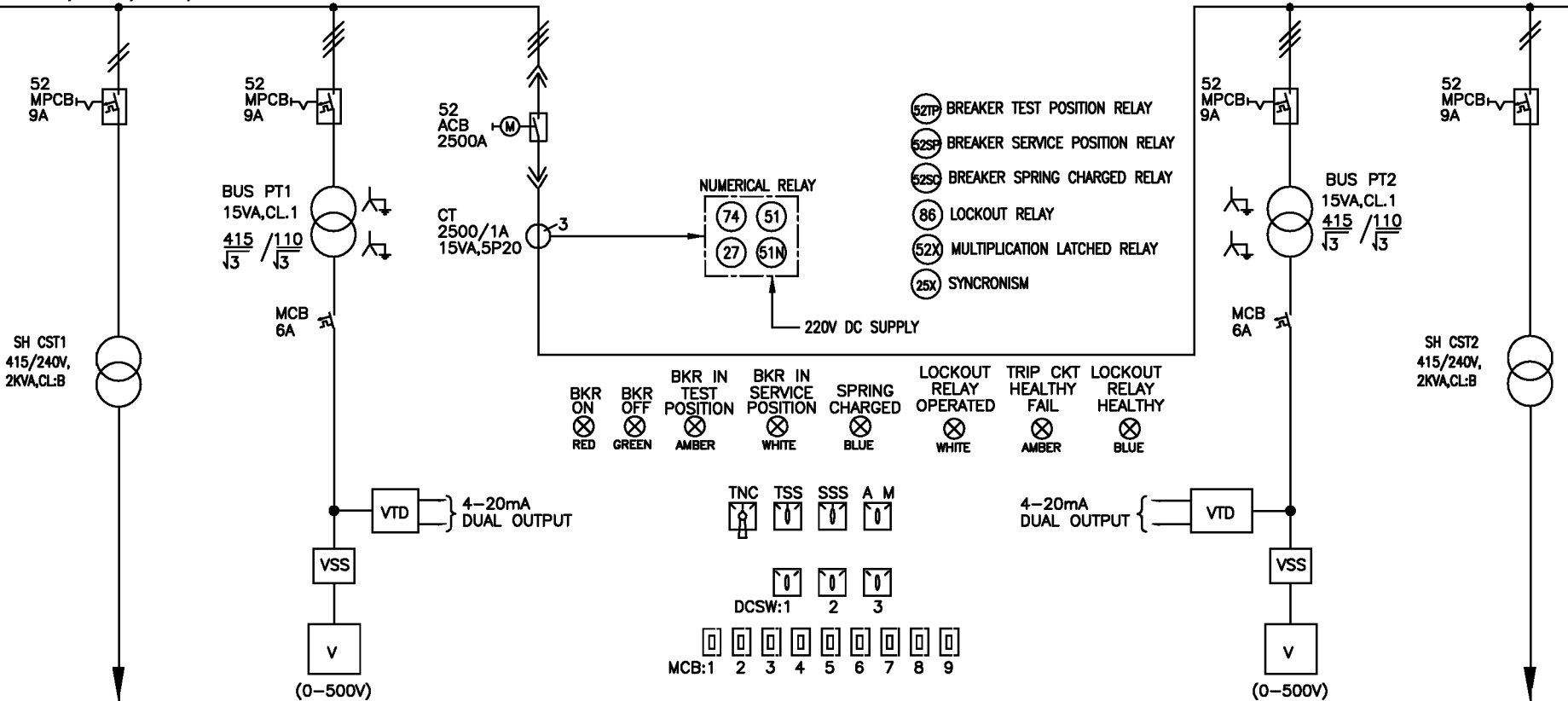
DRG. NO. EP-3-SL-018-001

INVENTORY NO.	07								
	06								
	05								
	04								
	03								
02									
0A	05.08.14	REVISED							
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA	20.05.14		

		BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE			
		TITLE : SINGLE LINE DIAGRAM LT MAIN SWITCH BOARD			
SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-SL-018-001	DIR :	REV. 0A	
			FILE NO.:		

1 2 3 4 5 6 7 8

415V, 2500A, 3PHASE, 3WIRE, 50HZ, 50KA FOR 1SEC ALUMINIUM MAIN BUS-A



DESCRIPTION	SH CST-1	BUS PT-1	BUSCOUPLER	BUS PT-2	SH CST-2
RATING			2500A		
FEEDER NO.	2F3	2F2	7F	12F3	12F4
SCHEME REF	EP-3-CS-018-005	EP-3-CS-018-005	EP-3-CS-018-002	EP-3-CS-018-005	EP-3-CS-018-005

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DRG. NO. EP-3-SL-018-001

INVENTORY NO.	07								
	06								
	05								
	04								
	03								
02									
0A	05.08.14	REVISED							
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA	20.05.14	DIR : FILE NO.:	

**BHARAT HEAVY ELECTRICALS LIMITED**  
 ELECTROPORCELAIN DIVISION BANGALORE

**TITLE :**  
 SINGLE LINE DIAGRAM  
 LT MAIN SWITCH BOARD

NO. OF SHEETS: 06  
 SHEET. NO.: 04

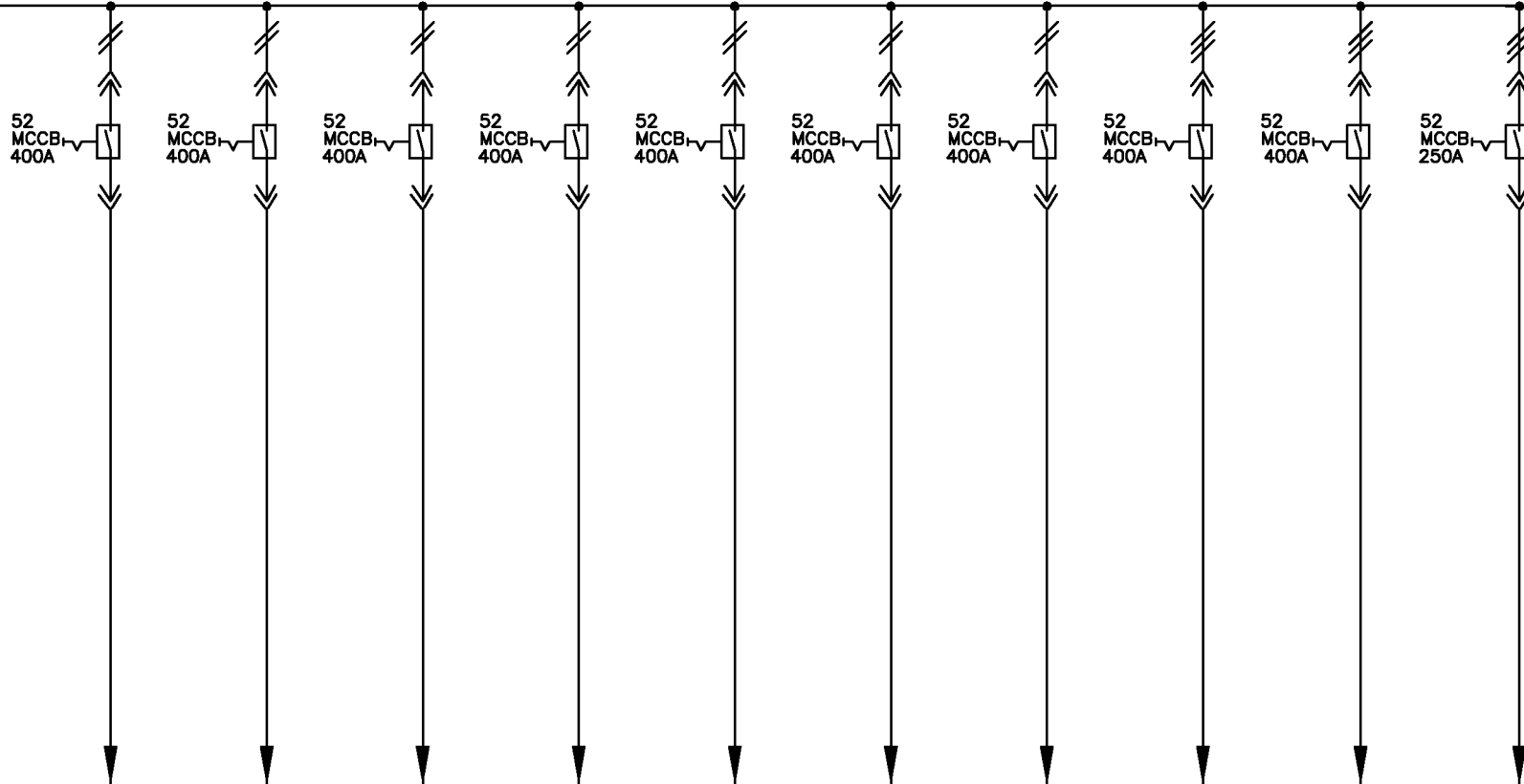
SCALE:      JOB NO. CR-14-018      DRG. NO. EP-3-SL-018-001      REV. 0A

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

1 2 3 4 5 6 7 8

415V, 2500A, 3PHASE, 3WIRE, 50HZ, 50KA FOR 1SEC ALUMINIUM MAIN BUS-B



DESCRIPTION	EC-1B, ESP-B	EC-2B ESP-B	EC-3B ESP-B	EC-4B ESP-B	EC-5B ESP-B	EC-6B ESP-B	EC-7B ESP-B	ACP	ACP-SPARE	VFD
RATING	183A	183A	183A	183A	183A	183A	183A	182A	182A	
FEEDER NO.	11F1	11F2	11F3	10F1	10F2	10F3	10F4	8F2	8F1	8F3
SCHEME REF	EP-3-CS-018-004									

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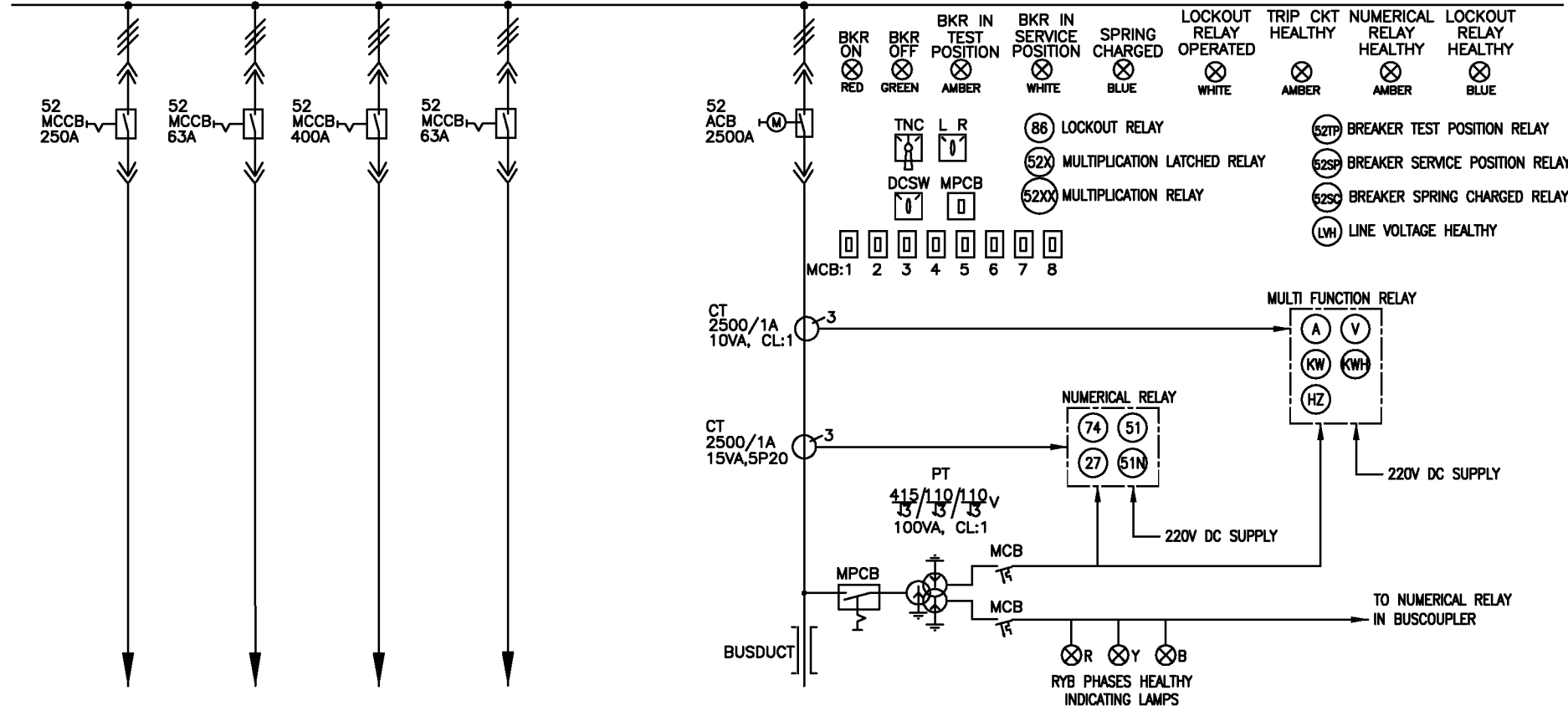
DRG. NO. EP-3-SL-018-001

INVENTORY NO.	07									BHARAT HEAVY ELECTRICALS LIMITED			
	06							ELECTROPORCELAIN DIVISION BANGALORE					
	05							TITLE : SINGLE LINE DIAGRAM			NO. OF SHEETS 06		
	04							LT MAIN SWITCH BOARD			SHEET. NO. 05		
03													
02													
0A	05.08.14	REVISED							DIR :				
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA	20.05.14	3	FILE NO.:	SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-SL-018-001	REV. 0A

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

415V, 2500A, 3PHASE, 3WIRE, 50HZ, 50KA FOR 1SEC ALUMINIUM MAIN BUS-B



DESCRIPTION	VFD-SPARE	SPARE FEEDER	AC & VENTILATION	ILLUMINATION	INCOMER-2
RATING		7.5KW			2500A
FEEDER NO.	9F3	12F2	9F2	11F3	13F2
SCHEME REF					EP-3-CS-018-003

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DRG. NO. EP-3-SL-018-001

INVENTORY NO.	07								BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE			
	06								TITLE : SINGLE LINE DIAGRAM LT MAIN SWITCH BOARD			
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA	20.05.14	DIR : FILE NO.:	SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-SL-018-001	SHEET. NO. 06
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04												
03												
02												
0A	05.08.14	REVISED			CHECKED	TRINATH	20.05.14					



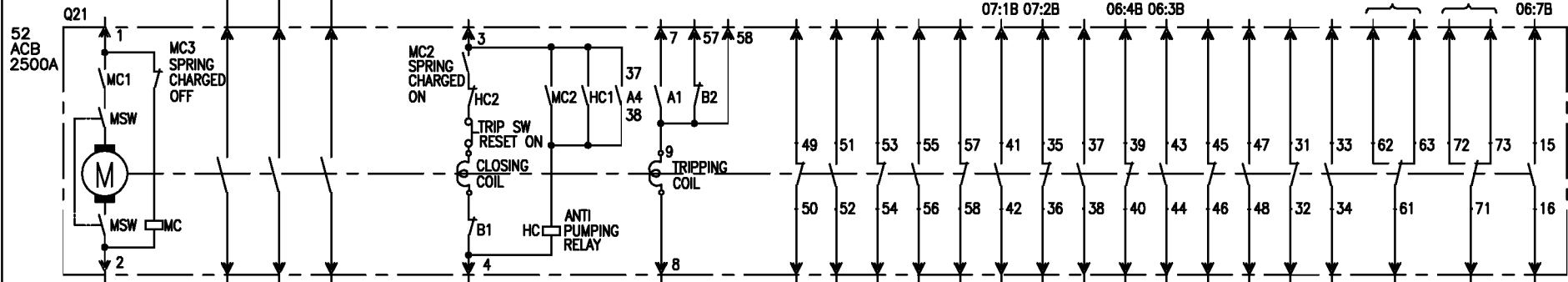
FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

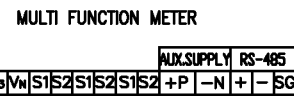
1 2 3 4 5 6 7 8

415V 3PH, 3W, 50Hz, 50KA FOR 1SEC.

R  
Y  
B



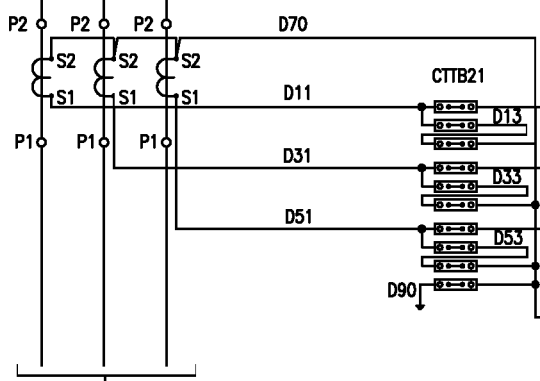
MFM21



AUX.SUPPLY RS-485  
V1|V2|V3|Vn|S1|S2|S1|S2|S1|S2|+P|-N|+|-SG  
03:6E  
X1:18 RS 485  
X1:19 ENERGY MANAGEMENT SYSTEM

220V DC  
04:1A

CT21-23  
2500/1A  
BURDEN:15VA  
CLASS:1.0



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DRG. NO. EP-3-CS-018-001

INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
07									
06									
05							DESIGNED	JAGADISH	06.05.14
04							DRAWN		
03							CHECKED	TRINATH	06.05.14
02									
01									

		<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPORCELAIN DIVISION BANGALORE				
		TITLE : <b>CONTROL SCHEME</b> <b>LT MAIN SWITCH BOARD INCOMER-1</b>				
		DIR :				SHEET. NO. : <b>02</b>
		FILE NO.:		SCALE :		REV. <b>0A</b>
		JOB NO. <b>CR-14-018</b>		DRG. NO. <b>EP-3-CS-018-001</b>		

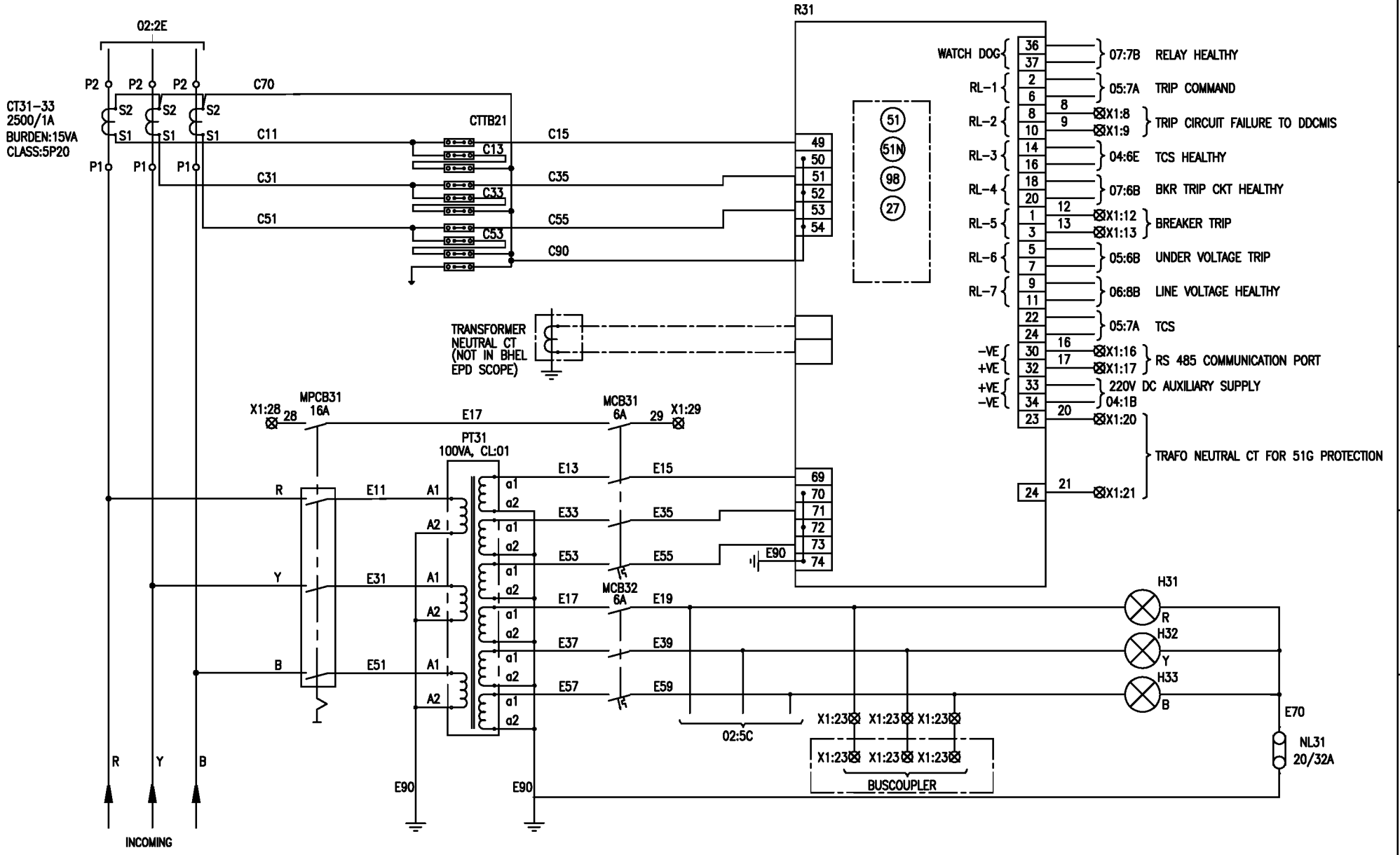
FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

1 2 3 4 5 6 7 8

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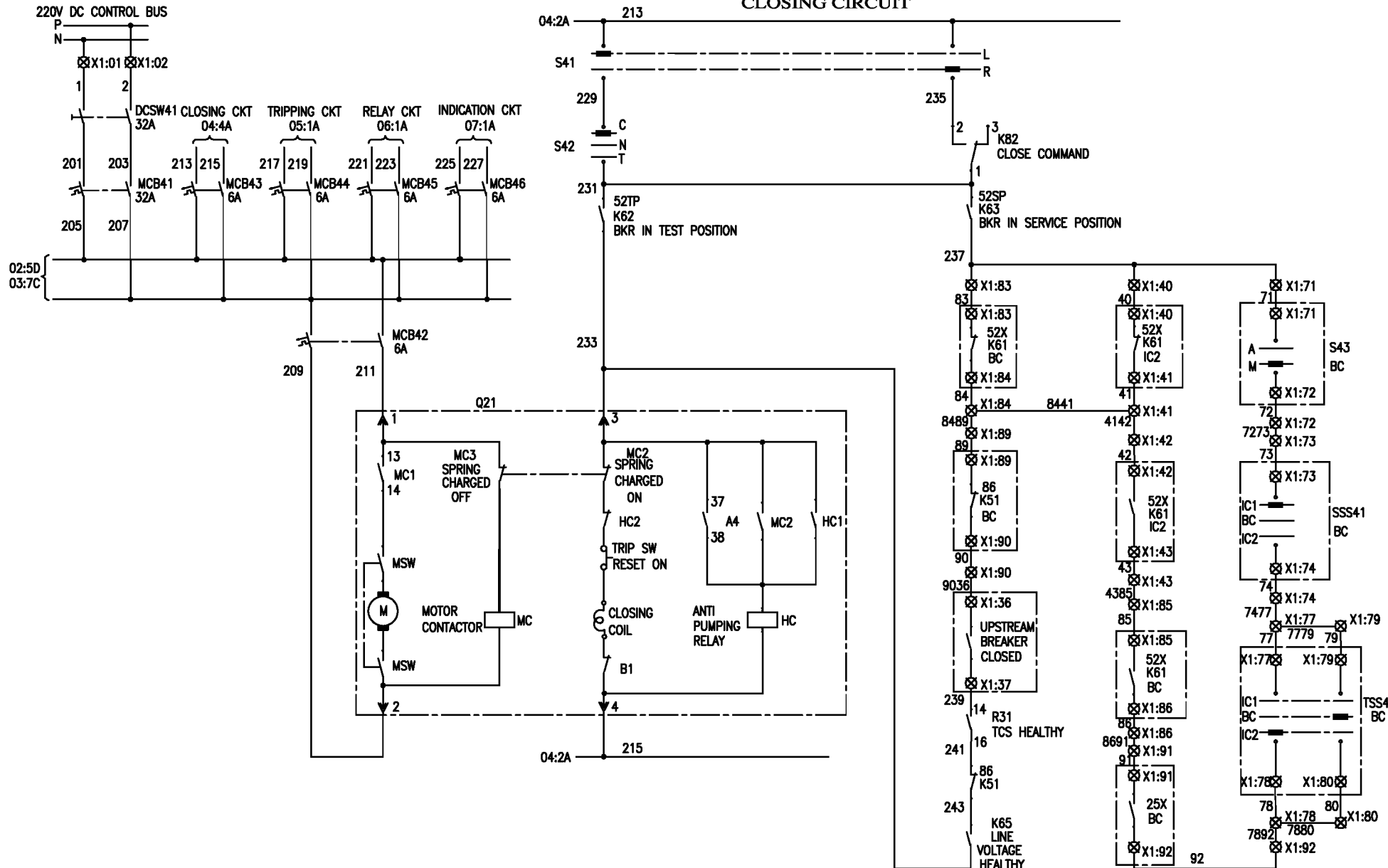
DRG. NO. EP-3-CS-018-001



- WATCH DOG { 36 } 07:7B RELAY HEALTHY
- { 37 } 05:7A TRIP COMMAND
- RL-1 { 2 } 05:7A TRIP COMMAND
- { 6 } 05:7A TRIP COMMAND
- { 8 } X1:8 TRIP CIRCUIT FAILURE TO DDCMIS
- RL-2 { 8 } X1:8 TRIP CIRCUIT FAILURE TO DDCMIS
- { 9 } X1:9 TRIP CIRCUIT FAILURE TO DDCMIS
- { 10 } X1:9 TRIP CIRCUIT FAILURE TO DDCMIS
- RL-3 { 14 } 04:6E TCS HEALTHY
- { 16 } 04:6E TCS HEALTHY
- RL-4 { 18 } 07:6B BKR TRIP CKT HEALTHY
- { 20 } 07:6B BKR TRIP CKT HEALTHY
- RL-5 { 1 } X1:12 BREAKER TRIP
- { 3 } X1:13 BREAKER TRIP
- RL-6 { 5 } 05:6B UNDER VOLTAGE TRIP
- { 7 } 05:6B UNDER VOLTAGE TRIP
- RL-7 { 9 } 06:8B LINE VOLTAGE HEALTHY
- { 11 } 06:8B LINE VOLTAGE HEALTHY
- { 22 } 05:7A TCS
- { 24 } 05:7A TCS
- VE { 30 } X1:16 RS 485 COMMUNICATION PORT
- +VE { 32 } X1:17 RS 485 COMMUNICATION PORT
- +VE { 33 } 220V DC AUXILIARY SUPPLY
- VE { 34 } 04:1B
- { 20 } X1:20 TRAFU NEUTRAL CT FOR 51G PROTECTION
- { 21 } X1:21 TRAFU NEUTRAL CT FOR 51G PROTECTION
- { 24 } X1:21 TRAFU NEUTRAL CT FOR 51G PROTECTION

INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE	DIR	FILE NO.:	SCALE	JOB NO.	CR-14-018	DRG. NO.	EP-3-CS-018-001	NO. OF SHEETS	09	SHEET. NO.	03	REV. NO.	0A	
07																							
06																							
05							DESIGNED	JAGADISH	06.05.14														
04							DRAWN																
03							CHECKED	TRINATH	06.05.14														
02																							
01																							

1 2 3 4 5 6 7 8



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DRG. NO. EP-3-CS-018-001

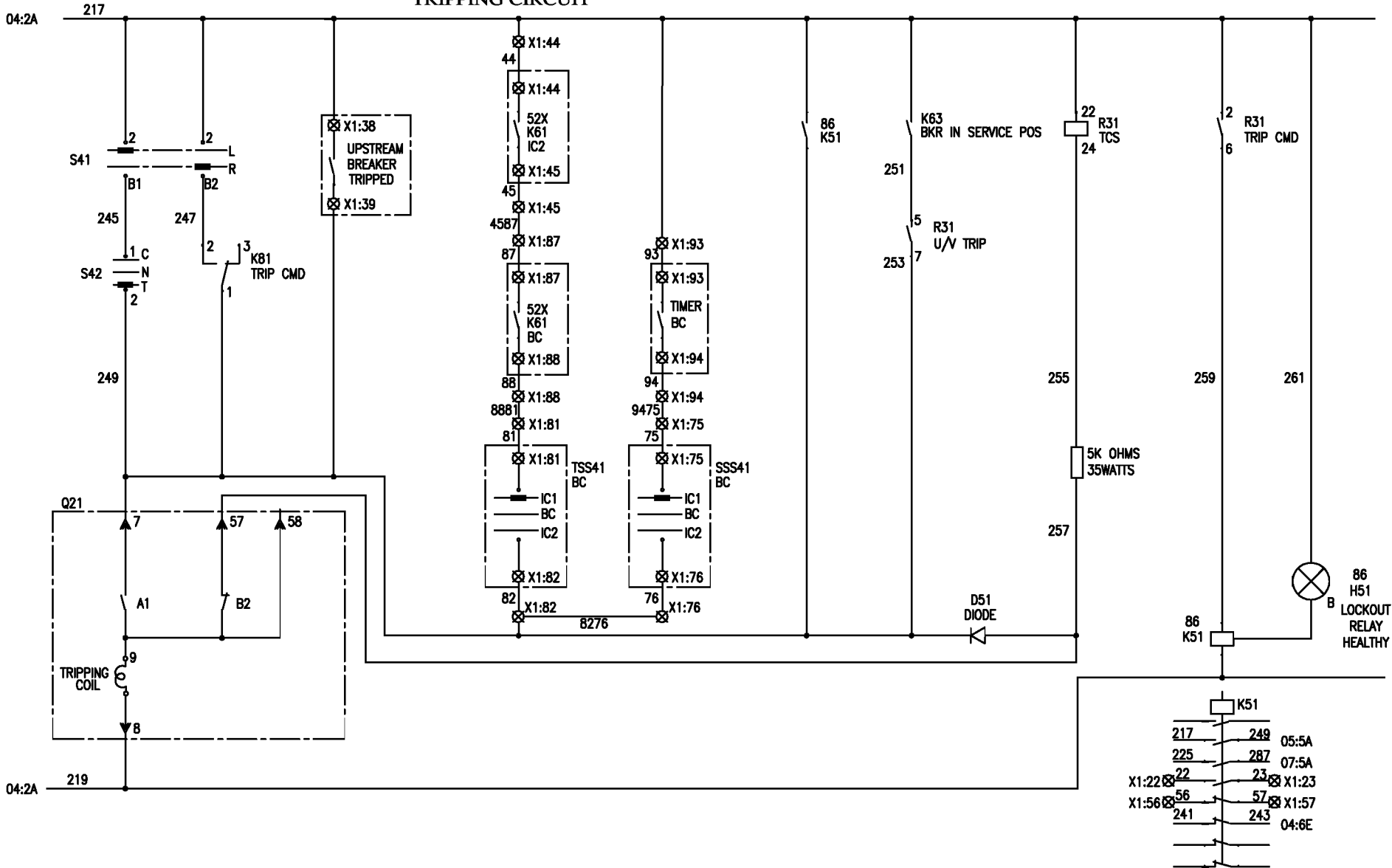
INVENTORY NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
07								
06								
05						DESIGNED	JAGADISH	06.05.14
04						DRAWN		
03						CHECKED	TRINATH	06.05.14
02								
01								
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA		06.05.14



<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPORCELAIN DIVISION BANGALORE		
TITLE : <b>CONTROL SCHEME</b> <b>LT MAIN SWITCH BOARD INCOMER-1</b>		NO. OF SHEETS : 09 SHEET. NO. : 04
SCALE	JOB NO. CR-14-018	REV. 0A
	DRG. NO. EP-3-CS-018-001	

1 2 3 4 5 6 7 8

TRIPPING CIRCUIT



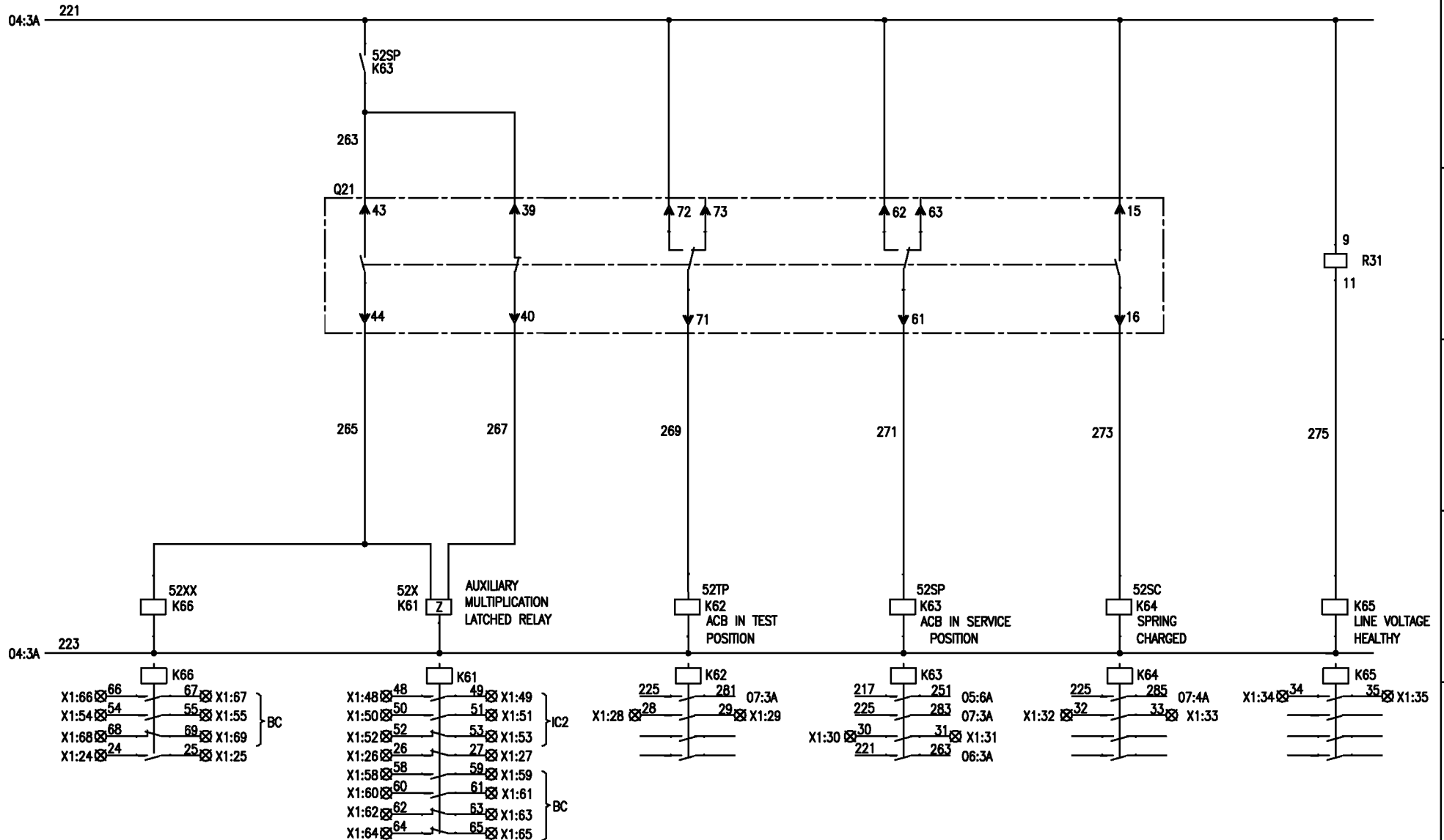
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DRG. NO. EP-3-CS-018-001

INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
07									
06									
05							DESIGNED	JAGADISH	06.05.14
04							DRAWN		
03							CHECKED	TRINATH	06.05.14
02									
01									
							APPROVED	KS BALA	06.05.14

<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPORCELAIN DIVISION BANGALORE			NO. OF SHEETS 09 SHEET. NO. 05
TITLE : CONTROL SCHEME LT MAIN SWITCH BOARD INCOMER-1			
SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-001	REV. 0A

RELAY CIRCUIT



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DRG. NO. EP-3-CS-018-001

INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
07									
06									
05							DESIGNED	JAGADISH	06.05.14
04							DRAWN		
03							CHECKED	TRINATH	06.05.14
02									
01									

BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE				
TITLE :				
CONTROL SCHEME LT MAIN SWITCH BOARD INCOMER-1				
NO. OF SHEETS	09			
SHEET. NO.	06			
REV. NO.	0A			
SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-001		

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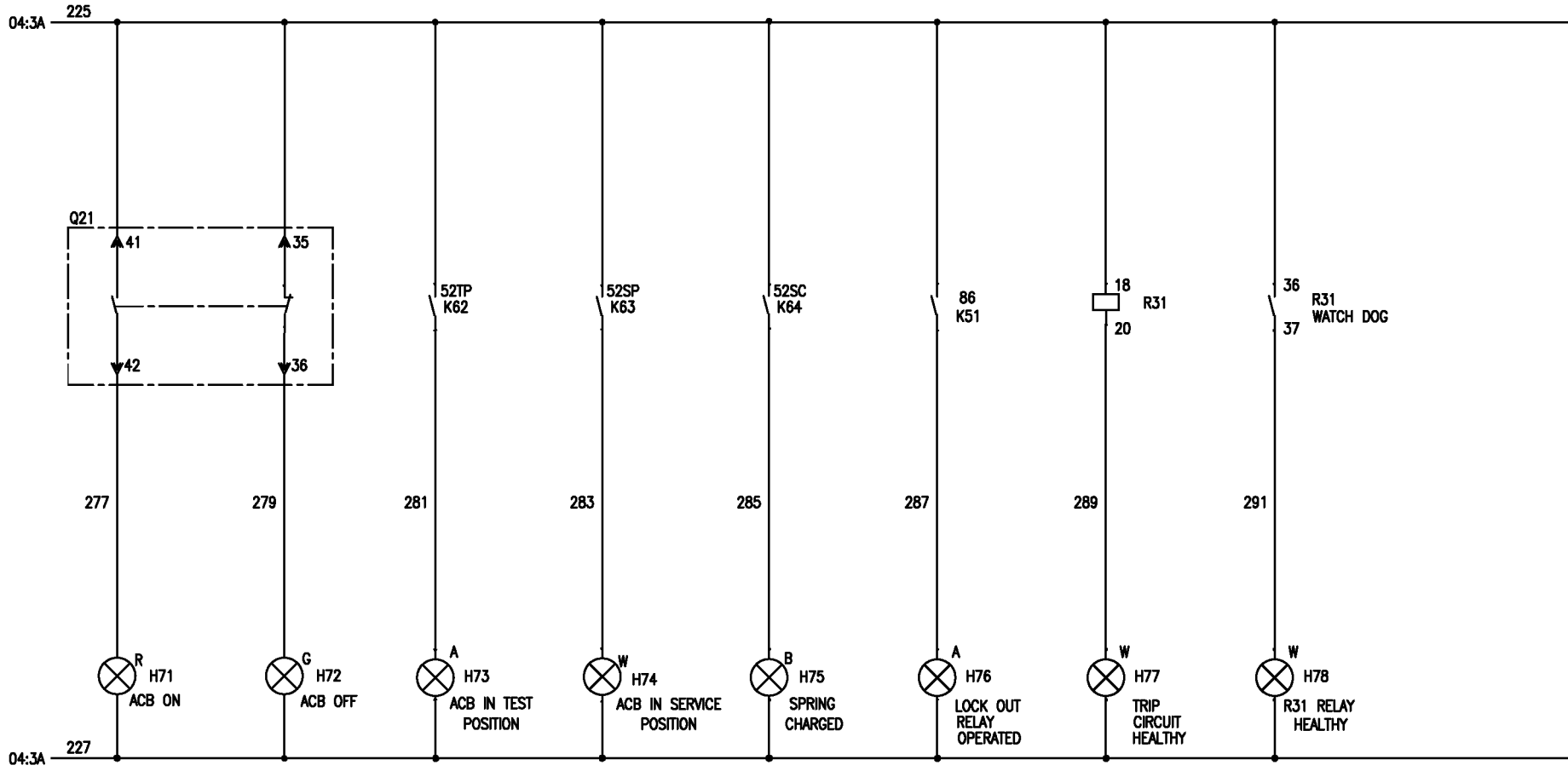
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INDICATION CIRCUIT



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DRG. NO. EP-3-CS-018-001

INVENTORY NO.	07																			
	06																			
	05																			
	04																			
	03																			
02																				
01																				
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA														

DESIGNED	JAGADISH	06.05.14		BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE			
DRAWN				TITLE : CONTROL SCHEME LT MAIN SWITCH BOARD INCOMER-1			
CHECKED	TRINATH	06.05.14		NO. OF SHEETS : 09 SHEET. NO. : 07			
APPROVED	KS BALA	06.05.14	DIR :	SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-001	REV. 0A

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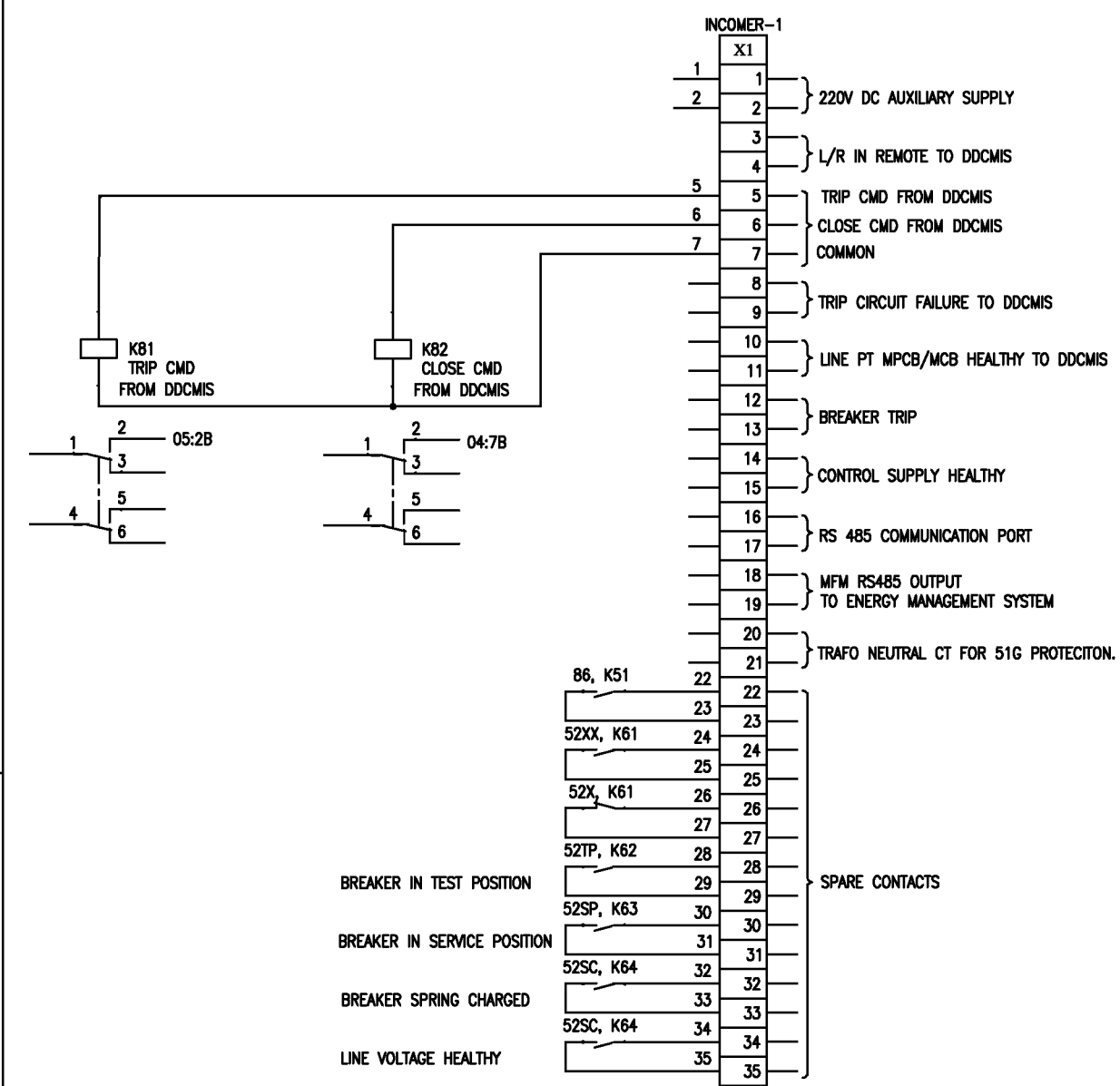
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DRG. NO. EP-3-CS-018-001



INCOMER-1  
INTER TB CONNECTION

X1	
84	89
84	41
43	85
86	91
90	36
92	78
78	80
77	79
77	74
72	73
45	87
81	88
82	76
94	75

A  
 B  
 C  
 D  
 E

INVENTORY NO.	07										BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE				
	06														
	05				DESIGNED	JAGADISH	<i>Jagadish</i>	06.05.14				TITLE :	CONTROL SCHEME	NO. OF SHEETS	09
	04				DRAWN							LT MAIN SWITCH BOARD INCOMER-1	SHEET. NO.	08	
03				CHECKED	TRINATH	<i>Trinath</i>	06.05.14	DIR :							
02								FILE NO.:		SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-001	REV. OA		
01															
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA	06.05.14								



FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

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INDIA POWER CORPORATION (HALDIA) LIMITED  
HALDIA

PROJECT:

3x150 MW COAL BASED POWER PLANT HALDIA

CUSTOMER CONSULTANT:



DEVELOPMENT CONSULTANT PVT LTD  
KOLKATA

DRG. NO. EP-3-CS-018-002

INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE	DIR	BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE			NO. OF SHEETS	10
											FILE NO.:	SCALE	JOB NO.		
07											TITLE : CONTROL SCHEME LT MAIN SWITCH BOARD BUSCOUPLER			SHEET. NO.	01
06							JAGADISH		06.05.14		CR-14-018			EP-3-CS-018-002	0A
05											EP-3-CS-018-002				
04															
03															
02															
01							TRINATH		06.05.14						
							KS BALA		06.05.14						

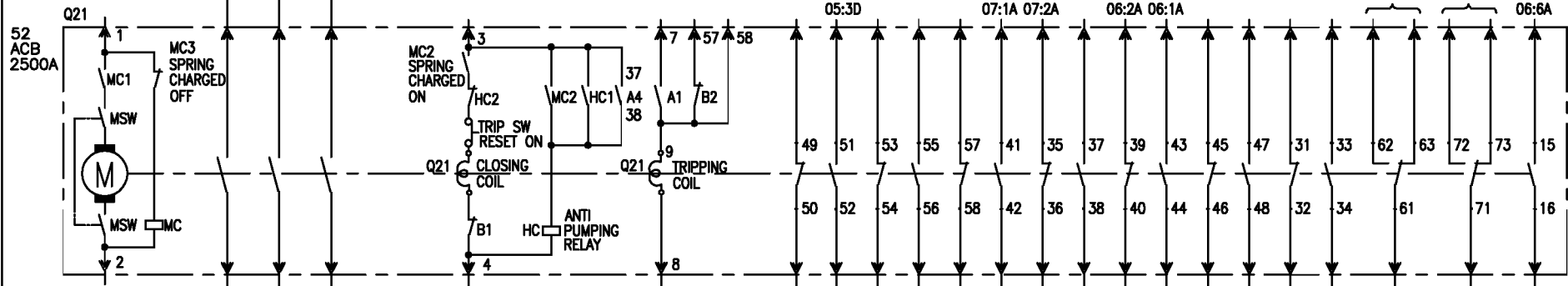
FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

1 2 3 4 5 6 7 8

415V 3PH, 3W, 50Hz, 50KA FOR 1SEC.

R  
Y  
B



03:1E

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DRG. NO. EP-3-CS-018-002

INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
07									
06									
05							DESIGNED	JAGADISH	06.05.14
04							DRAWN		
03							CHECKED	TRINATH	06.05.14
02									
01									



BHARAT HEAVY ELECTRICALS LIMITED  
ELECTROPORCELAIN DIVISION BANGALORE

TITLE : CONTROL SCHEME  
LT MAIN SWITCH BOARD BUSCOUPLER

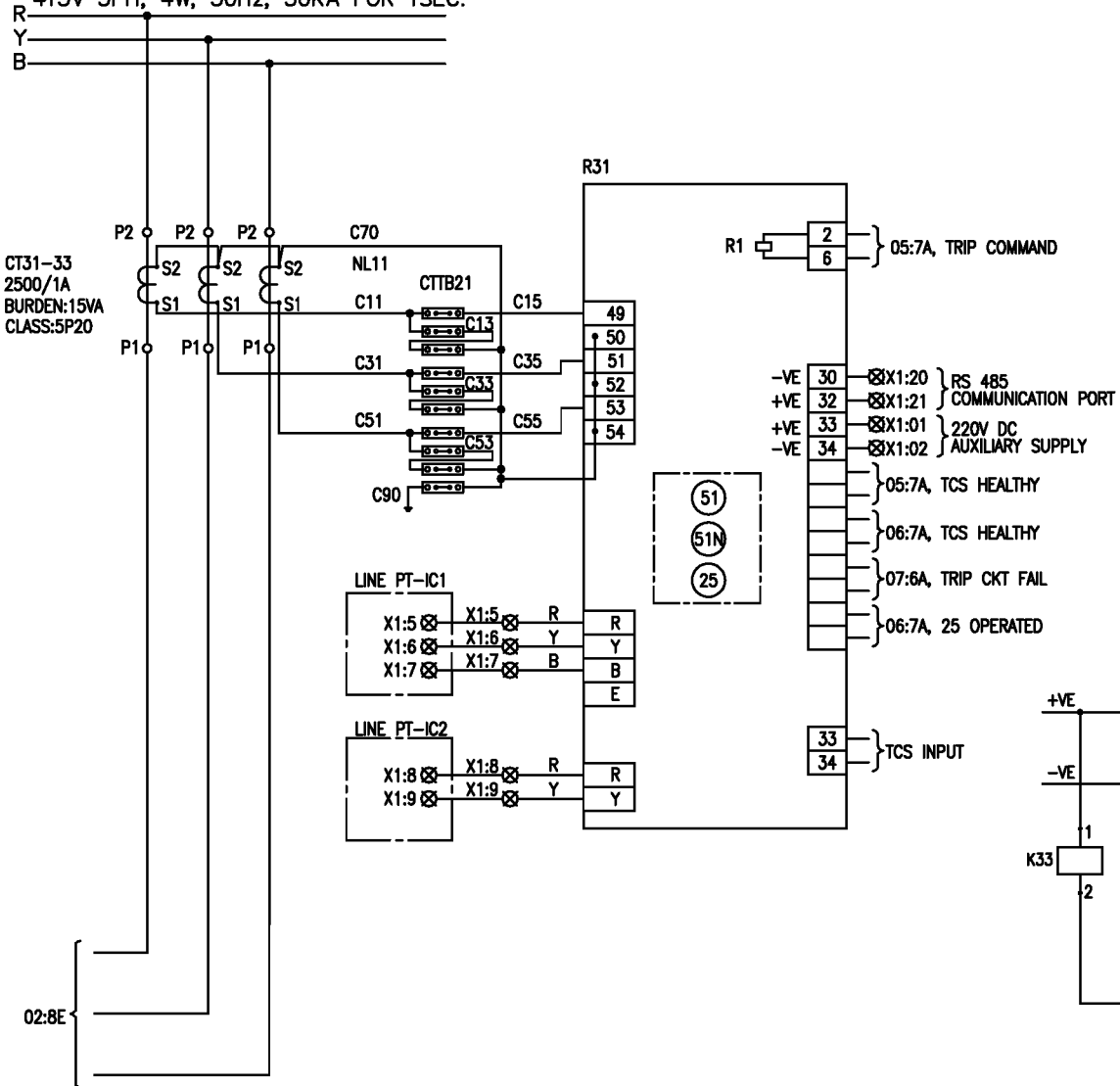
NO. OF SHEETS	10
SHEET. NO.	02
REV. NO.	0A

SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-002
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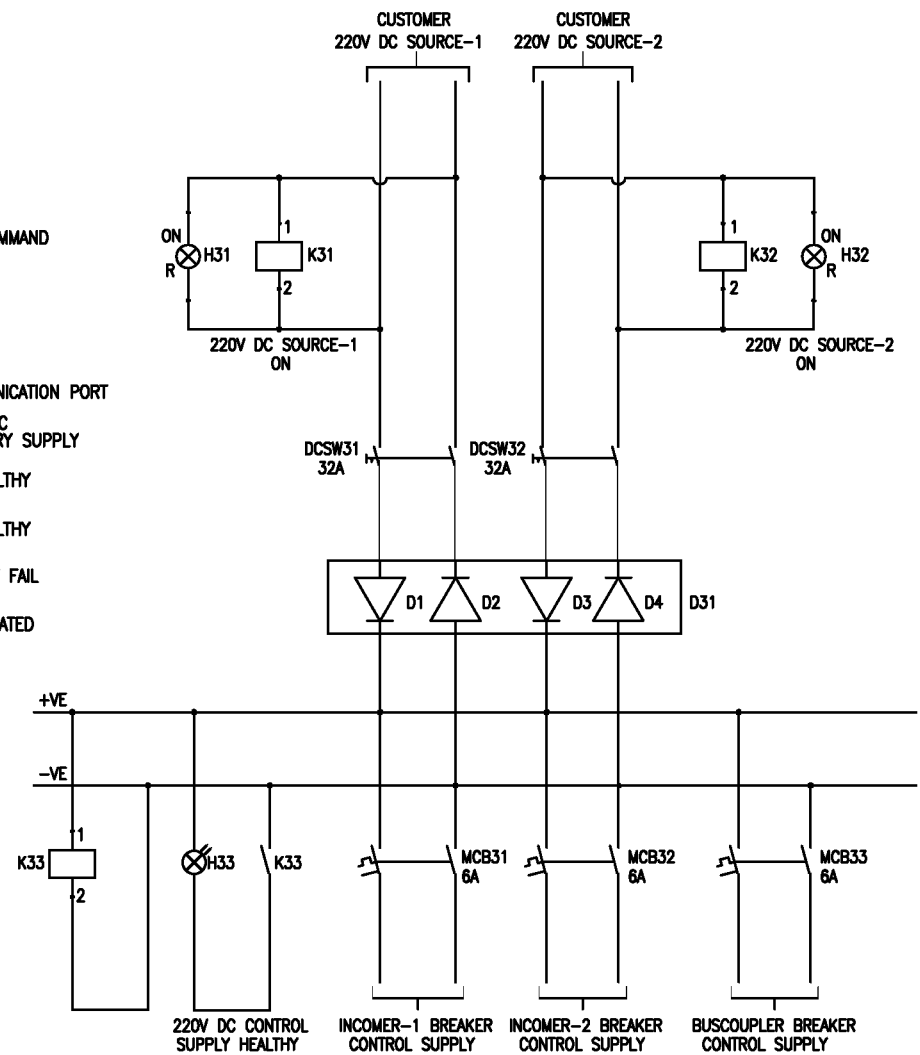
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DRG. NO. EP-3-CS-018-002

415V 3PH, 4W, 50Hz, 50KA FOR 1SEC.



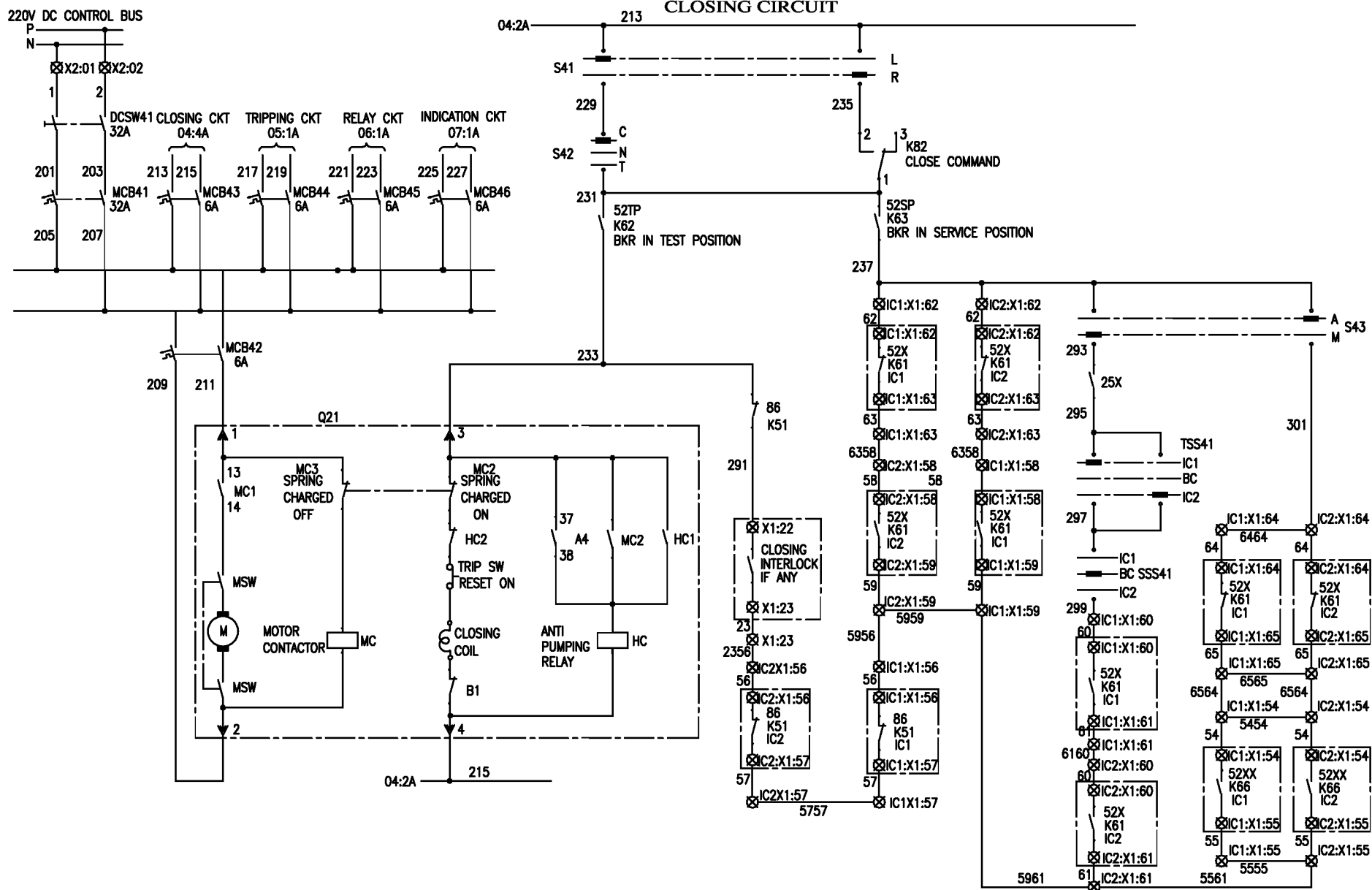
220VDC CONTROL SUPPLY CIRCUIT



INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
07							JAGADISH	<i>Jagadish</i>	06.05.14
06							TRINATH	<i>Trinath</i>	06.05.14
05							KS BALA	<i>Ks Bala</i>	06.05.14
04									
03									
02									
01									

		BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE			
		TITLE : CONTROL SCHEME LT MAIN SWITCH BOARD BUSCOUPLER			NO. OF SHEETS : 10 SHEET. NO. : 03
SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-002	REV. 0A		



1 2 3 4 5 6 7 8



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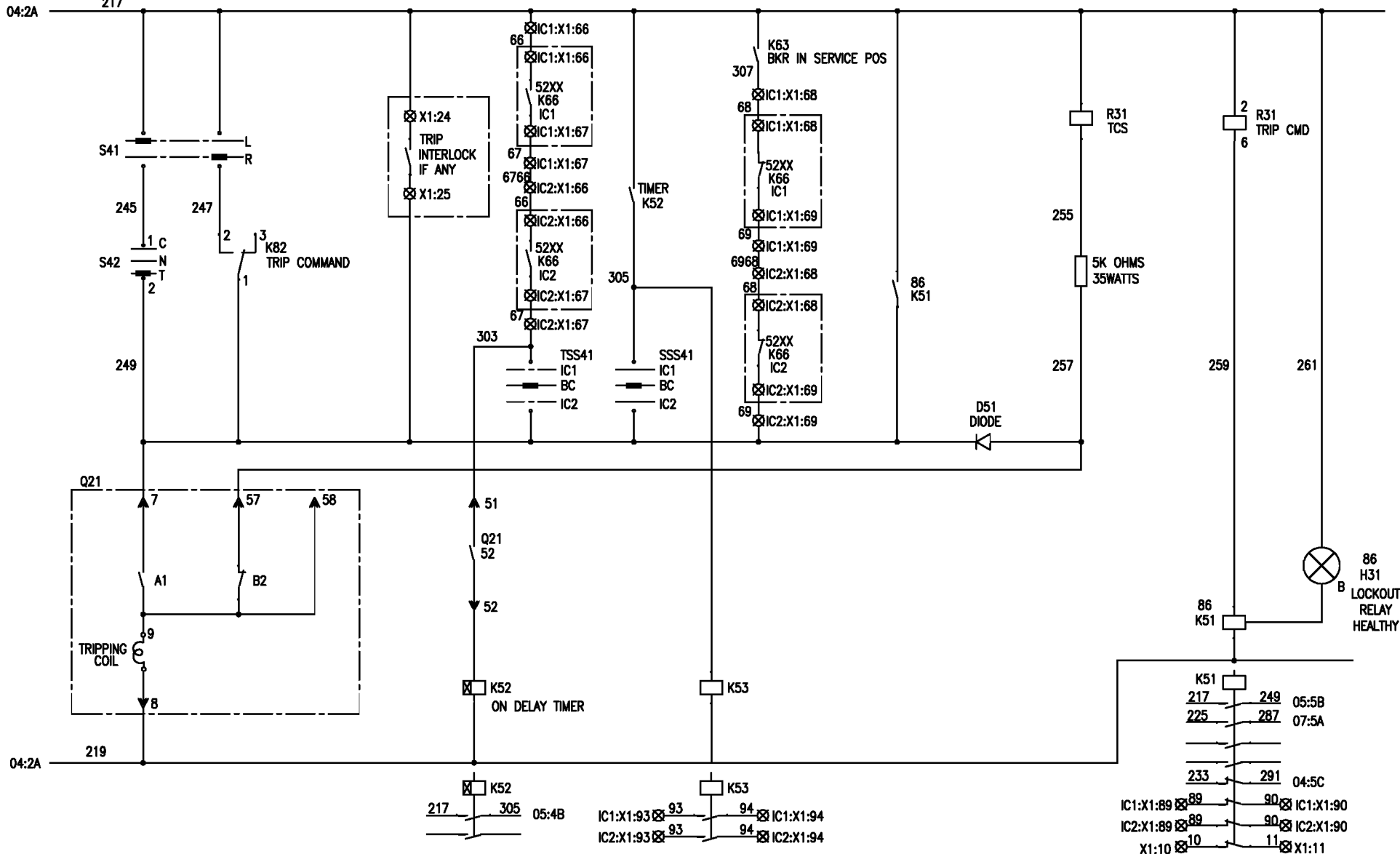
DRG. NO. EP-3-CS-018-002

INVENTORY NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
07								
06								
05						DESIGNED	JAGADISH	06.05.14
04						DRAWN		
03						CHECKED	TRINATH	06.05.14
02								
01								
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA		06.05.14

		<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPORCELAIN DIVISION BANGALORE		
TITLE :		CONTROL SCHEME LT MAIN SWITCH BOARD BUSCOUPLER		NO. OF SHEETS : 10
SCALE :		JOB NO. CR-14-018		SHEET. NO. : 04
DIR : FILE NO. :		DRG. NO. EP-3-CS-018-002		REV. 0A

1 2 3 4 5 6 7 8

TRIPPING CIRCUIT



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DRG. NO. EP-3-CS-018-002

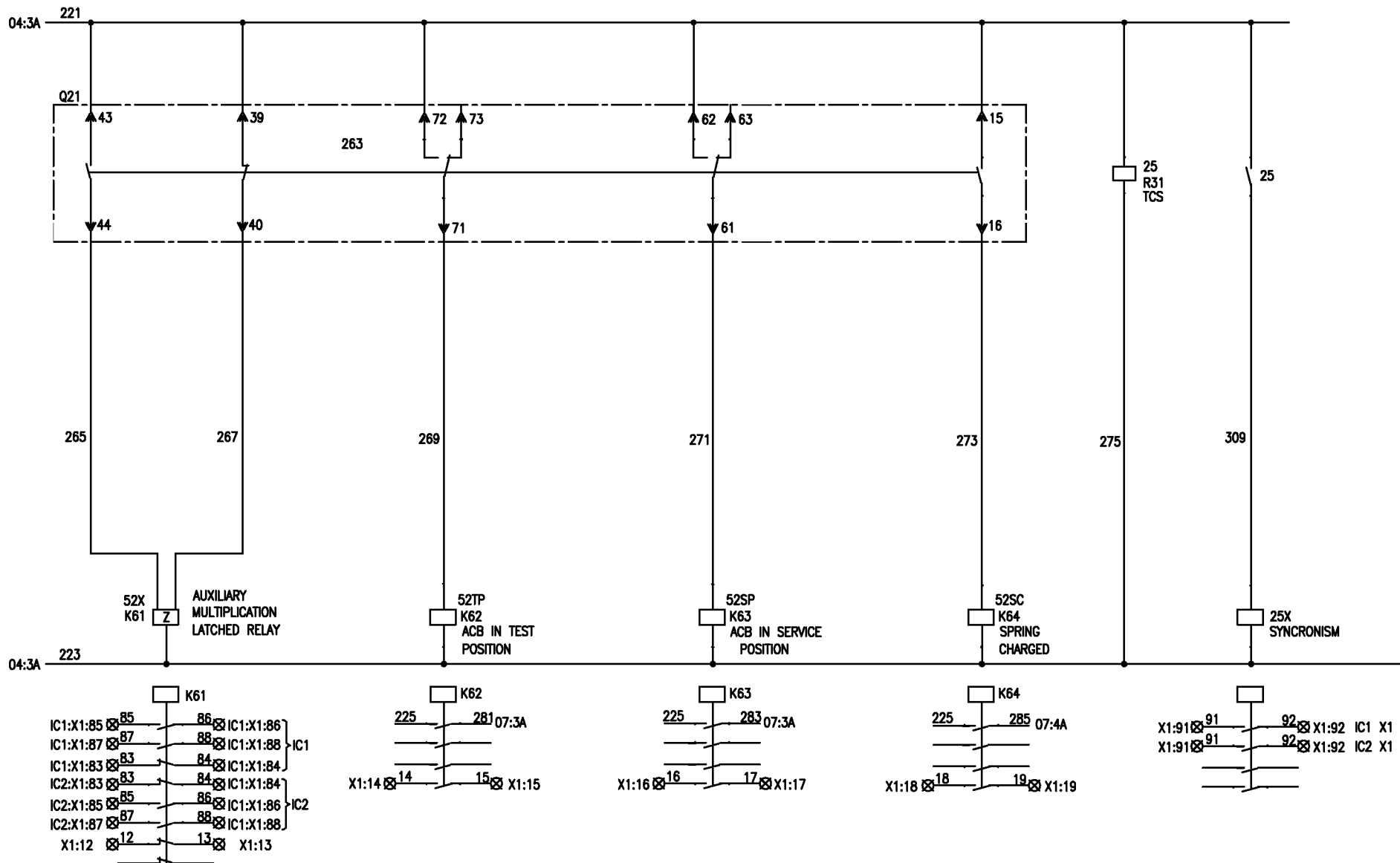
INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
07									
06									
05							DESIGNED	JAGADISH	06.05.14
04							DRAWN		
03							CHECKED	TRINATH	06.05.14
02									
01									
							APPROVED	KS BALA	06.05.14

		BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE		
		TITLE : CONTROL SCHEME LT MAIN SWITCH BOARD BUSCOUPLER		
SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-002	REV. 0A	

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

RELAY CIRCUIT



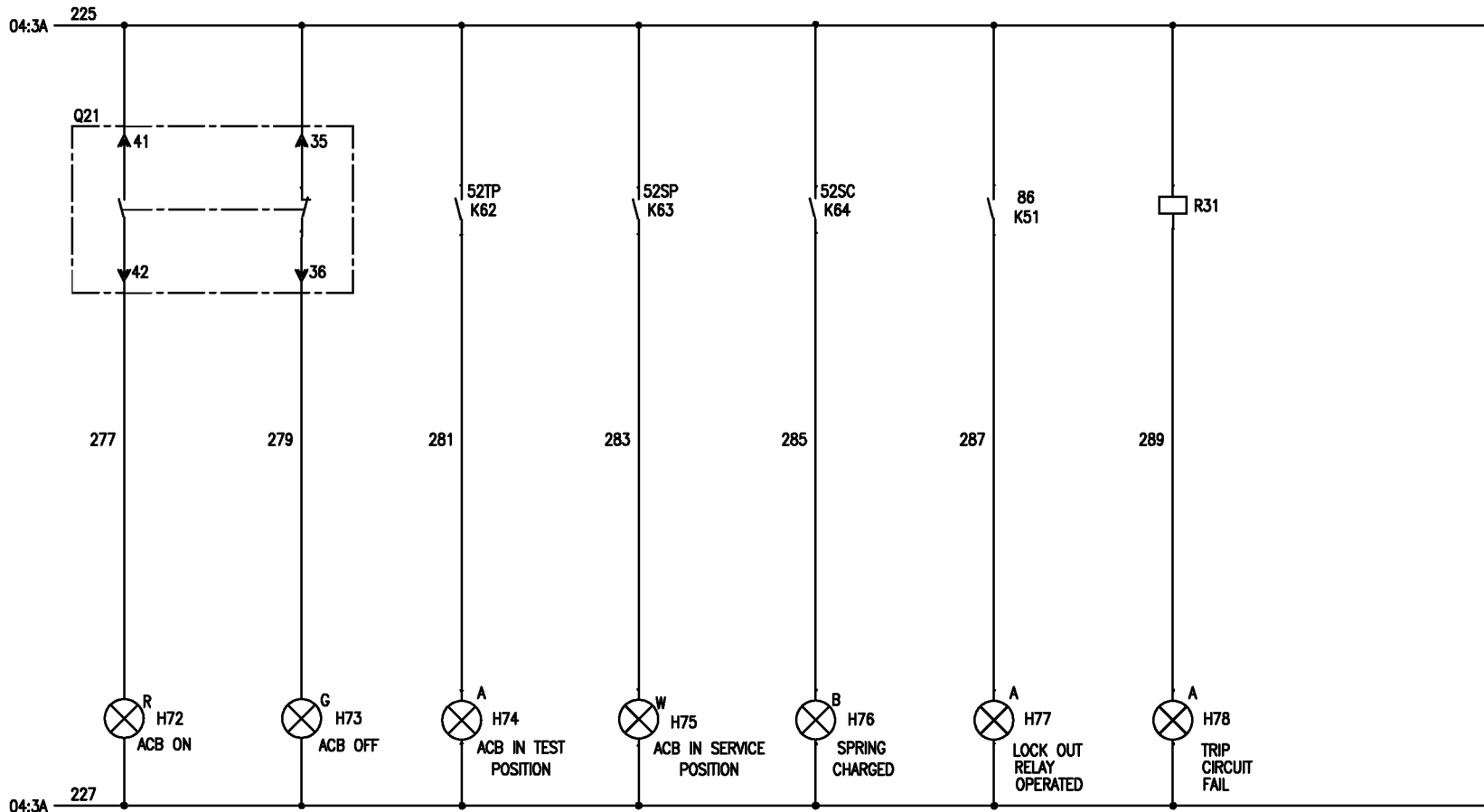
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DRG. NO. EP-3-CS-018-002

INVENTORY NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
07								
06								
05					DESIGNED	JAGADISH	<i>Jagadish</i>	06.05.14
04					DRAWN			
03					CHECKED	TRINATH	<i>Trinath</i>	06.05.14
02								
01								
REV. NO.					APPROVED	KS BALA	<i>Ks Bala</i>	06.05.14



		<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPORCELAIN DIVISION BANGALORE		
		TITLE : <b>CONTROL SCHEME</b> <b>LT MAIN SWITCH BOARD BUSCOUPLER</b>		
SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-002	REV. 0A	

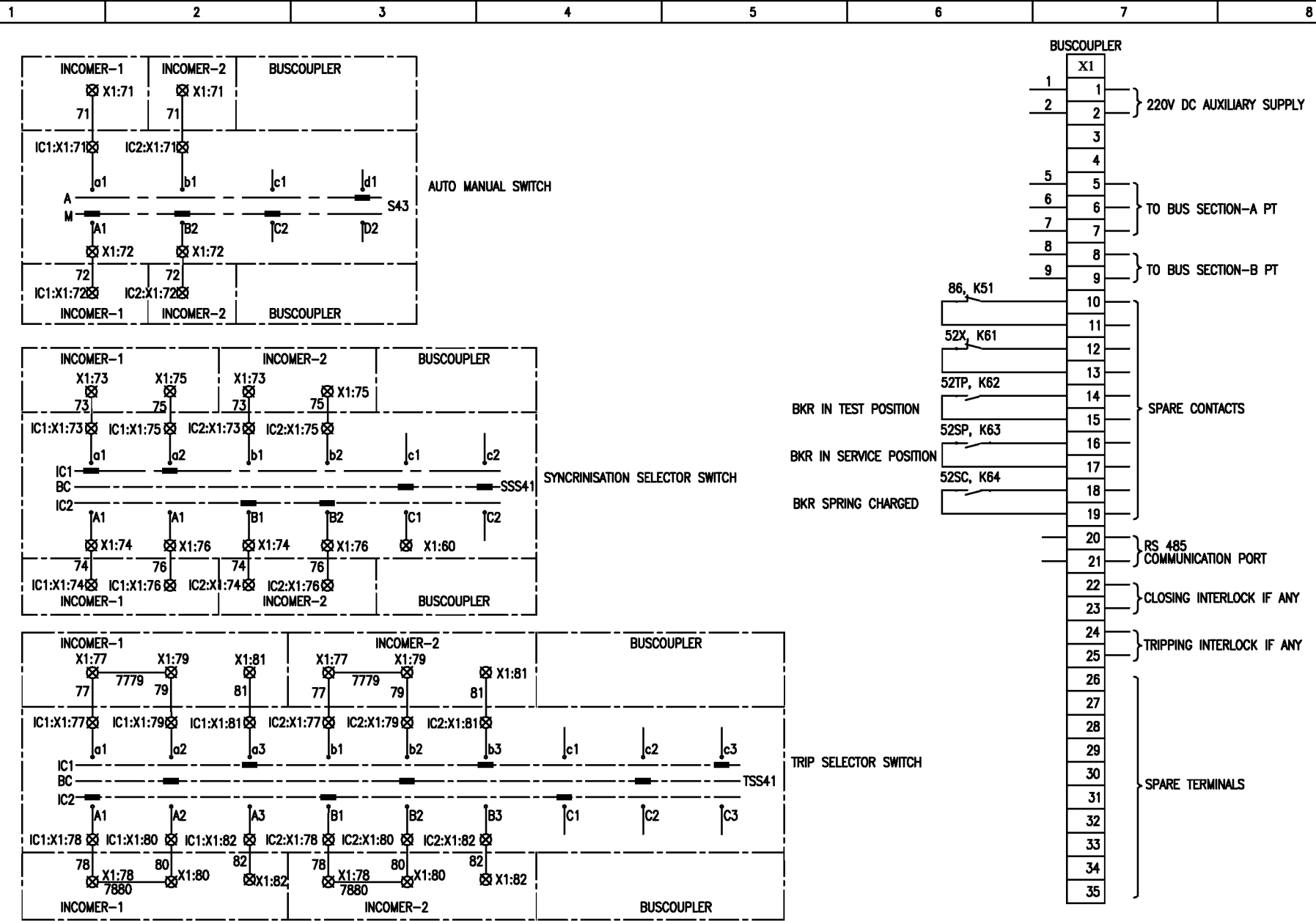
INDICATION CIRCUIT



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DRG. NO. EP-3-CS-018-002



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	05									CONTROL SCHEME		SHEET. NO.	07
	04									LT MAIN SWITCH BOARD BUSCOUPLER		REV.	0A
	03									SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-002	
02								DIR :					
01								FILE NO.:					
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA	06.05.14						



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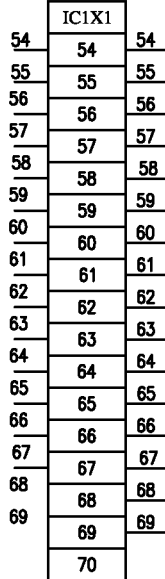
DRG. NO. EP-3-CS-018-002

INVENTORY NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
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06								
05						DESIGNED	JAGADISH	06.05.14
04						DRAWN		
03						CHECKED	TRINATH	06.05.14
02								
01								
REV. NO.						APPROVED	KS BALA	06.05.14

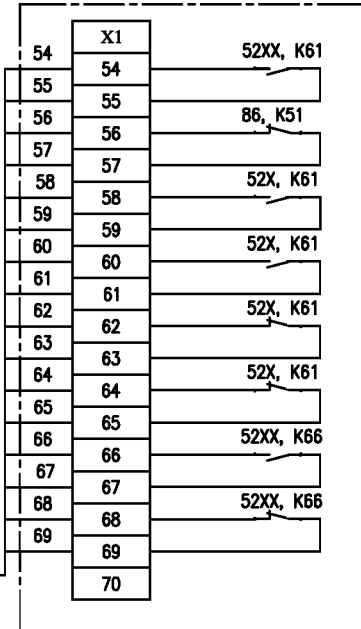
		BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE		
		TITLE : CONTROL SCHEME LT MAIN SWITCH BOARD BUSCOUPLER		
NO. OF SHEETS	10	SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-002
SHEET. NO.	08			REV. 0A

1 2 3 4 5 6 7 8

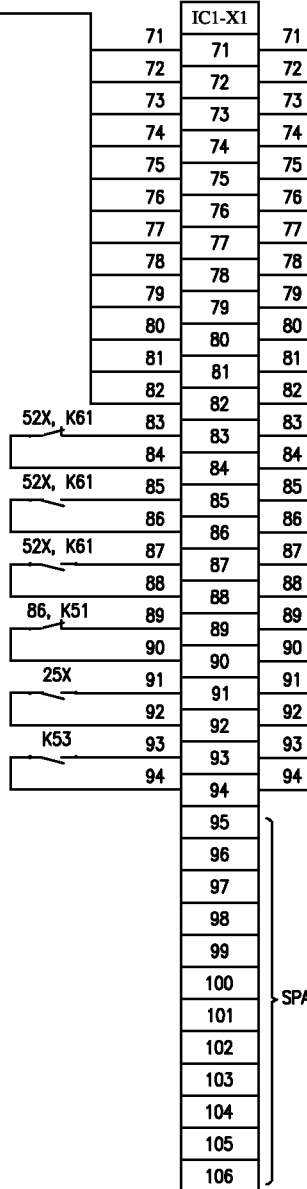
BUSCOUPLER



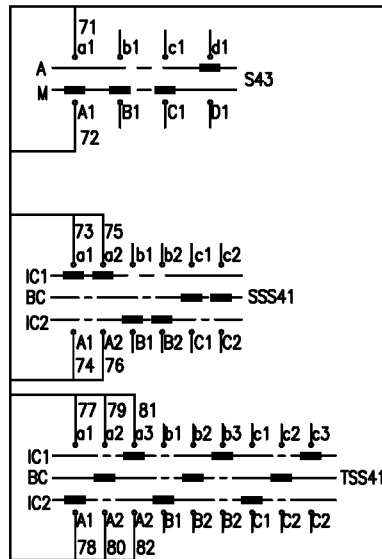
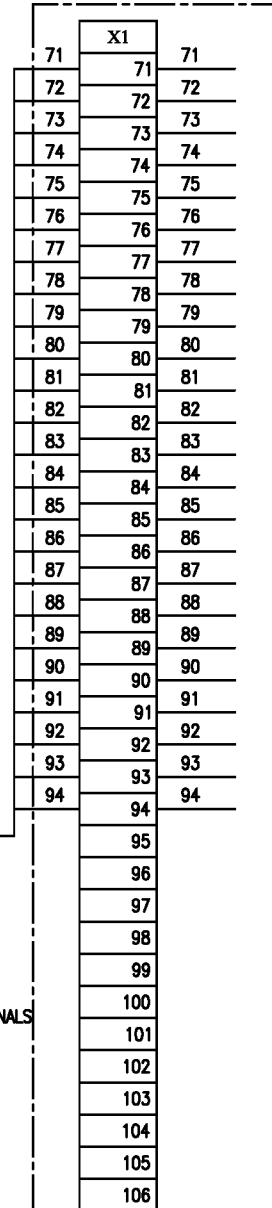
INCOMER-1



BUSCOUPLER



INCOMER-1



BUSCOUPLER INTER TB CONNECTION

X1	IC1-X1	IC2-X1
22		56
0	57	57
0	56	59
0	59	59
0	63	58
0	58	63
0	59	61
0	61	60
0	64	64
0	65	65
0	54	54
0	55	55
0	61	55
0	67	66
0	69	68

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DRG. NO. EP-3-CS-018-002

INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA	DATE
07								
06								
05								
04								
03								
02								
01								

NAME	SIGN.	DATE
DESIGNED JAGADISH	<i>Jagadish</i>	06.05.14
DRAWN		
CHECKED TRINATH	<i>Trinath</i>	06.05.14
APPROVED KS BALA	<i>Ks Bala</i>	06.05.14

		<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPORCELAIN DIVISION BANGALORE		
TITLE : <b>CONTROL SCHEME</b> <b>LT MAIN SWITCH BOARD BUSCOUPLER</b>			NO. OF SHEETS : 10 SHEET. NO. : 09	REV. : 0A
SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-002		



FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

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**INDIA POWER CORPORATION (HALDIA)LIMITED  
HALDIA**

PROJECT:

**3x150 MW COAL BASED POWER PLANT HALDIA**

CUSTOMER CONSULTANT:



DEVELOPMENT CONSULTANT PVT LTD

**DEVELOPMENT CONSULTANT PVT LTD  
KOLKATA**

DRG. NO. EP-3-CS-018-003

INVENTORY NO.	07										<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPORCELAIN DIVISION BANGALORE			
	06										TITLE : <b>CONTROL SCHEME</b> <b>LT MAIN SWITCH BOARD INCOMER-2</b>	NO. OF SHEETS	09	
	05											SHEET. NO.	01	
	04													
	03													
02														
01														
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA		06.05.14	06.05.14	DIR : FILE NO.:	SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-003	REV. 0A

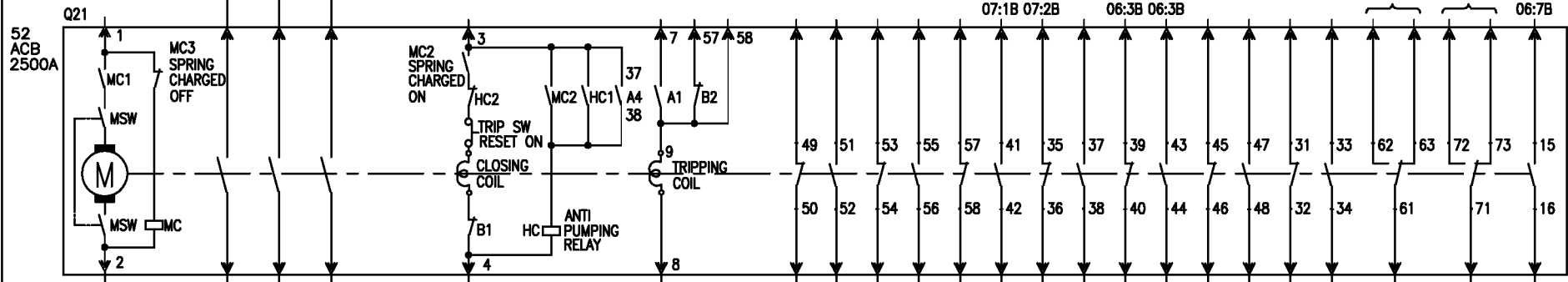
FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

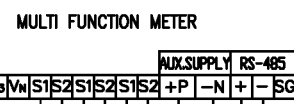
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415V 3PH, 4W, 50Hz, 50KA FOR 1SEC.

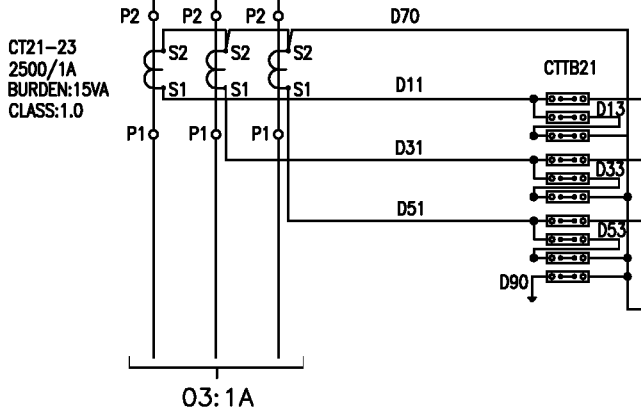
R  
Y  
B



MFM21



AUX.SUPPLY RS-485  
V1|V2|V3|Vn|S1|S2|S1|S2|+P|-N|+|-SG  
X1:18 RS 485  
X1:19 ENERGY MANAGEMENT SYSTEM  
220V DC  
04:1B



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DRG. NO. EP-3-CS-018-003

INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
07									
06									
05							DESIGNED	JAGADISH	06.05.14
04							DRAWN		
03							CHECKED	TRINATH	06.05.14
02									
01									



BHARAT HEAVY ELECTRICALS LIMITED  
ELECTROPORCELAIN DIVISION BANGALORE

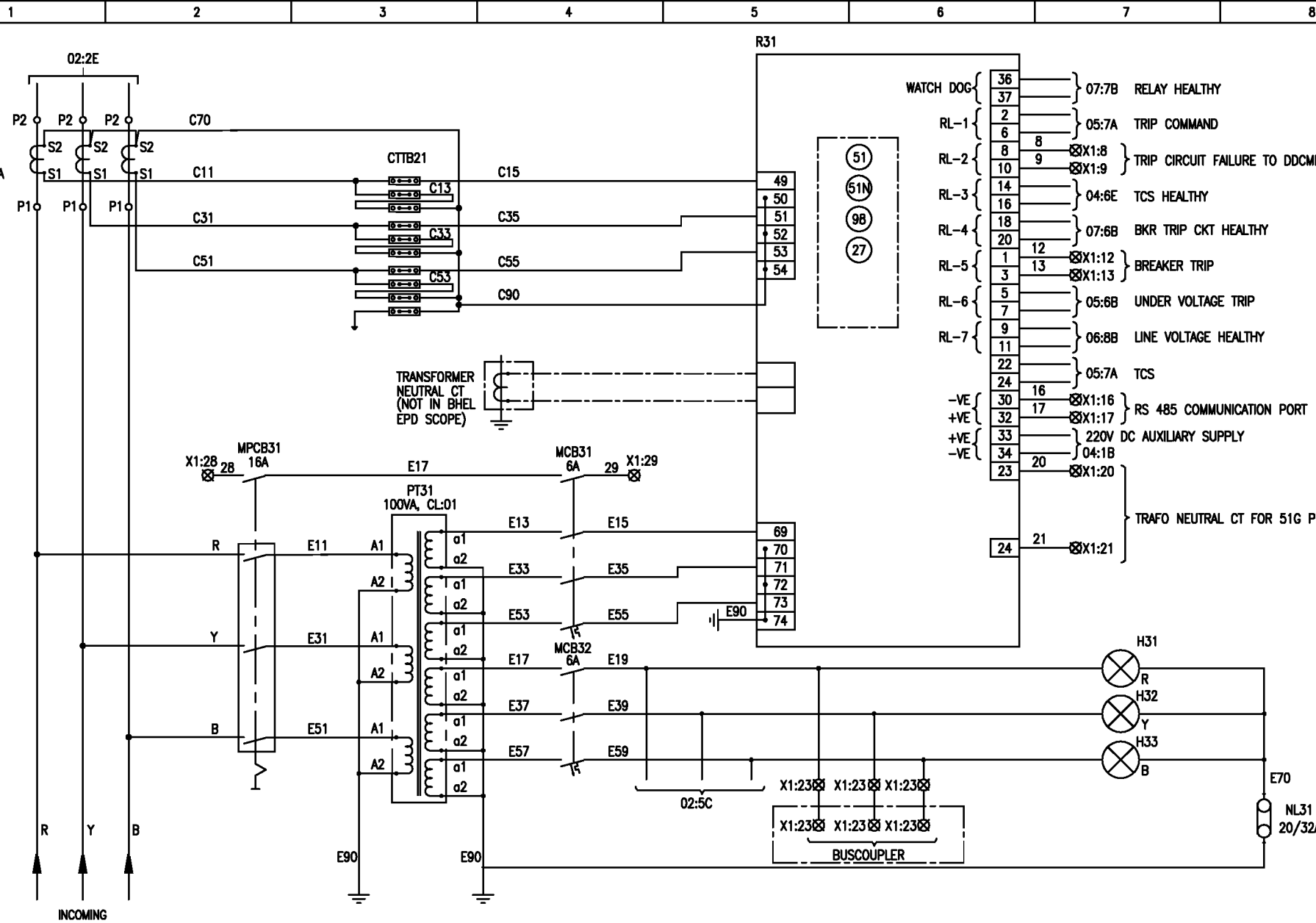
TITLE : CONTROL SCHEME  
LT MAIN SWITCH BOARD INCOMER-2

NO. OF SHEETS 09  
SHEET. NO. 02

SCALE JOB NO. CR-14-018 DRG. NO. EP-3-CS-018-003 REV. 0A

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.



- WATCH DOG { 36 } 07:7B RELAY HEALTHY
- { 37 } 05:7A TRIP COMMAND
- RL-1 { 2 } 05:7A TRIP COMMAND
- { 6 } 05:7A TRIP COMMAND
- { 8 } X1:8 } TRIP CIRCUIT FAILURE TO DDCMS
- { 9 } X1:9 } TRIP CIRCUIT FAILURE TO DDCMS
- RL-2 { 10 } 04:6E TCS HEALTHY
- { 14 } 04:6E TCS HEALTHY
- RL-3 { 16 } 07:6B BKR TRIP CKT HEALTHY
- { 18 } 07:6B BKR TRIP CKT HEALTHY
- RL-4 { 20 } 07:6B BKR TRIP CKT HEALTHY
- { 1 } 12 X1:12 } BREAKER TRIP
- { 3 } 13 X1:13 } BREAKER TRIP
- RL-5 { 5 } 05:6B UNDER VOLTAGE TRIP
- { 7 } 05:6B UNDER VOLTAGE TRIP
- RL-6 { 9 } 06:8B LINE VOLTAGE HEALTHY
- { 11 } 06:8B LINE VOLTAGE HEALTHY
- { 22 } 05:7A TCS
- { 24 } 05:7A TCS
- VE { 30 } 16 X1:16 } RS 485 COMMUNICATION PORT
- +VE { 32 } 17 X1:17 } RS 485 COMMUNICATION PORT
- +VE { 33 } 220V DC AUXILIARY SUPPLY
- VE { 34 } 04:1B } TRAF0 NEUTRAL CT FOR 51G PROTECTION
- { 20 } X1:20 } TRAF0 NEUTRAL CT FOR 51G PROTECTION
- { 21 } X1:21 } TRAF0 NEUTRAL CT FOR 51G PROTECTION

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DRG. NO. EP-3-CS-018-003

INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
07									
06									
05							DESIGNED	JAGADISH	06.05.14
04							DRAWN		
03							CHECKED	TRINATH	06.05.14
02									
01									

**BHARAT HEAVY ELECTRICALS LIMITED**  
 ELECTROPORCELAIN DIVISION BANGALORE

30

DIR :  
FILE NO.:

**TITLE :**  
 CONTROL SCHEME  
 LT MAIN SWITCH BOARD INCOMER-2

SCALE

JOB NO. CR-14-018

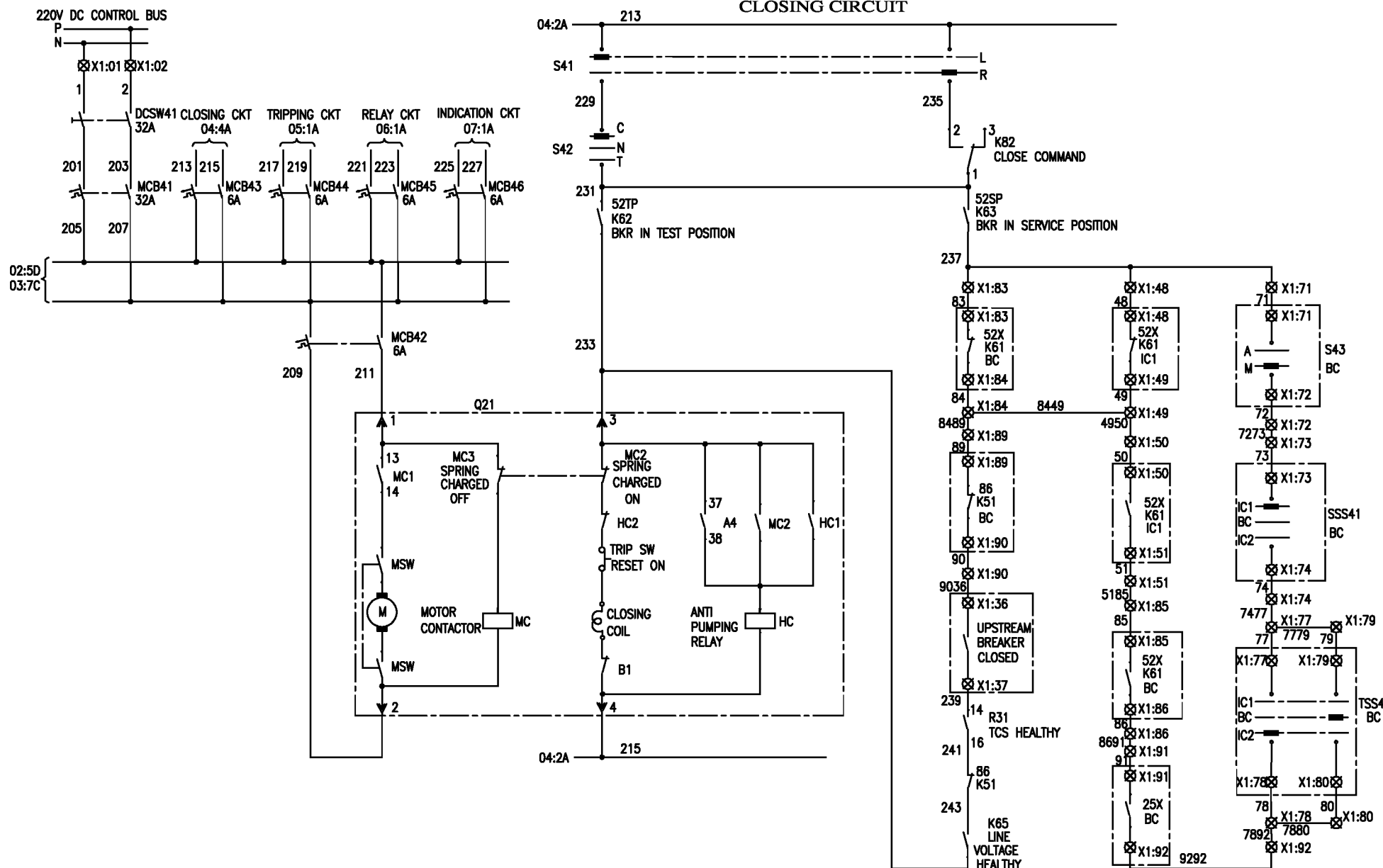
DRG. NO. EP-3-CS-018-003

NO. OF SHEETS 09

SHEET. NO. 03

REV. 0A



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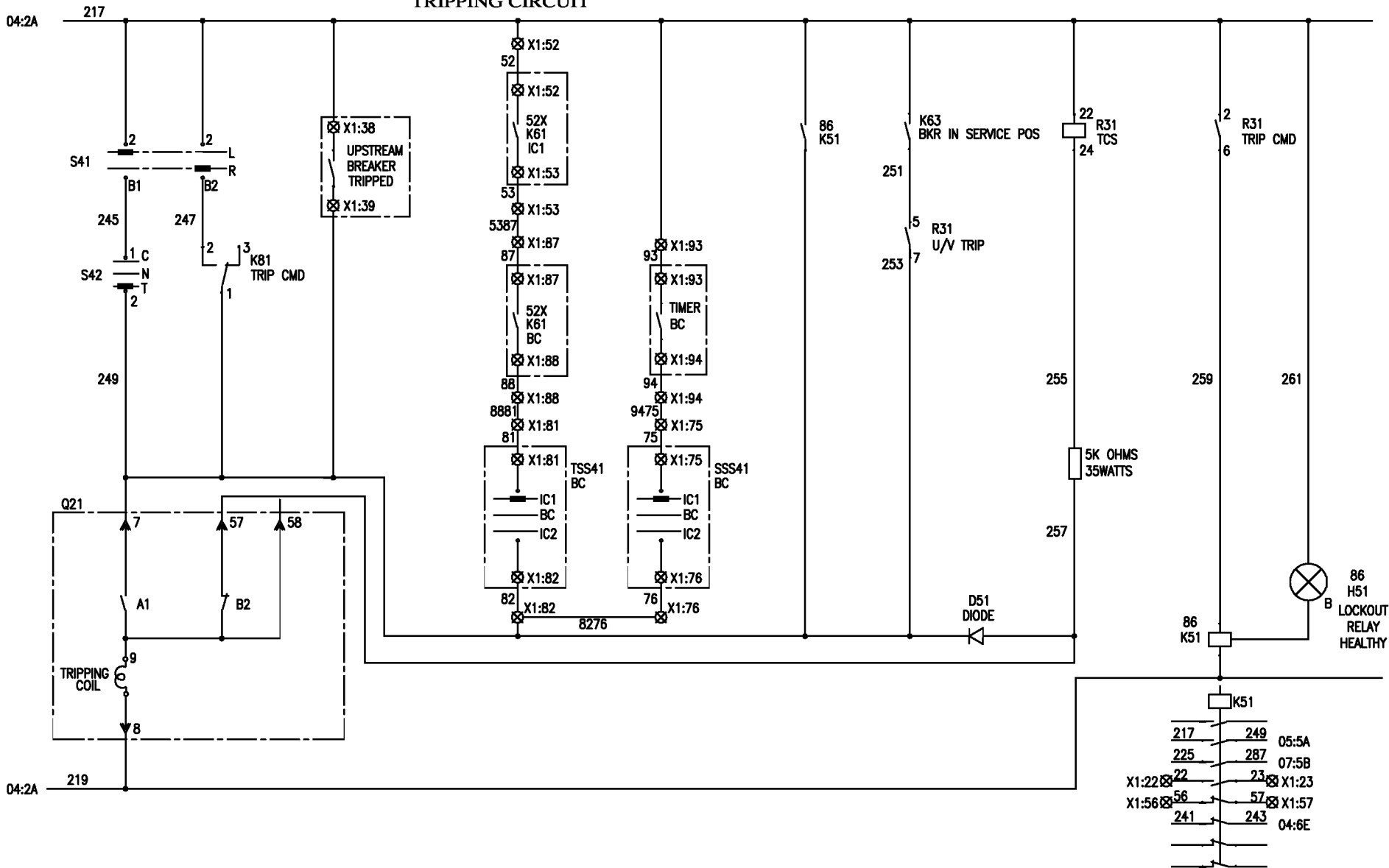
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DRG. NO. EIP-3-CS-018-003

INVENTORY NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
07								
06								
05						DESIGNED	JAGADISH	06.05.14
04						DRAWN		
03						CHECKED	TRINATH	06.05.14
02								
01								
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA		06.05.14

		<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPORCELAIN DIVISION BANGALORE		
TITLE : <b>CONTROL SCHEME</b> <b>LT MAIN SWITCH BOARD INCOMER-2</b>			NO. OF SHEETS	09
			SHEET. NO.	04
SCALE	JOB NO. CR-14-018	DRG. NO. EIP-3-CS-018-003	REV. OA	

TRIPPING CIRCUIT



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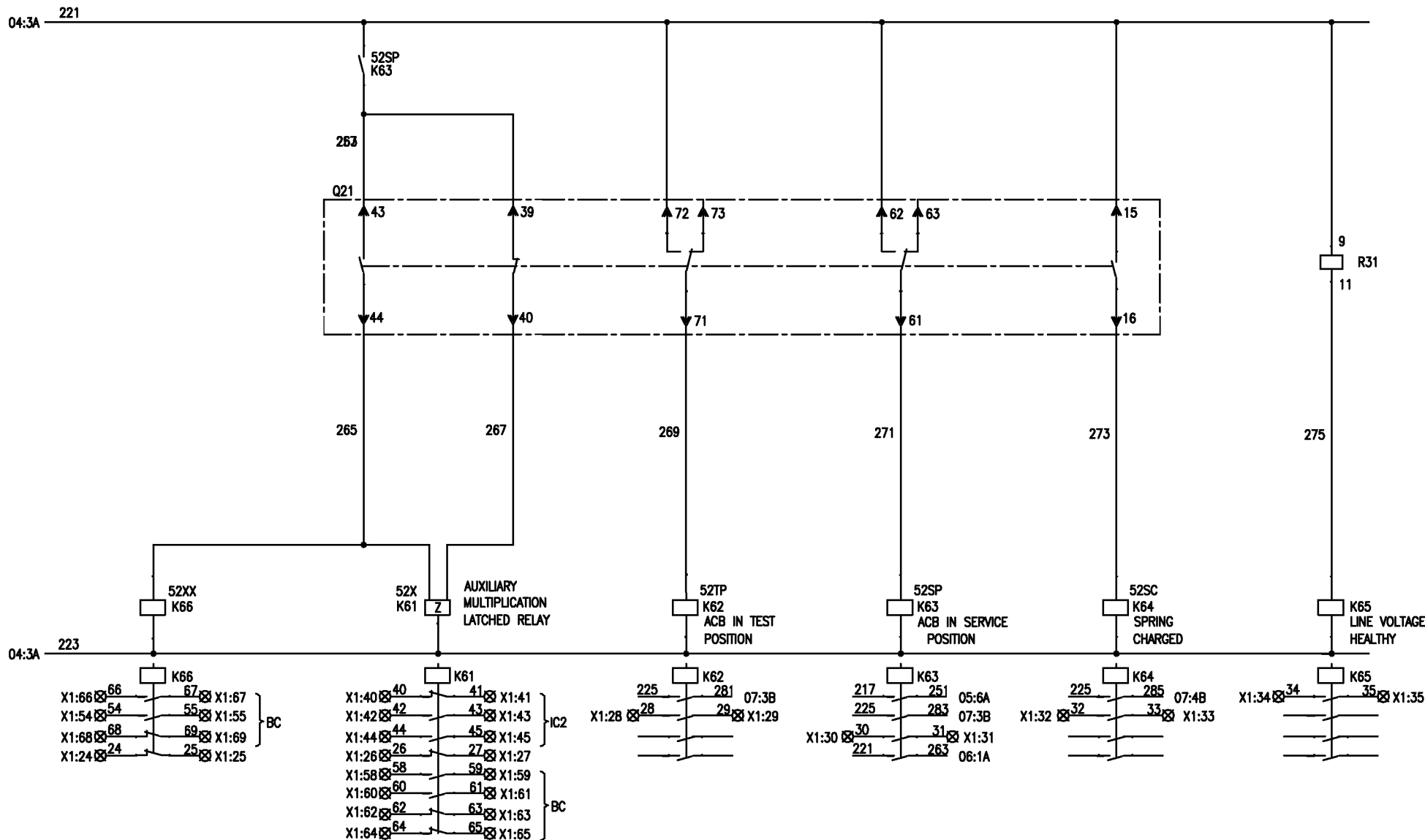
DRG. NO. EIP-3-CS-018-003

INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
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06									
05							DESIGNED	JAGADISH	06.05.14
04							DRAWN		
03							CHECKED	TRINATH	06.05.14
02									
01									
							APPROVED	KS BALA	06.05.14

<b>BHARAT HEAVY ELECTRICALS LIMITED</b> ELECTROPORCELAIN DIVISION BANGALORE			NO. OF SHEETS 09 SHEET. NO. 05
TITLE : CONTROL SCHEME LT MAIN SWITCH BOARD INCOMER-2			
SCALE	JOB NO. CR-14-018	DRG. NO. EIP-3-CS-018-003	REV. 0A

1 2 3 4 5 6 7 8

RELAY CIRCUIT



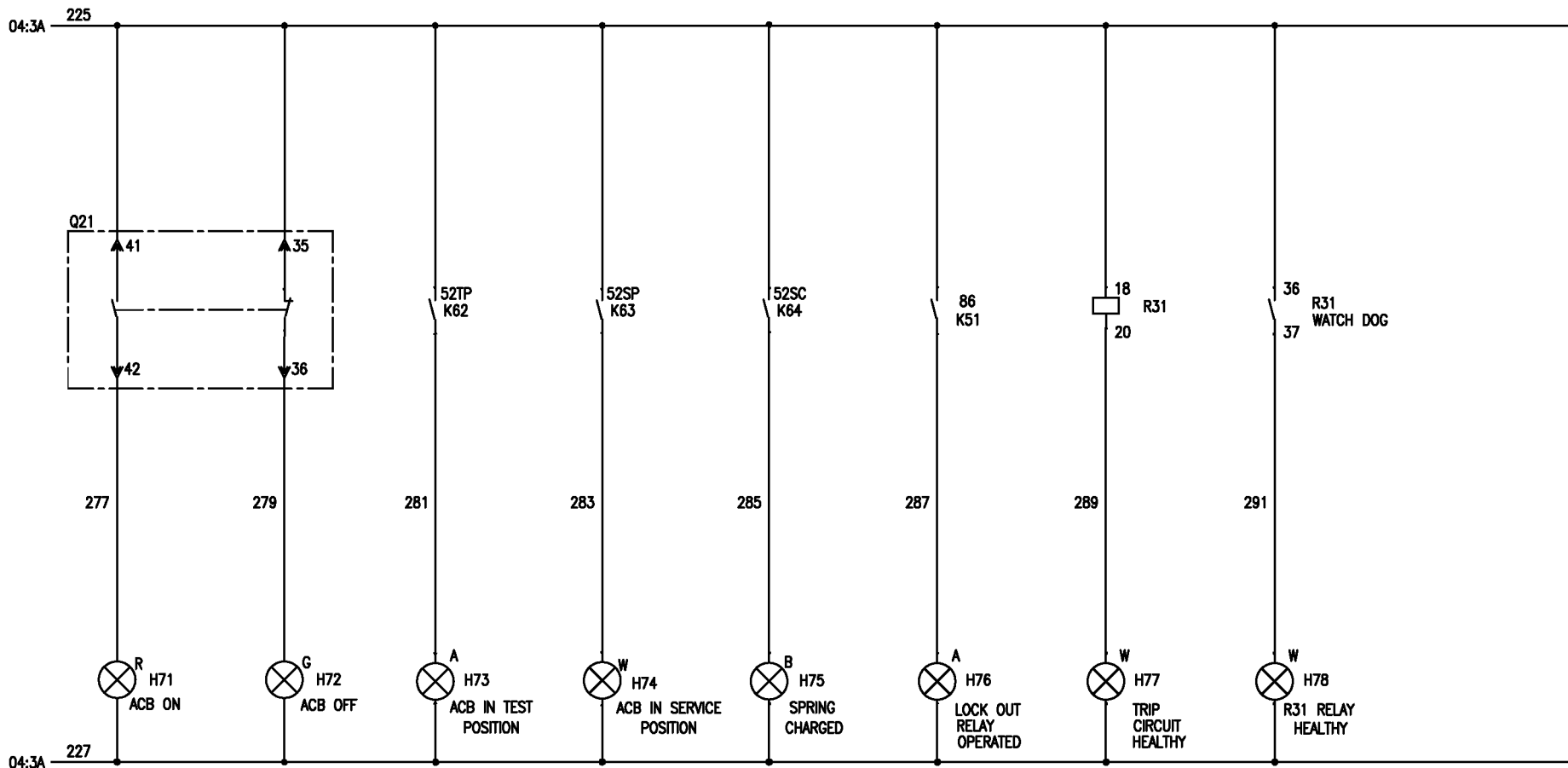
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DRG. NO. EP-3-CS-018-003

INVENTORY NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
07								
06								
05						DESIGNED	JAGADISH	06.05.14
04						DRAWN		
03						CHECKED	TRINATH	06.05.14
02								
01								
REV. NO.								

		BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE		
		TITLE : CONTROL SCHEME LT MAIN SWITCH BOARD INCOMER-2		
SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-003	REV. OA	

INDICATION CIRCUIT



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DRG. NO. EP-3-CS-018-003

INVENTORY NO.	07									BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE			
	06												
	05				DESIGNED	JAGADISH	<i>Jagadish</i>	06.05.14		TITLE : CONTROL SCHEME LT MAIN SWITCH BOARD INCOMER-2	NO. OF SHEETS	09	
	04				DRAWN						SHEET. NO.	07	
03				CHECKED	TRINATH	<i>Trinath</i>	06.05.14	DIR :					
02								FILE NO.:					
01								SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-003	REV. OA		
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA	<i>KS Bala</i>	06.05.14					

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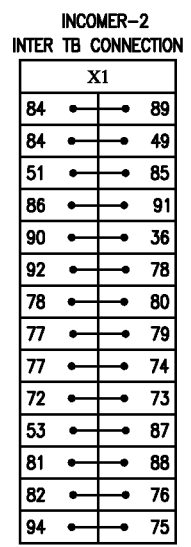
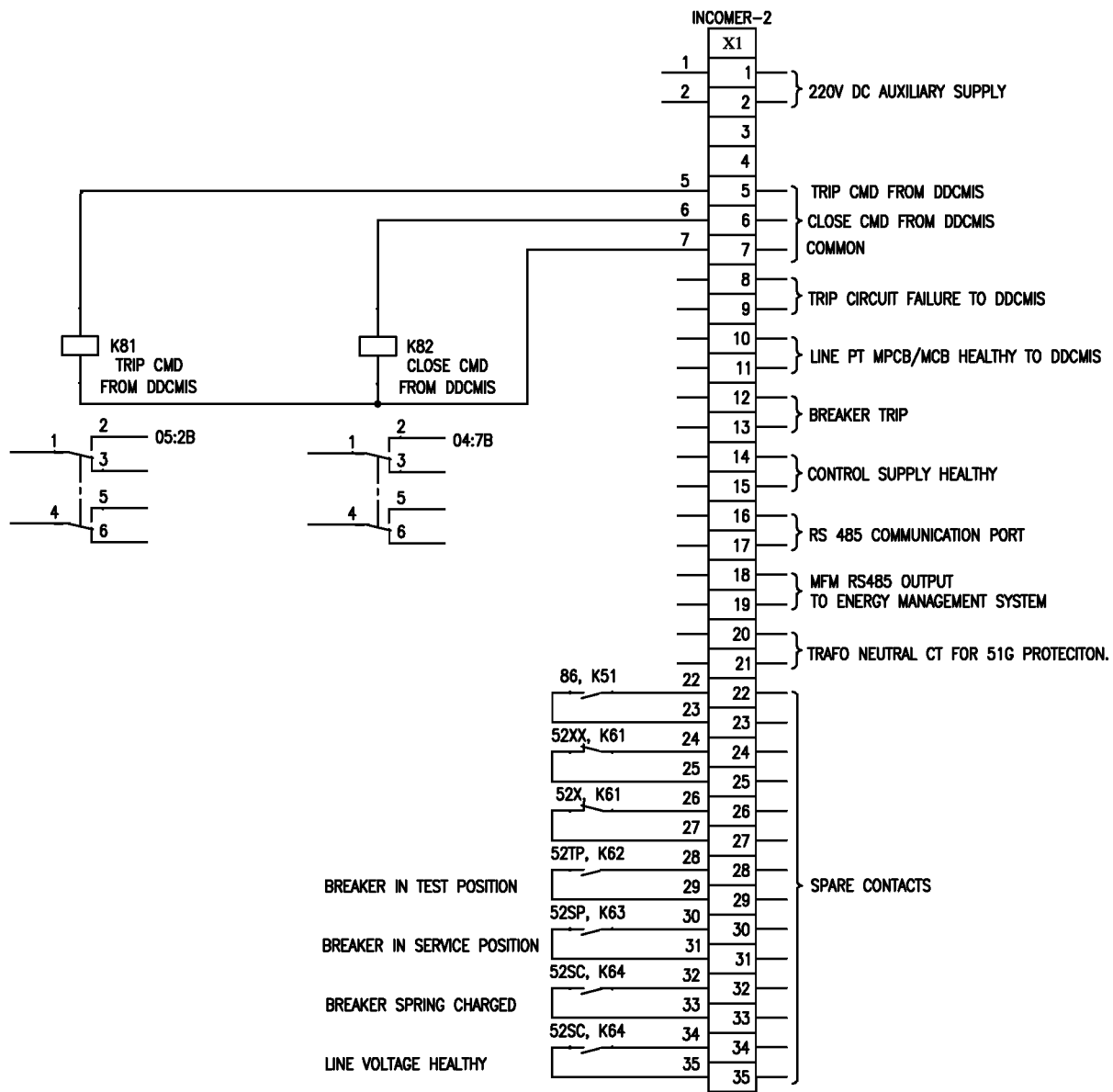
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DRG. NO. EP-3-CS-018-003

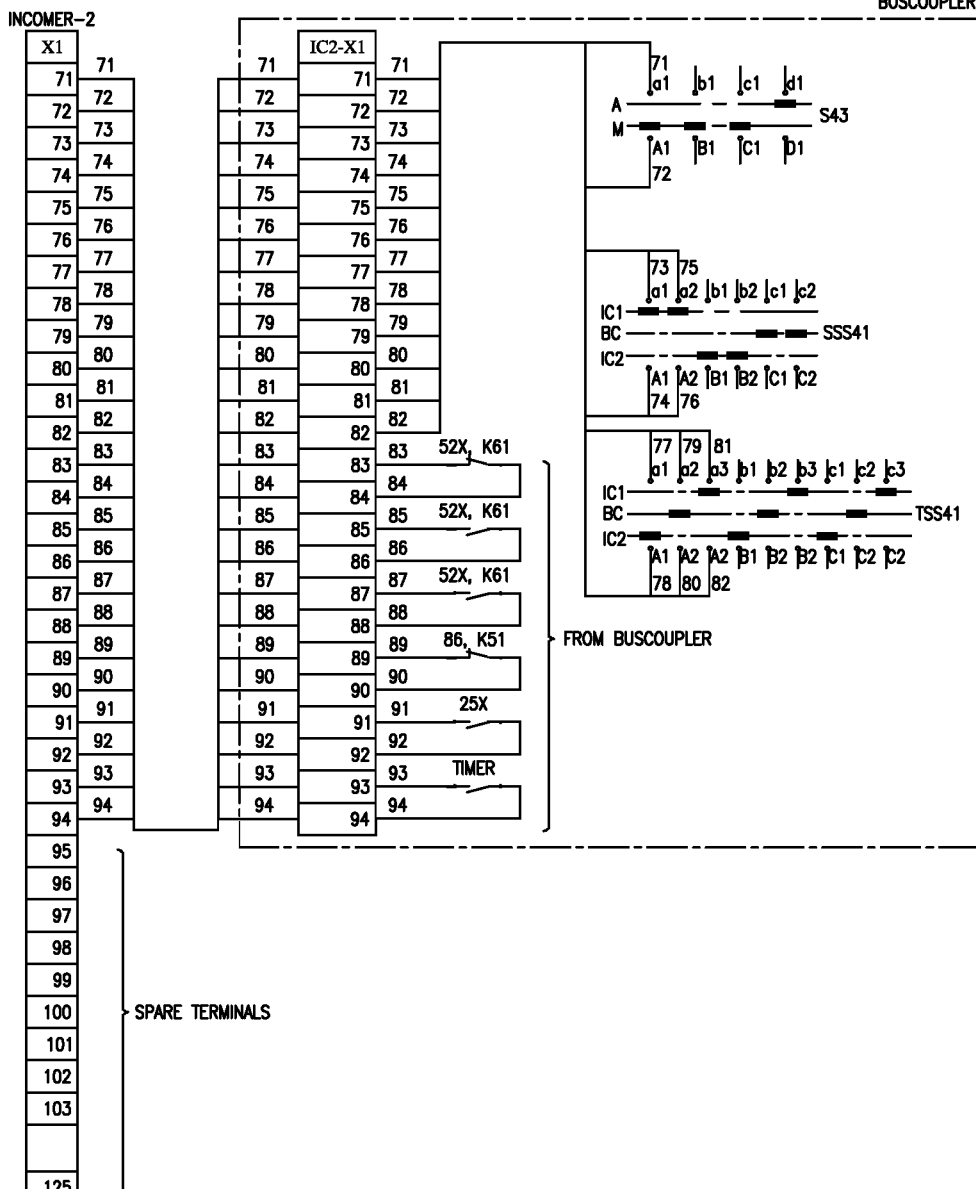
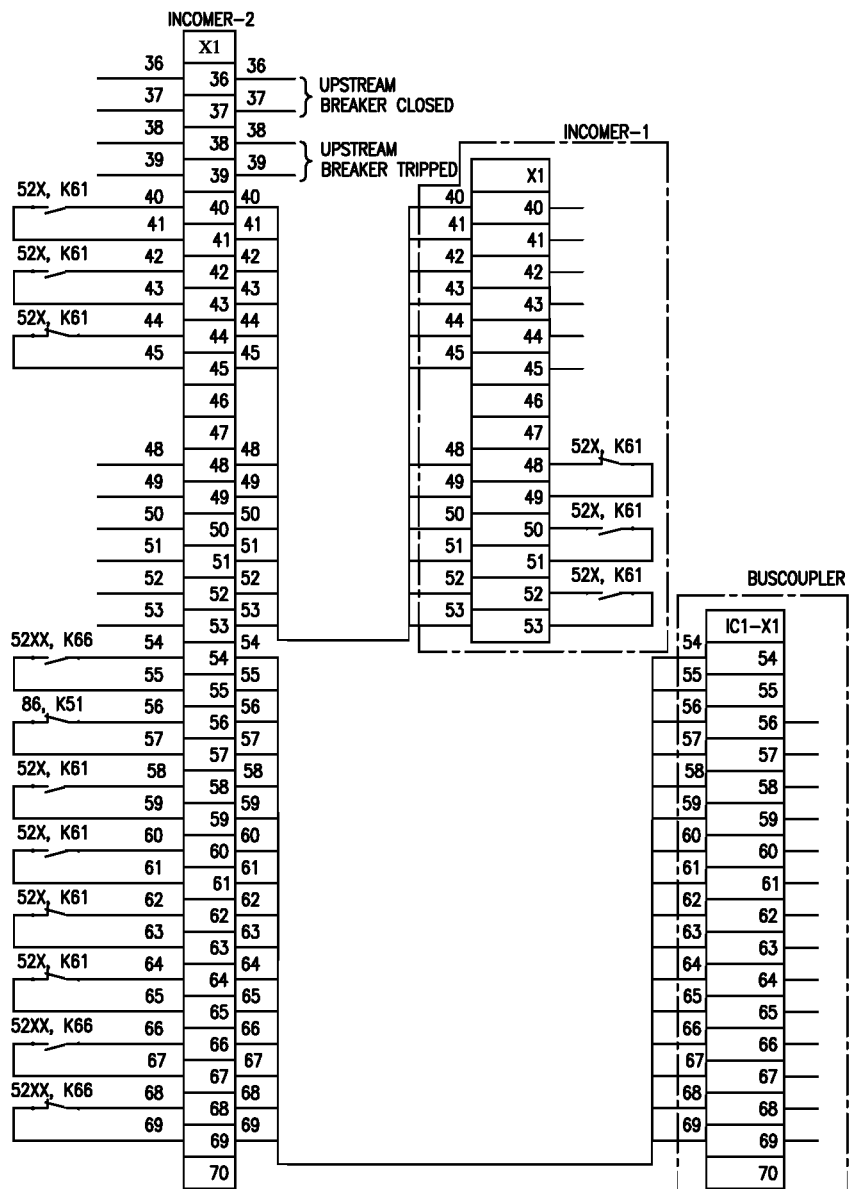


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REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA	DATE
07							
06							
05							
04							
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INVENTORY NO. 07 06 05 04 03 02 01		NAME JAGADISH TRINATH KS BALA		SIGN.   		DATE 06.05.14 06.05.14 06.05.14		DIR : FILE NO.:		BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE		TITLE : CONTROL SCHEME LT MAIN SWITCH BOARD INCOMER-2		NO. OF SHEETS SHEET. NO. 09 08		REV. OA	
								SCALE		JOB NO. CR-14-018		DRG. NO. EP-3-CS-018-003					

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DRG. NO. EP-3-CS-018-003

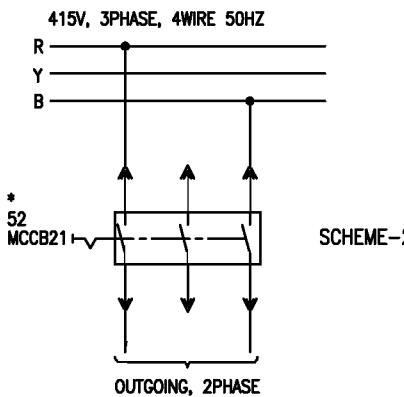
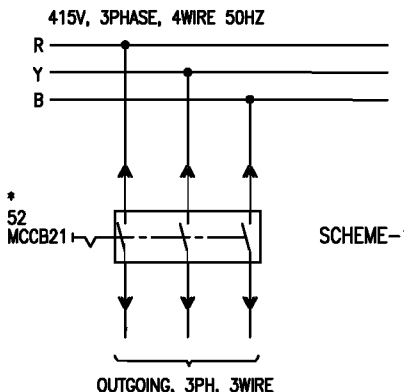
INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
07									
06									
05							DESIGNED	JAGADISH	06.05.14
04							DRAWN		
03							CHECKED	TRINATH	06.05.14
02									
01									

BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE			
TITLE : CONTROL SCHEME LT MAIN SWITCH BOARD INCOMER-2			NO. OF SHEETS : 09 SHEET. NO. : 09
SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-003	REV. OA



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DRG. NO. EIP-3-CS-018-004



\* FOR FEEDER RATING REFER FEEDER LIST

LIST OF FEEDERS						
SL NO.	DESCRIPTION/LABEL INSCRIPTION	QTY	FEEDER RATING	MCCB RATING	CONNECTED TO	
1	LIGHTING, WELDING & RECEPTACLE	1	63A	63A		SCHEME-1
2	CUSTOMER USE	1	400A	400A		SCHEME-1
3	ELECTRONIC CONTROLLER-1A, FOR ELECTROSTATIC PRECIPITATOR-A	1	183A	400A	RY	SCHEME-2
4	ELECTRONIC CONTROLLER-2A, FOR ELECTROSTATIC PRECIPITATOR-A	1	183A	400A	YB	SCHEME-2
5	ELECTRONIC CONTROLLER-3A, FOR ELECTROSTATIC PRECIPITATOR-A	1	183A	400A	BR	SCHEME-2
6	ELECTRONIC CONTROLLER-4A, FOR ELECTROSTATIC PRECIPITATOR-A	1	183A	400A	RY	SCHEME-2
7	ELECTRONIC CONTROLLER-5A, FOR ELECTROSTATIC PRECIPITATOR-A	1	183A	400A	YB	SCHEME-2
8	ELECTRONIC CONTROLLER-6A, FOR ELECTROSTATIC PRECIPITATOR-A	1	183A	400A	BR	SCHEME-2
9	ELECTRONIC CONTROLLER-7A, FOR ELECTROSTATIC PRECIPITATOR-A	1	183A	400A	RY	SCHEME-2
10	ELECTRONIC CONTROLLER-SPARE, FOR ELECTROSTATIC PRECIPITATOR-A	1	183A	400A	YB	SCHEME-2
11	ACP FOR LT MAIN SWITCH BOARD ELECTROSTATIC PRECIPITATOR-A	1	182A	400A	BR	SCHEME-2
12	AC & VENTILATION	1		400A		SCHEME-1
13	AC & VENTILATION SPARE	1		400A		SCHEME-1
14	ELECTRICALLY OPERATED HOIST	1	7.5KW	63A		SCHEME-1
15	ELECTRONIC CONTROLLER-1B, FOR ELECTROSTATIC PRECIPITATOR-B	1	183A	400A	RY	SCHEME-2
16	ELECTRONIC CONTROLLER-2B, FOR ELECTROSTATIC PRECIPITATOR-B	1	183A	400A	YB	SCHEME-2
17	ELECTRONIC CONTROLLER-3B, FOR ELECTROSTATIC PRECIPITATOR-B	1	183A	400A	BR	SCHEME-2
18	ELECTRONIC CONTROLLER-4B, FOR ELECTROSTATIC PRECIPITATOR-B	1	183A	400A	RY	SCHEME-2
19	ELECTRONIC CONTROLLER-5B, FOR ELECTROSTATIC PRECIPITATOR-B	1	183A	400A	YB	SCHEME-2
20	ELECTRONIC CONTROLLER-6B, FOR ELECTROSTATIC PRECIPITATOR-B	1	183A	400A	BR	SCHEME-2
21	ELECTRONIC CONTROLLER-7B, FOR ELECTROSTATIC PRECIPITATOR-B	1	183A	400A	RY	SCHEME-2
22	ELECTRONIC CONTROLLER-SPARE, FOR ELECTROSTATIC PRECIPITATOR-B	2	183A	400A	YB	SCHEME-2
23	ACP FOR LT MAIN SWITCH BOARD ELECTROSTATIC PRECIPITATOR-B	1	182A	400A		SCHEME-2
24	ACP SPARE, FOR LT MAIN SWITCH BOARD ELECTROSTATIC PRECIPITATOR-B	1	182A	400A		SCHEME-1
25	VFD	1		250A		SCHEME-1
26	VFD SPARE	1		250A		SCHEME-1
27	SPARE FEEDER	1		63A		SCHEME-1
28	AC & VENTILATION	1		400A		SCHEME-1
29	ILLUMINATION	1		63A		SCHEME-1
30	ELECTRICALLY OPERATED HOIST	1	7.5KW	63A		SCHEME-1

INVENTORY NO.	07							BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE			
	06							TITLE : CONTROL SCHEME OUTGOING FEEDERS	NO. OF SHEETS	02	
	05								SHEET. NO.	02	
	04										
03							DIR :				
02							FILE NO.:	SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-004	REV. 0A
01											
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA	20.05.14				

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

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INDIA POWER CORPORATION (HALDIA)LIMITED  
HALDIA

PROJECT:

3x150 MW COAL BASED POWER PLANT HALDIA

CUSTOMER CONSULTANT:



DEVELOPMENT CONSULTANT PVT LTD  
KOLKATA

DRG. NO. EP-3-CS-018-005

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INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA	NAME	SIGN.	DATE
07										
06										
05								DESIGNED	JAGADISH	20.05.14
04								DRAWN		
03								CHECKED	TRINATH	20.05.14
02										
01										



BHARAT HEAVY ELECTRICALS LIMITED  
ELECTROPORCELAIN DIVISION BANGALORE

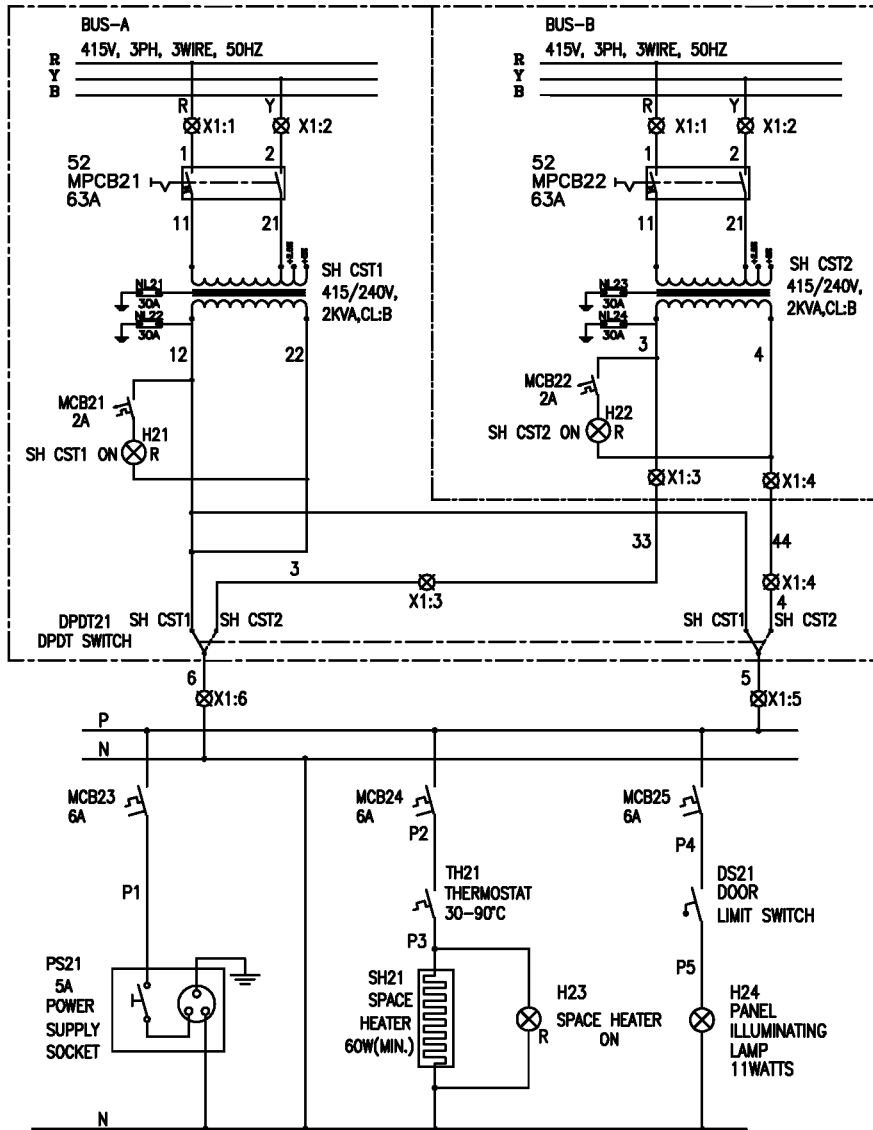


TITLE : CONTROL SCHEME  
SPACE HEATER SUPPLY TRAF0

NO. OF SHEETS	02
SHEET. NO.	01

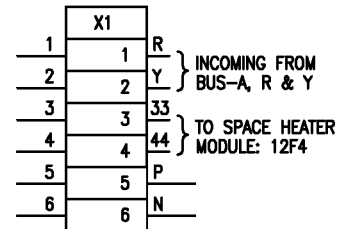
SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-005	REV. 0A
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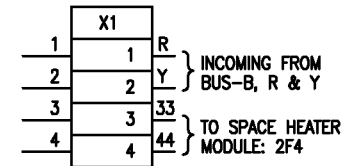


NOTE:-  
 1. POWER SOCKET WILL BE IN INCOMER-1&2 & BUSCOUPLER  
 2. SPACE HEATER & PANEL ILLUMINATING LAMP WILL BE PROVIDED IN ALL CABLE ALLEY

TERMINAL DIAGRAM  
 BUS SECTION-A



TERMINAL DIAGRAM  
 BUS SECTION-B



DRG. NO. EP-3-CS-018-005

INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
07									
06									
05							DESIGNED	JAGADISH	20.05.14
04							DRAWN		
03							CHECKED	TRINATH	20.05.14
02									
01									

		BHARAT HEAVY ELECTRICALS LIMITED ELECTROPORCELAIN DIVISION BANGALORE			
		TITLE : CONTROL SCHEME SPACE HEATER SUPPLY TRAF0			
SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-005			
DIR : FILE NO.:					
			REV. 0A		

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

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DRG. NO. EP-3-CS-018-006



INDIA POWER CORPORATION (HALDIA)LIMITED  
HALDIA

PROJECT:

3x150 MW COAL BASED POWER PLANT HALDIA

CUSTOMER CONSULTANT:



DEVELOPMENT CONSULTANT PVT LTD  
KOLKATA

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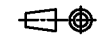
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INVENTORY NO.	REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA	NAME	SIGN.	DATE
07										
06										
05								DESIGNED	JAGADISH	20.05.14
04								DRAWN		
03								CHECKED	TRINATH	20.05.14
02										
01										



BHARAT HEAVY ELECTRICALS LIMITED  
ELECTROPORCELAIN DIVISION BANGALORE



TITLE : CONTROL SCHEME  
BUS PT

NO. OF SHEETS	02
SHEET. NO.	01

SCALE	JOB NO. CR-14-018	DRG. NO. EP-3-CS-018-006	REV. 0A
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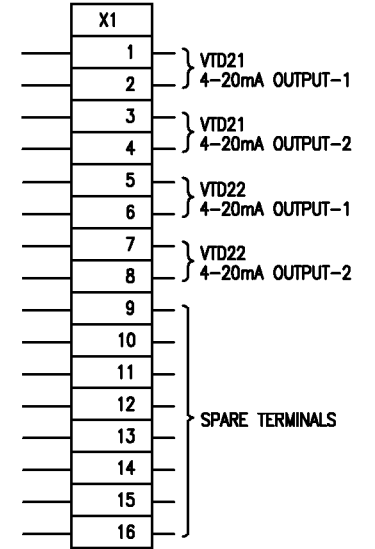
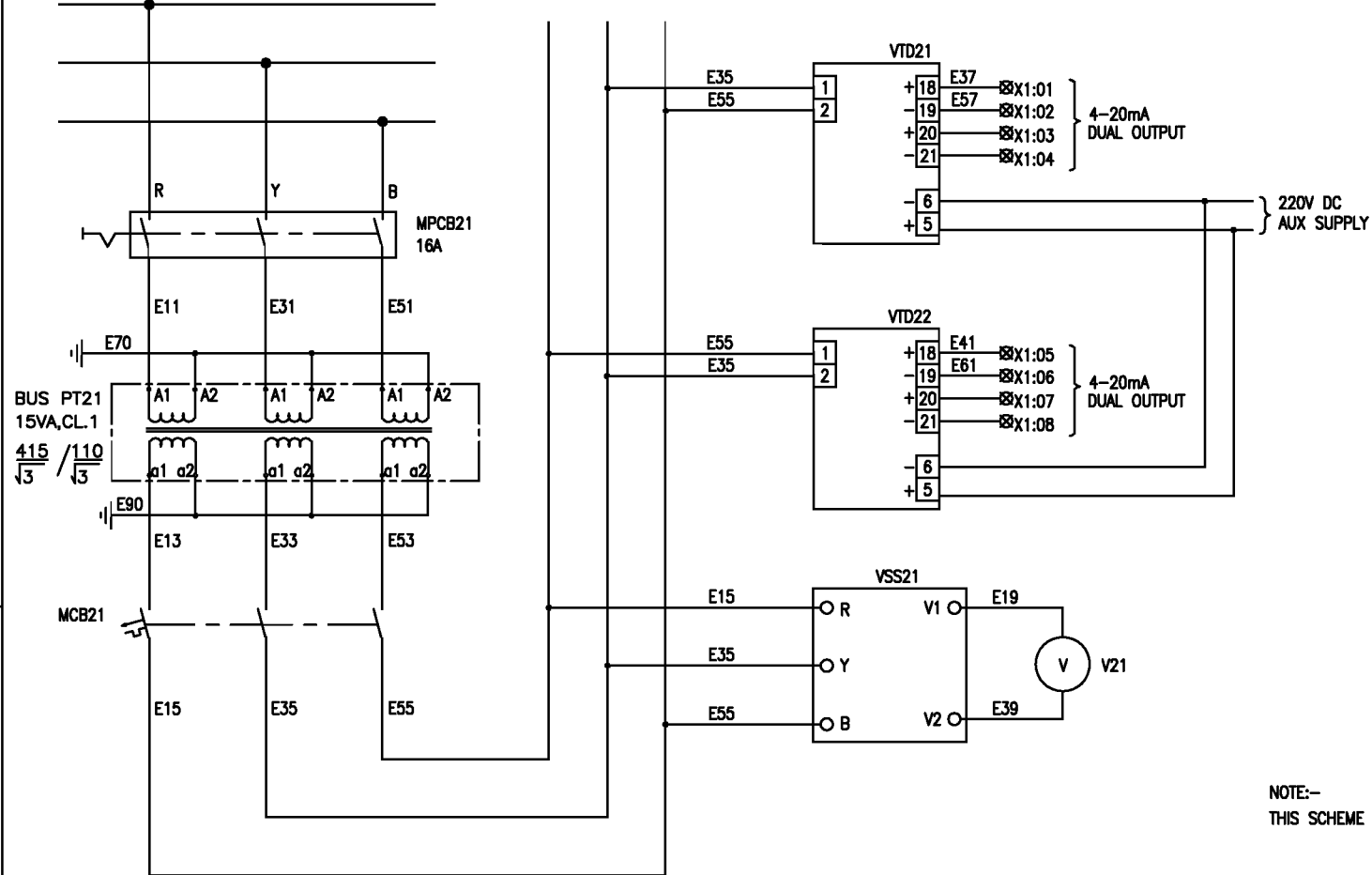
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DRG. NO. EIP-3-CS-018-006

415V, 3PH, 3W, 50Hz, 50KA FOR 1SEC.



NOTE:-  
THIS SCHEME IS APPLICABLE FOR BOTH BUS PT'S

INVENTORY NO.	07								BHARAT HEAVY ELECTRICALS LIMITED				
	06								ELECTROPORCELAIN DIVISION BANGALORE				
	05								TITLE : CONTROL SCHEME BUS PT				NO. OF SHEETS 02
	04												SHEET. NO. 02
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA	20.05.14	DIR : FILE NO.:	SCALE	JOB NO. CR-14-018	DRG. NO. EIP-3-CS-018-006	REV. 0A	

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

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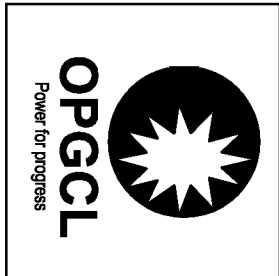
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CUSTOMER:



ODISHA POWER GENERATION CORPORATION LIMITED  
 BANHARPALI, JHARSUGUDA  
 ORISSA-768234, INDIA

PROJECT:

2x660 MW UNITS 3&4 IB THERMAL POWER STATION

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DRG. NO. EP-3-GA-019-001

INVENTORY NO.

REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE	DIR :	FILE NO.:	SCALE	JOB NO.	DRG. NO.	NO. OF SHEETS	NO. OF SHEETS	REV.
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06																
05						JAGADISH		04.11.14								
04																
03																
02																
01						TRINATH		04.11.14								
						KS BALA		04.11.14								

DEVELOPMENT CONSULTANT PVT LTD  
 KOLKATA



CUSTOMER CONSULTANT:



BHARAT HEAVY ELECTRICALS LIMITED

ELECTROBORCELAIN DIVISION, BANGALORE

TITLE :  
 GENERAL ARRANGEMENT  
 AUXILIARY CONTROL PANEL

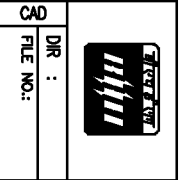
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DRG. NO. EP-3-GA-018-001

INVENTORY NO.

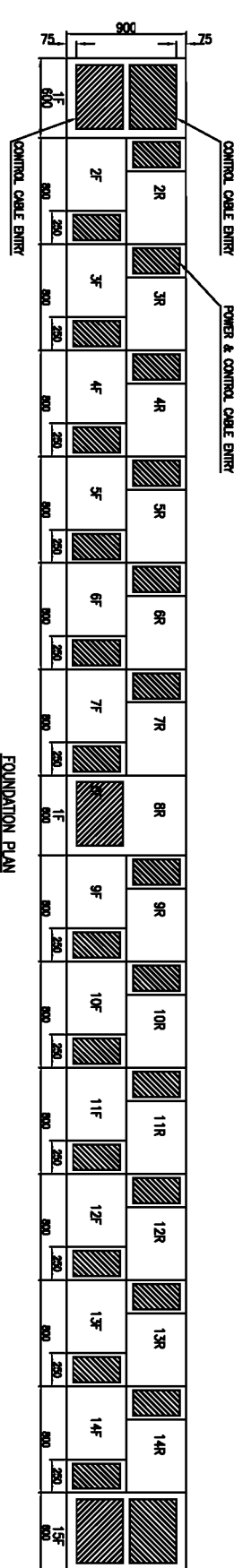
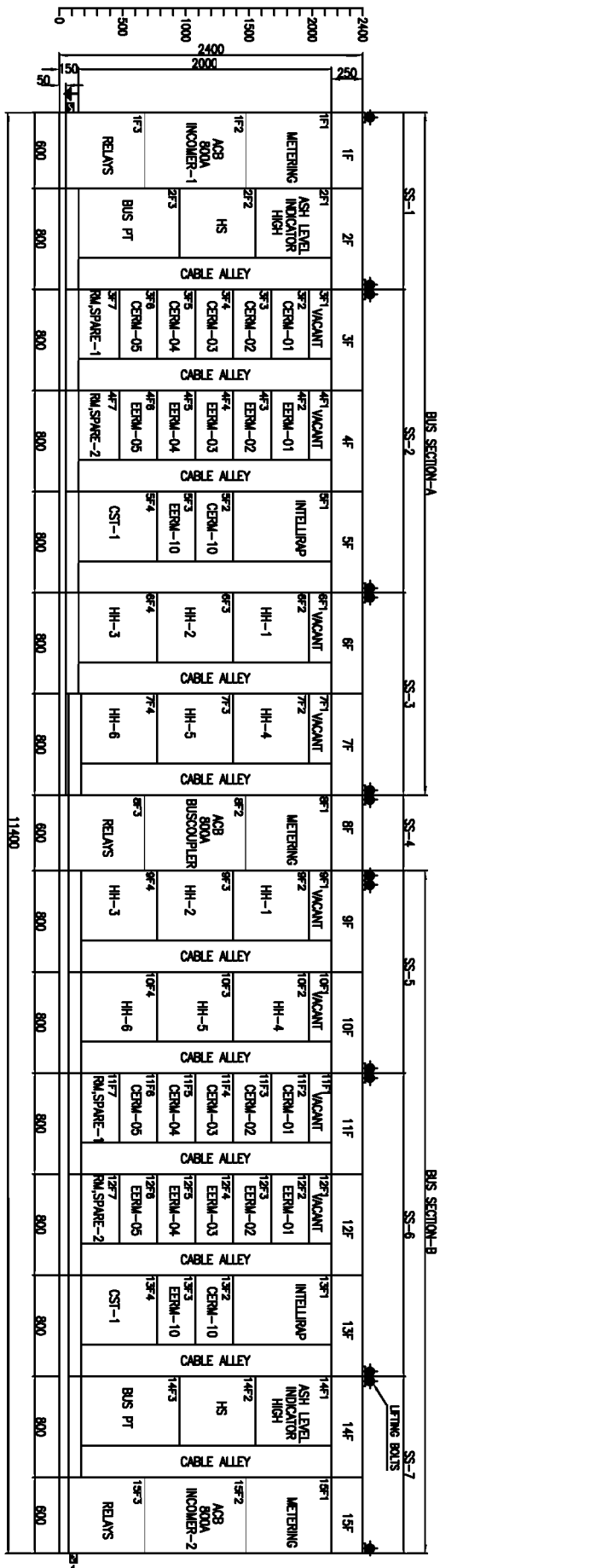
07	REV.	DATE	DESCRIPTION
06			
05			
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07	BY	APPD.	APPROVED	NAME	SIGN.	DATE
06				JAGADISH		04.11.14
05						
04						
03						
02						
01						



BHARAT HEAVY ELECTRICALS LIMITED	
ELECTRORORREPLAIN DIVISION, BANGALORE	
TITLE :	
GENERAL ARRANGEMENT	
AUXILIARY CONTROL PANEL	
NO. OF SHEETS	04
SHEET NO.	02
REV.	0A

FIRST ANGLE PROJECTION ALL DIMENSIONS ARE IN MM.





DRG. NO. EP-3-GA-019-001

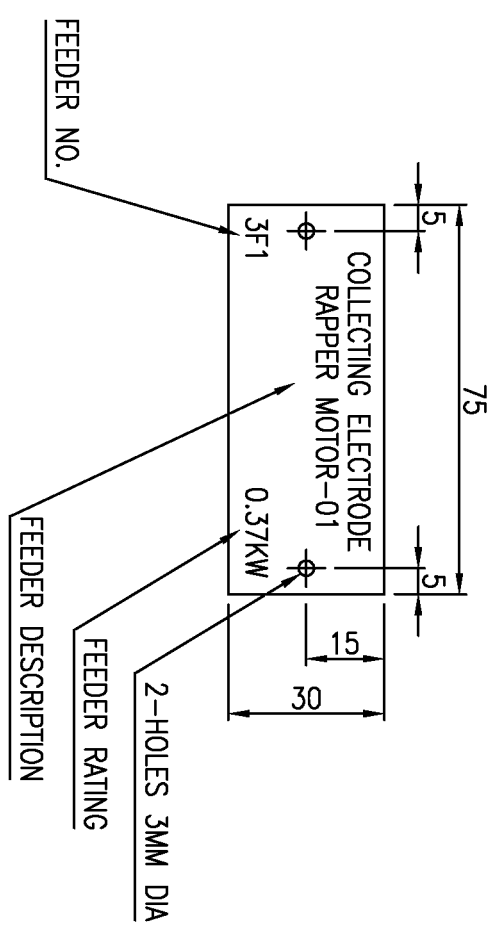
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07		06																	
06		05						JAGADISH		04.11.14									
04		03																	
03		02																	
02		01																	
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SL. NO.	FEEDER NO BUS-A BUS-B	DESCRIPTION/LABEL INSCRIPTION	QUANTITY BUS-A BUS-B	FEEDER RATING	MCCB RATING	MPCB RATING	MODULE SIZE
1	1F2	INCORNER-1	1	1	800A		FULL PNL
2	8F2	BUSCOUPLER	1	1			FULL PNL
3	3F2	COLLECTING ELECTRODE RAPPER MOTOR-01	1	0.37KW		16A	300MM
4	3F3	COLLECTING ELECTRODE RAPPER MOTOR-02	1	0.37KW		16A	300MM
5	3F4	COLLECTING ELECTRODE RAPPER MOTOR-03	1	0.37KW		16A	300MM
6	3F5	COLLECTING ELECTRODE RAPPER MOTOR-04	1	0.37KW		16A	300MM
7	3F6	COLLECTING ELECTRODE RAPPER MOTOR-05	1	0.37KW		16A	300MM
8	3F2	COLLECTING ELECTRODE RAPPER MOTOR-06	1	0.37KW		16A	300MM
9	3F3	COLLECTING ELECTRODE RAPPER MOTOR-07	1	0.37KW		16A	300MM
10	3F4	COLLECTING ELECTRODE RAPPER MOTOR-08	1	0.37KW		16A	300MM
11	3F5	COLLECTING ELECTRODE RAPPER MOTOR-09	1	0.37KW		16A	300MM
12	3F2	COLLECTING ELECTRODE RAPPER MOTOR-10	1	0.37KW		16A	300MM
13	5F3	GAS DISTRIBUTION RAPPER MOTOR	1	0.37KW	16A	16A	300MM
14	4F2	EMITTING ELECTRODE RAPPER MOTOR-01	1	0.37KW	16A	16A	300MM
15	4F3	EMITTING ELECTRODE RAPPER MOTOR-02	1	0.37KW	16A	16A	300MM
16	4F4	EMITTING ELECTRODE RAPPER MOTOR-03	1	0.37KW	16A	16A	300MM
17	4F5	EMITTING ELECTRODE RAPPER MOTOR-04	1	0.37KW	16A	16A	300MM
18	4F6	EMITTING ELECTRODE RAPPER MOTOR-05	1	0.37KW	16A	16A	300MM
19	4F2	EMITTING ELECTRODE RAPPER MOTOR-06	1	0.37KW	16A	16A	300MM
20	4F3	EMITTING ELECTRODE RAPPER MOTOR-07	1	0.37KW	16A	16A	300MM
21	4F4	EMITTING ELECTRODE RAPPER MOTOR-08	1	0.37KW	16A	16A	300MM
22	4F5	EMITTING ELECTRODE RAPPER MOTOR-09	1	0.37KW	16A	16A	300MM
23	5F3	EMITTING ELECTRODE RAPPER MOTOR-10	1	0.37KW	16A	16A	300MM
24	3F7	APPER MOTOR SPACE-1	1	0.37KW	16A	16A	300MM
25	4F7	APPER MOTOR SPACE-2	1	0.37KW	16A	16A	300MM
26	3F6	APPER MOTOR SPACE-3	1	0.37KW	16A	16A	300MM
27	3F7	APPER MOTOR SPACE-4	1	0.37KW	16A	16A	300MM
28	7F2	APPER MOTOR SPACE-5	1	0.37KW	16A	16A	300MM
29	5F4	OPM BLOWER MOTOR	1	1.1KW	16A	16A	300MM
30	6F2	HOPPER HEATER-1&2, FIELD-1	1	12KW	32A		600MM
31	6F3	HOPPER HEATER-1&2, FIELD-2	1	12KW	32A		600MM
32	6F4	HOPPER HEATER-1&2, FIELD-3	1	12KW	32A		600MM
33	7F2	HOPPER HEATER-1&2, FIELD-4	1	12KW	32A		600MM
34	7F3	HOPPER HEATER-1&2, FIELD-5	1	12KW	32A		600MM
35	7F4	HOPPER HEATER-1&2, FIELD-6	1	12KW	32A		600MM
36	6F2	HOPPER HEATER-1&2, FIELD-7	1	12KW	32A		600MM
37	6F3	HOPPER HEATER-1&2, FIELD-8	1	12KW	32A		600MM
38	6F4	HOPPER HEATER-1&2, FIELD-9	1	12KW	32A		600MM
39	7F3	HOPPER HEATER-1&2, FIELD-10	1	12KW	32A		600MM
40	7F4	HOPPER HEATER-1&2, FIELD SPACE-1	1	12KW	32A		600MM
41	2F3	HOPPER HEATER-1&2, FIELD SPACE-2	1	12KW	32A		600MM

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

SL. NO.	FEEDER NO BUS-A BUS-B	DESCRIPTION/LABEL INSCRIPTION	QUANTITY BUS-A BUS-B	FEEDER RATING	MCCB RATING	MPCB RATING	MODULE SIZE
42	5R2	SUPPORT INSULATOR HEATER	1	1	40KW	63A	600MM
43	2R2	SUPPORT INSULATOR HEATER SPACE	1	1	40KW	63A	600MM
44	2F2	SHAFT INSULATOR HEATER	1	1	10KW	32A	600MM
45	2R4	SHAFT INSULATOR HEATER SPACE	1	1	10KW	32A	600MM
46	5F4	CONTROL SUPPLY TRANSFORMER	1	1	5KVA	16A	475MM
47	2F3	BUS PT	1	1			475MM
48	2F1	ASH LEVEL INDICATOR HIGH	1	1			775MM
49	5F1	INTELLI-RAP MODULE	1	1			475MM
50	4R1	MARSHALLING FOR RAPPER MOTORS + WIRELESS CONTROLLER	1	1			775MM
51	5R1	MARSHALLING FOR RAPPER MOTORS + WIRELESS CONTROLLER	1	1			775MM
52	7R1	MARSHALLING FOR HOPPER HEATER + WIRELESS CONTROLLER	1	1			775MM



EXAMPLE OF FEEDERS LABEL  
MATERIAL: 2MM THICK ALUMINIUM SHEET  
INSCRIPTION: ISO 4MM HEIGHT LETTERS ENGRAVED ON BLACK BACK GROUND

**BHARAT HEAVY ELECTRICALS LIMITED**  
ELECTROBORCELAIN DIVISION, BANGALORE

TITLE : GENERAL ARRANGEMENT  
AUXILIARY CONTROL PANEL

JOB NO. CR-14-019      DRG. NO. EP-3-GA-019-001

NO. OF SHEETS : 04  
SHEET NO. : 04

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

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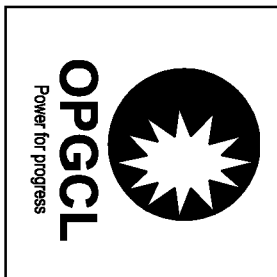
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CUSTOMER:



ODISHA POWER GENERATION CORPORATION LIMITED  
 BANHARPALI, JHARSUGUDA  
 ORISSA-768234, INDIA

PROJECT:

2x660 MW UNITS 3&4 IB THERMAL POWER STATION

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DRG. NO. EP-3-SL-019-315

INVENTORY NO.

REV. NO.	DATE	DESCRIPTION	BY	APPO.	APPROVED	NAME	SIGN.	DATE	DIR :	FILE NO.:	SCALE	JOB NO.	DRG. NO.	NO. OF SHEETS	REV.	
07																
06					DESIGNED	JAGADISH		05.01.15								
04					DRAWN											
03																
02					CHECKED	TRINATH		05.01.15								
01						KS BALA		05.01.15								

DEVELOPMENT CONSULTANT PVT LTD  
 KOLKATA



CUSTOMER CONSULTANT:

BHARAT HEAVY ELECTRICALS LIMITED  
 ELECTROPROCLAIM DIVISION BANGALORE

TITLE :  
 SINGLE LINE DIAGRAM  
 AUXILIARY CONTROL PANEL

NO. OF SHEETS  
 18

SHEET NO.  
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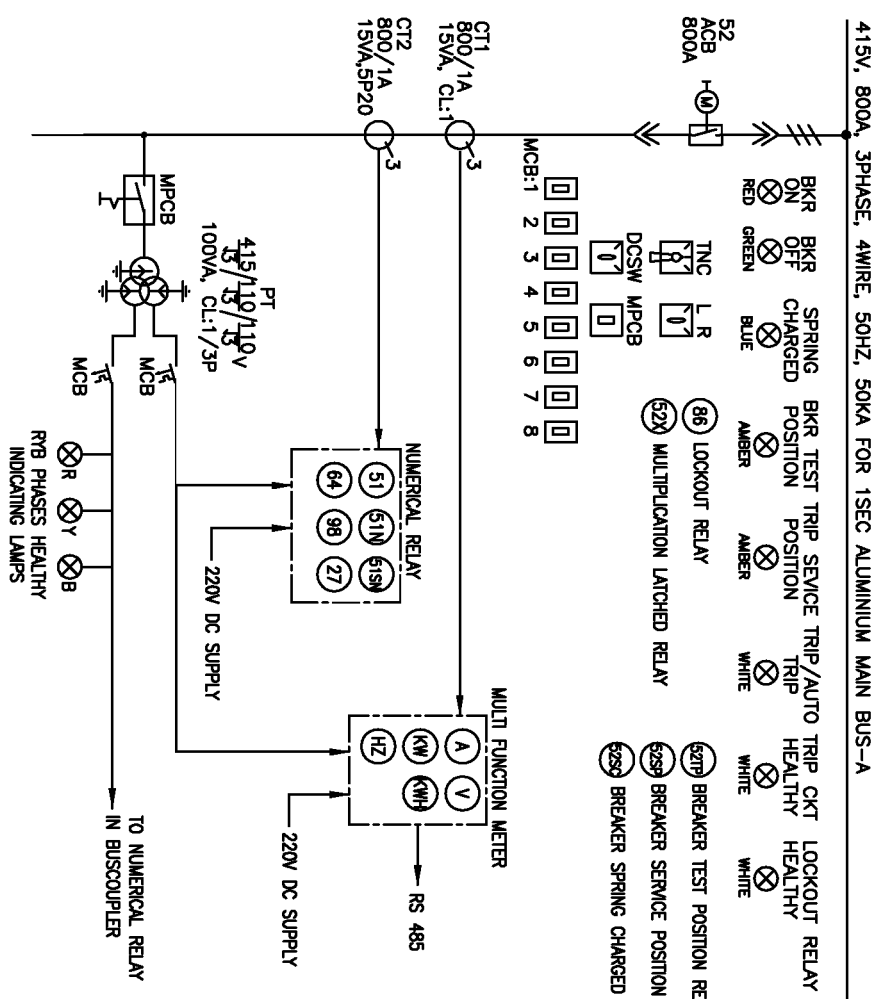
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DRG. NO. EP-3-SL-019-315

1 2 3 4 5 6 7 8

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.



DESCRIPTION	INCOMER-1	
RATING	800A	CONTROL SUPPLY TRANSFORMER
FEEDER NO.	1F2	5KVA
SCHEME REF.	EP-3-CS-107-004	SF4
CABLE SIZE	3-3.5CX300SQMM AL	2F1
		EP-3-019-CS-007
		EP-3-019-CS-009

CERM: COLLECTING ELECTRODE RAPPING MOTOR  
EERM: EMITTING ELECTRODE RAPPING MOTOR  
GRM: GAS DISTRIBUTION RAPPING MOTOR  
HH: HOPPER HEATER  
HI: SUPPORT INSULATOR HEATER  
HS: SHAFT INSULATOR HEATER

INVENTORY NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA	DIR :	FILE NO.:	SCALE	JOB NO.	CR-13-020	DRG. NO.	EP-3-SL-019-315
07													
08													
09													
04			DESIGNED			JAGADISH	05.01.15						
03			DRAWN										
02			CHECKED			TRINATH	05.01.15						
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NO. OF SHEETS	18												
SHEET NO.	02												
REV.	00												

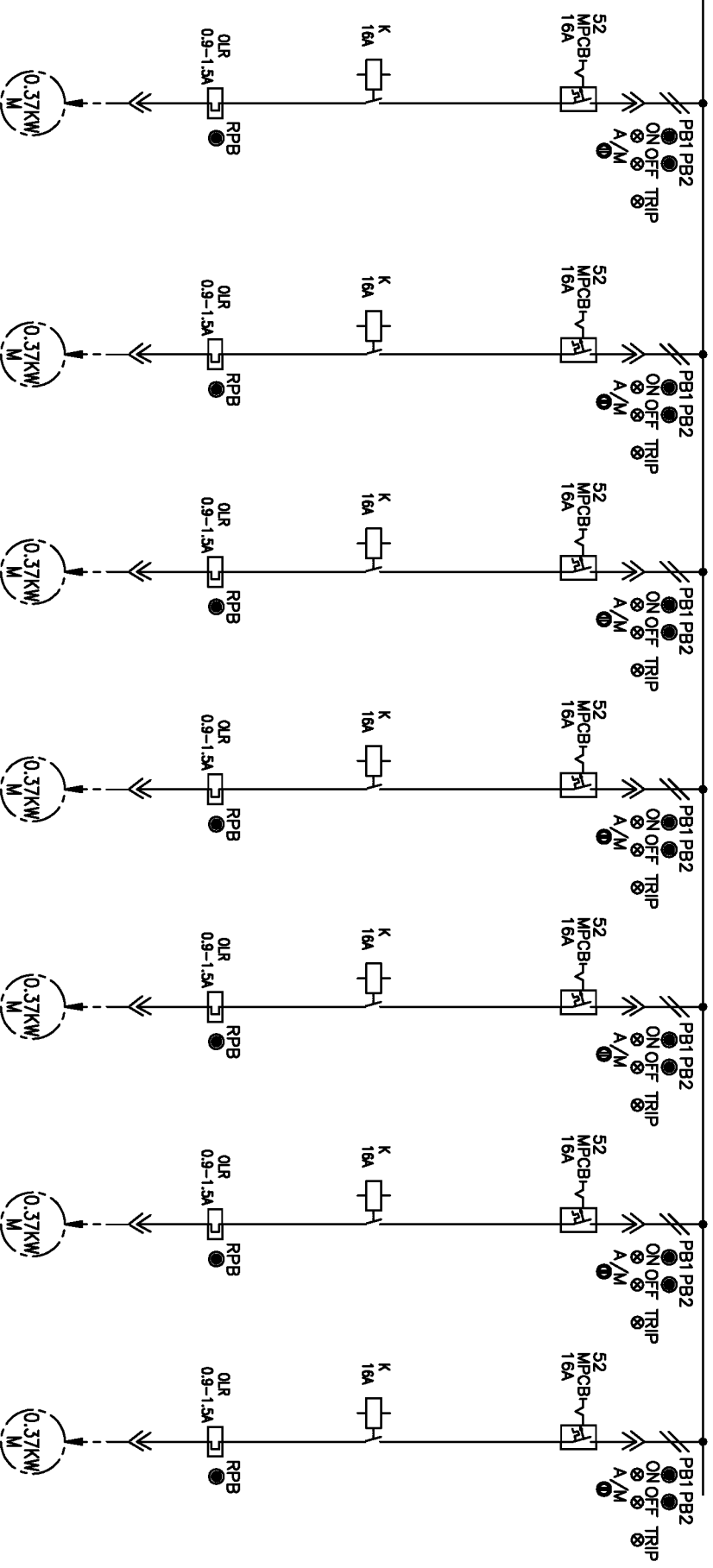
BHARAT HEAVY ELECTRICALS LIMITED  
ELECTROPORCELAIN DIVISION BANGALORE

SINGLE LINE DIAGRAM  
AUXILIARY CONTROL PANEL



1 2 3 4 5 6 7 8

415V, 800A, 3PHASE, 3WIRE 50HZ 50KA FOR 1SEC



DESCRIPTION	CERM-1	CERM-2	CERM-3	CERM-4	CERM-5	CERM-6	CERM-7
RATING	0.37KW	0.37KW	0.37KW	0.37KW	0.37KW	0.37KW	0.37KW
FEEDER NO.	3F2	3F3	3F4	3F5	3F6	3R2	3R3
SCHEME REF	EP-3-CS-019-002						
CABLE SIZE	1-3CX2.5SQMM CU XLPE	1-3CX2.5SQMM CU XLPE	1-3CX2.5SQMM CU XLPE	1-3CX2.5SQMM CU XLPE	1-3CX2.5SQMM CU XLPE	1-3CX2.5SQMM CU XLPE	1-3CX2.5SQMM CU XLPE

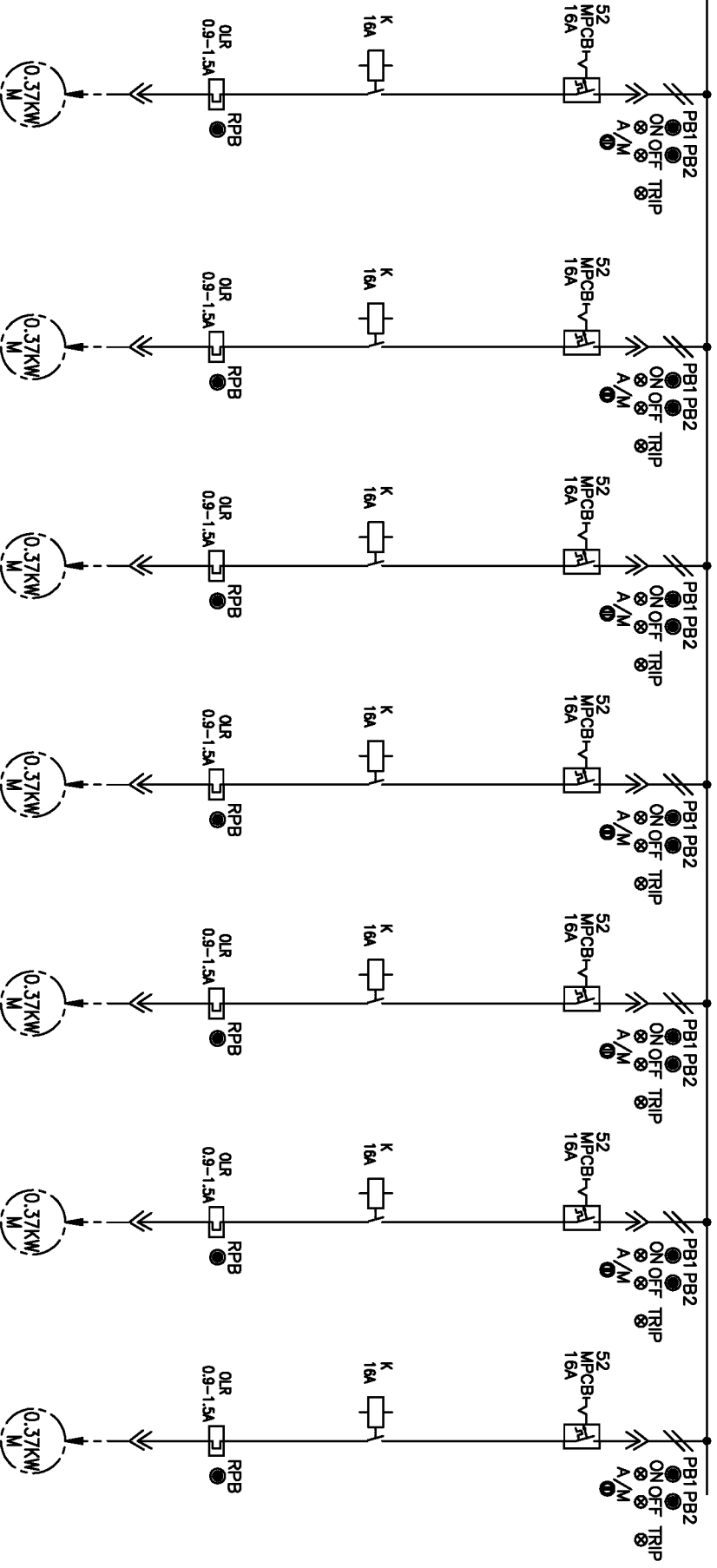
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DRG. NO. EP-3-SL-019-315

REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA	DIR. :	FILE NO.:	SCALE	JOB NO. CR-13-020	DRG. NO. EP-3-SL-019-315	NO. OF SHEETS 18	SHEET. NO. 03	REV. NO. 00
07														
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INVENTORY NO.														

1 2 3 4 5 6 7 8

415V, 800A, 3PHASE, 3WIRE 50HZ 50KA FOR 1SEC



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DRG. NO. EP-3-SL-019-315

DESCRIPTION	CERM-8	CERM-9	CERM-10	EERM-1	EERM-2	EERM-3	EERM-4
RATING	0.37KW	0.37KW	0.37KW	0.37KW	0.37KW	0.37KW	0.37KW
FEEDER NO.	3R4	3R5	5F2	4F2	4F3	4F4	4F5
SCHEME REF	EP-3-CS-019-002						
CABLE SIZE	1-30x2.5SQMM CU XLPE	1-30x2.5SQMM CU XLPE	1-30x2.5SQMM CU XLPE	1-30x2.5SQMM CU XLPE	1-30x2.5SQMM CU XLPE	1-30x2.5SQMM CU XLPE	1-30x2.5SQMM CU XLPE

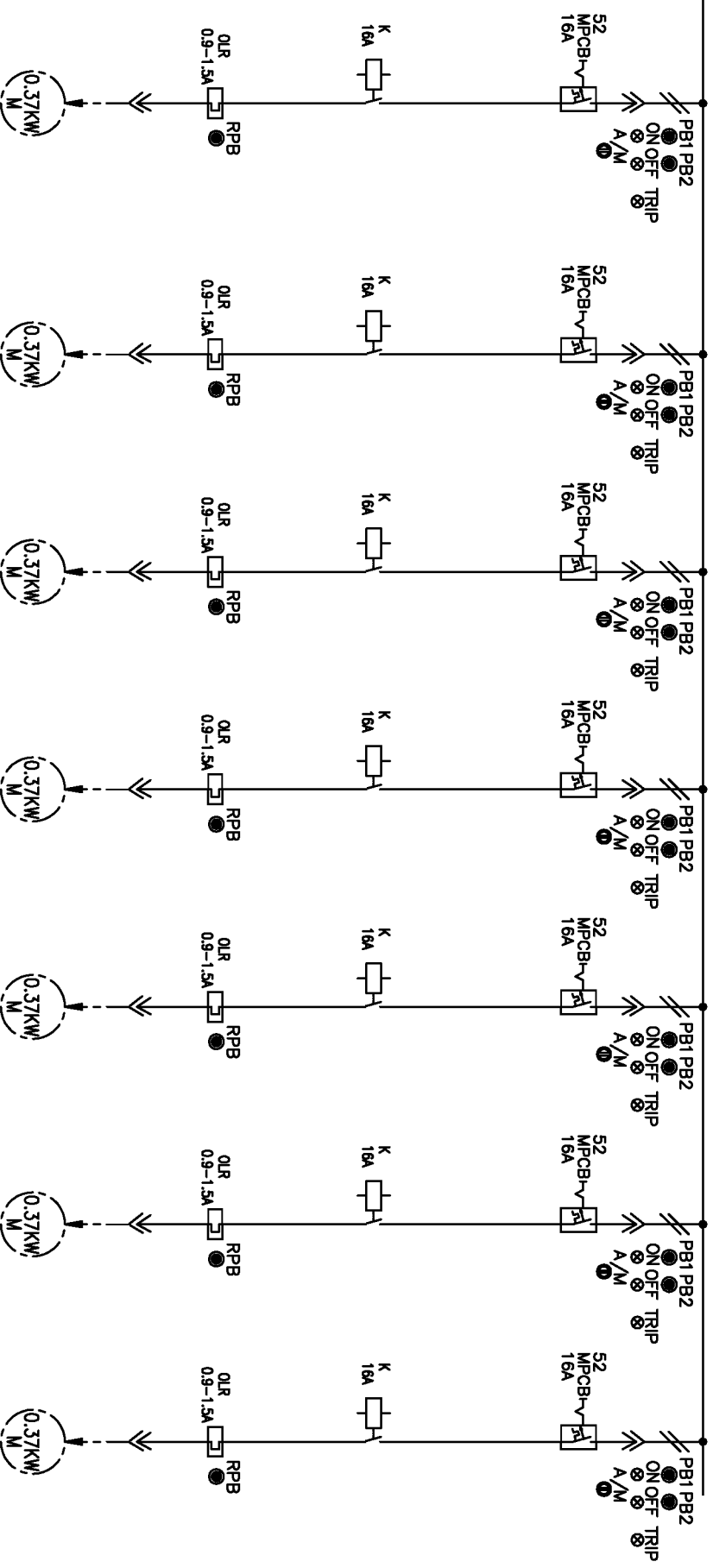
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BHARAT HEAVY ELECTRICALS LIMITED  
ELECTROPORCELAIN DIVISION BANGALORE

TITLE :  
SINGLE LINE DIAGRAM  
AUXILIARY CONTROL PANEL

1 2 3 4 5 6 7 8

415V, 800A, 3PHASE, 3WIRE 50HZ 50KA FOR 1SEC



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DRG. NO. EP-3-SL-019-315

DESCRIPTION	EERM-5	EERM-6	EERM-7	EERM-8	EERM-9	EERM-10	GDRM
RATING	0.37KW	0.37KW	0.37KW	0.37KW	0.37KW	0.37KW	0.37KW
FEEDER NO.	4F6	4R2	4R3	4R4	4R5	5F3	5R3
SCHEME REF	EP-3-CS-019-002						
CABLE SIZE	1-3CX2.5SQMM CU XLPE	1-3CX2.5SQMM CU XLPE	1-3CX2.5SQMM CU XLPE	1-3CX2.5SQMM CU XLPE	1-3CX2.5SQMM CU XLPE	1-3CX2.5SQMM CU XLPE	1-3CX2.5SQMM CU XLPE

REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	KS BALA	DIR. :	FILE NO.:	SCALE	JOB NO.	CR-13-020	DRG. NO.	EP-3-SL-019-315	NO. OF SHEETS	18	SHEET. NO.	05	REV.	00
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INVENTORY NO.																			



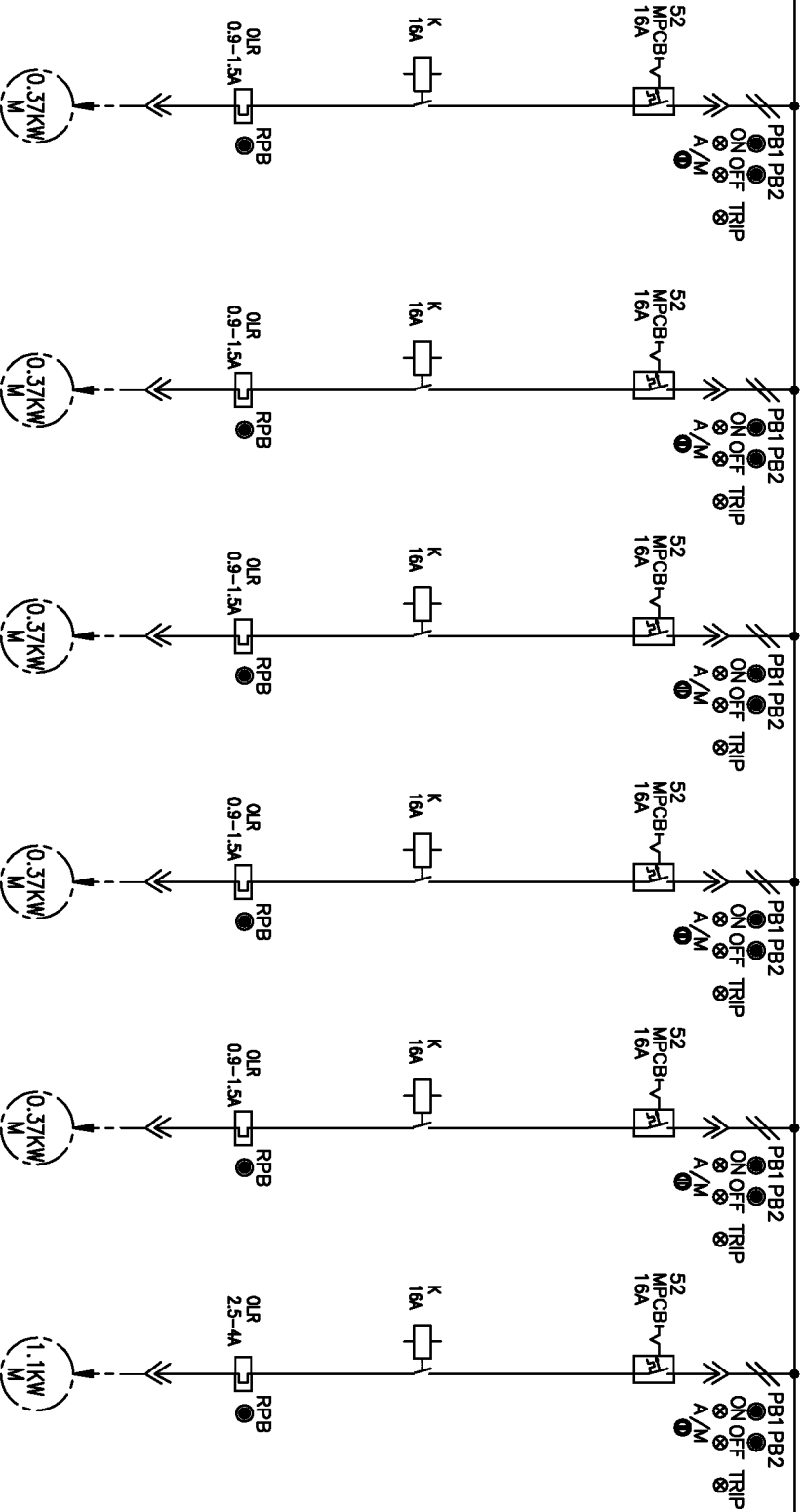
BHARAT HEAVY ELECTRICALS LIMITED

ELECTROPORCELAIN DIVISION BANGALORE

TITLE :  
SINGLE LINE DIAGRAM  
AUXILIARY CONTROL PANEL

1 2 3 4 5 6 7 8

415V, 800A, 3PHASE, 3WIRE 50HZ 50KA FOR 1SEC



DESCRIPTION	SPARE-1	SPARE-2	SPARE-3	SPARE-4	SPARE-5	OPM
RATING	0.37KW	0.37KW	0.37KW	0.37KW	0.37KW	1.1KW
FEEDER NO.	3F7	4F7	3R6	3R7	7R2	5R4
SCHEME REF	EP-3-CS-019-002					
CABLE SIZE	1-3CX2.5SQMM CU XLPE	1-3CX2.5SQMM CU XLPE	1-3CX2.5SQMM CU XLPE	1-3CX2.5SQMM CU XLPE	1-3CX2.5SQMM CU XLPE	EP-3-CS-019-041

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DRG. NO. EP-3-SL-019-315

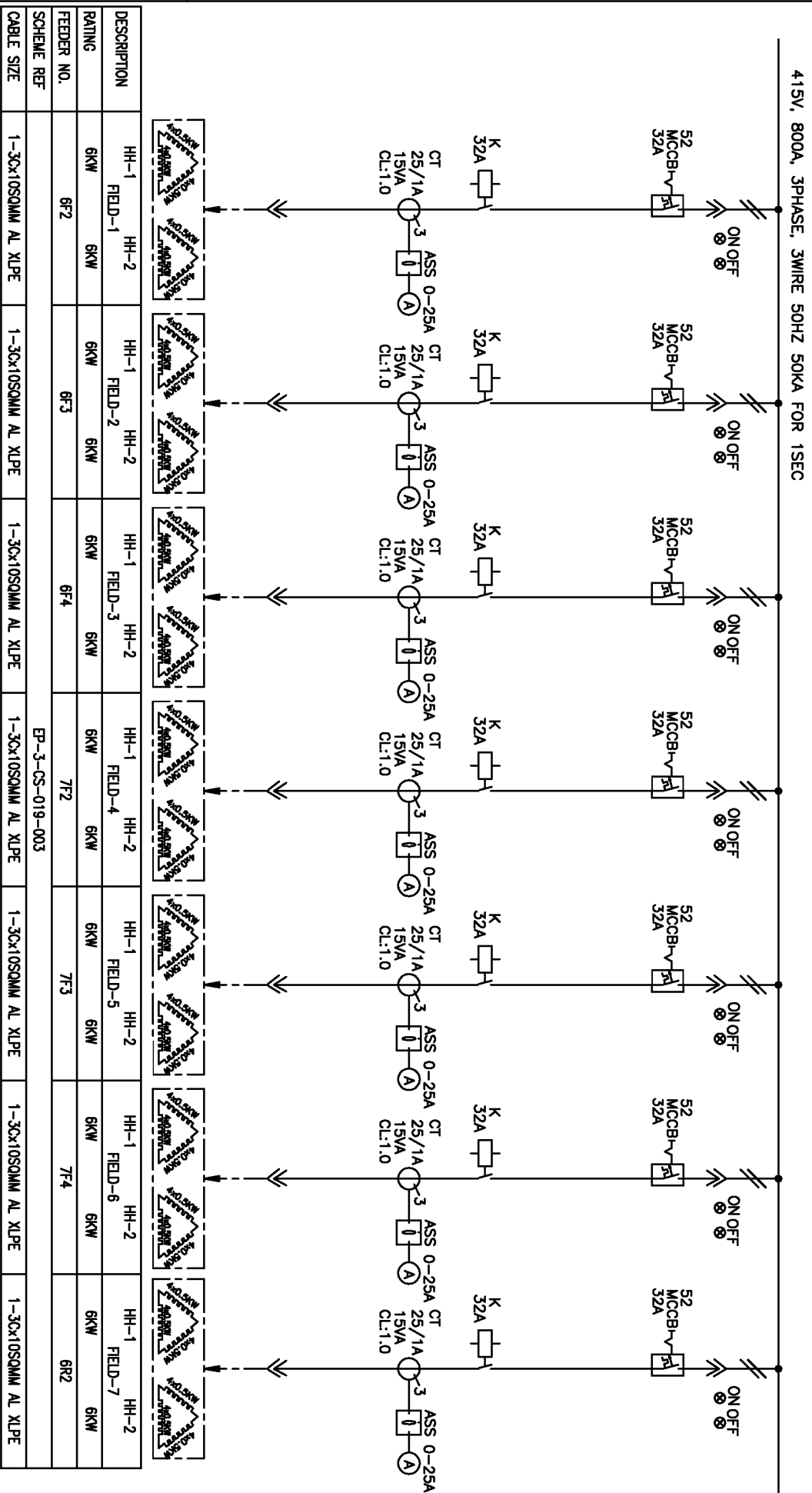
REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE	DIR :	FILE NO.:	SCALE	JOB NO.	CR-13-020	DRG. NO.	EP-3-SL-019-315	NO. OF SHEETS	18	SHEET NO.	06	REV.	00
07																					
06																					
05						DESIGNED	JAGADISH	05.01.15													
04						DRAWN															
03						CHECKED	TRINATH	05.01.15													
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INVENTORY NO.																					

BHARAT HEAVY ELECTRICALS LIMITED  
ELECTROPERCELAIN DIVISION BANGALORE

TITLE :  
SINGLE LINE DIAGRAM  
AUXILIARY CONTROL PANEL

DRG. NO. EP-3-SL-019-315

1 2 3 4 5 6 7 8  
FIRST ANGLE PROJECTION  
ALL DIMENSIONS ARE IN MM.



DESCRIPTION	HH-1	HH-2	HH-1	HH-2	HH-1	HH-2	HH-1	HH-2	HH-1	HH-2	HH-1	HH-2
FIELD-1	FIELD-1	FIELD-2	FIELD-2	FIELD-3	FIELD-3	FIELD-4	FIELD-4	FIELD-5	FIELD-5	FIELD-6	FIELD-6	FIELD-7
RATING	6KW	6KW	6KW	6KW	6KW	6KW	6KW	6KW	6KW	6KW	6KW	6KW
FEEDER NO.	6F2	6F2	6F3	6F4	7F2	7F2	7F3	7F3	7F4	7F4	7F4	6R2
SCHEME REF	EP-3-CS-019-003											
CABLE SIZE	1-3CX10SQMM AL XLPE											

INVENTORY NO.	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE	DIR.	FILE NO.:	SCALE	JOB NO.	CR-13-020	DRG. NO.	EP-3-SL-019-315	NO. OF SHEETS	18	SHEET NO.	07	REV.	00
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06																				
05					DESIGNED	JAGADISH	05.01.15													
04					DRAWN															
03					CHECKED	TRINATH	05.01.15													
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DATE																				

BHARAT HEAVY ELECTRICALS LIMITED  
ELECTROPORCELAIN DIVISION BANGALORE

TITLE :  
SINGLE LINE DIAGRAM  
AUXILIARY CONTROL PANEL

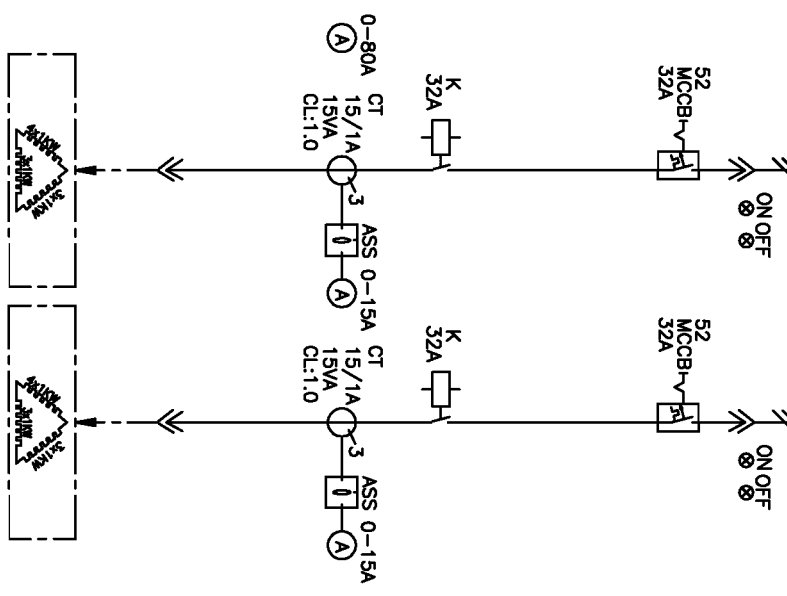


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DRG. NO. EP-3-SL-019-315

FORM 66-301 A

415V, 800A, 3PHASE, 3WIRE 50HZ 50KA FOR 1SEC



DESCRIPTION	HS	HS-SPARE
RATING	10KW	10KW
FEEDER NO.	2F2	2R4
SCHEME REF	EP-3-CS-019-005	
CABLE SIZE	1-3Cx10SQMM AL XLPE	1-3Cx10SQMM AL XLPE

INVENTORY NO.		DESCRIPTION		BY	APPO.	APPROVED	NAME	SIGN.	DATE	DIR :	FILE NO.:	SCALE	JOB NO.	CR-13-020	DRG. NO.	EP-3-SL-019-315	NO. OF SHEETS	18	NO. OF SHEETS	09	
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BHARAT HEAVY ELECTRICALS LIMITED  
 ELECTROPORCELAIN DIVISION BANGALORE

SINGLE LINE DIAGRAM  
 AUXILIARY CONTROL PANEL

