The Tata Power Company Ltd	TATA POWER	*OPEN TENDER NOTIFICATION*
Tender Reference: ***CC25VJS021***		*Document Date:* ***18th July 2024***

The Tata Power Company Limited Invites Tender through E-Tender Two-Part Bidding Process from interested bidders for the following package: -

A. Summary of the tendered package:

Sr. No.	Description	Tender Reference no.	Bid Guarantee Fee / EMD (Rs.)	Tender Fee (Rs.)	Last Date and Time for payment of Tender Participation fee
For the following package please send mail to Mr Vinayak Shinde (vinayak.shinde@tatapower.com) with copy to Mr. Rameshkumar P N (pnramesh@tatapower.com).					
1.	OLA for Supply of FRTU for Mumbai Distribution	CC25VJS021	2,00,000/-	2,000 /-	29th July 2024

B. Procedure to Participate in Tender.

Following steps to be done before "Last date and time for Payment of Tender Participation Fee" as mentioned above

1. Non-Refundable Tender Fee, as indicated in table above, to be submitted in the form of

Direct deposit in the following bank account and submit the receipt along with a covering letter clearly indicating the Tender Reference number –

Beneficiary Name – The Tata Power Co. Ltd.

Bank Name – HDFC Bank Ltd.

Branch Name – Fort Branch, Mumbai

Address – Maneckji Wadia Building, Nanik Motwani Marg, Fort, Mumbai 400023.

Branch Code – 60

Bank & Branch Code – 400240015

Account No – 00600110000763

Account type – CC

IFSC Code – HDFC0000060

2. Eligible and Interested Bidders to submit duly signed and stamped letter on Bidder's letterhead indicating

Tender Enquiry number

Name of authorized person

Contact number

e-mail id

Details of submission of Tender Participation Fee

E-mail with necessary attachment of 1 and 2 above to be send to vinayak.shinde@tatapower.com with copy to pnramesh@tatapower.com before "Last date and time for Payment of Tender Participation Fee"

Interested bidders to submit Tender Participation Fee and Authorization Letter before Last date and time as indicated above after which link from Tata Power E-Tender system (Ariba) will be shared for further communication and bid submission.

Please note all future correspondence regarding the tender, bid submission, bid submission date extension, Pre-bid query etc. will happen only through Tata Power E-Tender system (Ariba).

No e-mail or verbal correspondence will be responded. All communication will be done strictly with the bidder who have done the above step to participate in the Tender.

Also it may be strictly noted that once date of "Last date and time for Payment of Tender Participation Fee" is lapsed no Bidder will be sent link from Tata Power E-Tender System (Ariba). Without this link vendor will not be able to participate in the tender. Any last moment request to participate in tender will not be entertained.

Any payment of Tender Participation Fee by Bidder who have not done the pre-requisite will not be refunded.

Also all future corrigendum's to the said tender will be informed on Tender section on website https://www.tatapower.com only.

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OPEN TENDER NOTIFICATION

FOR

OLA for Supply of FRTU for Mumbai Distribution

The Tata Power Company Limited (Tata Power)
Smart Center of Procurement Excellence,2nd Floor,
Sahar Receiving Station, Near Hotel Leela,
Sahar Airport Road, Andheri East, Mumbai-400059

Section A : Tender Notice including Instruction to Bidders

1. Tender Details

1.1 Key Tender Specific Details

Reference Number	**CC25VJS021**
Description	OLA for Supply of FRTU for Mumbai Distribution
Type of Tender	**Outline Agreement**
Estimated Period	**2 years**
Tender Fee	**Rs 2000/-**
Earnest Money Deposit (EMD)	**Rs 2,00,000/-** **Rs. Two Lakhs Only**
Price Basis	**Firm Price**
Executive Handling this Tender*	Name: Mr. Vinayak Shinde E-Mail ID: vinayak.shinde@tatapower.com
Technical Query *	Name: Mr. A V Potdar E-Mail ID: avpotdar@tatapower.com

*You may contact the above personnel from Monday to Friday during office hours only.

1.2 Calendar of Events

(a)	Payment of Tender Fee and Submission of letter nominating authorized person by Interested Bidder indicating their intent to Buy Tender	Till 29th July 2024
(b)	Access to Tender Documents through E-Tender system to authorized person of Interested Bidder	29th July 2024
(c)	Last Date of receipt of pre-bid queries, if any.	2nd Aug 2024
(d)	Last Date of Posting Consolidated replies to all the pre-bid queries as received	8th Aug 2024
(e)	Last date and time of receipt of Bids	19th Aug 2024

Note:- * These date and time are as planned and tentative. In case of change the same shall be intimated to Authorized Person of Interested Bidder through E-Tender System.

Please note post submission of Bids relevant communication will be done with Authorized Person of Interested Bidder through E-Tender System

1.3 Mandatory documents required along with the Bid

1.3.1 Bid Guarantee Fee (EMD) of requisite value and validity. PLEASE NOTE THAT BID GUARANTEE ONLY IN FORM OF BANK GUARANTEE WILL BE ACCEPTED.

1.3.2 Requisite Documents to ascertain fulfilling of Technical and Commercial Pre-Qualification Requirement as detailed in Tender Enquiry.

1.3.3 Technical Submission including Drawings, Type Test details etc as detailed in Technical Specification.

1.3.4 Required Commercial Submission as detailed in Tender Document

1.3.5 Technical and Commercial Clarification and Deviations as per the format attached in the Tender Enquiry

1.3.6 Proper authorization letter to sign the tender and participate in Tata Power E-Tender system on the behalf of bidder.

1.3.7 **For vendor not registered with Tata Power, Duly filled Vendor Registration form with all supporting documents is mandatory to participate in the Tender**.

Please note that in absence of any of the above documents, the bid submitted by a bidder shall be liable for rejection.

Also please note that whenever editable format are shared it is requested that data be filled in relevant cells. No formatting or addition / deletion of rows / columns to be done. Wherever editable Excel submission are requested the file should be free from references, macros etc.

Checklist of Document Submission

Stage of Tendering	Document	Type of Format	Mode of submission
Before last date of Pre-Bid Query	Query / Clarification / Deviation (QCD) Format. (F1) Technical and Commercial	Editable Excel Format	Through message in E-tender system
Bid Submission Envelope 1 (First Part)	**Earnest Money Deposit**	**Original Bank Guarantee**	**In Sealed Envelope**
Bid Submission Envelope 2 (Second Part)	**Documents to be uploaded in Ariba only.** In case of multiple files, a zipped folder can be attached for the same (size limit of 100MB per zipped file)		
To be submitted Under Tab 2.1 in Ariba	Duly filled PQR and supporting documents		
	Duly filled PQR format	Editable Excel Format	E-Tender System
	Backup documents for Technical and Commercial PQR	Signed and Scanned documents	E-Tender System
To be submitted under Tab 2.2 in Ariba	Technical Submission and Supporting Documents		
	Duly filled Unpriced Bid Format. Signed copy of Technical Specifications indicating your acceptance of the same	Signed and scanned copy of document	E-Tender System
To be submitted under Tab 2.3 in Ariba	Commercial Submission and supporting document		

	Letter of Undertaking (FOR VENDORS NOT REGISTERED WITH TATA POWER)	Scanned Copy of letter of undertaking duly filled, stamped and signed	E-Tender System
	E-auction Undertaking form	Scanned Copy of letter of undertaking duly filled, stamped and signed	E-Tender System
Bid Submission Envelope 3 (Third Part)	**Duly filled Priced Bid Format**	Hard copy in original duly signed and stamped	**Sealed Envelope**
	Duly filled Priced Bid Format	To be entered in E-Tender System	E-Tender System

1.4 Deviation from Tender

Normally, the deviations to tender terms are not admissible and the bids with deviation are liable for rejection. Hence, the bidders are advised to refrain from taking any deviations on this Tender. Still in case of any deviations, all such deviations shall be set out by the Bidders, clause by clause in the Query / Clarification / Deviation (QCD) Format. Deviations have to be mandatorily submitted in editable Excel sheet.

Technical or Commercial Deviation should be mentioned in Deviation Format only. Deviation in any other document or Format will not be considered.

1.5 Right of Acceptance/Rejection

1.5.1 Bids are liable for rejection in absence of following:-
1.5.2 Mandatory Documents as listed in 1.3 above
1.5.3 Price Bid as per the Price Schedule mentioned in Tender Document
1.5.4 Receipt of Bid and Response to queries within the due date and time

Tata Power reserves the right to accept/reject any or all the bids without assigning any reason thereof.

1.6 Qualification Criteria

Sr no	Parameter	Tata Power Requirement	Documents To be submitted by Bidder to ascertain meeting of Pre-qualification requirement
1	Infrastructure	Bidder must be an OEM of Equipment with manufacturing facility / assembly in India. The bidder must have in-house routine and acceptance testing facilities for acceptance as per relevant IS/IEC	Self-undertaking to be submitted in this regard. TATA Power reserves the right to inspect the said manufacturing facility as a proof of compliance to this parameter.
2	Supply and Experience	The bidder must have supplied for same or higher size and voltage a) A minimum of 150 nos FRTU during last 3 years or b) A single order of 75 nos or c) Two orders of 45 nos last 3 years. Indian Subsidiaries of global companies having plant in India are also eligible to bid if the qualification requirements stated above are met independently or in combination with the parent company. Declaration from parent company needs to be submitted.	Purchase Order Copies and Completion Certificates. Self-undertaking to be submitted in this regard. Declaration from parent company needs to be submitted. TATA Power reserves the right to inspect the said manufacturing facility as a proof of compliance to this parameter.
3	Performance	The bidder should have performance certificates for 2 year satisfactory performance from at least 2 reputed Distribution Utilities for FRTU/ equipments of similar or higher rating. The work against these issued certificates should be completed in last seven years from the date of bid submission. In case the bidder has a previous association with any of Tata Power Groups for similar products and services, the performance feedback for that bidder by Tata Power User Group shall only be considered irrespective of performance certificates issued by any third organization.	Supply List & Performance Certificates from the utilities
4	Commercial Capability	Average Annual turnover of the bidder for last three years shall not be less than Rs 7 Crs	Copy of audited Balance Sheet and P&L Account along with UDIN number to be submitted in this regard.

5	Type Test	The bidder shall submit Type test reports obtained from CPRI/ERDA/NABL/ International Accredited Lab for the equipment / material offered. The type tests should have been conducted on the equipment / material of the same design. The type tests should have been conducted within 5 years prior to the date of bid opening. Time period for type test can be extended by another 5 years as a special case, if there is no change in design / material of construction (MOC). In case the type test reports furnished are not for the quoted equipment / material but for the equipment / material with higher voltage class and/or different capacity, then type test shall be carried out for the offered equipment / material from CPRI/ERDA/NABL/ International Accredited Lab without any cost implication to the owner and the Type Test reports shall be submitted before dispatch of the equipment / material.	Type Test Report. Undertaking that there is no change in design / material of construction (MOC) if Type Test Report older than 5 years. Type test reports for the offered equipment / material from CPRI/ERDA/NABL/ International Accredited Lab without any cost implication to the owner and the Type Test reports shall be submitted along with BID.

1.7 Pre-Bid Queries

Technical or Commercial Pre-Bid Queries if any has to be sent through message in E-Tender System. Pre-Bid Query has to be sent only in the Query / Clarification / Deviation (QCD) Format. Pre-Bid Queries sent in any other format or send through any other communication channel will not be accepted and answered. Pre-Bid Query have to be sent in the stipulated timeline as defined in the Tender Document. No Pre-Bid Query will be accepted after the due time and date as specified as "Last Date of receipt of pre-bid queries, if any"

1.8 Marketing Integrity

We have a fair and competitive marketplace. The rules for bidders are outlined in the General Condition of Contracts and other parts of Tender Documents. Bidders must agree to these rules prior to participating. In addition to other remedies available, Tata Power reserves the right to exclude a bidder from participating in future markets due to the bidder's violation of any of the rules or obligations contained in the General Condition of Contracts or other part of the Tender Documents. A bidder who violates the market place rules or engages in behavior that disrupts the fair execution of the marketplace, may result in restriction of a bidder from further participation in the marketplace for a length of time, depending upon the seriousness of the violation. Examples of violations include, but are not limited to:

- Failure to honor prices submitted to the marketplace

- Breach of terms as published in TENDER
- Submit irrelevant documents or frequently cases of missing documents as part of compliance to Qualifying, Technical or Commercial Requirements causing unnecessary delay in Tender Evaluation

1.9 Supplier Confidentiality

All information contained in this tender is confidential and shall not be disclosed, published or advertised in any manner without written authorization from Tata Power. This includes all bidding information submitted to Tata Power. All tender documents remain the property of Tata Power and all suppliers are required to return these documents to Tata Power upon request. Suppliers who do not honor these confidentiality provisions will be excluded from participating in future bidding events.

1.10 Payment Terms

100% payment shall be made within **60 days** (45 days for MSME) from the receipt and acceptance of the material at the Consignee Stores/Site/Location as per the Contractual Terms and Conditions.

2. Evaluation Criteria

- The bids will be evaluated technically on the compliance to tender terms and conditions.
- The bids will be evaluated commercially on the overall all-inclusive lowest cost for the complete tender BOQ / each line item as calculated in Schedule of Items. Tata Power however, reserves right to split the order line item wise and/or quantity wise among more than one Bidder. Hence all bidders are advised to quote their most competitive rates against each line item.
- Bidder has to mandatorily quote against each item of Schedule of Items. Failing to do so, Tata Power may reject the bids.

NOTE: In case of a new bidder not registered with Tata Power, factory inspection and evaluation shall be carried out to ascertain bidder's manufacturing capability and quality procedures. However Tata Power reserves the right to carry out factory inspection and evaluation for any bidder prior to technical qualification. In case a bidder is found as Disqualified in the factory evaluation, their bid shall not be evaluated any further and shall be summarily rejected. The decision of Tata Power shall be final and binding on the bidder in this regard.

2.1 Price Variation Clause and Cap: Firm Price

3. Submission of Bid Documents

3.1 Bid Submission

Bidders are requested to submit their offer in line with this Tender document. Bids shall be submitted in 3 (three) parts:

FIRST PART: "EMD – BANK GUARANTEE" of Value detailed in 1.1 valid for 180 days from the due date of bid submission in the form of Bank Guarantee favoring 'The Tata Power Company Limited'. The EMD has to be strictly in the format as mentioned in Tender Document, failing which it shall not be accepted by Tata Power and the bid as submitted shall be liable for rejection.

Note : BG of 180 days and further claim period of 180 days is needed. In case the same cannot be issued by your bank then BG valid for 365 days can be provided.

Note : At times bidders have sought Tata Power bank details which is needed by them to make BG. Hence the same is reproduced below. These details are only provided to facilitate making of BG if needed:

Tata Power's Bank Details for submitting EMD BG:

Bank Name & Address – HDFC Bank, Maneckji Wadia Building, Nanik Motwani Marg, Fort, Mumbai 400 023.
A/c no. - 00600110000763
IFSC Code – HDFC0000060

The hard copy of EMD in a sealed envelope should be sent on address mentioned in Tender document.

First Part has to be submitted in Sealed Envelope.

SECOND PART: "TECHNICAL / UN-PRICED COMMERCIAL BID" shall contain the following documents:

a) Documentary evidence in support of Technical, Commercial qualifying criteria
b) Technical literature/GTP/Type test report/Details of Qualified Manpower Available/ Testing Facility available etc. *(complete in all respect as desired and detailed in Technical Specification and Technical Requirement Section)*
c) Duly filled Technical and Commercial Deviation Sheets
d) Duly filled formats like Authorization affidavit form
e) *Unpriced Commercial Bid*

The technical / un-priced commercial bid shall be properly indexed and is to be submitted in Soft Copy though E-Tender system of Tata Power. Hard Copy of Technical Bids need not be submitted.

Second Part has to be submitted through E-Tender System Only

THIRD PART: "PRICE BID" shall contain only the price details and strictly in Price Bid format along with explicit break up of basic prices and applicable GST. Basic price should include packaging forwarding, freight, transit insurance and any other cost envisaged by the bidder.

Third part has to be submitted through E-Tender System (ARIBA) only.

FOR BIDS INVITED THROUGH E-TENDER SYSTEM (TECHNICAL AND UN-PRICED COMMERCIAL BID) :

In response to advertisement Bidder has to provide details of person authorized to Bid on behalf of the Bidder. An e-mail will be generated by E-Tender System and the authorized person can download the Tender Documents from the system.
SECOND and THIRD PART of the Bid have to be submitted in E-Tender System.

Bidders have to mandatorily submit SECOND PART (Technical and Un-priced commercial Bid) only through E-Tender system of Tata Power. Bids submitted through any other form/ route shall not be admissible.

EMD
"Please mention Tender Reference No"

Please mention our Tender Reference No on the Tender and drop the same in our Tender Box located at The Tata Power Company Limited, Smart Center of Procurement Excellence,2nd Floor, Sahar Receiving Station, Near Hotel Leela, Sahar Airport Road, Andheri East, Mumbai-400059

Bids submitted by Email/Telex/Telegram /Fax will be rejected. No request from any Bidder to Tata Power to collect the proposals from Courier/Airlines/Cargo Agents etc. shall be entertained.

SIGNING OF BID DOCUMENTS:

The bid must contain the name, residence and place of business of the person or persons making the bid and must be signed and sealed by the Bidder with his usual signature. The names of all persons signing should also be typed or printed below the signature.

The Bid being submitted must be signed by a person holding a Power of Attorney authorizing him to do so, certified copies of which shall be enclosed.

The Bid submitted on behalf of companies registered with the Indian Companies Act, for the time being in force, shall be signed by persons duly authorized to submit the Bid on behalf of the Company and shall be accompanied by certified true copies of the resolutions, extracts of Articles of Association, special or general Power of Attorney etc. to show clearly the title, authority and designation of persons signing the Bid on behalf of the Company. Satisfactory evidence of authority of the person signing on behalf of the Bidder shall be furnished with the bid.

A bid by a person who affixes to his signature the word 'President', 'Managing Director', 'Secretary', 'Agent' or other designation without disclosing his principal will be rejected.

The Bidder's name stated on the Proposal shall be the exact legal name of the firm.

3.2 Contact Information

Communication Details: Detailed in 1.1

3.3 Bid Prices

Bidders shall quote for the entire Scope of Supply/ work with a break up of prices for individual items and Taxes & duties. The bidder shall complete the appropriate Price Schedules included herein, stating the Unit Price for each item & total price with taxes, duties & freight up to destination at various sites of Tata Power. The all-inclusive prices offered shall be inclusive of all costs as well as Duties, Taxes and Levies paid or payable during the execution of the supply work, breakup of price constituents.

The quantity break up shown else-where other than Price Schedule is tentative. The bidder shall ascertain himself regarding material required for completeness of the entire work. Any items not indicated in the price schedule but which are required to complete the job as per the Technical Specifications/ Scope of Work/ SLA mentioned in the tender, shall be deemed to be included in prices quoted.

3.4 Bid Currencies

Prices shall be quoted in Indian Rupees Only. It also may be noted that the denomination of Purchase Order / Outline Agreement / Rate Contract and associated Payment to Successful Bidder shall also be in Indian Rupees Only. In case Bidder intends to import any equipment, part etc and supply to Tata Power then all liability and costs related to import will rest with the Bidder. All statutory compliances, payments, expenditure etc related to importing of equipment will be responsibility of the bidder.

3.5 Period of Validity of Bids

Bids shall remain valid for 180 days from the due date of submission of the bid.

Notwithstanding clause above, Tata Power may solicit the Bidder's consent to an extension of the Period of Bid Validity. The request and responses thereto shall be made in writing.

3.6 Alternative Bids

Bidders shall submit Bids, which comply with the Bidding documents. Alternative bids will not be considered. The attention of Bidders is drawn to the provisions regarding the rejection of Bids in the terms and conditions, which are not substantially responsive to the requirements of the bidding documents.

3.7 Modifications and Withdrawal of Bids

The bidder is not allowed to modify or withdraw its bid after the Bid's submission. The EMD as submitted along with the bid shall be liable for forfeiture in such event.

3.8 Earnest Money Deposit (EMD)

The bidder shall furnish, as part of its bid, an EMD amounting as specified in the tender. The EMD is required to protect the Tata Power against the risk of bidder's conduct which would warrant forfeiture.
The EMD shall be in following form:

- Bank Guarantee valid for 180 days after due date of submission.

The EMD shall be forfeited in case of:

a) The bidder withdraws its bid during the period of specified bid validity.

Or

b) In case of a successful bidder, if the Bidder, within 15 days, does not
i) accept the purchase order, or
ii) furnish the required Contract Performance Bank Guarantee (CPBG)

Original Bank Guarantee submitted as EMD shall be returned only after completion of award process for unsuccessful bidders and issue of Contract Performance Bank Guarantee (CPBG) for successful bidder.

4. Bid Opening & Evaluation process

4.1 Process to be confidential

Information relating to the examination, clarification, evaluation and comparison of Bids and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process. Any effort by a Bidder to influence Tata Powers processing of Bids or award decisions may result in the rejection of the Bidder's Bid.

4.2 Technical Bid Opening

Bids will be opened at Corporate Office of Tata Power as per our standard Process. The bids shall be opened internally by Tata Power. Technical bid must not contain any cost information whatsoever.

First the envelope marked "EMD" will be opened. Bids without EMD of required amount/ validity in prescribed format, shall be rejected.

Next, the technical bid of the bidders who have furnished the requisite EMD will be opened in E-Tender system.

4.3 Preliminary Examination of Bids/Responsiveness

Tata Power will examine the Bids to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the Bids are generally in order. Tata Power may ask for submission of original documents in order to verify the documents submitted in support of qualification criteria.

Prior to the detailed evaluation, Tata Power will determine the substantial responsiveness of each Bid to the Bidding Documents including production capability and acceptable quality of the Goods offered. A substantially responsive Bid is one, which conforms to all the terms and conditions of the Bidding Documents without material deviation.

Bid determined as not substantially responsive will be rejected by the Tata Power and/or the Tata Power and may not subsequently be made responsive by the Bidder by correction of the non-conformity.

4.4 Techno Commercial Clarifications

Bidders need to ensure that the bids submitted by them are complete in all respects. To assist in the examination, evaluation and comparison of Bids, Tata Power may, at its discretion, ask the Bidder for a clarification on its Bid for any deviations with respect to the Tata Power specifications and attempt will be made to bring all bids on a common footing. All responses to requests for clarification shall be in writing and no change in the price or substance of the Bid shall be sought, offered or permitted owing to any clarifications sought by Tata Power.

4.5 Price Bid Opening

The EMD of the bidder withdrawing or substantially altering his offer at any stage after the technical bid opening will be forfeited at the sole discretion of Tata Power without any further correspondence in this regard.

Arithmetical errors will be rectified on the following basis: If there is a discrepancy between the unit price and the total price per item that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price per item will be corrected. If there is a discrepancy between the Total Amount and the sum of the total price per item, the sum of the total price per item shall prevail and the Total Amount will be corrected.

4.6 Reverse Auction and Price Matching Option

Tata Power reserves the right to go for Reverse Auction (RA) for price negotiation and discover the most competitive price on ARIBA portal, Tata Power's official e-tendering platform. This will be decided after techno-commercial evaluation of the bids. Bidders need to give their acceptance with the offer for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case Tata Power decides to go for RA.

Only those bidders who are techno-commercially qualified shall be eligible to participate further in RA process. However, the original H1 bidder (whose price bid is the highest post techno-commercial evaluation) shall not be allowed to participate in further RA process provided minimum three techno-commercially qualified bids are available.

For case where more than one bidders have to be awarded (including Rate Contract / Outline Agreement) Price Matching Option will be exercised. Volume of job allocated to original competitive bidder will be more than bidder who is chosen through Price Matching Option. Tata Power decision regarding work sharing shall be final and no explanation OR clarification shall be given regarding the same.

5.0 Award Decision

Tata Power will award the contract to the successful bidder whose bid has been determined to be the lowest-evaluated responsive bid as per the Evaluation Criterion mentioned at Clause 2.0. The Cost for the said calculation shall be taken as the all-inclusive cost quoted by bidder in Priced Bid Format subject to any corrections required in line with Clause 4.3 above. The decision to place purchase order/Outline Agreement/ Rate Contact solely depends on Tata Power on the cost competitiveness across multiple lots, quality, delivery and bidder's capacity, in addition to other factors that Tata Power may deem relevant.

Tata Power reserves all the rights to award the contract to one or more bidders so as to meet the delivery requirement or nullify the award decision without assigning any reason thereof.

In case any supplier is found unsatisfactory during the delivery process, the award will be cancelled and Tata Power reserves the right to award other suppliers who are found fit.

5.1 Rate Contract / Outline Agreement

Rate Contract / Outline Agreement does not guarantee any assured business volume in Rupees or Quantity. Quantities are only indicative and specified for the purpose of readiness as per the request from Purchaser. Supplies shall be only against Firm Purchase Orders placed as per the agreed terms and conditions of Rate Contract / Outline Agreement. Purchaser shall be entitled at its discretion to place firm order for such supplies on "As and When Required Basis" without minimum take-off guarantee.
Rate Contract / Outline Agreement will have list of Items with Unit Rate and applicable Taxes and Duties. There will be a cap on value for which order which can be placed against the Rate Contract / Outline Agreement. Actual quantity ordered for each line item may differ significantly from the tentative quantity indicated in the Tender Document. One / few / all items of Rate Contract / Outline Agreement can be ordered till the Cap Value is reached.

6.0 Order of Preference/Contradiction:

In case of contradiction in any part of various documents in tender, following shall prevail in order of preference:

1. Outline Agreement/Purchase Order (with Commercial conditions)
2. Special Terms and conditions (if applicable)
3. General Terms and conditions

4. Technical Specifications

In case there is a discrepancy in the BOQ mentioned in tender (to the extent modified through subsequent Corrigendum, if any) and the bid submitted by any bidder, the description as mentioned in the tender (to the extent modified through subsequent Corrigendum, if any) shall prevail.

7.0 Ethics

Tata Power is an ethical organization and as a policy Tata Power lays emphasis on ethical practices across its entire domain. Bidder should ensure that they should abide by all the ethical norms and in no form either directly or indirectly be involved in unethical practice.

Tata Power work practices are governed by the Tata Code of Conduct. Bidder is request to refer Tata Code of Conduct Clause in General Terms and Conditions.

8.0 General Condition of Contract and Special Condition of Contracts

Any condition not mentioned above shall be applicable as per General Terms and Conditions and Special Condition of Contracts attached along with this tender.

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Annexure 1

Schedule Of Items

Sr. no.	Material / Service Short Text (as per SAP)	Estimated Quantity	UoM	Unit Rate (Basic)	Total
1	FRTU,FRTU PANEL,FOR OUT DOOR CSS,PREWIR	75	EA		
2	FRTU,MINI FRTU,MINI FRTU FOR AUTOMATION	75	EA		
	Total				
	GST				
	Total Value including GST				
Total Amount with taxes in Words					

(All Values to be entered in Indian Rs.)

	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 26th Oct 2021
	Field Remote Terminal Unit	

FIELD REMOTE TERMINAL UNIT

Specification

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R0	Prepared By	Checked By Approved For Issue By
Sign and Date		
Initials	Mr. Balaji Shakkarwar	Mr. Santosh Wangde

	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18th Oct 2021
	Field Remote Terminal Unit	

Contents

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
Sign and Date		
Initials	Mr. Balaji Shakkarwar	Mr. Santosh Wangde

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
Sign and Date		
Initials	Mr. Balaji Shakkarwar	Mr. Santosh Wangde

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
Sign and Date		
Initials	Mr. Balaji Shakkarwar	Mr. Santosh Wangde

	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18th Oct 2021
	Field Remote Terminal Unit	

1. Scope:

This specification covers design, engineering, manufacture; shop testing, inspection, packing and delivery of FRTU for RMU automation, complete with all accessories suitable for application for Distribution Automation system. It is not the intent to specify completely herein all details of the equipment's nevertheless the equipment shall be complete and operative in all respects and shall confirm to the highest standard of engineering, design and workmanship.

2. Applicable Standards:

FRTU shall comply with the requirements stated in the latest editions of the following recommendations, standard and specifications:

a. International Electro technical Commission (IEC),
b. Institute of Electrical and Electronics Engineer (IEEE)
c. American National Standards Institute (ANSI)
d. National Equipment Manufacturers association (NEMA) standards

3. Climatic Conditions:

Altitude: 16 meters above mean sea level.
Wind pressure: 195 Kg/Sq. m up to an elevation of 30 meters as per IS: 875-1975 and as per IEC 694

Ambient temperature (Ave. Daily): Max. 55ºC & Min.10.0 ºC
Relative Humidity: Max. 100% & Min. 10% (non-condensing)
Average number of rainy days per annum: 100
Average number of thunderstorm days per annum: 40
Rainy months: June to October
Average annual rainfall: 1200 mm
Atmosphere: Generally laden with mild acid and dust suspended during dry months and subjected to fog in cold months.

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4. General Technical Requirements:

4.1 FRTU Functions:

4.1.1 FRTU shall support all basic functionalities.
4.1.2 Serial interfaces (RS 485 Configurable) with Modbus serial protocol.
4.1.3 Ethernet 10/100 BaseT interface with IEC 60870-5-104 & IEC60870-5-101 protocol
4.1.4 Minimum number of I/O tags handling capacity shall be 200 I/O tags.
4.1.5 FRTU have inbuilt optical coupler to isolate field signals.
4.1.6 FRTU shall support suitable feature of battery availability check.
4.1.7 Suitable provision in FRTU to supervise and prevent accidental serious discharge of battery.
4.1.8 FRTU shall support Event storage capacity as follows

Measurement Events	10000
System Events	1000
Alarms	1000
Normal Events	5000

4.1.9 Such events shall be stored in the basis of FIFO.
4.1.10 Local viewing of these events shall be possible.
4.1.11 FRTU's digital input/output capacity should be such that it can able to fulfil automation of Two 4 way RMU's.
Please refer **Annexure # 2** and it should support expandability.
4.1.12 FRTU shall support web based monitoring from remote as well as local.
4.1.13 All DI & DO status shall be visible in FRTU panel.
4.1.14 FRTU shall support feature of remote configuration as well as diagnosis.

4.1.15 FRTU shall have feature of multi master reporting with minimum 4 numbers of master.
4.1.16 As the SCADA/DMS system will use public domain GPRS, therefore it mandatory to guard the data/ equipment from intrusion/damage/breach of security & shall have SSL/VPN based security.
4.1.17 Shall support SNMP.
4.1.18 Capability of time synchronization with GPS receiver and SCADA..

4.2 Communication Port:

4.2.1 FRTU shall have one TCP/IP Ethernet port for communication with Master station(s) using IEC 60870-5-104/101 protocol.
4.2.2 FRTU shall have one number of RS 485 ports for communication with MFTs to be connected in daisy chain using MODBUS protocol.
4.2.3 FRTU shall have one port for connecting the portable configuration and maintenance tool for FRTU.

4.3 Master Station Communication Protocol:

FRTU shall use IEC 60870-5-104/101 communication protocol for communicating with master station. The FRTU communication protocol shall be configured to report Analog & status changes by exception to master stations. However, FRTU shall support periodic reporting of analog data and periodicity shall be configurable from 2 sec to 1 hour. Digital status data shall have higher priority than the Analog data. The dead-band for reporting Analog value by exception shall be initially set to 1% (in %) of the full scale value.

4.4 Communication Protocol between FRTU and MFTs:

The FRTU shall acquire data from the MFTs using the MODBUS serial protocol. The MFT will act as slave to the FRTU. The FRTU shall transmit these values to the master station in the frame of IEC 60870-5-104/101 protocol. FRTU shall support and accept AMI, MFI, ITI analog data type.

4.5 FRTU Enclosures:

Wall mounted enclosures conforming the IEC 529, with an index of protection (IP) , IP55 along with CANOPY in both indoor & outdoor locations. FRTU panel shall be provided with arrangement of housing FRTU hardware, space for battery and communication modems. The enclosure shall be fabricated using 2 mm thick CRCA for panel door, side top bottom cover using 2 mm thick CRCA, mounting plate 1.6 mm thick CRCA.
Louvers for ventilation to be provided and shall comply IP 55.

The dimension shall be suitable to accommodate FRTU I/O modules, Power supply accessories, battery/ battery charger, terminal blocks and communication modems. The front access door shall be hinged on cabinet with a common lock and key, locking arrangement should be special type of extra protection from theft. Removable type gland plates shall be provided at bottom of enclosure with required knock out holes for single compression glands for DI and DO cable entry. Provision of entry shall be kept for extending GSM/GPRS modem antenna outside the enclosure.

4.5.1 All panels shall be supplied with 230 VAC, 50 Hz, single-phase switch and 15/5A duplex socket arrangement for maintenance.

4.5.2 All panels shall be provided with an internal maintenance lamp, and gaskets.

4.5.3 The safety ground shall be isolated from the signal ground and shall be connected to the ground network. Safety ground shall be a

copper bus bar. The contractor shall connect the panel's safety ground of to the owner's grounding network.

4.5.4 There shall be no sharp corners or edges. All edges shall be rounded to prevent injury.

4.5.5 Droppable disconnecting type link should be used for AC and DC power source termination and it should mount on horizontal C channel.

4.5.6 Panel should be design such way that Replaceable accessories like Modems, Batteries, external DI card , DO card, FRTU CPU card, FRTU power supply card, etc. can easily detached from the panel.

4.6 Local/Remote selector Panel

4.6.1 A manual Local/Remote selector switch shall be provided for each FRTU to disable all control outputs by breaking the power supply connection to the control outputs.

4.6.2 When in "Local" position, the Local/Remote switch shall allow testing of all the control outputs of FRTU without activating the control outputs to field devices.

4.6.3 A status input indication shall be provided for the Local/Remote switch to allow the SCADA system to monitor the position of the switch.

4.6.4 When in Local mode, Command controls to be allowed from Push button along with LED provision for change of state verification.

4.6.5 All lamp & push buttons located on the panel front shall be easily readable & operable.

4.6.6 The effects of glare from sunlight and artificial lighting shall be minimized.

4.6.7 Pushbuttons and pilot lights shall be oil tight, heavy duty type, hermetically sealed.

4.6.8 All control command pushbuttons shall have protective guards to prevent accidental actuation using one common pushbutton for executing command.

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4.6.9 Lamp test function shall be provided for all indicating lights.
4.6.10 Pushbutton and Lamp shall be Omron or equivalent make.
4.6.11 Internal cable channels maximum filling shall not to exceed 60% of the cable channel cross sectional area.
4.6.12 Terminations shall preferable push on type / screw type.
4.6.13 Interconnections signal wiring between Di/DO card shall be made only through terminal blocks.
4.6.14 Opening in all enclosures through which wiring passes & each conduit termination shall be suitable bushed to prevent cutting or abrasion of the wiring insulation.
4.6.15 Electrical schematic diagrams mimic shall be shown for all switching device.
4.6.16 Panel shall be enclosed type with IP55 standard.
4.6.17 Panel shall be compact & properly fitted in FRTU panel.

4.7 Digital Input Module

FRTU shall be capable of accepting isolated dry (potential free) contact status inputs. The FRTU shall provide necessary sensing voltage, current, optical isolation and de-bounce filtering independently for each status input. The sensing voltage shall not exceed 24 V dc. The FRTU shall accept two types of status inputs i.e. Single point Status inputs and Double point status inputs.

Single point status input will be from a normally-open (NO) or normally-closed (NC) contact which is represented by 1-bit in the protocol message.
The Double point status input will be from two complementary contacts (one NO and one NC) which is represented by 2-bits in the protocol message. A switching device status is valid only when one contact is closed and the other contact is open. Invalid states shall be reported when both contacts are open or both contacts are closed.

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FRTU configuration software shall have capability to invert the DI signal value if required in configuration.

There should be visual indication of status of all DI's present in the FRTU panel for troubleshooting the problem.

4.8 Digital Output Module

The FRTU shall provide the capability for a master station to select and change the state of digital output points. These control outputs shall be used to control power system devices such as Circuit breakers, isolator and other two-state devices, which shall be supported by the FRTU. FRTU should also support single command output to control other parameters like reboot/reset from remote, if required.

The output contacts shall be rated to operate RMU isolator and Breaker motors. In case Control output module of FRTU does not provide potential free control output contact of required rating, then separate control output relays shall be provided by the contractor. These output contact shall be used to drive heavy duty relays. These output contact must have fuse protection to protect it from overcurrent/overload. Kindly give details of fuse used. Also include spare fuse in panel BOM.

There shall be visual indication of DO's available in the FRTU panel when command issued for any digital output for troubleshooting the problem.

4.9 Interface wires to FRTU for DI and DO from RMU:

4.9.1 Shall be based as plug in type connectors for the bays which are under control, rest will be given on TB. All DI & DO connections pertaining to one bay should be connected to one plug. This will be helpful for incase of issuing outage on the bay, field engineer has to remove the plug so that there will not be any power supply available at motorization circuit to avoid unwanted operation at the time of outage. Considering safe remote operations this is a mandatory requirement.

4.9.2 Terminal blocks (disconnecting type links) are not envisaged in such arrangements.

4.9.3 The male type connector plug shall have 10 core multicolor armored cable of 1.5sqmm of suitable length as per requirement of site.

4.9.4 Male and female type connector (Pair) should be provided by vendor to terminate cable at FRTU end.

4.9.5 All DI supply connection is through fuse. Kindly give details of fuse used. Also include spare fuse in panel BOM.

4.9.6 Detailed Cable requirement for FRTU DI and DO is mentioned in **Annexure #1.**supplier shall consider quantity with each FRTU

4.9.7 Dressing of input, output communication wiring is in vendor scope.

4.9.8 Internal cable channels maximum filling shall not exceed 60 percent of the cable channel cross sectional area.

4.9.9 Proper cross ferruling shall be used in input output wiring terminations in FRTU and RMU side.

4.9.10 Interconnections signal wiring between DI/DO card shall be made only through terminal blocks

4.9.11 Wire type : PVC insulate, Flexible, multi-stranded, untinned, FRLS type and Wire termination: Tinned copper insulated lugs Ferrule: White PVC tubular ferrule with black painting

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4.10 Interface wires to FRTU for Meter communication:

4.10.1 Shall be 0.5sqmm 4 core twisted pair shielded and armored.
4.10.2 Detailed Cable requirement for FRTU DI and DO is mentioned in **Annexure #1.**

4.11 Provision of AC supply:

4.11.1 Shall be 1.5sqmm 3 core armored cable with 3 pin plug and socket.
4.11.2 Droppable link should be used for AC power source termination. It should be mounted in horizontal arrangement. It must be supplied with plastic cover protection to avoid direct access/touching.
4.11.3 Detailed Cable requirement for FRTU DI and DO is mentioned in **Annexure #1.**

4.12 Communication Package:

4.12.1 1 no of Ethernet, 4G GPRS gateway with 1 Ethernet 10/100 BaseT port.
4.12.2 4G GPRS with fallback 3G/2G Gateway should support multi NAT configuration.
4.12.3 Driver software.
4.12.4 Gateway shall be remotely manageable and configurable.
4.12.5 Cellular router should have Single SIM provision.
4.12.6 Antenna with low loss RF cable with minimum 5m (extension of antenna cable shall be possible).
4.12.7 The 4 G Cellular Router Should have two antenna connection (MIMO).One is primary cellular antenna & second is diversity antenna(MIMO)

4.12.8 Rated Voltage: 9-60 VDC.
4.12.9 Open VPN , IP Sec, L2TP, PPTP, GRE
4.12.10 Cable to connect the communication module of FRTU.
4.12.11 GPRS modem should full fill all requirement mentioned in GTP **Annexure#3**
4.12.12 Make provision of hole for antennae with PVC IP65 gland for cable entry

4.13 Troubleshooting:

FRTU shall have proper diagnosis tool for trouble shooting the failures related to the following from remotely as well as locally. Supplier shall consider all required configuration and diagnosis cable and software with each supplied FRTU.

4.13.1 Communication of FRTU with master
4.13.2 Communication of MFM with FRTU.
4.13.3 Communication of DI/DO.

4.14 Battery and Battery charger:

4.14.1 24 VDC SMPS battery charger 230VAC input, 10 Amps Output.
4.14.2 FRTU should capable to monitor Battery and battery charger healthiness. **It is more preferable if the battery charger have inbuilt feature of Battery health monitoring.**
4.14.3 Battery and battery charger should capable for all FRTU required operation and Aux. supply to Modem & MFM etc.
4.14.4 Battery Rating: 24 V DC, **21 AH**, SMF-VRLA with chargers suitable for indoor as well as outdoor applications.

4.14.5 The batteries are intended to operate the isolators of 11kV/22kV/33kV RMU. The rating of closing coil is in the range from 90 watts to 120 watts.

4.14.6 The battery & its charger must withstand average operations of 10nos for max 30 seconds.

4.14.7 Power supply package shall meet the power supply requirement for the MFM and modem as well.

4.14.8 Suitable provision in FRTU shall be present to supervise/monitor and prevent accidental serious discharge of battery.

4.14.9 Battery and battery charger plays very important role in remote operation while restoration of power supply to the customer. Hence to monitor healthiness of battery continuously in services condition, routine tests for battery condition monitoring shall be ensured.

4.14.10 FRTU must be able to perform the battery discharge test at a manual set period or period can be pre-defined for auto discharge test.

4.14.11 Battery Health Monitoring Unit must be of standard make.

4.14.12 Ambient Temperature Operation: -5deg C to +60degC

4.14.13 Ambient temperature Storage: -20deg C to +65 deg C.

4.14.14 Humidity: 100% RH, non -condensing

4.14.15 Adhere to Standards IEC60927-1, IEC61000 with ingress protection of IP20.

5. Advanced Features:

The FRTU shall support following advance SMART features without any additional hardware. These SMART features will be instrumental in Tata Power's journey towards Digitalization.

5.1 Possibility for logic development

5.2 Auto-change over of source functionality

5.3 Communication between FRTU's

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6. Cyber security:

The FRTU shall support the advanced cyber security standards as per the ISO/IEC/IS standards listed in MoP Order No. 12/34/2020-T&R dated 24th Dec 2021. (ISO 27001/02, IEC62443, IEC 15408, IEC 17025, IEC27019, IEC 61508, IEC 61850,NERC CIP-009-1, and IS 16335.)

6.1 FRTU should have following feature:

1.1 User level configuration User wise authentication like system admin, configuration admin, control, operator.

1.2 Update the firmware/software with the digitally signed OEM validated patches. enables only those ports and services that are required for normal operations.

1.3 Disabling the DNS

1.4 Disabling, enabling & configuration the TCP and UDP ports.

1.5 Door- lock alarm integration with FRTU.

6.2 Type test standards for FRTUs

6.2.1 IEC 60870-1-2:1989 Telecontrol equipment and systems. Part 1: General considerations. Section Two: Guide for specifications.

6.2.2 IEC 60870-2-1:1995 Telecontrol equipment and systems - Part 2: Operating conditions –

Section 1: Power supply and electromagnetic compatibility.

6.2.3 IEC 60870-2-2:1996 Telecontrol equipment and systems - Part 2: Operating conditions –

Section Environmental conditions (climatic, mechanical and other non-electrical influences).

6.2.4 IEC 60870-3:1989 Telecontrol equipment and systems. Part 3: Interfaces (electrical characteristics)

List of designated laboratories for cyber security conformance testing as per MoP Order No. 12/34/2020-T&R dated 24th Dec 2021 are:

Sr. No.	Equipment	**Equipment Communication Protocol**	**Conformance Standards**	**Designated Laboratories**
1	Remote Terminal Units (RTUs) & PLCs with IEC communications protocols	IEC 60870-5 -101 / IEC 60870-5 -104	IEC 60870-5- 7 Security extension & IEC 62351 series-: IEC 62351-100-1, IEC 62351-100-3, IEC 62351-5, IEC 62351-8, IEC 62443-4-2	Central Power Research Institute (CPRI), Prof Sir C V Raman Road, Sadashivanagar P O, Bengaluru – 560080, Karnataka

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7. Accessories:

7.1 Separate MCBs with 10A protection for AC and DC supply.
7.2 Separate MCBs for Motor supply and Battery charger needs to be provided.
7.3 All intra panel wiring and cable to connect the Batteries.
7.4 Separate Earthing shall be provided for FRTU panel.
7.5 Separate Ethernet cable and provision of Antennas for communication.

8. Training:

Bidder shall give 20 man-day's training on operation and configuration of FRTU and related accessories and aux equipment to TATA power. Training will be the time of Factory acceptance test (FAT) and site acceptance test at site.

FRTU training course shall cover the following:

8.1 FRTU operation including data flow.
8.2 Troubleshooting, identification and replacement of faulty Modules.
8.3 Preventive maintenance of the FRTU
8.4 Use of FRTU configuration and Maintenance tool
8.5 All functional and Diagnostic testing of FRTU
8.6 Database modification and configuration of FRTU

9. Documentation:

The bidder shall submit all the standard and customized FRTU documents for review and approval which includes the following:

9.1 FRTU Function design document
9.2 FRTU Hardware description document & all the documents referred therein to meet all the clauses of the specification.
9.3 FRTU Test equipment user documents.

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9.4 FRTU user guide
9.5 FRTU Operation & Maintenance document
9.6 FRTU Training documentation
9.7 FRTU database document
9.8 FRTU I/O list (as build) after the execution
9.9 FRTU Test procedures
9.10 Data Requirement Sheet (DRS) of all items
9.11 Protocol documentation including implementation profile etc.
9.12 FRTU installation and Layout, GA, BOQ, schematics and internal wiring drawings for each FRTU site
9.13 FRTU to C&R panels/ field device cabling details for each FRTU site

10. Nameplate and Markings:

Nameplate showing all technical parameters shall be provided on all equipment's. "PROPERTY OF TATA POWER" shall be suitably embossed on the nameplate.

10.1 Painting:

All paints shall be applied on clean, dry surfaces under suitable atmospheric and other conditions in accordance with the paint manufacturer's instructions. All paints used shall be compatible with each other and capable of being used as a system. The system shall be capable of performance for five years in the environment specified without any need for maintenance.

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Color Code:

Exterior & Interior paint shade - Siemens Grey RAL 7035 (Texture)
Paint thickness: 60-90 Microns
No consecutive coats of paint shall be of the same shade.

Minimum standards acceptable are cleaning by shot blasting to Grade As 2.5 of ISO 8501-1 and Al sheet steel surfaces shall be degreased, pickled and phosphate in accordance with IS 6005 - "Code of practice for phosphating of iron and steel."

Immediately following phosphating the surfaces shall be painted with two coats of high quality zinc chromate primer. All rough surfaces of coatings shall be filled with approved two pack filler and rubbed down to a smooth finish.

Interior surfaces of terminal boxes, after preparation, cleaning and priming shall be painted with one coat of zinc chromate primer, one coat of phenolic based undercoating, followed by one coat of phenolic based finishing paint to white color followed by a final coat of anti-condensation white paint of a type and make to the approval of the Project Manager. A minimum overall paint film thickness of 150 microns shall be maintained throughout. The first coat of primer shall be applied on the same day, preferably within two hours of shot blasting.

Exterior steel surfaces and metalwork, after preparation and priming shall be painted with one coat of zinc chromate primer, one coat of phenolic based under coating and two coats of micaceous iron oxide paint, then painted with a final coat of phenolic based hard glass finishing paint of the light grey shade No 631 of IS 5, to provide an overall minimum paint thickness of 200 microns.

10.2 Galvanizing:

All galvanizing shall be carried out by the hot dip process, in accordance with Specification ISO: 1460 or IS: 2629. However, high tensile steel nuts, bolts and spring washers shall be electro - galvanized to service condition four. The zinc coating shall be smooth, continuous and uniform. It shall be free from acid spots and shall not scale, blister or be removable by handling or packing. There shall be no impurities in the zinc or additives to the galvanic bath, which could have a detrimental effect on the durability of the zinc coating.

Before pickling, all welding, drilling, cutting, grinding and other finishing operations must be completed and all grease, paint, varnish. Oil, welding slag and other foreign matters completely removed. All protuberances that would affect the life of galvanizing shall also be removed.

The weight of zinc deposited shall be in accordance with BS 729 and shall not be less than 0.61 kg/m2 with a minimum thickness of 86 microns for items of thickness more than 5 mm, 0.46 kg!m2 (64 microns) for items of thickness between 2 mm and 5 mm and 0.33 kg! 012(47 microns) for items less than 2 mm thick.

Parts shall not be galvanized if their shapes are such that the pickling solution cannot be removed with certainty or if galvanizing would be unsatisfactory or if their mechanical strength would be reduced.

In the event of damage to the galvanizing the method used for repair shall be subject to the approval of the Project Manager or that of his representative. Repair of galvanizing on site will generally not be permitted.

The threads of all galvanized bolts and screwed rods shall be cleared of shelter by spinning or brushing. A die shall not be used for cleaning the threads unless specifically approved by the Project Manager. All nuts shall be galvanized. The threads of nuts shall be cleaned with a tap and the threads oiled. Partial immersion of the work shall not be permitted and the galvanizing tank must

therefore be sufficiently large to permit galvanizing to be carried out by one immersion.

After galvanizing no drilling or welding shall be performed on the galvanized parts of the equipment excepting that nuts may be threaded after galvanizing.

To avoid the formation of white rust, galvanized material shall be stacked during transport and stored in such a manner as to permit adequate ventilation. Sodium dichromate treatment shall be provided *to* avoid formation of white rust after hot dip galvanization.

The galvanized steel shall be subjected to tests as per IS-2633 and BS : 729.

11. Tests & Test Certificates:

FRTU shall have been type tested as per latest IEC. The bidder shall submit Type test reports for FRTU, Battery/ Battery charger, Industrial grade Modem.

The FRTU's Shall have passed type tests carried out by government accredited labs and in accordance with IEC 255-4, 255-6, 801-2 and 801-3 to demonstrate that the FRTU's comply with the ratings stated in these standard. As a minimum, certificates for the following type tests shall be furnished: Other test as applicable are include in the given table 1

11.1 Dielectric test
11.2 Impulse Voltage withstand test
11.3 High frequency disturbance test
11.4 Thermal requirement test
11.5 Mechanical requirement test
11.6 Limiting dynamic value test
11.7 Contact performance test
11.8 Electromagnetic radiation susceptibility test
11.9 Electrostatic discharge susceptibility test

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The FRTU shall pass manufacture's standard routine test in accordance with the reference standard. In addition to the tests described in the IEC standard, the routine test and test reports of the FRTU's shall include the following:

11.9.1 Visual test to confirm that construction and sizing requirement have been met.
11.9.2 Rigorous testing of each input and output functions of the FRTU's. This shall include the Fault detection and the disturbance data storage functions as well as the operation of the FRTU time and the date facilities.
11.9.3 Verification of the use of the FRTU test equipment for maintenance and testing.
11.9.4 Verification that FRTU software and firmware support FRTU sizing and expansion requirements.
11.9.5 Verification of successful communication (i.e. protocols) all the required data rates.
11.9.6 Testing of secure operation.
11.9.7 Verification of the ability to download parameter and configuration data from SCADA master station.

TATA POWER reserves right to ask, type test certificate for any component used.

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	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18th Oct 2021
	Field Remote Terminal Unit	

Table 1:

	Type Test Verification Sheet		
	Date of Verification		
1	**2**	**3**	**4**
No	**Type Test**	**IS/IEC**	**Available -Y/N**
1	Dielectric withstand	IEC 60255-5	
2	Impulse wave	IEC 60255-5	
3	Insulation resistance	IEC 60255-5	
	EMC Standards Level Comments		
4	Electrostatic discharge	IEC 61000-4-2	
5	Radiated fields	IEC 61000-4-3	
6	Fast transients	IEC 61000-4-4	
7	Impulse waves	IEC 61000-4-5	
8	Common mode radio frequencies	IEC 61000-4-6	
9	50 Hz magnetic fields	IEC 61000-4-8	
10	Damped oscillatory waves	IEC 61000-4-12	
11	Damped oscillatory waves - short	IEC 61000-4-18	
12	Damped oscillatory waves - rapid	IEC 61000-4-18	
	Climatic tests		
13	Exposure to cold	IEC 60068-2-1	
14	Exposure to dry heat	IEC 60068-2-2	
15	Exposure to damp heat	IEC 60068-2-78	
16	Temperature variation	IEC 60068-2-14	
17	Cyclic damp heat test	IEC 60068-2-30	
	Corrosive atmosphere		
18	Salt spray test	IEC 60068-2-52	
	Mechanical tests		
19	Vibrations	IEC 60255-21-1	

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20	Shock test	IEC 60255-21-2	
21	Seismic test	IEC 60255-21-3	
22	Enclosure protection	IEC 60529 & IEC 62262	
23	Packaging impact protection	IEC 60068-2-32	

12. Factory Inspection:

12.1 Equipment shall be subject to inspection by a duly authorized representative of the Purchaser. Inspection may be made at any stage of manufacture at the option of the purchaser and if the equipment found unsatisfactory as to workmanship or material, the same is liable for rejection. Supplier shall grant free access to the place of manufacture to the purchaser's representative at all times when the work is in progress.

12.2 Supplier shall give prior inspection notice. **(15 days for domestic and 30 days for international)**

12.3 Factory inspection will be carried as per approved QAP.

12.4 Material shall be dispatched after Dispatch Clearance only.

13. Inspection of material after receipt at store:

Material after receipt at TATA POWER Store / site will be inspected by special team designated by TATA POWER team. The material is liable for rejection if found different from the reports of pre-dispatch inspection.

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14. Guarantee:

Supply of all equipment's and associated accessories shall be guaranteed for satisfactory performance for period of **60** months from the date of commissioning. In case of failure of equipment / part of equipment's during guarantee period it shall be replaced or repaired by supplier free of cost. Supplier should replace the faulty part with operational part during the replacement and repair duration within 15 days after the failure is reported, if any. Supplier has to provide remote and on-site support to resolve the hardware and software related issue.

15. Packing and Shipping:

15.1 **Packing:**

The equipment's are to be transported adequately sealed against water ingress, All accessories and spares shall be packed and securely clamped against movement in robust, wooden, non-returnable packing cases to ensure safe transit in rough terrain, cross country road conditions and in heavy rains from the manufacturer's works to the specified destinations.

Equipment or material liable to deterioration by sea water, moisture, or ingress of foreign matter shall be totally sealed in strong polythene bags and those -liable to deterioration due to condensation shall be protected by packs of silica gel or other approved desiccant.

All accessories shall be carefully packed so that they are fully protected during transport and handling operations and in storage. Internal surfaces of loose accessories shall be sealed by means of gaskets and blanking off plates. All parts liable to rust shall receive an anti-rusting coat and shall be suitably protected. It shall be the responsibility of the Contractor to make good any damage caused through insufficient packing.

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Each packing case shall be indelibly marked, on two adjacent sides and on the top, with the following,

15.1.1 Individual serial number
15.1.2 Purchaser's name
15.1.3 Order number and date
15.1.4 Destination (A color coded marking to indicate destination)
15.1.5 Manufacturers /Suppliers name
15.1.6 Date & Year of manufacture
15.1.7 Name and address of Agent
15.1.8 Description and numbers of contents
15.1.9 Country of origin
15.1.10 Case measurements
15.1.11 Gross and net weights in kilogram.
15.1.12 Necessary slinging and stacking instructions.

Each crate or container shall be marked clearly on the outside of the case to show TOP and BOTTOM positions with appropriate signs to indicate where the mass is bearing and the correct positions for slings. All component parts, which are separately transported, shall have permanent identification marks to facilitate correct matching and assembly at site. Welded parts shall be marked before welding.

16. Tender Sample:

Not applicable

17. Quality control:

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Manufacturer shall have adequate Quality Control Facilities. Quality assurance plan & Field quality plan shall be submitted. Refer Annexure#4.

18. Testing facilities:

Manufacturer shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards.

19. Manufacturing activities:

Separate sheet showing detail-manufacturing activities shall be submitted along-with bid.

20. Schedules of deviations:

The Bidders shall set out all deviations from this specification, Clause by Clause in this schedule. Unless **specifically** mentioned in this schedule, the tender shall be deemed to confirm the purchaser's specifications. (Format is attached)

21. Guaranteed Technical Particulars:

Bidder shall submit separate sheet showing guaranteed technical particulars-Format is attached as **Annexure # 3.**

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22. Drawings, data and manuals:

To be submitted with bid.
Completely filled-in Technical Schedules.
General description of the equipment and all components including brochures
General arrangement drawings
Type Test Certificates
Experience List
Detail bill of material
To be submitted after the award of the contract:

Sr. No.	Description	For Approval	For Review Information	Final Submission
1	Technical Schedules	√		√
2	General Arrangement drawings	√		√
3	Single Line Diagram	√		√
4	Installation Instructions		√	√
5	Instruction for Use		√	√
6	Transport/ Shipping dimension drawing		√	√
7	Foundation Plan & loading details		√	√
8	QA &QC Plan	√	√	√
9	Test Certificates	√	√	√

23. Sub-contractors:

The supplier shall ensure that any sub-contractors appointed by him under the Contract follow the Quality Assurance requirements of this specification. The

supplier shall assess the sub-contractor's Quality Assurance arrangements prior to his appointment to ensure compliance with the appropriate ISO standard and the specification. Auditing of the sub-contractor's Quality Assurance arrangements shall be carried out by the supplier and recorded in such a manner that demonstrates to the TATA POWER the extent of the audits and their effectiveness.

24. Spare parts:

The Bidder shall give an assurance that spares will continue to be available through the life of the equipment, which shall be 15 years minimum. However, the supplier shall give a minimum of 12 months' notice in the event of plan to discontinue manufacture of any component used in this equipment.

Any parts shall be subject to the same specification, tests and conditions as similar material supplied under the Contract. They shall be strictly interchangeable and suitable for use in place of the corresponding parts supplied with the plant and must be suitably marked and numbered for identification.

25. Completeness of contract:

The bidder without extra charges, although not specifically mentioned herein, but necessary or useful for similar equipment and their efficient performance shall provide all fittings or accessories. The bid shall clearly indicate if any additional equipment or parts would be necessary to give a complete offer and if so the details and the prices shall be included in the bid.

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Annexure #1

	Description	Core	Cables	Distance (Mts.)	Total Length (Meters)	Harting Connectors
DI + DO	DI & DO Cable - 10 Core multi-color armored cable of 1.5 Sq mm	10	6	15	90	10 Pin Female & male Connector at FRTU ends.
AC Supply	AC Supply - 3 Core 1.5 Sq mm armored cable	3	1	15	15	No Harting Connector
Earthing	Earthing - 16 Sq mm Cable	1	1	10	10	No Harting Connector
LT Breaker & Transformer	6 Core multi-color armored cable of 1.5 Sq mm	6	4	20	80	Harting plug not required. Arrange a TB to terminate alarms at FRTU end.
Fuses	As per equipment				5 no's	Each ratting type 5 no's
Configuration and console cable	As per OEM equipment requirement				1 no's	1 no's -each type of cable

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Annexure #2

S.No.	Alarm Description	Equipment	Normal state	Alarm state	INFO type	IOA
1	Local Remote S/W status	FRTU	Remote	Local	SPI	1
2	IC1 IS status	RMU#1	Close	Open	DPI	501
3	IC1 ES status		Open	Close	DPI	502
4	IC2 IS status		Close	Open	DPI	503
5	IC2 ES status		Open	Close	DPI	504
6	OG#1 CB status		Close	Open	DPI	505
7	OG#1 ES status		Open	Close	DPI	506
8	OG#2 CB status		Close	Open	DPI	507
9	OG#2 ES status		Open	Close	DPI	508
10	LT#1 CB status		Close	Open	DPI	509
11	LT#2 CB status		Close	Open	DPI	510
12	IC1 IS status	RMU#2	Close	Open	DPI	511
13	IC1 ES status		Open	Close	DPI	512
14	IC2 IS status		Close	Open	DPI	513
15	IC2 ES status		Open	Close	DPI	514
16	OG#1 CB status		Close	Open	DPI	515
17	OG#1 ES status		Open	Close	DPI	516
18	OG#2 CB status		Close	Open	DPI	517
19	OG#2 ES status		Open	Close	DPI	518
20	LT#1 CB status		Close	Open	DPI	519
21	LT#2 CB status		Close	Open	DPI	520
22	Motor supply	BC	Normal	Fail	SPI	3
23	Battery Charger		Normal	Fail	SPI	4
25	Battery		Normal	Alarm	SPI	5
26	Equipment fault		Normal	Alarm	SPI	6

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27	AC Supply		Normal	Fail	SPI	7
28	OTI/WTI alarm	TRF#1	Reset	Operated	SPI	8
29	OTI/WTI Trip		Reset	Operated	SPI	9
30	OTI/WTI alarm	TRF#2	Reset	Operated	SPI	10
31	OTI/WTI Trip		Reset	Operated	SPI	12
32	FPI#1	IS 1	Reset	Operated	SPI	13
33	FPI#2	IS 2	Reset	Operated	SPI	14
34	ISO 1 VPIS status	VPIS	Reset	Operated	SPI	15
35	ISO 2 VPIS status	VPIS	Reset	Operated	SPI	16

Control						
S.N.	**Alarm description**	**Equipment**	**Normal state**	**Alarm state**	**INFO type**	**IOA**
1	IC1 IS Control	RMU#1	Close	Open	DCO	1001
2	IC2 IS Control		Close	Open	DCO	1002
3	IC1 IS Control	RMU#2	Close	Open	DCO	1005
4	IC2 IS Control		Close	Open	DCO	1006
5	FPI#1	FPI	Reset	Operated	SCO	2001
6	FPI#2		Reset	Operated	SCO	2002

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	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18th Oct 2021
	Field Remote Terminal Unit	

Annexure #3	**GTP for FRTU**		
	Parameter	Tata Power Requirement	Bidders response
1	SCOPE of work	FRTU panel with power and communication package	
2	Applicable Standard	As per specifications	
3	Ambient Temperature	-10 deg to + 55 deg Celsius	
	FRTU Functions		
4	FRTU make		
5	Master Protocol	IEC 104	
6	Slave protocol	MODBUS	
7	Ethernet Interface Port and Data Rate	Ethernet port with Ethernet 10/100 BaseT	
8	Ethernet Port expandability	Optional	
9	Serial Interface Port and Data rate	RJ45 interface Ports with 2400 to 38400	
10	User configurability of the serial Port	Essential	
11	Max I/O tag handling capacity	200	
12	Inbuilt opto-coupler for DI/DO	Essential	
13	Support to battery availability Check	Essential	
14	Local event storage capacity	As per specification: Measurement Events 10000 System Events 1000 Alarms 1000 Normal Events 5000	
15	Retrieval of SOE	Required -Should be able to retrieve in form of excel	
16	Web based monitoring	Essential	
17	FRTU's digital input/output capacity	Capacity of I/O should be sufficient for Two 4 way RMU automation (Minimum 54 DIs and 12DOs	

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		hardwired capacity). Please refer Annexure # 2 and it should support expandability.	
18	Feature of remote configuration as well as diagnosis	Essential	
19	Number of Multi master reporting possible with same ASDU	4	
20	Number of Multi master reporting possible with different ASDU	Optional	
21	Support to SNMP	Essential	
22	Automatic Startup after power failure	Essential	
23	Support SSL/VPN based security	Essential and adhere to CEA cyber security guidelines 2021	
24	Support remote restart of FRTU as well as Modem	Essential	
25	Support to Time Synchronization with GPS	Essential	
26	Support to Time Synchronization with Master	Essential	
FRTU Communication Ports			
27	No of Ethernet Interface Port	Min 1	
28	No. of Serial Interface Port	Min 1	
29	No. of configuration Port	Min 1	
30	Configuration port type	Serial/USB/Ethernet	
FRTU Enclosure			
31	Panel Dimension [mm(H)*mm(W)*mm(D)]	Max 800*600*450	
32	IP protection	IP 55 with outdoor protection Canopy as per specifications	
33	Support to wall mounting arrangement	Essential	

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34	Provision for Local/Remote selector switch	Essential	
DI Card			
35	Digital Input card threshold voltage	18v dc	
36	Digital Input card sensing voltage	24v dc. Separate fuse protection must be available for each DI point	
DO Card			
37	DO card rating	The output contacts shall be rated to operate RMU isolator and Breaker motors (3-5Amps/min). Fuse protection must be available to each DO output card.	
38	If External relays required, then Make, Type and rating of the relays	If needed then the output external contacts shall be rated to operate RMU isolator and Breaker motors. OEM of relay to be specified	
Interface between FRTU and RMU			
39	Consideration of Plug type connector	Essential	
40	Is plug wise arrangement include the bay wise DI & DO	After disconnecting plug, particular bay should isolate	
41	Is Bay wise disconnection available	After disconnecting plug, particular bay should isolate	
42	Consideration of cable as per Annexure # 1	Essential	
Interface between FRTU and MFM, AC supply, LT breaker and Transformers & modem			
43	Consideration of cable as per Annexure # 1	Essential	
44	Supply to MFM through FRTU panel is considered	Essential	
Communication Package: AS PER GTP OF INDUSTRIAL CELLULAR ROUTER			
Troubleshooting			
45	Availability of diagnostic tool	Essential-should be available from remote as well as local	

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46	Failure of Communication of FRTU to master	Essential-should be available from remote as well as local	
47	Failure of Communication of FRTU to MFM	Essential-should be available from remote as well as local	
48	Failure of Communication of FRTU to DI/DO	Essential-should be available from remote as well as local	
	Power Supply		
49	FRTU power supply requirement	As per RMU isolator operation requirement. Closing coil of rating from 90-120 watts	
50	Battery Charger Rating	IP 230 VAC, OP 24 VDC, current : 10 Amps-as per specification with separate MCB	
51	Support to monitoring of battery charger and Battery Health	Essential as per specification	
52	Battery Rating	24 Volts DC, 21 AH	
53	Battery Type	Sealed Maintenance Free, VRLA suitable for outdoor operations	
54	Consideration of the power supply requirement for operation of Isolator of RMU.	Essential as per specification	
55	Consideration of the power supply requirement for Modem.	Essential as per specification	.
56	Consideration of the power supply requirement for MFM.	Essential as per specification	
57	Location of the Battery	Inside panel along with battery charger unit	
58	Make of batteries	Standard brand having good efficiency & life period	
59	Suitable provision in FRTU to supervise and prevent accidental serious discharge of battery	Essential as per specification	

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60	Integrated Battery and battery charger monitoring function through FRTU	Essential as per specification	
61	Remote alarm of battery and battery charger monitoring	Essential as per specification AC fail, DC fail, Battery Low, Battery polarity reverse, Battery Over/Under voltage, Charger rectifier fail,etc. internal alarms to monitor	
	Advanced feature		
62	Possibility for logic development within FRTU and between FRTU	Essential	
63	Auto-source change over functionality either inbuilt or through logic programming	Essential	
64	Communication between FRTU's	Essential	
65	Inbuilt auto functions management	Essential-In service and out of service option should be available through FRTU configuration	
66	Hardware required for advanced smart function	NO extra hardware required at FRTU end	
	Training		
67	No. of man-day's considered	20 man days	
	Test and Test certificates		
68	Compliance to type tests	As per spec	
69	Consideration of FAT	Essential	
70	Location of FAT	Essential	
71	Consideration of SAT	Essential	
	Material Delivery		
72	Duration for drawing approval	15 days from the date of contract confirmation	
73	Duration for Material delivery	90-120 days from the date of drawing approval	

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Guarantee			
74	Consideration of No. of months for Guarantee	60 months	
75	Replacement & repair of faulty part during part failure	Essential. The replacement/repairs should be done within 15 days of complaint raised.	
Cyber security			
76	Cyber security standard	Essential. Must adhere to the standards mentioned in Cyber security Guidelines of Power Sector, 2021	
77	User level authentication	Essential	
78	Different type of user configuration	Essential-system, configuration, admin, control	
79	TCP & UDP Port access authentication	Essential	
80	FRTU Door lock & unlock alarm availability	Essential for physical security	
Installation and Commissioning			
81	Installation and Commissioning of FRTU at identified site	5 Mondays	

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	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18th Oct 2021
	Field Remote Terminal Unit	

Annexure #3	**GTP for Industrial Cellular Router**		
	Industrial Router GTP		
Sr.No	**Technical requirement**	**Tata Power requirement**	**Bidders Response**
1.0	**Product Description**		
1.1	Make & Model	Vendor to provide Make & model of proposed cellular Router. Also provide life cycle details	
2.0	**Radio Interface**		
2.1	Radio Interface	4G LTE, Fallback to 3G, 2G	
2.2	Data interface	Cat 4 , Max download 150 Mbps, Max upload 50 Mbps	
2.3	Supported frequency band	Modem should support multiband connectivity with FDD 4G LTE & TDD 4G LTE. It should support Band 1,3,5,8,Band 40 and Band 41. The offered cellular router should support and compatible to the data & radio interface of the network of public mobile service provider in Mumbai city	
2.4	Radio Transmitter Power	Vendor to provide details of radio transmitter power	
2.5	Receiver Sensitivity	Vendor to provide details of receiver channel sensitivity	
2.6	Adjacent Channel Sensitivity	Vendor to provide details of Adjacent channel sensitivity	
2.7	Cellular Module / Chip	Vendor shall give details of cellular chip /Module used along with datasheet	
3.0	**Operating Condition**		

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3.1	Operating Temperature	-20 C to 70 C	
3.2	Operating Humidity	5 % to 100 % (non -condensing)	
3.3	Power Consumption	Vendor to provide power consumption for idle and max during data transmission	
3.4	Storage /transport temperature	-40 to +85 C	
3.5	MTBF	Vendor to provide details of MTBF	
3.6	Protection from pollution	Vendor shall provide design details such as protective paint /conformal coating on MCB ,high grade electronic components uses to protect from environmental pollution	
4.0	**System Characteristics**		
4.1	CPU	Vendor to provide make & technical details of CPU used. Vendor should also attached technical data sheet of CPU .CPU usage should not crossed 60 % in typical operating & maintenance condition	
4.2	RAM	Vendor to provide details of memory type, Speed & Size. Usage of memory should not crossed 60 % in typical operating & maintenance condition	
4.3	Flash Storage	Vendor to provide details of flash storage Memory Provision to store system logs, event logs ,configuration file	
5.0	**Mechanical Construction**		
5.1	Dimension (W X H X D)	Vendor to provide details of Dimension (W X H X D)	
5.2	Weight in Kg	Vendor to provide details of Weight in KG	
5.3	Housing	Metal Preferred Aluminium alloy having better heat dissipation & ruggedness	
5.4	Mounting	DIN rail Mounting	
5.5	Degree of Protection	IP 30	
6.0	**Interface/Port Type**		

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6.1	Ethernet	Minimum 2 X RJ45 Port ethernet, Speed 10/100 Mbps auto negotiable having status LED indication .Port should be configurable as LAN /WAN as required	
6.2	Cellular interface	Cellular router should have Single SIM provision.	
6.3	Ethernet Cable (CAT 6)	Vendor to provide Ethernet Cable (CAT 6) minimum 1.5 M	
7.0	**Software Features / Supported protocols**		
7.1	Network Protocols	TCP/IP ,UDP/IP, HTTP, ARP,DHCP, ICMP, SNMP, V1/V2 &V3, NTP, SSL/TLS	
7.2	Routing	Astatic Routing, RIP 1 &2 ,OSPF V2 &V3	
7.3	VPN	Open VPN , IP Sec, L2TP, PPTP, GRE	
7.4	Alarm Message	Device shall have alarm notification on SNMP trap	
7.5	Management /Monitoring	Cellular router should shall support Local /Remote management through web HTMLS ,SSHP & Telnet 4.It shall support monitoring through system logs & SNMP version V1/V2 & V3.Notification & command shall be possible over SMS. Firmware upgradation through Web, backup & restore of configuration shall be possible	
7.6	Operating System	Vendor to give the details of operating system & its Version	
7.7	Application	Vendor to give the details of application & package installed in router	
7.8	AT Command Support	YES /NO	

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7.9	Scheduled rebooting	Device should be capable to program auto rebooting as per configured scheduled configured scheduled time	
7.10	Watch dog feature	Router Shall have feature of tracking data connectivity status by periodic ping test and switchover on backup. Cellular /WAN interface if tracking ping test fail	
7.11	Factory Reset	Provision of Resetting the device for factory configuration	
7.12	Diagnosis Feature	Device Shall support real time diagnostic such as active connection ,traffic on interfaces	
8	**Security**		
8.1	Security	HTTPs, SSH, Authentication with RADIUs or TACACS + , activate cellular interface with SMS ,Ethernet 802 .1X(EAP-PEAP/MsCHPv2 or EAP -TLS	
8.2	Authentication	User Management (local ,RADIUS, TACACS + , Mixed)	
8.3	State inspection firewall	Static firewall IPv4 / IPv6 with incoming and forwarding ruleset ,DoS protection ,IP /Port/Protocol filtering ,NAT	
9	**Antenna**		
9.1	No Of Antenna	The 4 G Cellular Router Should have two antenna connection (MIMO).One is primary cellular antenna & second is diversity antenna(MIMO)	
9.2	Cable Length	Cable should have Low loss RF Cable with minimum 5 M	
9.3	Type of Antenna	Antenna Should be Omni directional with high gain (High gain ≥5)	

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9.4	Construction of antenna	It should be Steady ,good quality material ,water/ weather proof having adequate gold plate connector compatible with cellular router antenna. Port. It should be suitable mounting arrangement to installed indoor	
9.5	Frequency Band, impedance & Polarization	Vendor Shall provide the details of frequency Band .Antenna should be compatible with offered device & network service provide with frequency band ,port impedance & radio signal polarization	
9.6	VSWR	Vendor Shall provide details of VSWR	
9.7	Gain of antenna	Vendor Shall provide Gain details of primary & secondary antenna	
9.8	Input /Output Resistance	Vendor Shall provide details of input /output resistance	
9.9	Polarization Form	Vendor Shall provide details of Polarization Form	
9.10	Efficiency	Vendor Shall provide details of Efficiency	
9.11	Return Loss	Vendor Shall provide details of Return Loss	
9.12	Impedance	Vendor Shall provide details of Impedance	
10	**Power Supply**		
10.1	Power Supply	9 V to 60 V dc	
10.2	Connector Type	Router Should have preferable screw type firm connection. It should have reverse polarity protection & surge protection	
11	**Status & diagnostics indicator**		
11.1	LED indicator	Vendor to provide details of status & diagnostics indicator. (Power- ON & OFF ,ERR- Error Red, Signal, network, SIM status)	
12	**Certification:- IEC**	**Specified as below or equivalent to international Standard**	

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12.1	Electrostatic discharge immunity test	IEC EN 61000-4-2	
12.2	Radiated, radio-frequency, electromagnetic field immunity test	IEC EN 61000-4-3	
12.3	Electrical fast transient/burst immunity test	IEC EN 61000-4-4	
12.4	Surge immunity test	IEC EN 61000-4-5	
12.5	Immunity to conducted disturbances, induced by radio-frequency fields	IEC EN 61000-4-6	
12.6	Power frequency magnetic field immunity test	IEC EN 61000-4-8	
12.6	Immunity for industrial environments	IEC EN 61000-6-2	
12.7	Emission standard for industrial environments	IEC 61000-6-4:2018	
12.8	Information technology equipment –Safety	IEC 60950	
12.9	Environmental testing-Vibration (sinusoidal)	IEC 60068-2-6	
12.10	Environmental testing-Shock	IEC 60068-2-27	
12.11	Environmental testing-Free Fall (withdrawn)	IEC 60068-2-32	
13.0	Country of manufacturing	Vendor to provide Country of manufacturing details	
14.0	Service centre in India	Vendor to provide details of Service centre in India	
15.0	Regulatory compliance	Vendor shall confirm that offered product is complied & certified by all Indian government bodies related to telecommunication/ wireless communication (WPC ,DOT) to operate &user this product in country . Vendor to	

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		share compliance certificate of the same such as MTCTE Certificate	
16.0	Surge protection /electrical isolation	It should be available on all Ethernet communication port & power supply input .vendor shall share certification	
17.0	**Warranty**	60 months. Repair/Replacement must be with 15days from the date of failure report	

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Battery & Charger GTP

Sr.No	Technical requirement	Tata Power requirement	Bidders Response
1.0	Scope	The battery & battery charger are intended for operating 33kV/22kV/11KV RMU isolators. The rating of closing & opening coils is from 90-120 watts. Operating time 50ms Max. The battery should capable of withstanding normal load of FRTU & operational load of RMU isolators	
2.0	Average Number of Operations	Minimum 10 nos for 30 sec	
3.0	Standards	**IS 1885/IEC 600504, IS -15549/2005**	
4.0	Climate	Must able to operate efficiently considering hot & humid climate of Mumbai, India region. The battery shall be capable of operating satisfactorily in outdoor applications when it ishoused in a Cubicle between 10 deg. C and 65 deg.C and in locations where the relative humidity between 30% to 100%	
5.0	**Battery Ratings**		
5.1	Voltage	24 VDC specified at 27 deg.C.	
5.2	Battery Type	SMF,VRLA with chargers of conventional type	
5.3	Voltage/cell	2 volts	

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5.4	Capacity of Batteries	21 AH,10Amps	
5.5	Connecting cables	Cable size selection should provide the lowest voltage Drop possible between battery system and operating Equipment.	
5.6	Method of charging	Constant voltage method and current limit(variable Current)	
5.7	Efficiency	Not less than 90% at full rated load	
6	**Battery Charger Rating**		
6.1	Battery Charger type	Constant Voltage and Current limiting charger. **Charger with inbuilt battery health monitoring is highly preferable**.	
6.2	Charger Input Voltage	Single phase (2 wire) voltage 250V AC +30% to -20% Frequency 50Hz ± 5%..	
6.3	**Charger Output**		
6.3.1	Regulation	± 1%	
6.3.2	Charger current	10 Ampere	
6.3.3	Efficiency	Not less than 85% at full rated load	
6.3.4	Current limit	110% of rated load	
6.3.5	Insulation	Not less than 5 mega Ohms. i. between DC output terminals and AC input terminals. ii. Between AC input terminals and earth	
6.3.6	Indication	The charger shall have suitable indicators to visually know its mode of operation. Charger indication as below must be available: Mains on (Red LED) , Charger on (Yellow), Boost on (Yellow LED), Float on (Green LED) and Battery reverse polarity (Red LED), O/p DC fuse blown (Red/ LED) LED lamp indication.	

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		(LED colours can be changed)	
6.3.7	Protection	Input single pole MCB's for AC & DC of 10 Amperes separate for battery & charger. The battery charger must include protections like: i) AC input MCCB & ELBS with input ON/OFF switch and fuses/ contactor. ii) DC output MCCB with output ON/OFF switch and fuses. iii) Current limit protection, soft start feature, surge suppressor. iv) Fast semiconductor fuses for rectifier bridge. v) Charger over load / short circuit vi) Battery polarity reverse, Battery Over/Under voltage, Charger rectifier fail, etc.	
6.3.9	Battery & charger Alarms	Potential free contacts must be available to integrate with SCADA for abnormality if any. Most preferred alarms are like: AC supply fail DC supply fail Battery Low Battery Fail Battery Charger fail Battery polarity reverse	
6.3.8	Cooling	External exhaust fan(Optional)	
6.4	Climate	Must able to operate efficiently considering hot & humid climate of Mumbai, India region. The battery shall be capable of operating satisfactorily in outdoor applications when it is housed in a Cubicle between 10 deg. C and 65 deg.C and in locations where the relative humidity	

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		between 30% to 100%	
6.5	Wiring	The internal wiring of the charger shall be carried out with PVC insulated 650V grade standard copper conductor. The control wiring shall be carried out with 2.5 Sq.mm copper conductors.	
6.6	Accessibility	All the important components of the charger must be easily accessible for maintenance, repair, replacement in case of trouble without giving interruption to total D.C. supply as far as possible.	
6.7	**Test**		
6.7.1	ACCEPTANCE AND ROUTINE TESTS	All acceptance and routine tests as stipulated in the relevant standards shall be carried out by the bidder. The test certificates are to be furnished for approval.	
6.7.2	Acceptance test for battery charger with batteries	1. Marking 2. Verification of dimensions. 3. Regulation test. 4. Ripple test, 5. Megger values and HV Test. 6. Test for battery discharge capacity.	
6.7.3	Type Tests:	Following shall constitute type tests in respect of chargers and batteries. 1. Insulation resistance 2. High voltage test at 1.5KV for 1 minute 3. Regulation (Load & Line) 4. Dry heat test at 55°C for 16 hrs with full load on as per IS: 9000 part 3/Sec5/1977. 5. Damp heat test at 55°C and at 95% RH for two cycles as per IS: 9000 part 5/Sec1/1981	

		6. Cold test at -10°C for 4 hrs as per IS: 9000 part 2/Sec4/1977	
7	Drawings	Detailed drawings, circuit details and technical literature of batteries shall be enclosed to the offer. Tenders not accompanied by the above are liable for rejections, Trouble shooting charts shall be supplied with each unit to trace faults in the charger with voltage and Resistances to be measured at various test joints.	
8	painting	The box shall be painted with powder coating with siemens grey colour.	
9	Guarantee	The batteries supplied must have guarantee for a period of minimum 36 months from date of supply. The Battery Charger supplied should have the guarantee for a period of minimum 60 months from the date of supply. The replacement of both must be supplied within 15 days of complaint raised.	

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	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 26th Oct 2021
	Mini Field Remote Terminal Unit	

MINI FIELD REMOTE TERMINAL UNIT

Specification

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	ENGINEERING SPECIFICATIONS	SPEC/DMS/Mini FRTU Date: 18th Oct 2021
	Mini Field Remote Terminal Unit	

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	ENGINEERING SPECIFICATIONS	SPEC/DMS/Mini FRTU Date: 18th Oct 2021
	Mini Field Remote Terminal Unit	

1. Scope:

This specification covers design, engineering, manufacture; shop testing, inspection, packing and delivery of Mini FRTU for RMU automation, complete with all accessories suitable for application for Distribution Automation system. It is not the intent to specify completely herein all details of the equipment's nevertheless the equipment shall be complete and operative in all respects and shall confirm to the highest standard of engineering, design and workmanship.

2. Applicable Standards:

Mini FRTU shall comply with the requirements stated in the latest editions of the following recommendations, standard and specifications:

a. International Electro technical Commission (IEC),
b. Institute of Electrical and Electronics Engineer (IEEE)
c. American National Standards Institute (ANSI)
d. National Equipment Manufacturers association (NEMA) standards

3. Climatic Conditions:

Altitude: 16 meters above mean sea level.
Wind pressure: 195 Kg/Sq. m up to an elevation of 30 meters as per IS: 875-1975 and as per IEC 694

Ambient temperature (Ave. Daily): Max. 55ºC & Min.10.0 ºC
Relative Humidity: Max. 100% & Min. 10% (non-condensing)
Average number of rainy days per annum: 100
Average number of thunderstorm days per annum: 40
Rainy months: June to October
Average annual rainfall: 1200 mm
Atmosphere: Generally laden with mild acid and dust suspended during dry months and subjected to fog in cold months.

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4. General Technical Requirements:

4.1 Mini FRTU Functions:

4.1.1 Mini FRTU shall support all basic functionalities.
4.1.2 Serial interfaces (RS 485 Configurable) with Modbus serial protocol.
4.1.3 Ethernet 10/100 BaseT interface with IEC 60870-5-104 & IEC60870-5-101 protocol
4.1.4 Minimum number of I/O tags handling capacity shall be 120 I/O tags.
4.1.5 Mini FRTU have inbuilt optical coupler to isolate field signals.
4.1.6 Mini FRTU shall support suitable feature of battery availability check.
4.1.7 Suitable provision in FRTU to supervise and prevent accidental serious discharge of battery.
4.1.8 Mini FRTU shall support Event storage capacity as follows

Measurement Events	10000
System Events	1000
Alarms	1000
Normal Events	5000

4.1.9 Such events shall be stored in the basis of FIFO.
4.1.10 Local viewing of these events shall be possible.
4.1.11 Mini FRTU's digital input/output capacity should be such that it can able to fulfil automation of One 4 way RMU.
Please refer **Annexure # 2** and it should support expandability.
4.1.12 Mini FRTU shall support web based monitoring from remote as well as local.
4.1.13 All DI & DO status shall be visible in FRTU panel.

4.1.14 Mini FRTU shall support feature of remote configuration as well as diagnosis.
4.1.15 Mini FRTU shall have feature of multi master reporting with minimum 4 numbers of master.
4.1.16 As the SCADA/DMS system will use public domain GPRS, therefore it mandatory to guard the data/ equipment from intrusion/damage/breach of security & shall have SSL/VPN based security.
4.1.17 Shall support SNMP.
4.1.18 Capability of time synchronization with GPS receiver and SCADA..

4.2 Communication Port:

4.2.1 Mini FRTU shall have one TCP/IP Ethernet port for communication with Master station(s) using IEC 60870-5-104/101 protocol.
4.2.2 Mini FRTU shall have one number of RS 485 ports for communication with MFTs to be connected in daisy chain using MODBUS protocol.
4.2.3 Mini FRTU shall have one port for connecting the portable configuration and maintenance tool for FRTU.

4.3 Master Station Communication Protocol:

Mini FRTU shall use IEC 60870-5-104/101 communication protocol for communicating with master station. The Mini FRTU communication protocol shall be configured to report Analog & status changes by exception to master stations. However, Mini FRTU shall support periodic reporting of analog data and periodicity shall be configurable from 2 sec to 1 hour. Digital status data shall have higher priority than the Analog data. The dead-band for reporting

Analog value by exception shall be initially set to 1% (in %) of the full scale value.

4.4 Communication Protocol between Mini FRTU and MFTs:

The Mini FRTU shall acquire data from the MFTs using the MODBUS serial protocol. The MFT will act as slave to the Mini FRTU. The Mini FRTU shall transmit these values to the master station in the frame of IEC 60870-5-104/101 protocol. Mini FRTU shall support and accept AMI, MFI, ITI analog data type.

4.5 Mini FRTU Enclosures:

Wall mounted enclosures conforming the IEC 529, with an index of protection (IP) , IP55 along with CANOPY in both indoor & outdoor locations. Mini FRTU panel shall be provided with arrangement of housing Mini FRTU hardware, space for battery and communication modems. The enclosure shall be fabricated using 2 mm thick CRCA for panel door, side top bottom cover using 2 mm thick CRCA, mounting plate 1.6 mm thick CRCA.
Louvers for ventilation to be provided and shall comply IP 55.

The dimension shall be suitable to accommodate Mini FRTU I/O modules, Power supply accessories, battery/ battery charger, terminal blocks and communication modems. The front access door shall be hinged on cabinet with a common lock and key, locking arrangement should be special type of extra protection from theft. Removable type gland plates shall be provided at bottom of enclosure with required knock out holes for single compression glands for DI and DO cable entry. Provision of entry shall be kept for extending GSM/GPRS modem antenna outside the enclosure.

4.5.1 All panels shall be supplied with 230 VAC, 50 Hz, single-phase switch and 15/5A duplex socket arrangement for maintenance.
4.5.2 All panels shall be provided with an internal maintenance lamp, and gaskets.
4.5.3 The safety ground shall be isolated from the signal ground and shall be connected to the ground network. Safety ground shall be a copper bus bar. The contractor shall connect the panel's safety ground of to the owner's grounding network.
4.5.4 There shall be no sharp corners or edges. All edges shall be rounded to prevent injury.
4.5.5 Droppable disconnecting type link should be used for AC and DC power source termination and it should mount on horizontal C channel.
4.5.6 Panel should be design such way that Replaceable accessories like Modems, Batteries, external DI card , DO card, FRTU CPU card, FRTU power supply card, etc. can easily detached from the panel.

4.6 Local/Remote selector Panel

4.6.1 A manual Local/Remote selector switch shall be provided for each Mini FRTU to disable all control outputs by breaking the power supply connection to the control outputs.
4.6.2 When in "Local" position, the Local/Remote switch shall allow testing of all the control outputs of FRTU without activating the control outputs to field devices.
4.6.3 A status input indication shall be provided for the Local/Remote switch to allow the SCADA system to monitor the position of the switch.
4.6.4 When in Local mode, Command controls to be allowed from Push button along with LED provision for change of state verification.
4.6.5 All lamp & push buttons located on the panel front shall be easily readable & operable.

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4.6.6 The effects of glare from sunlight and artificial lighting shall be minimized.
4.6.7 Pushbuttons and pilot lights shall be oil tight, heavy duty type, hermetically sealed.
4.6.8 All control command pushbuttons shall have protective guards to prevent accidental actuation using one common pushbutton for executing command.
4.6.9 Lamp test function shall be provided for all indicating lights.
4.6.10 Pushbutton and Lamp shall be Omron or equivalent make.
4.6.11 Internal cable channels maximum filling shall not to exceed 60% of the cable channel cross sectional area.
4.6.12 Terminations shall preferable push on type / screw type.
4.6.13 Interconnections signal wiring between Di/DO card shall be made only through terminal blocks.
4.6.14 Opening in all enclosures through which wiring passes & each conduit termination shall be suitable bushed to prevent cutting or abrasion of the wiring insulation.
4.6.15 Electrical schematic diagrams mimic shall be shown for all switching device.
4.6.16 Panel shall be enclosed type with IP55 standard.
4.6.17 Panel shall be compact & properly fitted in FRTU panel.

4.7 Digital Input Module

Mini FRTU shall be capable of accepting isolated dry (potential free) contact status inputs. The Mini FRTU shall provide necessary sensing voltage, current, optical isolation and de-bounce filtering independently for each status input. The sensing voltage shall not exceed 24 V dc. The FRTU shall accept two types of status inputs i.e. Single point Status inputs and Double point status inputs.

Single point status input will be from a normally-open (NO) or normally-closed (NC) contact which is represented by 1-bit in the protocol message.

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The Double point status input will be from two complementary contacts (one NO and one NC) which is represented by 2-bits in the protocol message. A switching device status is valid only when one contact is closed and the other contact is open. Invalid states shall be reported when both contacts are open or both contacts are closed.

Mini FRTU configuration software shall have capability to invert the DI signal value if required in configuration.

There should be visual indication of status of all DI's present in the Mini FRTU panel for troubleshooting the problem.

4.8 Digital Output Module

The Mini FRTU shall provide the capability for a master station to select and change the state of digital output points. These control outputs shall be used to control power system devices such as Circuit breakers, isolator and other two-state devices, which shall be supported by the FRTU. Mini FRTU should also support single command output to control other parameters like reboot/reset from remote, if required.

The output contacts shall be rated to operate RMU isolator and Breaker motors. In case Control output module of Mini FRTU does not provide potential free control output contact of required rating, then separate control output relays shall be provided by the contractor. These output contact shall be used to drive heavy duty relays. These output contact must have fuse protection to protect it from overcurrent/overload. Kindly give details of fuse used. Also include spare fuse in panel BOM.

There shall be visual indication of DO's available in the Mini FRTU panel when command issued for any digital output for troubleshooting the problem.

4.9 Interface wires to Mini FRTU for DI and DO from RMU:

4.9.1 Shall be based as plug in type connectors for the bays which are under control, rest will be given on TB. All DI & DO connections pertaining to one bay should be connected to one plug. This will be helpful for incase of issuing outage on the bay, field engineer has to remove the plug so that there will not be any power supply available at motorization circuit to avoid unwanted operation at the time of outage. Considering safe remote operations this is a mandatory requirement.

4.9.2 Terminal blocks (disconnecting type links) are not envisaged in such arrangements.

4.9.3 The male type connector plug shall have 10 core multicolor armored cable of 1.5sqmm of suitable length as per requirement of site.

4.9.4 Male and female type connector (Pair) should be provided by vendor to terminate cable at FRTU end.

4.9.5 All DI supply connection is through fuse. Kindly give details of fuse used. Also include spare fuse in panel BOM.

4.9.6 Detailed Cable requirement for Mini FRTU DI and DO is mentioned in **Annexure #1.**supplier shall consider quantity with each Mini FRTU

4.9.7 Dressing of input, output communication wiring is in vendor scope.

4.9.8 Internal cable channels maximum filling shall not exceed 60 percent of the cable channel cross sectional area.

4.9.9 Proper cross ferruling shall be used in input output wiring terminations in Mini FRTU and RMU side.

4.9.10 Interconnections signal wiring between DI/DO card shall be made only through terminal blocks

4.9.11 Wire type : PVC insulate, Flexible, multi-stranded, untinned, FRLS type and Wire termination: Tinned copper insulated lugs Ferrule: White PVC tubular ferrule with black painting

4.10 Interface wires to Mini FRTU for Meter communication:

4.10.1 Shall be 0.5sqmm 4 core twisted pair shielded and armored.
4.10.2 Detailed Cable requirement for FRTU DI and DO is mentioned in **Annexure #1.**

4.11 Provision of AC supply:

4.11.1 Shall be 1.5sqmm 3 core armored cable with 3 pin plug and socket.
4.11.2 Droppable link should be used for AC power source termination. It should be mounted in horizontal arrangement. It must be supplied with plastic cover protection to avoid direct access/touching.
4.11.3 Detailed Cable requirement for Mini FRTU DI and DO is mentioned in **Annexure #1.**

4.12 Communication Package:

4.12.1 1 no of Ethernet, 4G GPRS gateway with 1 Ethernet 10/100 BaseT port.
4.12.2 4G GPRS with fallback 3G/2G Gateway should support multi NAT configuration.
4.12.3 Driver software.
4.12.4 Gateway shall be remotely manageable and configurable.

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4.12.5 Cellular router should have Single SIM provision.
4.12.6 Antenna with low loss RF cable with minimum 5m (extension of antenna cable shall be possible).
4.12.7 The 4 G Cellular Router Should have two antenna connection (MIMO).One is primary cellular antenna & second is diversity antenna(MIMO)
4.12.8 Rated Voltage: 9-60 VDC.
4.12.9 Open VPN , IP Sec, L2TP, PPTP, GRE
4.12.10 Cable to connect the communication module of FRTU.
4.12.11 GPRS modem should full fill all requirement mentioned in GTP **Annexure#3**
4.12.12 Make provision of hole for antennae with PVC IP65 gland for cable entry

4.13 Troubleshooting:

Mini FRTU shall have proper diagnosis tool for trouble shooting the failures related to the following from remotely as well as locally. Supplier shall consider all required configuration and diagnosis cable and software with each supplied FRTU.

4.13.1 Communication of FRTU with master
4.13.2 Communication of MFM with FRTU.
4.13.3 Communication of DI/DO.

4.14 Battery and Battery charger:

4.14.1 24 VDC SMPS battery charger 230VAC input, 10 Amps Output.
4.14.2 Mini FRTU should capable to monitor Battery and battery charger healthiness. **It is more preferable if the battery charger have inbuilt feature of Battery health monitoring.**

4.14.3 Battery and battery charger should capable for all FRTU required operation and Aux. supply to Modem & MFM etc.

4.14.4 Battery Rating: 24 V DC, **21 AH**, SMF-VRLA with chargers suitable for indoor as well as outdoor applications.

4.14.5 The batteries are intended to operate the isolators of 11kV/22kV/33kV RMU. The rating of closing coil is in the range from 90 watts to 120 watts.

4.14.6 The battery & its charger must withstand average operations of 10nos for max 30 seconds.

4.14.7 Power supply package shall meet the power supply requirement for the MFM and modem as well.

4.14.8 Suitable provision in Mini FRTU shall be present to supervise/monitor and prevent accidental serious discharge of battery.

4.14.9 Battery and battery charger plays very important role in remote operation while restoration of power supply to the customer. Hence to monitor healthiness of battery continuously in services condition, routine tests for battery condition monitoring shall be ensured.

4.14.10 Mini FRTU must be able to perform the battery discharge test at a manual set period or period can be pre-defined for auto discharge test.

4.14.11 Battery Health Monitoring Unit must be of standard make.

4.14.12 Ambient Temperature Operation: -5deg C to +60degC

4.14.13 Ambient temperature Storage: -20deg C to +65 deg C.

4.14.14 Humidity: 100% RH, non -condensing

4.14.15 Adhere to Standards IEC60927-1, IEC61000 with ingress protection of IP20.

5. Advanced Features:

The Mini FRTU shall support following advance SMART features without any additional hardware. These SMART features will be instrumental in Tata Power's journey towards Digitalization.

5.1 Possibility for logic development

5.2 Auto-change over of source functionality

5.3 Communication between FRTU's

6. Cyber security:

The Mini FRTU shall support the advanced cyber security standards as per the ISO/IEC/IS standards listed in MoP Order No. 12/34/2020-T&R dated 24th Dec 2021. (ISO 27001/02, IEC62443, IEC 15408, IEC 17025, IEC27019, IEC 61508, IEC 61850,NERC CIP-009-1, and IS 16335.)

6.1 Mini **FRTU should have following feature:**

1.1 User level configuration User wise authentication like system admin, configuration admin, control, operator.

1.2 Update the firmware/software with the digitally signed OEM validated patches. enables only those ports and services that are required for normal operations.

1.3 Disabling the DNS

1.4 Disabling, enabling & configuration the TCP and UDP ports.

1.5 Door- lock alarm integration with FRTU.

6.2 Type test standards for FRTUs

6.2.1 IEC 60870-1-2:1989 Telecontrol equipment and systems. Part 1: General considerations. Section Two: Guide for specifications.

6.2.2 IEC 60870-2-1:1995 Telecontrol equipment and systems - Part 2: Operating conditions –

Section 1: Power supply and electromagnetic compatibility.

6.2.3 IEC 60870-2-2:1996 Telecontrol equipment and systems - Part 2: Operating conditions –

Section Environmental conditions (climatic, mechanical and other non-electrical influences).

6.2.4 IEC 60870-3:1989 Telecontrol equipment and systems. Part 3: Interfaces (electrical characteristics)

List of designated laboratories for cyber security conformance testing as per MoP Order No. 12/34/2020-T&R dated 24th Dec 2021 are:

Sr. No.	Equipment	Equipment Communication Protocol	Conformance Standards	Designated Laboratories

1	Remote Terminal Units (RTUs) & PLCs with IEC communications protocols	IEC 60870-5 -101 / IEC 60870-5 -104	IEC 60870-5- 7 Security extension & IEC 62351 series-: IEC 62351-100-1, IEC 62351-100-3, IEC 62351-5, IEC 62351-8, IEC 62443-4-2	Central Power Research Institute (CPRI), Prof Sir C V Raman Road, Sadashivanagar P O, Bengaluru – 560080, Karnataka

7. Accessories:

7.1 Separate MCBs with 10A protection for AC and DC supply.
7.2 Separate MCBs for Motor supply and Battery charger needs to be provided.
7.3 All intra panel wiring and cable to connect the Batteries.
7.4 Separate Earthing shall be provided for FRTU panel.
7.5 Separate Ethernet cable and provision of Antennas for communication.

8. Training:

Bidder shall give 20 man-day's training on operation and configuration of Mini FRTU and related accessories and aux equipment to TATA power. Training will be the time of Factory acceptance test (FAT) and site acceptance test at site.

Mini FRTU training course shall cover the following:

8.1 FRTU operation including data flow.
8.2 Troubleshooting, identification and replacement of faulty Modules.
8.3 Preventive maintenance of the FRTU
8.4 Use of FRTU configuration and Maintenance tool
8.5 All functional and Diagnostic testing of FRTU
8.6 Database modification and configuration of FRTU

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9. Documentation:

The bidder shall submit all the standard and customized Mini FRTU documents for review and approval which includes the following:

9.1 Mini FRTU Function design document
9.2 Mini FRTU Hardware description document & all the documents referred therein to meet all the clauses of the specification.
9.3 Mini FRTU Test equipment user documents.
9.4 Mini FRTU user guide
9.5 Mini FRTU Operation & Maintenance document
9.6 Mini FRTU Training documentation
9.7 Mini FRTU database document
9.8 Mini FRTU I/O list (as build) after the execution
9.9 Mini FRTU Test procedures
9.10 Data Requirement Sheet (DRS) of all items
9.11 Protocol documentation including implementation profile etc.
9.12 Mini FRTU installation and Layout, GA, BOQ, schematics and internal wiring drawings for each FRTU site
9.13 Mini FRTU to C&R panels/ field device cabling details for each FRTU site

10. Nameplate and Markings:

Nameplate showing all technical parameters shall be provided on all equipment's. "PROPERTY OF TATA POWER" shall be suitably embossed on the nameplate.

10.1 Painting:

All paints shall be applied on clean, dry surfaces under suitable atmospheric and other conditions in accordance with the paint manufacturer's instructions. All

paints used shall be compatible with each other and capable of being used as a system. The system shall be capable of performance for five years in the environment specified without any need for maintenance.

Color Code:

Exterior & Interior paint shade - Siemens Grey RAL 7035 (Texture)
Paint thickness: 60-90 Microns
No consecutive coats of paint shall be of the same shade.

Minimum standards acceptable are cleaning by shot blasting to Grade As 2.5 of ISO 8501-1 and Al sheet steel surfaces shall be degreased, pickled and phosphate in accordance with IS 6005 - "Code of practice for phosphating of iron and steel."

Immediately following phosphating the surfaces shall be painted with two coats of high quality zinc chromate primer. All rough surfaces of coatings shall be filled with approved two pack filler and rubbed down to a smooth finish.

Interior surfaces of terminal boxes, after preparation, cleaning and priming shall be painted with one coat of zinc chromate primer, one coat of phenolic based undercoating, followed by one coat of phenolic based finishing paint to white color followed by a final coat of anti-condensation white paint of a type and make to the approval of the Project Manager. A minimum overall paint film thickness of 150 microns shall be maintained throughout. The first coat of primer shall be applied on the same day, preferably within two hours of shot blasting.

Exterior steel surfaces and metalwork, after preparation and priming shall be painted with one coat of zinc chromate primer, one coat of phenolic based under

coating and two coats of micaceous iron oxide paint, then painted with a final coat of phenolic based hard glass finishing paint of the light grey shade No 631 of IS 5, to provide an overall minimum paint thickness of 200 microns.

10.2 Galvanizing:

All galvanizing shall be carried out by the hot dip process, in accordance with Specification ISO: 1460 or IS: 2629. However, high tensile steel nuts, bolts and spring washers shall be electro - galvanized to service condition four. The zinc coating shall be smooth, continuous and uniform. It shall be free from acid spots and shall not scale, blister or be removable by handling or packing. There shall be no impurities in the zinc or additives to the galvanic bath, which could have a detrimental effect on the durability of the zinc coating.

Before pickling, all welding, drilling, cutting, grinding and other finishing operations must be completed and all grease, paint, varnish. Oil, welding slag and other foreign matters completely removed. All protuberances that would affect the life of galvanizing shall also be removed.

The weight of zinc deposited shall be in accordance with BS 729 and shall not be less than 0.61 kg/m2 with a minimum thickness of 86 microns for items of thickness more than 5 mm, 0.46 kg!m2 (64 microns) for items of thickness between 2 mm and 5 mm and 0.33 kg! 012(47 microns) for items less than 2 mm thick.

Parts shall not be galvanized if their shapes are such that the pickling solution cannot be removed with certainty or if galvanizing would be unsatisfactory or if their mechanical strength would be reduced.

In the event of damage to the galvanizing the method used for repair shall be subject to the approval of the Project Manager or that of his representative. Repair of galvanizing on site will generally not be permitted.

The threads of all galvanized bolts and screwed rods shall be cleared of shelter by spinning or brushing. A die shall not be used for cleaning the threads unless specifically approved by the Project Manager. All nuts shall be galvanized. The threads of nuts shall be cleaned with a tap and the threads oiled. Partial immersion of the work shall not be permitted and the galvanizing tank must therefore be sufficiently large to permit galvanizing to be carried out by one immersion.

After galvanizing no drilling or welding shall be performed on the galvanized parts of the equipment excepting that nuts may be threaded after galvanizing.

To avoid the formation of white rust, galvanized material shall be stacked during transport and stored in such a manner as to permit adequate ventilation. Sodium dichromate treatment shall be provided *to* avoid formation of white rust after hot dip galvanization.

The galvanized steel shall be subjected to tests as per IS-2633 and BS : 729.

11. Tests & Test Certificates:

Mini FRTU shall have been type tested as per latest IEC. The bidder shall submit Type test reports for FRTU, Battery/ Battery charger, Industrial grade Modem.

The FRTU's Shall have passed type tests carried out by government accredited labs and in accordance with IEC 255-4, 255-6, 801-2 and 801-3 to demonstrate that the FRTU's comply with the ratings stated in these standard. As a minimum, certificates for the following type tests shall be furnished: Other test as applicable are include in the given table 1

11.1 Dielectric test
11.2 Impulse Voltage withstand test
11.3 High frequency disturbance test
11.4 Thermal requirement test
11.5 Mechanical requirement test
11.6 Limiting dynamic value test
11.7 Contact performance test
11.8 Electromagnetic radiation susceptibility test
11.9 Electrostatic discharge susceptibility test

Mini FRTU shall pass manufacture's standard routine test in accordance with the reference standard. In addition to the tests described in the IEC standard, the routine test and test reports of the FRTU's shall include the following:

11.9.1 Visual test to confirm that construction and sizing requirement have been met.
11.9.2 Rigorous testing of each input and output functions of the FRTU's. This shall include the Fault detection and the disturbance data storage functions as well as the operation of the FRTU time and the date facilities.
11.9.3 Verification of the use of the FRTU test equipment for maintenance and testing.
11.9.4 Verification that FRTU software and firmware support FRTU sizing and expansion requirements.
11.9.5 Verification of successful communication (i.e. protocols) all the required data rates.
11.9.6 Testing of secure operation.
11.9.7 Verification of the ability to download parameter and configuration data from SCADA master station.

TATA POWER reserves right to ask, type test certificate for any component used.

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12. Factory Inspection:

12.1 Equipment shall be subject to inspection by a duly authorized representative of the Purchaser. Inspection may be made at any stage of manufacture at the option of the purchaser and if the equipment found unsatisfactory as to workmanship or material, the same is liable for rejection. Supplier shall grant free access to the place of manufacture to the purchaser's representative at all times when the work is in progress.

12.2 Supplier shall give prior inspection notice. **(15 days for domestic and 30 days for international)**

12.3 Factory inspection will be carried as per approved QAP.

12.4 Material shall be dispatched after Dispatch Clearance only.

13. Inspection of material after receipt at store:

Material after receipt at TATA POWER Store / site will be inspected by special team designated by TATA POWER team. The material is liable for rejection if found different from the reports of pre-dispatch inspection.

14. Guarantee:

Supply of all equipment's and associated accessories shall be guaranteed for satisfactory performance for period of **60** months from the date of commissioning. In case of failure of equipment / part of equipment's during guarantee period it shall be replaced or repaired by supplier free of cost. Supplier should replace the faulty part with operational part during the replacement and repair duration within 15 days after the failure is reported, if any. Supplier has to provide remote and on-site support to resolve the hardware and software related issue.

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15. Packing and Shipping:

15.1 **Packing:**

The equipment's are to be transported adequately sealed against water ingress, All accessories and spares shall be packed and securely clamped against movement in robust, wooden, non-returnable packing cases to ensure safe transit in rough terrain, cross country road conditions and in heavy rains from the manufacturer's works to the specified destinations.

Equipment or material liable to deterioration by sea water, moisture, or ingress of foreign matter shall be totally sealed in strong polythene bags and those -liable to deterioration due to condensation shall be protected by packs of silica gel or other approved desiccant.

All accessories shall be carefully packed so that they are fully protected during transport and handling operations and in storage. Internal surfaces of loose accessories shall be sealed by means of gaskets and blanking off plates. All parts liable to rust shall receive an anti-rusting coat and shall be suitably protected. It shall be the responsibility of the Contractor to make good any damage caused through insufficient packing.

Each packing case shall be indelibly marked, on two adjacent sides and on the top, with the following,

15.1.1 Individual serial number
15.1.2 Purchaser's name
15.1.3 Order number and date
15.1.4 Destination (A color coded marking to indicate destination)
15.1.5 Manufacturers /Suppliers name
15.1.6 Date & Year of manufacture
15.1.7 Name and address of Agent
15.1.8 Description and numbers of contents

15.1.9 Country of origin
15.1.10 Case measurements
15.1.11 Gross and net weights in kilogram.
15.1.12 Necessary slinging and stacking instructions.

Each crate or container shall be marked clearly on the outside of the case to show TOP and BOTTOM positions with appropriate signs to indicate where the mass is bearing and the correct positions for slings. All component parts, which are separately transported, shall have permanent identification marks to facilitate correct matching and assembly at site. Welded parts shall be marked before welding.

16. Tender Sample:

Not applicable

17. Quality control:

Manufacturer shall have adequate Quality Control Facilities. Quality assurance plan & Field quality plan shall be submitted. Refer Annexure#4.

18. Testing facilities:

Manufacturer shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards.

19. Manufacturing activities:

Separate sheet showing detail-manufacturing activities shall be submitted along-with bid.

20. Schedules of deviations:

The Bidders shall set out all deviations from this specification, Clause by Clause in this schedule. Unless **specifically** mentioned in this schedule, the tender shall be deemed to confirm the purchaser's specifications. (Format is attached)

21. Guaranteed Technical Particulars:

Bidder shall submit separate sheet showing guaranteed technical particulars-Format is attached as **Annexure # 3.**

22. Drawings, data and manuals:

To be submitted with bid.
Completely filled-in Technical Schedules.
General description of the equipment and all components including brochures
General arrangement drawings
Type Test Certificates
Experience List
Detail bill of material
To be submitted after the award of the contract:

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Sr. No.	Description	For Approval	For Review Information	Final Submission
1	Technical Schedules	√		√
2	General Arrangement drawings	√		√
3	Single Line Diagram	√		√
4	Installation Instructions		√	√
5	Instruction for Use		√	√
6	Transport/ Shipping dimension drawing		√	√
7	Foundation Plan & loading details		√	√
8	QA &QC Plan	√	√	√
9	Test Certificates	√	√	√

23. Sub-contractors:

The supplier shall ensure that any sub-contractors appointed by him under the Contract follow the Quality Assurance requirements of this specification. The supplier shall assess the sub-contractor's Quality Assurance arrangements prior to his appointment to ensure compliance with the appropriate ISO standard and the specification. Auditing of the sub-contractor's Quality Assurance arrangements shall be carried out by the supplier and recorded in such a manner that demonstrates to the TATA POWER the extent of the audits and their effectiveness.

24. Spare parts:

The Bidder shall give an assurance that spares will continue to be available through the life of the equipment, which shall be 15 years minimum. However,

the supplier shall give a minimum of 12 months' notice in the event of plan to discontinue manufacture of any component used in this equipment.

Any parts shall be subject to the same specification, tests and conditions as similar material supplied under the Contract. They shall be strictly interchangeable and suitable for use in place of the corresponding parts supplied with the plant and must be suitably marked and numbered for identification.

25. Completeness of contract:

The bidder without extra charges, although not specifically mentioned herein, but necessary or useful for similar equipment and their efficient performance shall provide all fittings or accessories. The bid shall clearly indicate if any additional equipment or parts would be necessary to give a complete offer and if so the details and the prices shall be included in the bid.

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Annexure #1

	Description	Core	Cables	Distance (Mts.)	Total Length (Meters)	Harting Connectors
DI + DO	DI & DO Cable - 10 Core multi-color armored cable of 1.5 Sq mm	10	4	15	60	10 Pin Female & male Connector at FRTU ends.
AC Supply	AC Supply - 3 Core 1.5 Sq mm armored cable	3	1	15	15	No Harting Connector
Earthing	Earthing - 16 Sq mm Cable	1	1	10	10	No Harting Connector
LT Breaker & Transformer	6 Core multi-color armored cable of 1.5 Sq mm	6	2	20	40	Harting plug not required. Arrange a TB to terminate alarms at FRTU end.
Fuses	As per equipment				5 no's	Each ratting type 5 no's
Configuration and console cable	As per OEM equipment requirement				1 no's	1 no's -each type of cable

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Annexure #2

S.No.	Alarm Description	Equipment	Normal state	Alarm state	INFO type	IOA
1	Local Remote S/W status	FRTU	Remote	Local	SPI	1
2	IC1 IS status	RMU#1	Close	Open	DPI	501
3	IC1 ES status		Open	Close	DPI	502
4	IC2 IS status		Close	Open	DPI	503
5	IC2 ES status		Open	Close	DPI	504
6	OG#1 CB status		Close	Open	DPI	505
7	OG#1 ES status		Open	Close	DPI	506
8	OG#2 CB status		Close	Open	DPI	507
9	OG#2 ES status		Open	Close	DPI	508
10	LT#1 CB status		Close	Open	DPI	509
11	LT#2 CB status		Close	Open	DPI	510
12	IC1 IS status	RMU#2	Close	Open	DPI	511
13	IC1 ES status		Open	Close	DPI	512
14	IC2 IS status		Close	Open	DPI	513
15	IC2 ES status		Open	Close	DPI	514
16	OG#1 CB status		Close	Open	DPI	515
17	OG#1 ES status		Open	Close	DPI	516
18	OG#2 CB status		Close	Open	DPI	517
19	OG#2 ES status		Open	Close	DPI	518
20	LT#1 CB status		Close	Open	DPI	519
21	LT#2 CB status		Close	Open	DPI	520
22	Motor supply	BC	Normal	Fail	SPI	3
23	Battery Charger		Normal	Fail	SPI	4
25	Battery		Normal	Alarm	SPI	5
26	Equipment fault		Normal	Alarm	SPI	6

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27	AC Supply		Normal	Fail	SPI	7
28	OTI/WTI alarm	TRF#1	Reset	Operated	SPI	8
29	OTI/WTI Trip		Reset	Operated	SPI	9
30	OTI/WTI alarm	TRF#2	Reset	Operated	SPI	10
31	OTI/WTI Trip		Reset	Operated	SPI	12
32	FPI#1	IS 1	Reset	Operated	SPI	13
33	FPI#2	IS 2	Reset	Operated	SPI	14
34	ISO 1 VPIS status	VPIS	Reset	Operated	SPI	15
35	ISO 2 VPIS status	VPIS	Reset	Operated	SPI	16

Control						
S.N.	**Alarm description**	**Equipment**	**Normal state**	**Alarm state**	**INFO type**	**IOA**
1	IC1 IS Control	RMU#1	Close	Open	DCO	1001
2	IC2 IS Control		Close	Open	DCO	1002
3	IC1 IS Control	RMU#2	Close	Open	DCO	1005
4	IC2 IS Control		Close	Open	DCO	1006
5	FPI#1	FPI	Reset	Operated	SCO	2001
6	FPI#2		Reset	Operated	SCO	2002

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	ENGINEERING SPECIFICATIONS	SPEC/DMS/Mini FRTU Date: 18th Oct 2021
	Mini Field Remote Terminal Unit	

Annexure #3	**GTP for FRTU**		
	Parameter	Tata Power Requirement	Bidders response
1	SCOPE of work	Supply of Mini/Micro FRTU panel with power supply and battery backup	
2	Applicable Standard	As per specifications- IEC EN 61000-4-2 ,3,4,5,6 & 8 , IEC EN 61000-6-2 & 4, IEC 60950,IEC 60068-2-6 ,27&32	
3	Ambient Temperature	-10 deg to + 55 deg Celsius	
	FRTU Functions		
4	FRTU make	Bidders to provide detail	
5	Master Protocol	IEC 104	
6	Slave protocol	MODBUS	
7	Ethernet Interface Port and Data Rate	Ethernet port with Ethernet 10/100 BaseT	
8	Ethernet Port expandability	Optional	
9	Serial Interface Port and Data rate	RJ45 interface Ports with 2400 to 38400	
10	User configurability of the serial Port	Essential	
11	Max I/O tag handling capacity	120	
12	Inbuilt opto-coupler for DI/DO	Essential	
13	Support to battery availability Check	Essential	
14	Local event storage capacity	As per specification: Measurement Events 10000 System Events 1000 Alarms 1000 Normal Events 5000	
15	Retrieval of SOE	Required -Should be able to retrieve in form of excel	
16	Web based monitoring	Essential	
17	FRTU's digital input/output capacity	Capacity of I/O should be sufficient for One 4 way RMU automation	

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		(Minimum 24 DIs and 8DOs hardwired capacity).	
18	Feature of remote configuration as well as diagnosis	Essential	
19	Number of Multi master reporting possible with same ASDU	4	
20	Number of Multi master reporting possible with different ASDU	Optional	
21	Support to SNMP	Essential	
22	Automatic Startup after power failure	Essential	
23	Support SSL/VPN based security	Essential and adhere to CEA cyber security guidelines 2021	
24	Support remote restart of FRTU as well as Modem	Essential	
25	Support to Time Synchronization with GPS	Essential	
26	Support to Time Synchronization with Master	Essential	
FRTU Communication Ports			
27	No of Ethernet Interface Port	Min 1	
28	No. of Serial Interface Port	Min 1	
29	No. of configuration Port	Min 1	
30	Configuration port type	Serial/USB/Ethernet	
FRTU Enclosure			
31	Panel Dimension [mm(H)*mm(W)*mm(D)]	Small form factor preferred	
32	IP protection	IP 55 with outdoor protection Canopy as per specifications	
33	Support to wall mounting arrangement	Essential	
34	Provision for Local/Remote selector	Essential	

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	switch		
		DI Card	
35	Digital Input card threshold voltage	18v dc	
36	Digital Input card sensing voltage	24v dc. Separate fuse protection must be available for each DI point	
		DO Card	
37	DO card rating	The output contacts shall be rated to operate RMU isolator and Breaker motors (3-5Amps/min). Fuse protection must be available to each DO output card.	
38	If External relays required, then Make, Type and rating of the relays	If needed then the output external contacts shall be rated to operate RMU isolator and Breaker motors. OEM of relay to be specified	
		Interface between FRTU and RMU	
39	Consideration of Plug type connector	Essential	
40	Is plug wise arrangement include the bay wise DI & DO	After disconnecting plug, particular bay should isolate	
41	Fuses - 5each type in panel	Essential	
42	Supply to MFM through FRTU panel is considered	Essential	
		Troubleshooting	
43	Availability of diagnostic tool	Essential-should be available from remote as well as local	
44	Failure of Communication of FRTU to master	Essential-should be available from remote as well as local	
45	Failure of Communication of FRTU to MFM	Essential-should be available from remote as well as local	
46	Failure of Communication of FRTU to DI/DO	Essential-should be available from remote as well as local	
		Power Supply	
47	FRTU power supply requirement	As per RMU isolator operation	

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		requirement. Closing coil of rating from 90-120 watts	
48	Battery Charger Rating	IP 230 VAC, OP 24 VDC, current : 10 Amps-as per specification with separate MCB	
49	Support to monitoring of battery charger and Battery Health	Essential as per specification	
50	Battery Rating	24 Volts DC, 21 AH	
51	Battery Type	Sealed Maintenance Free, VRLA suitable for outdoor operations	
52	Consideration of the power supply requirement for operation of Isolator of RMU.	Essential as per specification	
53	Consideration of the power supply requirement for Modem.	Essential as per specification	.
54	Consideration of the power supply requirement for MFM.	Essential as per specification	
55	Location of the Battery	Inside panel along with battery charger unit	
56	Make of batteries	Standard brand having good efficiency & life period	
57	Suitable provision in FRTU to supervise and prevent accidental serious discharge of battery	Essential as per specification	
58	Integrated Battery and battery charger monitoring function through FRTU	Essential as per specification	
59	Remote alarm of battery and battery charger monitoring	Essential as per specification AC fail, DC fail, Battery Low, Battery polarity reverse, Battery Over/Under voltage, Charger rectifier fail,etc. internal alarms to monitor	
Advanced feature			
60	Possibility for logic development	Essential	

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	within FRTU and between FRTU		
61	Auto-source change over functionality either inbuilt or through logic programming	Essential	
62	Communication between FRTU's	Essential	
63	Inbuilt auto functions management	Essential-In service and out of service option should be available through FRTU configuration	
64	Hardware required for advanced smart function	NO extra hardware required at FRTU end	
	Training		
65	No. of man-day's considered	20 man days	
	Test and Test certificates		
66	Compliance to type tests	As per spec	
67	Consideration of FAT	Essential	
68	Location of FAT	Essential	
69	Consideration of SAT	Essential	
	Material Delivery		
70	Duration for drawing approval	15 days from the date of contract confirmation	
71	Duration for Material delivery	90-120 days from the date of drawing approval	
	Guarantee		
72	Consideration of No. of months for Guarantee	60 months	
73	Replacement & repair of faulty part during part failure	Essential. The replacement/repairs should be done within 15 days of complaint raised.	
	Cyber security		
74	Cyber security standard	Essential. Must adhere to the	

		standards mentioned in Cyber security Guidelines of Power Sector, 2021	
75	User level authentication	Essential	
76	Different type of user configuration	Essential-system, configuration, admin, control	
77	TCP & UDP Port access authentication	Essential	
78	FRTU Door lock & unlock alarm availability	Essential for physical security	
Installation and Commissioning			
79	Installation and Commissioning of FRTU at identified site	5 Mondays	

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Annexure #3 **GTP for Industrial Cellular Router**

Industrial Router GTP

Sr.No	Technical requirement	Tata Power requirement	Bidders Response
1.0	**Product Description**		
1.1	Make & Model	Vendor to provide Make & model of proposed cellular Router. Also provide life cycle details	
2.0	**Radio Interface**		
2.1	Radio Interface	4G LTE, Fallback to 3G, 2G	
2.2	Data interface	Cat 4 , Max download 150 Mbps, Max upload 50 Mbps	
2.3	Supported frequency band	Modem should support multiband connectivity with FDD 4G LTE & TDD 4G LTE. It should support Band 1,3,5,8,Band 40 and Band 41. The offered cellular router should support and compatible to the data & radio interface of the network of public mobile service provider in Mumbai city	
2.4	Radio Transmitter Power	Vendor to provide details of radio transmitter power	
2.5	Receiver Sensitivity	Vendor to provide details of receiver channel sensitivity	
2.6	Adjacent Channel Sensitivity	Vendor to provide details of Adjacent channel sensitivity	
2.7	Cellular Module / Chip	Vendor shall give details of cellular chip /Module used along with datasheet	
3.0	**Operating Condition**		
3.1	Operating Temperature	-20 C to 70 C	

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3.2	Operating Humidity	5 % to 100 % (non -condensing)	
3.3	Power Consumption	Vendor to provide power consumption for idle and max during data transmission	
3.4	Storage /transport temperature	-40 to +85 C	
3.5	MTBF	Vendor to provide details of MTBF	
3.6	Protection from pollution	Vendor shall provide design details such as protective paint /conformal coating on MCB ,high grade electronic components uses to protect from environmental pollution	
4.0	**System Characteristics**		
4.1	CPU	Vendor to provide make & technical details of CPU used. Vendor should also attached technical data sheet of CPU .CPU usage should not crossed 60 % in typical operating & maintenance condition	
4.2	RAM	Vendor to provide details of memory type, Speed & Size. Usage of memory should not crossed 60 % in typical operating & maintenance condition	
4.3	Flash Storage	Vendor to provide details of flash storage Memory Provision to store system logs, event logs ,configuration file	
5.0	**Mechanical Construction**		
5.1	Dimension (W X H X D)	Vendor to provide details of Dimension (W X H X D)	
5.2	Weight in Kg	Vendor to provide details of Weight in KG	
5.3	Housing	Metal Preferred Aluminium alloy having better heat dissipation & ruggedness	
5.4	Mounting	DIN rail Mounting	
5.5	Degree of Protection	IP 30	
6.0	**Interface/Port Type**		

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6.1	Ethernet	Minimum 2 X RJ45 Port ethernet, Speed 10/100 Mbps auto negotiable having status LED indication .Port should be configurable as LAN /WAN as required	
6.2	Cellular interface	Cellular router should have Single SIM provision.	
6.3	Ethernet Cable (CAT 6)	Vendor to provide Ethernet Cable (CAT 6) minimum 1.5 M	
7.0	**Software Features / Supported protocols**		
7.1	Network Protocols	TCP/IP ,UDP/IP, HTTP, ARP,DHCP, ICMP, SNMP, V1/V2 &V3, NTP, SSL/TLS	
7.2	Routing	Astatic Routing, RIP 1 &2 ,OSPF V2 &V3	
7.3	VPN	Open VPN , IP Sec, L2TP, PPTP, GRE	
7.4	Alarm Message	Device shall have alarm notification on SNMP trap	
7.5	Management /Monitoring	Cellular router should shall support Local /Remote management through web HTMLS ,SSHP & Telnet 4.It shall support monitoring through system logs & SNMP version V1/V2 & V3.Notification & command shall be possible over SMS. Firmware upgradation through Web, backup & restore of configuration shall be possible	
7.6	Operating System	Vendor to give the details of operating system & its Version	
7.7	Application	Vendor to give the details of application & package installed in router	
7.8	AT Command Support	YES /NO	

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7.9	Scheduled rebooting	Device should be capable to program auto rebooting as per configured scheduled configured scheduled time	
7.10	Watch dog feature	Router Shall have feature of tracking data connectivity status by periodic ping test and switchover on backup. Cellular /WAN interface if tracking ping test fail	
7.11	Factory Reset	Provision of Resetting the device for factory configuration	
7.12	Diagnosis Feature	Device Shall support real time diagnostic such as active connection ,traffic on interfaces	
8	**Security**		
8.1	Security	HTTPs, SSH, Authentication with RADIUs or TACACS + , activate cellular interface with SMS ,Ethernet 802 .1X(EAP-PEAP/MsCHPv2 or EAP -TLS	
8.2	Authentication	User Management (local ,RADIUS, TACACS + , Mixed)	
8.3	State inspection firewall	Static firewall IPv4 / IPv6 with incoming and forwarding ruleset ,DoS protection ,IP /Port/Protocol filtering ,NAT	
9	**Antenna**		
9.1	No Of Antenna	The 4 G Cellular Router Should have two antenna connection (MIMO).One is primary cellular antenna & second is diversity antenna(MIMO)	
9.2	Cable Length	Cable should have Low loss RF Cable with minimum 5 M	
9.3	Type of Antenna	Antenna Should be Omni directional with high gain (High gain ≥5)	

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9.4	Construction of antenna	It should be Steady ,good quality material ,water/ weather proof having adequate gold plate connector compatible with cellular router antenna. Port. It should be suitable mounting arrangement to installed indoor	
9.5	Frequency Band, impedance & Polarization	Vendor Shall provide the details of frequency Band .Antenna should be compatible with offered device & network service provide with frequency band ,port impedance & radio signal polarization	
9.6	VSWR	Vendor Shall provide details of VSWR	
9.7	Gain of antenna	Vendor Shall provide Gain details of primary & secondary antenna	
9.8	Input /Output Resistance	Vendor Shall provide details of input /output resistance	
9.9	Polarization Form	Vendor Shall provide details of Polarization Form	
9.10	Efficiency	Vendor Shall provide details of Efficiency	
9.11	Return Loss	Vendor Shall provide details of Return Loss	
9.12	Impedance	Vendor Shall provide details of Impedance	
10	**Power Supply**		
10.1	Power Supply	9 V to 60 V dc	
10.2	Connector Type	Router Should have preferable screw type firm connection. It should have reverse polarity protection & surge protection	
11	**Status & diagnostics indicator**		
11.1	LED indicator	Vendor to provide details of status & diagnostics indicator. (Power- ON & OFF ,ERR- Error Red, Signal, network, SIM status)	
12	**Certification:- IEC**	**Specified as below or equivalent to international Standard**	

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12.1	Electrostatic discharge immunity test	IEC EN 61000-4-2	
12.2	Radiated, radio-frequency, electromagnetic field immunity test	IEC EN 61000-4-3	
12.3	Electrical fast transient/burst immunity test	IEC EN 61000-4-4	
12.4	Surge immunity test	IEC EN 61000-4-5	
12.5	Immunity to conducted disturbances, induced by radio-frequency fields	IEC EN 61000-4-6	
12.6	Power frequency magnetic field immunity test	IEC EN 61000-4-8	
12.6	Immunity for industrial environments	IEC EN 61000-6-2	
12.7	Emission standard for industrial environments	IEC 61000-6-4:2018	
12.8	Information technology equipment –Safety	IEC 60950	
12.9	Environmental testing-Vibration (sinusoidal)	IEC 60068-2-6	
12.10	Environmental testing-Shock	IEC 60068-2-27	
12.11	Environmental testing-Free Fall (withdrawn)	IEC 60068-2-32	
13.0	Country of manufacturing	Vendor to provide Country of manufacturing details	
14.0	Service centre in India	Vendor to provide details of Service centre in India	
15.0	Regulatory compliance	Vendor shall confirm that offered product is complied & certified by all Indian government bodies related to telecommunication/ wireless communication (WPC ,DOT) to operate &user this product in country . Vendor to	

Meant for (Internal Circulation / External – Stakeholders Circulation)

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Sign and Date		
Initials	Mr. Balaji Shakkarwar	Mr. Santosh Wangde

		share compliance certificate of the same such as MTCTE Certificate	
16.0	Surge protection /electrical isolation	It should be available on all Ethernet communication port & power supply input .vendor shall share certification	
17.0	**Warranty**	60 months. Repair/Replacement must be with 15days from the date of failure report	

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	ENGINEERING SPECIFICATIONS	SPEC/DMS/Mini FRTU Date: 18th Oct 2021
	Mini Field Remote Terminal Unit	

Battery & Charger GTP

Sr.No	Technical requirement	Tata Power requirement	Bidders Response
1.0	Scope	The battery & battery charger are intended for operating 33kV/22kV/11KV RMU isolators. The rating of closing & opening coils is from 90-120 watts. Operating time 50ms Max. The battery should capable of withstanding normal load of FRTU & operational load of RMU isolators	
2.0	Average Number of Operations	Minimum 10 nos for 30 sec	
3.0	Standards	**IS 1885/IEC 600504, IS -15549/2005**	
4.0	Climate	Must able to operate efficiently considering hot & humid climate of Mumbai, India region. The battery shall be capable of operating satisfactorily in outdoor applications when it ishoused in a Cubicle between 10 deg. C and 65 deg.C and in locations where the relative humidity between 30% to 100%	
5.0	**Battery Ratings**		
5.1	Voltage	24 VDC specified at 27 deg.C.	
5.2	Battery Type	SMF,VRLA with chargers of conventional type	
5.3	Voltage/cell	2 volts	

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5.4	Capacity of Batteries	21 AH,10Amps	
5.5	Connecting cables	Cable size selection should provide the lowest voltage Drop possible between battery system and operating Equipment.	
5.6	Method of charging	Constant voltage method and current limit(variable Current)	
5.7	Efficiency	Not less than 90% at full rated load	
6	**Battery Charger Rating**		
6.1	Battery Charger type	Constant Voltage and Current limiting charger. **Charger with inbuilt battery health monitoring is highly preferable**.	
6.2	Charger Input Voltage	Single phase (2 wire) voltage 250V AC +30% to -20% Frequency 50Hz ± 5%..	
6.3	**Charger Output**		
6.3.1	Regulation	± 1%	
6.3.2	Charger current	10 Ampere	
6.3.3	Efficiency	Not less than 85% at full rated load	
6.3.4	Current limit	110% of rated load	
6.3.5	Insulation	Not less than 5 mega Ohms. i. between DC output terminals and AC input terminals. ii. Between AC input terminals and earth	
6.3.6	Indication	The charger shall have suitable indicators to visually know its mode of operation. Charger indication as below must be available: Mains on (Red LED) , Charger on (Yellow), Boost on (Yellow LED), Float on (Green LED) and Battery reverse polarity (Red LED), O/p DC fuse blown (Red/ LED) LED lamp indication.	

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		(LED colours can be changed)	
6.3.7	Protection	Input single pole MCB's for AC & DC of 10 Amperes separate for battery & charger. The battery charger must include protections like: i) AC input MCCB & ELBS with input ON/OFF switch and fuses/ contactor. ii) DC output MCCB with output ON/OFF switch and fuses. iii) Current limit protection, soft start feature, surge suppressor. iv) Fast semiconductor fuses for rectifier bridge. v) Charger over load / short circuit vi) Battery polarity reverse, Battery Over/Under voltage, Charger rectifier fail, etc.	
6.3.9	Battery & charger Alarms	Potential free contacts must be available to integrate with SCADA for abnormality if any. Most preferred alarms are like: AC supply fail DC supply fail Battery Low Battery Fail Battery Charger fail Battery polarity reverse	
6.3.8	Cooling	External exhaust fan(Optional)	
6.4	Climate	Must able to operate efficiently considering hot & humid climate of Mumbai, India region. The battery shall be capable of operating satisfactorily in outdoor applications when it is housed in a Cubicle between 10 deg. C and 65 deg.C and in locations where the relative humidity	

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		between 30% to 100%	
6.5	Wiring	The internal wiring of the charger shall be carried out with PVC insulated 650V grade standard copper conductor. The control wiring shall be carried out with 2.5 Sq.mm copper conductors.	
6.6	Accessibility	All the important components of the charger must be easily accessible for maintenance, repair, replacement in case of trouble without giving interruption to total D.C. supply as far as possible.	
6.7	**Test**		
6.7.1	ACCEPTANCE AND ROUTINE TESTS	All acceptance and routine tests as stipulated in the relevant standards shall be carried out by the bidder. The test certificates are to be furnished for approval.	
6.7.2	Acceptance test for battery charger with batteries	1. Marking 2. Verification of dimensions. 3. Regulation test. 4. Ripple test, 5. Megger values and HV Test. 6. Test for battery discharge capacity.	
6.7.3	Type Tests:	Following shall constitute type tests in respect of chargers and batteries. 1. Insulation resistance 2. High voltage test at 1.5KV for 1 minute 3. Regulation (Load & Line) 4. Dry heat test at 55°C for 16 hrs with full load on as per IS: 9000 part 3/Sec5/1977. 5. Damp heat test at 55°C and at 95% RH for two cycles as per IS: 9000 part 5/Sec1/1981	

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		6. Cold test at -10°C for 4 hrs as per IS: 9000 part 2/Sec4/1977	
7	Drawings	Detailed drawings, circuit details and technical literature of batteries shall be enclosed to the offer. Tenders not accompanied by the above are liable for rejections, Trouble shooting charts shall be supplied with each unit to trace faults in the charger with voltage and Resistances to be measured at various test joints.	
8	painting	The box shall be painted with powder coating with siemens grey colour.	
9	Guarantee	The batteries supplied must have guarantee for a period of minimum 36 months from date of supply. The Battery Charger supplied should have the guarantee for a period of minimum 60 months from the date of supply. The replacement of both must be supplied within 15 days of complaint raised.	

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AGREED TERMS & CONDITIONS (ATC)- Indigenous Supply

Bidder's Name: M/s. _____

RFQ ref. No. CC25VJS021

Enquiry Description: OLA for Supply of FRTU for Mumbai Distribution

Bidder's Offer Ref.: *<pls mention your offer reference no here>*

1. SUBMISSION OF THIS DOCUMENT DULY SIGNED, SHALL CONSTRUE THAT ALL THE CLAUSES OF AGREED TERMS AND CONDITIONS HAVE BEEN ACCEPTED BY YOU. PURCHASE ORDER, IF ANY, SHALL BE GOVERNED BY THE CONFIRMATION PROVIDED HERE.

S. No.	Description	BIDDER'S RESPONSE
A	**TECHNICAL**	
1	Acceptance of technical specifications / scope of work including General/Technical notes as per Tender specification **In case of deviation, confirm that the same has been furnished separately.**	
2	Confirm data sheets duly filled in have been submitted, wherever required as requested in Technical specification/ Scope of work	
B	**COMMERCIAL**	
3	**Bid Validity** Confirm Bid Validity 180 days from date of bid submission.	
4	**Firm price:** No Price Variation is applicable on this tender	
5	**Delivery Terms** Confirm delivery terms DAP (FOR) basis for any spares/consumables	
6	**Packing & Forwarding** Confirm that Packing & Forwarding charges including Special Packaging Requirement (if applicable) are included in base price	
7	**Freight Charges** Confirm that Freight charges are included in base price	
8	**Taxes and duties:** GST: __% HSN/ SAC Code: Any other tax as applicable:	
9	**Price Reduction / LD / SLA**: Confirm that Bidder agrees to the LD charges as specified in GCC Supply	
10	**Delivery Period:** Mention the delivery timelines from the date of order	
11	**Payment Terms Acceptance:** Confirm acceptance to the Payment terms as specified in GCC Supply.	
12	**Warranty / Latent Defect Liability Period:** Confirm that Bidder agrees to the clause as specified in Technical specs	
13	**Contract Performance Bank Guarantee**: Confirm acceptance to Submission of Unconditional Bank Guarantee as per GCC Supply.	

S. No.	Description	BIDDER'S RESPONSE
14	**Testing and Inspection charges (if applicable):** Confirm the quoted are Inclusive of all testing and inspection charges as per Tender specification	
15	**Compliance to other terms & conditions** Acceptance of all other terms & conditions as forming the Part of the RFQ/ Tender document and communicated vide subsequent addendum(s) if any: **In case of deviation, confirm that the same has been furnished separately.**	

*Bidders / Vendor shall note that in case of any contradiction between the Agreed Terms and Conditions (ATC); and the Bidders offer, the ATC shall prevail.

Bidder's Authorised Signatory and stamp:

Name:

The Tata Power Company Limited is hereunder referred to as the "Purchaser" or "Company". The person, firm or company selling the goods, the subject of this purchase order is referred to as "Vendor" or "Contractor". The subject of this purchase order is hereinafter referred to as the "Material(s)"or "Goods".

The Contract shall mean the contract as derived from the following:

1. Purchase Order (with 'Commercial Notes' and Annexures to the Purchase Order referred thereon)
2. Technical Specifications.
3. General Terms & Conditions

The documents including all reference document (s) and Annexures forming the Contract are to be read together as a whole and are to be taken as mutually explanatory.

1. Price:

Unless otherwise specifically stipulated, the price shall be firm and shall not be subject to escalation for any reason till the validity of this Contract.

Unless otherwise specifically stipulated, the price shall be inclusive of road/ rail worthy water-proof packing & forwarding charges up to effecting delivery at FOT/ FOR despatch point, GST and shall also be inclusive of inland freight, terminal taxes and entry taxes as leviable on the transportation or entry of goods into any local area limits pursuant to the Contact.

2. Taxes and Duties:

2.1 The Contract Price shall be inclusive of all taxes, duties, including but not limited to GST or any local taxes, levies imposed by State/Central/Local governments

2.2 Taxes as mentioned in the Contract Price or Price Schedule shall be paid to the contractor subject to the Contractor complying with all the statutory requirements and furnishing the relevant documents including error free invoices containing detailed break-up of the taxes

2.3 However the payment of GST or local levies shall be restricted to the total amount as indicated in the price schedule.

2.4 Any duties, levies or taxes not mentioned in Contract Price or Price Schedule but applicable as per any statute (s) shall be deemed to be included in the Contract price and shall be to the account of the Contractor.

2.5 Any statutory variation in duties, levies or taxes if applicable and specified in this Contract till the scheduled date for supply of Goods and limited to direct invoices of the Contractor shall be to the account of Purchaser. The Contractor shall have the obligation to provide the necessary documentary evidence / supporting by way of gazetted notifications etc. to prove the change in such levies or taxes between the due date of submission of the Bid and the scheduled date of supply of goods to claim the difference.

2.6 The Contractor shall pass on to the Purchaser all the benefits of either reduction in tax rates, exemptions, concessions, rebate, set off, credits etc. or introduction of new tax rates exemptions, concessions, rebate, set off, credits etc. pertaining to all taxes, duties, imposts, fees and levies in respect of the supplies of Goods or performance of obligations under the contract. This would specifically include reduction of tax rates as a result of statutory changes or judicial rulings.

2.7 Any other taxes, levies and duties not mentioned in Contract Price or Price Schedule but applicable as per any statute (s) or introduction (omission) of new taxes, levies and duties shall be deemed to be included in the Contract Price and shall be to the account of the Contractor.

2.8 For facilitating availment of a credit, set-off, rebate, drawback or like benefit available to the Purchaser, the Contractor will facilitate the Purchaser by providing the necessary documentary and/or procedural support. In any process of assessment or re-assessment, of taxes payable by the Purchaser. Wherever expressly agreed the purchaser would provide the statutory form 'C' to the seller for availing the concessional rate of Central sales tax.

2.9 The Contractor shall bear and pay all the costs, liabilities, levies, interest, penalties in respect of non-compliances of any legal requirements as per various statutory provisions. The contractor shall keep the owner indemnified at all times from any tax liability, interest, penalties or assessments that may be imposed by the statutory authorities for non-compliances or non-observation of any statutory requirements by the Contractor.

2.10 Purchaser shall pay the invoices to the Vendor after necessary deductions as prescribed under the applicable law, income – tax or other

deductions under the State Tax laws as may be applicable to the Contract.

3 Packing details:

Packing details: The material must be packed in suitable packing to suit the mode of transport and to ensure its safe receipt at point of delivery. Any damage to material noticed at the time of delivery at site, due to improper packing or any other reason whatsoever shall be the responsibility of the Vendor. Such damaged goods shall be replaced within 14 days from intimation from the Purchaser.

4 Transportation and Unloading at Site:

The Vendor shall deliver the Material(s) at site/ Stores as per the delivery address specified in the Purchase order. The unloading at delivery shall be organised by the Purchaser unless otherwise specified. The receipt of the material/ equipment is subject to inspection and rejection if Material(s) is found unsatisfactory or any of the clauses under this purchase order are violated.

5 Insurance:

Unless otherwise specified, Purchaser will be responsible to obtain transit insurance for the Material(s). The Vendor shall intimate the Order Manager (as mentioned in the Purchase Order) along with Invoice, packing list, the Railway Receipt/Truck or Lorry Receipt etc. immediately after the consignment is booked, at the e-mail id mentioned in the Purchase order.

6 Payment Terms:

100% payment shall be made within 60 days from the receipt and acceptance of the material at the Consignee Stores/ Site/ Location as per the Contractual terms and conditions herein.

7 Bills and invoice:

The tax invoices should contain the details to comply with the GST Law. The supplier shall:

i) Furnish (electronically) and communicate to the Owner, the details of Goods or Services supplied by the 10th of the month succeeding the said tax period,
ii) Upon discovery of any discrepancy, rectify it and shall pay the tax and interest thereof,
iii) Furnish the returns (electronically), for the inward and outward supplies of Goods and/or Services, before the specified dates as per the GST Law,
iv) Communicate the tax paid, credits etc. as and when credited.
v) The Invoice should clearly state the description of the goods, quantity, sale price, tax %, and tax amount;
vi) The Invoice should be signed by an Authorized Signatory.

Bills/Invoices in the name of The Tata Power Company Ltd. with packing lists in triplicate shall be forwarded along with the equipment.

Contractor to furnish GST Registration no. in all invoices as well as Purchaser's (Tata Power's) GST no.

8 Transfer of Title and risk:

The transfer of property and risk of Material(s) shall be deemed to take place as follows:

a. For delivery F.O.R. or F.O.T. despatch point: Transfer of property on handing over the Material(s) to the carrier against receipt of clean Railway Receipt/Truck or Lorry Receipt and such receipt having been handed over to Purchaser. However, the risk of loss shall pass to the Purchaser on delivery of goods at the specified destination.

b. In case the Material(s) are procured by the Vendor from sub-vendors on receipt of duly endorsed documents of title to the goods.

9 Contract Performance Bank Guarantee (In case applicable):

9.1 The Vendor shall within 15 days of issue of this Purchase Order furnish an unconditional irrevocable bank guarantee duly stamped and strictly as per the prescribed format of the Purchaser from any nationalized bank or any scheduled bank having a branch in Mumbai and approved by the Purchaser for a sum equivalent to 10% of the Total value of Order valid for a period not less than 6 months from the expiry of the Warranty period.

9.2 Irrespective of the performance demonstrated as part of the Factory Acceptance Tests Take-over tests / Performance Tests etc, the Purchaser may call for re-validation of performance of the system during the performance guarantee period by conducting fresh performance tests if in its opinion, the

system is not able to deliver the designed performances based on its operational performance results. If the equipment fails to prove the performance during such performance tests, the Purchaser may allow the Vendor to either rectify the system by addition / modification of equipment etc at the Vendor's costs & risk to restore the performance levels. Failure to rectify the system to achieve the designed performance levels may result in imposition of penalties including revocation of the Performance Bank Guarantee and forfeiture of the entire amount under the Performance Guarantee.

9.3 In case the Vendor fails to furnish the requisite Bank Guarantee as stipulated above, then the Company shall have the option to terminate the contract besides other contractual remedies.

10 Price reduction:

10.1 The Vendor agrees that time of supply of Material(s) is of prime importance.
If the Vendor fails to supply Material(s) before the respective scheduled / fixed date for supply. Company may without prejudice to any other right or remedy available to the Company: -

10.1.1 Recover from the Vendor ascertained and agreed, genuine pre-estimate liquidated damages, and not by way of penalty, a sum equivalent to 1% (of total value of order) per week or part thereof for each week's delay, beyond the scheduled supply date each subject to maximum of 10% of the total order value, even though the Company may accept delay in supply after the expiry of the scheduled supply date. The Company may, at its discretion, set off the aforesaid amounts from any other amounts owed by the Company to the Vendor or recover such amounts in other manner as may be permissible under applicable laws.

10.1.2 Arrange to get supply from elsewhere on account and at the sole risk of the Vendor, such decision of the Company being final and binding on the Vendor; or

10.1.3 Terminate the contract or a portion of supply of the supply work thereof, and if so desired, arrange for the supply in default by the Vendor to be attained from elsewhere at the sole risks and costs of the Vendor.

10.2 Liquidated damages for performance shortfall (if applicable) shall be specified in the Technical Specifications.

10.3 The Liquidated Damages referred in this clause 10 may be recovered by the Company from the Vendor as set off against any monies owed by the Company to the Vendor or in any other manner permissible under applicable laws.

11 Warranties:

11.1 Materials and Workmanship: Vendor shall fully warrant that all the stores, equipment and component supplied under the order shall be new and of first class quality according to the specifications and shall be free from defects (even concealed fault, deficiency in design, materials and workmanship).

11.2 Should any defects be noticed in design, material and/or workmanship within 12 months after the Material(s) or any portion thereof as the case may be have been commissioned or for 24 months from the date of delivery, whichever period concludes earlier. Purchaser shall inform Vendor and Vendor shall immediately on receipt of such intimation, depute their personnel within 7 days to investigate the causes of defects and arrange rectification/ replacement/modification of the defective equipment at site, without any cost to Purchaser within a reasonable period. If the Vendor fails to take proper corrective action to repair/replace defects satisfactorily within a reasonable period, Purchaser shall be free to take such corrective action as may be deemed necessary at Vendor's risk and cost after giving notice to the Vendor, including arranging supply of the Goods from elsewhere at the sole risk and cost of the Vendor.

11.3 In case defects are of such nature that equipment shall have to be taken to Vendor's work for rectification etc., Vendor shall take the equipment at his costs after giving necessary undertaking or security as may be required by Purchaser. After repair Vendor shall deliver the equipment at site on freight paid basis. Any taxes applicable in relation to this repair shall be to the Vendor's account. All risks in transit to and fro shall be borne by the Vendor.

11.4 Equipment or spare parts thereof replaced shall have further warranty for a period of 12 months from the date of acceptance.

12 Quality, Testing, inspection, installation:

12.1 All Material(s) supplied under this Contract shall be new and unused.

12.2 Wherever a specific Quality Assurance Plan is provided with the Request for Quotation (RFQ) or agreed as part of the commercial/ technical discussions, the same shall be binding on the Vendor.

12.3 The material shall be inspected

a. At consignee end by Purchaser.

b. At factory premise of the Vendor/ sub-vendor by Purchaser or third party duly nominated by Purchaser. The Vendor shall extend all necessary co-operation to Purchaser/ third party inspector carrying out the inspection. The Inspector(s) shall have the right to carry out the inspection or testing, which will include inspection and testing of the raw materials at manufacturers shop, at fabricators shop and at the time of actual despatch before and/or after completion of packing.

12.4 The Vendor will inform Purchaser at least eight (8) days in advance of the exact place, date and time of tendering the Material(s) for required inspection and provide free access to the Inspector(s) during normal working hours at Vendor's or his/ its sub-Suppliers works, and place at the disposal of the Inspector(s) all useful means for undertaking the Inspection, checking the results of tests performed, marking the Material(s), getting additional tests conducted and final stamping of the Material(s).

12.5 Even if the inspection and tests are fully carried out, the Vendor shall not be absolved from its responsibilities to ensure that the Material(s), raw materials, components and other inputs are supplied strictly to conform and comply with all the requirements of the Contract at all stages, whether during manufacture and fabrication, or at the time of Delivery as on arrival at site and after its erection or start up or consumption, and during the defect liability period. The inspections and tests are merely intended to prima facie satisfy Purchaser that the Material(s) and the parts and components comply with the requirements of the Contract.

12.6 *All costs associated with the inspection shall be included in cost of Material(s).*

12.7 Original material test certificate/ performance test certificate/ fitment certificate/ test reports etc. relevant/ applicable as per the specifications/ standards shall be dispatched along with the material supply failing which the material may be rejected.

13 Rejection:

13.1 Rejected goods shall be removed and replaced within 14 days of the date of communication of rejection.

13.2 Claim in respect of breakage/shortages in any cases shall be referred on the Vendor within ninety (90) days from the date of receipt of Goods by the Purchaser which shall be replaced/made good by the Vendor at his own cost. All risk of loss or damage to the material shall be upon the Vendor till it is delivered to the purchaser/consignee.

14 **General Indemnity:**

The Vendor shall indemnify and keep the Purchaser indemnified from and against any and all claims, costs, liabilities (financial), litigations, compensations, judgments, expenses or damages (including attorney's fees and other related expenses) arising out of any breach or alleged breach of any of the conditions of this Contract, performance of the obligations hereunder, or any representation or misrepresentation made by the Vendor or any third party with regard to the subject of this Contract.

15 **Indemnity against IPR:**

The equipment, system, drawings, and other materials that shall be supplied against the order will become the Purchaser's property. Without limitation of any liability of whatsoever nature, the Purchaser shall be indemnified and kept indemnified against any claim for infringement or breach of any of the statues, rules & regulations by the use of or sale of any article or material supplied by the Vendor. The indemnity shall include any infringement of patent, trade mark, design, copyright or other property rights whether in Country of Origin, or elsewhere resulting from the Vendor's design, manufacture, use, supply or re-supply & would also cover use or sale of any article or material supplied by the Vendor to the Purchaser under the Purchase Order. The Indemnity shall cover any claim/action taken by a third party either directly against the Purchaser or any claim/action made against the Vendor & where under the Purchaser is made liable. The

Indemnity shall be for losses, damages, and costs including litigation costs, attorney fees etc incurred by the Purchaser in relation to the Purchase Order.

16 Latent Defects Liability period (if applicable):

Notwithstanding the inspections, acceptance tests, quality checks etc carried out by the Vendor and witnessed/accepted by the Purchaser, the Vendor shall further warrant the equipment for any latent defects in its design, material or workmanship against the specifications set forth and shall make good any such defects by way of repair or replacement of the part or whole of the defective product at its own cost & risks as and when such latent defects are observed and intimated by the Purchaser and intimated to the Vendor within 36 months of completion of warranty period.

17 Force Majeure:

17.1 In the event of either party being rendered unable by force majeure to perform any obligation required to be performed by it under this Contract the relative obligation of the party affected by such force majeure shall, after notice under this articles be suspended for the period during which such cause lasts. The term 'Force Majeure' as employed herein shall mean acts of God, wars (declared or undeclared), riots or civil commotion, fire, floods, and acts and regulations of the Government of India or State Government or any of the statutory agencies. Both the party shall pay to the other party, the amount payable upon the date of the occurrence of such force majeure.

17.2 Upon the occurrence of such cause and upon its termination, the party alleging that it has been rendered unable as aforesaid, thereby shall notify the other party in writing immediately but not later than twenty four (24) hours of the alleged beginning and ending thereof giving full particulars and satisfactory evidence in support of the claims.

17.3 During the period, the obligations of the parties are suspended by force majeure, the contractor shall not be entitled to payment of any rate.

17.4 In the event of the force majeure conditions continuing or reasonably expected to continue for a period more than thirty (30) days, Purchaser shall have the option of terminating the contract by giving seven (7) days notice thereof to the contractor.

18 Variation:

Except for any provisions in this Purchase Order, any change /modification to the terms and conditions of this Order can be issued only by Purchaser or with the prior written approval from Purchaser.

19 Termination

19.1 The Contract shall be deemed to be terminated on completion of delivery of Material(s)

19.2 Termination of Default by Vendor:
Purchaser may terminate the contract at any time if the Vendor fails to carry out any of his obligations including timely delivery under this Contract. Prior to termination, the Vendor shall be advised in writing of the causes of unsatisfactory performance to be improved upon 15 days of the receipt of notice. In case, if the Vendor fails to bring about the improvement to the satisfaction of the Purchaser, then the order shall be terminated.

19.3 Without prejudice to the rights and remedies available to Purchaser, Purchaser may terminate the Contract or part thereof with immediate effect with written notice to the Vendor if,:

19.3.1 The Vendor becomes bankrupt or goes into liquidation.

19.3.2 The Vendor makes a general assignment for the benefit of creditors.

19.3.3 A receiver is appointed for any substantial property owned by the Vendor.

19.3.4 The Vendor has misrepresented to Purchaser, acting on which misrepresentation Purchaser has placed the Purchase Order on the Vendor.

The Vendor/ Contractor shall not be entitled to any further payment under the Contract if the Contract is terminated. If the order is terminated under clause 19.2 and 19.3, the Vendor shall not be entitled to any further payment, except that, if Purchaser completes the supply of Material(s) and the costs of completion are less than the Total Order value, the Purchaser shall pay Vendor an amount properly allocable to supply of Material(s) fully performed by Vendor prior to termination for which payment was not made to Vendor. In case, the cost of completion of Material(s) exceed the total Order value, the additional cost incurred by Purchaser for such completion shall be paid by the Vendor.

19.4 Purchaser shall be entitled to terminate the Contract at it's convenience, at any time by giving thirty (30) Days prior notice to the Contractor. Such notice of termination shall specify that termination is for Companies convenience and the date upon which such termination becomes effective. Upon receipt of such notice, the Contractor shall proceed as follows:

19.4.1 cease all further work, except for such work as may be necessary and instructed by the Company/ Company's representative for the purpose of protecting those parts of the supplies already manufactured;

19.4.2 stop all further sub-contracting or purchasing activity, and terminate Sub-contracts;

19.4.3 handover all Documents, equipment, materials and spares relating to the supply of goods prepared by the Contractor or procured from other sources up to the date of termination for which the Contractor has received payment equivalent to the value thereof; and

19.4.4 handover those parts of the supplies manufactured by the Contractor up to the date of termination.

Upon termination pursuant to clause 19.4, the Vendor shall be entitled to be paid the full value on the Material(s) delivered in accordance with the Contract.

19.5 The Contractor shall not be released from any of his obligations or liabilities accrued under the Contract on termination. For the avoidance of doubt, the termination of the Contract in accordance with this clause shall neither relieve the Contractor of his accrued obligations for Warranty or his accrued liability to pay (liquidated) damages for Delay nor shall entitle him to reduce the value of Performance Security.

20 Sub letting and assignment:

The contractor shall not without prior consent in writing of the Purchaser, sublet, transfer or assign the contract or any part thereof or interest therein or benefit or advantage thereof in any manner whatsoever, provided nevertheless that any such consent shall not relieve the contractor from any obligation, duty or responsibility under the contract.

21 **Dispute Resolution**:

Dispute or differences arising out or relating to this Order shall be resolved amicably by the parties. Failing such amicable resolution of dispute / differences either party may refer the matter to arbitration of a Sole Arbitrator to be appointed jointly by both the parties. The award of the Arbitrator shall be final, binding and conclusive on the parties. The venue for arbitration shall be Mumbai. The Arbitration proceedings will be governed and regulated by the provisions of Indian Arbitration and Conciliation Act, 1996 as amended from time to time and the rules framed there under.

22 Governing laws

This Contract shall be construed in accordance with and governed by the Laws of India without giving effect to any principle of conflict of law.

23 Jurisdiction

This Contract and the transaction contemplated herein shall be subject to the exclusive jurisdiction of the competent Courts in Mumbai only.

24 Limitation of Liability

Notwithstanding anything contained in the Contract, the Contractor's aggregate liability under this Contract shall be limited 100% of the Total order value. This shall however, exclude liability arising pursuant to clause 2.8- tax indemnity, clause 14- General Indemnity, clause 15- Indemnity against IPR, clause 25 – Confidentiality and liabilities arising due to wilful misconduct, gross negligence, third party claims and corrupt acts attributable to the Vendor.

25 Confidentiality:

The Vendor shall use the Confidential Information of the Purchaser only in furtherance of this Contract and shall not transfer or otherwise disclose the Confidential Information to any third party. The Vendor shall (i) give access to such Confidential Information solely to those employees with a need to have access thereto; and (ii) take the same security precautions to protect against disclosure or unauthorized use of such Confidential Information that the party takes with its own confidential information but, in no

event, shall a party apply less than a reasonable standard of care to prevent such disclosure or unauthorized use.

26 Consequential Damages:

Unless otherwise specified, neither Party shall be responsible for and nor shall be liable to the other Party for indirect/consequential losses and damages suffered by such Party including for loss of use, loss of profit whether such liability or claims are based upon any negligence on the part of the other Party or its employees in connection with the performance of the Purchase Order.

27 New Legislation (The Micro, Small and Medium Enterprise Development Act 2006)

a. This Act has been enacted and made effective from 2nd October 2006. The Interest on Delayed Payments to Small Scale and Ancillary Industrial Undertaking Act, 1993 is repealed.

b. Vendor is requested to inform the purchaser if vendor fall under The Micro, Small and Medium Enterprises Development Act, 2006 legislation and provide the purchaser, registration number and date to enable purchaser to take necessary care. The vendors are also requested to mention the same on their invoice / bill.

28 Relation between parties:

The Purchase Order shall be entered into on a principal-to-principal basis only. The Purchase order shall not be construed as a partnership or an association of persons. There is no agent and principal relationship between the parties. Each party shall be responsible for its own conduct. The Vendor shall ensure at all times that all the work carried out under this contract either by its own person or through any of its sub-Vendors shall be always done under its own direct supervision.

29 Environment / ISO 14001 Certification:

The Vendor to confirm whether their organization is ISO 14001 certified. If not, the Vendor must certify that the handling, use and disposal of their product / by-products conform to practices consistent with sound environmental management and local statutes. The Vendor shall ensure that all the wastes are disposed in environmental friendly way with strict compliance to applicable laws including adherence to MoEF guidelines with respect to disposal of batteries, lead waste, copper cables, ash, waste oil, e-waste etc which shall be disposed through MoEF approved parties only. The Vendor shall also be responsible to collect and recycle all the e-waste generated at the end of the product life cycle at its own costs and risks as per the MoEF guidelines/ orders.

30 Tata Code of Conduct

The Purchaser abides by the Tata Code of Conduct in all its dealing with stake holders and the same shall be binding on the Purchaser and the Vendor for dealings under this Purchase Order. A copy of the Tata Code of Conduct is available at our website: http://www.tatapower.com/aboutus/code-of-conduct.aspx. The Vendor is requested to bring any concerns regarding this to the notice of our Chief Ethics Officer on the e-mail ID: cecounsellor@tatapower.com.

31 Responsible Supply Chain Management:

The Purchaser is committed for a cleaner environment and respect of Human rights through its Responsible Supply Chain Management policy. The Vendor is required to comply with all the environment & Human rights related laws, including emission norms, Labour and environmental regulations. The Purchaser encourages its Vendors/ Contractors/ Business partners to pay more attention to green design, green supply, green production, green logistics and green packaging in performing their business obligations.

The Vendor is required to abide by the Tata Power Corporate Environment policy, Energy Conservation and Corporate Sustainability Policy.

A copy of the Responsible Supply Chain Management Policy along with Environment policy, Energy Conservation policy, Sustainability policy, Health & Safety policy and Human Rights policy is available at website: http://www.tatapower.com/sustainability/policies.aspx.

Vendor/Bidder is required to completely fill the attached "Supplier Sustainability Questionnaire" in support of their Green Supply Chain Management initiatives and submit the same with their offer.

The Owner recognizes that diversity in the workplace positively impacts business. The Owner is committed to help people from SC/ST background either by helping them to become entrepreneurs or by engaging workforce from SC/ST community under the contracts agreed herein. To encourage engaging SC/ST community, the owner may consider on the merit to incentivize the Contractor by paying additional 1% of the service contract portion if the number of SC/ST workforce engaged in the contract exceeds 30% of the total deployed strength and 2%, if the strength goes beyond 50%. While the Contractor will assist the workforce so engaged to become self-reliant in meeting the work expectation, the Owner may also volunteer its training resources to the extent possible to improve their employability. The Contractor shall maintain the proper documentation of such category of the workforce engaged and the owner may consider to pay the incentive after its verification.

The Owner may also consider extending price preference of 5% in the bid evaluation for an order value up to Rs.50 Lacs, provided the company is owned by a person from SC/ST community having minimum 50% holding in the company.

32 Vendor rating

You are requested to ensure compliance to the terms of the individual orders with regards to timely delivery, provision of all applicable documents / challans / test certificate, quality of the material etc. Your performance with respect to the said factors will be taken into consideration for future business.

33 Vendor Feedback:

33.1 In this dealing Vendors feedback is important for the purchaser to improve its processes. If vendor have to report any grievance, problem or require any clarification, information, vendor is requested to contact purchaser at email ID: CC_CUSTOMERFEEDBACK@tatapower.com

33.2 Vendor is requested to ensure compliance to the terms of the individual orders with regards to timely delivery, provision of all applicable documents / challans / test certificate, quality of the material etc. Vendor performance with respect to the said factors will be taken into consideration for future business.

34 Non-Waiver:

Failure of Purchaser or its representatives to insist upon adherence to any of the terms or conditions incorporated in the Contract or failure or delay to exercise any right or remedies herein or by law accruing, or failure to promptly notify the Vendor in the event of breach or the acceptance of or the payment of any Material(s) hereunder or approval of any design or Material(s) shall not release the Vendor and shall not be deemed a waiver of any right of Purchaser to insist upon the strict performance thereof or of any of its rights or remedies as to any such Material(s) regardless of when the Material(s) are shipped, received or accepted not shall any purported oral modification or revisions of the Contract by Purchaser or its representative(s) act as waiver of the terms hereof.

35 **Repeat Order**:

Purchaser may place the repeat order for 100% of ordered quantities within a span of 6 months from the date of issue of this Purchase Order & Vendor shall execute it at same rates, terms and conditions.

36 Severability

If any provision of this Contract is invalid, unenforceable or prohibited by law, this Contract shall be considered divisible as to such provision and such provision shall be inoperative and shall not be part of the consideration moving from any Party hereto to the others, and the remainder of this Contract shall be valid, binding and of like effect as though such provision was not included herein.

ESG FRAMEWORK FOR BUSINESS ASSOCIATES

Tata Power's Sustainability philosophy sits at the core of its Business Strategy. Tata Power Sustainability Model has an overarching objective of 'Leadership with care' with key elements of 'Care for the Environment'; 'Care for the Community'; 'Care for our Customers / Partners' and 'Care for our People'. These sustainability objectives encompass the Environmental, Social and Governance objectives driven as integrated elements.

Tata Power, together with its stakeholders is determined to achieve sustainable growth while creating shared value for all.
As a part of future ready roadmap, Tata Power has targeted following as our Environment, Social and Governance priorities:

- Being Carbon Net Zero before 2045
- Growing Clean capacity (80% by 2030)
- Customer centricity
- Becoming water neutral before 2030
- Achieving zero waste to landfill before 2030
- No net loss of biodiversity before 2030
- Positively impacting 80 million lives by 2027

In order to create a sustainable business ecosystem, Tata Power expects that all its Business Associates (BA) which includes its suppliers, vendors, consultants and service providers to align to its ESG and sustainability commitments.

Tata Power encourages improved efficiencies and scaling up of green initiatives through technology and innovation taking us farther on the journey of reducing carbon emissions and preparing the entire eco-system towards products and services that would have net positive impact on the environment and communities that we operate in.

The Vendors/ bidders wishing to associate with Tata Power are expected to share their own sustainability and ESG journey. We at Tata Power promote all Business Associates to have a sustainable procurement policy for their supplier and service providers to contribute to our integrated approach in achieving a sustainable supply chain. The BA is encouraged to carry out the assessment of their sub-contractors and sub-vendors on sustainability readiness so that they are aware of the expectation/ business requirement.

The Vendor/ Bidder shall fill-in the 'Environment, Social and Governance Compliance Screening Questionnaire for Business Associates' attached at Annexure-I and submit the same along with the Bid in Ariba online platform.

Responsible Supply Chain Management:

Tata Power is committed for a cleaner environment and respect of Human rights through its Responsible Supply Chain Management policy.
Tata Power Business Associate (BA) shall comply with all the environment & Human rights related laws, including emission norms, Labour and environmental regulations.

Tata Power encourages its BA to focus on green design, green supply, green production, green logistics and green packaging in performing their business obligations. The BA is expected to abide by the Tata Power Corporate Environment policy, Energy Conservation and Corporate Sustainability Policy (enclosed with this document as Annexure-II).

The BA is expected to:

- Strive towards Conservation of Energy, Water, Resources and optimize transportation of Men & Materials to minimize environmental impact and reduce carbon footprint.
- Carry out the assessment of materials used for construction, operation & maintenance, consumables and accordingly phase out those materials which are environmentally hazardous.
- Be cognizant that diversity in the workplace positively impacts business.
- Promote affirmative action by supporting people from SC/ ST background by engaging workforce from SC/ ST community under the contracts agreed herein.
- Share the commitment of 'No child labour', 'No forced labour', Non-discrimination on the basis of caste, colour, religion, gender, disability, maternity or pregnancy or any other factor unrelated to the requirements of the job
- Pay the wages or remuneration to the workforce, personnel deployed in compliance to all applicable laws and regulations.
- Provide its employees/ deployed labor with an employment environment that is free of physical or psychological harassment.
- Carry out the assessment of their Sub-contractors on their Sustainability Readiness so that they are aware of the above expectation/ standards
- To ensure usage of suitable package material which is more environmentally sustainable. Further the packing material shall be recycled to the extent possible. The material used for packing is expected to suit the mode of transport and to ensure its safe receipt at point of delivery.

Waste Disposal:

The BA is expected to follow best practices for disposal of waste, few of which are listed below:

- Have a detailed project plan that includes the waste management, segregation of all designated waste material (Recyclable/ Non-Recyclable), collecting, storing, disposing and transferring the same to pre-arranged facility/ destination in timely and safe manner as per environmental legislations. The project plan shall also include the innovative construction practice to eliminate or minimize waste, protect surface/ground water, control dust and other emissions to air and control noise.

- Have purchase policy to encourage the procurement of material with recycled and minimum packaging of goods during delivery and appropriate means for site-to-site transportation of materials to avoid damage and litter generation.

- Ensure that the residents living near the site are kept informed about proposed working schedule and timings/ duration of any abnormal noise full activity that is likely to happen.

- Ensure the regular maintenance and monitoring of vehicles and equipment for efficient fuel use so that emissions and noise are within acceptable limits to avoid air pollution.

Water Management:

The BA is expected to follow best practices for water management, few of which include a management and monitoring system for water withdrawals and consumption, procedures to reduce water usage or reuse/recycle water, and pretreatment of wastewater before disposal.

Compliance to Law:
The BA shall adhere to responsible business practices and comply with the provision of all the Statutory Acts Applicable. Special attention of the BA is drawn towards the compliance of provision of the following statues: (along with the latest amendments/additions, as applicable):

- The Child Labour (Prohibition and Regulation) ACT, 1986.
- The Contract Labour (Regulation and Abolition) ACT, 1970.
- The Employee's Pension Scheme, 1995.
- The Employee's Provident Funds and miscellaneous provisions Act, 1952.
- The Employees State Insurance Act, 1948.
- The Equal Remuneration Act, 1976.
- The Industrial Disputes Act, 1947.
- The Maternity Benefit Act, 1961.
- The Minimum Wages Act, 1948.
- The Payment of Bonus Act, 1965
- The Payment of Gratuity Act, 1972.
- The Payment of Wages Act, 1936.
- The Shops & Establishment Act, 1954.
- The Workmen's Compensation Act, 1923.
- The Employer's Liability Act, 1938.
- and any other applicable statutory act

Social Accountability (SA 8000):

Tata Power expects its BAs to follow guidelines of SA 8000:2014 on the following aspects

- Child Labour
- Forced or Compulsory Labour
- Health & Safety
- Freedom of Association & Right to Collective Bargaining
- Discrimination
- Disciplinary Practices
- Working Hours
- Remuneration
- Management System

Health and Safety

The BA is expected to ensure the health and safety of his and his Sub-contractor’s staff and labour. The BA shall, in collaboration with and according to the requirements of the local health authorities, ensure that medical staff, first aid facilities, sick bay and ambulance service are available at the accommodation and on the Site at all times, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics. The BA shall maintain records and make reports concerning health, safety and welfare of persons deployed, and damage to property, as the Owner’s Representative may reasonably require. The BA shall be responsible for the medical treatment / hospitalization of his and his Sub-contractor’s staff/ labour.

The BA shall appoint a qualified Safety officer at the Site to be responsible for maintaining the safety, and protection against accidents, of all personnel on the Site. Such Safety officer shall have the authority to issue instructions and take protective measures to prevent accidents.

The BA shall comply in toto with the Tata Power's Contractor Safety Terms & Conditions, Health Safety & Environment Manual while working on Tata Power Site/ Services/ Contracts.

Grievance Mechanism

The BA is expected to have grievance procedures that allow stakeholders to anonymously bring environmental and/or work-related violations and/or concerns to the attention of management. In addition, the BA is expected to have procedures for examining reports of environmental and/or work-related violations or concerns and/or privacy complaints.

Data Protection

The BA is expected to have a formal process to address data security or privacy issues.

ANNEXURE-I

Sr. No.	Question Description	Response (Y/N)	Remarks
Organization			
1	Does your Company have Sustainability Policy at Organization Level? If Yes, Please attach		
2	Do you have sustainable procurement policy in place for your own suppliers? If Yes, Please attach		
3	Does your company do regular assessment of its suppliers on ESG parameters?		
4	Are there ESG risks, or negative impacts identified in your supply chain		
Governance			
1	Is diversity taken into consideration when appointing board members/ senior management? Do you have an independent director/s?		
2	Has your company taken initiatives to ensure ethical practices at workplace? Please share the details, Policies etc.		
3	Does your company have a formal process to address data security or privacy issues? Please share the details, Policies etc.		
4	Does your company have grievance mechanism for stakeholder issues and track resolution?		
Environment/ Planet			
1	Does your company have Environmental Policy? If Yes, Please attach		
2	Do you have a formal process for waste management including solid wastes, liquid wastes and hazardous waste?		
3	Does your company track greenhouse gas emission? Also, what percentage of own consumption comes from the renewable energy?		
4	Does your company have a formal process for water management including monitoring of water consumption and withdrawals, and if applicable, pretreatment of wastewater?		
Green Technology/ Innovation			
1	Are your facility/ Product/ Services provided by you is based on green design, green production, green packaging or green logistics considerations? Please elaborate.		
2	Do your products or services have any environmental or social features or benefits (e.g. environmental/energy certification, ecolabels, fair trade certification, etc.)?		
Social/ People			
1	Does you facility/ Company have written personnel policies in place Are you an equal opportunity employer?		
2	Please describe any formal programme / campaign in place to promote company involvement with the community (volunteering, etc.). What is the percentage of profit spend on community activities?		
3	Does your company have a written Health & Safety Policy or Program? If Yes, Please attach		
Certifications: Does your company have following certifications (valid till date-please mention validity)			
1	ISO9001 accreditation		
2	SA8000 or equivalent		
3	ISO 14001 certification		
4	ISO 18001/45001 or equivalent		
5	ISO/IEC 27001 or equivalent		
6	Any Other (Please specify)		

Signature

Business Associate Name

ANNEXURE-II

CORPORATE SUSTAINABILITY POLICY

At Tata Power, our Sustainability Policy integrates economic progress, social responsibility and environmental concerns with the objective of improving quality of life. We believe in integrating our business values and operations to meet the expectations of our customers, employees, partners, investors, communities and public at large

- We will uphold the values of honesty, partnership and fairness in our relationship with stakeholders
- We shall provide and maintain a clean, healthy and safe working environment for employees, customers, partners and the community
- We will strive to consistently enhance our value proposition to the customers and adhere to our promised standards of service delivery
- We will respect the universal declaration of human rights, International Labour Organization's fundamental conventions on core labour standards and operate as an equal opportunities employer
- We shall encourage and support our partners to adopt responsible business policies, Business Ethics and our Code of Conduct Standards
- We will continue to serve our communities:
    - By implementing sustainable Community Development Programmes including through public/private partnerships in and around our area of operations
    - By constantly protecting ecology, maintaining and renewing bio-diversity and wherever necessary conserving and protecting wild life, particularly endangered species
    - By encouraging our employees to serve communities by volunteering and by sharing their skills and expertise
    - By striving to deploy sustainable technologies and processes in all our operations and use scarce natural resources efficiently in our facilities
    - We will also help communities that are affected by natural calamities or untoward incidence, or that are physically challenged in line with the Tata Group's efforts

The management will commit all the necessary resources required to meet the goals of Corporate Sustainability.

(Praveer Sinha)
CEO & Managing Director

Date: 15th June, 2018

TATA POWER
Lighting up Lives!

Supplier Code of Conduct

Tata Power follows the Tata Code of Conduct (TCoC) and the Whistle blower Policy and expect all its Suppliers to adhere to the same principles. **"Supplier"** here means any business, company, corporation, person or other entity that provides, sells or seeks to sell, any kind of goods or services to Tata Power, including the Supplier's employees, agents and other representatives.

Tata Code of Conduct- (TCoC): https://www.tatapower.com/pdf/aboutus/Tata-Code-of-Conduct.pdf

Whistle Blower Policy: https://www.tatapower.com/pdf/aboutus/whistle-blower-policy-and-vigil-mechanism.pdf

Anti-Bribery & Anti-Corruption Policy: https://www.tatapower.com/pdf/aboutus/abac-policy.pdf

The suppliers are expected to adhere to the following Do's and Don'ts:

Do's

1. The Suppliers shall be committed to supplying products and services of high quality that meet all applicable standards and laws, including product packaging, labelling and after-sales service obligations.
2. Comply with all applicable laws and regulations, both in letter and in spirit, in all the territories in which it operates.
3. Strive to provide a safe, healthy and clean working environment for its employees.
4. Strive for environmental sustainability, particularly with regard to the emission of greenhouse gases, consumption of water and energy and the management of waste and hazardous materials.
5. The Supplier shall represent our company (including Tata brand) only with duly authorised written permission from our company.
6. Safeguard the confidentiality on the use of intellectual property, information and data of the Company.
7. Gifts and hospitality given or received should be modest in value and appropriate as per Company Policy.
8. The assets of Tata Power shall be employed primarily and judiciously for the purpose of conducting the business for which they are duly authorised.
9. All actual or potential conflicts due to financial or any other relationship with a Tata Power employee shall be disclosed.

Don'ts

1. The Supplier shall not make unfair or misleading statements about the products and services of competitors.
2. Children shall not be employed at workplaces.
3. Forced labour shall not be used in any form.
4. The Suppliers shall neither receive nor offer or make, directly or indirectly, any illegal payments, remunerations, gifts, donations or comparable benefits that are intended, or perceived, to obtain uncompetitive favours for the conduct of its business with Tata Power.

Reporting Violations

The Supplier shall notify the Company regarding any known or suspected improper behaviour of other suppliers or employees relating to its dealings with Tata Power, by email to: cecounsellor@tatapower.com. The same can also be raised through our 3rd party ethics helpline facility:

Toll-free Number	1800 267 4065
Email	tatapower@tip-offs.in
Website & Chatbot	www.tatapower.tip-offs.in
Postal address	Attn to: Mr. Puneet Arora, Deloitte Touch Tohmatsu India LLP, 6 floor, AIPL Business, Sector 62, Gurugram, Haryana 122102