

The Tata Power Company Ltd		<i>OPEN TENDER NOTIFICATION</i>
<i>Tender Reference: CC27AS021</i>		<i>Document Date: 02nd August 2026</i>

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. Aayush Srivastava (aayush.srivastava@tatapower.com) with copy to Mr. Rameshkumar P N (pnramesh@tatapower.com).					
1.	1 year OLA for Supply of FRTU for Mumbai Distribution	CC27AS021	3,50,000/-	2,000 /-	14 th August 2026

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 – HDFC00000060

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

The Tata Power Company Ltd		OPEN TENDER NOTIFICATION
Tender Reference: CC27AS021		Document Date: 02nd August 2026

E-mail with necessary attachment of 1 and 2 above to be send to aayush.srivastava@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.

The Tata Power Company Ltd		<i>OPEN TENDER NOTIFICATION</i>
<i>Tender Reference: CC27AS021</i>		<i>Document Date: 02nd August 2026</i>

OPEN TENDER NOTIFICATION

FOR

OLA of 1 year 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**

The Tata Power Company Ltd		<i>OPEN TENDER NOTIFICATION</i>
<i>Tender Reference: CC27AS021</i>		<i>Document Date: 02nd August 2026</i>

Section A : Tender Notice including Instruction to Bidders

1. Tender Details

1.1 Key Tender Specific Details

Reference Number	CC27AS021
Description	OLA of 1 year for Supply of FRTU for Mumbai Distribution
Type of Tender	Outline Agreement
Estimated Period	1 year
Tender Fee	Rs 2000/-
Earnest Money Deposit (EMD)	Rs 3,50,000/- Rs. Three Lakh Fifty Thousand Only
Price Basis	Fixed Price basis
Executive Handling this Tender*	Name: Mr. Aayush Srivastava E-Mail ID: aayush.srivastava@tatapower.com
Technical Query *	Name: Mr. Sachin Sutar E-Mail ID: sachin.sutar@tatapower.com Contact: 9029008451

*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	14 th August 2026
(b)	Last date and time of receipt of Bids	21 st August 2026

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

The Tata Power Company Ltd		<i>OPEN TENDER NOTIFICATION</i>
<i>Tender Reference: CC27AS021</i>		<i>Document Date: 02nd August 2026</i>

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		

The Tata Power Company Ltd		<i>OPEN TENDER NOTIFICATION</i>
<i>Tender Reference: CC27AS021</i>		<i>Document Date: 02nd August 2026</i>

	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

The Tata Power Company Ltd		<i>OPEN TENDER NOTIFICATION</i>
<i>Tender Reference: CC27AS021</i>		<i>Document Date: 02nd August 2026</i>

/ 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

Interested parties to note that Bidder shall be required to fulfil the pre-qualification requirement / criteria mentioned below in order to qualify for the subject tender. Bidder will be required to submit relevant supporting documents against each criterion to demonstrate their qualification during the bid submission stage. Bidders not found meeting the pre qualification requirements given below will be disqualified from the tender.

No	Parameter	Tata Power Requirement	Documents to be submitted by vendor to ascertain meeting of Pre-Qualification Requirement
1	Infrastructure	Bidder must be an OEM of Equipment. 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 250 nos RMU during last 3 years or b) A single order of 120 nos or c) Two orders of 80 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 years satisfactory performance from at least 2 reputed Distribution Utilities for equipment of	Supply List & Performance Certificates from the utilities

The Tata Power Company Ltd		<i>OPEN TENDER NOTIFICATION</i>
<i>Tender Reference: CC27AS021</i>		<i>Document Date: 02nd August 2026</i>

		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.	
4	Commercial Capability	Average Annual turnover of the bidder for last three years shall not be less than Rs 18 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/ International Accredited Lab for the equipment / Cyber security standards as per MoP Order No 12/34/2020-T&R for the 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 / 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/ 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"

The Tata Power Company Ltd		OPEN TENDER NOTIFICATION
Tender Reference: CC27AS021		Document Date: 02nd August 2026

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

The Tata Power Company Ltd		OPEN TENDER NOTIFICATION
Tender Reference: CC27AS021		Document Date: 02nd August 2026

evaluated any further and shall be summarily rejected. The decision of Tata Power shall be final and binding on the bidder in this regard.

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

Address for sending original EMD BG:

To,
Aayush Srivastava
Lead - Corporate Contracts

The Tata Power Company Limited, 2nd Floor, Sahar Receiving Station, Near Hotel Leela, Sahar Airport Road, Andheri East, Mumbai-400059.

Mobile – 9616311300

First Part has to be submitted in Sealed Envelope.

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

- Documentary evidence in support of Technical, Commercial qualifying criteria
- 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)*
- Duly filled Technical and Commercial Deviation Sheets
- Duly filled formats like Authorization affidavit form
- 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

The Tata Power Company Ltd		<i>OPEN TENDER NOTIFICATION</i>
<i>Tender Reference: CC27AS021</i>		<i>Document Date: 02nd August 2026</i>

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.

The Tata Power Company Ltd		<i>OPEN TENDER NOTIFICATION</i>
<i>Tender Reference: CC27AS021</i>		<i>Document Date: 02nd August 2026</i>

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 Tata Power Company Ltd		<i>OPEN TENDER NOTIFICATION</i>
<i>Tender Reference: CC27AS021</i>		<i>Document Date: 02nd August 2026</i>

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.

The Tata Power Company Ltd		OPEN TENDER NOTIFICATION
Tender Reference: CC27AS021		Document Date: 02 nd August 2026

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 Contract 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.

The Tata Power Company Ltd		<i>OPEN TENDER NOTIFICATION</i>
<i>Tender Reference: CC27AS021</i>		<i>Document Date: 02nd August 2026</i>

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.

---XXX---

The Tata Power Company Ltd		<i>OPEN TENDER NOTIFICATION</i>
<i>Tender Reference: CC27AS021</i>		<i>Document Date: 02nd August 2026</i>

Annexure 1

Schedule Of Items

Sr. No.	Material / Service Short Text (as per SAP)	Estimated Quantity	UoM	Unit Rate	Total
1	FRTU,MINI FRTU,MINI FRTU FOR AUTOMATION OF RM,	200	EA		
2	MALE FEMALE,CONNECTOR SET,FRTU ASHIDA,	1000	EA		
3	FRTU,FRTU PANEL,FOR OUT DOOR CSS,PREWIRED	50	EA		
	Total				
	GST				
	Total Value Including GST				

ANNEXURE 1 –**1. Accessing Ariba Sourcing**

Step 1: You will get an invitation to your email from Ariba System. Keep this email, it contains your login Information and a direct link to Ariba.

Step 2: Click “Click Here” to access the Ariba Web Site.

Dear Santosh

This email message has been sent in response to your request to reset your password for The Tata Power Company Limited's Ariba Spend Management site.

Before you can access The Tata Power Company Limited's events, you must first move your buyer-specific username from the buyer's site to the Ariba Commerce Cloud.

[Click Here](#) to move your buyer-specific username from the buyers site to the Ariba Commerce Cloud.

If you are unable to launch a browser using this link, copy the link and paste it into the address bar of any of the supported Web browsers to form a single-line URL.

http://TATAPOWER.supplier.ariba.com?awssso_tkn=33qxEHvypD56d8154afffffffd86d6f931

NOTE: This link is only valid for 30 days. Make sure you register on the Ariba Commerce Cloud before the link expires. After you register on the Ariba Commerce Cloud, you can no longer use this link.

Thank you,
Ariba, Inc. Administrator

Step 3: Define your password and secret question. Click “OK”

 Help | Logout
Welcome USER_TEST2 - UPM-Kymmenä Corporation

Expired Password

Your password has expired. Follow these instructions to complete this step: Create a new password and confirm. Select a secret question and answer it so ...

Passwords are case-sensitive, and must be between 8 and 16 characters long. They can include any Latin characters and punctuation marks, and must include at least one numeral between the first and last character. They must also include at least one letter. For example, go2anba.

The current secret answer that you have entered is different from the one that has been recorded for this user.

New Password: *

New Password (confirm): *

Secret Question: *

Secret Answer: *

(*) indicates a required field

You expressly agree and understand that your data entered into this system may be transferred outside of the European Union or other jurisdiction where you are located, as further described in the Ariba Data Policy [Data Policy](#)

Step 4: If it's the first time you are invited to use UPM Ariba, you'll need to accept the “Participant Terms”.

Select “I accept the terms of this agreement”. Click “OK”.

Instructions to Bidder (Two bid)

Doc9075069 - TEST1000092433 (Economic) Time remaining 23:50:38

✓ Your response has been submitted. Thank you for participating in the event.

Revise Response

All Content

Name ↑	Price	Quantity	Extended Price	Unit of Price
1 Supply Total			7,150.00 EUR	
Please indicate the unit price for each item				
1.1 Power Packs	95.00 EUR	50 each	4,750.00 EUR	per 1
Please indicate the unit price for power pack				
1.2 Retaining Rings	480.00 EUR	5 each	2,400.00 EUR	per 1
Please indicate the unit price for retaining ring				

Q :- What to do if you have a problem during the e-bidding?

If you have any problem related the system: - **Call first Tata Power e- bidding / Auction Cell**

➤ **e-bidding/auction Cell details:-**

Core team		
Contact Person	E-Mail Id	Contact Details
Ravi Shingare	ravi.shingare@tatapower.com	9029004168

Q Communicating with Tata Power Auction team during auction

Step 1: Click “Compose Message”.

Primary alternative 2

All Content

Name ↑

1 UPM Prerequisites

1.1 Do You accept UPM General Purchasing Conditions for Products and Services ? ☒ ✓

1.2 Do you accept UPM code of conduct ? ☒ ✓

1.3 Do you accept UPM Environmental Policy ? ☒ ✓

1.4 Do you accept UPM CSR ? ☒ ✓

1.5 Do you accept UPM Invoicing policy ? ☒ ✓

2 Request for Quotation

2.1 Fatty acid Kaipola

Step 2: Compose Your Message and click “Send”.

	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 26 th 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: 18 th Oct 2021
	Field Remote Terminal Unit	

Contents

1. Scope:.....	5
2. Applicable Standards:	5
3. Climatic Conditions:	5
4. General Technical Requirements:.....	6
4.1 FRTU Functions:	6
4.2 Communication Port:.....	7
4.3 Master Station Communication Protocol:	7
4.4 Communication Protocol between FRTU and MFTs:.....	8
4.5 FRTU Enclosures:.....	8
4.6 Local/Remote selector switch.....	9
4.7 Digital Input Module	10
4.8 Digital Output Module	11
4.9 Interface wires to FRTU for DI and DO from RMU:.....	12
4.10 Interface wires to FRTU for Meter communication:.....	13
4.11 Provision of AC supply:	13
4.12 Communication Package:.....	13
4.13 Troubleshooting:.....	14
4.14 Power supply package:	14

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: 18 th Oct 2021
	Field Remote Terminal Unit	

5.	Advanced Features:	15
6.	Cyber security:	16
7.	Accessories:.....	18
8.	Training:	18
9.	Documentation:	18
10.	Nameplate and Markings:.....	19
10.1	Painting:	19
10.2	Galvanizing:.....	21
11.	Tests & Test Certificates:	22
12.	Factory Inspection:.....	25
13.	Inspection of material after receipt at store:	25
14.	Guarantee:	26
15.	Packing and Shipping:	26
16.	Tender Sample:	27
17.	Quality control:	27
18.	Testing facilities:	28
19.	Manufacturing activities:	28
20.	Schedules of deviations:	28

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

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

21.	Guaranteed Technical Particulars:.....	28
22.	Drawings, data and manuals:.....	29
23.	Sub-contractors:.....	29
24.	Spare parts:.....	30
25.	Completeness of contract:.....	30
	Annexure #1.....	31
	Annexure #2.....	33
	Annexure #3.....	Error! Bookmark not defined.

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
Sign and Date		
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18 th 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 conform 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:

- International Electro technical Commission (IEC),
- Institute of Electrical and Electronics Engineer (IEEE)
- American National Standards Institute (ANSI)
- 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. 55°C & Min. 10.0 °C

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

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.

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

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.

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

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

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18 th Oct 2021
	Field Remote Terminal Unit	

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.

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18 th Oct 2021
	Field Remote Terminal Unit	

- 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.

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18 th Oct 2021
	Field Remote Terminal Unit	

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.

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

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

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

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 Dual 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)

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

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.

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

- 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

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

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.

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

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

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: 18 th Oct 2021
	Field Remote Terminal Unit	

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.

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
Sign and Date		
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18 th Oct 2021
	Field Remote Terminal Unit	

- 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.

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: 18 th Oct 2021
	Field Remote Terminal Unit	

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 undercoating 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.

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

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

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/m² (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

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: 18 th Oct 2021
	Field Remote Terminal Unit	

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

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: 18 th Oct 2021
	Field Remote Terminal Unit	

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.

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: 18 th 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			

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: 18 th Oct 2021
	Field Remote Terminal Unit	

19	Vibrations	IEC 60255-21-1	
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.

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: 18 th Oct 2021
	Field Remote Terminal Unit	

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.

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: 18 th Oct 2021
	Field Remote Terminal Unit	

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:

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: 18 th Oct 2021
	Field Remote Terminal Unit	

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**.

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: 18 th Oct 2021
	Field Remote Terminal Unit	

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

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: 18 th Oct 2021
	Field Remote Terminal Unit	

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.

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: 18 th Oct 2021
	Field Remote Terminal Unit	

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 rating type 5 no's
Configuration and console cable	As per OEM equipment requirement				1 no's	1 no's -each type of cable

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
Sign and Date		
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18 th Oct 2021
	Field Remote Terminal Unit	

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

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: 18 th Oct 2021
	Field Remote Terminal Unit	

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

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: 18 th 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	Preferred make Siemens, Schneider, Ashida and Hitachi	
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	

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
Sign and Date		
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18 th Oct 2021
	Field Remote Terminal Unit	

		(Minimum 54 DIs and 12DOs 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	Essential	

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: 18 th Oct 2021
	Field Remote Terminal Unit	

	arrangement		
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			

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

45	Availability of diagnostic tool	Essential-should be available from remote as well as local	
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	

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No. - R2	Prepared By	Checked By Approved For Issue By
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18 th Oct 2021
	Field Remote Terminal Unit	

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	

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

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: 18 th 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. Preferred make: Teltonica RUT951, Lantronix and Moxa	
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	

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

3.0	Operating Condition		
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	

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

5.5	Degree of Protection	IP 30	
6.0	Interface/Port Type		
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 Dual 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 ,SSH & 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	

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

7.8	AT Command Support	YES /NO	
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	Primary Antenna Cable should have Low loss RF Cable with minimum 10mtr length. Secondary Antenna Cable should have Low loss RF Cable with minimum 5mtr length.	
9.3	Type of Antenna	Antenna Should be Omni directional with	

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

		high gain (High gain ≥ 5)	
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)	

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18 th Oct 2021
	Field Remote Terminal Unit	

12	Certification:- IEC	Specified as below or equivalent to international Standard	
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	

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18 th Oct 2021
	Field Remote Terminal Unit	

		telecommunication/ wireless communication (WPC ,DOT) to operate &user this product in country . Vendor to 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	

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18 th Oct 2021
	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 is housed 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	

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18 th Oct 2021
	Field Remote Terminal Unit	

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 $\pm$ 5%..	
6.3	Charger Output		
6.3.1	Regulation	$\pm$ 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.	

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

		(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	

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

		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	

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/FRTU Date: 18 th Oct 2021
	Field Remote Terminal Unit	

		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.	

Meant for (Internal Circulation / External – Stakeholders Circulation)

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



MINI FIELD REMOTE TERMINAL UNIT

Specification



Meant for (Internal Circulation / External – Stakeholders Circulation)

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

Contents

1. Scope:.....	5
2. Applicable Standards:	5
3. Climatic Conditions:	5
4. General Technical Requirements:.....	6
4.1 FRTU Functions:	6
4.2 Communication Port:.....	7
4.3 Master Station Communication Protocol:	7
4.4 Communication Protocol between FRTU and MFTs:.....	8
4.5 FRTU Enclosures:.....	8
4.6 Local/Remote selector switch.....	9
4.7 Digital Input Module	10
4.8 Digital Output Module	11
4.9 Interface wires to FRTU for DI and DO from RMU:.....	12
4.10 Interface wires to FRTU for Meter communication:.....	13
4.11 Provision of AC supply:	13
4.12 Communication Package:.....	13
4.13 Troubleshooting:.....	14
4.14 Power supply package:	14

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

5.	Advanced Features:	15
6.	Cyber security:	16
7.	Accessories:.....	18
8.	Training:	18
9.	Documentation:	19
10.	Nameplate and Markings:.....	19
10.1	Painting:	19
10.2	Galvanizing:.....	21
11.	Tests & Test Certificates:	22
12.	Factory Inspection:.....	24
13.	Inspection of material after receipt at store:	24
14.	Guarantee:	24
15.	Packing and Shipping:	25
16.	Tender Sample:	26
17.	Quality control:	26
18.	Testing facilities:	26
19.	Manufacturing activities:	27
20.	Schedules of deviations:	27

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

21.	Guaranteed Technical Particulars:.....	27
22.	Drawings, data and manuals:.....	27
23.	Sub-contractors:.....	28
24.	Spare parts:.....	28
25.	Completeness of contract:.....	29
	Annexure #1.....	30
	Annexure #2.....	32
	Annexure #3.....	Error! Bookmark not defined.

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
Sign and Date		
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/Mini FRTU Date: 18 th 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:

- International Electro technical Commission (IEC),
- Institute of Electrical and Electronics Engineer (IEEE)
- American National Standards Institute (ANSI)
- 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. 55°C & Min. 10.0 °C

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.

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

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.

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

- 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

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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.

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

- 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.

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

- 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.

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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.

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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.

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

- 4.12.5 Cellular router should have Dual 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.**

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

- 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 IP55.

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.

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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.

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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
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Meant for (Internal Circulation / External – Stakeholders Circulation)

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

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

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 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

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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/m² (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.

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

- 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.

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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.

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

- 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.

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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:

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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,
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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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.

Meant for (Internal Circulation / External – Stakeholders Circulation)

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

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

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 rating type 5 no's
Configuration and console cable	As per OEM equipment requirement				1 no's	1 no's -each type of cable

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
Sign and Date		
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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

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/Mini FRTU Date: 18 th 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	Preferred make Siemens, Schneider, Ashida and Hitachi	
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	

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

		for One 4 way RMU automation (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	

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
Sign and Date		
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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	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			

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
Sign and Date		
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

47	FRTU power supply requirement	As per RMU isolator operation 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			

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

60	Possibility for logic development within FRTU and between FRTU	Essential	
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			

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
Sign and Date		
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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	

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
Sign and Date		
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/Mini FRTU Date: 18 th Oct 2021
	Mini 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. Preferred make: Teltonica RUT951, Lantronix and Moxa	
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		

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
Sign and Date		
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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		

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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 Dual 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,HTTPS	
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 ,SSH & 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	

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
Sign and Date		
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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	Primary Antenna Cable should have Low loss RF Cable with minimum 10mtr length. Secondary Antenna Cable should have Low loss RF Cable with minimum 5mtr length.	
9.3	Type of Antenna	Antenna Should be Omni directional with high gain (High gain ≥ 5)	

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev No.- R2	Prepared By	Checked By Approved For Issue By
Sign and Date		
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	ENGINEERING SPECIFICATIONS	SPEC/DMS/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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	

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/Mini FRTU Date: 18 th Oct 2021
	Mini Field Remote Terminal Unit	

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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	Mini Field Remote Terminal Unit	

		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 is housed 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 $\pm$ 5%..	
6.3	Charger Output		
6.3.1	Regulation	$\pm$ 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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