অসম শক্তি বিতৰণ কোম্পানী লিমিটেড

ASSAM POWER DISTRIBUTION COMPANY LTD.

Request for Proposal

SUPPLY OF IEC61850 COMPLIANT NUMERICAL RELAYs FOR 33/11 KV TRANSFORMERS AND FEEDERS

NIT NO. APDCL/CGM (PP&D)/Relay Procurement/2024-25/NIT NO-25/01

OFFICE OF THE CHIEF GENERAL MANAGER (PP&D), APDCL

INDEX

INVITATION FOR BIDS (IFB)

ASSAM POWER DISTRIBUTION COMPANY LTD.
CIN: U40109AS2003SGC007242
Website:www.apdcl.org

TENDER NOTICE No. 25/01

E-tenders in two parts viz.1) Techno-Commercial Bids and 2) Price Bids, with validity up to 180 days are hereby invited from reputed Original Equipment Manufacturers for supply of **IEC 61850 Compliant Numerical RELAYs for protection of Transformers and Feeders.** Interested bidders may view the detailed Request for Proposal (RFP) on website www.assamtenders.gov.in as well as www.apdcl.org.

Key tender dates :

Description	Date & Time
Tender document publishing date and time	20.05.2025 15.00 hrs.
Pre-Bid Meeting	26.05.2025 12:00 hrs.
Bid Submission start date and time	03.06.2025 09:00 hrs.
Bid submission end date and time	16.06.2025 17:00 hrs
Technical Bid Opening Date & time	18.06.2025 12:00 hrs

Chief General Manager (PP&D), APDCL

Memo No. CGM (PP&D)/APDCL/Relay Procurement/2024-25/NIT NO-25/01/93838**Dated:** 16.05.2025
Copy to:

1. The P.S to the Chairman, APDCL/AEGCL/APGCL, Bijulee Bhawan, Guwahati-1, for kind information of the Chairman, APDCL/AEGCL/APGCL.
2. The P.S. to the MD, APDCL, Bijulee Bhawan, Guwahati-1, for kind information of the MD, APDCL.
3. The Chief General Manager (F&A), APDCL, Bijulee Bhawan, Guwahati-1, for kind information.
4. The PRO, APDCL, Bijulee Bhawan, Guwahati-1 for publication of the above tender in one issue of "The Assam Tribune", one "Assamese daily" and National News Paper.
5. The concerned IT Wing, APDCL, Bijulee Bhawan, Ghy-1, for information and publication of the notice in official website.
6. Relevant Office file.

Chief General Manager (PP&D), APDCL

ASSAM POWER DISTRIBUTION COMPANY LTD.
CIN: U40109AS2003SGC007242
Website:www.apdcl.org

Memo No. CGM (PP&D)/APDCL/Relay Procurement/2024-25/NIT NO-25/01/3389 Dated: 20.05.25

The Chief General Manager (PP&D), Assam Power Distribution Company Limited, Bijulee Bhawan, Paltan Bazar, Guwahati-1, invites e-tenders from Original Equipment Manufacturers (OEMs) for supply of IEC 61850 Compliant RELAYs for Transformer protection and Feeder protection to various T&C Divisions of APDCL. Interested OEMs may view the detailed Tender Notice and specification by visiting APDCL website www.apdcl.org **or** www.assamtenders.gov.in

Work description	Average annual turnover (Rs. in Cr.)	EMD amount (Rs. in lakh)	Period of completion in days
Supply of IEC 61850 Compliant RELAYs for Transformer protection and feeder protection to various T&C Divisions of APDCL.	5.00	10.00	120 (One hundred and twenty) days from the date of issue of LoA

IMPORTANT INFORMATION

SL No.	Event	Information to the Bidders	
1	Tender document publishing date	20.05.2025	**15:00 Hrs.**
2	Pre-Bid Meeting	26.05.2025	**12:00 Hrs.**
3	Bid Submission start date and time	03.06.2025	**09:00 Hrs.**
4	Bid submission end date and time	16.06.2025	**17:00 Hrs.**
5	Technical Bid Opening Date & time	18.06.2025	**12:00 Hrs.**
6	**Pre-Bid Meeting Address**	**Online (Link to be shared on 25.05.2025)** **Venue:** O/o the Chief General Manager (PP&D), APDCL 6th floor, Bijulee Bhawan, Paltan bazar, Guwahati-781001	
7	Tender Document	The complete Tender Documents can be downloaded free of cost from the APDCL's website www.apdcl.org, as well as e-tendering portal of GoA www.assamtenders.gov.in	
8	Period of completion in days	120 (One hundred Twenty) days from the date of issue of work order	
9	Minimum Average Annual Turnover (Rs. in lakh)	**Rs. 500.00 Lakhs** **For Local MSE Bidders of Assam - NIL** *Although it is relaxed for local MSE bidders submission of tum-over certificates is compulsory as per clause3 (iii) (a) of Basic Qualifying Criteria (Financial) .*	
10	Tender Processing Fees (Rs.)	**Rs. 9,000.00(Rupees Nine Thousand Only)**	

11	Bid Security/EMD (Rs. In lakh)	**Rs. 10,00,000.00 (Ten Lakhs Only)** The EMD amount may be submitted using any of the following options: **Option 1**: The EMD may be submitted through online mode (Net banking or NEFT /RTGS) at the time of submission of the E tender. For further details regarding online payment of the EMD, the bidders are requested to refer to the E-tendering portal www.assamtenders.gov.in. or **Option 2:** The bidders may also avail the option to submit the EMD in the form of Bank Guarantee (BG) as per the prescribed format under Section: Forms of Bid of the tender document. The BG shall be issued by scheduled a Nationalized/ commercial Bank located in India; pledged in favour of Assam Power Distribution Company Limited (APDCL) with a validity period of not less than 180 days from the last date of submission of E tender. The relevant bank details may be referred as under: A/c No. 00000033876397506 Name: APDCL DRAWING ACCOUNT SUBIDIARY IFSC Code: SBIN0001518 Any tender without EMD will be rejected outright. The EMD will be returned to the bidder(s) whose offer is not accepted within one month from the date of issue of LoA (s) to the qualified bidder(s). The EMD to the successful bidder will be released on submission of Performance Bank Guarantee at the time of execution of the after sales service agreement [Annexure 2(C)]. However, if the return of EMD is delayed for any reason, no interest / penalty shall be payable to the bidder.
12	Address & contact details for future correspondences in this regard	O/o the Chief General Manager (PP&D), APDCL 6th floor, Bijulee Bhawan, Paltan Bazar, Guwahati-781001, email ID: cgmppd.mattc@apdcl.com

1. **Scheme :** "Procurement of IEC 61850 compliant RELAY for Transformer and Feeder Protection with Broken conductor feature for upgradation of existing protection system to improve safety and reliability" under residual fund from SOPD 20-21 and APDCL own fund.

2. **Tender Processing fees & EMD:** The tender processing fee and EMD shall be deposited through online mode as per the provision explained above.

3. **Bid Validity:** The bid shall remain valid for a period of 180 days from the last date of bid submission. However, in exceptional circumstance, APDCL may solicit the Bidder's consent to an extension of the bid validity period. In that case request and responses thereto shall be made in writing or by E-mail.

4. The bidding will be conducted through the open competitive bidding procedures as per the provisions specified in the Bid. A Single Stage Two Envelope E-tendering Procedure to be adopted to carry out the tendering formalities against this tender.

5. Bids must be submitted electronically through E-tender portal www.assamtenders.gov.in in two parts as Techno Commercial bid and Price bid. A copy of the Technical Bid shall be submitted in a sealed envelope super scribing (a) Tender No. (b) Name of the bidder with full address. The submitted hardcopies shall be used for preservation purpose only**. Submission of Techno-commercial Bid in hard/paper form shall not be considered for evaluation purpose. The intending Bidders are advised to upload their techno-commercial bids carefully and completely.**

6. The detailed Qualifying Requirements (QR) are specified in the **"Qualifying/Eligibility Criteria & Document Checklist"** of the Bidding Document.

7. Only those bidders found responsive in Part-I of Bid viz. Techno Commercial bid with adequate bid capacity shall be considered for opening of Price Bid. The date and time of opening of Part-II Bid (Price) shall be communicated to those bidders whose bids are qualified for opening.

8. The Bidders shall comply with and agree to all the provisions of this existing conditions of the BID DOCUMENT for various bidding considerations including but not limited to eligibility, costs, payments, information regarding APDCL systems, bid formats, bid submission and other considerations.

9. The Bidders are expected to examine all instructions, forms, terms, and specifications in the Bidding Document. Failure to furnish all information or documentation required by the Bidding Document may result in the rejection of the Bid.

10. **Financial resources**: The bidder shall have to specify proposed source of financing, such as liquid assets, unencumbered real assets, line of credit and other financial means, net current commitments, available to meet the total construction cash flow demand of the subject contract (evaluation & qualification criteria).

11. In case of Micro/ Small/ Medium units of Assam valid documents/ certificates issued by competent authority shall be submitted along with the bid. Preference will be given to Micro/ Small/ Medium units as per provisions of the "The Assam Procurement Preference Policy,2021.

12. In the event of any electrical accident occurring due to supply/installation/use of poor quality/ sub-standard material/item or due to poor workmanship on the part of the supplier leading to death or injury of any person or damage to any property the supplier shall be held responsible and shall be liable to pay compensation for the same.

13. Corrigendum, if any, shall be published online on the website and will be deemed to be a part of the bid document and binding on all the bidders.

14. The bidding documents are not transferable and cost of bidding document is not refundable under any circumstances.

15. Formal authority, Registered/Notarized for signing the tender or other documents on behalf of the firm / individual shall be submitted along with the bid. In case of registered company Board's resolution of the company for authorized signatory should be furnished.

16. APDCL reserves the right to cancel/withdraw this invitation for bids without assigning any reason and shall bear no liability whatsoever consequent upon such a decision.

17. The issue of this BID DOCUMENT does not imply that APDCL is bound to select a Bidder for the Project. APDCL reserves the right to cancel/reject/withdraw any/all bids without assigning any reason thereof and shall bear no liability whatsoever consequent upon such a decision. APDCL may accept any tender or part thereof advantageous to APDCL and can award the supply work to one party or split up the supply works amongst different bidders. Decision of undersigned is final and binding on all.

18. Other detail Eligibility Criteria may be seen in bid document.

Chief General Manager (PP&D), APDCL
Bijulee Bhawan

TENDER INVITING PROPOSAL

Name of Work : Supply of IEC 61850 Compliant RELAYs for Transformer protection and feeder protection under "APDCL own fund and residual fund from SOPD 20-21"

1. Scope of Work

The various activities under the scope of work shall among other related aspects cover the following-

i. Supply of IEC 61850 Edition I & II compliant Numerical RELAYs with PRP and HSR and Process Bus 9-2 LE support for future upgradation.
ii. Training: 2-3 days training programme dedicated to detailed training on the complete functionalities of the numerical relays shall be arranged by the OEM in 3 batches comprising minimum 5 to maximum 10 APDCL T&C engineers. The training shall be held at OEM's factory premises or APDCL Test Lab as intimated by APDCL after issue of LOA.
iii. The bidder shall arrange a demonstration and testing session for the offered relay at the designated Testing & Commissioning (T&C) Divisions of APDCL. During this session, the following evaluations must be conducted:
a) High Impedance Fault (HIF) Simulation: The relay must be tested for its ability to detect high impedance faults simulated under realistic conditions, demonstrating the accuracy and reliability of the HIF detection algorithm. The bidder must also bring their own disturbance records (COMTRADE files) of HIZ faults and simulate the same through relay test kit during the demonstration to test the detection capability of the relay.
b) Interoperability and GOOSE Messaging Test: The relay must demonstrate compliance with IEC 61850 standards, particularly focusing on interoperability through GOOSE (Generic Object-Oriented Substation Event) messaging. The relay's performance in supporting fast, reliable communication between IEDs (Intelligent Electronic Devices) will be assessed, with emphasis on its role in enhancing protection coordination within the DISCOM environment.
All interoperability tests shall be carried out as per the procedure and parameters detailed in **Clause No. 11 of the Technical Specification Section**.
iv. Site delivery, unloading, loading and handling of all materials supplied should be the sole responsibility of supplier.
v. Submission of technical specification (GTP) /Test Certificate/Drawings etc. of RELAYs to be submitted.
vi. The pre-delivery testing and inspection shall be carried out at OEMs laboratory.

2. Basic Specification of the supply to be carried out.

i. Relay supplied shall conform to the requirement of relevant standard as per approved GTP.
ii. Relays must comply with **IEC 61850 Edition 2** and support **GOOSE messaging**, MMS, and redundant Ethernet communication (PRP and HSR).
iii. Relay should include features like **event and disturbance recording**, password-protected access, and time synchronization via SNTP/PTP.

3. Basic Qualifying Requirement.

To be qualified for the package the bidder must compulsorily meet the following minimum criteria.

i) Technical

a) The Bidders must be an **original equipment manufacturer** of the protection relays involved in this tender. The bidders should have manufacturing and servicing facility in India for protection relays. Documentary evidence for being manufacturers like registration certificate issued by SSI/ NSIC/Directorate of Industries etc. for qualifying requirements and copies of these documents are to be submitted with the bid.

b) The bidder must have capacity to manufacturer **10,000 nos**. of IEC 61850 Compliant Numerical RELAYs in a year. The bidder must furnish necessary information along with supporting documents in support of this clause.

c) The Bidder must have designed, manufactured; type tested and supplied and commissioned similar RELAYs and furnish list such works executed as Qualifying Requirement.

d) The bidder must have **at least 05 (five) years' experience** of manufacturing, supply, installation and commissioning of similar protection devices in various **state/ central PSU** in India as on the date of bid opening. Necessary supporting documents have to be furnished along with the bid.

e) **The Bidder must confirm the support service or supplying spares of the offered RELAYs for at least next 10 years as per Annexure -2 (C) after the expiry of the warranty period.** The bidder must have 24 hours service support facility in India and details of such support facility should be enclosed with the bid.

f) The bidder shall furnish copies of performance certificates for **two years** of successful operation as on the due date of bid opening for the offered RELAYs in respect to implementation of IEC 61850 protocols to any SCADA/ SAS from **two reputed Power sector utility of India** (State / Central PSU and reputed private utilities like Tata Power, CESC, Torrent Power, BSES). The bidder shall furnish Copies of Purchase Orders and corresponding proof of execution of the orders along with the bid.

g) The IEC 61850 compliant RELAYs that are running satisfactorily in the APDCL's network for more than 01 year will be considered. However, as APDCL has not integrated those RELAYs with SCADA /SAS the bidder then has to submit the performance certificate for SCADA/SAS integration through IEC 61850 from two different utilities for satisfactory operation for 2 years.

h) The Bidder must have sufficient qualified personnel to fill positions required for contract implementations. The Bidder will supply information of the key personnel, design & engineering staff, support staff, field staff giving details of experience.

i) Multinational RELAYs manufacturing companies with manufacturing set up in India may import required / desired RELAYs from their foreign counterpart with same brand name at their own risk, cost and responsibility without hampering the stipulated delivery schedule as stated in the bid document.

j) The responsive bidder shall have to configure the relay to be supplied as per the site specific requirement of APDCL for smooth commissioning of the RELAYs as the RELAYs are procured for retrofitting.

k) The equipment provided shall also comply with the latest revisions of Indian Electricity act and Indian Electricity rules and any other applicable statutory provisions, rules and regulations, relevant IS and IEC standards.

l) The Manufacturer shall invariably furnish QAP along with his offer. The QAP adopted by him in the process of manufacturing. Precautions taken for ensuring usages of quality raw material and sub-component shall be stated in QAP.

m) **The supplier should mention following:**

i. **Product maturity:** The RELAY manufacturer should mention the time period for which

the offered product is in the market. The offered relay should be in the market in the last 5 years.

ii. Expected product life should be at least 20 years.

n) The bidders' manufacturing facilities must have the following ISO certifications:
   i. ISO 9001:2008 Certification for meter manufacturing.
   ii. ISO 14001:2004 for Environmental Management Systems
   iii. OHSAS 18001:2007 for Occupational Health and Safety.
   iv. ISO 27001:2005 for Information Security Management Systems.

ii) Financial

a) **Bid Capacity:**

The Bidders who meet the minimum qualification criteria mentioned against the A) Technical & B) Financial section will be qualified only if their available bid capacity at the time of bidding is more than the estimated cost of the tender. The available capacity will be calculated as under:

Assessed available bid capacity = (A*N*2-B)

Where,

A = Maximum value of supply works of meter executed in any one year during the last five years (updated to the price level of the year as indicated in Annexure 2(A) rate of inflation may be taken as 10% per year taking into account the completed as well as works in progress.

N = Number of years prescribed for completion of the works for which bids are invited. (Value of N=1/2 Up to 6 Months & N=1 above 6 Months)

B = Value (updated to the price level) of existing supply commitments and ongoing supply works to be completed during period of completion of work for which bids are invited. In support of this the intending bidder has to submit an affidavit as per the format indicated in the Annexure 2(B) along with all the relevant supporting documents mention therein.

N.B The statements showing the value of existing commitments and on-going supply works of meter as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the Engineer in charge, not below the rank of CEO/DGM/Superintending Engineer of electrical utilities. Submission of Annexure 2(A) & 2(B) of Annexures.

   i. APDCL reserves the right to carry out the Bid Capacity assessment of the Bidders and the owner's decision shall be final and binding to the bidder.
   ii. Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have :
      1. Made misleading or false representations in the forms, statements and enclosures submitted as a proof of the qualification requirements; and/or
      2. Record of poor performance such as abandoning the work, rescinding of contract for which the reasons are attributable to the non-performance of the contractor, consistent history of litigation awarded against the Applicant or financial failure due to bankruptcy.

b) Average annual turnover of the bidder for the last three consecutive financial years shall be as per NIT and the annual turnover must be certified by a registered Chartered Accountant. The bidder must furnish necessary documents like the copies of the income tax return submitted by the firm for the last three years.

c) If the total work in hand against the works of APDCL, the successor companies ASEB and other agencies exceed more than 3 (three) times the average annual turnover of the bidder, the bid shall be treated as **non-responsive.**

d) The bidder shall furnish GST registration certificate, Employee Provident fund and valid Labour License (wherever applicable).
e) The bidder shall furnish copy of their Pan Card. The card must be in the name of the firm if the bidder is a firm.
f) Power of attorney should be a registered/ notarized one.
g) Formal authority, Registered/Notarized for signing the tender or other documents on behalf of the firm / individual must be submitted along with the bid. In case of registered company Board's resolution of the company for authorized signatory should be furnished.
h) Notwithstanding anything stated herein above, APDCL reserves the right to assess the capacity and capability of the bidder to execute the work, should the circumstance warrant such assessment in the overall interest of APDCL.

4. Submission of documents with technical bids

a. Valid BIS License.
b. The bidder shall invariably submit Technical Specification, type tests certificates, GTP and GA drawings as per bid requirements for IEC 61850 Complaint Transformer Protection Relay & Feeder protection relay.
c. ISO Certificate.
d. MSME Certificate.
e. Trade License.
f. Company Profile.
g. Pan Card of the firm.
h. GST Registration Certificate.
i. EPF.
j. Bank solvency certificate.
k. Average annual turn-over certificate, ITR, audited balance sheet from CA as per bid.
l. Document in support for positive net worth as per bid.
m. Submission of Annexure 2(A) & 2(B) for assessment of bid capacity.
n. Submission of Fin1, Fin2 and Fin 3 for assessment of bid capacity.
o. The bidder shall provide production capacity of different capacities of DTRs per month.
p. Details past experience along with present supply orders in hand with awarded amount and progress report.
q. Brief write-up on methodology to carry out the assignment, if awarded.
r. Details of manpower of the bidder.
s. Certificate in support of performance of the bidder.
t. Bidders have to provide a list of projects completed by them in last five years.
u. A detailed list of existing or ongoing supply works with APDCL/AEGCL & APGCL.
v. A detailed list of existing or ongoing supply works with other Central/State Govts.
w. A detail list of supply work completed/under implementation by the bidder in last 5 years need to be submitted.
x. The bidder shall submit Notarized affidavit in support that the bidder is not blacklisted or debarred by any utilities/ State/ Central Govt.
y. Bidders shall compulsorily submit cash credit limit from their concerned bank.

5. Submission of price bids:

The tender should be in two parts, i.e. (i) Techno commercial bid, (ii) Price bid and it should be submitted through the online portal www.assamtenders.gov.in only.

i. **Techno-commercial bid**

In the techno commercial bid, the bidders are required to submit copies of Documentation fees, Earnest money Deposit, PAN, GST registration, Annual Turn Over certified by C.A for last 3 years (₹5.00 Cr), Order executing details of similar work, vendor's company credentials, registration details, etc. as per requirement.

A set of the above documents must be sequentially uploaded along with the forms of bid for techno-commercial evaluation failing which it will be treated as non-responsive.

ii. **Price Bid**

The Price Bid will include the offered price for supply of IEC 61850 Compliant RELAYs for Transformer protection and feeder protection, Submission of Price Bidding Schedules with all quantities and prices shall be filled up as per Price Bidding schedule provided in the detailed bid document. **All quoted rate should be on FOR basis inclusive of GST and freight, insurance as applicable as per prevailing rate.**

Note :

a) When there is a difference between the rates in figures and in words, the amount in word should prevail. If the bidder does not accept the correction of the errors as above, his bid will be rejected and the amount of bid guarantee/security will be forfeited.

b) The rates quoted should be inclusive of all taxes, duties & levies applicable on the last date of receipt of the tenders.

c) Except writing rates and amount, the bidder should not write any conditions or make any changes, additions, alterations and modifications in the printed form of tenders. All corrections / overwriting should be countersigned by the bidder.

d) **No separate declaration offering discount on price will be allowed. Offered price in the price schedule will be final.**

e) In the event of any bidder found to be involved in corrupt or fraudulent practices in competing for the bid, APDCL will reject a proposal. Even if any such thing is detected after award of contract, the contract will be cancelled forthwith without any notice and the PBG will be invoked. Moreover, APDCL will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded a contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for this bid, or in executing the contract.

f) The rates of operation and maintenance may vary for different packages.

g) Bidders should be to upload their most competitive rates. It may please be noted that incomplete tenders will not be accepted.

6. Litigation History

The bidder shall not have any legal history with APDCL and the successor companies of erstwhile ASEB. Bidders shall submit details of all the litigation, arbitration or other claims, whether pending, threatened, or resolved in the last five years, with the exception of immaterial claims with. a cumulative impacts of not more than 10 per cent of their total assets. The Employer may disqualify bidders in the event that the total amounts of pending or threatened litigation, arbitration or other claims represent more than 50 per cent of their total assets.

The bidder shall not be blacklisted by any utility in India.

a) The Bidder's offer shall include and substantiate its claimed data on qualifying requirements by uploading scanned original copies of valid supporting documents such as listed out in Tender Proforma part – 1 (Techno-commercial) enclosed in the section 3 of this document:

b) Original documents defining the constitution or legal status, place of registration, and principal place of business, written power of attorney of the signatory of the Bid to commit the Bidder.
c) Certificates and testimonials in support of credentials and certifications of the bidder's organization.
d) Qualifications and experience of key site management and technical personnel proposed for the Contract.
e) Reports on the financial standing of the Bidder, such as profit and loss statements and auditor's reports for the past five years.
f) Evidence of adequacy of working capital for this contract (access to line (s) of credit and availability of other financial resources).
g) Authority to seek references from the Bidder's Bankers.
h) Information regarding any litigation, current or during the last· five years, in which the Bidder is involved, the parties concerned, and disputed amount
i) Bidders shall also upload proposals of work methods and schedule in sufficient detail to demonstrate the adequacy of the bidders' proposals to meet the APDCL's Requirements and the completion time.
j) Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have:

a) Made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements, and /or
b) Record of poor performance by the bidders or their sister concern such as abandoning the works, not properly completing the contract, inordinate delays in completions, litigation history, or financial failures etc.in APDCL or its sister concerns.

k) Notwithstanding anything stated herein under, the Purchaser reserves the right to assess the capacity and capability of the bidder to execute the work, shall the circumstances warrant such assessment in the overall interest of APDCL.

7. Security Deposit and Agreement

Within fifteen (15) days of the award of contract, the successful bidders shall have to deposit security money at the O/o the CGM(PP&D) APDCL, in the form of Bank Guarantee issued by any Nationalized Bank / Scheduled Bank in Company's standard format on non-judicial stamp of appropriate value for an amount equal to 10% of the ordered value of the work order. The Security Deposit will be forfeited, in case the vendor fails to execute the order to the satisfaction of APDCL. The Security Deposit amount shall remain with the APDCL till the end of contract plus additional three months and shall not bear any interest and shall be liable for forfeiture in case of the breach of any terms and conditions of the Contract.

8. Understanding of Bid Document

A prospective Bidder is expected to examine all instructions, forms, terms, technical specifications and scope of supply in the Bid documents and fully inform himself as to all the conditions and matters which may in any way affect the scope of supply or the cost thereof. Failure to furnish all information required in the Bid document or submission of a Bid not substantially responsive to the Bid document in every respect will be at the Bidder's risk and may result in the rejection of its bid.

9. Performance Guarantee

The successful bidder shall have to deposit performance security in the form of Bank Guarantee from a scheduled commercial bank of RBI pledged in favour of Assam Power Distribution Company Limited as per prescribed proforma for an amount equivalent to 10% (ten percent) of

the awarded value. The BG shall be furnished to the Chief General Manager (PP&D), APDCL along with acceptance of Letter of Intent (LOI). The validity of the BG shall be for a period of 66 (sixty six) months beyond the scheduled date of completion of supply as per supply order with additional one month claim period. If the supplier fails or neglect to perform any of his obligations under the contract, the APDCL shall have the right to forfeit in full or in part thereof at its absolute discretion the performance security deposit furnished by the supplier. No interest shall be payable on such deposits.

10. Abnormally Low Bids

a) An abnormally Low Bid is one in which the Bid price, in combination with other elements of the Bid, appears to be so low that it raises concerns as to the capability of the Bidder to perform the contract for the offered price.

b) For the purpose of identification and dealing with the ALBs, the MD, APDCL shall act as ex-officio Chairman of the Tender Evaluation Committee. The Committee shall undertake the following three-stage review process to check the possibility of an ALB by a potential successful bidder and take necessary action, as deemed fit. The decision of the Committee shall be conclusive and binding on all.

   i) identify abnormally low costs and unit rates by comparing them with the APDCL estimate or other substantially responsive bidders, or recently awarded similar contracts;

   ii) clarify and analyse the Bidder's resource inputs and pricing, including overheads, contingencies and profit margins; and

   iii) decide whether to accept or reject the Tender.

c) methodologies, as applicable:

   When Estimated Cost is disclosed: In this case, the ALB shall be identified based on the comparison with the Estimated Cost of the Project. The bids with quoted price below 10% (ten percent) of the Estimated Cost shall be treated as ALB by the Committee.

   When Estimated Cost is not disclosed: In this event, the Committee shall resort to a statistical approach in which first the Average Bid value shall be calculated among the substantially responsive bidders. Subsequently, the bids with quoted price found to be lower than 10% of the calculated average value shall be identified as ALBs.

d) Once a potential ALB has been identified, the Committee will seek a written explanation from the bidder of the reasons for the offered Tender price, including a detailed price analysis, proposed methodology, schedule, and allocation of risks and responsibilities. This may also include information regarding the economy of the manufacturing process; the services to be provided, or the construction method to be used; the technical solutions to be adopted; and any exceptionally favorable conditions available to the bidder for the works, equipment or services proposed.

e) Failure to furnish the required information against point 1.4 above within the stipulated time period will lead to the rejection of the bidder. In that case, the Committee will resort to the next lowest ranked bidder and reiterate the process, in case that bidder also happens to come under ALB.

f) On receiving the Bidder's justification, the Committee will meticulously examine the information provided by the bidder while taking into account all the relevant evidences produced in response to the request for clarification.

g) After examining the explanation given and the detailed price analyses presented by the bidder, the Committee may at its sole discretion:

a) Accept the Tender subject to requiring the bidder to submit an Additional Performance Security in pursuant to the Clause 2.1 to protect the Employer from any financial loss in the event of default of the successful bidder under the contract; or
b) Reject the Tender, if the evidence provided does not satisfactorily account for the low Tender price and make a similar determination for the next lowest ranked bid, if required.

11. Additional Performance Security in the event of ALB

a) In the event that an Abnormally Low Bid has been accepted for award of contract, the successful bidder shall be required to submit an additional Performance Security along with the regular Contract Performance Guarantee for an amount calculated as under:
   i) If the Bid Price offered by the shortlisted Bidder is lower than 10% but up to 20% of the estimated Project cost, then the Additional Performance Security shall be calculated @ 5% of the Contract Price.
   ii) If the Bid Price offered by the shortlisted Bidder is below 20% of the estimated Project cost, then the Additional Performance Security shall be calculated @ 15% of the Contract Price.
   iii) The additional Performance Security shall be treated as part of the Performance Security and shall be valid for a period coextensive with the Contract Performance Guarantee.
b) Non-submission of the additional Performance Security shall constitute sufficient ground to reject the bid and similar assessment pursuant to clause 1 will be made for the next ranked bidder.

12. Pre-bid meeting: Prospective bidders are requested to be attend the online/offline Pre-bid meeting on the date mentioned in the NIT without fail, so that all kind of queries/ clarifications can be discussed. APDCL will not accept any complain, request for correction/modification etc. after holding of pre-bid meeting. The link for joining the pre-bid meeting shall be shared on 25th May 2025.

13. Evaluation & Award of Work

a) The evaluation will be carried out in two parts techno-commercial evaluation along with demonstration of the sample relays at designated T&C Divisions and thereafter opening the price bid evaluation only of those bidders who qualify and meet the technical requirements and successfully demonstrate their offered relays to the satisfaction of APDCL Engineers. If any of the bidder is found non-responsive in techno-commercial evaluation than the bids are liable to be rejected and price bids of those bidders will not be opened.

b) The price quoted by the bidder shall not be unrealistic in comparison with market price and the price quoted should have parity with market price. Any bid found unrealistic in comparison with market price shall be liable for rejection.

c) APDCL is not bound to accept the lowest quoted rate if the bidder is not responsive as per requirement of APDCL's terms and conditions.

d) Supply shall be started from the date as stated in the work order, failing which order will be cancelled without further correspondence.

e) Supply Orders may be awarded to more than one responsive bidders at L1 rate.

f) APDCL will review past performance of the responsive bidders while issuing LOA even if the bidder is L1.

14. Period of Completion

120 days (One Hundred Twenty days) from the date of issue of supply order/ LoA.
NB: The project being a time bound GOA funded priority scheme the intending bidder who feel competent enough to complete within the stipulated period should only participate. No extension of work will be granted.

15. Implementation Schedule

Comprehensive implementation schedule of work for the mentioned works

S.N	Description	EXECUTION PERIOD	
		14 days	106 days
1	Approval of GTP		
2	Manufacture & supply of IEC 61850 Numerical Relays for feeders and Transformers		

16. Terms of Payments

a. The following terms shall be applicable for the payments against supply of the material as per the BOQ:-

i) 100% payment shall be admissible within 4 weeks from the date of receipt of the materials/equipment at site in full and good condition and subject to satisfactory completion of supply as per terms and conditions of the bid/Purchase Order and validity of performance guarantee submitted as per PBG clause less deduction of retention money and advance applicable as per terms and conditions stipulated in the purchase order.

ii) All payment shall be made from the office of the CGM (PP&D), APDCL. The bills after due verification and passing by the concerned consignee should be placed to the CGM (PP&D) for payment after all the lots received are verified by the respective consignees through ERP using MIGO. All billing transactions must be in strict adherence with ERP as per order APDCL/No-ERP/PMU/2018/04/17 Dated: 26.10.2018.

iii) The right of the supplier to have payment or reimbursement of any cost for execution of supply of relays as the case may be, against this order will be forfeited or deemed to have been relinquished if the claim for it is not preferred to the appropriate authority within 6(Six) months from the date of completion or deemed completion as per clause of Company's GCSE.

b. Payment shall be released subject to the following conditions: -

i) Supply should be strictly conforming to relevant technical specifications.

ii) Proper submission of bills duly verified by the consignee along with all relevant documents viz., Goods Receipt Note (GRN) issued by the consignee, challan, Bill Passing Journal Voucher, etc. complete in every aspect in strict adherence to transactions in ERP as stipulated vide No. APDCL/NO-ERP/ PMU/2018/04/17, dated 26.10.2018 shall be ensured.

iii) The supplier should intimate the undersigned the dispatch of every consignment along with supporting documents for our record.

The right of the supplier to have payment or reimbursement of any cost for execution of works/supply of materials as the case may be, against this order will be forfeited or deemed to have been relinquished if the claim for it is not preferred to the appropriate authority within 6(Six) months from the date of completion or deemed completion as per clause of Company's GCSE.

Bank Guarantees (BG) submitted along with the bid or to be submitted should be from any branch of nationalized or scheduled Bank of RBI located in India.

17. Guarantee and Penalties

a) Liquidated Damages (LD): The proposed work is on top priority of APDCL and therefore has to be completed within stipulated/agreed schedule. Any delay beyond that shall attract penalty as per Company's General condition of supply and erection(available in official website).
b) Warranty from the manufacturer shall be produced along with manufacturer's test certificate for all equipment/ materials covered under Manufacturer's warranty.
c) Relays will be **guaranteed** for satisfactory performance for a period of **66 months** from the date of receipt at the respective consignee. Any problem/malfunction/defect in the numerical relays in the said period shall be attended within 24 hours from the time of intimation (written or telephonic) in online mode. If the problem/malfunction/defect is still not resolved upon the online consultation as above, the same shall be attended free of charge and rectified by the OEM which shall be inclusive of pickup of the defective relay/component from respective T&C Lab within 15 (Fifteen) days after the receipt of the written complaint through mail or letter.

18. Testing & Inspection

a) All the materials to be supplied shall be tested /inspected at manufacturer's works by authorized officer/ Engineers of APDCL before dispatching them to worksite. The OEM shall intimate the CGM (PP&D) sufficiently in advance (at least 15 days) regarding the date of inspection of materials/ equipment at manufacturer's works. The materials to be dispatch to the T&C Divisions of APDCL only after receipt of dispatch clearance to be issued by the CGM (PP&D) after satisfactory testing of the same.
b) The bidder shall have to submit copies type test reports of the RELAYs to be supplied as per latest IEC/IS Standards along with the bid. Only the tests carried out at **CPRI / DNVGL shall be accepted**. Type test reports, conducted 7 years prior to the date of opening of tender shall not be accepted.

Equipment, which have never been tested for critical performance, shall not be accepted. In such cases, a promise or agreement by a bidder to have the equipment tested after award of a contract is not acceptable.

19. Approvals/Clearances

GTP, drawings and all technical aspects of IEC compliant Numerical differential & directional/non-directional feeder protection relay shall be approved by CGM (PP&D), APDCL.

20. Clarification of Bids

To assist in the examination, evaluation, comparison of the Bids, and eligibility or qualification of the Bidders, the Employer may, at its discretion, ask any Bidder for a clarification of its Bid and/or seek information related to historical data/ documents pertaining to credentials of the Bidders and the Bids, that the Employer may require. Any clarification submitted by a Bidder in respect to

its Bid and that is not in response to a request by the Employer shall not be considered. The Employer's request for clarification and the response shall be in writing. No change, including any voluntary increase or decrease, in the prices or substance of the Bid shall be sought, offered, or permitted.
Moreover, If a Bidder does not provide clarifications of its Bid or data/ documents sought, by the date and time set in the Employer's request for clarification/ data/ document, its Bid may be rejected.

21. Enviornmental Consideration

While carrying out the assignment, no damage to environment /forests will be caused by the awarded bidder. If so done, the awarded bidder will have to compensate the same to the satisfaction of the licensed Authority.

22. Variation of Quantity:

APDCL shall have the right to increase/ decrease the ordered quantity by 20% within 50 days of the period of completion of supply order and the same shall be supplied at the same rates/ prices and terms and conditions stipulated in the order except in regard to delivery schedule, which shall be mutually agreed upon in case of increase in the ordered quantity

23. Termination of Work Order

Company reserves the right to terminate the work order at any stage in accordance with the Company's General Condition of Supply and Erection in force

24. Termination of contract on Supplier's default

If the Supplier neglect to execute the Works with due diligence and expertise or shall refuse or neglect to comply with any reasonable order given to him, in the Contract by the Purchaser in connection with the works or shall contravene the provisions of the Contract, the owner may give notice in writing to the supplier to make good the failure, neglect or contravention complained of. Should the supplier fail to comply with the notice within thirty (30) days from the date of serving the notice, then and in such case the Owner shall be at liberty to employ other workmen and forthwith execute such part of the works as the supplier, may have neglected to do or if the owner shall think fit, without prejudice to any other right he may have under the Contract to take the work wholly or in part out of the supplier 's hands and re-contract with any other person or persons to complete the works or any part thereof the Owner shall be entitled to retain and apply any balance which may otherwise be due on the Contract by him to the contractor, or such part thereof as may be necessary, to the payment of the cost of executing the said part of the work or of completing the Works as the case may be. If the cost of completing of Works or executing a part thereof as aforesaid shall exceed the balance due to the contractor, the contractor shall pay such excess. Such payment of excess amount shall be independent of the liquidated damages for delay which the contractor shall have to pay if the completion of works' is delayed.

In addition, such action by the Owner as aforesaid shall not relieve the Contractor of his liability to pay liquidated damages for delay in completion of works as defined in clause no.26 of GCSE

Such action by the Owner as aforesaid, the termination of the Contract under this clause shall neither entitle the contractor to reduce the value of the contract Performance Guarantee nor the time thereof. The contract Performance Guarantee shall be valid for the full value and for the full period of the contract including guarantee period.

25. Termination of contract on purchasers' initiative

The Purchaser reserves the right to terminate the Contract either in part or in full due to reasons other than those mentioned under clause entitled "Contractor's Default." The Purchaser shall in such an event give fifteen (15) days' notice in writing to the Contractor of his decision to do so. The Contractor upon receipt of such notice shall discontinue the work on the date and to the extent specified in the notice, make all reasonable efforts to obtain cancellation of all orders and contracts to the extent they are related to the work
terminated and terms satisfactory to the Purchaser, stop all further sub-contracting or purchasing activity related to the work terminated, and assist the Purchaser in maintenance, protection, and disposition of the Works acquired under the Contract by the Purchaser.
In the event of such a termination, the Contractor shall be paid compensation, equitable and reasonable, dictated by the circumstances prevalent at the time of termination.
If the Contractor is an individual or a proprietary concern and the individual or the proprietor dies the Purchaser is satisfied that the legal representatives of the individual contractor or of the proprietor of propriety concern and in the case of partnership, the surviving partners, are capable of carrying out and completing the Contract, the Purchaser shall be entitled to cancel the Contract as to its uncompleted part without being in any way liable to payment of any compensation to the estate of deceased Contractor and/or to surviving partners of the contractor's firm on account of the cancellation of the contract. The decision of the purchaser that the legal representatives of the deceased contractor or surviving partners of the contractor's firm cannot carry out and complete the contract shall be final and binding on the parties. In the event of such cancellation, the Purchaser shall not hold the estate of the deceased Contractor and/or the surviving partner of the Contractor's firm liable to damages for not completing the Contract.

26. Frustration of contract

In the event of frustration of the contract of supervening impossibility in items of Section 56 of the Indian Contract Act, parties shall be absolved of their responsibility to perform the balance portion of the contract.

27. Disclaimer:

While the Company will make every endeavour to extend necessary facilitation in expediting the work, the contractor shall be responsible to organize and arrange all necessary inputs right from mobilization activities up to completion of the project. Company will not entertain any failure / delay on such accounts. Also, Company will not be responsible for any compensation, replenishment, damage, theft etc. as may be caused due to negligent working, insufficient coordination with Government / non-Government / Local Authority by the contractor and/ or his personnel deputed for work. The contractor shall take necessary insurance coverage under LIC/GIC etc. for his working personnel and the goods in store as well as in transit. The contractor will be deemed to have made him acquainted with the local working conditions at site(s) and fully provide for into the bid submitted.

28. Before submitting the tender, the intending bidders are requested to physically survey/inspect the location/route and the scope of supply and have discussion with concerned Consignee in this regard in order to minimize issues after awarding the contract. No additional quantity other than the supply order will be entertained.

29. If for any reason the last date of receiving and opening of tender or the date of pre-bid discussion is a declared holiday the next working day will be considered for receiving and opening of bid or pre bid discussion.

30. Terms and conditions, which are not specified, herein above will be governed by the APDCL's General Conditions of supply and erection in force APDCL's General Conditions of supply and erection (GCSE) may be seen in our official website:www.apdcl.org.

31. Force Majeure

a. The Supplier shall not be liable for forfeiture of its Performance Security, liquidated damages, or termination for default if and to the extent that it's delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

b. For purposes of this Clause, "Force Majeure" means an event or situation beyond the control of the Supplier that is not foreseeable, is unavoidable, and its origin is not due to negligence or lack of care on the part of the Supplier. Such events may include, but not be limited to wars or revolutions, earthquake, fires, floods, epidemics, quarantine restrictions, and freight embargoes.

c. If a Force Majeure situation arises, the Supplier shall promptly and no later than 10 (ten) days from the first occurrence thereof, notify APDCL in writing of such condition and the cause thereof. Unless otherwise directed by APDCL in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

d. The decision of APDCL with regard to the occurrence, continuation, period or extent of Force Majeure shall be final and binding on the Contractor.

32. Settlement of Disputes

a. APDCL and the Supplier shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the Contract.

b. If the Parties fail to resolve such a dispute (the date of commencement of the dispute shall be taken from the date when this clause reference is quoted by either Party in a formal communication clearly mentioning existence of dispute or as mutually agreed) or difference by mutual consultation within twenty-eight (28) days from the commencement of such consultation, either Party may require that the dispute be referred for resolution to the formal mechanisms specified in the subsequent Clauses under this BID DOCUMENT.

33. Arbitration

All disputes or differences in respect of which the decision, if any, of the Employer has not become final or binding as aforesaid shall be settled by arbitration in the manner provided in the Company's General Conditions of Supply and Erection (GCSE).

34. Legal Jurisdiction

For any litigation arising out of the Contract which cannot be resolved through mutual agreement or through Arbitration, the Gauhati High Court will have the sole jurisdiction.

NOTICE AND ANNEXURES

ANNEXURE- 1 (A)

LIST OF ONGOING & COMPLETED WORKS								
SN	**Name of work**	**Order No**	**Quantum of work**	**Contact Value**	**Scheme**	**Stipulated date of completion as per w/order**	**Date of actual completion / present status**	**Remarks**
1								
2								
3								

NB : This annexure must be certified by concern officer not below the rank of DGM/ CEO.

BIDDER'S INFORMATION SHEET: Annexure- I (B)

Bidder's Information	
Bidder's legal name	
Bidder's country of constitution	
Bidder's year of constitution	
Bidder's legal address in country of constitution	
Bidder's authorized representative (name, address, telephone numbers, fax numbers, e-mail address)	

Attached are copies of the following original documents.

❑ 1. In case of single entity, articles of incorporation or constitution of the legal entity named above.

FINANCIAL SITUATION (FIN-1)

Each bidder must fill in this form

Financial Data for Previous 3 Years [Rs in lakhs]		
Year 1:	**Year 2:**	**Year 3:**

Information from Balance Sheet

Total Assets			
Total Liabilities			
Net Worth			
Current Assets			
Current Liabilities			

Information from Income Statement

Total Revenues			
Profits Before Taxes			
Profits After Taxes			

❑ Attached are copies of financial statements (balance sheets including all related notes, and income statements) for the last three years, as indicated above, complying with the following conditions.

- Historic financial statements must be audited by a certified accountant.
- Historic financial statements must be complete, including all notes to the financial statements.
- Historic financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).

Form FIN - 2: Average Annual Turnover

Each Bidder must fill in this form

Annual Turnover Data for the Last 3 Years	
Year	**Amount (Rs. In lakhs)**
Average Annual Turnover	

The information supplied should be the Annual Turnover of the Bidder in terms of the amounts billed to clients for each year for contracts in progress or completed in ₹(Rupees).

Form FIN – 3: Financial Resources

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as indicated in Section 3 (Evaluation and Qualification Criteria)

Financial Resources		
No.	**Source of financing**	**Amount (Rs. In lakhs)**
1		
2		
3		
4		

ANNEXURE- 2 (A)

Details of information required for calculating the Bid Capacity.

(Bid Capacity = A*N*2 - B)

STATEMENT FOR DETERMINING VALUE OF 'A'

SL No.	Name of work	Value of Transformer supply works done during the year (excluding advance such as mobilisation advance etc.) Rs. In Lakhs. All other conditions of this annexure will remain same.					
		5th year	4th year	3rd year	2nd year	1st year	Total
		FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24	
		E	D	C	B	A	
	Factor for updating to current price level	1.464	1.331	1.21	1.10	1.0	
	Updated value of work						

Note:

1. 5th year is taken as FY 2019-20 and 1st year is taken as FY 2023-24.
2. Figures from Column E to A shall be supported by certificates issued by the officer not below the rank of **CEO/DGM/Superintending Engineer** of electrical utilities.

ANNEXURE- 2 (B)

STATEMENT FOR VALUE OF 'B'

Value of existing commitments and ongoing works to be completed in the period stipulated for completion in the present tender.

AFFIDAVIT

(To be typed on Rs. 100/- non –judicial stamp paper)

I/We …….. aged years son/daughter of …….. Do hereby solemnly affirm and declare as follows for and on behalf of the Firm: ……..

LIST OF EXISTING COMMITMENT AND ONGOING WORKS

SL No.	Name of Work	Year of commencement of work	Contract Value (Rs. In Lakhs)	Stipulated period of Completion	Value of Work executed	Value of remaining works to be completed

* All Certificates regarding this will required to be duly signed by the officer not below the rank of **CEO/DGM/Superintending Engineer** of electrical utilities.

ANNEXURE- 2(C)

AFTER SALES SERVICES PROFORMA TO BE TYPED ON Rs 100 STAMP PAPER & NOTARISED

To,

The Chief General Manager (PP&D),
APDCL, Bijulee Bhawan, Paltanbazar
Guwahati-781001

Sub: UNDERTAKING FOR REQUIRED SPARES/REPLACEMENTS & EXTENDING PROMPT AFTER SALES SERVICE

Ref: Purchase order no :_____under NIT 25/1

We have supplied APDCL following items :-

1 ----------

2 ----------

3 ---------- etc.

In this regard, as stipulated by APDCL, we hereby undertake to supply the required spares/replacements and extend prompt after sales service for (item name) being offered by us.

This condition of supply of spares /after sales services and replacement of the same by us will be valid for a **Period of fifteen (15) Years** from the date of supply of equipment/materials or as mutually agreed at the time of supply.

In case we fail to extend the replacement and after sales services as above, APDCL will have the right to take necessary action as deemed fit.

(Signature of authorized Person with Seal)

Date:

WITNESS1	WITNESS 2
Signature:	Signature:
Name:	Name:
Designation:	Designation:

FORMS OF BID

PROFORMA OF BANK GUARANTEE FOR EARNEST MONEY
(To be stamped in accordance with Stamp Act)
The non-Judicial stamp paper should be in the name of issuing bank

Ref…….. **Bank Guarantee No……..**
Date……..

To

The Chief General Manager (PP&D)
Assam Power Distribution Company Ltd.
Bijulee Bhawan, Paltanbazar
Guwahati-1

Dear Sirs/ Madam,

In accordance with invitation to bid under your Bid No…….. M/s…….. having its Registered/ Head Office at…….(hereinafter called the 'Bidder') wish to participate in the said Bid or …… and you, as a special favour have agreed to accept an irrevocable and unconditional Bank Guarantee for an amount of …….. valid upto…….. On behalf of Bidder in lieu of the Earnest Money deposit of the BID required to be made by the bidder, as a condition precedent for participation in the said Bid.

We, the …….. Bank at …… have our Head Office at……..(local address) guarantee and undertake to pay immediately on demand by Assam Power Distribution Company Limited, the Amount of ……..(in words & figures) without any reservation, protest, demur and recourse. Any such demand made by said 'Purchaser' shall be conclusive and binding on us irrespective of any dispute or difference raised by the Bidder.

The Guarantee shall be irrevocable and shall remain valid up to and including ……..@..... if any further extension of this guarantee is required, the same shall be extended to such required period (not exceeding one year) on receiving instruction from M/s …….. on whose behalf this guarantee is issued.

In witness whereof the Bank, through its authorized office, has set its hand and stamp on this…… day of ……20…… at ……

WITNESS

……	……..
(Signature)	(Signature)
……..	……
(Name)	(Name)
……..	……
(Official Address)	(Official Address)

@ This date shall be thirty (30) days after the last date for which the bid is valid.

PROFORMA OF BANK GUARANTEE FOR CONTRACT PERFORMANCE
(To be stamped in accordance with Stamp Act)

Ref…….. **Bank Guarantee No……..**
Date……..

To

The Chief General Manager (PP&D)
Assam Power Distribution Company Ltd.
Bijulee Bhawan, Paltan bazar
Guwahati-1

Dear Sirs/ Madam,

In consideration of Assam Power Distribution Company Ltd., (herein after referred to as the 'Purchaser' which expression shall unless repugnant to the context or meaning thereof include its successors, administrators and assigns) having awarded to M/s…… ……..with registered/ Head office at ……..(hereinafter referred to as " Contractor" which expression shall unless repugnant to the context or meaning thereof include its successors, administrators, executors and assigns), a Contract by issue of 'Purchaser's Letter of Intent No…… dated…….. and the same having been acknowledged by the contractor, resulting in a contract and contractor having agreed to provide a Contract Performance Guarantee for the faithful performance of the entire Contract equivalent to 10(%) of the said value Contract to the Purchaser.

We…….. (Name & Address) having its Head Office at ……(hereinafter referred to as the " Bank" , which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns) do hereby guarantee and undertake to pay the Purchaser, on demand any or all monies payable by the contractor to be extent of ₹ …….. at any time up to ……..**(day/month/year) without any demur, reservation , contest , recourse or protest and / or without any reference to this contractor. Any such demand made by the purchaser on the bank shall be conclusive and binding notwithstanding any difference between the Purchaser the Contractor or any dispute pending before any Court, Tribunal, Arbitrator or any other authority. The bank undertakes not to revoke this guarantee during its currency without previous consent of the purchaser and further agrees that the guarantee herein contained shall continue to be enforceable till the Purchaser discharges this guarantee.

The Purchaser shall have the fullest liberty without affecting in any way the liability of the Bank under the guarantee, from time to time to extend the time for performance or the contract by the contractor. The Purchaser shall have the fullest liberty, without affecting this guarantee, to postpone from time to time the exercise of any power vested in them or of any right which they might have against the contractor, and to exercise the same at any time in any matter, and either to enforce or to for bear to enforce any covenants, contained or implied, in the contract between the purchaser and the contractor or any other course or remedy or security available to the purchaser. The Bank shall not be released to its

obligations under these presents by any exercise by the purchaser of its liberty with reference to the matters aforesaid or any of them or by reason of any other act of omission or commission on the part of the purchaser or any other indulgences shown by the purchaser or by any other matter or thing whatsoever which under law would, but for this provision have the effect of relieving the Bank.

The bank also agrees that the purchaser at its option shall be entitled to enforce this guarantee against the Bank as a principal debtor, in the first instance without proceeding against the contractor

and not withstanding any security or other guarantee the purchaser may have in relation to the Contractor's liabilities.

Notwithstanding anything contained herein above our liability under this guarantee is restricted to …….. And it shall remain in force up to an including …….. and shall be extended from time to time for such period (not exceeding 1 year) as may be desired by M/s……..on whose behalf this guarantee has been given.

Dated this…….. Day of …….. 20……. at…….

WITNESS

……..	…….
(Signature)	(Signature)
……	……..
(Name)	(Name)
……..	……..
(Official address)	(Official address)

Attorney as per power
Of Attorney No……..
Date……..

NB: The stamp paper of appropriate value shall be purchased in the name of issuing bank.

PROFORMA OF EXTENSION OF BANK GUARANTEE

Ref…….. **Date……..**

To

The Chief General Manager (PP&D)
Assam Power Distribution Company Ltd.
Bijulee Bhawan, Paltanbazar
Guwahati-1

Dear Sirs/ Madam,

Sub: Extension of Bank Guarantee No…….. for Rs…….. Favouring yourselves, expiring on …….. On account of M/S…….. in respect of contract no…….. dated …….. (herein after called original Bank Guarantee).

At the request of M/s …… we …… bank, branch office at …….. and having its Head Office at …….. Do hereby extend our liability under the above mentioned Bank Guarantee No…… dated……for a further period of …… (Years/ Months) from…….. to expire on…….. expect as provided above, all other terms and conditions of the original Bank Guarantee No…….. dated …….. Shall remain unaltered and binding.

Please treat this as an integral part of the original Bank Guarantee to which it would be attached.

Yours faithfully

For……
Manager/ Agent/Accountant ……..
Power of attorney No……
Dated……
SEAL OF BANK

Note: The non-judicial stamp paper of appropriate value shall be purchased in the name of the Bank who has issued the Bank Guarantee.

FORMAT OF PRICE BID AND TENDER PERFORMA

Price Bid Format/BOQ
(To be filled up by the bidder)

For each item mentioned in the price bid, the bidder must furnish details of rate as per the format provided below for delivery at the different T&C Divisions and is to be submitted along with the bid document. The quoted GST Charges shall be added up with the unit price quoted in the provided format of BOQ and financial evaluation shall be carried out on the total amount.

Rate quoted shall be inclusive of all taxes, duties, carriage, loading, unloading and insurance etc.

SN	Description of Equipment	unit	Qty	Unit Rate including F&I	GST @ 18 %	Rate including GST
1	IEC 61850 Compliant Non-Directional Numerical Over current and Earth Fault Protection RELAY with 14 BI and 10 BO	No.	393			
3	IEC 61850 Compliant Numerical Transformer Differential Protection RELAY with 14 BI and 10 BO	No.	44			

Manufacturer Seal and Signature

Tender Proforma part – 1 (Techno-commercial)

SL. NO.	PARTICULARS	SUBMITTED BY MANUFACTURER	PAGE NO.
	GENERAL		
1	Name of Manufacturer &	[Text]	
2	Complete Address of registered factory/ office	[Text]	
3	Contact No	[Text]	
4	E-mail	[Text]	
5	Document in support of legal status of firm		
6	Board resolution of the company to authorizing the signatory in case of company		
7	Information regarding any litigation, current or during the last five years, in which the Bidder is involved, the parties concerned, and disputed amount		
9	Particulars of payment made for Purpose of Tender documents money Receipt No and Date	Boolean (If Yes, Necessary docs to be provided)	
10	Amount of earnest money paid with Money receipt No. and date Deposit No. and Date	Boolean (If Yes, Necessary docs to be provided)	
11	Details of the Bank Guarantee as EMD (BG/TD/Bank Call Deposit)		
12	Whether ISO 14001:2004, ISO 27001:2005, ISO 9001:2008, OHSAS 18001:2007 certified? If yes, enclose valid license/certificate	Boolean (If Yes, Necessary docs to be provided)	
13	Whether IEC 61850 Ed I & II Compliant	Boolean (If Yes, Necessary docs to be provided)	
14	Type Test for IEC 61850 Ed I & II is performed in CPRI/ DNVGL	Boolean (If Yes, Necessary docs to be provided)	
15	Whether IEC 61850 9-2 LE Compliant for process bus sampled values	[Text]	
16	Acceptance of terms of payment	Boolean (Yes/No)	
	FINANCIAL		
17	PAN	[Text]	
18	GST	[Text]	
19	Whether Income Tax Clearance certificate submitted	Boolean (If Yes, Necessary docs to be provided)	
20	Audited Balance sheet, Profit & Loss account, Auditor's report for last three year (FY 2022-23, FY 2023-24 & FY 2024-25)	[Text]	
21	Annual Turnover during the Past 3Years (Duly Audited Annual Report certified by Registered Chartered Accountant to be submitted)	[Text]	
22	Authority to seek references from the Bidder's Bankers		
23	Value of similar work performed by the bidder in each of the last five years – Statement		

	TECHNICAL ABILITY AND EXPERIENCE		
24	Experience in Manufacture of similar Items (Enclose Factory Registration Certificate and List of Plant & Machinery)	[Text]	
25	Whether all in-house facilities available for Design, R&D, Manufacture, Acceptance, Routine Testing & Tests during manufacture on raw and in process material at works (Describe the facilities available with make and capacity of machinery duly supported with documentary evidence, viz. calibration certificates (NABL certified), photographs, acceptance test certificates etc.)	Boolean (If Yes, Necessary docs to be provided)	
26	Whether the manufacturer has in-house NABL accredited testing laboratory based on IS/ISO/IEC 17025: 2005/2017: General Requirements for the Competence of Testing and Calibration Laboratories (Second Revision)	Boolean (If Yes, Necessary docs to be provided)	
27	Submit information regarding level of automation achieved and list of areas where manual processing exists.	[Text]	
28	Directorate of Industries registration	Boolean	
29	Whether manufacturer has complete manufacturing process along with flow chart should be certified and documented.	Boolean (If Yes, Necessary docs to be provided)	
30	List of Technical manpower available with their Qualification and Experience	[Text]	
31	Details and Test Certificates of brought out materials from respective manufacturers	[Text]	
32	Details of similar items supplied to other utilities/ PSU (List of orders executed to be enclosed since date of inception, duly supported with order copies for few of recent orders)	[Text]	
33	Whether Performance certificates from 'end utilities' in respect of similar items supplied is submitted. (Certificates from minimum 2 prominent 'end utilities' indicating satisfactory operation for not less than 2 years to be submitted)	Boolean (If Yes, Necessary docs to be provided)	
34	Whether Quality Assurance Plan available? If yes, please furnish the statement giving list of important raw materials, names of sub-suppliers for the raw materials, list of standards according to which the raw materials are tested, list of test normally carried out on raw materials in presence of vendor's representative and copies of test certificates	Boolean (If Yes, Necessary docs to be provided)	
35	Whether any legal issues pending between vendor/manufacturer & APDCL	Boolean (If Yes, Necessary docs to be provided)	

Manufacturer Seal and Signature

TECHNICAL SPECIFICATION

1. Scope:

1.1. This specification covers design, manufacture, assembly, testing before supply, inspection, packing and delivery and other basic technical requirements in respect of protective directional/non-directional Overcurrent & Earth Fault and Differential multifunctional combined microprocessor-based protection and management relays for 33 kV and 11 kV feeders and for 33/11KV Power Transformers installed at various 33/11 kV sub-stations. The bidder is to be supply Relay against this specification is required for vital installations where continuity of service is very important. The design, materials and manufacture of the equipment shall, therefore, be of the highest order to ensure continuous and trouble-free service over the years. The manufacturer has to design the schematics for protection and control of all equipment including monitoring indications, visual and audible alarm, inter locking schemes among different equipment. Any other requirement which are not specifically covered here but which are necessary for successful commissioning of the relays are also within the scope of the Contract.

1.2. The relays manufactured should conform to the relevant standards and of highest quality of engineering design and workmanship. The equipment manufactured shall ensure satisfactory and reliable performance throughout the service life.

2. Service Conditions:

2.1. System particulars:

Nominal system voltage	33 kV & 11 kV
Corresponding highest system voltage	36 kV & 12 kV
Frequency	50 Hz±3%
Number of phases	3
Neutral Earthing	11 kV solidly earthed

2.2. Climatic Conditions:

Equipment supplied against the specification shall be suitable for satisfactory operation under the following tropical conditions:

Max. ambient air temperature	45 ° C
Max. relative humidity	100 %
Max. annual rainfall	3500 mm
Max. wind pressure	260 kg/sq.m.
Max. altitude above mean sea level	1000 mtrs.
Isoceraunic level	45
Reference Ambient Temperature for temperature rise	60 ° C
Climatic Condition	Moderately hot and humid tropical climate conducive to rust and fungus growth

The climatic conditions are prone to wide variations in ambient conditions and hence the equipment shall be of suitable design to work satisfactorily under these conditions.

3. Applicable Standards:

3.1. Unless otherwise specified all equipment and material shall conform to the latest IS/IEC applicable standards. Equipment complying with other internationally recognized standards will also be considered if it ensures performance equivalent or superior to Indian standards. In the event of supply of equipment conforming to any international / internationally recognized standards other than the standard listed below.

3.2. All the relays provided under the specification shall generally conform to the latest issues of the following:

a)	IS 12063/1987	Degree of Protection provided for enclosure of electrical equipment.
b)	IS 5/2004	Color for ready mixed paints & enamels.
c)	IS 3231 / 1986 & 1987	Electrical relays for power system protection
d)	IEC 60255	Numerical protection relay
d)	IS 8686/1977	Static Protective Relays
e)	IS 1248/2003	Indicating instruments
f)	IEC 61850 Edition I & II	Communication Protocol for RELAYs.
g)	IEC 62439	HSR& PRP
h)	IEEE 1588	Precision Time Protocol
i)	IEC 60068	HEC for PCBs.
l)	IS 375	Marking and arrangement for switchgear Bus
m)	IS 5578/1984	Marking of insulated conductors.

Table 1: List of standard applicable

4. GENERALREQUIREMENT OF NUMERICAL RELAYS:

The relay in general shall comply with the all the requirements mentioned in General requirements below. The following protections shall be provided to feeder and power transformers by numeric relays.

4.1. Numerical multifunctional combined microprocessor based feeder protection and management relay will protect the 33 kV or 11kV feeders and 33/11kV transformers from all electrical and other faults along with reporting system, disturbance record for fault analysis. Manufacturer should comply with any special requirement or feature asked for retrofitting the relays. All numerical relays shall be provided with 'Relay Failure Annunciation contact" which must be extra from the output contact specific Relay in the detail technical specification.

4.2. **The numerical relay must have an IEC 61850 Edition 1, Edition 2 certification. The numerical relay must have PRP and HSR compliant dual redundant rear RJ45 port and process bus 9-2LE support for future upgradation.**

4.3. The MTTR of the offered relay shall be less than 30 mins facilitating quick replacement of faulty unit without disturbing majority of wirings.

4.4. The relays shall employ IPC [institute for interconnecting and packaging electronic circuits] Class 3 printed circuit boards i.e. IPC 610-3.

4.5. The relay shall have the facility to program the pickup threshold between 40 to 150 % of VDC independently per digital input to prevent the spurious pick up of binary during inputs DC earth fault condition and should be ESI 48- 4EB2 compliant.

4.6. The relays provided should comply with the international standards of NERC-CIP/BDEW for cyber security to provide protection against unauthorized disclosure, transfer, modification, or destruction of information and/or information systems, whether accidental or intentional.

4.7. The OEM must execute a non-disclosure agreement with APDCL.

4.8. All PCB used in relays should have harsh environmental coating as per standard IEC 60068 (HEC) to increase the particle repellence and thereby increasing the life of relay. RELAY shall be manufactured using lead- free components. The bidder must submit supporting documents regarding the conformity of the relevant standard in the offered relay. G3 certificate shall be accepted as a proof of conformity for operation in the extreme environmental condition.

4.9. The relay shall provide an operating range of -40°C to 60°C and be tested as per IEC 60068 for 16 Hours operation between -40°C to 85°C.

4.10. The relay shall have a USB/RS232/RJ45 communication port for connecting to a local PC/Laptop for setting and viewing the data from the relay. The relay must have either IEC61850 + IEC 103 or IEC 61850 + Modbus with minimum 2 nos. redundant PRP and HSR compliant RJ45 communication port. Use of any type of converter is not acceptable.

4.10 The RELAY shall be provided with 1 set of common support software compatible with Windows 10 which will allow easy uploading of settings of RELAY in addition to downloading of event, faults, disturbance records, measurements for trouble shooting purposes.

4.11. Manufacturer of relays should have their own SAS application so that they can provide easy system solution if required in future.

4.12. The manufacturer shall provide all necessary software tools along with source codes to perform addition of bays in future and complete integration with SCADA by the User. These software tools shall be able to configure relay, add analog variable, alarm list, event list, modify interlocking logics etc. for additional bays / equipment which shall be added in future.

4.13. Relay parameterization should be accomplished with the front panel keys and display. Due to the numerous settings, this manual method can be somewhat laborious. To simplify programming and provide a more intuitive interface, set points can be entered with a PC/Laptop running Setup software should be provided with the relay so that the engineers can configure /upload/ Download the settings and Disturbance records without any hassles.

5. TYPE TESTS:

Offered relay must be type tested for the following tests:

S.N	Type Test	Test Specification
1	**Performance test**	
1.1	Measurement accuracy of characteristic quantity and specified time	IEC 60255-1
1.2	Limits of operating range of auxiliary energizing inputs and auxiliary voltage dependence	IEC 60255-1
1.3	Limits of frequency range and frequency dependence	IEC 60255-1
1.4	Limits of ambient temperature and ambient temperature dependence	IEC 60255-1
2	**Rated burden requirement**	
2.1	Measuring circuits	IEC 60255-1
2.2	Auxiliary circuits	IEC 60255-1

2.3	Signaling inputs	IEC 60255-1
3	**Thermal requirements**	
3.1	Maximum allowable temperature	IEC 60255-27
3.2	Limits of continuous and temporary thermal withstand and values of input energizing quantities	IEC 60255-27
3.3	Limits of short time thermal withstand value of input energizing quantities	IEC 60255-27
3.4	Limiting dynamic value	IEC 60255-6
4	**Insulation test**	
4.1	Insulation resistance measurement	IEC 60255-27
4.2	Dielectric test	IEC 60255-27
4.3	Impulse voltage withstand capability test	IEC 60255-27
4.4.	Protective bonding resistance test	IEC 60255-27
5	**Power supply requirements**	
5.1	Voltage dips to dc auxiliary voltage	IEC 60255-26
5.2	Interruptions to dc auxiliary voltage	IEC 60255-26
5.3	Ripple in dc auxiliary voltage	IEC 60255-26
5.4	Voltage dips to AC auxiliary voltage	IEC 60255-26
5.5	Interruptions to ac auxiliary voltage	IEC 60255-26
6	**Environmental test**	
6.1	Cold test	IEC 60068-2-1
6.2	Dry heat test	IEC 60068-2-2
6.3	Damp heat, cyclic	IEC 60068-2-30
6.4	Storage temperature test	IEC 60068-2-1 & 2
	Electromagnetic compatibility requirement	
7	**Emission tests**	
7.1	Radiated radio-frequency emission test	IEC 60255-26
7.2	Conducted radio-frequency emission test	IEC 60255-26
8	**Immunity tests – enclosure**	
8.1	Electrostatic Discharge test	IEC 60255-26
8.2	Radiated radio-frequency immunity test	IEC 60255-26
8.3	Power-frequency magnetic field immunity test	IEC 60255-26
8.4	Pulse magnetic field immunity test	IEC 61000-4-9
8.5	Damped oscillatory magnetic field immunity test	IEC 61000-4-10
9	**Immunity tests- Port**	
9.1	Immunity to conducted disturbances, induced by radio-frequency fields	IEC 60255-26
9.2	Fast transient disturbance test	IEC 60255-26
9.3	Slow Damped Oscillatory Waves Immunity test (1 MHz burst)	IEC 60255-26
9.4	Surge Immunity test	IEC 60255-26
9.5	Power frequency immunity test	IEC 60255-26
10	**Contact performance**	
10.1	Contact making/Breaking capacity test	
10.2	Continuous capacity	
11	**Mechanical performance requirements**	
11.1	Durability of relay operation	IEC 60255-6
11.2	Durability of plug-in relays	IEC 60255-6
11.3	Durability of relay setting controls	IEC 60255-6
11.4	Vibration response and endurance test	IEC 60255-21-1

11.5	Shock response and withstand test	IEC 60255-21-2
11.6	Bump test	IEC 60255-21-2
11.7	Seismic test	IEC 60255-21-3
12	**IEC 61850 performance requirements**	
12.1	Level A 1 certificate	
12.2	IEC 61850 Edition II Part 6,7-1,7-2,7-3,7-4 and 8-1	
12.3	IEC 61850-5 Edition 2 Performance class P1	

Type test reports for the above tests shall be submitted for verification of APDCL along with bid, failing which bid will be rejected. The type test reports should be either from CPRI or DNV-GL or ERDA.

6. Training:

Suitable training for minimum 3 (three) days shall be imparted to APDCL's T&C engineers (Minimum batch size: 5-10 nos.) at OEMs factory premises/APDCL test lab after issue of LoA on the following items:

a) Relay setting and parameterization
b) Relay configuration with respect to I/P, O/P and functional block for protection.
c) Configuration, communication and automation achievable through GOOSE provision in substations.
d) Configuration and Interfacing required for third party SCADA System Integration.
e) Diagnostic features for disturbance records.
f) Relay troubleshooting.

The bidder shall also submit the detailed report on the training imparted containing all the contents for the training. The entire cost of the training shall be borne by the bidder.

7. Inter-operability test and Demonstration: The demonstration and inter –operability test will be an integral part of the evaluation process, for which due intimation will be sent to the bidders. The manufacturer shall have to demonstrate inter –operability test with other bidders participating in the tender in presence of APDCL's officials. All the necessary arrangement to perform the inter-operability test will be under the scope of the bidders. All bidder has to bring the following equipment to demonstrate the Interoperability testing.

i. Each Type of offered relay (Relay Type and complete article no should match as per tender offering) – 1 no. each
ii. Ethernet Switch (Type of Port as offered in Numerical Relays) – 2 nos.
iii. GPS / SNTP Server – 1 no.
iv. Required Patch Chord – 1 set
v. Power Supply Modules – as required.

The following points to be checked during the interoperability test :-

a) Necessary user friendly configuration tool shall be provided to configure the RELAY. It should be compatible with SCD / ICD files generated by a third party system
b) Goose signals shall be freely configurable for any kind of signals using graphic tool/user friendly software.
c) Time synchronization from the SNTP server.
d) Signal exchange over GOOSE communication from one make of relay to the other make of relays.

e) Binary signals to be exchanged.

f) Control command to be published.

g) One LED to be configured with GOOSE signal received from the other RELAY for checking quick indication of the signal receipt.

h) Protection operation signal to be configured to other relays.

i) Disturbance recorder needs to be configured for the signal exchange.

j) GOOSE receiving time to be shown in the relay display from event recorded and disturbance recorder. GOOSE transfer time should be less than message type 1A, Performance Class P1 i.e. 10 ms.

k) One of protection stage should be set to minimum time value (e.g. 20 ms) and injecting the current value in all relays in series. Checking the protection function blocking with published GOOSE signal of protection start from other relay. This shall ensure that GOOSE communication signal from other relay reaches before 15 ms.

l) Disturbance fault records to be captured in COMTRED format (.DAT and .CFG). Each relay DR function needs to be configured for protection start, protection trip, breaker control commands as well as waveform recording of current and voltage signals.

m) Remote Parameterization to be shown.

n) Port redundancy to be checked.

o) Communication failure is to be checked by opening the communication cable while GOOSE message transfer.

p) Parameterization from the front port to be shown.

q) RTU simulator for command execution by relay over IEC 61850 Communication.

The offered relay will only be accepted after fulfilment of above Q.R. & successful inter -operability test as per the evaluation of the APDCL's assessing officers.

8. TECHNICAL REQUIREMENTS FOR NUMERICAL OC/EF NON-DIRECTIONAL :

8.1. **The following are the technical requirement of feeder protection relay**

Sl. No.	Feature and Function	Technical requirement
1	Purpose and application	It is intended to automate the Switchgears specified in the scope of supply and use Communicable Numeric relays for Protection, Control, Metering and Status monitoring. This specification is based on the understanding that an integrated Automation System along with protections shall be provided and same shall have provisions for Integration with SCADA system. All the feeders shall be remote controlled from APDCL's SCADA and from the local console of the numerical relays. Numerical multifunctional combined Microprocessor based Feeder protection and management relay to protect the 33kV Feeder from all electrical and other faults along with reporting system, Disturbance record for fault analysis. Manufacturer should comply with any especial requirement or feature asked for retrofitting the relays. Relay should be IEC 61850 compliant. Relay should have 4 CT input for O/C and E/F protection. There should be option for derivation of E/F internally.
2	Main Protection feature	1. Relay should have minimum **Four** group of setting. Setting group changeover required from digital status input. 2. Electrical over load protection with selectable IEC curves with three stages, first stage to be used as IDMT and second stage to be used as high set for short circuit protection and third stage for Definite Time. 3. Earth fault protection in two stages with IEC characteristics. First stage to be used as IDMT/Definite Time and second stage to be used as instantaneous

		elements. Earth fault element should be suitable for both CBCT and residual type CT connection. 4. One stage Negative phase sequence Protection with IEC Curves. 5. CB Fail Protection & time settable as per user 6. The relay should be immune to DC switching while carrying current i.e. no spurious trip should be generated if relay DC is made On and Off. 7. The relay should conform to the IEC255-4 or BS 142 for Inverse time characteristics. 8. The relay should have features to monitor for one stage broken conductor feature for alarm and trip by calculating I2/I1 and CB opening time. 9. The relay should have inrush blocking feature. 10. The relay should have the current based thermal overload feature incorporated. 11. The relay shall have the feature to detect the HIZ faults which is characterised by the low earth fault currents. 12. The relay should have cold load pick up feature to provide stability during start up after a long shut down, Cold load pick up (CLP) logic should work by *either* inhibiting one or more stages of the over current protection for a set duration *or* raising the over current setting of selected stages , for the cold loading period. 13. Trip circuit supervision: Relay shall have inbuilt Trip Circuit Supervision function for supervising minimum two nos. trip coil both during CB open and CB closed condition 14. Fault Locator: The relay shall include a fault-locating algorithm to calculate the fault location with +/- 2.5 % accuracy for phase-to-phase and phase-to-earth faults in effectively and low-resistance earthed networks.
3	**Processor feature**	Relay shall be completely Numerical with protective elements having software algorithm based on sampling of Analog inputs. Sampling Rate of Analog Signal: The sampling rate should be more than 800 Hz for 50 Hz signal or better for each analog channel. Hardware based measurements shall not be acceptable.
4	**Operational Philosophy**	The operation of Relay shall be possible both locally from the Switchgear and remote & Local Work station. The local position shall be displayed in remote / local workstation and remote operation shall be blocked if the switch is in Local. Clear control priorities shall prevent initiation of operation of a single switch at the same time from more than one of the various control levels and there shall be interlocks among various control levels. The priority shall always be with the lowest enabled control level. Relay accuracy shall not be affected by system frequency fluctuation.
5	**Status/Optical Inputs/Digital inputs**	1. Minimum **14** number binary inputs are required. 2. All binary inputs should be settable threshold voltage from 20 to 170 V DC. 3. Setting group is required to be changed with any binary input status. 4. Trip circuit supervision with either BI or BO status 5. The Binary inputs shall be acquired by exception with 1ms resolution. Contact bouncing in binary inputs shall not be assumed as change of state. 6. Relay should have comprehensive self-diagnostic feature with remote indication of relay failure and alarm shall be generated without tripping of circuit. 7. Provision of Testing relays output without any current injection. 8. No. of programmable LEDs - at least 9 nos. with latching option. 9. All the BI should be freely configurable.

6	**Main measuring and reporting feature**	All measurements should be in primary quantities. Minimum following displays are required in alpha numeric:- 1. Three phase (Positive sequence) current 2. Neutral (zero sequence) current 3. All the trips should have clear indication on the relay interface. 4. Three nos. of Fixed LEDs (for trip, Alarm, Relay available & Relay out of service) & minimum 9 nos. three colour programmable LEDs which can be assigned to any protection function for local annunciation. 5. Resetting should be selectable as hand reset or auto reset. 6. The default relay LCD shall be user defined to display primary circuit loading.
7	**Tools for Fault diagnostics**	1. **Fault record:** The relay shall have the facility to store at least last 5 time-stamped fault records with information on cause of trip, trip values of electrical parameters in the relay 2. **Event record:** The relay shall have the facility to store at least 1000 time stamped event records with 1ms resolution. 3. **Disturbance records:** The relay shall have capacity to store at least 15 sec disturbance record waveforms.
8	**Memory and Recording Feature**	1. The relay setting and programming should be stored in EEPROM so that during Aux. Power failure no data is lost. The last 5 fault DR records should be in flash memory and DR will not erase in case of DC supply fail for more than 2 days. 2. Relay should have event log, trip log and DR record. All logs should go in to history. 3. All tripping of relay should initiate DR in auto without extra binary input. Triggering of DR with binary input should be user configurable. 4. Should be able to record at least 10 fault records and 20 event records in flash memory. 5. Minimum 10 nos. of latest trip log with cause of trip should be stored in memory along with date and time stamping. The memory should not be lost with the switching off of DC. 6. The relay should have fault-recording feature with current waveform and Digital Input status. The fault waveform should consist of minimum four current waveforms of three phase current and zero sequence current and DI status. Triggering time for Pre and Post should have user selectable. This record should be in flash memory for minimum 7(seven) days even after switching off the DC supply.
9	**Auxiliary Supply**	Both 240 V AC and 110 V DC [- 25% to + 10%] 2 wire unearthed system. Necessary software shall be in-built for proper shutdown and restart in case of power failure. Auxiliary supply burden will be around 20Watt.
10	**Rated CT/PT secondary**	5/1 Amp(User selectable) , CTs used to be protection class
11	**Rated frequency**	50 HZ +/- 5%
12	**Ambient condition**	1. Operating ambient temperature up to 55Deg C. 2. Operating Humidity up to 93%. 3. Relay shall meet the requirement for withstanding electromagnetic interference according to relevant parts of latest IEC 60255-26. Failure of single component within the equipment shall neither cause unwanted operation nor lead to a complete system breakdown.
13	**Module and Mounting**	1. Relay should be flush mounted type. 2. Module to be preferably draw out type then it should have CT shorting facility of make before break type. 3. Mounting in switchgears located in non-AC rooms. 4. Galvanic isolation between field connection and relay hardware should be there.

		5. The relays should be housed in a robust metal case suitable for panel mounting conforming to IP 51 (Front face) and IP 20 in the rear side.
14	**Watchdog and self monitoring**	The relay should have facility to comprehensively monitor the healthiness of its circuits and components by own monitoring system. In case of any problem of hardware and software elements of the relay, the fault diagnosis information shall be displayed on the LCD and an alarm should be generated by one of the output contacts. The alarm as soft signal to be sent to SCADA system as well. Necessary support documentation explaining the self-diagnostic feature shall be furnished. Watch dog contact shall be provided in addition to required 14 BI, 10 BO (Relay supervision contact must be additional from 10 BO). All the BI & BOs shall be freely configurable. All binary inputs should be settable threshold voltage from 20…170 VDC.
15	**Settings**	As detailed in Clause No. 11 of Technical Specification
16	**Relays Output**	Minimum 10 number binary/digital output are required out of which 1. One potential free change over contact should be provided for start inhibit of relay. 2. All o/p contact should be freely programmable. 3. To enable fast direct tripping of the circuit breaker, the relay must have 2 optional high-speed binary outputs with an operate time of ≤ 2-3 ms. The binary output contacts shall be rated to make and carry 30 A for 0.5 s with a breaking capacity of ≥1 A (L/R<40 ms). 4. Rating of trip contacts. a) Contact durability>10K operation. b) **30 Amp make and carry for 0.5 sec for trip contact.** c) Make and carry for trip contacts L/R<=50ms Rating of Alarm contacts. d) **5 Amp make and carry continuously (ac or dc) -7 nos. and 8amps make and carry continuous (ac or dc) – 3 nos.**
17	**Relay software and Man Machine Interface**	1. The offered relay shall have a comprehensive local MMI (man-machine interface) for interface. It shall have the following minimum elements so that the features of the relay can be accessed and setting changes can be done locally. - At least 48 character alphanumeric backlit LCD display unit. - The LCD panel should be able to display graphical data such as at least 2 Configurable SLDs, vector diagram of instantaneous power. 2. Should have password protected key padlock. The password of the relay should of Level 4 to provide security to the setting parameters. 3. Tactile keypad for 4 navigation keys for browsing and setting the relay menu. 4. Necessary software for relay setting , retrieving DR, event log, trip log should be supplied by the Manufacturer. The License of the software is to be issued to APDCL for the entire lifespan of the relay. 5. Additional functions can be added to RELAY by software up-gradation and downloading this upgraded software to the relays by simple communication through PC. 6. Multiuser/Corporate license for installation on minimum 40 nos. of PCs/Laptops.
18	**Date and time**	Date and Time stamping with faults and record. The clock should be powered from internal cell and should not require setting after every DC switching. The internal cell life shall be minimum 7 years. Time synchronization by SNTP via IEC 61850 only.

19	**Lugs and terminators**	All CT and PT terminals shall be provided as fixed (screwed) type terminals on the relay to avoid any hazard due to loose connection leading to CT opening or any other loose connection. Necessary amount of lugs should be supplied along with each relay for CT connection and control wiring.
20	**Manuals, Drawings and Literature**	1. The relays should be supplied with manuals with all technical and operating instructions. 2. All the internal drawings indicating the logics and block diagram details explaining principle of operation should be given at the time of supply. 3. Mapping details shall be submitted in IEC format.
21	**Standard documentation per Relay, according to IEC 61850**	1. MICS document (model implementation conformance statement). 2. PICS (protocol implementation conformance statement). 3. Conformance Test certificate from DNVGL/CPRI. 4. PIXIT document. All the above-mentioned certificates shall be submitted. 5. ICD file 6. SCD file
22	**Extendibility in Future**	The Manufacturer shall provide all necessary software tools along with source codes to perform addition of bays in future and complete integration with SCADA by the User. These software tools shall be able to configure relay, add analog variable, alarm list, event list, modify interlocking logics etc. for additional bays/equipment's which shall be added in future.
23	**Lifespan**	The supplier should mention following:- 1. Product maturity: The Manufacturer should mention the time period for which the product is in the market. 2. Expected product life shall be minimum 10 years and additional 10 years service support after obsoletion notice (if any). 3. Hardware/Firmware change notification process and Upgrades to be provided free of cost within the Guarantee period/5 years whichever is later, if needed. 4. Lifespan of standard tools and processes for relay configuration, querying and integration.
24	**Standards**	As detailed in Table 1: List of Standards Applicable Clause No. 3.2 of Technical Specifications.
25	**Communication Port**	1. The relay should have Latest IEC 61850 Edition 2 or better Communication Protocol. 2. Relay should support PRP (Parallel Redundancy protocol) as per IEC 62439-3. 3. Functioning of Relay shall not hamper to fault occurring any interconnected relay. 4. The Relays must have two fibre-optic Ethernet ports with HSR and PRP-1. 5. The relay shall have a USB/RS232/RJ45 communication port for connecting to a local PC/Laptop for setting and viewing the data from the relay. Both IEC 103 (to communicate with existing SAS) and IEC 61850 must be available simultaneously in single relay with minimum two nos. redundant communication port (FO or RJ45). **Use of any type of converter is not acceptable.**
26	**Name Plate and marking**	Each RELAY shall be clearly marked with manufacturer's Name, type, serial no. and electrical rating data. Name plates shall be made of anodized aluminium with white engraving on black surface.
27	**Guarantee**	Relays will be guaranteed for the period of sixty six months from the date of last receipt at respective T&C Divisions.
28	**Performance**	Any problem in the said period should be attended free of charge inclusive of repair/replacement of relays/ component (both H/W, S/W).

		The relay for repair/ replacement of relays/ component (both H/W, S/W) must be picked up from concerned T&C Division free of charge and hustle free.
29	Type Test	As detailed in the table for type tests in Clause No. 5 of Technical Specifications.
30	Inter-operability test	As detailed in Interoperability Test and Demonstrations in Clause No. 7 of Technical Specifications.

8.2 PROTECTION SCHEMES FORNUMERICAL OC/EF RELAY WITH DIRECTIONAL AND NON-DIRECTIONAL:

The following protection functions must be available in RELAYs for feeder protection:

a) Timed and instantaneous phase and earth fault protection (Non-Directional):

Relay should have minimum 3 CT input for Non-Directional Over Current and 1 CT input for Earth Fault an . Relay should have timed and instantaneous phase fault in all three phases and earth fault with minimum 3 independent stages (IDMT & DT) for OC & EF protection and should support wide range of ANSI/IEC/IEEE curves and with adjustable reset time.

b) Inrush blocking feature:

Second harmonic blocking feature for over current and earth fault protection to be provided.

c) Thermal Overload:

The device should incorporate a current-based thermal characteristic, using fundamental load current to model heating and cooling of the protected plant. The element should be settable with both alarm and trip stages.

d) High impedance earth fault protection:

Relay shall have feature to detect high impedance earth faults which are characterized by low earth fault currents. The HIZ fault protection scheme shall be incorporated integrating both Fundamental Analysis and Harmonic Analysis algorithm such that the RELAY is capable of adequate coverage for the diversity of the current characteristics presented by HIZ faults in both low loading and high loading conditions. This function will see an earth fault which is very difficult to detect by a conventional feeder protection relay. The algorithm used for detection of HIZ faults to be specified in detail.

e) Negative sequence over current feature:

One stage of negative sequence over current protection with DT & IDMT feature (user selectable) to be provided.

f) Broken conductor (BC) protection (Phase Discontinuity Protection):

The relay should have features to monitor for single stage broken conductor. The offered relay shall have inbuilt algorithm to detect low magnitude fault current to detect downed conductor by calculating I2/I1. This function shall work for 50Hz system with efficiently grounded or isolated neutral. The Broken Conductor protection feature shall be incorporated in such a way that the relay operates in case of maloperation of single phase switchgear, operation of fuses, open jumper or broken conductor.

g) Circuit breaker failure protection:

CB fail protection function by incorporating CB fail timer & criteria for resetting CBF timer should be user selectable.

h) Cold load pick up feature :

To provide stability during start up after a long shutdown, cold load pickup (CLP) logic should work by either:

I. Inhibiting one or more stages of the over current protection for a set duration.

II. Raising the over current settings of selected stages, for the cold loading period.

i) **Trip circuit supervision:** Relay shall have inbuilt Trip Circuit Supervision function for supervising minimum two nos. trip coil both during CB open and CB closed condition.

j) The relay in addition to the above basic function should also provide the following functions:

i. The relay shall have the facility to latch the trip output relay.

ii. Relay shall have facility to control the CB in local/remote/ combination of both.

a) It should have test mode facility to test the relay operation during commissioning/maintenance activity which allows:

I. Secondary injection testing to be performed on the relay without operation of the trip contacts.

II. Binary inputs /output status monitoring

III. Binary output contacts test and LED tests.

k) **Fault Locator:** The relay shall include a fault-locating algorithm to calculate the fault location with +/- 2.5 % accuracy for phase-to-phase and phase-to-earth faults in effectively and low-resistance earthed networks.
Note: Only required for Directional OCEF protection Relay.

l) **Fuse Fail Supervision:** The offered relay should have fuse failure supervision that detects failures between the voltage measurement circuit and the relay. The failures are detected either by the negative sequence-based algorithm or by the delta voltage and delta current algorithm. Upon the detection of a failure, the fuse failure supervision function activates an alarm and blocks voltage-dependent protection functions from unintended operation.

9. Measurements :

All measurements should be in primary quantities. The default relay LCD shall be user defined to display primary circuit loading. As a minimum, the relay should measure and display in alpha-numeric the following standard quantities:

a) Phase currents

b) Neutral currents - derived and measured

c) Thermal state

d) Positive, negative and Zero sequence current

e) Ratio of negative to positive sequence current

f) Breaker operation counter

g) Breaker trip counter for Earth Fault

h) Breaker trip counter for Over Current.

i) Breaker operating time

j) Resetting of display should be selectable as hand reset or auto reset.

k) Three Phase Neutral Voltage (Only for Dir OCEF protection Relay)

l) Frequency & Power Factor (Only for Dir OCEF protection Relay)

m) Power & Energy Measurement (Only for Dir OCEF protection Relay)

10. Settings:

Setting range of offered relays shall comply the below Table, bidder to confirm each range in below table, and this document to be submitted with GTP.

Sl No	Protection Function: (Numerical Feeder protection Relay)	Bidder To Confirm Yes/No
1	**Three Phase Non Directional Over Current Protection**	
	Plug Setting	
	Low Set Stage - 0.05...5.00 × In, in steps 0.01	
	High Set Stage - 0.10...40.00 × In in steps 0.01	
	Instantaneous Stage - 1.00...40.00 × In in steps 0.01	
	Time Setting	
	Time multiplier Low Stage and High Set stage 0.05...15.00 in step 0.01	
	Operate delay time For Low stage and high stage 40...200000 ms in step 10	
	Operate delay time For Inst Stage 20...200000 ms in step 10	
	Operation accuracy: Current: ±1.5% of the set value or ±0.002 × In Voltage: ±1.5% of the set value or ±0.002 × Un Phase angle: ±2°	
2	**Three Phase Directional Over Current Protection**	
	Plug Setting	
	Low Stage - 0.05...5.00 × In, In steps 0.01	
	High Stage - 0.10...40.00 × In, In steps 0.01	
	Time Setting	
	Time multiplier - 0.05...15.00 in step 0.01	
	Operate delay time - 40...200000 msin step 10	
	Directional mode shall be site selectable 1. Non-directional, 2. Forward, 3. Reverse	
	Characteristic angle **-179...180° in steps 1**	
	Operation accuracy: Current: ±1.5% of the set value or ±0.002 × In Voltage: ±1.5% of the set value or ±0.002 × Un Phase angle: ±2°	
3	**Three Phase Non Directional Earth Fault Protection**	
	Plug Setting	

	Start value Low Stage - 0.010...5.000 × In, in step 0.005	
	High stage - 0.10...40.00 × In, in step 0.01	
	Inst Stage - 1.00...40.00 × In, in step 0.01	
	Time Setting	
	Time multiplier Low and High stage - 0.05...15.00 in step 0.01	
	Operate delay time Low & High stage - 40...200000 ms in step 10	
	Inst Stage - 20...200000 ms in step 10	
	Operation accuracy: ±1.5% of the set value or ±0.002 × In	
4	**Three Phase Directional Earth Fault Protection**	
	Plug Setting	
	Start value Low Stage - 0.010...5.000 × In, in step 0.005	
	High Stage - 0.10...40.00 × In in step 0.01	
	Directional mode Low and High stage shall be site selectable as 1. Non-directional, 2. Forward, 3. Reverse	
	Time Setting	
	Time multiplier Low Stage 0.05...15.00 in step 0.01	
	High Stage - 0.05...15.00 in step 0.01	
	Operate delay time Low Stage - 50...200000 ms in step 10	
	High Stage - 40...200000 ms in step 10	
	Operation Accuracy: Current: ±1.5% of the set value or ±0.002 × In Voltage: ±1.5% of the set value or ±0.002 × Un Phase angle: ±2°	
5	**Negative-sequence overcurrent protection:**	
	Start value 0.01...5.00 × In, in step 0.01	
	Time multiplier: 0.05...15.00 in step 0.01	
	Operate delay time: 40...200000 ms in step 10	
6	**Broken Conductor protection:**	
	Start value : 10...100% in step 1	
	Operate delay time : 100...30000 ms in step 1	
	Min phase current: 0.05...0.30 × In in step 0.01	

11. PROTECTION OF 33 KV POWER TRANSFORMERS :

In addition to compliance with the 'General requirements of numerical relays' as detailed above, **differential protection (87) for two winding transformer** shall have the following features:

The relay shall be very fast in operation. The relay shall be inherently stable for external through fault conditions without affecting the speed of operation for internal faults. The relay shall have stabilized differential protection (87T) with two independently settable stages. The biased low-set stage shall provide fast fault clearance while remaining stable when high currents are passing through the protected zone, which increases current measurement errors. The instantaneous high-set stage shall provide very fast clearance of severe internal power transformer faults with a high differential current regardless of their harmonics content. The operate time of the instantaneous stage shall be less than 25ms.

The relay is equipped with six phase-current inputs and one neutral-current input. The rated level of the current inputs is 1/5 A and selectable in the relay software.

The relay shall provide biased differential protection with triple slope tripping characteristics with faulty phase identification / indication. The range for the differential pick-up shall be from 0.1 to 2.5 pu. Its operating time shall not exceed 30 ms at 5 times rated current.

The relay shall have either a built in facility / software of ratio and phase angle correction or necessary interposing auxiliary current transformers of universal type, shall be provided in the respective panel. The necessary adaptation to the current ratios and vector groups shall be made using software (with internally settable adaptation for CT ratio matching and vector group) and all current inputs (1A and 5A) shall allow direct connection to the main CT, i.e. no interposing current transformers for matching transformer group and main CTs ratio shall be required.

The relay shall have 'no gap' detection technique to detect light CT saturation on a per phase basis. The no gap detection technique unblocks the low set differential element during light CT saturation, allowing the low set differential element to trip faster.

The relay shall be provided with 2nd harmonic restraint or any other inrush proof feature to ensure stability during inrush condition and to prevent operation due to magnetizing inrush current when the transformer is charged either from HV or LV side. The second harmonic blocking threshold shall be programmable one and it should be possible to deactivate the 2^{nd}harmonic restraint feature. But this feature shall not affect the speed of operation for internal fault. The ratio of the second harmonic component to the fundamental wave for the differential currents of the measuring system shall serve as the criterion for this feature.

The differential protection functions shall be provided with a 2nd harmonic blocking to avoid tripping at magnetizing inrush when the transformer is energized either from the HV or LV-side and with a 5th harmonic restraint to avoid tripping at over-excitation. It shall be possible to set the blocking and unblocking levels for the 5th harmonic restraint to manage excessive overvoltage situations.

The relay shall have saturation discriminator as an additional safeguard for stability under through fault conditions.

All output relays of the differential relay shall be suitable for both signals and trip duties.

The relay shall be with 2-bias winding. The relay shall have transient bias to enhance the stability of differential element during external fault condition.

The relay shall have adjustable bias slopes; slope m1 from 5 % to 50 % and slope m2 from 15% to 150 % and m3 from 100% to 150 % so as to provide maximum sensitivity for internal faults with high stability for through faults. The relay shall have adjustable operating setting range of 10% to 50% at zero bias.

The relay shall have an unrestrained high set element to back up the biased differential function and the setting range for it shall have a minimum setting of 5pu and a maximum setting of 30 pu.

The relay shall be such that there will not be any necessity of changing the setting of the relay whenever the transformer taps are changed from +5% to -10%.

Differential relay shall have facility for setting, parameterization, downloading of stored data, data

captured by disturbance recorder etc. locally through PC. Licensed version of the relay software should be provided as per the lifespan of the relay. Necessary software, cables, connectors and other accessories as required for download, analyze data etc. shall be within the scope of successful bidder.

The relay shall have disturbance recording (with time stamp) function with suitable no. of analog and digital channels, Memory size and number of disturbances stored in the relay shall be clearly indicated in the offer. No. of site selectable binary inputs, binary outputs, watchdog contact details, front and rear communication port details along with necessary hardware and software details shall be furnished.

11.1. **The following are the technical requirement of Differential protection relay:**

Sl. No.	Feature and Function	Technical requirement
1	**Purpose and application**	It is intended to automate the Switchgears specified in the scope of supply and use Communicable Numeric relays for Protection, Control, Metering and Status monitoring. This specification is based on the understanding that an integrated Automation System along with protections shall be provided and same shall have provisions for Integration with SCADA system. All the feeders shall be remote controlled from APDCL's SCADA and from the local console of the numerical relays. Numerical multifunctional combined Microprocessor based Transformer protection and management relay to protect the 33kV Transformer from all electrical and other faults along with reporting system, Disturbance record for fault analysis. It shall be numerical adjustable/variable percentage biased type differential relay. Manufacturer should comply with any especial requirement or feature asked for retrofitting the relays. Relay should be IEC 61850 compliant.
2	**Main Protection feature**	• The relay shall be very fast in operation with an operating time less than 40 millisecond at 5 times setting. • The relays shall be inherently stable for external through fault conditions without affecting the speed of operation for internal faults. • The relay shall have built in facility of ratio and phase angle correction. • The relay shall be provided with 2nd harmonic restraint or any other inrush proof feature to prevent operation due to magnetizing in rush current when the transformer is charged either from HV or LV side. But this shall not affect the speed of operation for internal fault. • It shall be provided with 5th harmonic restraint features to prevent operation due to possible over excitation of the transformer. This shall also not affect the speed of operation for internal fault. • The relay shall have 2 instantaneous phases over current(50) elements and 2 IDMT(51) phase over current elements with standard IEC / ANSI characteristics selection. It shall be possible to select either winding 1 or winding 2 for each element. Shall have possibility to add user defined characteristics for IDMT element. • The relay shall have facility to provide derived earth fault current protection as well as measured earth fault protection. Relay shall have 2 elements each for Instantaneous and IDMT derived earth fault (50N/51N), 2 elements each for Instantaneous and IDMT measured earth fault (50G/51G). It shall be possible to select either winding 1 or winding 2 for each element. Shall have possibility to add user defined characteristics for IDMT element. • The relay shall be with 2-bias winding. The differential characteristics shall incorporate two bias stages - first stage for steady state errors i.e tap position and CT ratios and second stage for transient errors i.e. CT saturation.

		• The relay shall have Negative Phase Sequence O/C protection with 2 DTL & 2 IDMT elements for measurement of derived Negative sequence current. Shall be possible to select STD IEC/ANSI characteristics. It shall be possible to select either winding 1 or winding 2 for each element. • The relay shall be such that there will not be any necessity of changing the setting of the relay whenever the transformer taps are changed from +5% to-10%. • The relay shall have high Impedance Restricted Earth fault Protection for LV side . • The relay shall have Circuit Breaker failure function. 2 element shall be provided- 1 element per winding. The circuit breaker fail function shall be triggered from an internal trip signal or from a binary input. Alternatively, if the trip is from a mechanical protection the circuit breaker position can be used to determine a failure. A second time delay shall be available to enable another stage to be utilized if required. An input shall also available to bypass the time delays when the circuit breaker is known to be faulty. • The relay shall have Negative Phase Sequence O/C protection with 2 DTL & 2 IDMT elements for measurement of derived Negative sequence current. Shall be possible to select STD IEC/ANSI characteristics. It shall be possible to select either winding 1 or winding 2 for each element.
3	**Processor feature**	Relay shall be completely Numerical with protective elements having software algorithm based on sampling of Analog inputs. Sampling Rate of Analog Signal: The sampling rate should be 1000 samples for 50 Hz signal or better for each analog channel. Hardware based measurements shall not be acceptable.
4	**Operational Philosophy**	The operation of Relay shall be possible both locally from the Switchgear and remote & Local Workstation. The local position shall be displayed in remote / local workstation and remote operation shall be blocked if the switch is in Local. Clear control priorities shall prevent initiation of operation of a single switch at the same time from more than one of the various control levels and there shall be interlocks among various control levels. The priority shall always be with the lowest enabled control level. Relay accuracy shall not be affected by system frequency fluctuation.
5	**Status/Optical Inputs/Binary inputs**	1. Minimum **14** number binary inputs are required. 2. All binary inputs should be settable threshold voltage from 20 to 170 V DC. 3. Setting group is required to be changed with any binary input status. 4. Trip circuit supervision with BI status 5. The Binary inputs shall be acquired by exception with 1ms resolution. Contact bouncing in binary inputs shall not be assumed as change of state. 6. Relay should have comprehensive self-diagnostic feature with remote indication of relay failure and alarm shall be generated without tripping of circuit. 7. Provision of Testing relays output without any current injection. 8. No. of programmable LEDs - at least 10 nos. with latching option. 9. All the BI should be freely configurable.
6	**Main measuring and reporting feature**	All measurements should be in primary quantities. Minimum following displays are required in alpha numeric:- 1. Three phase (Positive sequence) current 2. Neutral (zero sequence) current 3. Differential current, Voltage, Frequency etc. 3. All the trips should have clear indication on the relay terminals 4. Resetting should be selectable as hand reset or auto reset. 5. The default relay LCD shall be user defined to display primary circuit loading.

7	Tools for Fault diagnostics	1. **Fault record:** The relay shall have the facility to store at least last 100 time-stamped fault records with information on cause of trip, trip values of electrical parameters. 2. **Event record:** The relay shall have the facility to store at least 1000 time stamped event records with 1ms resolution. 3. **Disturbance records:** The relay shall have capacity to store at least 15 sec disturbance record waveforms.
8	Memory and Recording Feature	1. The relay setting and programming should be stored in EEPROM so that during Aux. Power failure no data is lost. The last 5 fault DR records should be in flash memory and DR will not erase in case of DC supply fail for more than 2 days.2. Relay should have event log, trip log and DR record. All logs should go in to history.3. All tripping of relay should initiate DR in auto without extra binary input. Triggering of DR with binary input should be user configurable.4. Should be able to record at least 10 fault records and 20 event records in flash memory.5. Minimum 10 nos. of latest trip log with cause of trip should be stored in memory along with date and time stamping. The memory should not be lost with the switching off of DC.6. The relay should have fault-recording feature with current waveform and Digital Input status. The fault waveform should consist of minimum four current waveforms of three phase current and zero sequence current and DI status. Triggering time for Pre and Post should have user selectable. This record should be in flash memory for minimum 7(seven) days even after switching off the DC supply.
9	Auxiliary Supply	Both 240 V AC and 110 V [- 25% to + 10%] 2 wire unearthed system. Necessary software shall be in-built for proper shutdown and restart in case of power failure.
10	Rated CT/PT secondary	5/1 Amp(User selectable) , CTs used to be protection class
11	Rated frequency	50 HZ ±5%
12	Ambient condition	1. Operating ambient temperature upto 55Deg C. 2. Operating Humidity upto 93%. 3. Relay shall meet the requirement for withstanding electromagnetic interference according to relevant parts of latest IEC 60255-26. Failure of single component within the equipment shall neither cause unwanted operation nor lead to a complete system breakdown.
13	Module and Mounting	1. Relay should be flush mounted type. 2. Module to be preferably draw out type then it should have CT shorting facility of make before break type. 3. Mounting in switchgears located in non-AC rooms. 4. Galvanic isolation between field connection and relay hardware should be there. 5. The relays should be housed in a robust metal case suitable for panel mounting conforming to IP 51 (Front face) and IP 20 in the rear side.

14	**Watchdog and self-monitoring**	The relay should have facility to comprehensively monitor the healthiness of its circuits and components by own monitoring system. In case of any problem of hardware and software elements of the relay, the fault diagnosis information shall be displayed on the LCD and an alarm should be generated by one of the output contacts. The alarm as soft signal to be sent to SCADA system as well. Necessary support documentation explaining the self-diagnostic feature shall be furnished. Watch dog contact shall be provided in addition to required 14 BI, 10 BO (Relay supervision contact must be additional from 10 BO). All the BI & BOs shall be freely configurable. All binary inputs should be settable threshold voltage from 20…170 VDC.
15	**Settings**	As detailed in Clause No. 11 of Technical Specification
16	**Relay outputs**	Minimum 10 number binary/digital output are required out of which 1. One potential free change over contact should be provided for start inhibit of relay. 2. All o/p contact should be freely programmable. 3. To enable fast direct tripping of the circuit breaker, the relay must have 2 optional high-speed binary outputs with an operate time of ≤ 2-3 ms. The binary output contacts shall be rated to make and carry 30 A for 0.5 s with a breaking capacity of ≥1 A (L/R<40 ms). 4. Rating of trip contacts. a) Contact durability>10K operation. b) **30 Amp make and carry for 0.5 sec for trip contact.** c) Make and carry for trip contacts L/R<=50ms Rating of Alarm contacts. d) **5 Amp make and carry continuously (ac or dc). -7 nos. and 8amps make and carry continuous (ac or dc) – 3 nos.**
17	**Relay software and Man Machine Interface**	1. The offered relay shall have a comprehensive local MMI (man-machine interface) for interface. It shall have the following minimum elements so that the features of the relay can be accessed and setting changes can be done locally. - At least 48 character alphanumeric backlit LCD display unit. - The LCD panel should be able to display graphical data such as at least 2 Configurable SLDs, vector diagram of instantaneous power. 2. Should have password protected key padlock. The password of the relay should of Level 4 to provide security to the setting parameters. 3. Tactile keypad for 4 navigation keys for browsing and setting the relay menu. 4. Necessary software for relay setting , retrieving DR, event log, trip log should be supplied by the Manufacturer. The License of the software is to be issued to APDCL for the entire lifespan of the relay. 5. Additional functions can be added to RELAY by software up-gradation and downloading this upgraded software to the relays by simple communication through PC. 6. Multiuser/Corporate license for installation on minimum 40 nos. of PCs/Laptops.
18	**Date and time**	Date and Time stamping with faults and record. The clock should be powered from internal cell and should not require setting after every DC switching. The internal cell life shall be minimum 7 years. Time synchronization by SNTP via IEC61850 only.
19	**Lugs and terminators**	All CT and PT terminals shall be provided as fixed (screwed) type terminals on the relay to avoid any hazard due to loose connection leading to CT opening or any other loose connection. Necessary amount of lugs should be supplied along with each relay for CT connection and control wiring.

20	**Manuals, Drawings and Literature**	1. The relays should be supplied with manuals with all technical and operating instructions. 2. All the internal drawings indicating the logics and block diagram details explaining principle of operation should be given at the time of supply. 3. Mapping details shall be submitted in IEC format.
21	**Standard documentation per Relay, according to IEC 61850**	1. MICS document (model implementation conformance statement). 2. PICS(protocol implementation conformance statement. 3. Conformance Test certificate from DNVGL/CPRI. 4. PIXIT document. All the above mentioned certificates shall be submitted. 5. ICD file 6. SCD file
22	**Extendibility in Future**	The Manufacturer shall provide all necessary software tools along with source codes to perform addition of bays in future and complete integration with SCADA by the User. These software tools shall be able to configure relay, add analog variable, alarm list, event list, modify interlocking logics etc. for additional bays/equipment's which shall be added in future.
23	**Lifespan**	The supplier should mention following:- 1. Product maturity: The Manufacturer should mention the time period for which the product is in the market. 2. Expected product life shall be minimum 10 years and additional 10 years service support after obsoletion notice (if any). 3. Hardware/Firmware change notification process and Upgrades to be provided free of cost within the Guarantee period/5 years whichever is later, if needed. 4. Lifespan of standard tools and processes for relay configuration, querying and integration.
24	**Standards**	As detailed in Table 1: List of Standards Applicable Clause No. 3.2 of Technical Specifications.
25	**Communication Port**	1. The relay should have Latest IEC 61850 Edition 2 or better Communication Protocol. 2. Relay should support PRP(parallel Redundancy protocol) as per IEC 62439-3. 3. Functioning of Relay shall not hamper to fault occurring any interconnected relay. 4. The Relays must have two fiber-optic Ethernet ports with HSR and PRP-1. 5. The relay shall have a USB/RS232/RJ45 communication port for connecting to a local PC/Laptop for setting and viewing the data from the relay. Both IEC 103 (to communicate with existing SAS) and IEC 61850 must be available simultaneously in single relay with minimum two nos. redundant communication port (FO or RJ45). **Use of any type of converter is not acceptable.**
26	**Name Plate and marking**	Each RELAY shall be clearly marked with manufacturer's Name, type, serial no. and electrical rating data. Name plates shall be made of anodized aluminium with white engraving on black surface.
27	**Guarantee**	Relays will be guaranteed for the period of sixty six months from the date of last receipt at respective T&C Division.
28	**Performance**	Any problem in the said period should be attended free of charge inclusive of repair/replacement of relays/ component (both H/W, S/W).

29	**Type Test**	As detailed in the table for type tests in Clause No. 5 of technical specifications.
30	**Training**	Suitable training to be imparted to employer persons on the following items:- 1. Relay setting and parameterization 2. Relay configuration with respect to I/P, O/P and functional block for protection. 3. GOOSE configuration. 4. Configuration and Interfacing required for third party SCADA System Integration. 5. Diagnostic features The details of syllabus to be finalized with APDCL.
31	**Inter-operability test**	As detailed in Interoperability Test and Demonstrations in Clause No. 7 of technical specifications.

11.2. **Protection Schemes for Numerical Transformer differential protection relay:**

a) **Biased differential protection (87 T):** Numerical biased differential protection relay with inbuilt current amplitude & vector group compensation feature & also with differential high set element for two winding power transformer compliant to IEC 60255.

C.T. secondary	Selectable 1 Amp / 5 Amps for both HV & LV sides
Online display of HV & LV phase currents & differential current- Needed	
Adjustable bias setting	5 to 50% In.
Operation based on fundamental frequency -50 Hz	
Programmable HV/LV CT ratio of T/F vector group -Needed	
Inbuilt REF protection -Needed	
Inbuilt HV & LV side over current & earth fault protection - Needed	
Inbuilt transformer trouble auxiliary relay – Needed	
Backlit LCD display - Needed	
Harmonic restrain feature- **Needed with settable feature for 2nd and 5th Harmonics**	
Storing facility of latest 100 fault events with real time clock	
Password protection – 4 Level	
DC burden	Quiescent condition – approx. 4 watt Under trip condition – 110 Volt - approx 4 watt, 110 Volt - approx 7 watt.
AC burden	Through current only: approx0.15VAfor1amp&0.30VAfor5amp(per bias circuit) Bias & differential Ckt only: 2.8 VA for 1 amp & 3.2 VA for 5 amp.
Contact arrangements	Two change over self reset tripping contacts & two annunciation contacts
Contact rating	Make & carry 7500VA for 0.2 sec. with max 30 A & 300 V AC or DC carry continuously 5 amp AC or DC break 1250 VA AC or 50 W DC resistive, 25 W L/R – 0.04 s subject to max. 5 amp & 300 Volts

Current Input	Six for differential & one for REF

b) Numerically stabilized low-impedance restricted earth-fault protection (64R)

c) This function should be provided to maximize the sensitivity of the protection of earth faults. The REF function should be selected separately for each winding and programmable as either high or low impedance. The REF function should be able to share the same CTs with the biased differential function. As in traditional REF protections, the function should respond only to the fundamental frequency component of the currents. The REF protection provided should be suitable for auto transformer also. The relay shall have both numerically stabilized low-impedance restricted earth-fault protection (64R) and High impedance restricted earth fault protection with metrosil (if required).

The numeric REF protection relay shall provide the following functions:

I. The relay shall have **high impedance** restricted earth-fault protection.

II. Current / voltage operated high impedance type with a suitable setting to cover the maximum portion of transformer winding. Necessary calculation to prove the above winding coverage shall be furnished along with the tender.

III. Tuned to the system frequency. Have suitable nonlinear resistor as required to limit the peak voltage and stabilizing resistance.

IV. Operating time shall be less than 40ms.

V. Have suitable stabilizing resistor to prevent mal operation during external faults, if necessary.

VI. Bidder to consider required Non Linear (VDR) resistance of metrosil make and stabilizing resistance required for the Restricted Earth Fault protection.

d) Overload Protection:

The RELAY Shall have thermal overload protection for alarm and trip condition with continuously adjustable setting range of 10-400% of rated current.

e) Over current Protection (50,51):

The RELAY shall have three stages of definite time over current protection as back up operating with separate measuring systems for the evaluation of the three phase currents, the negative sequence current and the residual current. In addition the relay shall have three stages of Inverse time overcurrent protection operating on the basis of one measuring system each for the three phase currents, the negative sequence current and the residual current.

f) Negative-sequence over current protection: One stage of negative sequence over current protection with DT & IDMT feature (user selectable) to be provided.

g) Local Breaker Back-Up Protection:

The relays shall have in-built LBB protection to detect the failure in the local breaker using the undercurrent Criteria and zero crossing detection and trip the upstream breaker. A set

of D.C. voltage operated auxiliary relays with coil cut-off arrangement and 2-N/O and 2-N/C contacts, Self reset with Hand reset flag indicator type shall be provided for each Transformer for:

Buchholz Alarm.

Buchholz Trip.

Winding Temp. Trip & winding Temp alarm.

Oil Temp trip & Oil Temp Alarm.

Pressure Release Device Trip.

OSR for OLTC trip

11.3. **MEASUREMENTS:**

All measurements should be in primary quantities. The default relay LCD shall be user defined to display primary circuit loading. As a minimum, the relay should measure and display in alpha-numeric the Instantaneous values with time stamp of the following standard quantities:

a) Phase currents and Phase Angles (HV & LV)
b) Neutral currents - derived and measured
c) Bias/Restraining Current
d) Differential Currents
e) Thermal state
f) Positive, negative and Zero sequence current
g) Ratio of negative to positive sequence current
h) Breaker operation counter
i) Breaker trip counter for Earth Fault
j) Breaker trip counter for Over Current.
k) Breaker operating time
l) Resetting of display should be selectable as hand reset or auto reset.

11.4. Setting range of offered relays shall comply the below Table, bidder to confirm each range in below table, and this document to be submitted with GTP.

Sl No	Protection Function: (Numerical Transformer protection (Two Winding) relay)	Bidder to Confirm (Yes/No)
1	**Three Phase Non Directional Over Current Protection**	
	Plug Setting	
	Low Set Stage - 0.05...5.00 × In, in steps 0.01	
	High Set Stage - 0.10...40.00 × In in steps 0.01	
	Inst Stage - 1.00...40.00 × In in steps 0.01	
	Time Setting	

	Time multiplier Low Stage and High Set stage 0.05...15.00 in step 0.01	
	Operate delay time For Low stage and high stage 40...200000 ms in step 10	
	Operate delay time For Inst Stage 20...200000 ms in step 10	
	Operation accuracy: ±1.5% of the set value or ±0.002 × In	
	Three Phase Non Directional Earth Fault Protection	
	Plug Setting	
	Start value Low Stage - 0.010...5.000 × In, in step 0.005	
	High stage - 0.10...40.00 × In, in step 0.01	
	Inst Stage - 1.00...40.00 × In, in step 0.01	
	Time Setting	
	Time multiplier Low and High stage - 0.05...15.00 in step 0.01	
	Operate delay time Low & High stage - 40...200000 ms in step 10	
	Inst Stage - 20...200000 ms in step 10	
	Operation accuracy: ±1.5% of the set value or ±0.002 × In	
	High operate value: 500...3000 %Ir in step 10	
	Low operate value: 5...50 %Ir in step 1	
	Slope section 1 : 10...50% in step 1	
	Slope Section 2: 100...500 %Ir in step 1	
	Restraint mode (Selectable) : Waveform	
2	2nd Harmonic + waveform	
	5th Harmonic + waveform	
	2nd Harmonic + 5th Harmonic + Waveform	
	Start value for 2nd Harmonic: 7...20% in step 1	
	Start value for 5th Harmonic : 10...50% 1	
	Operation Accuracy: ±2 Hz ±3.0% of the set value or ±0.002 × In	
3	**Numerically stabilized low-impedance restricted earth-fault protection**	
	Operate value: 5...50 %In in step 1	
	Minimum operate time: 40...300000 ms in step 1	
	Restraint mode: 2nd Harmonic	

	Start value: 2nd harmonic: 10...50% in step 1	
	Operation accuracy: ±2.5% of the set value or ±0.002 x In	
4	**High-impedance biased restricted earth-fault protection:**	
	Operate value: 1.0...50.0%In in step 0.1	
	Minimum operate time: 40...300000 ms in step 1	
	Operation accuracy: ±1.5% of the set value or ±0.002 × In	
5	**Negative-sequence over current protection:**	
	Start value 0.01...5.00 × In, in step 0.01	
	Time multiplier: 0.05...15.00 in step 0.01	
	Operate delay time: 40...200000 ms in step 10	

12. **SPARES:**

The manufacturer shall quote item-wise Unit Prices for all type of critical spares and other consumable spares recommended by him. Such spare shall include Electronic Cards, terminal connectors, display units and other essential spare parts of the RELAYs. Adapter plates are not required.

13 **DRAWING & LITERATURE:**

a) Triplicate copies of the following drawings and literature shall be submitted along with the order copy :

b) Principal dimension details of each RELAYs.

c) Schematic Wing Diagram for Terminal Block is to be submitted. Moreover it should be pasted on the casing of the RELAYs for ease of commissioning works.

d) Illustrative, descriptive literature, General Technical Data & Specification of Devices.

14. **DOCUMENTS TO BE SUBMITTED ALONG WITH THE OFFER:**

a. The contractor shall invariably submit the following documents, failing which the offers are liable for rejection:
b. Bill of Material (schedule-IA/IB/IC).
c. Documents supporting the qualifying requirements / past performance reports .
d. <u>Undertakings from relay manufacturer regarding</u>:
    i. Non-phasing out of the relays for at least 10 years from the date of supply.
    ii. For extending technical support and back-up guarantee.
    iii. Detailed catalogue/ technical literature in respect of all components/ accessories including bought-out items.
e. Names of supplier of bought out item.
f. List of testing equipment available with the manufacturer.

GUARANTEED TECHNICAL PARTICULARS

A. GTP FOR NON DIRECTIONAL NUMERICAL OC & EF RELAY FOR TRANSFORMER (BACK UP) and 11 KV FEEDERS

SN	Parameter	Requirement as per TS	Bidder's offer
1	Non Directional OC & EF Relay		
a	Make		
b	Type		
c	**Model no (Complete Article no)**		
d	Auxiliary supply	110 V DC and 230 VAC	
e	Mounting	Flush Mounted Draw out type	
2	**Conformance to**		
a	IEC 60255	Yes	
b	IEC 61850 Ed I & II	Yes	
C	Electromagnetic Interference as per IEC 60255-26	Needed	
d	IEC 61850 9-2 LE for process bus	Needed	
e	PRP as per IEC 62439-3	Needed	
f	HSR	Needed	
3	CT and VT inputs		
	No of CT Inputs		
	For Over Current	3	
	For Earth Fault	1	
	VT inputs	Not Required	
4	Size of the LCD Display	Large mimic graphical display	
	Password protection	4 level password protection Needed	
5	Relay equipped with CB open and close push buttons	Yes	
6	The relay should have Protection schemes		
A	Three phase Over Current (Non Directional)	Yes	
B	Earth Fault (Non Directional)	Yes	
C	Thermal Over Load	Yes	
D	Broken Conductor with 1 stage	Yes	
E	Inrush Blocking Feature	Yes	
F	Loss of Load	No	
G	High Impedance with Earth fault Protection	Yes	
H	Negative Phase Sequence Over Current feature	Yes	
I	Circuit breaker failure Protection	Yes	
J	Trip Circuit Supervision for Two Trip Coil	Yes	
K	Auto reclose	No	
L	Cold Load Pick up	Yes	
M	Fuse Fail Super Vision	NO	
J	Life Span [guaranteed]	5 Years	

7			
A	One time delayed element and two high set elements	Yes	
B	Setting range and Step for IDMT element for over Current	O/C Start Value : 0.05 to 5xIn in steps of 0.01	
C	Time multiplier settings	0.05…..15.00 in steps of 0.01	
D	Selectable time curve for IDMT Element	Yes	
E	Setting range and Step for high set elements for both Current	0.10 to 40 x In in steps of 0.01 [High Set Stage] 1 to 40 x In [Inst. Stage]	
F	Time delay	40…..200000 ms in steps of 10	
G	Setting range and Step for IDMT element for Earth Fault Current	E/F Start Value : 0.05 to 5 x In in steps of 0.01	
H	Time multiplier settings	0.05…..15.00 in steps of 0.01	
I	High Set with Delay for Earth Fault Current	E/F High Set : 0.10 to 40 x In in steps of 0.005	
	Time delay	0.05….15 in steps of 0.01	
J	sampling rate of analog signal	Relay must have user selectable sampling rate up to 1000 Samples /cycle @ 50 Hz	
8	Whether remote controllable from SCADA	Yes	
9			
A	No of Binary Inputs	**14 nos.**	
B	Max. No of Binary inputs (internally Feasible)	**To be specified by the bidder**	
C	Voltage ratings of Binary Inputs	Settable threshold voltage from 20 to 150%of DC SUPPLY.	
D	Provision for testing without current injection	Yes	
10	Supervision for CB Open and Close Status	Yes	
11	No. of Programmable LEDs and No. of non Latched LEDs	9 nos. of freely configurable LEDs 3 nos. of fixed LEDs.	
12	Analog measurement and display supported	Yes	
13	Fault Record Storage capacity	100 latest with time stamping	
14	Event Storage capacity	1000 with time stamping	
15	Disturbance record storage capacity	15 sec DR Waveform	
16	MMI with Keypad and LCD Provided	Yes	
17	CT Secondary should be user selectable	1A/5A	
18	Rated Frequency	50 Hz	
19			
A	Operating ambient temperature	0 to 55^{o} C	
B	Relative Humidity	95 % Non Condensing	
20	watch Dog	Yes	

21	CT ratio Settings	SETTABLE	
22			
A	No of Binary Output contact	**10 Nos + 1 No. watch Dog**	
B	Max. No of Binary outputs (internally Feasible)	**To be specified by the bidder**	
C	High Speed Output contact with less than 3 ms operation time	2 nos. (Included in total 10 nos.)	
D	Contact Rating	8 Amp Continuous	
	Make and carry for 3 Sec	15 Amp	
	Make and carry for 0.5 Sec	30 Amp	
	Operation time	less than 2-3ms	
23	Mode of Time Synchronization	SNTP via IEC 61850	
24	Type of Lugs and terminations		
A	For BI/BO	Pin type	
B	For CTs	Ring Type	
25	MTTR	30 Mins	
26	PCB used in the relay is in compliance of HEC as per IEC 60068	Required	
27	Compliance to Type Test	Type test reports attached in the TS.	
28	Communication Port		
a	Rear Port Details -100 MBPS	2 Nos. RJ 45 Port / 2 no. FO port	
b	Front Port Details -10 MBPS	1 No. RJ 45 Port / 1 no. USB Port	
29	Whether time synchronization are native to the RELAY	Yes	
30	Start and Trip Contacts are freely Programmable	Yes	
31	RELAY should be directly connected to the laptop with out the use of any intermediate converter through RJ 45 Port		
32	Specify the application for configuration and data downloading from the RELAY		
33	Software is to be provided for data downloading of events, Fault records for evaluation of the same		
34	Graphical configuration tool for I/O,O/P and functional building block for protection and control		
35	Any other software required for integration with SCADA		
36	DC Burden	Less than 20 W	

Signature of the Bidder
Date and Stamp

B. GTP FOR NUMERICAL DIFFERENTIAL RELAY FOR TRANSFORMER

SN	Parameter	Requirement as per TS	Bidder's offer
1	Differential Relay		
a	Make		
b	Type		
c	Model no		
d	Auxiliary supply	Both 110 V DC and 230 VAC	
e	Mounting	Flush Mounted Draw out type	
2	Conformance to		
a	IEC 60255	Yes	
b	IEC 61850 Ed I & II	Yes	
C	IEC 61850 9-2 LE for process bus sample values	Needed	
D	Electromagnetic Interference as per IEC 60255-26	Needed	
e	PRP as per IEC 62439-3	Needed	
f	HSR	Needed	
3	No of CT Inputs		
	For Differential protection	6	
	For Restricted Earth Fault	1	
4	Size of the LCD Display	Large mimic display	
	Password protection	4 level password protection Needed	
5	Relay equipped with CB open and close push buttons	Yes	
6	The relay should have Protection schemes		
a	Three phase Over Current	Yes	
b	Earth Fault	Yes	
c	Sensitive earth Fault	Yes	
d	Differential Protection	Yes	
e	Adjustable Bias Settings	Yes	
f	REF with High Impedance	Yes	
g	Inrush Blocking Feature	Yes	
h	Loss of Load	No	
i	Over and Under Frequency	Not needed	
j	Negative Phase Sequence Over Current feature	Yes	
k	Circuit breaker failure Protection	Yes	
l	Trip Circuit Supervision	Yes	
m	Over fluxing	Not Needed	
n	Harmonic restraints settable for 2H and 5H	Required	
o	Life Span [guaranteed]	5 Years	
7			

a	One time delayed element and two high set elements	Yes	
b	Setting range and Step for IDMT element for both Current	O/C Start Value : 0.05 to 5xIn in steps of 0.01	
c	Time multiplier settings	0.05…..15.00 in steps of 0.01	
d	Selectable time curve for IDMT Element	Yes	
e	Setting range and Step for high set elements for both Current	O/C Start Value : 0.10 to 40 x In in steps of 0.01 [High Set Stage] 1 to 40 x In [Inst. Stage]	
f	Time delay	40…..200000 ms in steps of 10	
g	Setting range and Step for IDMT element for Earth Fault Current	E/F Start Value : 0.010 to 5 x In in steps of 0.005	
h	Time multiplier settings	0.05…..15.00 in steps of 0.01	
i	High Set with Delay for Earth Fault Current	E/F High Set : 0.10 to 40 x In in steps of 0.005	
	Time delay	0.05….15	
j	sampling rate of analog signal	Relay must have user selectable sampling rate up to 1000 samples /cycle @ 50 Hz	
8	Whether remote controllable from SCADA	Yes	
9			
A	No of Binary Inputs (Equipped)	**14**	
B	Max. No of Binary Inputs (internally Feasible)	**To be specified by the bidder**	
C	Voltage ratings of Binary Inputs	Settable threshold voltage from 20 to 150 % of DC supply.	
D	Provision for testing without current injection	Yes	
10	Supervision for CB Open and Close Status	Yes	
11	No. of Programmable LEDs and No. of non Latched LEDs	9 nos. of freely configurable LEDs 3 nos. of fixed LEDs.	
12	Analog measurement and display supported	Yes	
13	Fault Record Storage capacity	100 latest with time stamping	
14	Event Storage capacity	1000 with time stamping	
15	Disturbance record storage capacity	15 sec DR Waveform	
16	MMI with Keypad and LCD Provided	Yes	
17	CT Secondary should be user selectable	1A/5A	
18	Rated Frequency	50 Hz	
19			
a	Operating ambient temperature	0 to 55^{o} C	
b	Relative Humidity	95 % Non Condensing	

20	watch Dog	Yes	
21	CT ratio Settings	SETTABLE	
22			
A	No of Binary Output	**10 Nos + 1 No. watch Dog**	
B	Max. No of Binary outputs (internally Feasible)	**To be Specified by the bidder**	
C	Contact Rating	8 Amp Continuous	
	Make and carry for 3 Sec	15 Amp	
	Make and carry for 0.5 Sec	30 Amp	
	Operate time	less than 1 ms	
23	Mode of Time Synchronization	SNTP	
24	Type of Lugs and terminations		
a	For BI/BO	Pin type	
b	For CTs	Ring Type	
25	MTTR	30 Mins	
26	PCB used in the relay is in compliance of HEC as per IEC 60068	Required	
27	Life Span [guaranteed]	5 years	
28	Compliance to Type Test	Type test reports attached	
29	Communication Port		
A	Rear Port Details	2 No. RJ 45 Port/ 2 Nos. FO Port	
B	Front Port Details	1 No. RJ 45 Port/ 1 No. USB	
30	Whether time synchronization are native to the relay	Yes	
31	Start and Trip Contacts are freely Programmable	Yes	
32	Relay should be directly connected to the relay without the use of any intermediate converter through RJ 45 Port		
33	Specify the application for configuration and data downloading from the relay		
34	Software is to be provided for data downloading of events, Fault records for evaluation of the same		
35	Graphical configuration tool for I/O,O/P and functional building block for protection and control		
36	Any other software required for integration with SCADA		
37	DC Burden	Less than 20 W	

Signature of the Bidder
Date and Stamp