



प्रभास्मि शशि सूर्ययोः

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No.JPD/S.E.(MM-II)/SPO-IV/D. 3988

Dated: 19/8/21

Sub.: Inviting suggestions over the Technical Specifications/ Pre qualifications requirement for purchase of Automatic CT & PT Test System.

Jaipur Discom is intending to procure Automatic CT (Current Transformer) & PT (Potential Transformer) Test System. While enclosing herewith the proposed specifications & Pre-Qualification Requirement, prospective bidders are requested to please examine the same thoroughly and furnish their comments/suggestions, if any, on email (semm2@jvvn.org) upto 3rd September 2021.

Encls.: As above.


(R.K.SHARMA)
SUPERINTENDING ENGINEER (MM-II)

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TECHNICAL SPECIFICATIONS FOR AUTOMATIC CT (CURRENT TRANSFORMER) & PT (POTENTIAL TRANSFORMER) TEST SYSTEM

1.0 OBJECTIVE:

To provide complete and comprehensive facilities for doing routine, acceptance and certification tests pertaining to accuracy requirements on Current Transformer & Potential Transformer for types of various accuracy classes generally confirming to relevant IS & IEC and demagnetization

2.0 REQUIREMENT:

The requirement of Automatic CT (Current Transformer) & PT (Potential Transformer) Test System is 7 Nos.

3.0 SCOPE:

Design, engineering, manufacture, delivery, installation and commissioning of Automatic Computerized CT & PT Test System in JVVNL site. In addition to above, the successful bidder / vendor (hereinafter referred to as Vendor) shall also be required to provide:

- i. Operations Manuals including drawings. – 1 set in hard copy , plus 1 set in CD form
- ii. Training to at least 5 personnel from the Department on all aspects of operation and maintenance
- iii. Continued technical support during Guarantee period and after warranty period.
- iv. List of Spare Parts & Consumable items. Applicable standard IEC-61869-2-3

V. Related Softwares.

4.0 Combined Automatic Instrument Transformer Test System

The CT/VT test system is designed to test CTs over the range of 1 to 2000 amperes and Single Phase & Three Phase VTs of 11kV and 33kV. The system should be self contained and includes all the required power source to generate the test voltage & current. The appropriate reference CTs and PTs, a set of burdens to load the test CT/PT to the required operating point and an Automatic CT/PT comparator to measure the errors of the test specimen transformer with respect to the reference transformer.

An automatic CT demagnetizer should be provided so that the test CTs can be demagnetized prior to conducting the accuracy tests.

The system arrangement should be such that all the controls and ^{connections} to CT, CT Burden connection of CT testing are provided on the front panel of the cabinet while all the connection to the Test VT, VT burdens connections for VT testing are made on the rear of the cabinet. The rear end of the cabinet can be fenced off for safety purpose. The high voltage power supply for the VT test set-up and the Standard Capacitor are provided externally of the cabinet.

4.01 FEATURES

- Fully pre-wired comprehensive turn key test system.
- Suitable for CTs upto 2000 A & Single Phase and three phase VT's of 11 & 33 KV class.
- CT/PT Transformer Test Set with computer & printer interfaces.
- Electronic Potential Divide or standard bipole PT facilitates testing of three phase VTs with various ratios for testing upto 33 KV.
- Automatic CT Demagnetizer.

4.02 The major components of the test system shall be:

- CTPT comparator
- An adjustable current source- Internal 2.4KA, 16KVA
- An adjustable current source complete with a precision (0.005 Class) internal multi-ratio standard CT.
- A set of CT burdens.
- A source of adjustable three phase voltage for single & three phase VT testing.
- Automatic CT demagnetizer.
- An Electronic Potential Divider (EPD)
- A SF6, 3 Terminal Standard Capacitor.
- Bipole 11 KV, 33 KV standard potential transformer for three phase testing
- A source of adjustable voltage for VT testing.
- A set of VT burdens.
- A set of leads for CT & VT connections:
- 20 KVA stabilizer.
- Desktop computer along with laser printer, computer table & chair

Aug 2 2020

5.0 Combined CTPT Comparator

The Instrument Transformer Comparator which is a fully automatic comparator capable of comparing both CTs and VTs. The input ranges of the instrument shall be 400 Volts or better on the VT side and 0.05 to 20 amperes on the CT side (5 ampere input) or 0.01 to 4 amperes (1 ampere input).

CT/PT Comparator has a Ratio Error measuring range of upto 20% for both CTs and VTs. The instrument can be controlled through its keyboard or the RS-232 port using an IBM compatible PC. A USB printer port shall be provided to drive a dedicated printer. Test Set shall measure the burden of the entire test-set up., The Test Set should recognize the accuracy classes of IEC, IEC-S, IEC-P, IS, IS-S, IS-P, IS-PR. In-built measurement feature shall be provided to facilitate balancing of the Bridge for 1 % of rating as per IS-S class specifications. Latest IEC-61869-2, 3 & 4; ANSI C57.13-2008/ IS-2705 standards should be incorporated. IS-PR testing as per IS-16227-3. Ratio & Phase Error Tests as per IEC 61869 for TP-X, TP-Y, TP-Z Class CTs.

5.01 Comparator shall have following features:

- *Micro processor based Comparator, fully automatic capable of comparing both CTs and VTs.
- *Very fast measurements.
- *The input ranges of the instrument are 1.2.... 400 volts on the VT side and 0.05 to 20 amperes on the CT side (5 ampere input) and 0.01 to 4 amperes (1 ampere input).
- *The comparator has a Ratio Error measuring range of upto 20% for both CTs and VTs.
- * In built feature for balancing for 1% of rated currents which is needed for testing CTs as per The Revised IS-S class CT specifications.
- * Ratio Error resolution of 0.1 ppm; upto 0.00001 display.
- Phase Error - 0.1 μ rad or 0.01 min
- * Also Suitable to measure latest 0.2S accuracy class CT's. Also suitable for latest amendment of IEC 60849 standard.
- *It shall measure the total burden connected to the test sample including burden of test leads. Separate Burden measurement terminals are provided for 4 Terminal measurement for current.
- *It recognizes the accuracy classes of ANSI, IEC, IEC-S, IEC-P, IS, IS-S, IS-P, IS-PR, AS, AS-S, BS, BS- S and 0.2S Class CTs
- *Internal Data Storage facility – can store upto 1, 00,000 readings in in-built memory.
- Option for data storage through USB Pendrive.
- *Provides Error messages on LCD display screen along with beeping alarm
- *The instrument can be controlled through its keyboard and the RS232 port using an IBM Compatible PC.
- *A USB printer port & RS232 PC Port are available to connect to the printer and PC/ Laptop
- . The comparator is designed to compare CTs/VTs of nominally the same ratio.
- * High resolution TFT 800x480 display.

Aug 21

*Option for to connect External LCD Display shall be provided.
 *Suitable for testing CTs of 5A and 1A using a single 5A Std. CT

5.02 SPECIFICATIONS FOR COMPARATOR

1. Voltage Input:	Range	-	1.2V ... 400 volts.
	Consumption	-	~ 0.02VA@120V
	Readout	-	in volts or % of
rating	Accuracy	-	±0.5% of reading FS.
2. Current Input	5A Range	-	0.05... 20 amperes
	Input	-	<0.5 VA @ 5A
	Consumption	-	0.01 ...4.0 amperes.
	1A Range	-	< 0.1 VA @ 1A
	Consumption	-	in amperes or % of
	Readout	-	
	current.	-	±0.5% of reading
	Accuracy	-	±0.1% FS
3. Measuring Ranges	Ratio Error	-	0 to ±20%
	Phase Error	-	0 to ±0.2 radians (20 crad.)
		-	0 to ±680 minutes
4. Frequency Range	Operating	-	45 to 65 Hz
	Indication	-	00.00
5. Highest Resolution	Ratio Error	-	0.1 ppm (0.0001%)
	Phase Error	-	0.1 µrad (0.0001crad)
6. Display	High resolution TFT 800x480 color display		
7. Keyboard	Front Panel membrane keyboard.		
8. Power Input	90 to 270 volts, 50Hz		
9. Accuracy Class :	Instrument should recognize IEC, ANSI, IS, IS-S, AS, BS, TPX, TPY & TPZ accuracy classes.		
10. Burden Measurement or Burden display			
Accuracy	±1%		
Voltage Burden Range	0-999.9 mVA - 9,999 VA.		
Voltage Impedance	Infinity to 99.99K Ω to 99.99Ω OR 0 - 999.9 mVA - 9,999VA		
Current Burden Range	0-999.9mVA - 9,999VA		

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Current Impedance

0-9,999 kΩ OR
0-999.9mVA – 9,999VA at specified current

Burden to be displayed on the comparator itself.

11. Power Factor

0 to 1.000

12. Computer Interface

An opto isolated RS-232 computer interface is provided in the instrument. This port can be used for remotely controlling the instrument or for downloading test results.

14. Printer Output

USB Port

15. Accuracy
Accuracy CT

Ratio Error

Phase Error

Normal operating range
(5 to 120%)

0.4% of reading **0.5% of reading**
±10 ppm ±10 micro rad

Extended Operating Range
(1 to 400%)

±0.8% of reading ±1.0% of reading
±20 ppm ±20 micro rad

16. Data Storage facility

store upto 1, 00,000 readings

17. Data Hold Facility

At any given % of Voltage or Current, we can hold the readings displayed by pressing F1 key. To resume measurements, press F1 again.

18. PC Operation

Can be controlled from a PC using PC keyboard. Results are shown on PC monitor and test results can be transferred to the PC for data storage. Results are stored in Predefined format or excel format.

6.0 ADJUSTABLE POWER SOURCE :

Power Input : The Input to the system is 440 volts ±10%, 50 Hz, 16 KVA max.

The adjustable power source having following Operating Controls & Indicators:

*Digital voltmeter and ammeter indicating source voltage and source current .

*Digital voltmeter and ammeter indicating input voltage and input current .

*Indicators for line and output.

*Output Control circuit breaker.

*Line circuit breaker.

Aug 2 2020

*Function switch -CT Hi, CT Med, CT Lo, <CT Lo, VT, Demagnetize & OFF.

*Fine and coarse controls for adjusting test voltage/current

*Standard CT ratio selection switches.

Burden selection switches.

CT demagnetizer indicator & initiate switch

Emergency OFF.

7.0 Protection:

- > Overload protection on line and regulator.
- > Zero start safety interlock.
- > Safety interlock switch for connecting to safety barrier.

8.0 Standard Current Transformer

8.01 GENERAL DESCRIPTION

The Instrument Current Transformer shall have precision 2000 amperes CTs designed for accurate measurement of Current or Instrument Current Transformer calibration applications. The CT winding are designed such as to provide the user with a facility to test the performance of the CT and verify its accuracy.

8.02 SPECIFICATIONS:


Primary	:	upto 2000 amperes
Secondary	:	5 ampere
Accuracy	:	0.005% IEC Class at a burden of 1VA, at 50 Hz.
Ratios provided	:	1.25, 2.5, 5, 6, 7, 7.5, 8, 9, 10, 12, 12.5, 14, 15, 16, 17.5, 20, 22.5, 25, 27.5, 30, 35, 40, 45, 50, 60, 70, 75, 80, 90, 100, 120, 140, 150, 160, 180, 200, 250, 300, 350, 375, 400, 500, 600, 700, 750, 800, 900, 1000, 1200, 1400, 1500, 1600, 1800 and 2000
Duty Cycle	:	Continuous upto 2000A, intermittent (5 minutes) at 200% current (4KA).

9.0 Current Transformer Burden

The Current Transformer Burdens shall be designed for loading instrument current transformers during accuracy tests. Burdens are designed to conform with IS 16227 / IEC- 61869 specifications. Each VA element can be suitably selected and added to get required VAs.

9.01 General Specifications:

1. Rated Input Current : 5A or 1A

Amy 31 

2. Ratings : 40VA, 20VA, 10VA, 7.5VA, 6.25VA & 5 VA and different combinations of these at 0.8 PF 3.75, 2.5, 1.875, 1.25 & 1VA at 1.0 PF

- 3. Maximum Burden at 0.8 PF : 88.75 VA in steps of 5VA
- 4. Current Operating Range : 1 to 200% of rated current
- 5. Accuracy (5 to 200%) : ± 3% and
± 3% of PF@ 0.8 PF
± 1% of PF at 1.0 PF

10.0 CT DEMAGNETIZER

An CT demagnetizer is provided within the test system. The demagnetizer shall be suitable for demagnetizing CTs of all ratios, having either 5A or 1A secondary windings.

11.0 VT OUTPUT SOURCE

An adjustable Three Phase output of 0 – 50kV, 7.5kVA three phase Voltage source with Control Desk is provided for energizing the test PT and the reference multi ratio PT. The 50kV VT Source should be kept outside the racks for safety considerations.

An adjustable Three Phase output of 0 – 50kV – shall provided for energizing the test PT and the reference divider (EPD) or PT for testing single phase VTs upto 33KV. Same source can also be used in three phase mode to test 11 KV and 33 KV three phase VTs (upto max of 120% of 33 KV). The HV source transformer & standard capacitor shall be kept outside the racks for safety considerations.

12.0 Bipole PT:

Primary/Secondary; 11kV/ $\sqrt{3}$ /110V/ $\sqrt{3}$ V class; 0.1 accuracy class @ 5VA
Primary/Secondary; 11kV/110V, class; 0.1 accuracy class @ 5VA
Primary/Secondary; 33kV/ $\sqrt{3}$ /110V/ $\sqrt{3}$ V class; 0.1 accuracy class @ 5VA
Primary/Secondary; 33kV/110V, class; 0.1 accuracy class @ 5VA

13.0 Electronic Potential Divider (EPD)

HIGH ACCURACY MULTI RATIO REFERENCE VT.

The EPD should be designed to operate over an output range of 140 volts down to 50 volts (120% of 120 volts and 80% of 110/ $\sqrt{3}$). An EPD Range extension Transformer to be provided to increase the EPD operating range to upto 280V. This Range Extension Transformer is needed as & when testing @ 190% is needed and/or if the operating Sec Voltages at the designated % of test exceed the normal operating EPD range of 140V.

EPD shall be provided with maximum ratio of upto 600 for testing single phase VTs of 11KV & 33KV with high accuracy of 0.05%.

Aug 20 2020

13.01 SPECIFICATIONS

Line Power : 230 volts, 50 Hz

Output Rating : 50-140 volts, 0.1 amperes.

Ratio Settings : Multiplier + two dials + 10T potentiometer

Accuracy : $\pm 0.05\%$ and 2 minute at rated condition.

14.0 SF6 GAS FILLED 3 TERMINAL STANDARD CAPACITOR :

A suitable SF6 Gas Filled 3 Terminal Standard capacitor is a extremely stable, low - loss capacitor designed for use in laboratories and testing departments. The model is of three terminal design and is insulated with pressurised Sulphur Hexafluoride (SF6) gas.

Rated Voltage = 33kV (max upto 39kV)
D F = $<1 \times 10^{-4}$

15.0 POTENTIAL TRANSFORMER BURDENS.

The Potential/Voltage Transformer Burdens are designed for loading instrument voltage transformers during accuracy tests. Burdens are designed to conform with IS 16227 / IEC 61869 specifications. Burden Power Factor is maintained at 0.8 over the range of 2.5 to 227.5VA

Burden elements are arranged in binary sequence & can be connected to the transformer in any combination. Large numbers of possible burden values are provided in this manner.

General Specifications:

- | | | |
|---------------------------------------|---|---|
| 1. Individual Burden Element Rating | : | 2.5, 5, 10, 20, 40, 50, 100 VA at 0.8PF |
| 2. Maximum Burden at 1.0 PF | : | 1.0, 1.25, 2.5, 5, 10VA at 1.0 PF |
| 3. Maximum Burden at 0.8 Power Factor | : | 227.5 VA in steps of 2.5 VA |
| 4. Rated Input Voltage | : | 110 V or 63.5 V |
| 5. Voltage Operating Range | : | 5% to 200% of rated Voltage |
| 6. Accuracy | : | $\pm 3\%$ of VA at 80 - 120% of rated Voltage |
| | : | $\pm 5\%$ of VA below 80% of rated Voltage |
| Voltage | : | $\pm 3\%$ of PF at 0.8 PF |

Qty - 3 Nos - For testing 3 phase PTs with Secondary Voltage - 110V
Qty- 1 No. - For testing Single Phase PTs with Secondary Voltage - 63.5V

16.0 POWER LEADS AND CONNECTING CABLES

The equipment is intended to be wired to a 440 volt source capable of supplying 50 amperes. It comes complete with a 5 meter, Four-wire power cable for this purpose.

Aug 21 2020

The equipment includes all the typical leads required to connect CTs or PTs and conduct tests. Such leads include the following:

1. VT secondary leads, 4 conductor arrangement for avoiding lead drop in the test set up (10 meters).
2. VT primary leads (5 x 1 meters).
3. Test VT secondary cable of 10 meters
4. Test VT burden cable of 10 meters
5. Test CT burden measurement leads of 3 meters.
6. Test CT secondary cable of 3 meters.
7. 6 nos. of 120 Sq. mm cable of 400A each.
8. Clamps for fastening primary connections.
9. Holes are provided in Busbar to connect the primary cables.
10. Safety Interlock switch.
11. 20 KVA stabilizer.

17.0 Technical data for PC:

Processor	:	Cache: 13.75 MB L3 or higher, MAX, Turbo Frequency 4.3 GHZ, 10 Core, 20 Threads or higher, Bus speed : 8 GT/s DMI3 or higher
RAM	:	Minimum 32 GB DDR
HDD	:	2 TB minimum
Optical Drive	:	48X/32X DVD/CD RW Combo Drive or better
Keyboard & Mouse	:	PS2/USB Multimedia/107 keys Keyboard or better.
I/O ports	:	Minimum 4 high speed USB 2.0 (2 front), Mic-In, Headphone-out, Line-In, 1 serial, 1 parallel, 2 PS2, One RJ-11, One RJ-45 minimum or better.
Networking	:	Onboard 10/100/1000 Mbps/Gigabit LAN with slot available for adding wireless networking card.
Modem & Communications	:	In-built high-speed 56 K modem or better, Broadband ready.
Operation System	:	PC shall be supplied with licensed operating system installed Windows 10 or better.
Monitor	:	Minimum 22 inches flat screen of LED color monitor, preferably with built in speakers.
Printer	:	Laser Printer, Suitable for paper size uptoA4
UPS	:	600 VA UPS

Note:- Suitable good quality computer table to be provided along with the above specified computer system.

18.0 DOCUMENTATION :

One set of following documents in print form (hard-copy) shall be supplied along with each test system:

- Operating manual of each component of test equipment
- Wiring diagram
- Calibration certificate of individual components of the system issued by the manufacturer.

Amig 31

- Test certificate of complete test system.

19.0 INSTALLATION AND COMMISSIONING:

The supplier shall be responsible to install and commission the CT & PT test equipment at the JVVNL site. The supplier shall submit the layout plan, installation proposal and electric supply requirements within 4 weeks from the date of receipt of the detailed purchase order to the Purchaser.

The Purchaser will arrange the appropriate room, location, electric supply etc. before the supply of the system so as to permit the smooth and proper installation of the system immediately upon its delivery to the designated location/s.

20. Calibration and testing:

The equipment shall be supplied along with the NABL calibration certificate /s of the individual components of the testing system(excluding the PC system). The calibration should also be done at each site during warranty period.

21. Training:

The supplier shall provide training on operation and maintenance of the CT & PT test equipment to at-least 5 Engineers of JVVNL, about the operation, maintenance and calibration of the test bench at the cost of the bidder at the destination place i.e. Meter labs of JVVNL.

22.0 Maintenance & Guarantee:

- (a) It shall be governed by clause 1.40 of GCC except that the guarantee shall be for a period of 5 years from the date of commissioning in Nigam's Lab. The equipment shall be guaranteed for trouble free operation for a period of 5 years from the date of commissioning. Guarantee includes annual NABL calibrations at each site.
- (b) The equipment found defective within the guarantee period shall be repaired / replaced by the supplier free of cost at the site of installation within 30 days from the date of receipt of information by purchaser/stores officer / Lab In-charge / JVVNL Representative as per clause no. 1.18 of GCC.

24.0 PAYMENT:-

As per latest amendment of GCC & ITB 70% of the payment shall be released after receipt of CT-PT Test Equipment (of complete unit) at designated meter lab and Balance 30% of payment shall be released on production of satisfactory installation and commissioning report of the concerned SE(M&P), JVVNL.

Aug 20 2020

25.0 WORK COMPLETION SCHEDULE:-

The installation and commissioning of CT-PT Test Equipment shall be completed within 45 days from the date of receipt of CT-PT Test Equipment at JVVNL's Lab along with intimation of location of place i.e. designated meter lab where CT-PT Test Equipment is to be installed. The concern AEn meter lab shall give intimation to the firm only after receiving the CT-PT Test Equipment to meter lab.

26.0 Qualification Requirements

The qualification requirements shall be as per Schedule-III A.

27.0 Prices:

Tenderer must quote 'FIRM' prices. The quoted prices shall be exclusive of G.S.T. If no duty and/ or tax is applicable at concessional rate, the same shall be clearly mentioned.

28.0 Delivery

The delivery of ordered quantity should be completed in 4 months period from the date of receipt of purchase order including commencement period of 60 days in equal bi-monthly installments.

29.0 ADDITIONAL ORDER

Repeat orders for additional quantities, up to a maximum of 50% of original ordered quantities, may be placed by the Nigam, on the same rates, terms and conditions given in the contract.

The amendment in the already existing PQR as proposed by the M&P wing are as under:-

S. No.	Existing Provision	Proposed Provision by M&P wing
1	Bidder should be manufacturer /authorized representative of the original manufacturer.	The Bidder of the CT & PT testing system must have at least 10 years experience in design and manufacture of such systems including their components The bids may be submitted only by the manufacturers of CT & PT testing equipment, or, their representatives, duly supported by a certificate issued by the manufacturers authorising and supporting the offer made by them
2	Bidder should have ISO:9001(with latest	The Bidder should be a ISO-9001-

Amy 21

Specs for CTVT System Aug 6 2020

	amendment) certification for quality standards. A valid copy of ISO certificate would be enclosed in the bid.	2015 certified Organization registered with accredited bodies – National Accreditation Board for Certification Bodies – NABCB & UKAS (United Kingdom Accreditation System) to discourage unreliable certificate promoters. (Registration with NABCB is mandatory as several small & medium scale units are ISO certified but are not registered with the relevant governing body)
3	The bidder should have supplied to utility / Discoms/ Govt. Departments of India/National accredited Lab at least 2 X QQ (QQ being the quoted quantity) Fully Automatic CT-PT Testing System of range 1-2000 Amp. with overall accuracy of 0.05% or better in last 3 financial years from the date of opening of technical-commercial bid.	They should also have supplied at least five CT & PT testing systems, in successful operation for at least 10 years at NABL accredited laboratory in India on the date of submission of their bids.
4	The credential/ performance certificates (letter) for at least 20% of the tendered quantity or minimum one No., whichever is higher, issued by a NABL accredited labs/ utilities/ Discoms/ Govt. Departments situated in India substantiating the satisfactory operation during last three years of similar or better fully automatic test bench, as on date of tender opening shall be submitted, failing which offer shall be treated as Non-responsive.	The bidder must submit at least five performance certificates for complete CT VT Rack Systems and not only for comparator.
5	The bidder must have trained service engineers dedicated for after sales trouble shooting and technical support, permanently posted in India. The bidder should possess adequate testing facilities for carrying out routine & acceptance test of items as per relevant standard at their works/service center in India. The bidder shall furnish documentary evidence in support for conducting routine & acceptance test	The bidders should have trained engineers dedicated for trouble shooting and technical support in India
6	--	Manufacturer should have annual turnover of minimum 5 crore for last 3 years.

Amj 21 J.

Specs for CTVT System Aug 6 2020

7	--	The Bidder should be their own NABL Accredited Laboratory for calibrating all the System components.
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