

## DEPARTMENT OF ELECTRICAL ENGINEERING, IIT DELHI

Minutes of the meeting of the purchase committee held on January 06, 2015 to purchase “Phasor Measurement Unit” to decide specifications and NIQ

**Members Present:** Prof. R. K. Mallik, Prof. S. Mishra, Prof. S. Prakriya, and Dr. B. Lall

The following specifications were decided for the Synchrophasor unit consisting of Phasor Measurement Unit (PMU) and a compatible GPS clock with it to be purchased under project RP02253:

Parameters	Specification
<b>PMU</b>	<ul style="list-style-type: none"><li>– Format: IEEE C37.18</li><li>– Data rate: 1-50 messages per second (mps)</li><li>– Total Vector Error: less than 1 percent</li><li>– Frequency range: +/- 5% of nominal frequency</li><li>– Phase Angle Range: -179.99 to 180°</li><li>– Harmonic distortion ≤10% (any harmonic)</li></ul>
<b>Data elements</b>	<ul style="list-style-type: none"><li>– 2 three phase current</li><li>– 2 three phase voltage</li><li>– Various analogs depending upon PMU model like MW, MVAR and any derived quantities based on voltage and current</li><li>– Minimum 6 digital inputs</li><li>– Communication: Serial and Ethernet</li></ul>
<b>GPS Clock</b>	<ul style="list-style-type: none"><li>– Nano second level accuracy</li><li>– Warranty of at least 5 years</li></ul>

### **Other Requirements:**

- The system should include programmable logic functions for a wide range of user-configurable protection, monitoring, and control schemes.
- Overcurrent fault protection and overvoltage protection is required.
- Other accessories needed should be made available.
- Local non-volatile memory needed. Specify the memory size in the bid.
- Battery backup is recommended.
- The control and measurement devices must have necessary facilities for user interface.
- Proper cooling, protection and safety arrangements must be available with the device.
- All supporting softwares are to be provided with the equipment.
- The system should have a feature of future expandability in terms of additional PMU interface.

- All sensors and measuring equipments should be provided and proper installation should be done.
- The system should include two synchronism check elements with separate maximum angle settings. The synchronism check function should allow different sources of synchronizing voltage ( $V_A$ ,  $V_B$ ,  $V_C$ ,  $V_{AB}$ ,  $V_{BC}$ , and  $V_{CA}$ ).
- Display and interfacing devices and ports should be provided.
- Software upgrade and auto update features are required.
- External pushbuttons for user operation is recommended.
- Any other features should be clearly mentioned in the technical bid.
- All sorts of precautions and protections needed while operation should be informed beforehand.

### **Terms & Conditions:**

1. Please submit the TECHNICAL and FINANCIAL bids in separate sealed envelopes. Mark the two envelopes clearly as "Technical Bid" and "Financial Bid". Both the sealed envelopes should be sent in a single sealed envelope, with clearly marked as "Phasor Measurement Unit". The quote should reach the following address on or before **30/01/2015** upto **05:00 PM**.  
**Name** : Prof. Ranjan K. Mallik  
**Address** : Room No. II-338  
 Department of Electrical Engineering  
 Indian Institute of Technology Delhi  
 Hauz Khas, New Delhi-110016 (India)
2. Please quote prices at FOB/CIF New Delhi, inclusive of installation charges.
3. Quote should be in Indian Rupees as well as US Dollars and to valid for at least three months.
4. Attach all the technical literatures and list of similar installations done in India.
5. Mention the warranty period. Also mention if there are any additional prices for on-site warranty.
6. Mention if you can provide any technical support like training of IIT Delhi personnel at IIT Delhi or in your factory and providing a technical person for operation of the machine for a certain period after installation. Kindly mention about this clearly in the technical bid.
7. If the quote is being submitted by the representative of the Principals/manufacturers themselves, a valid Agency ship/Dealership Certificate authorizing the agent to quote to IIT Delhi on behalf of the Principals should be enclosed.
8. The Institute reserves the rights to accept/reject any/all quotation without assigning any reasons thereof.
9. Complete set of manuals for the operation and servicing of the equipment should be given. All circuit diagrams, other mechanical and electrical schematics must be provided to main unit, sub systems and accessories.
10. Delivery as early as possible in weeks on receipt of Purchase Order.
11. Clearly specify the installation requirements- such as space, power, frequency, environment (temperature and humidity) etc.
12. If the items quoted are proprietary in nature, please enclose proprietary certificate from the principals stating "Certified that-----is a proprietary item of M/s ----- and no other manufacturer make these items".
13. If the bidder is Indian agent, the agency certificate should be enclosed.

14. Please produce compliance certificate for the specification.
15. Please ensure that the Indian agent has been enlisted with the Department of Expenditure, evidence may please be attached.
16. All bank charges payable in India are to buyer's account and bank charges in seller's country to seller's account.

**Purchase Committee members:**

Prof. R. K. Mallik

Prof. S. Mishra

Prof. S. Prakriya

Dr. B. Lall