University of Calcutta

Dept. of Applied Physics
92 APC Road, Kolkata 700009

Tender Notice

Enq No.: AP/UGC-SAP-DRS-II/JNB/18-19/04 Dated: 18/09/2018

To
The All Interested Parties

Dear M/s.
Please submit sealed quotation within **03/10/2018 (4 PM)** at the Office of the Department of Applied Physics for the following item.

Please enclose the copy of the following papers along with the quotation.
1. Trade License, 2. PAN Card, 3. VAT & Service Tax Registration wherever necessary

1. Introduction

Department of Applied Physics, University of Calcutta (CU) invites sealed bids from GST compliant bidders for a turnkey contract based jobs

2. Background

Department of Applied Physics, University of Calcutta wants to make a **smart substation based Power System control & monitoring panel**, which is a part of smart grid test bed system, to facilitate simulation of power systems, smart grid, testing and analysis for experiments and research purpose. The requirement envisages supplies to be made as modular components and future expansion of modules to be integrated with the present scope to further introduce additional components for necessary analysis and testing.

3. Requirement for this Tender

Supply of 1 no. **smart substation based Power System control & monitoring panel** along with installation and commissioning services for the total system.

4. Scope of Work.

Module: A substation based Power System Control & Monitoring Panel.

I. The scope of work will cover design, engineering, procurement of material/equipment, fabrication/ manufacturing, supply, inspection, transportation to site, storage, insurance, handling, erection, testing, trial run and commissioning of offered system for a substation based power system control & monitoring panel along with all associated equipment including interconnection to power supply system in fully integrated manner on turnkey basis. The basic scope of work includes the following:

II. The substation based power system control & monitoring panel will comprise of the following provisions:

i. Incoming supply from **grid** 415V, 50 Hz
   1. Circuit Breaker with remote tripping facility
   2. CT, PT for interfacing with smart controller for current, voltage and power monitoring facility
   3. Power contactor for power flow control
   4. Additional metering CT for external interfacing for making provision of IoT device (Zigbee)

ii. Incoming supply from **Synchronous generator** 415V, 50 Hz
   1. Circuit Breaker with remote tripping facility
   2. CT, PT for interfacing with smart controller for current, voltage and power monitoring facility, numerical relay,
   3. Numerical Relay (Buyer supplied)
   4. Power contactor

iii. 3rd supply source through **Tie Line**
   1. Circuit Breaker with remote tripping facility
   2. CT, PT for interfacing with smart controller for current, voltage and power monitoring facility

iv. **Transmission Line**
   1. Circuit Breaker with remote tripping facility
   2. CT, PT for interfacing with smart controller for current, voltage and power monitoring facility

v. General specifications
   1. All the 3 above sources will form a Bus system.
   2. The alternator supply will have provision for synchronising with grid power. A synchronising unit with display & communication facility will be supplied for this purpose.

vi. All devices (CB status, Numerical relay, current, voltage, synchronising unit) should be provisioned for interfacing with **external smart controller/PLC** through DI/AI or communication Ethernet/Profinet/Modbus/Profibus/IEC61850 as well as optical port. Required software license to be provided for HMI configuration, and licenses for 4 nos. concurrent users along with associated processing hardware.
   1. A minimum 7" Panel Display to be provided for Monitoring of the power system including Line voltage, Phase voltage, Line current, frequency, Line pf, Total pf, Line phase angle, Amplitude unbalance for voltage & current, Line power (KW, KVAR, KVA, KWH, KVARH, KVAH), Total power (KW, KVAR, KVA, KWH, KVARH, KVAH), Total reactive energy inflow & outflow, Total active energy inflow & outflow, Neutral conductor current. All the above parameters will be interfaced from the **external smart controller/PLC** through Ethernet/Profinet/Modbus. Necessary configuration software license to be considered in the supply.
   2. Control facility will also be provided in the Panel Display for ON/OFF of the power sources, Manual synchronising. Such control logic will be done in the **external smart controller/PLC** and interfaced with this Panel Display.
   3. All 3 sources as well as transmission line will have indicators for presence of supply using indicating lamps.
   4. Provision for Auto/manual selection for synchronising

III. Site survey for understanding the technical requirements.
IV. Existing equipment to be relocated, if required.
V. The panel should be table mounted, with provision for laying cable suitably (Tenderer to visit site for offering suitable solution). Necessary power and control terminals to be provided for external interfacing. 20% spare terminals to be provided.
VI. GI, conduits pipes, tools and tackles, cable trays racks, junction box, foundation bolts, inserts and anchor etc. and all the required materials fittings, and accessories to be provided as necessary.
VII. Spares and consumables for commissioning of the total system.
VIII. Any small civil work if necessary during erection.
IX. Drawing documents to be furnished.
X. Tenderer should supply required power cables for connection with grid and alternator supply. Communication cable will not be part of this supply. For cable length estimations the tenderer is required to make prior site survey.

5. General terms of supply

a. Power tapping source will be 10 metres from the location of control panel.
b. Power supply will be 415 VAC, 50 Hz.
c. Experts to be provided by the bidder for installation and commissioning till handover.

6. Preferred make list

- Enclosure: Rittal, Pyrotech, Valrack
- Panel Display: Siemens, Beckhoff, Mitsubishi
- Synchroscope: Lumel, Siemens, ABB
- Switch gear: Siemens, L&T, Schneider.

For
Professor Jitendranath Bera
Coordinator,
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Dept of Applied Physics
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University of Calcutta

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92 APC Road, Kolkata 700009

Tender Notice

Enq No.: AP/UGC-SAP-DRS-II/JNB/18-19/03 Dated: 14/09/2018

To
The All Interested Parties

Dear M/s.
Please submit sealed quotation within 03**/10/2018 (4 PM)** at the Office of the Department of Applied Physics for the following item.

Please enclose the copy of the following papers along with the quotation.
1. Trade License, 2. PAN Card, 3. VAT & Service Tax Registration wherever necessary

1. Introduction

Department of Applied Physics, University of Calcutta (CU) invites sealed bids from GST compliant bidders for a turnkey contract based jobs

2. Background

Department of Applied Physics, University of Calcutta wants to make a **Smart Controller panel for Power system towards smart grid test beds** which will facilitate simulation of power systems, smart grid, testing and analysis for experiments and research purpose. The requirement envisages supplies to be made as modular components and future expansion of modules to be integrated with the present scope to further introduce additional components for necessary analysis and testing.

3. Requirement for this Tender

Supply of 1 no. **Smart Controller panel for Power system** along with installation and commissioning services for the total system.

4. Scope of Work.

Module: Smart controller and communication panel for remote monitoring and control of hybrid generation, Transmission and distribution substations of power system towards smart grid test bed development.

I. The scope of work will cover design, Engineering, procurement of material/equipment, fabrication/ manufacturing, supply, inspection, transportation to site, storage, insurance, handling, erection, testing, trial run and commissioning of offered system for Smart Controller and Communication Panel for Power system with digital communication along with all associated equipment including interconnection to power supply system, networking, interfacing with external Drive panel and external Power system control & monitoring panel in fully integrated manner on turnkey basis. The basic scope of work includes the following:

i. Smart controller PLC/RTU based with

1. 30DI, 26DO
2. 4 AI (4-20mA/0-10V), 6 AO (4-20mA/0-10V)
3. AC Power monitoring card for interfacing 5A CT & 220V PT inputs – 4 nos.
4. Integrated Power monitoring capability for: Line voltage, Phase voltage, Line current, frequency, Line pf, Total pf, Line phase angle, Amplitude unbalance for voltage & current, Line power (KW, KVAR, KVA, KWH, KVARH, KVAH), Total power (KW, KVAR, KVA, KWH, KVARH, KVAH), Total reactive energy inflow & outflow, Total active energy inflow & outflow, Neutral conductor current
5. Memory: minimum 2MB
6. Provision for 20% spare module space in the PLC
7. Programming Logic control using Ladder/FBD/Statement List
8. Interface capability through Ethernet, Profinet, Modbus, Profibus, IEC61850, provision for optical fibre based system is required.
9. Monitoring & Control facility through **external HMI** will be provided for ON/OFF of the power sources, Manual synchronising etc. Such control logic will be done in the PLC/RTU and interfaced with this Panel Display/HMI through Ethernet/Profinet/Modbus. The external HMI are basically a server based multi-client system. The communication with HMI and PLC must be made using fibre optic cable.
10. PLC communication for DC drive control to be considered. Interface with external DC drives (2 nos.) will be through Profibus.
11. PLC programming software latest version license to be provided.
12. Application software development, as required.

ii. HMI control unit for centralised control & monitoring of the Smart Power Control software from remote location.

iii. 16 port Ethernet switch.

II. Site survey for understanding the technical requirements.

III. Existing equipment to be relocated, if required.

IV. The panel should be table mounted, with provision for laying cable suitably (Tenderer to visit site for offering suitable solution). Necessary power and control terminals to be provided for external interfacing. 20% spare terminals to be provided.

V. GI, conduits pipes, tools and tackles, cable trays racks, junction box, foundation bolts, inserts and anchor etc. and all the required materials fittings, and accessories to be provided as necessary.

VI. Spares and consumables for commissioning of the total system.

VII. Any small civil work if necessary during erection.

VIII. Drawing documents to be furnished.

IX. Tenderer should supply required power cable for connection with external source distributed at different floors of the department. All Control, Signal and Communication

cable necessary will be considered part of this supply. For cable length estimations the tenderer is required to make prior site survey.

X. Provision for RTDS system integration, its monitoring and control from HMI

XI. Provision for interfacing of FACTS devices, Load bus, another transmission line, Wind/Fuel cell generator bus, their monitoring and control from HMI

XII. Provision for supply of 6 nos. of client terminals to interfaced with HMI system

5. General terms of supply.

a. Power tapping source will be 5 metres from the location of control panel.
b. Power supply will be 230 VAC, 50 Hz.
c. Experts to be provided by the bidder for installation and commissioning till handover.

6. Preferred make list

- Enclosure: Rittal, Pyrotech, Valrack
- PLC: Siemens, Rockwell, GE
- HMI Control unit: Siemens, Dell, HP, IBM

For
Professor Jitendranath Bera
Coordinator,
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