Spec. for enquiry item 01 & 02

TRANSFORMER ENGINEERING DEPARTMENT
BHEL, JHANSI

1406 50917 dt 2/12/15 WO. 71543 A1 7100

ANNEXURE TO INDENT No.: ~~140640933~~ WO. NO.: ~~71158A17100~~

Automatic Voltage Regulating Relays / TRANSFORMER MONITERING CUS TAP CHANGER SYSTEM

The AVR relay scheme shall detect following : -

I. failure of auxiliary supply,
II. failure of PT supply and
III. failure of mechanism to complete the tap changing operation.

The relay shall have necessary contacts to be connected to the alarm & /or to the Annunciator available in the panel for visual and audible indication of the failure of trip circuit. The AVR relay shall be compatible to SCADA operation of any make. However, the RTCC panel shall be fully operable even in case of non utilization of AVR relay.

All the necessary wiring shall be carried out in RTCC panel and schematic drawings shall be submitted with the technical bid and during detailed engineering for approval in duplicate.

The AVR relay shall be provided as per following specification: -

1. Automatic voltage control shall be initiated by a voltage regulating relay of an approved make and suitable for flush and/or wall mounting / DIN-rail mounting.
2. The relay shall operate from the nominal reference voltage derived form a circuit mounted 1 phase / 3 phase Voltage transformer (VT).
3. The AVR relay shall be Microprocessor based Numerical relay having large LCD display 128x128.
4. The relay shall have 4 selectable set point voltages.
5. The AVR relay shall have the following methods as option for the compensation of voltage.
   - Apparent Current (Z-Comp.)
   - Line drop compensation (LDC)
   - Active Current
   - Reactive current
6. The relay bandwidth shall be adjustable between –5 to +15 of set point voltage.
7. The relay shall have following options regarding time behavior with Time factor selectable from 0.1 to 30.
   - Linear
   - Integral
   - Fast integral
8. The relay shall incorporate an under voltage / over voltage blocking facility which shall make the control inoperative if voltage falls / rises by percentage value of set point value (as mentioned in Guaranteed technical particulars) with automatic restoration of control when nominal voltage rises / falls to value as mentioned in the Guaranteed technical particulars.
9. The AVR relay shall have integrated features for the display of following parameters Integrated tap changer position display
   - Nominal Voltage
   - Load current
   - Bandwidth
   - Measuring values V. I. Active power, Reactive power, Apparent power, phase angle, Power factor, Reactive current and frequency
10. The AVR relay shall have facility to compensatethe VT and CT-errors.
11. The AVR relay shall have facility to register the tap changer statistics. In the statistics mode, the relay shall display the no. of tap changing operations occurred on each tap.

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12. The AVR relay shall have facility to recode thevoltage and current with respect to time. Each of voltage value shall be measured for 100ms and averaged for 1 second. The recorded values shall be presented in graphical format on the device.
13. The AVR relay shall have integrated feature to make the parallel operation of 10 transformers working in parallel. The relay shall be self sufficient and shall not require any additional devices like parallel balancing module etc. The following principal shall be available in the relay as standard.
    - Master Follower
    - Master Slave
    - ΔI SinΦ(Circulating current)
    - ΔI SinΦ(S) (circulating current principal for different KVA/MVA ratings of transformer)
    - ΔCos Φ
14. The AVR relay shall have facility to monitor orcontrol the following parameters
    - Monitoring of life time consumption of transformer
    - Monitoring of operating hours of Tap changer, Fansand Pump
    - Control of cooling levels of transformer
    - Recording of Hot spot temperature
15. The AVR relay shall have facility to record specific events (Event-Recorder) like under voltage, over voltage, Over current, Auto/Manual, local/remote etc. with date and time stamping.
16. The AVR relay shall have facility to make selection of Auto/Manual and Local/Remote.
17. The AVR relay shall have different LEDs to indicate Service and Blocked condition.
18. It is preferred that 12 nos of freely programmable LEDs shall be available to indicate different Operations / Alarm / Faults condition.
19. The AVR relay shall have freely programmable Binary Inputs, Binary outputs, Analog Inputs and Analog Outputs.
20. The AVR relay shall have software to make the parameter settings of the device and it shall also be possible to do the parameter setting through keyboard of relay.
21. The AVR relay shall have suitable interface to make communication with higher level SCADA system. The following ports a minimum shall be available on the device.
    a. Rs 232 port (COM 1) for doing the parameter setting and local communication with device.
    b. RS 232 port (COM 2) for communication with higher level SCADA with optional protocols like MODBUS, SPABUS, PROFIBUS DP, LON, IEC 60870-5-101, -103 and –104, IEC 61850 in preparation.
22. It shall be possible to communicate via bus with all similar devices located at different location by making communication link with any onedevice through its RS 485- port (E-LAN) meant for local communication.
23. It shall have facility by which a customer specific software programme can be written and incorporated as feature in the relay.
24. Outline and Mounting detail drawing shall be submitted with the offer. Descriptive leaflet catalouge and technical literature describing working prenciple of the model shall be submitted along with the offer.
25. Complete Schematic drawing, Terminal marking and wiring diagram shall be furnished along with the offer.

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18.11.2014
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2/11/15

Spec. For enquiry item 03 & 04

Annexure - I

Annexure to indent No. : 140651050 Dt. 05.12.2015

W.O. : 71542A17100

Customer : M/s GETCO

AUTOMATIC VOLTAGE REGULATING RELAY / TRANSFORMER MONITERING CUM TAP CHANGER SYSTEM

1. Automatic voltage control shall be initiated by a voltage regulating relay of an approved make and suitable for flush and/or wall mounting / DIN-rail / ***rack*** mounting.
2. The relay shall operate from the nominal reference voltage derived form a circuit mounted 1 phase / 3 phase Voltage transformer (VT).
3. The AVR relay shall be Microprocessor based Numerical relay having large LCD display 128x128 ***or higher.***
4. The relay shall have 4 selectable set point voltages.
5. The AVR relay shall have the following methods as option for the compensation of voltage.

   - Apparent Current (Z-Comp.)
   - Line drop compensation (LDC)
   - Active Current
   - Reactive current

6. The relay bandwidth shall be adjustable ~~between -5 to +15~~ of set point voltage ***to suit per step voltage of 1.25%.***
7. The relay shall have following options regarding time behavior with Time factor selectable from 0.1 to 30.

   - Linear
   - Integral
   - Fast integral

8. The relay shall incorporate an under voltage / over voltage blocking facility which shall make the control inoperative if voltage falls / rises by percentage value of set point value (as mentioned in Guaranteed technical particulars) with automatic restoration of control when nominal voltage rises / falls to value as mentioned in the Guaranteed technical particulars.
9. The AVR relay shall have integrated features for the display of following parameters

   - Integrated tap changer position display
   - Nominal Voltage
   - Load current
   - Bandwidth
   - Measuring values V. I. Active power, Reactive power, Apparent power, phase angle, Power factor, Reactive current and frequency

10. The AVR relay shall have facility to compensate the VT and CT-errors.
11. The AVR relay shall have facility to register the tap changer statistics. In the statistics mode, the relay shall display the no. of tap changing operations occurred on each tap.
12. The AVR relay shall have facility to recode the voltage and current with respect to time. Each of voltage value shall be measured for 100ms and averaged for 1 second. The recorded values shall be presented in graphical format on the device.
13. The AVR relay shall have integrated feature to make the parallel operation of 10 transformers working in parallel. The relay shall be self sufficient and shall not require any additional devices like parallel balancing module etc. ***At least*** following principal shall be available in the relay as standard.
    - Master Follower / Master Slave
    - Circulating current

14. The AVR relay shall have facility to monitor or control the following parameters

- Monitoring of life time consumption of transformer
- Monitoring of operating hours of Tap changer, Fans and Pump
- Control of cooling levels of transformer
- Recording of Hot spot temperature

15. The AVR relay shall have facility to record specific events (Event-Recorder) like under voltage, over voltage, Over current, Auto/Manual, local/remote etc. with date and time stamping.
16. The AVR relay shall have facility to make selection of Auto/Manual and Local/Remote.
17. The AVR relay shall have different LEDs to indicate Service and Blocked condition.
18. It is preferred that 12 nos of freely programmable LEDs ***duly tagged or stickered*** shall be available to indicate different Operations / Alarm / Faults condition. ***If stickers are provided, then 5 sets of such stickers shall be supplied free of cost for future replacement.***
19. The AVR relay shall have freely programmable Binary Inputs, Binary outputs, Analog Inputs and Analog Outputs.
20. The AVR relay shall have software to make the parameter settings of the device and it shall also be possible to do the parameter setting through keyboard of relay.
21. The AVR relay shall have suitable interface to make communication with higher level SCADA system. The following minimum ports shall be available on the device.

    a. RS 232 port (COM 1) for doing the parameter setting and local communication with device.
    b. RS 485, Fiber optic ports for communication with higher level SCADA with protocols like MODBUS & IEC 61850.

22. It shall be possible to communicate via bus with all similar devices located at different location by making communication link with any one device through its RS 485 - port ***or Fiber Optic port meant for SCADA*** communication.
23. It shall have facility by which a customer specific software programme can be written and incorporated as feature in the relay.

5/12/15
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SEAL OF COMPANY
DATE:

SIGNATURE OF BIDDER