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Technical Specification for on Line 3 key Gases Monitoring Device (Small DGA) for transformer

1. GENERAL:

The transformer will be equipped with on Line Gas in Oil Monitoring unit (Small DGA) which shall have suitable output to extend up to control room for displaying and shall be integrated in sub-station's PC via suitable converter with required software to store & retrieve data for managing & reviewing purpose. It is intended to continuously monitor the evolution of minimum 3 key dissolved gases individually, viz. Hydrogen (H₂), Carbon Monoxide (CO), Acetylene (C₂H₂) and moisture (H₂O) from the oil of transformer. Unit having multiple gases monitoring systemj but at least having measuring capability for H₂, CO, C₂H₂ and moisture (H₂O) will also be considered acceptable without any implications on the part of GETCO. The system shall be installable on available open bore ball or gate valve of transformer. In future when required, small DGA unit can shift from one place to other.

If small DGA unit is part of supply of transformers, the supplier shall coordinate and cooperate with transformer manufacturer for successful operation throughout its life. Transformer manufacturer shall also be equally responsible for the same.

2. SCOPE of WORK: The scope of work shall be to supply, mounting, erection, commissioning, etc. of 3 Gases DGA on line gas in oil monitoring unit (small DGA) for any transformer in GETCO.

- 2.1. The DGA unit shall be installable on available open bore, ball or gate valve mounted on transformer along with all required fittings and accessories.
- 2.2. The device shall be supplied with different channels for communication such as "Local USB", "Ethernet" and RS 485 Modbus remote terminal unit connections. The USB shall be used for local download, the Ethernet to connect system to GETCO intranet (if mentioned in Schedule of respective tender) and RS485 to connect to control room PC with suitable converters. ***The required software shall be loaded in GETCO PC at desired location such that all the data/display associated with the monitoring unit can be visualized and all archiving / trending can be achieved. Also, data with corresponding time of instant shall be stored in excel sheet format in sub-station's PC when read via communication port of small DGA. It shall also give printouts of all required data as desired.***
- 2.3. All required interconnection, wiring, cabling with cables etc., including all required accessories for successful operation of the system are in the scope of work.
- 2.4. Earthing & connection for the system at required location is to be carried out by supplier.
- 2.5. For successful first installation of the system, necessary tools, tackles, calibration equipment, carrier gas, calibration gas - required if any, is in the scope of supply, free of cost. Tools required for erection are on returnable basis.
- 2.6. Installation, commissioning and O&M manuals and procedures, etc., in hard and soft form.

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2.7. The system interface shall also include required field cable, patch cable, patch box, associated accessories & hardware's to connect to the GETCO PC to display the data and alarm contacts shall be extended to RTCC panel in control room by providing separate annunciator.

2.8. Training to GETCO Engineers.

3. SPECIFIC TECHNICAL REQUIREMENT

3.1. On Line 3 key Gases in Oil Monitoring Unit (Small DGA):

The small DGA unit shall be suitable for outdoor heavily polluted atmosphere, ambient temperature of 50°C and relative humidity of 95 % and shall have degree of protection class of IP-55 or better. Necessary type test reports shall be submitted with the technical bid. Each small DGA unit shall be provided with additional canopy, if required. They shall be suitable for mounting on offered transformer or separately mounted near transformer. The best single point of mounting location to ensure optimum flow of oil in the small DGA unit without any external / additional pump shall be decided in coordination with manufacturer.

The system shall operate satisfactorily for oil temperature range of -20°C to 105°C with heat fin adapter, (if required) and shall be suitable to withstand static and dynamic pressure of transformer. Provision shall be made available for collection oil samples for DGA and moisture analysis, without disturbing small DGA unit or its connections. It shall be possible to carry out the periodic maintenance of transformer easily. The functioning of small DGA unit shall be normal and guaranteed *with or without* necessity of any additives / consumable. If necessary, bidder ***shall mention it in technical bid and shall have to supply such additive or consumable, free of cost except calibration gas, as and when required in service, to GETCO site where it is provided.***

The small DGA unit for monitoring 3 key Gases and moisture shall be provided with user configurable minimum 6 alarm contacts and front panel LED arrays. The screen for alarm setting shall be available for setting alarms based on 3 key gases or moisture and rates of change for key gases. Suitable PC software shall be provided with each small DGA unit for configuring the alarm settings.

It shall be possible to configure sampling rates hourly/daily for small DGA unit. The alarm & caution thresholds shall be user configurable and on each alarm or caution breach automatic change in sampling rate as programmed should be possible.

The device should be provided with suitable software for graphical trending & diagnostic analysis of results. The device shall have minimum maintenance requirement.

The system must have a multiline LCD display on the front panel so that last reading and communication parameters can be seen besides system faults.

The Small DGA unit shall have necessary communication port to extend data up to control room for displaying and shall be integrated in sub-station's PC. The Small DGA unit shall be electromagnetically screened and

impervious to vibrations. Necessary type tests report for confirming to EMI-EMC compatibility shall be submitted with technical bid.

- 3.2. Data Monitoring System:** The data monitoring system shall be installed in GETCO sub-station's PC for continuous display, recording and archiving of information received from all DGA units with a provision for receiving information from future IEDs also. It shall be required to obtain audio visual alarm for gas level "Alert (ROC)" & "Alarm (Gas abnormal Level)" and "System Fault".
- 3.3. Interconnecting Cabling:** Suitable armored instrumentation cables shall be provided for interconnection of all small DGA units and the data monitoring system, to transfer output of small DGA unit. The cable of required length as per site condition shall be laid in HDPE conduits in trench as well as in ground. All required terminations shall be arranged by bidder. Provision shall be kept for installing and terminating cables from future small DGA unit. \
4. List of routine & acceptance tests shall be submitted with the technical bid. Successful bidder has to perform acceptance tests in presence of GETCO representative, as per relevant standard.
5. Services of On Line 3 key Gases in Oil Monitoring Unit (small DGA) during supply, mounting, erection, testing, commissioning and after sales even beyond guarantee period shall have to be arranged and provided by the bidder.
6. The bidder shall furnish all guaranteed technical particulars as called for in this specification. Bid not containing this information are likely to be rejected.
7. The unit can be fitted to any transformer as per need/requirement of GETCO.
8. It can be shifted from one place to other place as per our need.
9. Guarantee for the small DGA unit shall be 36 months from date of commissioning.
- 10. Deviation to technical specification:** Any deviations to this specification shall be separately listed in specified Schedule – XII only, in the absence of which, it will be presumed that the provision of the specification are complied with by the bidder.

**PRINCIPAL TECHNICAL PARAMETERS OF On line 3 key Gases in Oil
Monitoring Unit
(Small DGA) for Transformers**

| SR. NO. | Item | Specification | |
|---------|--|--|--|
| 1 | On Line 3 Key Gases in Oil Monitoring Unit (Small DGA) | Measurement Range : Hydrogen : 5-3000 ppm, CO : 10-10000 ppm, C ₂ H ₂ : 3-3000 ppm and moisture 0-100 % RS (Given in ppm) | |
| | | Accuracy : +/- 5% or +/- LDL (Whichever is greater) | |
| | | Sampling Port for Lab DGA : Should be available for taking Oil Sample without disturbing small DGA unit or its connections | |
| | | Alarm Contacts : Minimum 6 nos. of alarm contacts relay Output for setting alarm based on 3 key gases or moisture and rates of change for key gases | |
| | | Caution (Alert) Setting : settable/programmable | |
| | | Alarm Setting : Alarm Setting | |
| | | Export of Alarm & Value : To sub-station's PC | |
| | | Enclosure Rating : IP55 or better | |
| | | Sensor Rating : Vacuum to Oil pressure as above | |
| | | Oil Temperature : -20 to 105 °C | |
| | | Operating Temperature : -20 to 55 °C | |
| | | Operating Voltage : 200 ~ 300 VAC, 50 Hz, +/- 5 % | |
| | | EMI – EMC Suitability : as per applicable IEC standard | |
| | | Moving Part : No moving parts | |
| | | Internal storage : Minimum Twelve months for the offered intervals | |
| | | Data management | |
| | | Software : Suitable for Data logging and viewing | |
| | | Display : Sub-Station's PC or Laptop | |
| | | Storage Format : Data Shall be store in Excel Sheet | |
| | | PC Communication : Data from DGA should be fetched to substation's PC. | |

**GUARANTEED TECHNICAL PARTICULARS FOR On line 3 key Gases in Oil
Monitoring Unit (Small DGA) for Transformers
(TO BE FILLED IN BY THE TENDERER AND FURNISH WITH TECHNICAL BID)**

| Sr. No. | Technical Parameter | Guaranteed Particular (To be filled by bidder) |
|------------|---|---|
| 1 | Mounting Type suitable for transformer conventional Valves Required Valve size | |
| 2 | Measurement of gases | |
| 3 | Minimum Detection limit | |
| 4 | Accuracy | |
| 5 | Alarm Contacts & methodology of its integration with sub-station's PC as well as RTCC panel | |
| 6 | Sensitivity to Gases | |
| 7 | Alarm setting | |
| 8 | Way to export Alarm & Value | |
| 9 | No. of Front Panel Indicators | |
| 10 | Purpose of indicator | |
| 11 | Enclosure Rating | |
| 12 | Dimensions and weight | |
| 13 | Oil Temp. | |
| 14 | Operating temperature | |
| 15 | Operating Voltage | |
| 16 | Humidity | |
| 17 | Technology | |
| 18 | Oil sampling method | |
| 19 | Extraction method | |
| 20 | Extraction time | |
| 21 | Accuracy | |
| 22 | Sensor type & rating | |
| 23 | Communication | |
| 24 | Data download software | |
| 25 | Calibration required Specify Interval | |
| 26 | Sampling Frequency | |
| 27 | Internal Data Storage | |
| 28 | Calibration Gas Details if any | |
| 29 | Carrier Gas details if any | |