



**PARTIAL DISCHARGE ONLINE MONITORING SYSTEM (PDMS) FOR 115KV GIS AND CABLES**

Specification No.:

Approved date:

Rev. No.: -

Form No.

Page 1 of 10

**Invitation to Bid No.:**

**C Material, equipment, and specifications for GIS, cables and cable accessories**

**C1 General material and packing instructions**

In addition to the general instructions, the following shall be observed:

**1a Scope**

These specifications cover Partial Discharge Online Monitoring System (PDMS) for GIS, Cables and Cable accessories, with their functions and accessories.

**1b Standards**

All design, material, equipment required within the scope of works, manufacturing and testing shall be in accordance with the IEC, IEEE, EN, or equivalent standards; unless otherwise specified in these specifications.

**1c Principal requirement**

**1c.1 General**

**1c.2 System Performance**

**Partial Discharge Online Monitoring System (PDMS) for Substation** : using for measurement, monitoring and diagnostic of Partial Discharge (PD) in high voltage (115 kV) equipment of PEA substation: GIS, Cables and Cable accessories.



**PARTIAL DISCHARGE ONLINE MONITORING SYSTEM (PDMS) FOR 115KV GIS AND CABLES**

Specification No.:

Approved date:

Rev. No.: -

Form No.

Page 2 of 10

**The system shall be consist of**

**1.1) 1 (set) PDMS** at 1 (one) substation with min. 32 measurement channels.

**PDMS** is designed suitable to detect PD signal and monitoring of GIS, cables and cable accessories which having features as follows :

**Input Channel**

Max. measurement channels : Up to 32 channels per system/substation (can be increased further in case required)

Spike protection : Not less than 1000 V

**PD Monitoring Range**

1) UHF sensor : For GIS

- Measurement Range : 300 MHz – 1.5 GHz

- Max. distance of cable from sensor to PD monitor : the signal shall be transmitted through RG58 coaxial cable or fiber optic cable up to 50 m

2) HFCT sensor : For cable and cable accessories

- Measurement Range : 300 kHz - 20 MHz

- Max. distance of cable from sensor to PD monitor : the signal shall be transmitted through RG58 coaxial cable or fiber optic cable up to 80 m

**Noise Rejection Function**

: Use of High-pass, Low-pass, Band-pass, Notch-filters or noise suppression based on Wavelet analysis as required by site conditions.

**Data Acquisition**

Signal Sampling : 100 MS/s or recording continuously. A peak detector shall ensure that no pulse gets lost.

PD Analysis : Automatic

Record PD data interval : Measurement data is recorded from 30min/interval to 24hr/interval or recorded continuously



PARTIAL DISCHARGE ONLINE MONITORING SYSTEM (PDMS) FOR 115KV GIS AND CABLES

Specification No.:

Approved date:

Rev. No.: -

Form No.

Page 3 of 10

**Data Analysis**

1) PRPD View : The PD pulses and PD pattern are indicated in a 2 or 3-axis PRPD. The signal amplitude is indicated over the phase angle of power cycle and the number of pulse (intensity of PD activity) accumulated over a certain time period.

2) PD Expert Function : The user can view detailed data, download PD segment, view pattern in the power cycle in various form to analyze the historic and the live data of all channels.

3) PD Alarm Function : The software shall be able to show alarm in each circuit when the PD signal exceed the threshold which the alarm signal can identify potential of insulation defection

4) PD Monitoring and Trend Analysis : The software shall be able to show historic and live PD data as following:  
 1) PD amplitude data  
 2) No. of PD pulses or PD repetition rate data  
 3) Continuous PRPD recordings for all sensors (historic and live)  
 3) PD Power or PD Energy data  
 4) Recorded time (time. date, month, year)

**Data Validation** : Not less than 5 years

**Data Report** : Automatically generate reports of PD activity. Users can customize reports. Multiple user log into the system are possible not less than 30 user account configurable.

**Alarm and Indicator**

No. of Alarm contact : A minimum of 4 programmable alarm contacts (opening and closing) or check alarm by using software application shall be provided.

No. of Alarm LED : 4 programmable LEDs or check alarm by using software application shall be provided.

Remote Communication to Central Server : Ethernet, fiber optic, compatibility with IEC61850 protocol



**PARTIAL DISCHARGE ONLINE MONITORING SYSTEM (PDMS) FOR 115KV GIS AND CABLES**

Specification No.:

Approved date:

Rev. No.: -

Form No.

Page 4 of 10

**1.2) 8 (set)s of UHF Sensor** : Pick up signals in the UHF range and are mounted against the insulating spacers on GIS assets

Frequency response : 300 MHz – 1.5 GHz

Sensitivity : typical sensitivity 42dB $\mu$ V or -49dB or 11mm or better

**1.3) 18 (set)s of HFCT Sensor** : These sensors are clipped around the HV cable earth and pick up the transient currents that are induced in the sheath when a discharge occurs

Frequency Response : 300 kHz – 20 MHz

Inner Diameter : Any inner dimension available **not less than 35mm**

**1.4) 1 sets of Substation Server** is provided for each substation (supporting Online PDMS 8 systems, up to 256 measurement channels/sensors) In case a network connection is provided, the data of each substation can be reviewed from each control cabinet and from any windows based laptop within the network.

**Capacity of Central server**

No. of PMDS : Not less than 60 systems and shall be able to upgrade to support up to 500 systems

Every server shall be able to connect to each substation/PDMS within the network to review the data.

No. of Sensors : One system is provided for each substation(supporting up to 500 measurement channels/sensors)

In case a network connection is provided, the data to each substation can be reviewed from each control cabinet and from any windows based laptop within the network.

**HMI**

Display : Not less than 19 inch HMI monitor with touch functionality. Cabinet comes additionally with keyboard and mouse drawer to support viewer software which shall be used from any remote location to visualization and analyzation of PD data and configuration of PDMS.

Processor : Industrial Graded PC (IPC)  
Intel® Core i7, 4GHz, 8MB cache or better

Memory : Not less than 32 GB RAM

Hard Drive : Three HD SATA3 1TB , 3,5", 7200 rpm, 128 MB cache, SATA-600



PARTIAL DISCHARGE ONLINE MONITORING SYSTEM (PDMS) FOR 115KV GIS AND CABLES

Specification No.:

Approved date:

Rev. No.: -

Form No.

Page 5 of 10

**Data Storage**

Max. Data storage : For 8 substations, Max. 128 sensors per substations, data interval every 30 min, up to 3 years

**Data Backup**

: In built RAID configuration to prevent data loss in case of hard-drive failure and additional HDD for backups.

Remote Communication to On-line PMDS : Ethernet, Fiber Optic or better

**Data Structure**

Asset Data : Data contains information about:

- Name of substation
- Location of Substation
- Type of Asset
- Name of Asset

Sensor Data : Sensors setting can be configured:

- Upp or Uavg alarm thresholds or PD alarm level
- Sensor type

**Alarms tools**

Management of personal alarms : Automatic alarm generation; review via remote access or via software operate or web page

**Data structure user interface**

Asset data page : Data shall be contained information about:

- Name of substation
- Location of Substation
- Type of Asset
- Name of Asset

Sensor Data : For sensors, the following settings shall be configured:

- Detection/alarm levels
- Sensor type



PARTIAL DISCHARGE ONLINE MONITORING SYSTEM (PDMS) FOR 115KV GIS AND CABLES

Specification No.:

Approved date:

Rev. No.: -

Form No.

Page 6 of 10

**Report**

Report format : Excel or CSV and PDF or better  
 Report generator : Automatic and manual generation  
 Ambient temperature : 10 °C to 40 °C  
 Relative humidity : Up to 90 % non-condensation

**Power Supply**

Input Voltage : 230-240 VAC or 110-240 Vdc  
 Input Frequency : 50/60 Hz

**1.5) 1 set of Uninterruptable Power Supply** : Dedicated true online UPS with zero transfer time to ensure system stays in operation in case of power supply failure (for >30 minutes) and PC shuts down safely afterwards to ensure data security.

**1.6) 2 set of PD Calibrators** : Sets of standard calibration/impulse generator suitable for GIS and cables, the proposed pulse generator shall be consisted of;  
 1 x set of UHF impulse generator with voltage output :  
 2 to 50V or better and a pulse risetime of <200ps  
 1 x set of impulse generator with pC value output (into50-Ohm)  
 Traceability of certificate : DAkkS or LCOE



PARTIAL DISCHARGE ONLINE MONITORING SYSTEM (PDMS) FOR 115KV GIS AND CABLES

Specification No.:

Approved date:

Rev. No.: -

Form No.

Page 7 of 10

**C2 Material and packing data of the PDMS**

The following guarantee performances and details shall be submitted with the bid:

**Critical documents of the proposed PDMS shall be submitted with the bid as follows:**

Required technical document	Proposed technical document	Reference document (page/folder)
Guarantee performance data of PDMS (Page 8 of 10 to page 9 of 10)	<input type="checkbox"/> YES <input type="checkbox"/> No	
Catalogue	<input type="checkbox"/> YES <input type="checkbox"/> No	
Details, layout or drawings of the proposed PDMS architecture for 8 (eight) substations	<input type="checkbox"/> YES <input type="checkbox"/> No	
Packing details	<input type="checkbox"/> YES <input type="checkbox"/> No	
Sufficient references describing the previous experience of the suppliers (e.g. list of supply of equipment and/or materials having the same or similar design as proposed, field experience, the registration of TISI, the copies of license, and/or the inspection to supplier's factory by PEA's inspectors, etc.)	<input type="checkbox"/> YES <input type="checkbox"/> No	
Documents for showing the manufacturing experience	<input type="checkbox"/> YES <input type="checkbox"/> No	

**Note: The bidders who do not submit all critical documents mentioned in the above table with the bid will be rejected.**



**PARTIAL DISCHARGE ONLINE MONITORING SYSTEM (PDMS) FOR 115KV GIS AND CABLES**

Specification No.:

Approved date:

Rev. No.: -

Form No.

Page 8 of 10

**Invitation to Bid No.:**

Guarantee performance data of Partial Discharge Online Monitoring System (PDMS)

<b>Partial Discharge Online Monitoring System (PDMS)</b>		
Manufacturer's name		
Country of Origin		
Applied standard, publication number and year		
Type / Model / Catalogue No.		
<b>Performance Data:</b>		
Number of input channels per system	channels	
Spike protection	V	
<b>UHF sensor</b>		
Measurement range	MHz	
Sensitivity	dB $\mu$ V or dB or mm	
<b>HFCT sensor</b>		
Measurement range	MHz	
Max. distance of cable from sensor to PD monitor	m	
Inner diameter	mm	
Noise rejection methods		
Data acquisition		
Record PD pulse interval		
Data validation		
Data storage	TB	
HMI		
No. of alarm contact		
No. of status indications (LED or software)		
Remote communication to server		
Input voltage		
<b>Capacity of substation server</b>		
No. of PDMS		
No. of Sensor	Ch.	





**PARTIAL DISCHARGE ONLINE MONITORING SYSTEM (PDMS) FOR 115KV GIS AND CABLES**

Specification No.:

Approved date:

Rev. No.: -

Form No.

Page 9 of 10

Max. data storage	years	
<b>Partial Discharge Online Monitoring System(PDMS)</b>		
<b>General Data</b>		
Operating temperature	°C	
Relative humidity	%	
Power supply system	VAC	
Dimensions (W x D x H)	mm	
Weight	kg	
<b>Manufacturing experience</b>	Years	



**PARTIAL DISCHARGE ONLINE MONITORING SYSTEM (PDMS) FOR 115KV GIS AND CABLES**

Specification No.:

Approved date:

Rev. No.: -

Form No.

Page 10 of 10

**Invitation to Bid No.:**

Guarantee performance data of Partial Discharge Online Monitoring System (PDMS)

<b>Partial Discharge Online Monitoring System(PDMS)</b>		
PD analysis software comply standards	-	
Interfaces for connecting to the network		
Remote control, configuration and maintenance via TCP/IP	-	
Capable of GIS and cables PD monitoring	-	
The PD diagnostic and analysis software	-	