CIGRE Study Committee D1

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP [1]

WG* N° D1.66	**Name of Convenor :** Wojciech KOLTUNOWICZ (AT) **E-mail address**: wojciech.koltunowicz@omicronenergy.com
Technical Issues # [2]: 8	**Strategic Directions # [3]: 2**
The WG applies to distribution networks [4]: No	
Title of the Group: Requirements for partial discharge monitoring systems for gas insulated systems	

Scope, deliverables and proposed time schedule of the Group :

Background :

The first step of a risk assessment procedure to perform a sensitive partial discharge (PD) measurements aiming to detect critical defects in GIS was proposed in CIGRE TB 525. With the activity of WG D1.25 on "UHF partial discharge detection systems for GIS: Application guide for sensitivity verification", the implementation of the Ultra High Frequency (UHF) method has been revised and improved (CIGRE TB 654). The benefits of PD diagnosis are currently under evaluation in WG B3.24 "Benefits of PD diagnosis on GIS condition assessment". They are related to operational requirements for new/old installation and their extensions, refurbishment, outage planning etc. The pros and cons are evaluated to justify an investment decision for Partial Discharge Monitoring (PDM) systems.

Manufacturers and users of gas-insulated systems have gained a lot of experience with the application of Partial Discharge Monitoring (PDM) systems using the Ultra High Frequency (UHF) method for PD monitoring in service. However, the technical requirements of PDM systems are not standardized, and the related recommendations, derived from the different application cases, vary significantly. There is a strong need for a versatile PD monitoring system that can be able to provide all information requested in the relevant international documents to assure that incipient PD defects are detected and their evolution is monitored so that asset managers can derive prompt actions.

Scope :

The WG activity will concentrate on the technical requirements of PDM. A survey on UHF PDM technology will be performed to collect available knowledge from the field and understand the expectations and needs of the users. The technical advantages and disadvantages of different monitoring solutions will be described.

The technical and operational hardware and software requirements of a modern monitoring system will be discussed and defined. Special attention will be paid to the following:

- **Acquisition unit** (AU): A versatile solution will be proposed and their main feature will be defined [note: the general characteristics of UHF sensors were described in details in TB 525 and TB 654].
- **Noise rejection system**: A modern automated solution for separation of noise from PD signals, PD defect classification and risk assessment procedures will be described and its efficiency will be shown in several case studies.
- Monitoring **PD data representation**: A "direct survey" which will be conducted with the most experienced PDM system users will help to define the most friendly data visualization schemes.

- **Setting of warning and alarm levels**: An algorithm will be defined based on the risk assessment procedure presented in TB 525. The criteria to eliminate false alarms will be defined.
- **Reporting** from the monitoring: This topic will also be discussed based on user opinion about their expectations.
- **Interconnection** of the PDM to monitoring systems on related other HV assets: This topic will be also taken into consideration and the minimum requirements will be defined.
- **Defect localization** system feature: This topic will be discussed to define the expected user requirements.

The new WG will prepare a technical guidance and help users to choose a PDM system best fitting to their needs and their level of PD knowledge.

Deliverables: Technical brochure, summary report in Electra and Tutorial Presentation.

Time Schedule : start : 2016 **Final report** : 2019

Comments from Chairmen of SCs concerned :

Approval by Technical Committee Chairman : M. Wald
Date : 18/08/2016

(1) Joint Working Group (JWG) – (2) See attached table 1 – (3) See attached table 2 – (4) Delete as appropriate

Table 1: Technical Issues of the TC project "Network of the Future" (cf. Electra 256 June 2011)

1	Active Distribution Networks resulting in bidirectional flows within distribution level and to the upstream network.
2	The application of advanced metering and resulting massive need for exchange of information.
3	The growth in the application of HVDC and power electronics at all voltage levels and its impact on power quality, system control, and system security, and standardisation.
4	The need for the development and massive installation of energy storage systems, and the impact this can have on the power system development and operation.
5	New concepts for system operation and control to take account of active customer interactions and different generation types.
6	New concepts for protection to respond to the developing grid and different characteristics of generation.
7	New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control.
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics.
9	Increase of right of way capacity and use of overhead, underground and subsea infrastructure, and its consequence on the technical performance and reliability of the network.
10	An increasing need for keeping Stakeholders aware of the technical and commercial consequences and keeping them engaged during the development of the network of the future.

Table 2: Strategic directions of the TC (cf. Electra 249 April 2010)

1	The electrical power system of the future
2	Making the best use of the existing system
3	Focus on the environment and sustainability
4	Preparation of material readable for non technical audience