

FALCON

PLUG & PLAY Monitoring



PD monitoring unit for medium voltage electrical assets



- ✓ Partial Discharge monitoring
- ✓ Easy to install: PLUG & PLAY
- ✓ Cost-effective solution
- ✓ Non-intrusive
- ✓ No need of specific skills
- ✓ Automatic clustering
- ✓ Automatic configuration
- ✓ Automatic Alarms



FALCON

PLUG & PLAY Monitoring

FALCON represents a cost-effective solution for the continuous monitoring of Partial Discharges (PD) in Medium Voltage assets such as, [MV Switchgears](#), [MV Cables](#), [MV Transformers](#) and [MV Motors](#).

FALCON can identify the deterioration of insulation and the possible degradation of the health of the electrical system, before a failure.

The FALCON unit acquires and processes high frequency Partial Discharge signals, locally detected by the sensors to which it is connected, whether inductive (HFCT) or capacitive (TEV).

EASY TO INSTALL

A FALCON KIT comes with a sensor, a synchronization kit and the embedded web application.

FALCON is a plug & play device, that can be installed with only a few simple operations. It configures itself automatically and, once powered, it is immediately operational.

Another important advantage of FALCON is its capability to be easily integrated into an existing monitoring system. FALCON supports the IEC 61850 and OPC UA protocols. The FALCON Unit is equipped with two magnets which allow the unit to be installed directly on the panel of the switchgear or with a DIN rail, for a different type of installation.

SET UP

Below we have two examples of sensors installation. In the first case we have a 3-phase MT cable, the HFCT sensor can be positioned around the three screens or the common one.

A valid alternative is the TEV Antenna sensor, placed on the metallic enclosure of the panel by means of magnets. Being a single-channel device, the main purpose of FALCON is to identify the existence of insulation defects. The exact localization of the defect requires further analysis that can be conducted by Doble's GPS Group.

AUTOMATIC CONFIGURATION

FALCON is equipped with an automatic full scale and trigger level adjustment system, which always guarantees the best accuracy.



MEASURE

Automatic detection of Partial Discharges through sensors located on the cable termination or switchgear enclosure



STORAGE

Historical archive of measurements up to two years



ANALYSIS

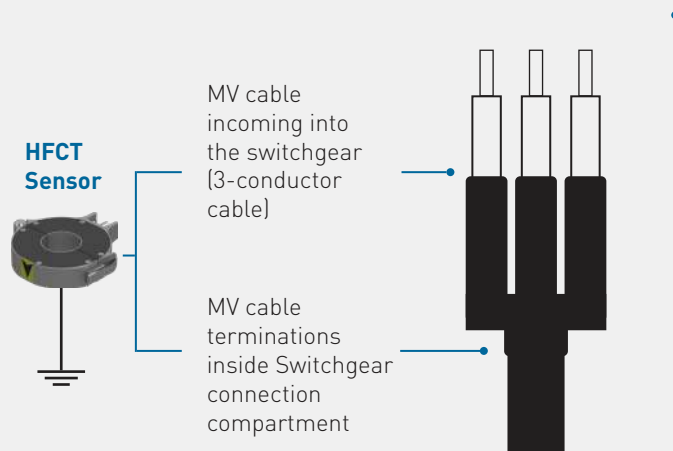
Automatic recognition of critical PD issues as they evolve



ALARMS

Configurable alarms easily integrated into existing management systems

TWO EXAMPLES OF SENSOR INSTALLATION ON MEDIUM VOLTAGE SWITCHGEAR



AUTOMATIC ALARMS

There are different ways to visualize incoming alarms:

- From a **LED** on the unit, that is green if FALCON doesn't detect any activity, and red if a harmful activity is detected
- From **DRY CONTACTS** that could be connected to any local SCADA or Building Management System.
- From FALCON's **WEB APPLICATION**, easily available through any web browser, laptop, or smartphone, that shows:
 - the state of the asset with traffic light logic
 - the list of alarms due to Partial Discharge activity
 - the list of system notifications (communication issues and malfunctions)
 - the display of trends and important statistical parameters (Qmax, repetition rate, alarms ...)
- From **IEC 61850** or **OPC UA Integrations**

Based on the defect evolution, the FALCON offers an algorithm able to determine if an asset has critical levels of Partial Discharge. In case the identified Partial Discharge represents a danger, FALCON sends an alarm to the operator to inform that a critical issue is found.

The alarms are given with 5 levels of severity:

GOOD: situation of stability.

MODERATE: birth of a phenomenon showing a very slow evolution. In this case it is advisable to schedule a further diagnostic intervention a few months later.

SLIGHTLY DETERIORATED: the phenomenon identified is growing.

DETERIORATED: it is advisable to schedule a further diagnostic intervention.

CRITICAL: the intervention must be scheduled as soon as possible.

All the information acquired is stored in FALCON memory and it is available via web application, PC, or smartphone.

When an evolving defect occurs, the web application immediately reports the condition of the asset and the criticality level of the defect. The interface is easy to read and doesn't require any specific skills. It is therefore not necessary to be a Partial Discharge expert to get immediate benefits out of the FALCON system.



WEB APPLICATION

The WEB APPLICATION shows:

- Status of the monitoring system
- Alarm list relevant to Partial Discharge activity
- List of system notifications (communication issues and malfunctions)
- Visualization of trending of the most important statistical parameters (Qmax, Repetition rate, Alarms, ...)



WEB APPLICATION

NETWORK INTEGRATION

The need to monitor many assets brings with it the need to manage a multitude of data. In the case of integrating the FALCON monitoring system with an existing infrastructure, the communication can take place via various protocols, such as IEC 61850, or the OPC UA, which allows the concentration of information from multiple units in one window.



TECHNICAL SPECIFICATION

| | | |
|------------------------|--------------------------------------|----------------------------|
| Partial Discharge | PD channel quantity | 1 |
| | Bandwidth | 16 kHz, 30 MHz |
| | Sampling frequency at full bandwidth | 125 MS/s |
| | Resolution | 12 bit |
| | Sensitivity | 1,10000 mV _{peak} |
| | Full Scale | 5 V _{peak} |
| | Imput impedance | 50 Ω |
| | Pre-trigger | 0,100% @ 100 μs |
| | Connector type | BNC |
| Synchronization input | Channel quantity | 1 |
| | Frequency range | 5-500Hz |
| | Imput impedance | 10 MΩ |
| | Sampling frequency at full bandwidth | 1MS/s |
| | Resolution | 12 bit |
| | Connector type | BNC |
| Communication system | Ethernet connector type | 10/100/1000 Mb/s |
| | | 2 LAN ports |
| Communication protocol | OPCUA - IEC 62541 | |
| | IEC 61850 | |
| | Modbus | |
| | DNP3 | |
| Power supply | 12 / 24 V _{DC} , 1A | |
| Working temperature | -20°C ÷ +55°C | |

APPLIED STANDARD

| Standard | Description |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| 93/68/EEC | CE Marking Directive |
| 2014/30/EC | IEC 61326 (EMC) Electro Magnetic Compatibility |
| 2014/35/EC | IEC 61010 (LVD) Low Voltage Directive |
| IEC 60068-2-6 | Environmental testing - Test Fc: Vibration (sinusoidal) |
| IEC 60270 IEC 60034-27 IEEE 1434-2014 | High-voltage test techniques - Partial discharge measurements Deviation: Magnitude of the apparent charge is measured in mV |



Doble Engineering Company
 Worldwide Headquarters
 123 Felton Street, Marlborough, MA 01752 USA
 tel +1 617 926 4900 | fax +1 617 926 0528
www.doble.com

Specifications are subject to change without notice.
 Doble is an ISO 9001 & ISO/IEC 17025 & 17034 Certified Company.
 Doble is an ESCO Technologies Company.
 PUBLISHED: SEPTEMBER, 2022