

QUALITROL® HFCT Sensor

Cable partial discharge measurement



Ensuring the reliable continued operation of power cables

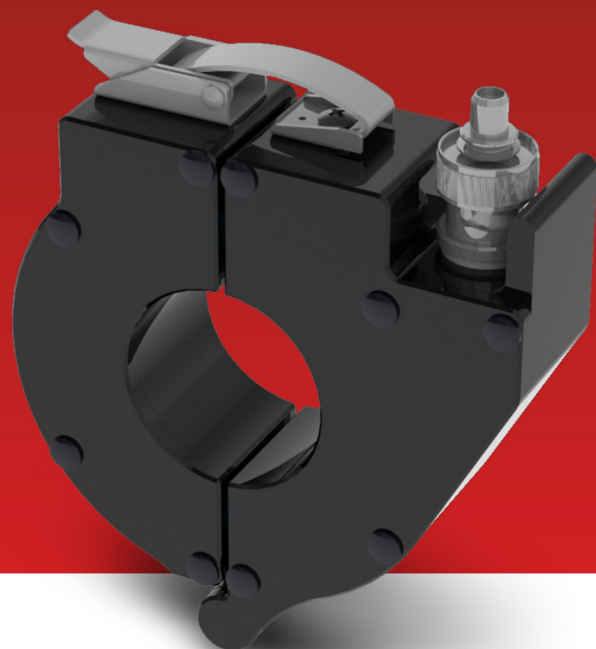
- No outage required for installation
- Split core nature of sensor allows easy installation
- Calibrated sensors enable the acquirement PD values in pC
- Wide frequency response enables the measurement of PD signals flowing through the defective cable
- High sensitivity improves signal to noise ratio
- Different internal diameters available for different cable core sizes
- High current variants are available on demand that will enable the sensor to be clamped on loaded cable

Product Summary

Description High Frequency Current

Transformer (HFCT), also known as Radio Frequency Current Transformer (RFCT), is a split core type inductive sensor and is used to sense high frequency current pulses travelling along the cable passing through the sensor

Application Application of HFCT can help in identifying cable internal or external PD when used in conjunction with a Transient Earth Voltage sensor. It is of a split core type inductive sensor and can be used to clamp around the earth grounded shield or over cable insulation (high current variants) without any disconnection of supply



QUALITROL®
Defining Reliability

QUALITROL TEV Sensor - Cable partial discharge measurement

Ensuring the reliable continued operation of power cables

- Failure in cable insulation is generally preceded by partial discharge and subsequent degradation phase. Detecting partial discharge at the early stage of degradation helps in preventing sudden failure

No outage required for installation

- Sensors can be clamped while the system is energized. No need to disconnect supply for clamping
- Sensors can be clamped around the earth shield of the cable, provided the independent access to cable earth shield is available. Sensors can also be clamped around the current carrying core
- Sensors can be clamped around easily without any power disruption due to split core nature

Wide frequency response enables the measurement of PD signals flowing through the defective cable

- Cable PD spectrum lies in between 500 kHz to 5 MHz
- The -3dB cut off frequencies of sensor are 200 KHz and 15 MHz
- The sensitivity of 10 mV is maintained between this frequency range

High sensitivity improves signal to noise ratio

- High sensitivity to the PD signals inside the cable that range in frequency from 500kHz to 5MHz
- High sensitivity improves signal to noise ratio as most of the field noise is outside the range of PD pulse frequency spectrum inside the cables
- High current variants provide a sensitivity of 3 mV/mA to 5 mV/mA which is high enough to acquire PD signal inside the cable

Different internal diameters available for different cable core sizes

- Options available for internal diameters are 30mm, 60mm, 100mm, 150mm
- Split core nature and high current variants enable PD measurements without any disconnection of power supply

High current variants are available on demand that will enable the sensor to be clamped on loaded cable

- Standard sensors can be clamped around the earth shield of cable and can bear circulating currents of up to 50A. High current variants can be clamped around the earth shield or cable insulation for currents greater than 50A
- Current saturation limit for high current variants is up to 1000A of power frequency current. High current variants sensitivity is limited to 3 mV/mA to 5m V/mA which is high enough to capture PD signals confidently

Why partial discharge measurement in power cables?

- Failure in cable insulation is generally preceded by a degradation phase which may last for months or several years
- Any insulation degradation results in the inception of partial discharges (PD) at degradation site(s)
- PD analysis and localisation helps in determining the insulation health and subsequently the life of power cables

Why QUALITROL Expert diagnostic and testing services?

- More than 25 years of experience in providing PD monitoring systems and services to utilities across the world
- World wide presence provides quick turn around times
- Long term serviceability assurance helps in formulating longer service contracts
- Cross team integration increases the accuracy of results and confidence of operator / asset manager
- Highly accurate PD detection and localisation system for power cables
- Greater emphasis on health and safety during PD measurements surveys

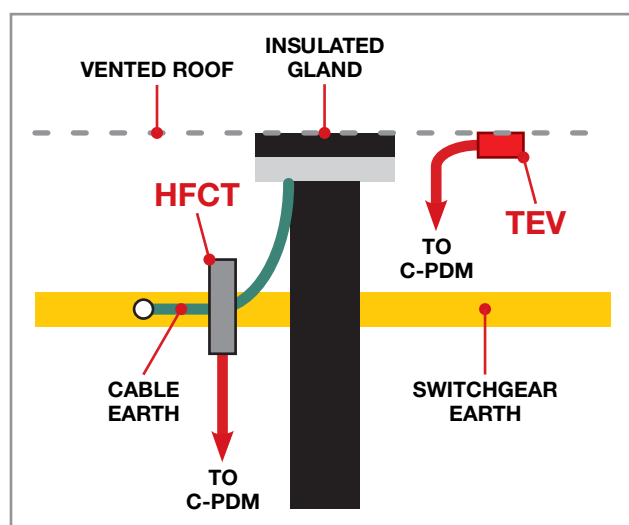
HFCT application

Overview

- The frequency response of the sensor is suitable to detect the flowing PD currents along the length of the cable. The HFCT sensor can be clamped around the cable earth or around the insulation taking into account that cable load current should be less than the saturation current of the HFCT.
- The arrow on the sensor indicates the polarity of primary PD currents. When the sensor is installed with the arrow directed to ground, the detected voltage signal will have the same polarity of the input current.

Different options for clamping location of the HFCT sensor

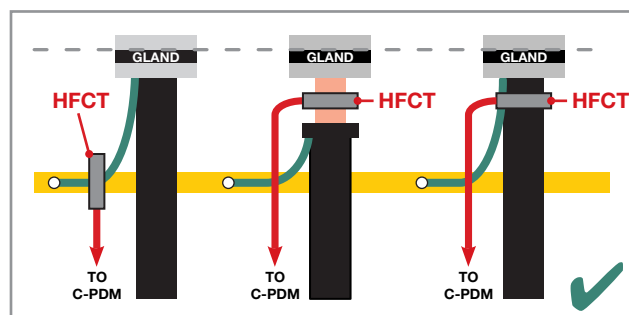
- The cable earth should be available to do sampling before it is connected to the switchgear earth.
- The HFCT sensor can be clamped over the semiconducting layer of the cable core. Note that the cable load current should be known and should be less than the rating of HFCTs. Otherwise it will saturate the core of the HFCT.
- The HFCT sensor can be clamped over the semiconducting layer of the cable core with the cable earth looped back.
- Sometimes there may be no insulated gland present at the cable termination, leaving behind no chance to get access to the cable earth. Such terminations should be modified (offline by owner) to get the cable earth extended out before it is connected to the switchgear earth.



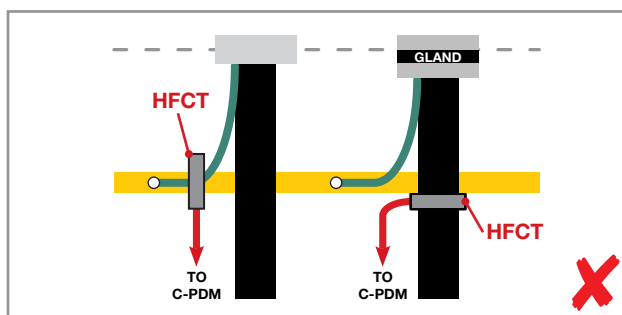
High Frequency Current Transformer and Transient Earth Voltage sensors installation overview



HFCT and TEV installed



Correct HFCT clamping locations



Incorrect HFCT clamping locations

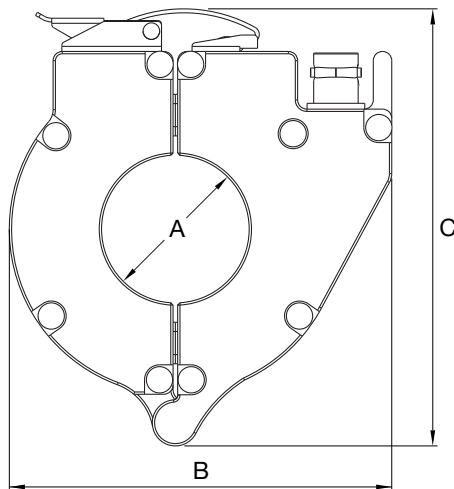


TECHNICAL SPECIFICATIONS

Materials	Case	HDPE material
	Type	Split core type
Performance	Sensitivity	10 mV/mA for standard variant of diameters 30 mm and 60 mm 3 mV/mA to 5 mV/mA for high current variants of diameters 60 mm, 100 mm and 150mm
	Frequency Response (-3dB)	200 kHz - 15 MHz
	Rise time	25 ns
	Fall time	3 μ s
	Recommended load	50 Ω
	Maximum power frequency current*	50A for standard variants Up to 1000A for high current variants
Comms	Ports	BNC female

*Standard sensors offer a sensitivity of up to 10 mV/mA with power frequency current saturation limit of up to 50A. However, high current variants are also available at the compromise of sensitivity up to 3 mV/mA - 5mV/mA.

Dimensions



Model HFCT-30

A = 26 mm [1.02"], B = 83 mm [3.27"], C = 85 mm [3.35"]
Depth is 32 mm [1.26"]

Model HFCT-60

A = 25 mm [0.98"], B = 127 mm [5.0"], C = 141 mm [5.55"]
Depth is 54 mm [2.13"]

Model HFCT-100

A = 35 mm [1.38"], B = 166 mm [6.53"], C = 185 mm [7.28"]
Depth is 95 mm [3.74"]

Model HFCT-150

A = 35 mm [1.38"], B = 228 mm [8.97"], C = 250 mm [9.84"]
Depth is 142 mm [5.59"]

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QUALITROL® Educational Services

QUALITROL® professional training (designed to achieve hands-on performance based objectives) prepares operations, maintenance, and engineering personnel to install, test, configure, operate and maintain QUALITROL® products.

About QUALITROL®

Established in 1945, with continual improvement at the core of our business, QUALITROL® provides smart utility asset condition monitoring across the globe. We are the largest and most trusted global leader for partial discharge monitoring, asset protection equipment and information products across generation, transmission and distribution. At QUALITROL® we are redefining condition monitoring technology for Electric utilities assets.

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