UltraTEV Monitor™

Award winning advanced asset monitoring and PD alarm system
For 24/7 monitoring of Partial Discharge (PD) activity in substation switchgear and cables

www.**ea**technology.com

FACT
PD monitoring is proven to reduce outages from MV switchgear failure by up to 71%

FACT
Two year payback period for monitoring your highest risk assets

FACT
PD escalates after it starts and it won't go away unless addressed

FACT
The UltraTEV Monitor™ is the most powerful PD monitoring solution available

Comprehensive PD Monitoring

- Provides valuable information on the actual condition of assets
- Enhances the effectiveness of asset management, by improving reliability and efficiency with reduced costs
- Reduces unplanned switchgear outages
- Increases site safety

The Award Winning UltraTEV Monitor™ enables progressive management of substations through its ability to precisely measure and analyse the actual condition of assets simultaneously.

Next Generation Technology

The UltraTEV Monitor™ is the product of EA Technology's unique experience as a pioneer in the measurement and interpretation of PD activity for nearly 40 years.
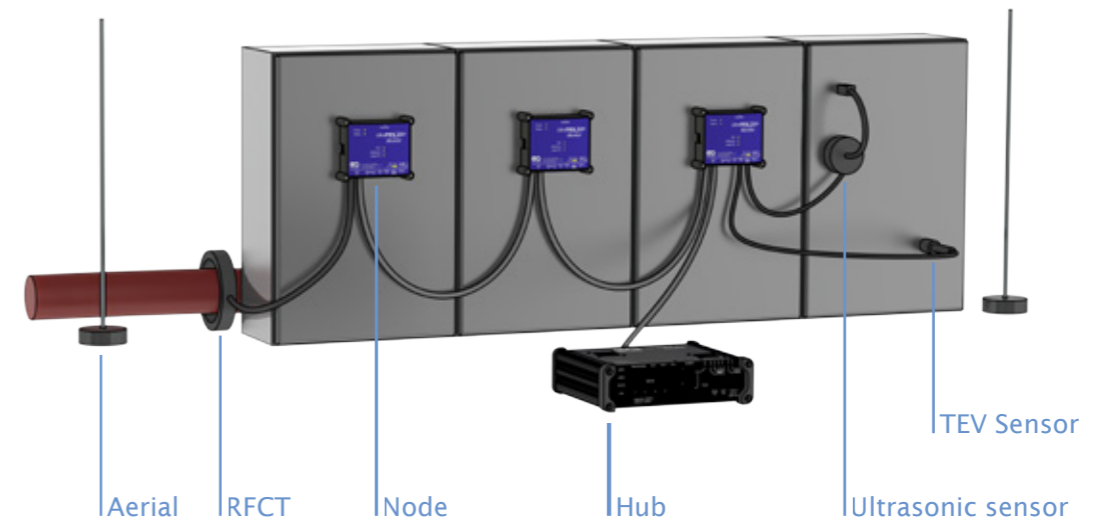
Multiple Sensor Systems

The UltraTEV Monitor™ is part of a new generation of asset management systems, combining the functions of multiple PD instruments in a single package.

Benefits and Features

- Cost of installation payback within two years
- The UltraTEV Monitor's™ unique external noise cancellation allows it to identify PD in high noise environments
- PD is located with unrivalled precision, eliminating costly investigations
- Innovative non-intrusive measurement technology allows flexible system installation and movement with switchgear outage and minimal cabling
- Continuous online condition monitoring provides early detection of asset deterioration, enabling informed preventative measures
- Internal PD, surface PD and PD in cables are all measured and analysed thereby pre-empting failures

- Monitoring of environmental conditions correlates changes in PD with humidity and temperature
- Configurable alarms and notifications allow instant response to deteriorating conditions
- Intuitive web-based management and data analysis system is simple and easy to use
- The option of intelligent cloud-based solution capable of remotely managing multiple systems
- Capacity for up to 300 individual PD measurement points so that even the largest of systems can be covered
- Product options include both fixed and portable systems to suit large or small site requirements

Illustrative System Layout

Aerial   RFCT   Node   Hub   Ultrasonic sensor   TEV Sensor

System Capabilities

The UltraTEV Monitor™ continuously monitors hundreds of points simultaneously, measuring the location, magnitude and severity of PD activity.

PD Detection

Continuously checks for the presence of PD activity on the surface of insulation, internal to components and in cables while recording over time.

PD Alarms

Alarm systems with intelligent configuration capabilities, allowing thresholds to be set individually on each channel, for different measurement types
Optional notifications via SCADA, email and SMS.

PD Measurement

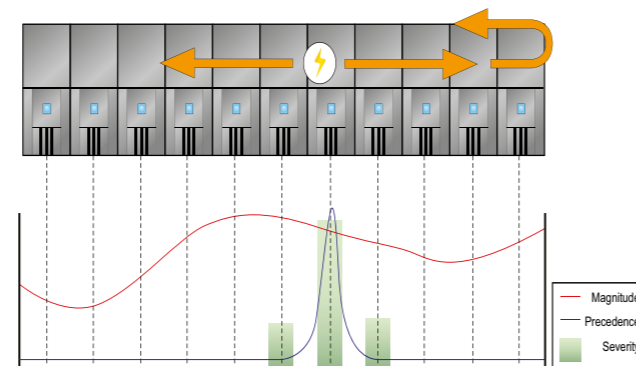Collates PD activity from up to 300 concurrent measurement points.

PD Trending

Monitors changes in PD activity from up to 300 concurrent measurement points over time, together with correlation to environmental condition (temperature and humidity).

PD Analysis

Evaluates and reports on PD activity continuously, with data accessible on the device, on the desktop or via the cloud.

PD Location

Uses time-of-flight measurement to a resolution of 1ns (nanosecond), locating the source of PD activity to within 30cms. Amplitude is not a sufficient indicator of PD so time-of-flight is used to gain an accurate location.

Mulitiple Sensors

Each UltraTEV Monitor™ measurement node is capable of measuring PD activity and the environmental factors which affect it in FIVE ways:

- **TEV**
  Transient Earth Voltage technology enables the detection of internal PD activity in metal-clad switchgear. Each node includes a built-in TEV sensor, plus additional plug-in TEV probe.

- **Ultrasonic**
  These sensors provide the capacity for surface discharge detection in a variety of electrical assets. Each node supports two plug-in external sensors.

- **Temperature**
  Built-in contact sensor for measuring the surface temperature of metal-clad switchgear, plus plug-in external sensor for measuring ambient air temperature.

- **Humidity**
  Humidity level readings allowing correlation with surface discharge measurements.

- **Radio Frequency Current Transformer (RFCT)**
  Cables are monitored via plug-in RFCT.

Options include (from left to right): ultrasonic microphone, contact ultrasonic sensor, plug-in TEV probe, temperature/humidity probe and Radio Frequency Current Transformer (RFCT)

The UltraTEV Monitor™ is available in a number of hardware and software configurations, to suit your individual requirements. With total hardware compatibility across our product range, customising your system is straightforward
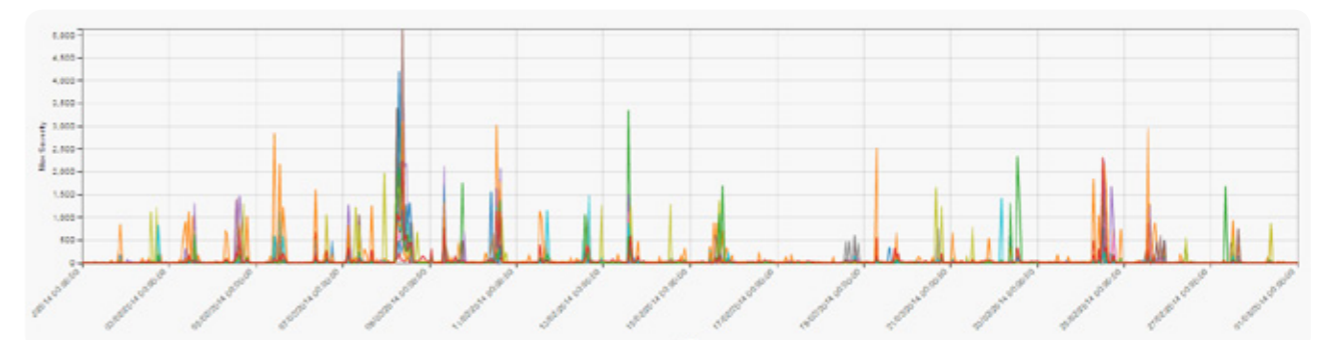
Wall-Mounted Hub

- Supports up to 60 nodes
- Connects to SCADA
- Can control extra devices through SCADA interface
- Wired LAN, Wi-Fi and 3G connectivity
- Designed for permanent or semi-permanent installations
- Intuitive web interface, including simple system commissioning

Portable Hub

- Supports up to 20 nodes
- Small, light yet robust
- Quick to set up
- Simple to extract data
- Wired LAN, Wi-Fi and 3G connectivity
- Intuitive web interface including simple system commissioning
- Optional external device for connecting to SCADA

The example screen-shot below shows a plot of PD Severity over a period of one month. Each colour line represents a different TEV measurement point.

UltraBUS™ Networking

The UltraTEV Monitor™ is the first system to employ EA Technology's UltraBUS™ networking solution.

Data and power are carried over a single cable, making the whole system safe, simple and unobtrusive to install. It also allows measurement nodes to be moved or added whenever needed.

24 Hour Access to Your Data

The UltraTEV Monitor provides all these benefits without any reliance on external communications access. Adding local network or 3G/4G connectivity allows for data retrieval and alarms notification worldwide while maintaining full data security. For even more advanced capability, the optional UltraTEV Cloud can be utilised.

UltraTEV™ Cloud

Innovative and totally secure data access from the UltraTEV Monitor™ is available as an option on both wall-mounted and portable products. Our state-of-the-art technology ensures that your latest data is always available to you online giving you total control of your data.

Centralised Device Management

The cloud collects data from each connected UltraTEV Monitor™. All of the functionality from the device is replicated in the cloud on one simple management console, making costly site visits to view and analyse data unnecessary.

Technical Specification
UltraTEV Monitor Node

TEV

Measurement Range	0 to 60dBmV
Pass Band	3 to 80 MHz
Resolution	1dB
Accuracy	±1dB
Precedence Resolution	1ns

ULTRASONIC

Measurement Range	-7dBµV to 68dBµV
Resolution	1dB
Accuracy	±1dB
Transducer Sensitivity	-65dB (0dB = 1volt/µbar rms SPL)
Transducer Centre Frequency	40 kHz
Transducer Diameter	16mm

CABLE PD

Measurement Range	0 to 102,400pC
Pass Band	200 kHz to 20MHz
Resolution	50pC

INDICATORS

Power LED	Bi-colour Red/Green LED
Status LED	Bi-colour Red/Green LED
TEV State	Bi-colour Red/Green LED
Ultrasonic State	Bi-colour Red/Green LED
Cable PD State	Bi-colour Red/Green LED

CONNECTORS

Power and Comms Signals	2x RJ45
Ultrabus TEV Sensor	1x BNC socket
Ultrasonic Sensor	2x 5-pin Lemo socket
Cable PD Sensor	1x 3-pin Lemo socket
Humidity Sensor	1x micro USB
Aux Power Connector	1x 2-pin Lemo socket

POWER SUPPLY

Low Voltage DC	48V, 80 mA

DIMENSIONS

Size	155 x 135 x 55mm (6.1 x 5.3 x 2.2 inches) 382 x 260 x 100 mm (15 x 10.2 x 3.9 inches)
Weight	0.45kg (0.9lbs) 3.6kg (7.9lbs) 4.2kg (9.2lbs)

ENVIRONMENTAL

Operating Temperature	0 to 50˚C
Humidity	0 – 90% RH non-condensing
IP Rating	53

EMC/SAFETY

Safety Class	SELV
EMC Immunity	Industrial Levels
EMC Emissions	Industrial Levels

Portable Hub Unit

POWER SUPPLY

Voltage In	100-230V AC (nominal)
Voltage Out	48V DC
Frequency	50-60 Hz (nominal)
Maximum Power	250W
Fusing (on hub unit)	1 x Anti-surge (T) 5A Fuse NOTE: All fuses are 5 x 20 mm cartridge type

HUB UNIT INDICATORS

System Power	1x Green LED
UltraBus Power	1x Green LED
Monitor Health	1x Green LED
Alarm, SCADA Outputs 1-3	4x Red LED

HUB UNIT CONNECTORS

UltraBUS	RJ45 Connector
Ethernet	RJ45 Connector 10/100/1000mb
USB	2 off USB Type-A Sockets
Auxiliary Power/Comms	3-pin IEC Connector
Power In	1x Neutrik XLR
Wi-Fi	1x RP-SMA
VGA	1x Standard Female three row DE-15
RS232	1x Male DB9
Chassis Earth	1x M4 Stud

DIMENSIONS

Size W x L x D	306mm x 248mm x 88mm
Hub Unit Weight	3.6kg
Power Supply Weight	4.2kg

ENVIRONMENTAL

Operating Temperature	0 – 50˚C
Humidity	0 – 90% RH non-condensing
IP Rating	30

EMC/SAFETY

EMC Class	1
EMC Immunity	Industrial Levels
EMC Emissions	Industrial Levels

Wall Mount Hub Unit and Power Supply

POWER SUPPLY IN

Voltage	100-230V AC (nominal)
Frequency	50-60 Hz (nominal)
Maximum Power	350W
Fusing	2x Anti-surge (T) 5A Double Pole Fusing Minimum 1000A Breaking Capacity 1x Fast (F) 100mA

POWER SUPPLY OUT

Hub Unit Power	12V DC, Maximum 5A
Node Power	48V DC, Maximum 5.2A
Phase Reference	9V AC, Maximum 100mA, Short-circuit Protected
Fusing	1x Anti-surge (T) 7A Fuse 1x Anti-surge (T) 8A Fuse NOTE: All fuses are 5 x 20 mm cartridge type

HUB UNIT INDICATORS

System Power	1x Green LED
UltraBus Power	1x Green LED
Monitor Health	1x Green LED
Alarm, SCADA Outputs 1-3	4x Red LED

POWER SUPPLY INDICATORS

Power On	1x Green LED

HUB UNIT CONNECTORS

UltraBUS	4x RJ45
Ethernet	4x RJ45 Connector 10/100/1000Mb
USB	2x USB Type-A Socket
Auxiliary Power/Comms	2x 6 Pin Lemo 1B
Power In	1x Neutrik 8 Pin speakON
Mobile Comms	2x SMA
Wi-Fi	2x RP-SMA
VGA	1x Standard Female three row DE-15
RS485	1x Male DB9
RS232	1x Male DB9
SCADA/Alarm Volt Free Output	2x Header Weidmuller SL 3.5 - 6 pin
SCADA/Isolated Inputs	1x Header Weidmuller SL 3.5 - 4 pin
Chassis Earth	1x M4 Stud

POWER SUPPLY CONNECTORS

Power Out	1x Neutrik 8 Pin speakON
Power In	1x Neutrik powerCON TRUE1

HUB UNIT VOLTS FREE CONTACTS

Type	4x Fully isolated SPDT
Switching Voltage	AC/DC 5V-48V
Switching Current	AC/DC 10mA – 5A
Connector	2x Weidmuller BL 3.5/4, Socket Block, Screw Terminals

HUB UNIT ISOLATED INPUTS

Type	2x Opto-Isolated
Switching Voltage	12V-90V DC
Connector	1x Weidmuller BL 3.5/6, Socket Block, Screw Terminals

DIMENSIONS

Size W x L x D	382mm x 260mm x 100mm (15 x 10.2 x 3.9 inches)
Hub Unit Weight	3.6kg (7.9lbs)
Power Supply Weight	4.2kg (9.2lbs)

ENVIRONMENTAL

Operating Temperature	0 - 40˚C with 3G Modem 0 - 50˚C without 3G Modem
Humidity	0 - 90% RH non-condensing
IP Rating	30

EMC/SAFETY

Safety Class	1
EMC Immunity	Industrial Levels
EMC Emissions	Industrial Levels

FITTINGS

Hub Unit and Power Supply each	4x 10mm/5mm keyhole slot
Interconnecting Cable	1.1m allowing installation above or next to each other

Products

EA Technology experts are happy to advise on and discuss product choice but as a guide:

Employ the Portable UltraTEV™ system if:

- Your requirements are for a smaller asset base
- Flexibility of both PD monitoring duration and positioning is key
- Site has ease of access and remote communications are not required

Employ the Wall-Mount UltraTEV™ system if:

- Monitoring of a large number of panels is needed
- You require a permanent installation at a particular site
- Site has ease of access and remote communications are not required

Employ the UltraTEV™ Cloud with either the Portable or Wall Mount UltraTEV™ system if:

- Sites have poor or costly access
- Good communication links are available
- Remote communications would optimise site asset management

Driven by Customer Need

The addition of the UltraTEV Monitor™ to our portfolio is the direct result of listening carefully to what customers need from an asset management system.

Valuable Condition Data

The UltraTEV Monitor™ is the most powerful tool ever developed for collecting and recording information on the condition of large numbers of assets. The system provides the information needed to implement full condition-based asset management techniques.

The ability to gather data on the condition of assets is a key part of the process of upgrading to Condition Based Risk Management™ (CBRM). This is EA Technology's market-leading methodology of applying a Health Index to each asset, which includes the probability and consequence of its failure; an approach which is proven to improve asset reliability, availability and safety, whilst reducing the overall costs of asset maintenance and replacement.

Global support

The UltraTEV Monitor™ can be supplied and supported anywhere in the world, through our network of international sales offices and distribution partners. We provide excellent lifetime support for this system including:

- Installation and commissioning
- Training
- Lifetime technical support
- Online data analysis and reports