UltraTEV® Plus²

technology

UltraTEV

Make Partial Discharge discovery simple

www.eatechnology.com

Product Brochure

The UltraTEV® Plus² brings together techniques and a wealth of experience and insight to make it easier than ever to avoid failures on your high voltage network.

This latest hand-held Partial Discharge (PD) instrument is easy to use, and combines additional sensing capabilities with real time advanced analytical features. The ability to distinguish true PD from noise and other interference means that you can make better decisions, save time, money and enhance safety.

User Features

- Provides numerical and audible ultrasonic readings for classification of PD
- Provides numerical and audible TEV readings for interpretation of PD
- Use the Locator probe accessory to accurately locate multiple PD sources
- Use the High Frequency Current Transformer (HFCT) to detect PD activity in cables
- Use the UHF directional antenna to quickly scan outdoor switchyards
- Phase resolved and waveform displays allow more reliable and conclusive decisions to be made based on measured PD
- Wi-Fi connectivity allows survey results to be easily synchronised with asset management systems
- Use a NFC tags attached to the assets to store and retrieve key results
- Menu-driven backlit colour touchscreen and buttons (can be used when wearing gloves) giving an intuitive user experience
- Multi language options
- Long-life rechargeable internal Lithium-Ion (Li-Ion) battery
- Temperature and humidity sensor

Business Benefits

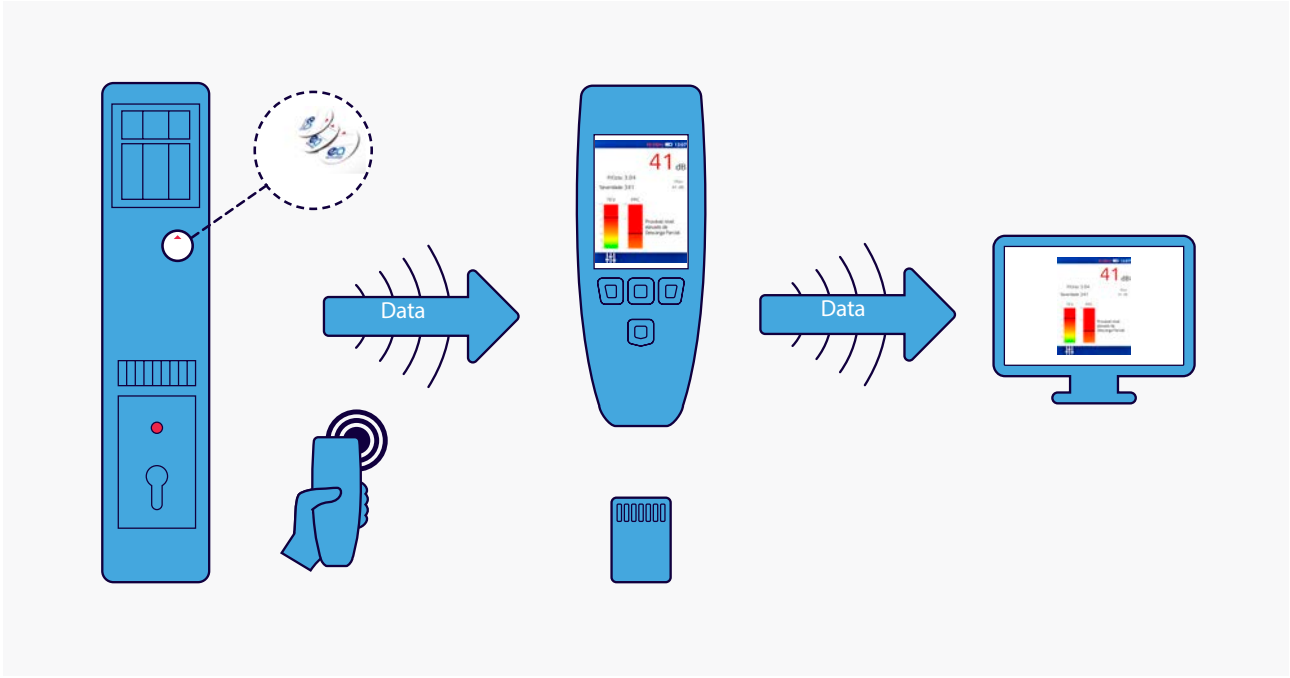
- Detect problems early by using the in-built PD classification and interpretation tools to avoid dangerous and damaging failures and minimise network outages
- Accurately measure and locate PD activity, enabling you to identify potential faults before they lead to failures
- Optimise maintenance cycles and asset life through a better understanding of asset condition, comparing PD results over time to identify trends
- Increase on-site productivity by using Survey mode to rapidly collect key condition information in an accurate and consistent manner
- Detect PD in a wide range of plant, cable and overhead line assets using a single instrument with dedicated accessories
- Easy to use with an intuitive and user friendly interface meaning little training is needed to become competent
- Identify deteriorating assets and trends by comparing current measurements to previous results stored locally on 'smart' Near Field Communication (NFC) tags
- Integrate PD surveys into your asset management process by seamlessly transferring data via zip or CSV file into your corporate system

"We have been using EA Technology's products successfully for detecting PD and other condition monitoring solutions for many years."

Neil Dobbs,
HV Compliance Manager,
BRITISH STEEL

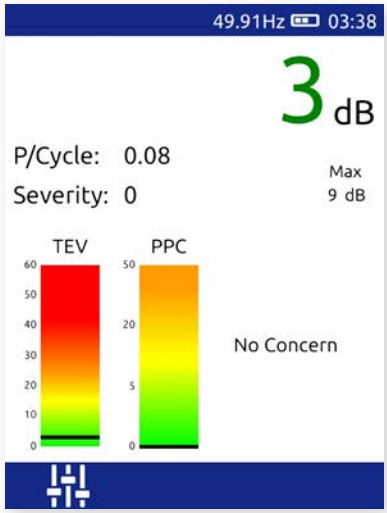
Capturing the results and transferring them easily

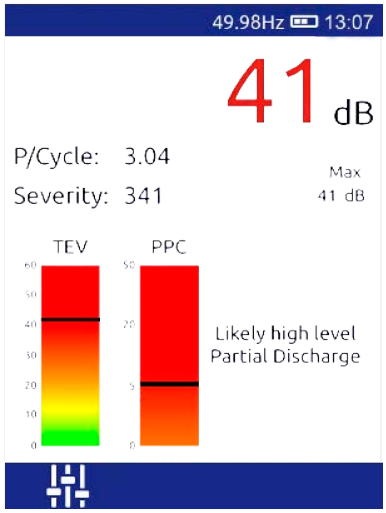
The UltraTEV® Plus² has NFC capability to store Asset data on programmable tags. It also has the ability to transfer the results directly on to your PC via Wifi or USB / SD Card. The survey functionality allows details of substations and assets to be entered on the screen, guiding users through the simple survey process. Screen shots can also be captured and saved.



Interpreting the condition of your electrical assets

The UltraTEV® Plus² has been designed to make asset inspections easy. The instrument helps the operator understand what the results mean by interpreting the data and displays clear information and instructions.



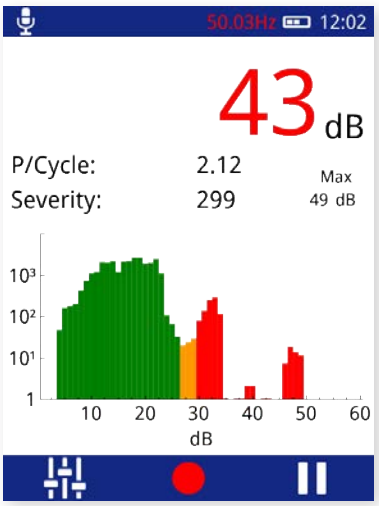


Partial Discharge Detection and Advanced Analytics

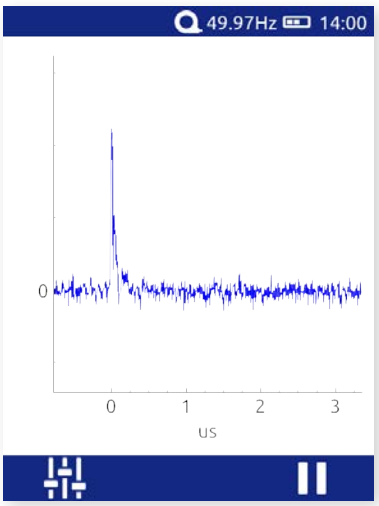
The UltraTEV® Plus² has the ability to measure PD in cables and cable accessories using an HFCT as well as established techniques for surface PD (Ultrasonic) detection and internal PD (TEV) detection on switchgear.

The new advanced analytics allow PD measurements to be examined more precisely in real time or after the inspection:

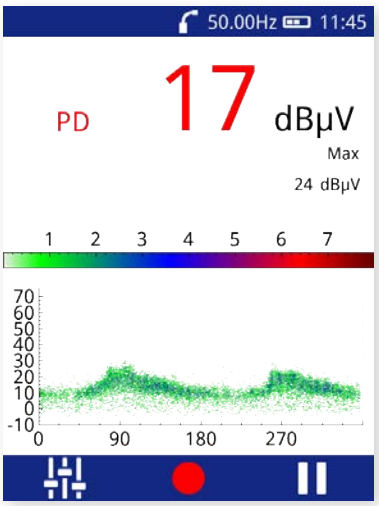
- Phase plots: helps to differentiate between noise patterns and real PD
- Waveform capture: examines amplitude of individual pulses, for PD Characteristics



Histogram



Waveform



Phase Resolved

Range of Kits and Uses

The UltraTEV® Plus² is a multifunctional instrument that can be used to rapidly survey the condition of whole substations and check that working environments are safe. Changes in PD activity levels can be compared between assets and analysed over time, providing a clear indication if further investigation is required. To meet your needs we offer the following instrument kits:

Kit 1	Metal clad Switchgear	Standard kit for Switchgear condition assessment includes headphones & battery chargers
Kit 2	Metal clad Switchgear and Cables	This kit has additional external sensors and includes an HFCT1- F 50, allowing quick and easy condition assessment of your cables* plus an Ultrasonic Contact Probe
Kit 3	Metal clad Switchgear, Cables and Outdoor assets	With the UltraDish™ option included in Kit 3, PD activity can be measured in overhead assets, offering a comprehensive condition assessment package
Kit 4	Locator probe kit 4 can be added to any of the above kit types	Specifically designed carry case containing Locator probe, 2m lead and 6m lead

* Access to cable earth required.

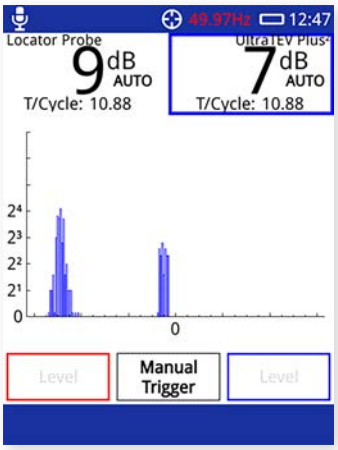
Multiple Functions

UltraTEV® Plus² Locator probe

The UltraTEV® Plus² Locator probe accessory has been designed to attach to the UltraTEV® Plus², ensuring that all your PD needs can be catered for in one instrument.

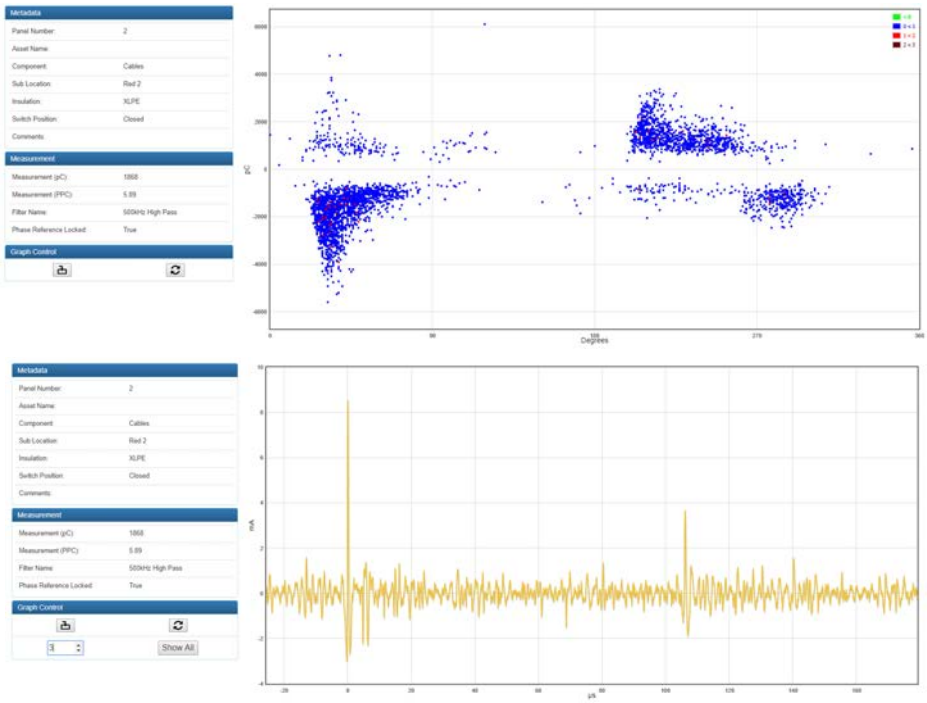
The Locator probe is used in conjunction with the UltraTEV® Plus² TEV sensor to locate the source of PD activity, using time-of-flight measurements.

Advanced software enables the instrument to easily locate PD at multiple discharge sites.



UltraTEV® Plus² Cable PD

PD activity in cables is measured by magnetic clamping the split-core HFCT accessory around the cable earth. The results are displayed on the instrument in pico Coulombs (pC) as numerical values.



Wireless Phase Reference

UltraTEV® Plus^2 with Wireless Phase Reference

A phase lock is critical to understanding partial discharge in high voltage systems, enhancing data analysis and optimising decision making. The new wireless phase reference accessory guarantees an accurate phase lock in any environment.

Why you need Wireless Phase Reference with UltraTEV® Plus^2

- Ensures the perfect phase reference every time, through multiple methods (mains power connection, e-field, Rogowski coil and photosensor).
- Wireless connection to the UltraTEV® Plus^2, up to 40 metres away.
- Long life battery, up to 16 hours.

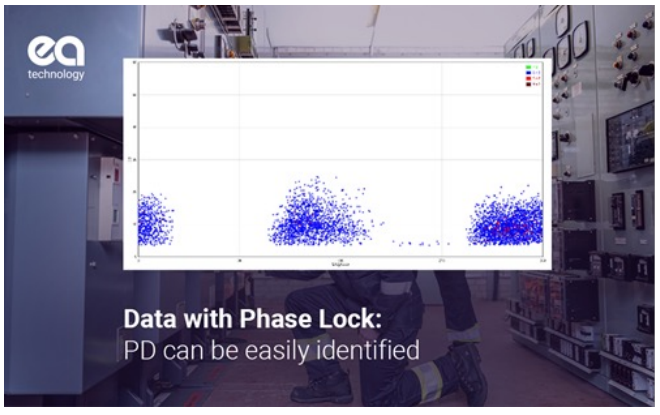
Wireless Phase Reference

4 ways of achieving Phase Lock

Using EA Technology's UltraTEV® Plus² with Wireless Phase Reference, a phase lock can be achieved in four different ways:

- Direct power mains connection.
- E-Field – An internal sensor will detect and lock on to the stray electric fields within the substation.
- Rogowski coil - Detecting AC signals in any conductor
- Photo sensor – A photo sensor on the front of the instrument will lock on to nearby mains frequency lighting such as a fluorescent fitting when there is a line of sight between the sensor and the light.

Wireless Phase Reference being used in situation.



Other Accessories

Flexi Sensor

The Flexi Sensor accessory is used to detect ultrasonic PD activity in hard to reach places where access is limited.

UltraDish

The UltraDish accessory is used to detect ultrasonic PD activity in overhead assets or at a distance.

Contact Probe

The Contact Probe is used to detect ultrasonic PD in sealed chambers.

Environmental Sensor

The Environmental Sensor is used to measure local temperature and humidity.

NFC Tags

NFC tags can be used to hold key asset information and results locally on the assets.

Headphones

The high noise attenuation headphones are comfortable to wear and are compatible with other PPE

HFCT

Our latest generation inductive sensor for online detection of partial discharge via the ground connection.

See next pages for details about the

UltraTEV® Plus[2] UHF Receiver and Directional Atenna.

Product Brochure

The UltraTEV® Plus² Survey Process

1. Enter Substation Data

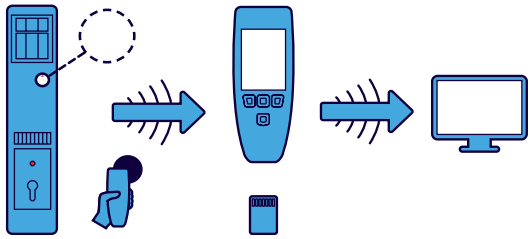
Details of substations and assets can be uploaded from NFC tags or manually entered on screen.

2. Survey and Capture Data

The new advanced analytics allow measurements to be examined more precisely in real-time or after the PD survey has been completed.

3. Transfer Asset Information

The UltraTEV® Plus² has the ability to transfer data directly to your PC or corporate system via Wifi or USB / SD Card.



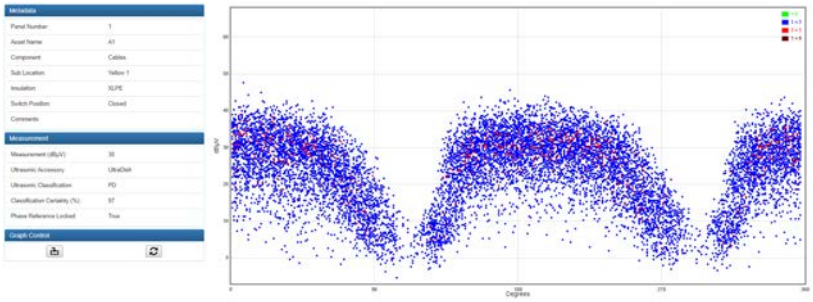
The UltraTEV® Plus² - Kit 3 stored in the specifically designed carry case.

The UltraTEV® Plus² Locator probe stored in the specifically designed carry case.

4. Analysis of Data

Asset data, results and ultrasonic activity, as well as screen shots can all be recorded for subsequent review and analysis.

Example of classification of readings that can be transferred and sent to EA Technology or your in-house PD experts for review.



Example of ultrasonic surface PD asset information that can be transferred and sent to EA Technology or your in-house PD experts for review.

Example of internal void PD measured using the TEV sensor. Asset information can be transferred and sent to EA Technology or your in-house PD experts for review.

The UltraTEV® Plus² UHF Receiver and UHF Directional Antenna

UltraTEV® Plus² UHF Receiver

The UHF receiver connects to the UltraTEV® Plus² smart accessory port so you can start taking UHF measurements quickly and with ease.

Features include:

- Simply plug the UHF receiver into the smart accessory port of the UltraTEV® Plus² to start taking UHF measurements.
- New UHF screens and scan modes are instantly available.
- Use the omnidirectional whip antenna when the source of signal to be measured can be readily determined, regardless of direction.
- Use the optional directional antenna to systematically scan an area to determine the location of PD sources. Ideal for outdoor air insulated substations.

UltraTEV® Plus² UHF Directional Antenna

The directional antenna simply connects to the UltraTEV® Plus² smart accessory port via the UHF receiver, so you can start to take UHF measurements quickly and with ease.

Features include:

- Ideal for outdoor switchyards.
- Easy to use and quick to identify internal PD problems.
- Rugged construction and safe to use around open terminal switchgear.
- Prevents costly and dangerous failures.

The UltraTEV® Plus² UHF Measurement Process

Scan a whole switchyard in minutes

Below is a 6-step quick guide to show the UHF measurement process using the UltraTEV® Plus² UHF Receiver and UHF Directional Antenna.

Step 1

Switch on the UltraTEV® Plus². Its quick startup means it's instantly ready for action.

Step 2

Sweep the switchyard for radio emissions.

Step 3

Filter out irrelevant emissions.
E.g. Mobile phone, television signals and non-destructive corona activity

Step 4

Watch/listen to readings as they peak, to focus on the source of emissions.

Step 5

Rotate instrument for polarity, to locate strongest signals.

Step 6

Use pulse modes to confirm emissions are PD.

Locate internal PD activity in:

- Instrument transformers
- Circuit breakers
- Isolators
- Disconnectors
- Surge arresters
- Cable sealing ends

Specification: UltraTEV® Plus²

TEV	
Sensor	Capacitive
Measurement Range	0 – 60dBmV
Resolution	1dB
Min Pulse Rate	10Hz (rolling displays only)
Discharge Pattern Phase Reference	Optical, E-Field and Manual
ULTRASONIC	
Measurement Range	-7dBµV to 71dBµV
Resolution	1dB
Accuracy	±1dB
Transducer Sensitivity	-65dB (0dB = 1volt/µbar RMS SPL)
Transducer Centre Frequency	40 kHz
Transducer Diameter	16mm
Heterodyning Frequency	38.4 kHz
CABLE PD	
Sensor	HFCT
Measurement Range	100 - 100 000 pC
Resolution	98pC
Accuracy	±98pC
Min Pulse Rate	10Hz
HARDWARE	
Enclosure	Self-colour injection moulded plastic case
Indicators	Colour back-lit LCD Charging indicator LED
Controls	Touch screen Keypad
Connectors	Micro USB connection port Micro SD slot 2 x Lemo accessory connection ports 3.5mm headphone jack
Headphones	Min. 8 ohms
ENVIRONMENTAL	
Operating Temperature	-20 to 50 degrees C
Humidity	0 – 90% non-condensing
IP Rating	42
POWER SUPPLIES	
Internal Batteries	3.7V rechargeable Lithium-Ion
Typical Operating Time	approx. 8 hours
Battery Conservation	Automatic low battery voltage 'switch off'

Specification: UltraTEV® Plus^2 Locator probe

TEV	
Sensor	Capacitive
Measurement Range	0 – 60dBmV
Resolution	1dB
Measurement Bandwidth	3 - 80 MHz
Accuracy	±1dB
Locator probe precedence	0.3ns equivalent to 10cm
HARDWARE	
Enclosure	Self-colour injection moulded plastic case
Indicators	Power indicator LED
Controls	3 x push-buttons
Connectors	Cable to UltraTEV® Plus^2
DIMENSIONS	
Size	201mm x 76mm x 34mm with 2m long cable
Weight	00.36kg
ENVIRONMENTAL	
Operating Temperature	-10 to 55 °C
Humidity	0 – 90% non-condensing
IP Rating	42

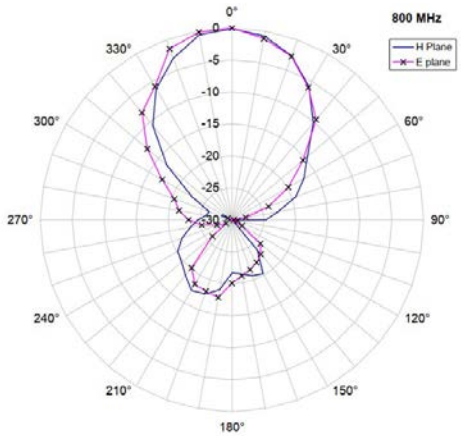
Specification: UltraTEV® Plus² UHF Receiver

HARDWARE MEASUREMENTS	
Enclosure	Aluminium
Indicators	None
Controls	None
Connectors	1x BNC antenna port 1x LEMO (UltraTEV Plus² connection)
DIMENSIONS	
Size	81mm x 40mm x 35mm
Weight	0.1kg
POWER SUPPLIES	
Power supply	Powered from UltraTEV Plus²
Supply voltage	5V
ENVIRONMENTAL MEASUREMENTS	
Operating temperature	0 - 55 °C
Humidity	0 - 90 % non-condensing
IP rating	42 (EN 60529)
UHF MEASUREMENT - GENERAL	
Modes	Switchable narrowband/wideband
Resolution	1 dBm
Measurement bandwidth	50Ω
UHF MEASUREMENT - NARROWBAND	
Measurement range	-85 – +5 dBm
Tuning frequency	47 – 1000 MHz
Bandwidth	8 MHz
Gain setting	-10 – +40 dB
Accuracy	±2 dB (0 dB gain; -50 dBm – 0 dBm input, 25°C)
UHF MEASUREMENT - WIDEBAND	
Measurement range	-61 – -1 dBm
Bandwidth	5 – 3300 MHz
Accuracy	±2 dB
COMPLIANCE	
Electromagnetic compatibility (EMC)	EN 61326-1:2013 (Electrical equipment for measurement, control and laboratory use – EMC requirements. General requirements.) EN 61000-6-2:2019 (Electromagnetic compatibility. Generic standards. Immunity standard for inwdustrial environments.) EN 55011:2016+A1:2017 (Industrial Scientific and Medical equipment – Radio frequency disturbance characteristics – Limits & methods of measurement)

*Please note this accessory requires UltraTEV Plus² V8 Hardware or higher.

Specification: UltraTEV® Plus² UHF Directional

HARDWARE MEASUREMENTS	
Enclosure	Self-coloured vacuum formed plastic case
Indicators	None
Controls	None
Connectors	1x BNC signal port
DIMENSIONS	
Size	440mm x 440mm x 110mm
Weight	2.1kg
ENVIRONMENTAL MEASUREMENTS	
Operating temperature	0 - 55 °C
Humidity	0 - 90 % non-condensing
IP rating	42 (EN 60529)
ANTENNA	
Forward gain	13.6 dBi at 800 MHz
Beamwidth	40^{o} in E-plane and 50^{o} in H-plane
Approximate bandwidth	100 MHz centred on 800 MHz
Maximum sensitivity frequency	800 MHz
Front to back ratio	Approximately 20 dB
Radiation pattern (800 MHz)	Normalized Radiation Pattern diagram



* Please note this accessory requires UltraTEV Plus² V8 Hardware or higher and a UHF Receiver.

Specification: Wireless Phase Reference (UTP2-WPR)

Physical	
Size	115*118*50mm
Weight	200g
Enclosure	Injection moulded plastic case
Connectors	1x GCS1 Current Sensor (for a cable of 1.5m in length) 1x Power Barrel connector
Mounting Mechanisms	Free-standing Magnets in feet to attach to any magnetic surface. Velcro Strap to wrap around cables (up to 100mm diameter)

Environmental	
Operating Temperature	-20 – +50 degrees °C
Humidity	0 – 95% non-condensing
IP Rating	42 (BS EN 60529)
Impact Rating	1IK08 (BS EN 62262)

Indicators and Controls	
Indicators	4x LEDs to indicate current Phase Reference Source 1x bi-colour LED for Wi-Fi/WPS status 1x LED to indicate charging status 3x LEDs for the Battery Level
Controls	3x Push Buttons

Power Supplies	
Internal batteries	Lithium Polymer 3.7V, 2000mAh
Operating Time	Approx. 16 hours
Battery Conservation	Automatic shutdown after 15 minutes of not being connected.
Power input	9Vac 50Hz/60Hz, 5W
Charging Time	Approx. 3h

Battery Charger/AC power port	
Rated voltage	230 VAC
Frequency	50Hz
Max output current	1.1 A
Output Voltage	9VAC
Power Rated	15W
Environment	-10 To 40 degrees C, 0-90%RH
Cable Length	Input: 2.0m Output: 1.8m

Connectivity	
Wireless	Wi-Fi (IEEE 802.11) – Connecting to the UTP2 Frequency: 2.4 GHz Maximum Power: +19.97 dBm Model Number: ESP32-C3-WROOM-02 Antenna: PCB Antenna, 3.42dBi Certificate Number: E1177-210909 Certificate Issued by: Notified Body 1177, TIMCO Engineering, Inc.

Phase Reference	
Sources	Mains Input Power, Lighting (Photo sensor), Electric field (High-Z sensor), Rogowski Coil
Frequency Range	50 Hz ± 1%, 60 Hz ± 1%
Accuracy	±5deg

Compliance	
Electromagnetic Compatibility (EMC)	BS EN IEC 61326-1:2021 (Electrical equipment for measurement, control, and lab use – EMC requirements) BS EN 61000-3-2: 2019 Electromagnetic compatibility (EMC) Part 3-2: Limits — Limits for harmonic current emission BS EN 61000-3-3: 2013 + A1: 2019 (Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply Systems)
Radio	ETSI EN 301 489-17 V3.2.4 (EMC standard for radio Equipment and services, for Broadband Data Transmission Systems) ETSI EN 301 489-1 V2.2.3 (EMC standard for radio equipment and services; Part 1: Common technical requirements)
Safety	BS EN 61010-1:2010+A1:2019 (Safety requirements for electrical equipment for measurement, control, and laboratory use)

For more information please call us on +1 (862) 261-2759 or email us at sales@eatechnologyusa.com

Global Footprint

EA Technology is an engineering and technology business that provides intelligent energy solutions for designers, installers, operators, and owners of power network assets.

Founded in 1966 we have over 50 years' experience in the industry and 6 regional offices around the world to support our global customer base.

We work with a lot of our clients on a long-term basis to help them safeguard their power networks.

We advise our clients on strategy and implementation of a range of technology solutions to manage power assets, delivering maximum life and minimise cost.

ea technology

Safer, Stronger, Smarter Networks

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