OMICRON

MONTESTO 200

Portable system for temporary on-line partial discharge monitoring for various electrical assets

Periodic on-line assessment of insulation condition

Early defect detection prevents failures

The insulation system of all medium-voltage (MV) and high-voltage (HV) assets is continuously subjected to electrical, thermal, mechanical and environmental stress factors. These cause insulation defects and aging over time, which can eventually lead to dielectric failure and costly outages if not handled in a timely manner.

To prevent this from happening, it is important to know the insulation condition of these assets over their entire service life of your electrical assets.

Insulation assessment based on partial discharge

Partial discharge (PD) activity is a reliable indicator of insulation condition, and high levels of PD activity are often a sign of developing insulation defects that can cause failure in electrical assets. That is why PD is an important diagnostic parameter used in the factory acceptance testing, commissioning and in-service testing and maintenance of various MV and HV assets.

On-line PD monitoring and measurement

Temporary on-line PD monitoring trends changes in PD activity over specified periods of time during the service life of electrical assets, providing you with a snapshot of insulation condition status when the asset is in operation.

The data gathered during temporary on-line PD monitoring enables engineers to determine when electrical equipment is at risk of failure and requires maintenance or replacement, such as the case with older equipment towards the end of its service life.

This vital condition-based information helps to optimize maintenance strategies, asset management and investment planning.

Clarify asset installation issues within the warranty period

Periodically check asset insulation condition state between scheduled offline diagnostic measurements

Identify assets that require immediate intervention

Observe assets at risk over extended periods of time

Identify assets that require permanent monitoring

Plan maintenance and investment based on asset condition

Temporary on-line PD monitoring

Motors and generators

Power transformers

Power cables

MONTESTO 200 at a glance

MONTESTO 200 is a portable solution for temporary on-line PD monitoring. Designed for both indoor and outdoor use, it performs synchronous, multi-channel trending of voltage and PD levels on various MV and HV electrical assets under load, such as:

> Motors and generators
> Power transformers
> HV cables, terminations and joints

Plug-and-play connections

MONTESTO 200 can be connected to permanently-installed PD sensors via a terminal box. This allows safe and easy plug-and-play connections while the asset is online, allowing you to avoid unnecessary downtime during setup.

Built-in computer

A powerful built-in computer enables continuous on-site data collection and storage. When it is set up with an Internet connection, you can access the built-in computer from a remote location to do the following

> Configure monitoring settings in less than 10 clicks of a mouse
> View and analyze real-time and trend data
> Receive reports by email

Online/Offline Delay

The MONTESTO 200 system also determines if the monitored asset is on-line or off-line by comparing the measured V_{rms} value to the given voltage threshold.

Alarm notification via email

The system can be configured to send email notifications when user-defined PD thresholds are violated and warnings and alarms are triggered. The system's event log and the corresponding real-time and historical PD data can be instantly viewed via the web interface.

Convenient data analysis

Software features, such as 3PARD (3-Phase Amplitude Relation Diagram) and automatic cluster separation, separate noise from PD signals to help you quickly and reliably determine the signal source.

Customizable, automatic reporting

With optional features, you can customize templates for different types of automatically-generated reports, whether triggered by the system status or by measurement events (warnings or alarms).

The reports include the corresponding trends and recorded phase-resolved PD (PRPD) and 3PARD diagrams and are distributed as specified.

Your benefits

> One solution for on-line temporary PD monitoring on various assets
> Compact and lightweight for easy transport
> Designed for indoor and outdoor use
> Built-in computer for continuous, long-term data collection and storage
> Web-based interface for convenient remote data access
> Automated software features for easy data analysis and reporting

www.omicronenergy.com/montesto200

Front panel features at a glance

A variety of interfaces for data communication: WIFI, LAN, USB, fiber optics, HDMI

Local asset status indication; automatic alarm notification via email (when configured by the user)

Built-in computer for continuous data collection and storage

IP65 rated enclosure designed for indoor and outdoor use

Device handles on both sides

Local Area Network (LAN) connection

Four PD measurement channels

Local device status indication tells you the operating condition of the measurement unit

Start/stop button

Measurement device grounding connection

Protection bumpers on both sides

AC power connection

Universal 12 V battery connection

Connection port for UHF sensor control

One solution for temporary on-line PD monitoring for various assets

Plug-and-play connections

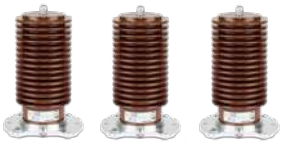
MONTESTO 200 can be easily connected to permanently-installed PD sensors via a terminal box. This enables a safe and convenient plug-and-play set up when electrical assets are on line. As a result, unnecessary downtime can be avoided and the asset can be evaluated under operating conditions.

1 MONTESTO 200

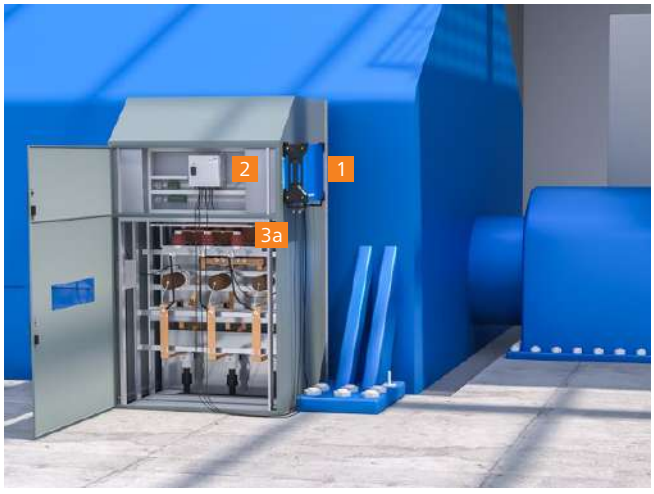
2 Terminal box

3 Permanently-installed sensors

3a Coupling capacitors



Motors and generators



Temporary on-line PD monitoring

MONTESTO 200 can also be mounted on or near the asset, connected to permanently-installed PD sensors via the terminal box, and left unattended for PD monitoring. Users can remotely connect to the system anytime with the convenient web interface.

On-line PD measurements

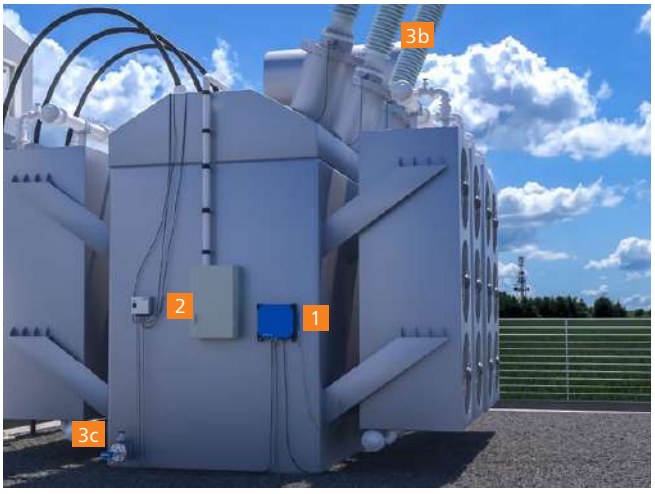
Spot PD measurements can be performed during monitoring session configuration, fine-tuning or quick evaluation.

3b Bushing tap sensors and adapters

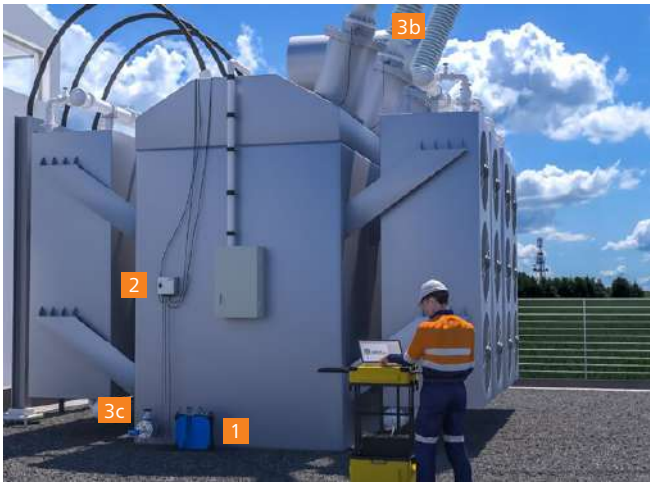
3c UHF drain valve sensor

3d High-frequency current transformers

Power transformers



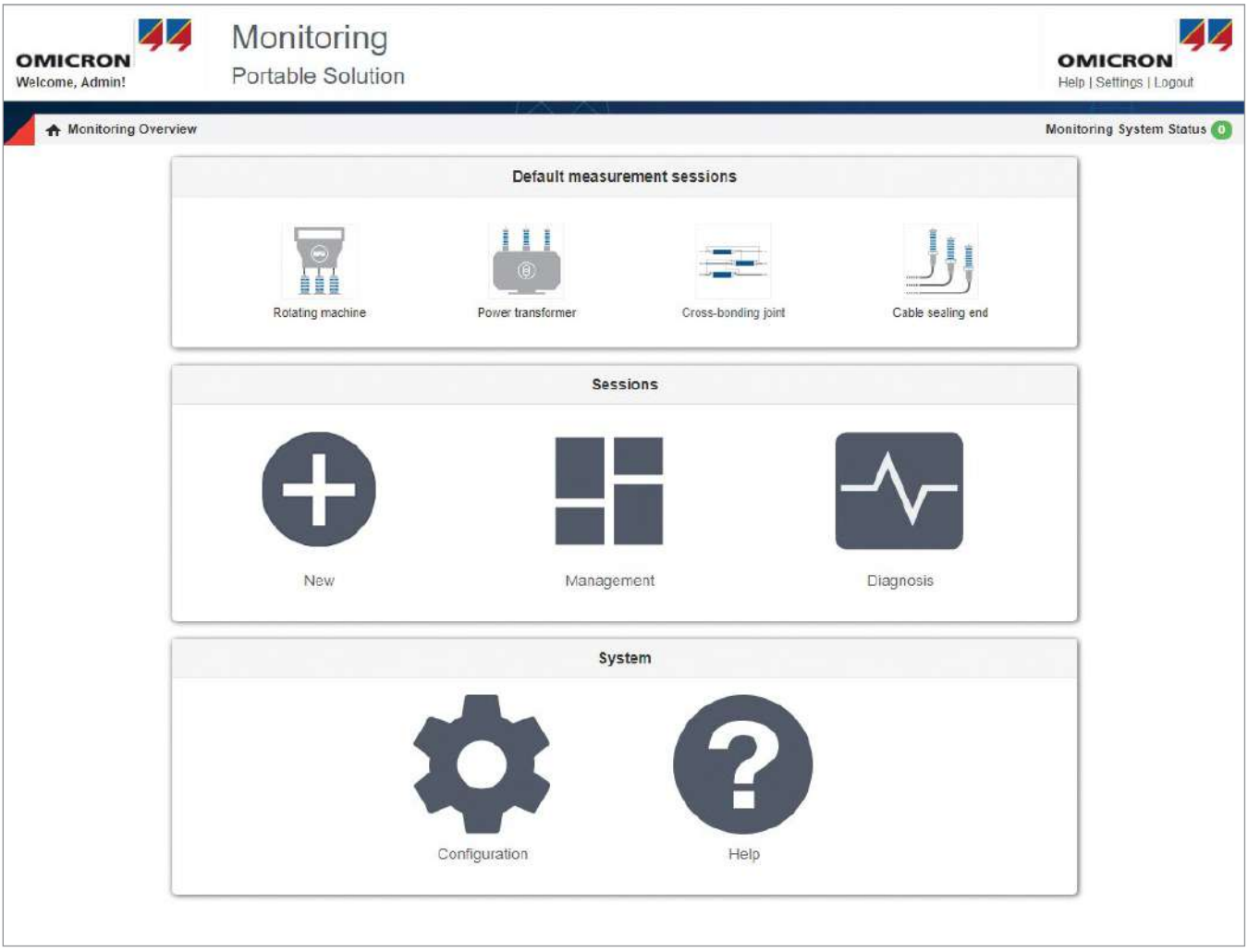
Power cables and accessories



On-line PD assessments from remote locations

Convenient web interface

For performing temporary on-line PD monitoring sessions, you can set up monitoring sessions as well as view and analyze collected data from anywhere using the MONTESTO 200 software's web interface.

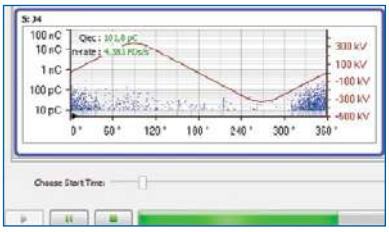


MONTESTO 200 web interface overview screen

1 Fast remote monitoring session setup

Users can set up and run temporary on-line PD monitoring sessions in six easy steps (less than 10 clicks of a mouse).

2 Recording PD data sets



MONTESTO 200 allows the recording of raw PD data sets for post-processing or for detailed analysis of the on-line data. They can be recorded by the monitoring software, when triggered by a threshold violation or by the user.

The main measurement values can be exported per channel in a .csv file during replay of a recorded PD dataset. Using these .csv files, you can perform further analysis and generate charts, for example with MS Excel.

3 Automatic alarm notification

The system can be configured to send email notifications when measured PD values exceed pre-defined PD thresholds and trigger an alarm. Supporting data can be viewed anywhere using a tablet or PC.

4 See triggered warnings and alarms

Event Log - TRAFO UM6

Show confirmed events

Confirm All

Start Date	End Date	Level	Source	Event	Status
8/22/2018 3:14 PM	8/22/2018 3:15 PM	Critical	HV Bushing / TAP 3	PD_W	active
8/22/2018 3:14 PM	8/22/2018 3:15 PM	Warning	HV Bushing / TAP 2	PD_V	active
8/22/2018 3:14 PM	8/22/2018 3:15 PM	Warning	HV Bushing / TAP 1	PD_U	active

The event log shows which PD events triggered a warning (yellow) or alarm (red). By clicking on an event, the corresponding real-time or historical PD trend data can be viewed.

5 Trend data

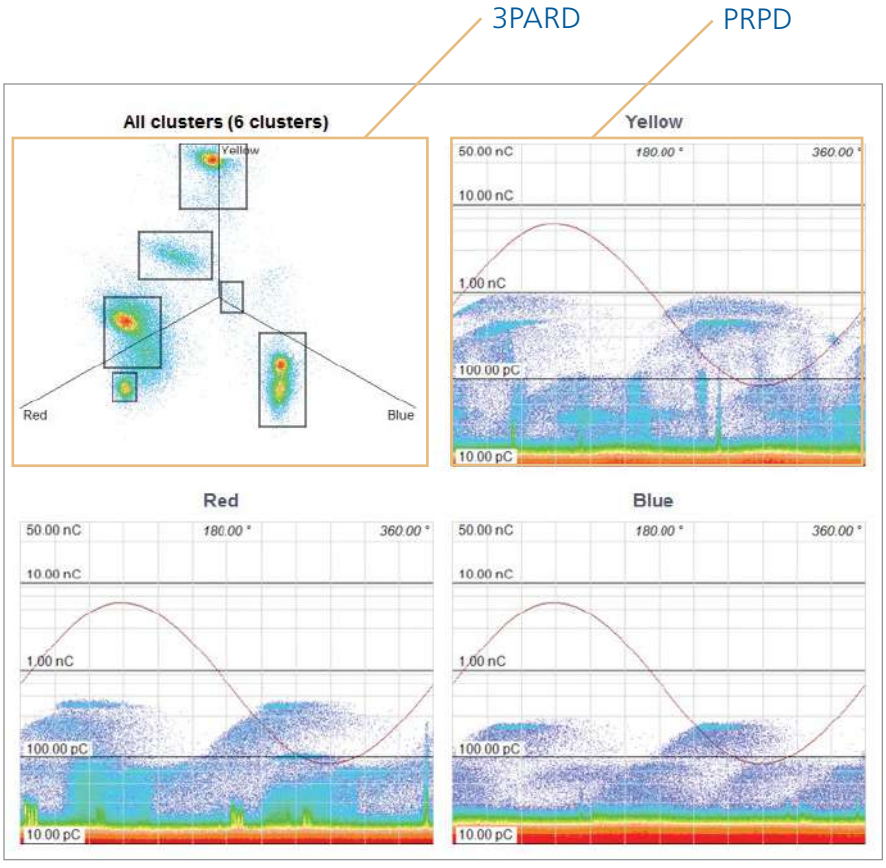
See PD trend charts for each phase or channel. Scroll over points to see PD values and zoom in to see more detail.

Comprehensive analysis and reporting

Automatic cluster separation

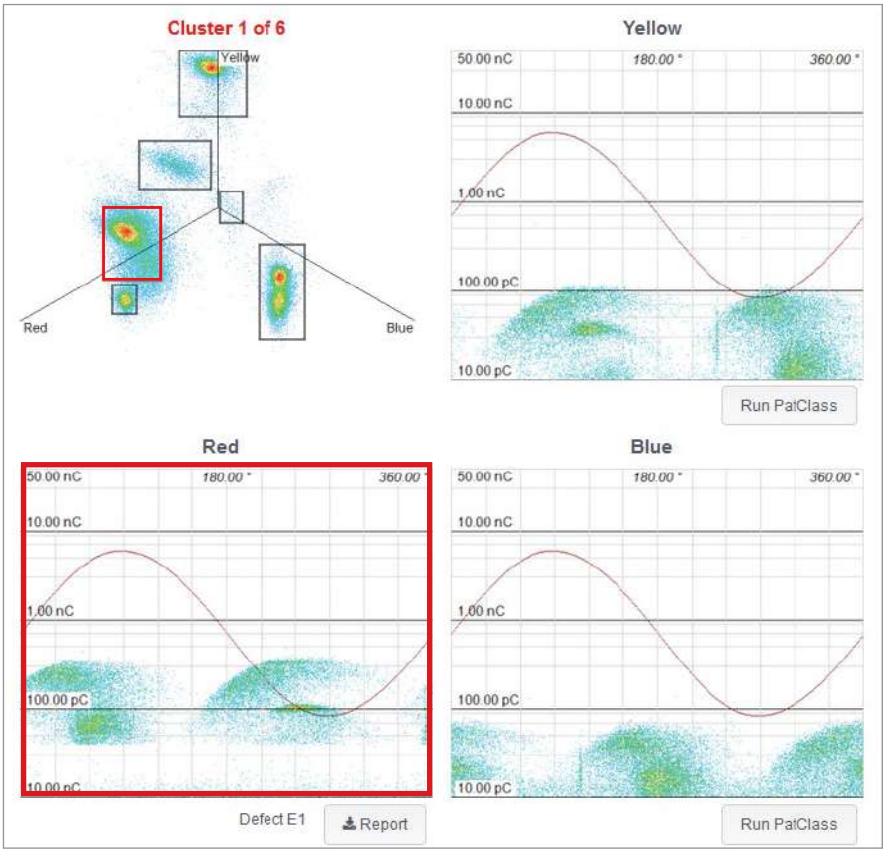
The advanced, web-based MONTESTO 200 software automatically stores PRPD (Phase-Resolved PD) patterns and the corresponding 3PARD (3-Phase Amplitude Relation Diagram) for each point in the PD trend diagram.

All signal sources are then automatically separated as clusters in the 3PARD to quickly differentiate between noise and PD for each phase.

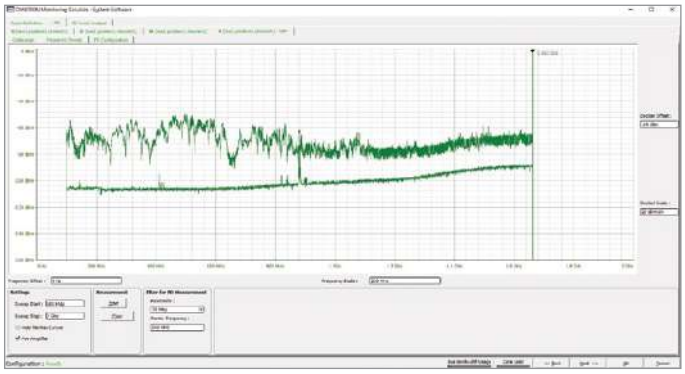


Unfiltered data

By clicking on a separated cluster, its individual PRPD pattern is shown. The most probable phase of origin is also identified after the separation is made.

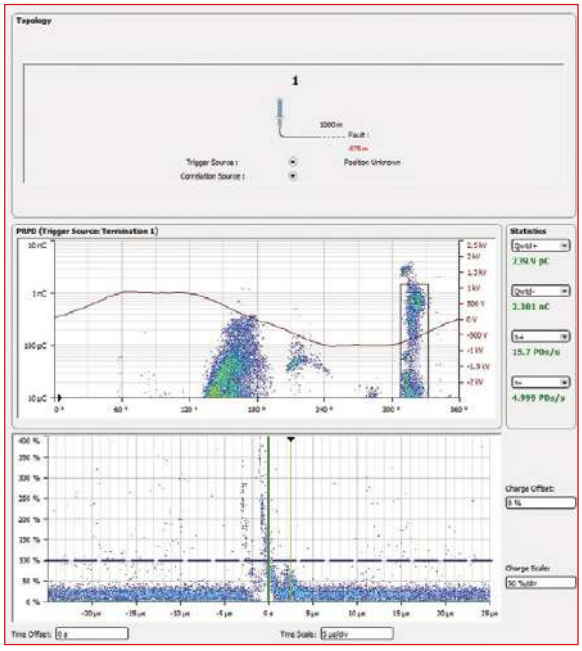


Filtered data



Frequency sweep diagram (UHF)

Several measurements are made for each frequency and the minimum (lower curve) and the maximum (upper curve) measured values are displayed. This method is used to detect any sources of interference in order to avoid them in a subsequent PD measurement.

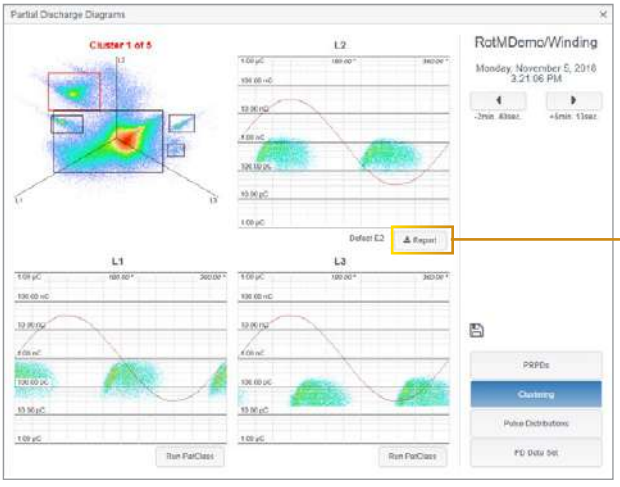


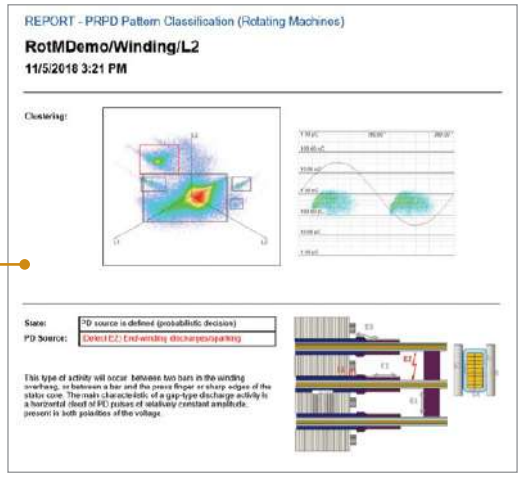
Cable Defect Localization

A unique, patented technology based on statistical Time Domain Reflectometry (sTDR) pinpoints the location of PD defects in cables and cable accessories.

Optional pattern classification for motors and generators

When enough data is available, the optional pattern classification analysis feature is performed for the phase with the highest amplitude to provide you with an explanation of the probable error.





Automatic report with explanation of probable error

MONTESTO 200 ordering information

MONTESTO 200 — Order no.

Includes the system components listed below — P0006484

Hardware

1 x 4-channel PD data acquisition unit and an integrated Industrial PC (IPC) in a rugged case
1 x Transportation case
1 x Mounting kit (includes mounting plates and magnets)
1 x Media converter

Pre-installed software on integrated Industrial PC (IPC)

1 x Advanced monitoring and PD analysis software
1 x Operating system software

Cables and accessories

1 x Duplex fiber optic cable (10 m / 32.81 ft)
1 x Grounding cable (6 m / 19.68 ft)
1 x Grounding clamp
4 x Signal cable with TNC connectors (4 m / 13.12 ft)
1 x Power supply cord (2 m / 6.56 ft)
1 x Battery cable (2.5 m / 8.20 ft)
2 x Small crocodile clamps for battery cable
2 x Large crocodile clamps for battery cable

Documentation

1 x MONTESTO 200 hardware user manual
1 x Software user manual
1 x OMS system software user manual

Optional accessories — Order no.

Hardware

CAL 542 – PD calibrator	
1 pC ... 100 pC	P0005902
0.1 nC ... 10 nC	P0005904
Rogowski coil – Current signal reference for measurements on power cables	E0532502
UPG 620 – Pulse generator for UHF signal verification	P0001354
UHF 620 – UHF bandwidth converter	P0006485
WiFi modem	E1608200

Software module

Pattern classification for rotating machines	P0006618
Basic Asset Measurement Report	P0006849

Application-specific accessories — Order no.

1 Terminal box

For use when PD sensors are permanently installed on various assets to enable plug-and-play, on-line PD measurement and monitoring. Designed for indoor and outdoor use.

3-channel terminal box	B1564401
4-channel terminal box	B1564502

2 Coupling capacitors

MCC 117: 17.5 kV, 2.2 nF	P0006465
MCC 124: 24 kV, 1.1 nF	P0006466
MCC 117 permanent installation kit	
Includes 3 x MCC 117, 1 x terminal box and 3 x tri-axial cables (5 m) with pre-installed connectors.	P0006480
MCC 124 permanent installation kit	
Includes 3 x MCC 124, 1 x terminal box and 3 x tri-axial cables (5 m) with pre-installed connectors.	P0006481

MONTESTO 200

Application-specific accessories — Order no.

3 CPL 844 permanent installation kit for bushings

Includes 3 x bushing tap sensors with adapters, 1 x terminal box and 3 x triaxial cables (10 m) with pre-installed IP65 connectors.

Current rating of the bushing sensors:

9 mArms ... 30 mArms	P0001033
30 mArms ... 60 mArms	P0001034
60 mArms ... 100 mArms	P0001035

4 UHF 620 bandwidth converter

Includes 1 x UHF 620 and connection cables in an IP65 case — P0006485

Application-specific accessories — Order no.

5 UHF drain valve sensor for oil-filled power transformers

UVS 610: 150 MHz to 1 GHz — P0006444

6 High-frequency current transformers

MCT 120: 80 kHz to 40 MHz, split ferrite core — P0006482

Motors and generators
Capacitive measurement

1 Terminal box
2 Coupling capacitors

Power transformers
Capacitive measurement

1 Terminal box
3 Bushing tap sensors and adapters

Power transformers
UHF measurement

4 UHF bandwidth converter
5 UHF drain valve sensor

HV cable terminations and joints
Inductive measurement

1 Terminal box
6 High-frequency current transformers

Technical specifications

MONTESTO 200

Acquisition unit

Number of input channels	4
Connector type	TNC
Frequency range	Hardware: AC: 5 Hz ... 16 kHz Software: Selectable, 10 Hz ... 450 Hz PD: 16 kHz ... 30 MHz
Sampling rate	AC: 31.25 kS/s PD: 125 MS/s
Peak input levels	AC: 200 mA PD: 80 V
Measurement accuracy	AC: ±0.25% PD: ±5%
Maximum double pulse resolution	< 200 ns
PD event time resolution	< 2 ns
PD filter bandwidth	9 kHz ... 5 MHz (10 bandwidth settings)
System noise	< 1 pC
Power consumption	max. 50 W

Power supply

Mains	AC: 100 V ... 240 V DC: 110 V ... 150 V
External battery	DC: 12 V battery

Operating conditions

Operating temperature	-30 °C … +55 °C -22 °F … +131 °F
Storage temperature	-40 °C … +80 °C -40 °F … +176 °F
Humidity	0 % … 95 % (non-condensing)
Protection class	IP65

Mechanical data

Dimensions (W x D x H)

MONTESTO 200:	427 x 405 x 150 mm 16.81 x 15.94 x 5.90 in
Transportation case:	540 x 550 x 550 mm 21.26 x 21.65 x 21.65 in

Weight

MONTESTO 200:	12 kg / 26.45 lbs
With transportation case and accessories:	28.50 kg / 62.83 lb

Internal PC

Processor	Intel Core i5-6300U CPU
Memory RAM	16 GB, DDR4
Storage	500 GB, SSD
Operating system	Windows 10

Application-specific accessories

1 Terminal box

Used for convenient plug-and-play connections of permanently-installed PD sensors to MONTESTO 200 without service interruption.

Technical Data

Protection class	IP65
Input	3 or 4 channels with coaxial cables in different lengths
Output	3 or 4 channels

2 MCC coupling capacitors

Different MCC coupling capacitors are available for various voltage levels.

Technical Data	MCC 117	MCC 124
U_m (phase-to-phase)	17.5 kV	24 kV
$C_{Nominal}$	2.2 nF (+/- 15%)	1.1 nF (+/-15%)
Withstand Voltage (1 min.)	38 kV	50kV
Q_{PD}	< 2 pC @ 20.7 kV	< 2 pC @ 27.6 kV
Output connector	TNC	TNC

3 CPL 844 bushing tap sensors

A variety of bushing tap sensors are available with adapters for PD measurements on various bushing types. They are included with the *Terminal box* as part of the *CPL 844 Permanent installation kit for bushings*.

Technical Data

Current ranges	9 mArms ... 30 mArms 30 mArms ... 60 mArms 60 mArms ... 100 mArms
Max. output voltage	25 V
Frequency range	16 kHz ... 10 MHz
Output connector	TNC
Protection degree	IP 66
Operating temperature	-40°C ... +90°C (-40°F ... +194°F)
Humidity	up to 95% relative humidity (non-condensing)

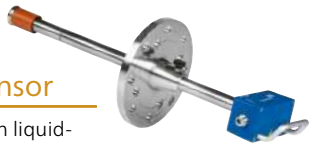
4 UHF 620 bandwidth converter

Extends the measuring frequency range up to the VHF/UHF range and makes the detection of partial discharge more sensitive..

Technical Data

Frequency range	100 MHz ... 2000 MHz
PD filter bandwidth	9 kHz ... 600 kHz (narrow band) 70 MHz (wide band) 1.9 GHz (ultra wide band)
Protection class	IP66
Connection cables	Included
PD event time resolution	< 2 ns

5 UVS 610 drain valve sensor



Allows PD measurements to be taken in liquid-insulated power transformers via the vent of an oil drain valve (DN50 or DN80).

Technical Data

Protection class	IP 66 / IP 67
Frequency range	150 MHz to 1000 MHz
Tightness	up to 5 bar pressure (at -15 °C to +120 °C / at 5 °F to 248 °F)
Insertion depth	55 mm to 450 mm / 2.2 inch to 17.7 inches

6 MCT 120 high-frequency CT

The MCT high-frequency current transformer (HFCT) picks up PD signals at a safe distance from high voltage. It is primarily intended for use on ground connections.

Technical Data

Frequency range (-6 dB)	80 kHz ... 40 MHz
Inner hole dimensions	53.5 mm / 2.11 inches
Ferrite core	Split
Output connector	TNC (including BNC adapter)

We create customer value through ...

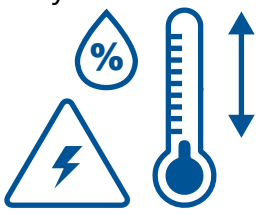
Quality

We always want you to be able to rely on our testing solutions. This is why our products have been developed with experience, passion and care and are continually setting ground-breaking standards in our industry sector.

You can rely on the highest safety and security standards

Superior reliability with up to

72



hours burn-in tests before delivery

100%

routine testing for all test set components

ISO 9001
TÜV & EMAS
ISO 14001
OHSAS 18001

Compliance with international standards

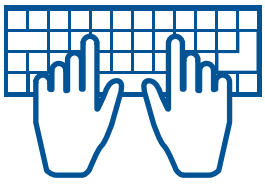
Innovation

Thinking and acting innovatively is something that's deeply rooted in our genes. Our comprehensive product care concept also guarantees that your investment will pay off in the long run – e.g. with free software updates.

... a product portfolio tailored to my needs

More than

200



developers keep our solutions up-to-date

More than

15%

of our annual sales is reinvested in research and development

Save up to

70%

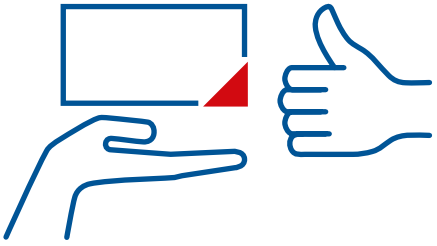
testing time through templates, and automation

We create customer value through ...

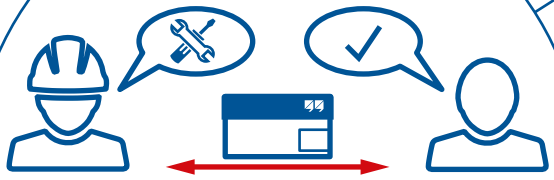
Support

When rapid assistance is required, we're always right at your side. Our highly-qualified technicians are always reachable. Furthermore, we help you minimize downtimes by lending you testing equipment from one of our service centers.

Professional technical support at any time



Loaner devices help to reduce downtime



Cost-effective and straight-forward repair and calibration

offices worldwide for local contact and support

Knowledge

We maintain a continuous dialogue with users and experts. Customers can benefit from our expertise with free access to application notes and professional articles. Additionally, the OMICRON Academy offers a wide spectrum of training courses and webinars.

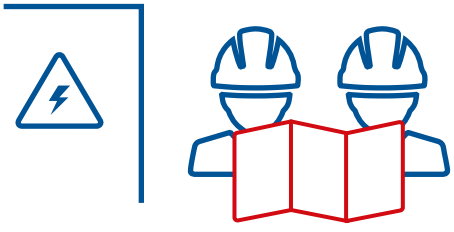
More than

300

Academy and numerous hands-on trainings per year

Frequently OMICRON hosted user meetings, seminars and conferences

to thousands of technical papers and application notes



Extensive expertise in consulting, testing and diagnostics

OMICRON is an international company that works passionately on ideas for making electric power systems safe and reliable. Our pioneering solutions are designed to meet our industry's current and future challenges. We always go the extra mile to empower our customers: we react to their needs, provide extraordinary local support, and share our expertise.

Within the OMICRON group, we research and develop innovative technologies for all fields in electric power systems. When it comes to electrical testing for medium- and high-voltage equipment, protection testing, digital substation testing solutions, and cybersecurity solutions, customers all over the world trust in the accuracy, speed, and quality of our user-friendly solutions.

Founded in 1984, OMICRON draws on their decades of profound expertise in the field of electric power engineering. A dedicated team of more than 900 employees provides solutions with 24/7 support at 25 locations worldwide and serves customers in more than 160 countries

For more information, additional literature, and detailed contact information of our worldwide offices please visit our website.

www.omicronenergy.com