

PDTech DELTAMAXX™

Digital Loss Factor/Capacitance Analyzer and
Partial Discharge Detector for Test Voltages up to 50 kV

The PDTech DELTAMAXX digital system determines with high precision the dielectric loss factor (power factor), capacitance, and partial discharge of:

- Generator and motor windings
- Transformers
- Cables and capacitors

The available systems are:

- PD detector only with or without integrated coupling (reference) capacitor
- Loss factor and capacitance measuring device
- Both functions integrated into one single unit

Units for 15 kV, 20 kV, 30 kV and 50 kV test voltages are available.



A new digital computing algorithm replaces moving parts and bridge components and allows digital calibration of the system. Application and system integration is simplified. The PDTech DELTAMAXX is ultracompact, can be battery operated, and uses differential amplifiers, thus allowing easy application to grounded and non-grounded test objects. The system automatically adapts to a wide range of test frequencies and locks into the main frequency while rejecting higher harmonics by the new algorithm. Typical 3rd and 5th harmonics are automatically eliminated. Its robustness against external disturbance and ease of application allows retrofit to many older high voltage test benches.

THE LOSS FACTOR/ CAPACITANCE TEST

The PDTech DELTAMAXX system measures current through a reference capacitor and test object. The current is measured by the voltage drop across shunt resistors. A 16-bit A/D converter processes these voltages. The phase angle difference between the high voltage and this current is determined by a novel algorithm, which allows the calculation of the loss angle and automatic elimination of several potential error sources.

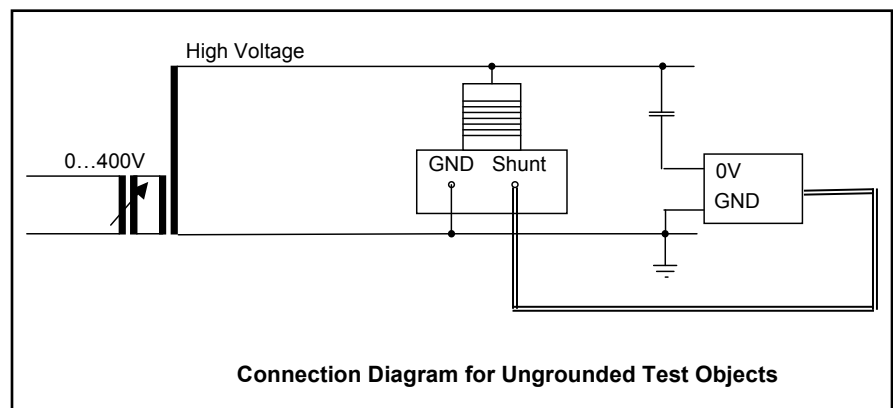
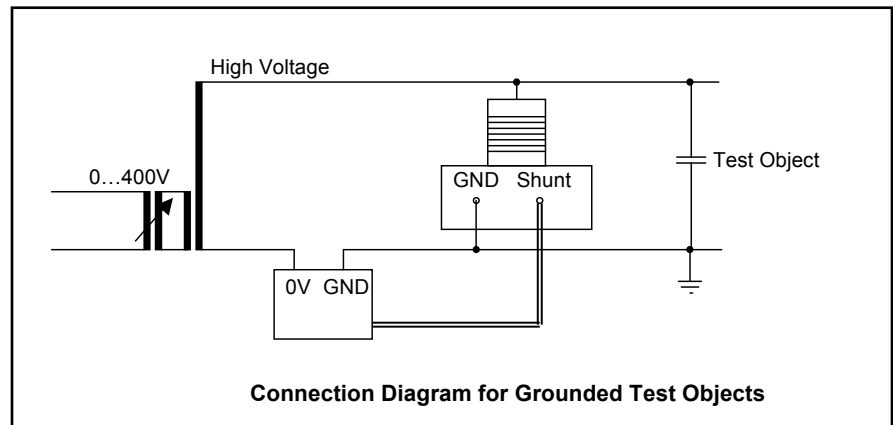
A USB interface allows communication to a PC and as the analog signal is processed very close to the test object, long signal cables are not necessary. Typically this length is limited to 5m, however, should longer connections be necessary, a fibre optic USB extender is available. The shunt resistance limits measuring ranges. There are shunts available for different current ranges, which need to be properly selected prior to a measurement.

The PDTech DELTAMAXX loss factor analyser does not need an external power supply as it is powered by USB. If a PD module is installed an external power supply (6V DC) must be used.

THE PARTIAL DISCHARGE TEST

The PDTech DELTAMAXX is configured to extract PD pulses from the coupling capacitor internally. PD measurement does not require external shunts or additional components, that is, coupling impedance, pre-amplifier, signal processing, and digitising all takes place in the measuring unit. This technique allows the PDTech DELTAMAXX unit to be placed in the direct vicinity of the test object and long signal cables, which could pick-up interference, are no longer necessary. Data is transferred digitally via the USB connection, which does not interfere with the analog part.

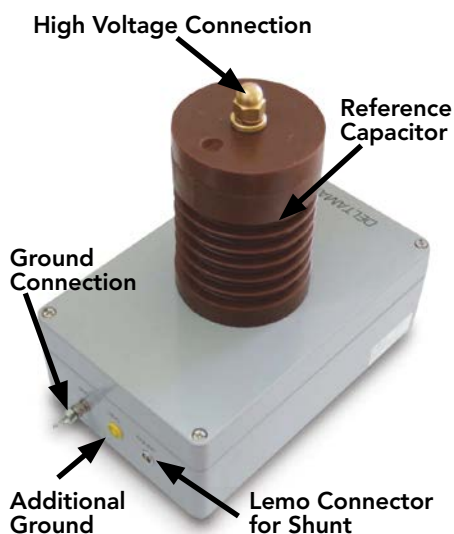
The instrument measures the partial discharge pattern and the apparent charge Q_{app} . Apparent charge is defined as the largest PD amplitude measured by an instrument with an impulse response according to IEC60270 sect. 4.3.3. Contrary to an analog device, this charge is calculated from the partial discharge pattern, by weighting the amplitudes as a function of their repetition frequency (IEC60270:2001, Table 1). The other measurement is Q_m , peak magnitude. Q_m , according to IEC 60034-27, is the charge level of a repetition frequency of 10 pulses per second (pps), which can be determined directly from a pulse height distribution which is a subset of the PD pattern.



PDTech DELTAMAXX

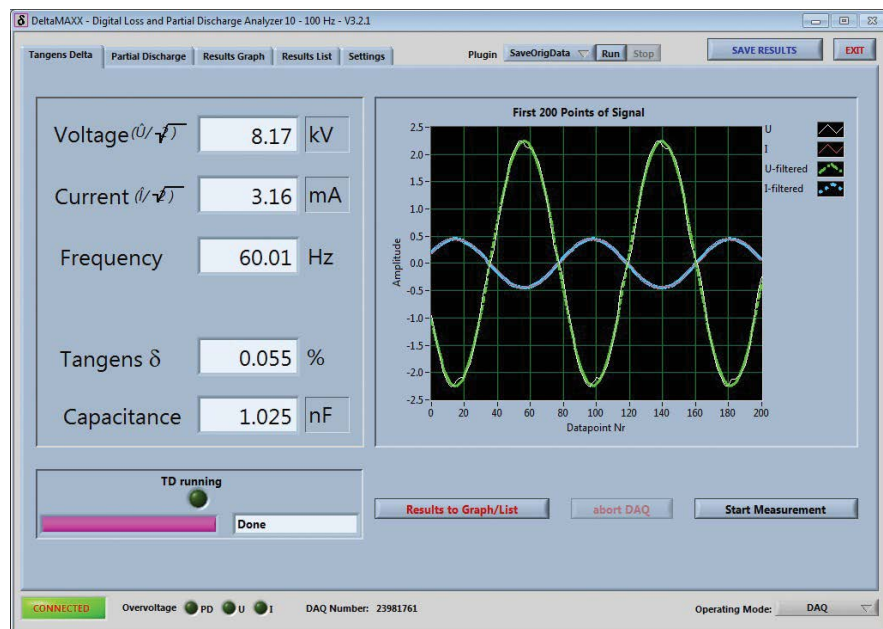
READY TO USE UNITS WITH BUILT-IN REFERENCE CAPACITOR

For many applications, with the PDTech DELTAMAXX, loss factor and capacitance measuring will use a direct connection with the reference capacitor. The shunt determines the measuring range and is connected by a differential signal cable to the main box.



THE SOFTWARE IS THE INSTRUMENT

The computer program is the instrument. The system calibration is part of the software, thus protocol generation and operation of the system is easier than using a microprocessor unit with extra computer interface. A PC is an integral part of the instrumentation. Protocol generation is included (HTML, Excel-Export).



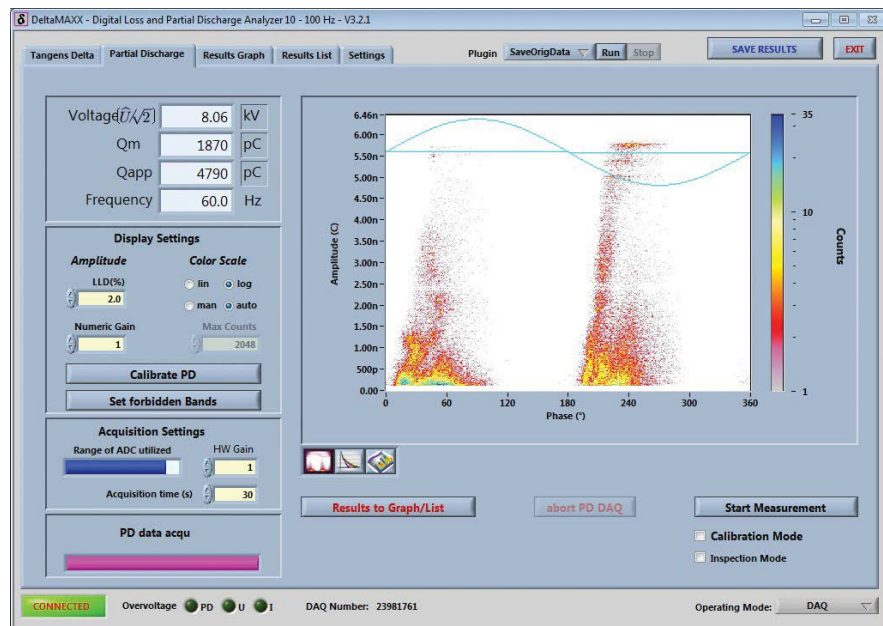
Results Screen for $\text{Tan}\delta$

PD TECH SCOPE OF SUPPLY

- Data acquisition module with integrated coupling reference capacitor
- Three current shunt modules (50 mA, 2 A, and 10 A)
- Connection cable set or shunt module, USB, and banana cables
- CD with configuration and operation software and user manual

OPTIONS

- PD Module with PDCAL 20 calibrator
- Laptop
- Optical USB link



Results Screen for Partial Discharge

PDTech DELTAMAXX

SPECIFICATIONS FOR TANδ/C MEASUREMENT

Test Frequency	10 to 100Hz
Maximum Current	depends on external components (shunts), standard is 10A, 50 mA and 2A also available.
Reference Capacitor	1nF nominal up to 20 kV at 23°C, correction in settings, see QA certificate for precise values
Tanδ	10 ⁻⁵ (resolution)
Error	Tanδ: 1-2·10 ⁻⁴ (uncertainty) Capacitance 0.5% at 5V input at 23°C
Display Units	selected via user interface
Power Supply	Via USB (for PD Module external power required)
Harmonics	Numerically rejected by software algorithm
Interface USB	PC requirement: Desktop or Notebook, Windows XP, 512 MB (min)
Test Voltage Range	15kV (DELTAMAXX 15), 20kV (DELTAMAXX 20), 30kV (DELTAMAXX30), 50kV (DELTAMAXX50)

SPECIFICATIONS FOR PARTIAL DISCHARGE MEASUREMENT WITH INTEGRATED COUPLING CAPACITOR

Test Frequency	10 to 100Hz (HV Frequency Range)
Coupling Capacitor	1nF nominal up to 20 kV at 23°C, see QA documents
Coupler Impedance	Integrated high-voltage isolation transformer
PD Band Pass	Designed according to IEC60270, 40-800kHz
PD Ranges	Depends on version and test object and noise, 10pC to 200nC typical
Max. Pulse Rep. Rate	40kHz
Display	Phase Resolved Partial Discharge Pattern
Power	USB and external 6VDC power supply
Interface	USB PC requirement: Desktop or Notebook, Windows XP, 512 MB (min.)
Test Voltage Range	15kV (DELTAMAXX 15), 20kV (DELTAMAXX 20), 30kV (DELTAMAXX 30), 50kV (DELTAMAXX 50)

Under certain circumstances such as excess noise or test object's impedance, the instrument's precision may vary. Specifications may change without notice.

PDTECH PDCAL20

(Battery Operated Calibration Pulse Generator)

The calibration pulse generator is used to inject known charge pulses into a high voltage test circuit in order to calibrate the amplitude scale of the PDTech DELTAMAXX. It is typically connected to the test circuit by (short) leads with 4mm banana plugs, plugged into the face of the calibration pulse generator. The connectors are separated by 19mm, so that a coaxial or banana adaptor can be used to connect the calibration pulse generator to coaxial cable.



PDTECH PDCAL20
(conforms to IEC 60270:2001)

Iris Power PDTech DELTAMAXX is a trademark of Qualitrol-Iris Power.

Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

QUALITROL-IRIS POWER HAS BEEN THE WORLD LEADER IN MOTOR AND GENERATOR WINDING DIAGNOSTICS SINCE 1990, PROVIDING A FULL LINE OF ON-LINE AND OFF-LINE TOOLS, AS WELL AS COMMISSIONING AND CONSULTING SERVICES.



A QUALITROL Company

www.irispower.com

www.qualitrolcorp.com

Iris Power LP
3110 American Drive
Mississauga, ON, Canada L4V 1T2
Phone: +1-905-677-4824
Fax: +1-905-677-8498
Sales.iris@qualitrolcorp.com

Qualitrol Company LLC
1385 Fairport Road
Fairport, NY, USA 14450
Phone: +1-585-586-1515
Fax: +1-585-377-0220

Qualitrol – PD Tech
Steinbruchstr. 11
CH 5200 Brugg 3
Switzerland
Phone: + 41 56 416 90 90
Fax: + 41 56 416 90 91



QUALITROL
Defining Reliability

Ver 3 • 9/13