

DELTA3000

10 kV Automated Insulation Power Factor Test Set with "PowerDB OnBoard"



- **Integrated PowerDB software package allows for automated control without the use of a laptop**
- **Rugged, portable unit for field/shop use and designed to work in high interference switchyards of up to 765 kV**
- **Built-in capability for storing, printing and downloading test results**
- **Optional module for LV 3-phase TTR testing and excitation current up to 500 mA**
- **Optional HV reference capacitors (100 pF, 1000 pF) with 2% dissipation factor, and a 10 nF HV TTR capacitor**
- **Optional Priority Access package offering exclusive 24/7 service and support (US market only)**

DESCRIPTION

The DELTA3000 is a fully automatic 10 kV insulation power factor test set designed for condition assessment of electrical insulation in high voltage apparatus such as transformers, bushings, circuit breakers, cables, lightning arresters and rotating machinery. In addition to performing insulation power factor tests, the DELTA3000 can be used for measuring the excitation current of transformer windings.

The DELTA3000 allows for direct data feed into PowerDB for automatically generating test reports such as table of contents, data sheets, deficiency and comments reports. All data can be saved in an XML file with all historical data. This allows the user to view the previous year's test sheet or to trend specific test points. If a user also has a full license of PowerDB, test sheets can be modified and downloaded to the instrument to customize the instrument's personality and procedures in order to meet customer needs.

The unit's intuitive and easy-to-use interface allows the user to configure test sheets and pop-up test procedures. A QWERTY keyboard makes it simple for entering all nameplate and location information. USB drive support is also included in the unit with two exposed USB ports.

The test set is designed to provide a comprehensive AC insulation diagnostic test. Measurements are performed automatically by the DELTA3000, and results are displayed on a large 8.4" full VGA bright color display. Measured

quantities include voltage, current, power (loss), power factor and capacitance. The operator has the option of correcting the current and loss readings to their 2.5 kV or 10 kV equivalents. Information can be downloaded directly to a PC or USB flash device, allowing the user to store up to 100,000 data sets. Printing is done via a second USB port directly to a USB thermal paper printer (included) allowing the user to print full-size test forms in either 8.5" x 11" or A4 size, without the use of an external laptop.



DELTA3000 shown testing a pad mount transformer

Two optional high-voltage reference capacitors are available to allow the user to perform a quick field check to ensure the DELTA3000 has maintained its calibration. In addition, an optional 10 nF TTR capacitor is available to allow the user to perform high-voltage Transformer Turns Ratio measurements with the DELTA3000.

The built-in tracking automatic interference suppression circuit ensures accurate and reliable test results under severe electrostatic and electromagnetic interference conditions. This feature allows the performance of test measurements in energized switchyards of up to 765 kV.

The Priority Access program provides specific support to assure full utilization of the Megger DELTA3000. The purchase of the program entitles the user to 24/7 support services at an economical cost, with the first year provided at no charge. (Applies to US market only.)

FEATURES AND BENEFITS

- Fully automatic operation (stand-alone or remote-control) with user interface via on-screen customizable test forms.
- Integrated PowerDB ONBOARD allows for data analysis and trending while in the field without the use of an external computer.
- Built-in USB port and included USB printer allows for 8.5"x 11" or A4 test forms printing without the use of a laptop.
- Built-in capability for storing test results, in an open XML format, to either internal memory or to an external USB storage device.
- Large 8.4" full VGA bright color display.
- Performs all standard ungrounded-specimen tests (UST) and grounded-specimen tests (GST), with or without a guard circuit.
- Built-in self diagnostic and calibration check.
- Optional module to perform LV three-phase transformer turns ratio testing and excitation current up to 500 mA in accordance with Megger TTR330 product specifications.
- Utilizing the automatic suppression circuitry achieves high accuracy measurement under severe electrostatic and electromagnetic interference conditions.
- Two-piece design reduces size and weight of the system and provides easier transportation.
- The operator has the option of measuring either the power factor or dissipation factor ($\tan \delta$).
- Open-ground detector ensures proper grounding before test.
- Interlock switches provide operator safety.
- High accuracy SF6 gas-filled capacitor as internal reference.
- Built-in interface to the optional Resonating Inductor (Cat. No. 670600) to extend the capacitance measuring range to 1.1 μ F at 10 kV.
- Optional HV TTR capacitor (10 nF) in addition to two HV reference capacitors (100 pF and 1000 pF) with a 2% dissipation factor.
- Optional USB bar code scanner to record and alphanumeric test identification in the field.
- Optional Priority Access package with exclusive services (US market only).
- Optional Oil Test Cell for testing insulating fluids up to 10 kV.
- Optional Calibration Standard verifies proper operation and accuracy of the test results.



Close-up of DELTA3000 panel



The DELTA3000, available in either 120 or 240 V ac/50 or 60 Hz, includes the Control Unit (top) and High Voltage Unit (bottom)

SPECIFICATIONS**Input**

120/230 V $\pm 10\%$, 1 ϕ , 50/60 Hz, 1440 VA

Output

0 to 12 kV, continuously adjustable, 200 mA continuous;
310 mA maximum for up to 5 minutes.

The power supply capacity can be expanded to 4 Amps
using the optional Resonating Inductor, catalog number 670600.

Accuracy**Voltage**

(RMS) $\pm(1\%$ of reading + 1 digit)

Current

(RMS) $\pm(1\%$ of reading + 1 digit)

Capacitance

$\pm(0.5\%$ of reading + 2 pF) in UST mode

$\pm(0.5\%$ of reading + 6 pF) in GST mode

Power Factor

$\pm 2\%$ of reading + 0.05% (up to 90%)

Dissipation Factor

$\pm 2\%$ of reading + 0.05% (up to 200%)

Watt Loss

$\pm(2\%$ of reading + 1mW)

Measuring Ranges**Voltage**

250 V to 12 kV, 10 V resolution. Minimum recommended voltage
is 500 V.

Current

0 to 5 Amps, 1 μ A maximum resolution. The measurement can be
corrected to either 2.5 kV or 10 kV equivalents.

Capacitance

1 pF to 1.1 μ F, 0.01 pF maximum resolution on low ranges.

Power Factor

0 to 100%, 0.01% maximum resolution.

Dissipation Factor

0 to 1000%, 0.01% maximum resolution.

Watt Loss

0 to 2 kW, actual power, 0 to 100 kW when corrected to 10 kV
equivalent. 0.1 mW maximum resolution. The measurement can be
corrected to either 2.5 kV or 10 kV equivalents.

Measurement

The following seven test modes are available, using the blue and
red measuring leads, and can be selected by the operator:

UST: Ground Red, Measure Blue

UST: Ground Blue, Measure Red

UST: No Ground, Measure to both Red and Blue

GST: No Guard

GST: Guard Blue, Ground Red

GST: Guard Red, Ground Blue

GST: Guard Red, and Blue, No Grounding

UST: Ungrounded Specimen Testing

GST: Grounded Specimen Testing

Printer Interface

USB

Computer Interface

Ethernet

User Interface

8.4 in., full-color VGA, test forms on-screen view, full QWERTY
keypad and navigational pushbuttons

Data Storage

Internal: up to 100,000 data sets

External: USB flash device, up to 100,000 data sets

Communication/Control Software

PowerDB and PowerDB ONBOARD

Test Frequency

Same as line frequency

Interference Suppression

Available Suppression Methods

1. Operator selectable automatic forward/reverse measurement
averaging.
2. Operator selectable automatic tracking interference cancellation.

Safety Qualifications

The test set meets the requirements of both the IEC-1010 and the
CE mark specifications. The test set also meets the shock and vibra-
tion requirements of the ASTM D999.75 standard.

Environment**Temperature**

Operating: 32 to 122° F (0 to 50° C),

Storage: -58 to +140° F (-50 to +60° C)

Relative Humidity

Operating: 0 to 90% non-condensing

Storage: 0 to 95% non-condensing

Dimensions**Control Unit**

16 H x 22 W x 16 D in.

(406 H x 559 W x 406 D mm)

High Voltage Unit

16 H x 22 W x 16 D in.

(406 H x 559 W x 406 D mm)

Weight

Control Unit: 74 lb (33kg)

High Voltage unit: 63 lb (29 kg)

Cables: 35 lb (16 kg)

OPTIONAL ACCESSORIES



Optional capacitor kit includes carry case, TTR capacitor (left), and 2 reference capacitors (center). Also shown are 2 connectors (right) that will work with the capacitors and are supplied with the DELTA3000 unit



The optional Resonating Inductor expands the capacitance range of the DELTA3000



The optional accessory kit, C/N 670501 includes mini bushing tap connectors, hot collar straps, temperature/humidity meter, .75" bushing tap connector, 1" bushing tap connector, "J" probe bushing tap connector, 3-ft non-insulating shorting leads, 6-ft non-insulating shorting leads



The optional Oil Test Cell, C/N 670511, is used for testing insulating fluids up to 10 kV



The optional Calibration Standard traceable to the NIST for quick operating or calibration checks of test set bridges calibrated in watts loss or in dissipation factor



Optional TTR300D module, for LV three-phase TTR testing, installed inside DELTA HV cabinet. (Lid not shown for clarity.) PowerDB ONBOARD controls the TTR300D module, providing all the benefits as referenced in the Megger TTR330 product specifications.

PowerDB™ Acceptance & Maintenance Test Data Management Software

The DELTA3000 come complete, at no extra charge, with PowerDB (a new powerful PC Windows® based software program). PowerDB allows the operator to completely program a test routine, in advance, for a transformer, save it under the transformer ID number, and then recall it in the future as required.

Testing on the DELTA3000 can be performed in a remote control manner, via PowerDB. Once testing is complete, results are easily downloaded to the external PC in an “open” XML data format. The unit’s internal memory also maintains historical data-files so that, through interface to PowerDB, current and past results can be archived, compared, analyzed, displayed in trend charts, and compiled into Test Reports.

Control of the DELTA3000 in this remote-control manner offers the following benefits:

- Easy to use interface between operator and instrument.
- Suspect data points are flagged visually using a RED highlight.
- Easily recall transformer setups from a custom settings menu.
- Quickly download results to the PC for completing a transformer test report.

With PowerDB’s extensive database capabilities, multiple data files (from multiple instruments) can automatically be fed to PowerDB in order to generate comprehensive asset analysis in the form of Reports containing table of contents, test data sheets, commentary, and deficiency summaries.

Electrical utilities who have invested in sophisticated Computerized Maintenance Management Systems (CMMS) can easily link with the PowerDB software because it works with a number of systems.

For testing companies using PowerDB, customer/contract information is quickly sorted and searched. Opening a specific record shows detailed information such as type of service, order date, sales contact, and invoice information. Job information can be transferred between field-use databases and a master database. Job/Device Productivity Reports aid in bidding future jobs as well as personnel evaluation.

The package also provides a number of other optional add-ons that are described in the PowerDB data sheet available on the Megger website www.megger.com.

PowerDB™ ONBOARD Acceptance & Maintenance Test Data Management Software

The “PowerDB ONBOARD” logo means PowerDB software is running on a computer embedded within the DELTA3000. This powerful feature provides the DELTA3000 with a common “User Interface” to minimize operator training and provides a seamless interface to the full PowerDB (PC version) application.

Easy-to-read on-screen test forms provide the user interface for instrument set-up and test operation. Results are displayed against pass/fail nameplate limits and can be stored (either internally or to a USB storage device) in an open XML data format.

The ONBOARD software also maintains a historical data file so that, while in the field, current and past results can be analyzed, compared, and displayed in trend charts without the need of an external computer. An 8.5” x 11” or A4 test form can also be printed in the field via an optional USB printer, and without the use of an external computer.

The screenshot displays the Megger DELTA3000 software interface for 'INSULATION TESTS TWO-WINDING TRANSFORMERS'. The form includes the following sections:

- Customer Information:** ABC Service Center, 1 of 7.
- Address:** Bryan Middle School 330 East Grand River Avenue, Dallas TX 77845.
- Date:** 4/20/2004.
- Temperature:** 75, **Humidity:** 55.
- Substation:** MAIN BUILDING, **Position:** TR #32.
- Test Results Table:** A table with columns for Test Type, Test Value, and Pass/Fail status. The table is divided into sections for 'TEST RESULTS' and 'TEST RESULTS - COMMENTS'.

Data entry and automated control of Megger DELTA3000

ORDERING INFORMATION

Item [Qty]	Cat. No.	Item [Qty]	Cat. No.
DELTA3000, 10 kV Automated Insulation Power Factor Test Set with "PowerDB ONBOARD"		Optional Accessories	
120 Vac, 60 Hz	673001	PowerDB software, full version, 1st machine license, soft key	DB1001
120 Vac, 50 Hz	673001-44	PowerDB software, 1st machine license, USB dongle	DB1001S
240 Vac, 60 Hz	673001-45	HV TTR capacitor (10 nF, 10 kV)	36610
240 Vac, 50 Hz	673001-47	HV reference capacitor (100 pF, 10 kV)	36610-1
Included Accessories		HV reference capacitor (1000 pF, 10 kV)	36610-2
USB portable thermal printer (120 V)	36493-1	**LV three-phase TTR field upgrade kit (for upgrading DELTA3000 to DELTA3100)	TTR300D
Line cord-Euro for thermal printer (240 V)	17032-18	Carry case for capacitors	36610-CC
*PowerDB software, full version		Capacitor kit (HV TTR cap, 2 ref caps, carry case)	36610-KIT
High voltage lead: 70 ft (21.4 m), double shielded, interchangeable hook or clip termination	30012-5	Resonating inductor	670600
HV return leads: 70 ft (21.4 m), shielded		Calibration standard	670500-1
Color-coded Red	25572-1	Oil test cell	670511
Color-coded Blue	25572-2	Hot collar belts [3]	670505
Ground lead: 15 ft (4.6 m)	4702-7	Bushing tap connectors [2]	670506
120 volt Power cord: [1] 8 ft (2.5 m)	17032-4	Transit cases for calibration standard (heavy-duty, foam-padded)	670635
240 volt Power cord: [1] 8 ft (2.5 m)	17032-2	Bar code scanner	36528
Safety hand switch, Interlock #1: 70 ft (21.4 m)	34460-021	High voltage lead, 25 ft (7.6 m)	30012-8
Safety hand switch, Interlock #2: 8 ft (2.5 m)	34460-020	Thermal paper (8.5" x 11") for printer	36809-1
Interconnect cables: for connecting the control unit and auxiliary module, [2] 5 ft (1.5 m)	27978, 27979	Thermal paper (A4) for printer	36809-2
Foam transit case: two, foam padded, heavy-duty cases for control and high voltage unit	35582	Replacement/spare battery pack for printer	37077
Instruction and application manual	AVTM673001	Accessory kit: mini bushing tap connectors [2], hot collar straps [3], temperature/humidity meter [1], .75" bushing tap connector [1], 1" bushing tap connector [1], "J" probe bushing tap connector [1], 3-ft non-insulating shorting lead [3], 6-ft non-insulating shorting lead [3]	670501
		Priority Access package (US market only)	D3K-P-ACCESS

*PowerDB software is included for a limited time only.

**C/N TTR300D converts a DELTA3000 to a DELTA3100 and includes all LV 3-phase TTR included accessories as listed in the Ordering Information on DELTA3100 data sheet.