

DELTA2000

10 kV Automated Insulation Power Factor Test Set



- **Designed to work in high interference switchyards of up to 765 kV**
- **Built-in capability for storing, printing and downloading test results**
- **Rugged, portable design for field/shop shop use with automated control via the PowerDB™ software package**
- **Optional module for LV 3-phase TTR testing and excitation current up to 500 mA (via PowerDB)**
- **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 services/support (US market only)**

DESCRIPTION

The DELTA2000 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.

This set has been designed to provide a comprehensive AC insulation diagnostic test. Measurements are performed automatically by the DELTA2000, and results are displayed on a large graphical LCD. 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.

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 operator has the option of storing the test results on the provided data key, or download directly to a PC or the included thermal printer. A small printer mounting can be installed inside the unit's lid in lieu of the standard printer that is included. The data key has storage capacity for 127 sets of test results. Information stored on the data key can be easily retrieved on a PC using the provided software program and interface box.

In addition to performing insulation power factor tests, the DELTA2000 can be used for measuring the excitation current of transformer windings.

The Priority Access program provides specific guaranteed support to assure full utilization of the Megger DELTA2000. The purchase of the program entitles the user free services for one year from receipt of the unit.

FEATURES AND BENEFITS

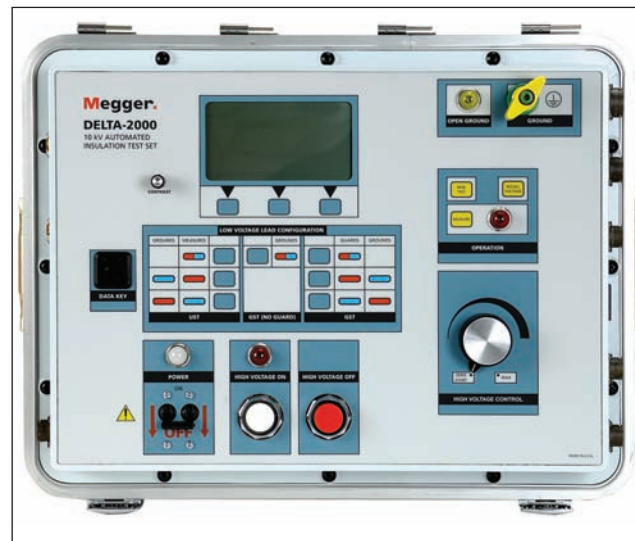
- Fully automatic operation eliminates operator error and reduces testing time.
- Simplified operation procedure eliminates the need for extensive software or hardware setups.
- Performs all standard ungrounded-specimen tests (UST) and grounded-specimen tests (GST), with or without a guard circuit.
- 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.
- Built-in self diagnostic and calibration check.
- The operator has the option of measuring either the power factor or dissipation factor ($\tan \delta$).

10 kV Automated Insulation Power Factor Test Set

- 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.
- Data key stores 127 sets of test results for retrieval and analysis. Stored results can be easily transferred to a PC using the provided interface box.
- Optional printer mounting inside unit's lid instead of standard thermal printer.
- Optional HV TTR capacitor (10 nF) in addition to two HV reference capacitors (100 pF and 1000 pF) with a 2% dissipation factor.
- Optional module to perform LV three-phase transformer turns ratio testing and excitation current up to 500 mA in accordance with Megger TTR300 product specifications (via PowerDB software).
- RS-232 serial interface for downloading the test results to a PC.
- Includes a battery/line operated printer for a hard copy of the test results which are date and time stamped.
- Optional bar code wand and PC software for recording an 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.
- Interfaces with a PowerDB software package that performs extensive information processing, data trending and report generation.



The DELTA2000, available in either 120 or 240 V ac/50 or 60 Hz, includes the Control Unit (top) and High Voltage Unit (bottom)



Close-up of DELTA2000 panel

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

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
vibration 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)



Data Keys with PC interface box and standard thermal printer

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 DELTA2000 unit



The optional Resonating Inductor expands the capacitance range of the DELTA2000



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 shunting leads, 6-ft non-insulating shunting leads



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



Optional TTR300D module, for LV three-phase TTR testing, installed inside DELTA HV cabinet. (Lid not shown for clarity.) Via PowerDB software, TTR testing is in accordance with Megger TTR300 product specifications. External laptop is easily placed on top surface of module for added convenience.

OPTIONAL ACCESSORIES (Continued)



Optional bar code wand for recording an alphanumeric test identification



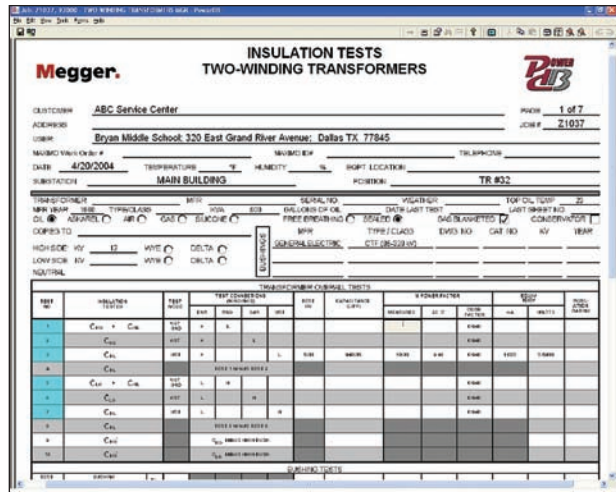
The optional Calibration Standard traceable to the NIST for quick operating or calibration checks of test set bridges calibrated in watts loss or in dissipation factor

PowerDB™ Acceptance & Maintenance Test Data Management Software

The DELTA2000 is controlled and automated by the PowerDB management system, a powerful software package providing data management for acceptance and maintenance testing jobs. 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.

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.

The package also provides test documentation and trending, report generation and a number of other optional add-ons that are described in the Megger PowerDB data sheet available on our website www.megger.com.



Data entry and automated control of Megger DELTA2000

ORDERING INFORMATION

Item [Qty]	Cat. No.	Item [Qty]	Cat. No.
DELTA2000, 10 kV Automated Insulation Test Set			
120 Vac, 60 Hz	672001	Optional Accessories	
120 Vac, 50 Hz	672001-44	PowerDB software, 1st machine license, soft key	DB1001
240 Vac, 60 Hz	672001-45	PowerDB software, 1st machine license, USB dongle	DB1001S
240 Vac, 50 Hz	672001-47	Printer mounted in lid (in lieu of std. printer)	Add -39
Included Accessories		HV TTR capacitor (10 nF, 10 kV)	36610
High voltage lead: 70 ft (21.4 m), double shielded, interchangeable hook or clip termination	30012-5	HV reference capacitor (100 pF, 10 kV)	36610-1
Low voltage leads: 70 ft (21.4 m), shielded		HV reference capacitor (1000 pF, 10 kV)	36610-2
Color-coded Red	25572-1	**LV three-phase TTR field upgrade kit (for upgrading DELTA2000 to DELTA2100)	TTR300D
Color-coded Blue	25572-2	Carry case for capacitors	36610-CC
Ground lead: 15 ft (4.6 m)	4702-7	Capacitor kit (HV TTR cap, 2 ref caps, carry case)	36610-KIT
120 volt Power cord: [1] 8 ft (2.5 m)	17032-4	Resonating inductor	670600
240 volt Power cord: [1] 8 ft (2.5 m)	17032-2	Calibration standard	670500-1
Safety hand switch, Interlock #1: 70 ft (21.4 m)	34460-021	Oil test cell	670511
Safety hand switch, Interlock #2: 8 ft (2.5 m)	34460-020	Hot collar belts [3]	670505
Interconnect cables: For connecting the control and high voltage units, two 5 ft (1.5 m)	27978, 27979	Bushing tap connectors [2]	670506
Foam transit case: two, foam padded, heavy-duty cases for control and high voltage unit	35582	Transit cases for calibration standard (heavy-duty, foam-padded)	670635
Programmed battery/line power serial thermal printer	33842	Bar code wand and software	34705
AC 120 V adapter	33841-2	High voltage lead, 25 ft (7.6 m)	30012-8
AC 230 V adapter	33841-3	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
Data keys [2]	30603	Priority Access package (US market only)	D2K-P-ACCESS
Data key interface box, 120 volt	30606	**C/N TTR300D converts a DELTA2000 to a DELTA2100 and includes all LV 3-phase TTR included accessories as listed in the Ordering Information on DELTA2100 data sheet.	
Data key interface box, 240 volt	30606-1		
Data key download software	35227		
PowerDB LITE software			
RS-232 cable	34675-1		
Instruction and application manual	AVTM672001A		

UK
 Archcliffe Road, Dover
 CT17 9EN England
 T +44 (0) 1 304 502101
 F +44 (0) 1 304 207342
 UKsales@megger.com

UNITED STATES
 4271 Bronze Way
 Dallas, TX 75237-1019 USA
 T 1 800 723 2861 (USA only)
 T +1 214 333 3201
 F +1 214 331 7399
 USsales@megger.com

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