

# DELTA-2000

## 10 kV Automated Insulation Power Factor Test Set



- **Extremely easy to use, without any extensive hardware or software setup**
- **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 use with automated control via the PowerDB™ software package**
- **Optional HV reference capacitors (100 pF, 1000 pF) with 2% dissipation factor, and a 10 nF TTR capacitor**
- **Optional Priority Access package offering exclusive services/support**

### DESCRIPTION

The DELTA-2000 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 DELTA-2000, 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. An optional 10 nF TTR capacitor in addition to two HV reference capacitors are also available.

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 DELTA-2000 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 DELTA-2000. 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 ( $\tan \delta$ ).
- Open-ground detector ensures proper grounding before test.
- Interlock switches provide operator safety.
- Built-in interface to the optional Resonating Inductor (Cat. No. 670600) to extend the capacitance measuring range to 1 $\mu$ 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 TTR capacitor (10 nF) in addition to two HV reference capacitors (100 pF and 1000 pF) with a 2% dissipation factor.
- 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.
- 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.

**SPECIFICATIONS**

**Input**

120 V ±10%, 1ϕ, 60 Hz, 1440 VA

**Output**

0 to 12 kV, continuously adjustable, 100 mA continuous, maximum 200 mA (15 minutes on, 15 minutes off, maximum 8 tests). The power supply capacity can be expanded to 4 Amps using the optional Resonating Inductor, catalog number 670600.

**Accuracy**

**Voltage**

(RMS) ±(1% of reading + 1 digit)

**Current**

(RMS) ±(1% of reading + 1 digit)

**Capacitance**

±(0.5% of reading + 2 pF) in UST mode  
 ±(0.5% of reading + 6 pF) in GST mode

**Measuring Ranges**

**Voltage**

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

**Current**

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

**Capacitance**

1 pF to 1.1 µF, 0.01 pF maximum resolution.

**Power Factor**

0 to 90%, 0.01% max. 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.

**Power Factor**

±(2% of reading + 0.05%)

**Watt-loss**

±(2% of reading + 1mW)

**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**

15 H x 22 W x 16 D in.  
 (381 H x 559 W x 406 D mm)

**High Voltage Unit**

15 H x 22 W x 16 D in.  
 (381 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

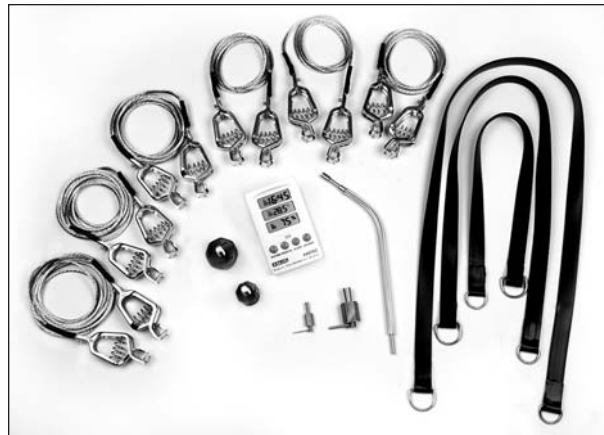
**OPTIONAL ACCESSORIES**



The optional Resonating Inductor expands the capacitance range of the DELTA-2000



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 DELTA-2000 unit.



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 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 printer mounted in lid

The optional Oil Test Cell is used for testing insulating fluids up to 10 kV



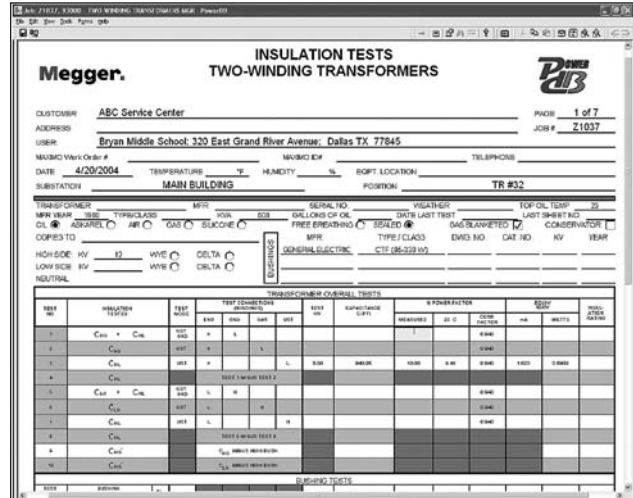
Optional bar code wand for recording an alphanumeric test identification

**PowerDB™ Acceptance & Maintenance Test Data Management Software**

The DELTA-2000 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](http://www.megger.com).



ORDERING INFORMATION			
Item [Qty]	Cat. No.	Item [Qty]	Cat. No.
DELTA-2000, 10 kV Automated Insulation Test Set		<b>Optional Accessories</b>	
120 Vac, 60 Hz	672001	Printer mounted in lid (in lieu of std. printer)	Add -39
120 Vac, 50 Hz	672001-44	HV TTR capacitor (10 nF, 10 kV)	36610
240 Vac, 60 Hz	672001-45	HV reference capacitor (100 pF, 10 kV)	36610-1
240 Vac, 50 Hz	672001-47	HV reference capacitor (1000 pF, 10 kV)	36610-2
<b>Included Accessories</b>		Carry case for capacitors	36610-CC
High voltage lead: 70 ft (21.4 m), double shielded, interchangeable hook or clip termination	30012-5	Capacitor kit (TTR cap, 2 ref caps, carry case)	36610-KIT
Low voltage leads: 70 ft (21.4 m), shielded		Resonating inductor	670600
Color-coded Red	25572-1	Calibration standard	670500-1
Color-coded Blue	25572-2	Oil test cell	670511
Ground lead: 15 ft (4.6 m)	4702-7	Hot collar belts [3]	670505
120 volt Power cord: [1] 8 ft (2.5 m)	17032-4	Bushing tap connectors [2]	670506
240 volt Power cord: [1] 8 ft (2.5 m)	17032-2	Transit cases for cables (heavy-duty, foam-padded)	218744
Safety hand switch, Interlock #1: 70 ft (21.4 m)	34460-021	Transit cases for calibration standard (heavy-duty, foam-padded)	670635
Safety hand switch, Interlock #2: 8 ft (2.5 m)	34460-020	Bar code wand and software	34705
Interconnect cables: For connecting the control and high voltage units, two 5 ft (1.5 m)	27978, 27979	RS-232 cable	34675-1
Foam transit case: two, foam padded, heavy-duty cases for control and high voltage unit	35582	High voltage lead, 25 ft (7.6 m)	30012-8
Programmed battery/line power serial thermal printer	33842	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
AC 120 V adapter	33841-2	Priority Access package	D2K-P-ACCESS
AC 230 V adapter	33841-3		
Data keys [2]	30603		
Data key interface box, 120 volt	30606		
Data key interface box, 240 volt	30606-1		
Data key download software	35227		
Instruction and application manual	AVTM672001A		