70-, 120- and 160-kV DC V2 Models
High Voltage DC Dielectric Test Sets

Megger

Model 220070V2 shown

- **Lightweight air-insulated high-voltage DC test set**
- **Maximum safety for operator according to IEC61010**
- **Clear control panel layout**
- **Intuitive and easy-to-follow test sequence**
- **Quick sheet with set-up and operating instructions in instrument lid**
- **Digital voltage and current metering**
- **Robust mechanical enclosure design for control unit and HV module**

DESCRIPTION

The High Voltage DC Dielectric Test Sets (70-, 120- and 160-kV) are dependable, portable dc high-voltage sources for checking the insulation quality of laminated electrical AC power cables and all types of DC power cables, motors, switchgear, insulators, transformers and capacitors. Each portable set is comprised of two separate modules:

Control Module

This module allows the operator to switch-select the appropriate current output range, adjust the output level and monitor both the applied voltage and leakage current at a safe distance from the high voltage being delivered to the load under test. No voltage higher than ac line power is present in the control module.

High-Voltage Module

The air-insulated high voltage power source delivers a dc high voltage to the test object. It receives its instruction from the control module.
Although a different control module is used with each of the three models, they are all the same size and weight. Each high-voltage module is a different size and weight to accommodate the rated output voltage.

APPLICATIONS

The dc dielectric test sets are used to make proof tests and insulation tests on electrical power cables, motors, switchgear, insulators, transformers and capacitors. Both types of tests are performed by applying controlled high voltages to the unit under test at or above insulation system operating level. Measuring the leakage current helps determine the unit under test's ability to withstand overvoltages such as lightning strikes and switching surges.

The three models described cover a range of output voltages that meet the most commonly specified ratings in 5-kV to 69-kV class cables. All models are suitable for testing power cables, switchgear and rotating machinery in accordance with IEEE, IPCEA, NEMA and ANSI guidelines.

Proof Test

Proof testing is used as an acceptance test of newly installed laminated AC and all types of DC power cables and for maintenance testing of service aged or repaired cables. The result of a proof test is that either the test object withstands the proof voltage level or it fails / breaks down. A proof test is a go/no-go test, unless the leakage current is monitored during the test as a trend indicator.

Insulation Resistance Test

To make appropriate tests on healthy insulation, the test instrument must have microampere sensitivity. Insulation resistance can be measured in at least three different ways:

The insulation resistance test is often referred to as a "spot check," and is performed by applying a predetermined voltage to the unit under test, holding it until the apparent leakage current becomes stable and recording the readings with adjustments for temperature. This test is especially applicable to low-capacitance units under test.

Time-varying tests such as the polarization index test (PI test) are independent of temperature effects and save time. To perform this test, a predetermined test voltage is applied to the unit under test and readings are taken at 1 minute and 10 minutes. The resulting ratio is analyzed to determine insulation quality. This type of test is especially appropriate for high-capacitance samples.

The step-voltage test is independent of temperature effects and saves time. To perform this test, the output voltage is increased in even steps at regular intervals over a fixed

period of time. As long as the resistance of the unit under test increases with time, it has high-quality insulation. This type of test is only useful for high-capacitance samples.

FEATURES AND BENEFITS

Filtered Half-Wave Rectification Operates Like a Full-Wave Rectified Unit

- Provides the advanced performance equal to a full-wave rectification
- Simple circuit layout assures long-term reliability

Lightweight High-Voltage Module

- Air-insulated design, one of the lightest weight HV module in its voltage and power class
- True portability allows single operator to transport and handle the unit in the field

Internal Guard Circuit/Guard Connection on High-Voltage Output Cable

- Eliminates stray surface leakage currents influencing the measurement
- Eliminates the need to hook up extra lead at the guard connection
- Ensures highly accurate measurements

Continuously Variable Test Voltage

- Test voltage can be adjusted freely between zero and the full voltage of the particular model

Fast Charging of High-Capacitance Samples

- Reduces test time

Negative Polarity Output to Ground

- Follows industry standard

Standard Safety Features

- Bipolar ammeter that displays the magnitude of the discharge current from the object under test
- Input-supply-line circuit breaker
- Output current overload relay
- Zero-start interlock for high-voltage output
- Pushbutton controls and indicating lights for high-voltage ON/OFF
- Circuit-breaker protection against internal damage by overloads, surges or test sample breakdown
- Interface for external permissive and safety interlocks

Model Capabilities/Applications

*Following are the specific acceptance and maintenance testing capabilities of each of the DC dielectric test sets regarding **laminated MV AC power cables** and **shielded DC HV power cables** per **IEEE Standards 400.1, 2007** and **400.5 Draft 13.***

70-kV DC Dielectric Test Set

- Acceptance testing of **AC** 15 kV class cable
- Maintenance testing of **AC** 28 kV class cable
- Acceptance testing of **DC** HV cables up to max 48 kV operating voltage
- Maintenance testing of **DC** HV cables between 48 kV and 70 kV operating voltage

120-kV DC Dielectric Test Set

- Acceptance testing on **AC** 35 kV class cable
- Maintenance testing on **AC** 46 kV class cable
- Acceptance testing of **DC** HV cables up to max 82 kV operating voltage
- Maintenance testing of **DC** HV cables between 82 kV and 120 kV operating voltage

160-kV DC Dielectric Test Set

- Acceptance testing on **AC** 63 kV class cable
- Maintenance testing on **AC** 110 kV class cable
- Acceptance testing of **DC** HV cables up to max 110 kV operating voltage
- Maintenance testing of **DC** HV cables between 110 kV and 160 kV operating voltage

SPECIFICATIONS

Input Power

Nominal 120 Vac, 50/60 Hz or
Nominal 230 Vac, 50/60 Hz operation

Ammeter

Ranges: 0 to 19.9 µA
0 to 199 µA
0 to 1.99 mA
0 to 5 mA
Resolution: 0.1 µA on lowest range
Accuracy: ±2% of reading + 1 digit

Voltmeter

Resolution: 100 V over entire range
Accuracy: ±(2% of reading + 100 V)

Ripple

Less than 2% on capacitive samples at continuous rated output

Temperature Range
Operating: -20 to +130° F (-30 to +55° C)
Storage: -40 to +150° F (-40 to +65° C)

Relative Humidity Range
Operating: 0 to 90% noncondensing
Storage: 0 to 95% noncondensing

Dimensions
Control Unit (all models)
17 H x 16 W x 7.5 D in.
(434 H x 406 W x 191 D mm)
High Voltage Unit
70 kV: 20 H x 12 W x 12 D in.
(510 H x 305 W x 305 D mm)
120 kV: 29 H x 12 W x 12 D in.
(740 H x 305 W x 305 D mm)
160 kV: 39 H x 12 W x 12 D in.
(1000 H x 305 W x 305 D mm)

*Weight
Control Unit (all models)
23 lb (10.5 kg)
High-Voltage Unit
70 kV: 44 lb (20 kg)
120 kV: 65 lb (30 kg)
160 kV: 73 lb (33 kg)

*Add approximately 2 lb (1 kg) to the weight for 230 Vac **(-47) model** control units

Cables (including carrying bag)
70 kV Models: 7 lb (3 kg)
120 and 160 kV Models: 9 lb (4 kg)
External Instrument Connection
(1/4" phone plug): 0-5.5 mA output

Current Output Specifications

Model	*Test Voltage	Output Current (120 VAC input) (230 VAC input -47 models)	Cat. No.
70 kV	0 to 70 kV dc	5.0 mA for 30 mins; 3.5 mA continuous	220070V2 220070V2-47
120 kV	0 to 120 kV dc	5.0 mA for 20 mins; 2.5 mA continuous 5.0 mA for 5 mins; 2.0 mA continuous	220123V2 220123V2-47
160 kV	0 to 160 kV dc	5.0 mA for 20 mins; 2.0 mA continuous 5.0 mA for 20 mins; 1.5 mA continuous	220163V2 220163V2-47

*Negative polarity with respect to ground
When using external 240/120 volt step-down voltage transformers, the ratings may be used as given for 120 volt input.

OPTIONS AND ACCESSORIES

Special Cable Lengths

For a nominal charge, a custom-length, shielded, high-voltage output cable up to 50 ft (15 m) can be supplied. Specify length when ordering.

High-Voltage Discharge and Grounding Stick

Applying a suitably rated high-voltage resistance discharge stick following a test is required to ***safely*** finish the test procedure. This will accomplish a safe and controlled discharge of highly capacitive samples.

High-voltage Discharge and Grounding Stick, ratings 70/120/160 kV

High-Voltage Discharge and Grounding Stick Specifications

Voltage	Cat. No.	Resistance	Max. Safe Discharge Capacitance*	Length	Weight
70 kV	222070-62	90 MΩ	10 μF	51 in. (1.30 m)	2.0 lb (0.9 kg)
120 kV	222120-62	100 MΩ	2.75 μF	51 in. (1.30 m)	2.7 lb (1.2 kg)
160 kV	222160-62	120 MΩ	2.25 μF	71 in. (1.80 m)	3.3 lb (1.5 kg)

***25°C 15 minute cooling period required after discharge**

ORDERING INFORMATION

Item	Cat. No.
Dielectric Test Sets	
70 kV dc, digital, 120 VAC	220070V2
70 kV dc, digital, 230 VAC	220070V2-47
120 kV dc, digital, 120 VAC	220123V2
120 kV dc, digital, 230 VAC	220123V2-47
160 kV dc, digital, 120 VAC	220163V2
160 kV dc, digital, 230 VAC	220163V2-47
Included Accessories	
Input supply cord, three-wire, 8 ft (2.4 m)	17032
Ground cables, 15 ft (4.5 m) [2 each]	4702-5
Interconnection cable, 15 ft (4.5 m)	18320
Detachable HV output cable, for 70 kV test sets,15 ft (4.5 m)	18328
Detachable HV output cable, for 120 and 160 kV test sets, 15 ft (4.5 m)	29590
Kilovolt/megohm test record graph paper [100-sheet pad]	220000
Carrying bag for cables	18313

Item	Cat. No.
Optional Accessories	
Discharge sticks	
70 kV HV	222070-62
120 kV HV	222120-62
160 kV HV	222160-62
Special cable lengths, HV cable	add –56

SALES OFFICE
USA
2621 Van Buren Avenue
Norristown, PA 19403 USA
T 1 800 723 2861 (USA only)
T 1 610 676 8500
USsales@megger.com

70_120_160_DCTSV2_US_V01
www.megger.com
ISO 9001:2015

Megger®