Megger

DET3 Contractor Series
3-Terminal Earth/Ground Resistance Testers

- **2 and 3 point testing**
- **ART (Attached Rod Technique) testing capability**
- **User selectable test voltage (25/50 V)**
- **Choice of digital or analog display**
- **Warning indicators prevent test failure**
- **IP54 rated**
- **Complete with leads, stakes and rugged carry case**
- **Simple one button operation**

DESCRIPTION

Megger's already popular 3-terminal ground testing instrument family includes the following models:

Model	Description
DET3TD	For basic requirements it provides digital ground testing and bond testing capabilities
DET3TC	The revolutionary new model with the capability of testing on-site grounds without disconnecting the utility connection.

Using ART method with the DET3TC to test commercial ground without disconnecting the system

The DET3TC includes a current measuring function for ART (Attached Rod Technique) testing capabilities. With this added function, on-site grounds can be tested separately without having to remove the utility connection (as explained further in this document).

The complete kit of instrument, test leads, stakes, batteries and calibration certificate is delivered in a tough polypropylene carry case – everything you need to start testing in one package. Optional terminal adapters are available for acceptance of a variety of test leads.

All models are rated to IP54, making them truly outdoor instruments. They are designed to meet stringent safety standards and are rated CAT IV 100V. The ground testers have been designed to be easy to use – a large selector switch makes selection of 2 or 3 pole tests easy with gloved hands – and the design makes the fitting of shorting links to perform 2-pole tests a thing of the past. A large, clear, easy to read LCD and thumb-sized test button also make the instruments particularly well suited to the outdoor conditions of ground testing. In addition to this ease of use feature, the ground tester automatically checks the connection and conditions of the P spike, C spike, and also the level of ground noise, indicating the status on the display. The instruments also include a voltmeter to enable measurement of ground voltage. They can measure resistance from 0.01 ohms to 2 kΩ. Also, to allow accurate testing in noisy environments, the instruments are capable of rejecting noise up to 40V peak to peak.

The Megger ground testers are powered by eight AA batteries which are widely available and also give excellent testing time – the status of these batteries is given by a bar graph on the LCD, allowing the operator to decide when to change the batteries before they expire.

By using the optional ICLAMP with the DET3TC, the user can augment the traditional fall-of-potential measurement method with ART (Attached Rod Technique), which allows electrode testing without disconnection and also leakage current measurements down to 0.5 mA.

APPLICATIONS

Proper grounding provides many varied benefits to both people and facilities. It lessens the chance of injury due to faulty installation, reduces the likelihood of damage from lightning strikes and induced voltages, improves the performance of computer, communication and other sensitive equipment and protects against static electricity from friction. Over time, ground systems can degrade or become ineffective.

Corrosion and weather influences exert mechanical strain on ground rods and cause metallic corrosion. Catastrophic events like lightning strikes or large fault currents can cause instant degradation. In addition, facility expansion can create different ground system needs.

The risks from ground system deterioration include potentially deadly electrical shock situations, plant-wide equipment damage, disruption in the performance of sensitive equipment and heat build-up on a single piece of electrical equipment.

The maintenance of an adequate low resistance ground connection is essential to both the protection and performance of any electrical system. Ground testing should be performed both upon installation, to meet design specification, and periodically thereafter in order to maintain service. All models can also perform bonding tests (using an ac signal), to determine that adequate connection has been made from equipment to the grounding system. Furthermore, the addition of a built-in current clamp capability enables the testing of attached grounds (ART) without lifting the utility connection.

Selection is easy. For basic requirements, DET3TD affords ground testing and bond testing capabilities. Applications to systems that have been connected to the utility feed are simplified with model DET3TC, where a built-in clamp input permits individual components of an expanded system to be separately measured without extra calculations.

Grounding electrodes from simple to complex systems can be tested, including:

- Primary and secondary electrical grounding systems
- Utility pole grounds
- Lightning protection systems
- Residential grounds
- Machinery safety grounds
- Computer and communication system grounds
- EMI/RFI system grounds
- Antenna and pedestal grounds
- CATV system grounds

FEATURES AND BENEFITS

- Microprocessor control for improved error detection
- Clear, unambiguous warnings and error indications ensure the reliability of the reading and reduce test time
- Simple to use, one touch operation improves efficiency
- User selectable test voltage ensures that the units can be used in agricultural environments
- Rugged, weatherproof case to IP54 makes the units truly outdoor instruments
- Large, clear LCD that can be read in ambient lighting
- Noise rejection to 40 V pk to pk allows accurate testing in noisy environments
- Testing kits and certificates supplied — everything needed to start testing immediately
- Accuracy of 2% of reading enhances reliability of measurements
- Clamp model for **Attached Rod Technique** allows the testing of the rod without the need for disconnection.
- Voltmeter function included allows you to measure the ground voltage and enhances operator safety
- CAT IV 100V provides increased operator safety in outdoor environments

Model DET3TC shown performing the classic fall-of-potential test method.

SPECIFICATIONS

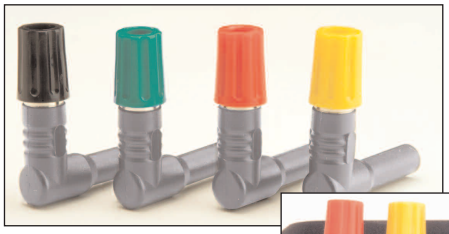
Resistance range: 0.01 to 2000 autoranging
Resistance accuracy:
2P measurements 2% ±3 digits
3P measurements 2% ±3 digits
ART measurements 5% ±3 digits

Maximum probe resistance
Rp limit: 100kΩ (50V output voltage)
Rc limit: 100kΩ (50V output voltage)
Limits reduced to 50kΩ for 25V output voltage
Limits reduced to 5kΩ for 0.01 Ω resolution
Earth voltage range: 0 – 100 V
Earth voltage accuracy: 2% ±2 V
2- and 3-wire test: Yes
ART (Attached Rod Technique): DET3TC
Ground current range (with current measuring clamp): 0.5 mA to 19.9 A
Ground current accuracy: 5% ±3 digits
Display: LCD
Test frequency: 128 Hz
Test voltage: 25 V or 50 V, user selectable (factory setting 50 V)
Test current: 450 micro-amps
Noise rejection: 40V pk to pk
Noise check: Automatic
C spike check: Automatic
P spike check: Automatic
Maximum current loop resistance: 100 k-ohms at 50V, 50 k-ohms at 25 V and 5 k-ohms for 0.01 ohm resolution for readings below 19 ohms
Maximum voltage probe resistance: 100 k-ohms at 50V, 50 k-ohms at 25 V and 5 k-ohms for 0.01 ohm resolution for readings below 19 ohms
Battery type: 8 1.5 V AA cells
Battery life: 3 hours, 700 consecutive tests
Safety: EN61010-1 CAT IV 100 V
Terminals: 4 mm plug type (test leads)
Ingress protection: IP54
EMC: Meets the requirements of EN61326-1:1998 for use in heavy industrial areas
Dimensions: 8 x 5.7 x 3.2 in. (203 x 148 x 78 mm)
Weight: 2.2 lb (1 kg)
Operating temperature range: -5° to +131° F (-15° to +55° C)
Storage temperature range: -40° to +158° F (-40° to +70° C)
Humidity: 95% RH non-condensing at 104° F (40° C)

Standards Compliance

Complies with the requirements of KEMA K85B.
Complies with the following parts of EN61557, "Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. - Equipment for testing, measuring or monitoring of protective measures".
Part 1 - General requirements
Part 5 - Resistance to earth

Each instrument comes complete with three leads, two test spikes, instruction manual CD, and a rugged carrying case, (current measuring clamp, shown, is an optional accessory for performing the ART testing capability using the DET3TC.)



Terminal Adapters are optional accessories used to allow the units' terminals to accept alternative cable connections.

ART (ATTACHED ROD TECHNIQUE) TESTING CAPABILITY

The **DET3TC** includes the additional testing capability that we have termed **ART**, for **Attached Rod Technique**. A nagging problem with traditional ground testing has been the requirement to "lift" (i.e., disconnect) the utility connection. Once the grounding conductor (the main conductor that connects the facility to the ground rod or grid) has been attached to the grounding electrode, the utility ground becomes a parallel resistance. The utility neutral is typically bonded to the ground bus at the service entrance and this connection, during a ground test, causes test current to flow back through the utility ground as well as through the test electrode. Test current divides according to Law of Parallel Resistance, but the tester makes its measurement based on total current flow. The reading is the combined parallel resistance of the on-site ground and the utility protection. This is a valid measurement, but not of the test electrode exclusively.

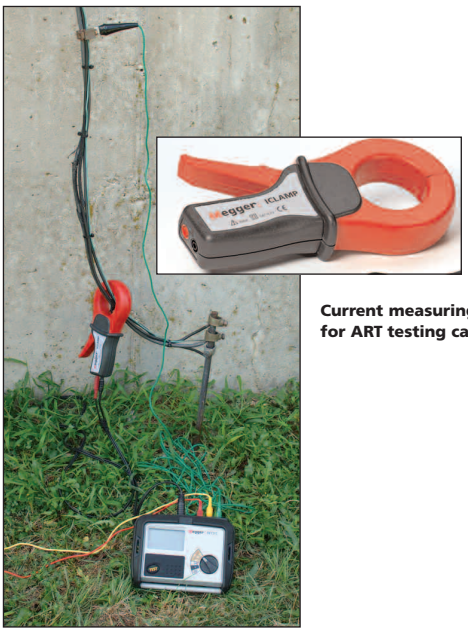
This poses a considerable problem in many common testing situations. If a commissioning test were required to determine if design specifications had been met for a new facility, such a reading would be insufficient. Lightning protection requiring a short, straight path into the earth, could also not be properly validated. But lifting the utility connection poses several problems, not the least of which is the breaking of what is often a welded bond, in addition to the temporary loss of protection.

Clamp-on ground testers, which measure ground resistance by clamping around the rod and inducing a test current onto it, are only a limited solution. They can accurately measure resistance of a single rod in a parallel system by inducing the test current onto the clamped rod and utilizing all the parallel grounds as the return. Collectively, these returns, typically the multiple grounds of the utility, contribute little to the loop measurement. This is essentially the reverse of the operation of a traditional tester, which uses the current probe as the return while current "goes to ground" through all parallels collectively. This technique solves the problem of separately measuring an attached rod, but leaves the problem that it cannot be proven.

A clamp-on measurement has to be accepted on faith and its reliability is based squarely on the knowledge and experience of the operator, leaving a large margin for "human error." In complex, multiply connected grids and other grounding schemes, return paths may exist that are entirely metallic, not including earth at all. The clamp-on test current will circulate through such paths and give a reading, essentially a continuity reading of the grid structure having nothing to do with soil resistance. Such readings will be low, and appear to the uninformed as acceptable grounds. The responsibility for making these determinations falls squarely on the operator. But even when properly addressed, there is no way of demonstrating the competence of the readings to a third party, such as a client. They must simply be accepted.

The **ART** testing capability combines the advantages of both of these technologies to produce a method that can reliably measure an attached ground, and prove it! A built-in clamp input, used in conjunction with the optional ICLAMP accessory, connected below the point of separation of the parallel test currents, measures only the current flowing through the test ground, not that going back through the utility. This current value is then used by the microprocessor to calculate ground resistance, strictly in accordance with **Fall of Potential** or its derivative procedures, supported by IEEE Standard 81 for proper ground testing, and subject to the appropriate proofs.

The **ART** method employs leads and probes just as does any traditional tester. Ground resistance can be profiled and graphed by moving the potential probe against the position of the current probe, and a Fall of Potential graph, Slope Method mathematical proof, or any of the other proven methods utilized to demonstrate the accuracy of the test. The only thing different from the operation of a familiar, traditional ground tester is that the clamp permits separation of the test currents in an attached or otherwise parallel-grounded system. This technique enables local grounds to be tested without lifting the utility connection, yet with the ease, reliability and confidence of a separate commissioning test.



Current measuring clamp (inset) for ART testing capability

OPTIONAL ACCESSORY KITS

Standard Kit,
Cat. No. 250579
Three color-coded test leads, 25, 50, 100 ft. (8, 15, 30 m); two 20-in. (51 cm) ground rods; canvas accessory case for leads and rods only

Deluxe Kit,
Cat. No. 250581
Set of three color-coded test leads, 25, 50, 100 ft. (8, 15, 30 m); two 20-in. (51 cm) ground rods; padded case to hold instrument, leads and rods

Standard Kit
Cat. No. EV6310-755
Hammer, 2.5 lb (1.13 kg); four galvanized steel spikes, 0.5 in. (12 mm); two spike extractors; four leads in carrying case

Professional Kit
Cat. No. 6320-245
Red, black, yellow, green cable reels (50 m); earth electrode leads (4 m green, 4 mm shrouded plug and large croc clip); 4 auger-style spikes; molded polyethylene carrying case; fiberglass measuring tape, 50 m

ORDERING INFORMATION

Item (Qty)	Cat. No.
Digital ground tester, ART capability	DET3TC
Digital ground tester	DET3TD
Included Accessories	
Hard carry case	EV5410-409
Replacement 3-wire lead set (15m red wire, 10m yellow wire, 4m green wire)	6220-805
Ground test stakes (x2) (200mm, 8mm dia)	6220-804

Item (Qty)	Cat. No.
Optional Accessories	
Current measuring clamp and connecting lead for ART testing method	ICLAMP
Calibration check box	6220-824
Right angled terminal adaptor set	6220-803
Standard accessory kit (leads, rods, canvas accessory case for leads & rods)	250579
Deluxe accessory kit (leads, rods, padded case)	250581
Standard accessory kit (hammer, spikes, leads)	EV6310-755
Professional ground testing kit (2 x 50m, 2 x 30m, 4 auger stakes, carry case)	6320-245
"Getting Down to Earth" a Megger guide to earth testing	AVTM25-TA
Replacement hard carry case	5410-429

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ISO STATEMENT
Registered to ISO 9001:2000 Reg no. Q 09250
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