MFT-X1
Multifunction tester

- True Loop™ test with patented Confidence Meter™
- CertSuite Installation compatible Bluetooth® result transfer
- Next generation 2-wire and 3-wire non-trip loop testing
- User upgradeable operating system
- High resolution 0.001Ω loop test
- Automatic volt-drop measurement
- Stabilised insulation test voltage
- Configurable RCD and EV auto-sequence tests
- Fast switch rechargeable plug-in battery pack
- Full colour TFT bonded display
- Re-designed lead set and carry case solution
- IP54 operational housing

DESCRIPTION

The MFT-X1 new electrical installation testing platform MFT-X1 is the first of a new generation of firmware upgradeable, full functionality multi-function testers for low voltage electrical installations.

Intended for use on all low voltage electrical installations including EV charge points and domestic photo-voltaic systems, the range of test capabilities allow for general commissioning of installations and periodic maintenance as well as detailed fault diagnostics.

FEATURES

True Loop™

True Loop™ impedance testing is now a standard feature on the MFT-X1. The latest 3-wire non-trip loop testing technology, incorporated with the patented Confidence Meter™, offers an unmatched, reliable, accurate, stable and repeatable loop test solution to the user, allowing testing in the most hostile high noise conditions or close to the source of supply.

Patented Confidence meter technology

All loop impedance ranges are now supported by the Megger patented Confidence meter technology, reducing typical test times for non-trip loop testing to around 7 seconds on quiet circuits, and providing optimised test times for loop impedance testing in difficult noisy supplies. The Confidence meter shows the progress of the loop measurement and indicates the presence of noise on the circuit, removing erroneous values to give a stable and consistent result.

MFT-X1 result downloading and CertSuite Installation

Test results can be tagged with circuit data and transferred to CertSuite Installation, the latest cloud base electrical certification software package from Megger.

When connected to a mobile device using the low energy Bluetooth® mode, results can be sent directly from the MFT-X1 to an Android or IOS device running Megger CertSuite software. These results are also synchronised with the cloud-based application.

With a wide range of certification options, CertSuite Installation is available as a monthly or yearly subscription package for electrical certification of installations taking results directly from the MFT whilst testing. CertSuite Installation is suitable for multiple concurrent users and is optimised for use with the MFT-X1.

Results can be stored and reviewed remotely by users whilst on site from different locations, accessed by head office or other users with the relevant permission, with professional looking certification and reports.

High resolution loop impedance testing

The MFT-X1 has extended the low end of the loop impedance range from 0.01 ohms to 0.001 ohms resolution and 50 kA current calculation. The True Loop impedance measurement using the patented confidence meter makes these low impedance measurements a realistic option, with two wire test connections and high current testing.

RCD custom testing

RCD testing can now be optimised with the RCD test configurator. Select a whole suite of tests or only those elements of the RCD you require. You can even add ramp testing to the sequence, optimising and simplifying testing.

EV Charge point testing

Suitable for both EV charger installation testing with either RCD Type B or RDC protected charge points. The MFT-X1 in conjunction with the Megger EVCA adaptor can test all known EV chargers for installation or maintenance.

Stabilised insulation test voltage

For the first time in any multifunction tester, the MFT-X1 incorporates a stabilised insulation test voltage, ensuring output voltage is accurate to within +/-2% +2 digits. This compares to the industry standard of +20% and so provides a more accurate test voltage without the risk of over-voltage damage to circuits or sensitive components.

Current measurement

The MFT-X1 uses current clamps for current measurement using the optional Megger MCC1010* current clamp for measurement of AC currents from 1 mA to 1000 A.

*Optional accessory

Customer upgradeable operating system

The operating system of the MFT-X1 range is upgradable by the user, simply by downloading the latest operating system file (.BIN) from the Megger web site to a suitable microSD card.

Insert the updated microSD card and pressing TEST initiates an automatic update process without the need for further user intervention.

Display and user interface

The user interface utilises the flexibility of the high contrast 480 x 272 colour, TFT bonded display, with a monochrome black on white mode designed specifically for use in difficult lighting conditions.

Enhancing the colour coded test selection rotary dial, range selection is now replicated on the instrument screen, ensuring easy use in poor lighting environments. Hot keys for second level functions are clearly shown across the top of each screen and the second control dial provides users with a further quick selection option of any highlighted feature, even if wearing protective gloves.

Relevant information is clearly shown on the display, both before and after each test, in full colour, and includes the Confidence Meter™ progress bar, RCD ramp test progress as well as the insulation and continuity measurement bar graph. The new Voltage Widget, displays the L-N, L-E and N-E voltages.

Li-ion or AA Alkaline battery solution

The Megger MFT-X1 is powered by the Megger Li-ion battery pack. The unique 4 Ahr rechargeable Li-ion battery provides the fastest and most flexible battery change solution in the industry. Alternatively an AA Alkaline adaptor is available as an optional accessory.

APPLICATIONS

The primary application is the testing of low voltage electrical installations in domestic, commercial, and industrial installations for single and three phase systems.

The wide range of test capabilities extend the use of the MFT-X1 to include:

- EV charge point testing
- Domestic PV testing
- Motor/Generator testing
- Machine testing
- Portable appliance safety testing
- Panel building and switchgear manufacturing
- Cable testing

Graphical assistance

The instrument has context help to provide graphical circuit connection guidance for each of the measurements.

Accessories

The MFT-X1 is shipped in a rugged, weather-proof carry case offering outstanding protection and flexible storage. Also included is a complete set of test leads to meet the wide range of connection challenges in modern electrical systems.

MFT-X1
Multifunction tester

FUNCTIONAL SUMMARY

Voltage measurement	
Voltage range	0.001 V to 2 V (mV range) 2 V to 600 V (V range), 1000 V DC (Non-CAT rated circuits)
Voltage type:	Trms, AC, DC
Phase sequence	Automatic phase sequence testing on detection of valid three phase supplies
Current measurement (non-contact)	
AC Trms	Using optional accessories: MCC1010 current clamp
Measurement Range	MCC1010: 1 mA to 300 A
Continuity/Resistance	
Measurement range Digital display	0.01 Ω to 999 kΩ Auto-ranging
Measurement Range Analogue arc	0 Ω to 1 MΩ log scale
Test voltage	4 V DC to 5 V DC
Test current (Nominal)	>200 mA 0 Ω >< 2 Ω 10 mA Auto reduction on high resistance (actual current reported in display)
Test polarities	Forward polarity
Buzzer resistance range	> 0.01 Ω < 2 kΩ
Buzzer threshold	0.3, 0.5, 1, 2, 3, 4, 5, 10, 20, 30, 40, 50, 100, 200 Ω
Insulation testing	
Measurement range Digital display	0.001 MΩ to 999 MΩ Auto-ranging
Measurement range Analogue arc	0.001 MΩ to >1000 MΩ log scale
Insulation test voltages	50 V DC to 1000 V DC + Variable 50 V to 999 V
Test current	1 mA to 2 mA
Stabilised output voltage	Output test voltage stabilised to -0% +2% +2 V
True Loop™ loop impedance testing	
2 Wire – all modes	
Test types	Mode 1: Non-Trip
	Mode 2: High current
	Mode 3: High resolution
Resolution	Non-Trip: 0.01 Ω
	High current: 0.01 Ω
	High resolution: 0.001 Ω
Voltage range	Non-trip: 48 V AC to 280 V AC
	High current: 48 V AC to 550V AC
	High resolution: 48 V AC to 550 V AC
Frequency range	45 Hz to 65 Hz (all modes)

MFT-X1
Multifunction tester

3 Phase testing	Non-trip: Single phase only
	High current: Three phase
	High resolution: Three phase
3 wire - non-trip	
Test types	RCD (non-trip) RCD EV (non-trip on 6mA EV RDCs)
Resolution	0.01 Ω
Voltage range	48 V AC to 280 V
Frequency range	45 Hz to 65 Hz
3 Phase testing	Single phase only
Volt drop	
Volt drop calculation	Requires Zref (Ze) and circuit current (I-vdrop)
Accuracy	Dependent on loop impedance accuracy
RCD testing	
RCD types supported	Type AC, A, B, AC(S), A(S), B(S)
Auto RCD sequence	1 / 2x IΔn, 1x IΔn, 2x IΔn, 5x IΔn, Ramp, 0° / 180° (customer configurable)
Ramp testing	10 mA to 1000 mA
RDC testing	6 mA RDC
Fault (Touch) voltage	0 V to 253 V
Earth testing	
2 wire	2 wire earth resistance test
3 wire	3 wire earth resistance
3 wire ART	3 wire testing with additional MCC1010 current clamp
Stakeless	Stakeless testing using the MCC1010 and MVC1010 clamps

MFT-X1
Multifunction tester

SPECIFICATIONS

Voltage measurement

Function	Range	Accuracy
Voltage DC	0 V – ±1000 V	±1% ± 3 digits
Voltage AC/TRMS	0 V – 600 V (15 – 500 Hz)	±2% ± 1 digits
Frequency	15 Hz – 99 Hz 100 Hz – 500 Hz	±0.5% ± 2 digit ±2.0% ± 2 digit

Millivolt measurement

Function	Range	Accuracy
mV AC/TRMS	0 mV to 1999 mV (50 / 60 Hz)	±1% ± 3 digits
mV DC	0 mV to ±1999 mV	±1% ± 3 digits

Live Earth detection

Indicates if the PE terminal is live when selecting the Loop or RCD test ranges. The relevant Loop or RCD test is inhibited.

Current

Function	Range	Accuracy
Current AC/TRMS	0.001 A – 0.100 A	±2% ±3 digits
	0.100 A – 2.000 A	±2% ±3 digits
	2.00 A – 20.00 A	±2% ±3 digits
	20.0 A – 300.0 A	±2% ±3 digits
Frequency Bandwidth	15 Hz – 500 Hz	
Influence of Frequency	30 Hz – 500 Hz ≤0.25 %	

Resistance and Continuity

Function	Range	Test Current	Accuracy
200 mA	0.01 Ω – 99.9 Ω	(0 Ω – 2 Ω) 205 mA ±5 mA	±3% ±2 digits
10 mA	0.01 Ω – 99.9 Ω	10 mA	±3% ±2 digits
	100 Ω – 999 kΩ		±5% ±2 digits
Open circuit voltage	4 V to 5 V		

EN61557-4 Measurement Range: 0.10 Ω to 999 kΩ.

Safety and electrical protection

Safety rating:	CAT III 600 V / CAT IV 300 V to EN 61010, IEC 61010-031 : 2015, IEC 61010-030.	Safety category rating valid to altitude of 2000 m.
Live voltage:	Active live voltage protection to 600 V between any test terminals without blowing a fuse. Live voltage warning on display and audible when >5 V is applied between any test terminals. Fuse protected to 1000 V, fuses are not user changeable.	

MFT-X1
Multifunction tester

Insulation test

Function	Range	Accuracy
1000 V	0.001 – 999 MΩ	±3% ±2 digits
500 V	0.001 – 500 MΩ	±3% ±2 digits
	> 500 MΩ	±10%
250 V	0.001 – 250 MΩ	±3% ±2 digits
	> 250 MΩ	±10%
100 V	0.001 – 100 MΩ	±3% ±2 digits
	> 100 MΩ	±10%
50 V	0.001 – 50 MΩ	±3% ±2 digits
	> 50 MΩ	±10%
VAR	Leakage current > 1 mA	±3% ±2 digits
50 V – 999 V	Leakage current < 1 mA	±10%
Leakage current	0.1 µA – 1.99 mA	±10%
Output voltage	-0% +2% +2 V at rated load or less	
Voltage display	±1% ± 3 V	
Short circuit current	1.5 mA nominal	
Test current on load	1 mA at min pass values of insulation	
Maximum capacitance	2 µF for a stable reading, 5 µF absolute limit	

EN61557-2 Measurement Range: 0.10 MΩ to 999 MΩ.

Loop 2-Wire - No RCD (L-PE, L-N or L-L)

Function	Range	Accuracy
2-Wire HR	0.001 – 9.999	±2% ±0.030 Ω
2-Wire	0.01 Ω – 9.99 Ω	±2% ±5 digits
	10.0 Ω – 99.9 Ω	±10% ±5 digits
	100 Ω – 1999 Ω	±10% ±5 digits
Supply Voltage	48 V – 550 V	
Supply Frequency	45 Hz – 65 Hz	

Can be used to measure supply source resistance quickly and reliably between Line and PE or two Live conductors up to 550 V.

EN61557-3 Measurement Range: 0.30 Ω to 1999 Ω

Loop 2-Wire L-PE with RCD

Function	Range	Accuracy
	0.01 Ω – 1999 Ω	±10% ±5 digits
Supply Voltage	48 V – 280 V	
Supply Frequency	45 Hz – 65 Hz	

Note: Uses the Megger Confidence Meter to measure the supply source impedance of circuits protected with an RCD rated ≥30 mA when there are only two connections possible. When a neutral is available the three-wire test will provide a quicker, more accurate result.

Note: RCD may trip if there are high leakage currents in the circuit under test. This measurement is immune to the effect of inductance found in some RCDs as it measures resistance (RCD Uplift).

EN61557-3 Measurement Range: 1.00 Ω to 1999 Ω

MFT-X1
Multifunction tester

Loop 3-Wire L-PE with RCD

Designation	Test Current	Application
RCD	15 mA	For circuits protected by an RCD rated 30 mA or greater.
RDC EV	3 mA	For EV charger circuits protected by a RDC and a Type A RCD rated 30 mA or greater.

Function	Range	Accuracy
	0.01 Ω – 9.99 Ω	±2% ±5 digits
	10.0 Ω – 199 9 Ω	±10% ±5 digits
Supply Voltage	48 V – 280 V	
Supply Frequency	45 Hz – 65 Hz	

Note: Uses the Megger Confidence Meter to measure the supply source impedance of circuits protected with an RCD when three connections are possible. The L-N Loop resistance needs to be less than 12 Ω. The resistances of the L-PE, L-N and N-PE loops are all shown, and the accuracy of the L-PE resistance depends on the maximum resistance displayed. When the neutral is not available the two-wire test must be used.

Note: RCD may trip if there are high leakage currents in the circuit under test. This measurement is immune to the effect of inductance found in some RCDs as it measures resistance.

EN61557-3 Measurement Range: 1.00 Ω to 1999 Ω

RCD Tests
Types A and AC

RCD Types	AC, A, AC(S), A(S)
RCD Rated Current (IΔn)	10 mA, 30 mA, 100 mA, 300 mA, 500 mA, 650 mA, 1000 mA, VAR
½ I no-trip Test Current	-10% – +0% 0.5 IΔn
1 I, 2 I, 5 I trip test – AC current	-0% – +10% M • IΔn
1 I, 2 I, 5 I trip test – pulsed DC current	-0% – +10% 1.4 • M • IΔn
Trip time	±10%
Ramp trip test current	±5%
Fault Voltage (0 V – supply)	+5% +15% ±0.5 V
Supply Voltage	48 V – 280 V
Supply Frequency	45 Hz – 65 Hz

Type B

RCD Types	B, B(S)
RCD Rated Current (IΔn)	10 mA, 30 mA, 100 mA, 300 mA, 500 mA
½ I no-trip Test Current	-10% – +0% (0.5 IΔn)
1 I, 2 I, 5 I trip test Current	-0% – +10% (2 IΔn)
Trip time	±10%
Trip current (ramp)	±5%
Fault Voltage (0 V – supply)	+5% +15% ±0.5 V
Supply Voltage	48 V – 280 V
Supply Frequency	45 Hz – 65 Hz

RDC (Type EV) with a 30 mA Type A RCD

Test current	2.0 mA increasing to 6.3 mA before being held at that current for 10s.
Trip time	±1% ±1 ms
Trip current (ramp)	± 5%
Fault Voltage (0 V – supply)	+5% +15% ±0.5 V
Supply Voltage	48 V – 280 V
Supply Frequency	45 Hz – 65 Hz

Earth

Function	Range	Accuracy
2-Wire test	0.01 Ω – 1999 Ω	±2% ±3 digits
Test Frequency	128 Hz	
Test Current	4.5 mA	
Maximum auxiliary electrode resistance (3-wire test)	5 kΩ	

Note: The 2-wire earth test measures resistance between the blue and green terminals using a 128 Hz square wave; the result includes the resistance of test leads.

EN61557-5 Measurement Range: 1 Ω to 1999 Ω.

Function	Range	Accuracy
3 wire test	0.01 Ω to 1999 Ω	±2% ±3 digits
Test frequency	128 Hz	
Test current	25 V, 4.5 mA	
Maximum auxiliary electrode resistance	5 kΩ for 25V	

Function	Range	Accuracy
3P ART	0.01 Ω to 1999 Ω	±5% ±3 digits
Test frequency	128 Hz	
Test current	25 V, 4.5 mA	
Minimum test current through the clamp	5 %	
Maximum auxiliary electrode resistance	5 kΩ for 25V or 100 kΩ for 50 V	

EN 61557-5 Measurement Range: 1 Ω to 1999 Ω.

Function	Range	Accuracy
Stakeless	1.0 Ω to 60 Ω	±7% ±5 digits
Test frequency	128 Hz	

EN 61557-5 Measurement Range: 1.00 Ω to 40.0 Ω.

MFT-X1
Multifunction tester

Power supply

Li-ion rechargeable	7.2 V DC 4400 mAh (non-serviceable) + charge status indication
Battery charger (Li-ion)	Input: 110 V / 230 V AC, 50/60Hz, 1.3 A Output: 3 A, 8.4 V DC
Battery life (Li-ion)	Li-ion: 4400 mAh = >15 hrs* **Continuity:** Approximately 2000 tests using Li-ion battery (0.5s test every 30s per EN 61557) **Insulation:** Approximately 1400 tests using Li-ion battery (0.5s test every 30s per EN 61557) **Earth:** Approximately 1600 tests using Li-ion battery *times based on typical daily test profile
Battery charging time	Li-ion: 2.5 to 3 hrs (ambient temperature dependent)
LR6 (AA) battery module	8 x LR6 (AA) Alkaline batteries

Environmental

Conditions	**Range**
Operating Temperature	-10 °C to +55 °C
Storage Temperature	-25 °C to +70 °C
Operating Humidity	90% R.H. at +40 °C max
Ingress Protection	IEC 60529: IP 54 : Equipment is protected against ingress of dust and water splashes and is suitable for indoor and outdoor use.
Vibration	MIL-PRF-28800F:class 2
Maximum operating altitude	2000 m
Pollution degree	2

Mechanical

Length	274 mm (10.79 ")
Width	96 mm (3.78 ")
Depth	143 mm (5.63 ")
Weight – Instrument only	1.57 kg (3.46 lb)
Shipping weight	5.6 kg (12.35 ib)

MFT-X1
Multifunction tester

ORDERING INFORMATION

Description	Part number
MFT-X1-BS Multifunction tester BS1363	1012-223
MFT-X1-SC Multifunction tester Schuko	1012-225
MFT-X1-CH Multifunction tester Switzerland	1012-229
MFT-X1-AU Multifunction tester AUS/NZ	1012-230

Included accessories
Switched test probe SP5
Red test lead, probes, clips and grabbers
Blue test lead, probe, clips and grabbers
Green test lead, probe, clips and grabbers
Earth test spike and leads kit
Li-ion battery 4400 mAh
Li-ion battery charger
SIA10 MAINS socket interface adaptor UK (boxed)
Neck strap
Multipurpose hard base carry case
Quick start guide
Calibration certificate

Description	Part number
Optional and replacement accessories	
Multipurpose hard base carry case	1014-985
Blow moulded carry case (Polypropylene)	1013-453
Switched test probe SP5	1002-774
Neck strap replacement	1013-454
Li-ion battery 4400 mAh	1013-450
SIA10 MAINS socket interface adaptor UK (boxed)	1014-300
SIA20 Mains socket interface adaptor AU	1007-170
SIA40 Mains socket interface adaptor SCHUKO	1007-171
SIA45 Bipolar Mains socket interface adaptor SCHUKO	1007-158
SIA50 Mains socket interface adaptor CH	1007-164
SIA60 Mains socket interface adaptor USA	1007-087
Li-ion battery charger	1013-451
3 lead set RD/GN/BU non-fused (boxed)	1014-291
3 lead pro set RD/GN/BU non-fused (boxed)	1014-292
3 lead set RD/GN/BU fused 10 A (boxed)	1014-295
3 piece grabber set RD/GN/BU (boxed)	1014-299
7 piece probe and clip set RD/GN/BU (boxed)	1014-301
3 lead RD/GN/BU fused 10 A (boxed) – fused leads only	1014-304
Earth test spike and leads kit	1001-810
MCC1010 Current clamp	1010-516
MVC1010 Voltage clamp	1010-518
MSA1363 socket adaptor UK	1013-837
MTF230 – Schuko (Type-F) Socket adaptor	1013-838
LA-KIT Lamp adaptor kit	1014-833
AA battery module	1013-452
UKAS Calibration certificate	1013-460

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