

# MULTIFUNCTION INSTALLATION TESTERS



ORDER CODE HV000003

## FULLTEST3

MULTIFUNCTION DEVICE FOR SAFETY TESTS ON SWITCHBOARDS AND MACHINES ACCORDING TO IEC/EN60204-1:2006 AND IEC/EN61439-1

- **Verification of dielectric strength** with test voltage up to 5100V in compliance with the prescriptions of new standard IEC/EN61439-1
- **Verification of protection against indirect contact** in compliance with the prescriptions of standard IEC/EN 60204-1:2006
- **Continuity of protective conductors** (test current 200mA ÷ 25A)
- **Verification of RCD tripping** (RCD AC, A, B) up to 1A
- **Measurement of Non-trip earth resistance**
- **Verification of coordination of magneto-thermal protections** (MCB curves B, C, D, K) and fuses (gG, aM)
- **Insulation resistance** with test voltage up to 1000V
- **Verification of residual voltage** on capacitive elements
- **Measurement of leakage current** through the outlet and through optional clamp (HT96U)
- **Functional test** through outlet (power, current)
- **Phase sequence**
- **Tests in automatic sequence:** possibility to program a sequence of tests with automatic start up to a maximum of 8.



HT offers a cutting-edge device to carry out all measurements required by the new laws as regards tests to be performed on electric switchboards and machines IEC/EN60204-1:2006 and IEC/EN61439-1.

Further to measurements of **protective conductors' continuity, insulation and dielectric strength**, FULLTEST3 is capable of carrying out tests on RCDs type A, AC and B, General, Selective and Delayed, measurements of Line/Loop impedance also with high resolution 0.1mΩ (with optional accessory IMP57), measurement of non-trip earth resistance and leakage current with clamp transducer. It can also carry out test on breaking capacity, protection tripping, I2t tests relevant to magneto-thermal circuit breakers in curve B, C, D, K and fuses type gG and aM. The device is also provided with a "touch-screen" colour display and 3 USB ports for connection to PC, USB pen drive, USB printers and possible bar code readers.



FULLTEST at work



2-wire continuity test



Test on RCDs



4-wire continuity test



Measurement of Loop impedance



Measurement of insulation resistance



Measurement of non-trip earth resistance



Dielectric strength test



Residual voltage measurement



Compact USB printer with rechargeable battery (Optional)



Soft carrying bag for accessories.



IMP57 (Optional)



HT96U (Optional)



FT3R-GLP (Optional)



FT3RMTCT (Optional)

### Functions

- Continuity of protective conductors with 200mA
- Continuity of protective conductors with I>10A, V<12V
- Continuity of protective conductors with I>25A, V<12V
- Insulation with test voltages 100, 250, 500, 1000VDC
- Dielectric withstand with voltage programmable from 250V to 5100VAC
- Discharge time/residual voltage on plugs and internal circuits
- Absorbed/leaked current and power at plug of machines
- Tripping time/current of type A, AC, B General and Selective RCDs up to 1000mA
- Contact voltage
- Line/Loop impedance and Ipsc calculation
- Line/Loop impedance with high resolution (with optional accessory IMP57)
- Non-trip earth resistance
- Leakage current (with optional accessory HT96U)
- Phase sequence
- Timer and limit thresholds selectable through programmable ramps

### Main features

Power supply:	207V ÷ 253V / 50-60Hz
Protection:	with fuses, at input
Display:	LCD colour "touch-screen" display
Memory:	internal, 999 locations
PC interface:	USB (PC, pen drive, printers, etc.) and Bluetooth™
Mechanical protection:	IP40
Pollution level:	2
Safety:	IEC/EN61010-1
Considered standards:	IEC/EN61557-1-2-3-4-13-14 IEC/EN60204-1:2006 IEC/EN61439-1 IEC/EN60335-1 EN50106
Measurement category:	CAT III 300V (safety test) CAT III 300V (functional test)
Size (LxWxH):	400x300x170mm
Weight:	15 kg

### Included accessories

	Integrated power supply cable
2317-IECIV-200-R	Test cable 2.5mm <sup>2</sup> , 2m, red, 2 pieces
2310-IECIV-200-B	Test cable 0.75mm <sup>2</sup> , 2m, blue
2310-IECIV-200-V	Test cable 0.75mm <sup>2</sup> , 2m, green
2310-IECIV-200-N	Test cable 0.75mm <sup>2</sup> , 2m, black, 2 pieces
C2033X	Cable with 3-terminal Shuko plug
FT3HVPRB1	1 cable banana-alligator clip + 1 cable banana-lead 2m HV
404-IECN	Measuring lead CAT III, 3 pieces
5004-IECN	Alligator clip, 4 pieces
TOPVIEW2007	Windows software + USB cable
FT3BRSN	Soft carrying bag for accessories.
	ISO9000 calibration certificate
	User Manual
	Quick user guide
	User manual on CD-ROM

### Optional accessories

IMP57	Accessory for measuring Loop impedance with high resolution
HT96U	Clamp for measuring leakage currents
FT3HVTIP	Cable banana-lead, black HV
FT3KBDEN	USB keyboard
FT3R-GLP*	Red/green control lamp for ongoing test with 7m cable
FT3RMTCT	Remote start/stop/save button with cable length 7 m.
FT3SFTSW	Open door detection device for verification room
FT3MPT2	Thermal printer with 32 columns
FT3BARCR	Bar code reader with USB port
FT3BLACKBOX	Device for functional verification of FULLTEST3
C2009AD	Cable with adapter for connection to IMP57
FT3REDLP**	Red control lamp for ongoing test with 7m cable

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(\*) For devices with HW version 70 or higher and N/S equal or higher than 16101107. (\*\*) For devices with HW version lower than 70.



## 1. ELECTRICAL SPECIFICATIONS

Accuracy indicated as  $\pm$  [% readings + (number of digits \* resolution)] at 23 °C  $\pm$  5 °C <80%HR

### Continuity of protection conductor with I>200mA

Range ( $\Omega$ )	Resolution ( $\Omega$ )	Accuracy	Overload protection
0.00 $\div$ 19.99	0.01	$\pm(3.0\%rdg + 3dgt)$	CAT III 300V
20.0 $\div$ 199.9	0.1		

Standard test leads: cables 2.5mmq, 2m length  
 Output voltage: approx. 4.5V AC  
 Test current: >200mA DC (R < 20 $\Omega$  with standard test leads)  
 Timer on measure: 1s  $\div$  60min (in step of 1s)  
 Measure method: 2 wires

### Continuity of protection conductor with I>25A (2-wire)

Range ( $\Omega$ )	Resolution ( $\Omega$ )	Accuracy	Overload protection
0.000 $\div$ 1.999	0.001	$\pm(3.0\%rdg + 3dgt)$	CAT III 300V
2.00 $\div$ 19.99	0.01		

Standard test leads: cables 2.5mmq, 2m length  
 Output voltage: approx. 4.5V AC  
 Test current: > 25A AC (R < 0.1 $\Omega$  with standard test leads)  
 >10A AC (R < 0.5 $\Omega$  with standard test leads)  
 Timer on measure: 1s  $\div$  60min (in step of 1s)  
 Measure method: 2 wires

### Continuity of protection conductor with I>25A (4-wire)

Range ( $\Omega$ )	Resolution ( $\Omega$ )	Accuracy	Overload protection
0.000 $\div$ 1.999	0.001	$\pm(3.0\%rdg + 3dgt)$	CAT III 300V
2.00 $\div$ 19.99	0.01		

Standard test leads: cables 2.5mmq, 2m length  
 Output voltage: approx. 4.5V AC  
 Test current: > 25A AC (R < 0.1 $\Omega$  with standard test leads)  
 >10A AC (R < 0.5 $\Omega$  with standard test leads)  
 Timer on measure: 1s  $\div$  60min (in step of 1s)  
 Measure method: 4 wires

### Continuity of protection conductor with – IEC/EN60204-1:2006

Range ( $\Omega$ )	Resolution ( $\Omega$ )	Accuracy	Overload protection
0.000 $\div$ 1.999	0.001	$\pm(3.0\%rdg + 3dgt)$	CAT III 300V
2.00 $\div$ 19.99	0.01		

Standard test leads: cables 2.5mmq, 2m length  
 Line impedance range: 0.001 $\Omega$   $\div$  2.000 $\Omega$  (in step of 0.001 $\Omega$ )  
 Section of PE conductor: 1, 2.5, 4, 6, 10, 16, 25, 35, 50, 70mmq  
 Type of protection devices: MCB (magnetothermic) Curve B, C, D, K, Fuses type gG, aM  
 Nominal current MCB: 6, 10, 13, 16, 20, 25, 32, 40, 50, 63A (Curve B)  
 0.5, 1, 1.6, 2, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63A (Curve C)  
 0.5, 1, 1.6, 2, 4, 6, 10, 13, 16, 20, 25, 32A (Curve D and Curve K)  
 Nominal current fuse: 2A  $\div$  1250A (Fuse gG) ; 2A  $\div$  6300A (Fuse aM)  
 Cable length range: 0.1  $\div$  999.9m  
 Type of cable selectable: Copper, Aluminum  
 Output voltage: approx. 4.5V AC  
 Test current: >10A AC  
 Timer on measure: 1s  $\div$  60min (in step of 1s)  
 Measure method: 4 wires



## Insulation resistance

Test voltage (V)	Range (MΩ)	Resolution (MΩ)	Accuracy	Overload protection
100	0.01 ÷ 9.99	0.01	±(3.0%rdg+3dgt)	CAT III 300V
	10.0 ÷ 19.9	0.1		
	20.0 ÷ 99.9		±5.0%rdg	
250	0.01 ÷ 9.99	0.01	±(3.0%rdg+3dgt)	
	10.0 ÷ 19.9	0.1	±5.0%rdg	
	20.0 ÷ 99.9			
	100 ÷ 249	1		
500	0.01 ÷ 9.99	0.01	±(3.0%rdg+3dgt)	
	10.0 ÷ 19.9	0.1	±5.0%rdg	
	20.0 ÷ 99.9			
	100 ÷ 499	1		
1000	0.01 ÷ 9.99	0.01	±(3.0%rdg+3dgt)	
	10.0 ÷ 19.9	0.1	±5.0%rdg	
	20.0 ÷ 99.9			
	100 ÷ 999	1		

Nominal test voltage: 100, 250, 500, 1000VDC  
 Accuracy test voltage: (-0% ÷ 25%) Unom  
 Test current: > 1mA (fino a Unom/1mA)  
 Short circuit current: <15mA  
 Measurement modes: Manual, Auto, Timer  
 Timer on measure: 5s÷10min (resolution 1s)

## Dielectric test

Nominal test voltage Un (V)	Resolution (V)	Accuracy	Overload protection
250 ÷ 800	10	±3.0%Un	CAT III 300V
810 ÷ 2500			
2510 ÷ 5100			

Test voltage: 250V ÷ 5100V AC, 50/60Hz programmable in steps of 10V  
 Measurement modes: MANUAL, RAMP, TIMER, BURN  
 PULSE: (duration 3 measurement cycles: 60ms@50Hz, 50ms@60Hz)  
 Timer on measure: 1s ÷ 10min in step of 1s  
 Output power: 500VA at 5100V  
 Discharging current: selectable IAPP and IREAL modes

## Discharging current IAPP mode

Measurement range (mA)	Resolution (mA)	Accuracy	Overload protection
0 ÷ 200	1	±3.0%rdg + 2mA	CAT III 300V

## Discharging current IREAL mode

Measurement range (mA)	Resolution (mA)	Accuracy	Overload protection
0 ÷ 110	1	±3.0%rdg + 4mA	CAT III 300V

Discharging current threshold: 1 ÷ 110mA (adjustable in step of 1mA, for IAPP or IREAL modes)  
 Short circuit current: > 200mA

## Residual voltage – Modes INT and PLUG

Range (s)	Resolution (s)	Accuracy	Overload protection
10 ÷ 460 V AC	1	±(3.0%rdg + 3V)	CAT III 300V
10 ÷ 650 V DC			

Nominal main voltage: 230V o 240V  
 Input voltage (UTRIG): 0 ÷ 460V V AC  
 Measurement modes: INT (4 wire connection, discharging time 1s or 5s, Linear, Not Linear)  
 PLUG (2 wire connection, discharging time 1s, Linear, Not Linear)  
 Limit value residual voltage: 60V TRMS  
 Range AC voltage: 0.0 ÷ 710V  
 Input impedance: 100MΩ (URES), 450kΩ (UTRIG)



### Leakage current on the test socket

Range	Resolution	Accuracy	Overload protection
0.25mA ÷ 49.99mA	0.01mA	±(3.0%rdg + 3dgt)	CAT II 300V
0.05A ÷ 0.99A	0.01A		
1.0A ÷ 10.0A	0.1A		

Power supply: 195V ÷ 253V AC  
 Frequency range: 40Hz ÷ 100kHz  
 Limit value: 0.25mA ÷ 10.00mA selectable

### Absorbed current on test socket

Range (A)	Resolution (A)	Accuracy	Overload protection
0.00 ÷ 0.99	0.01	±(3.0%rdg + 3dgt)	CAT II 300V
1.0 ÷ 20.0	0.1		

Power supply: 195V ÷ 253V AC  
 Frequency range: 15Hz ÷ 723Hz

### Active / Apparent power on test socket

Range (W/VA)	Resolution (W/VA)	Accuracy	Overload protection
0.0 ÷ 99.9	0.1	±(5.0%rdg + 10dgt)	CAT II 300V
100 ÷ 999	1	±(5.0%rdg + 3dgt)	
1.00k ÷ 5.06k	10		

Power supply: 195V ÷ 253V AC  
 Frequency range: 15Hz ÷ 723Hz  
 Timer: 5s ÷ 60min (resolution 1s)  
 Limit value apparent power: 6VA ÷ 5.06kVA

### Power factor

Range	Resolution	Accuracy	Overload protection
0.00 ÷ 1.00	0.01	See Papp, Pact	CAT II 300V

### Leakage current with external transducer clamp HT96U (optional accessory)

Selectable range	Measurement range	Resolution	Accuracy (*)	Overload protection
1A	0.0 ÷ 99.9mA	0.1mA	±(3.0%rdg + 3dgt)	Measurement lead connected to ground
	100mA ÷ 1000mA	1mA		
100A	0.00A ÷ 9.99A	0.01A		
	10.0A ÷ 100.0A	0.1A		
1000A	0.0A ÷ 99.9A	1A		
	100A ÷ 1000A			

(\*) Accuracy of instrument without clamp  
 Type of clamp: HT96U optional accessory (available ranges 1A, 100A, 1000A)  
 Transduced input voltage: 0 ÷ 1V AC  
 Input impedance: 1MΩ  
 Frequency range: 40Hz ÷ 100kHz



## RCD Test

Nominal currents selectable:	10mA, 30mA, 100mA, 300mA, 500mA, 650mA, 1000mA
Type RCD:	AC, A, B, General, Selective, Delayed
Measurement modes:	x1/2, x1, x2, xK (K= 4 B type, K=5 AC, A type), Ramp, Auto (seq:x1/2, x1, xK), Ut
Range voltage / frequency:	100V ÷ 265V / (50Hz/60Hz) ±0.5Hz
Contact voltage limits:	25V, 50V selectable
Test current polarity:	0°, 180° selectable

### During of trip out test [ms] – TT/TN systems (Resolution:1ms, Accuracy: ±(3.0%rdg+ 2ms))

	x 1/2			x1			x2			xK			AUTO			Rampa		
	G	S	R	G	S	R	G	S	R	G	S	R	G	S	R	G	S	R
<b>10mA</b> <b>30mA</b> <b>100mA</b>	AC	1000	1000	1000	1000	1000	1000	1000	1000	200	250	50	150	✓	✓	320		
	A	1000	1000	1000	1000	1000	1000	1000	1000	200	250	50	150	✓	✓	320		
	B	1000	1000	1000	1000	1000	1000	1000	1000			200	250	✓	✓	320		
<b>300mA</b>	AC	1000	1000	1000	1000	1000	1000	1000	1000	200	250	50	150	✓	✓	320		
	A	1000	1000	1000	1000	1000	1000	1000	1000	200	250	50	150	✓	✓	320		
	B	1000	1000	1000	1000	1000	1000	1000	1000							320		
<b>500mA</b>	AC	1000	1000	1000	1000	1000	1000	1000	1000	200	250	50	150	✓	✓	320		
	A	1000	1000	1000	1000	1000	1000	1000	1000	200	250					320		
	B	1000	1000	1000												320		
<b>650mA</b>	AC	1000	1000	1000	1000	1000	1000	1000	1000	200	250	50	150	✓	✓	320		
	A	1000	1000	1000	1000	1000	1000	1000	1000	200	250					320		
	B															320		
<b>1000mA</b>	AC	1000	1000	1000	1000	1000	1000	1000	1000	200	250					320		
	A	1000	1000	1000	1000	1000	1000	1000	1000							320		
	B															320		

## Line / Loop Impedance P-P, P-N, P-PE

Range (Ω)	Resolution (Ω)	Accuracy	Overload protection
0.000 ÷ 2.000 (*)	0.1m	±(3.0%rdg + 3dgt)	CAT III 300V
0.00 ÷ 9.99	0.01		
10.0 ÷ 99.9	0.1		
100 ÷ 199	1		

(\*) Only with optional accessory IMP57

Measurement modes:	Loop/lpsc, kA, I2t test, trip current, Ut (indirect contact)
Type of protection devices:	MCB (magnetothermic) Curve B, C, D, K, Fuse type gG, aM
Corrente nominale MCB:	6, 10, 13, 16, 20, 25, 32, 40, 50, 63A (Curve B) 0.5, 1, 1.6, 2, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63A (Curve C) 0.5, 1, 1.6, 2, 4, 6, 10, 13, 16, 20, 25, 32A (Curve D and Curve K)
Nominal current fuses:	2A ÷ 1250A (Fuse gG) ; 2A ÷ 6300A (Fuse aM)
Breakdown current MCB/Fuses::	1kA ÷ 25kA selectable
Section of cable:	1 ÷ 70mmq selectable
Cable type:	Copper, Aluminum
Type of cable insulation:	PVC, Butyl rubber, EPR/XLPE
Number of parallel cables (I2t test):	1 ÷ 99
Trip out time of protection devices:	0.1s, 0.2s, 0.4s, 5s
P-N, P-PE / P-PP voltage:	100 ÷ 265V / 100 ÷ 460V
Frequency:	(50Hz/60Hz) ±0.5Hz

## Prospective short circuit current (Ipsc)

Range (A)	Resolution (A)	Accuracy	Overload protection
0.05 ÷ 0.99	0.01	Depending on the accuracy of Z measure	CAT III 300V
1.0 ÷ 99.9	0.1		
100 ÷ 999	1		
1.00k ÷ 46.00k	0.01k		





## Global earth resistance without RCDs tripping

Idn (mA)	Measure range ( $\Omega$ )	Resolution ( $\Omega$ )	Accuracy	Overload protection
10	0 ÷ 1999	1	$\pm(3.0\%rdg + 1\Omega)$	CAT III 300V
30	0.0 ÷ 99.9	0.1		
	100 ÷ 1999	1		
100	0.0 ÷ 99.9	0.1	$\pm(3.0\%rdg + 3dgt)$	
	100 ÷ 999	1		
300	0.0 ÷ 99.9	0.1		
	100 ÷ 299	1		
500	0.0 ÷ 99.9	0.1		
	100 ÷ 199	1		
650	0.0 ÷ 99.9	0.1		
	100 ÷ 149	1		
1000	0.0 ÷ 99.9	0.1		

Test current:  $I_{dn}/2$   
P-N, P-PE / P-PP voltage: 100 ÷ 265V, 50/60Hz  
Mains nominal voltage: 230V or 240V

## Contact voltage

Range (V)	Resolution (V)	Accuracy	Overload protection
0 ÷ 100 (U <sub>tlim</sub> = 50V)	1	$\pm(3\%rdg + 3V)$	CAT III 300V
0 ÷ 50 (U <sub>tlim</sub> = 25V)			

## Phase sequence rotation test

Range (V)	Frequency	Overload protection
360 ÷ 460	50Hz/60Hz $\pm 0.5Hz$	CAT III 300V

Indication of test: 1.2.3. (correct), 2.1.3. (incorrect), 1.1.X (not defined)



## 2. GENERAL SPECIFICATIONS

### POWER SUPPLY:

Main voltage:	207V ÷ 253V AC - 50/60Hz ±5%
Absorbed current:	16Amax

### MECHANICAL SPECIFICATIONS:

Dimensions (L x W x H):	400 x 300 x 170mm
Weight:	15kg

### MEMORY AND INPUT/OUTPUT INTERFACES

Internal memory:	999 locations (three levels structure)
PC interface:	USB type "B"
Keyboard, printer, pen drive, barcode:	2 x USB type "A"
Warning lamp:	for Dielectric test
Keyboard for remote controls	START/STOP/SAVE keys
Bluetooth interface	connection to mobile devices

### ENVIRONMENTAL CONDITIONS:

Reference temperature:	23°C ± 5°C
Working temperature:	0°C ÷ 40°C
Working humidity:	<80%HR
Storage temperature:	-10 ÷ 60°C
Storage humidity:	<80%HR

### REFERENCE GUIDELINES

Safety tests machines/switchboards/devices:	IEC/EN60204-1; IEC/EN61439-1-2; IEC/EN60335-1
Literature:	IEC/EN61187
Instrument:	IEC/EN61557-1-2-3-4-6-13-14

### GENERAL CHARACTERISTICS:

Display :	TFT, LCD, color 4.3" with capacitive touch screen
Instrument safety:	IEC/EN61010-1
Insulation:	double insulation
Pollution degree:	2
Measurement category:	CAT II 300V (I, Leak, Power), CAT III 300V (other tests)
Max. height of use:	2000m
Mechanical protection:	IP40
Input protections:	Fuses T16/250V, FF12.5A/500V, F20A/500V

**This instrument complies with the requirements of the European Low Voltage Directives 2014/35/EU (LVD) and EMC 2014/30/EU**

**This instrument satisfies the requirements of 2011/65/EU (RoHS) directive and 2012/19/EU (WEEE) directive**