

MFT5010/4010

Digital MULTIFUNCTION TESTER INSTRUCTION MANUAL

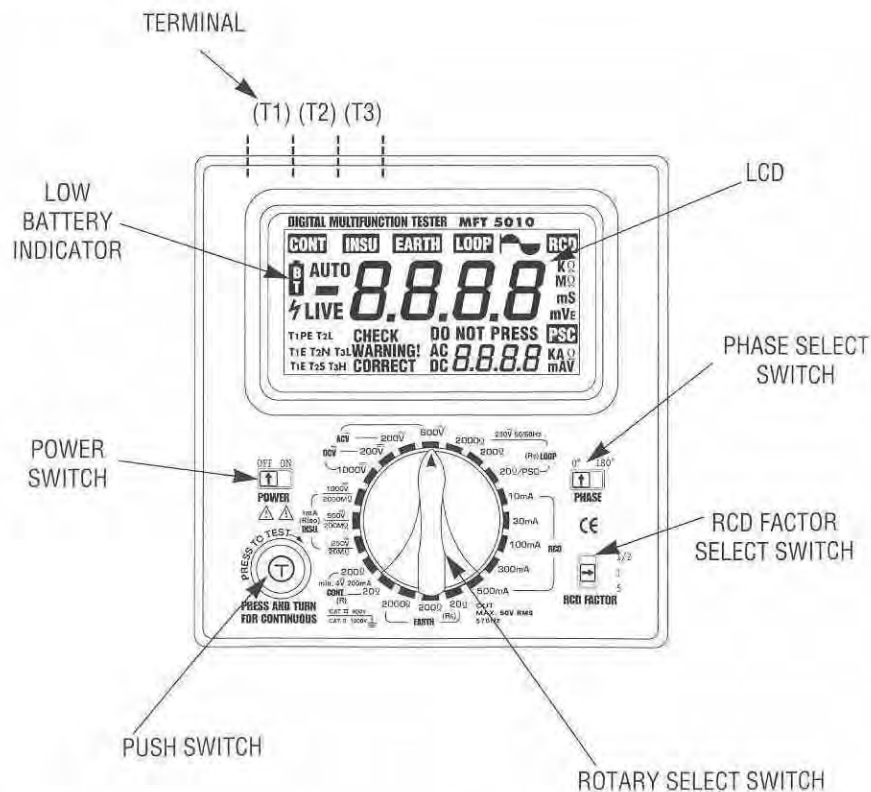


Test Products International, Inc.
9615 SW Allen Blvd.
Beaverton, OR 97005
www.testproductsintl.com

► TABLE OF CONTENTS ◀

A. FRONT LINE DRAWING	2
B. INSTRUCTION	3
C. INPUT TERMINAL APPLICATION & LIMIT	5
D. MEASUREMENT TECHNIQUES	5
E. FEATURES	7
F. TECHNICAL DATA	8
G. SPECIFICATION	10
H. OPERATING INSTRUCTIONS	
1. Measuring Continuity(Resistance test)	14
2. Measuring Insulation Resistance	15
3. Measuring DC Voltage	16
4. Measuring AC Voltage	17
5. Measuring Loop Impedance and Psc	18
6. Measuring Rcd Trip Time	20
7. Measuring Earth Resistance	22
I. ACCESSORIES	26
J. MAINTENANCE	27
K. TROUBLE SHOOTING GUIDE	28
L. SERVICE	28

A. FRONT LINE DRAWING.



B. INSTRUCTION

1. Safety Warnings

This instruction manual contains information and warnings which have to be followed by the user to ensure safe operation and to retain the instrument in safe condition.

Read these operating instructions before using the instrument.







Pay particular attention to all **WARNINGS** and **CAUTIONS** in this instruction manual.

WARNING is for the user to avoid electric shock hazard.

CAUTION is for the user to avoid damage to the instrument.

1. Do not open the battery compartment cover when making measurement.
2. Before opening the battery compartment to replace the battery, make sure to set the TEST button to OFF position and remove test leads from the instrument.
3. The instrument is designed to measure on a circuit of up to 250V AC at LOOP and RCD testing.
4. To avoid electric shock hazard, do not use the instrument if it is in the following conditions ;
 - a) Shows visible damage.
 - b) Fails to perform intended operation.
 - c) Remember to always inspect your instrument before use for any sign of abnormality or damage. If any abnormal conditions exist (e.g. damaged leads, cracked case, display faulty, etc.) do not attempt to make measurements. Return it to your nearest distributor for rectification.
 - d) Always check the continuity of yours leads prior to setting the unit for measurement by following the instruction given in the sections below ;
 - e) Do not make measurement if the instrument, test leads or your hands are wet.
 - f) Do not make measurement in an explosive atmosphere (i.e. in the presence of flammable gasses or fumes, vapor or dust).
 - g) Never exceed the maximum allowable of any function.
 - h) Always set the TEST button to OFF position after use. When you do not use the instrument for a long period of time, place it in storage after removing the battery.

2.Safety Symbols

	DANGEROUS VOLTAGE		SEE EXPLANATION IN MANUAL
	AC -ALTERNATING CURRENT		GROUND
	DC-DIRECT CURRENT		FUSE

3.EC Declaration of Conformity

This is to certify that model 5010 conforms to the protection requirements of the council directive 89/336/EEC, in the approximation of laws of the member states relating to Electromagnetic compatibility and 73/23/EEC, The Low Voltage Directive by application of the following standards:

EN 50081-1	1992 Emissions Standard
EN 50082-1	1992 Immunity Standard
EN61010-1	1993 Safety Standard
EN61010-2-031	1995 Safety Standard
EN61557	1997 Safety Standard

To ensure conformity with these standards, this instrument must be operated in accordance with the instructions and specifications given in this manual.

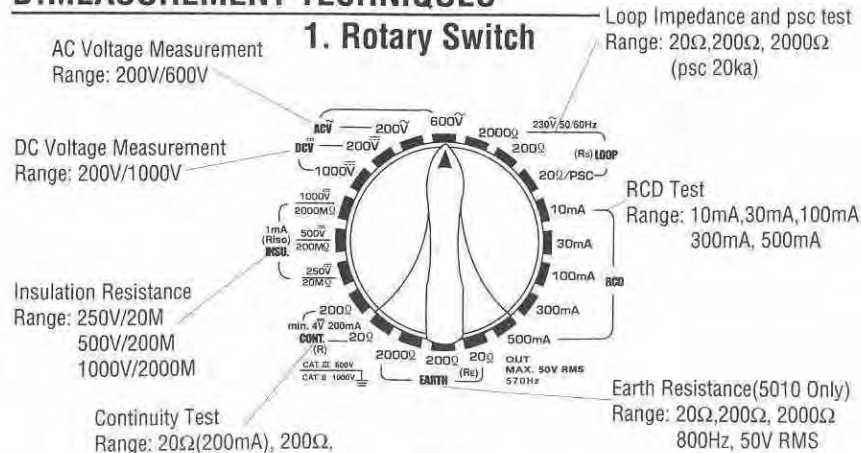
CAUTION:

Even though this instrument complies with the immunity standards, the accuracy can be affected by strong radio emissions not covered in the above standards. Sources such as hand held radio transceivers, radio and TV transmitters, vehicle radios and cellular phones generate electromagnetic radiation that could be induced into the test leads of this instrument. Care should be taken to avoid such situations or alternative and check to make sure that the instrument is not being influenced by these emissions.

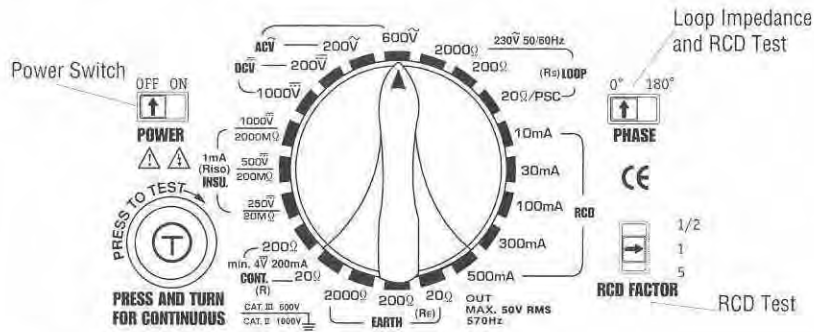
C.INPUT TERMINAL APPLICATION & LIMIT

	T1	T2	T3	MAX INPUT
AC Voltage	(PE)	L	-	600V
DC Voltage	(PE)	L(+)	-	1000V
Continuity Test	(PE)	L	-	250V
Insulation Resistance	(PE)	L	-	250V
Earth Resistance (5010 ONLY)	Earth	Probe	Auxilliary earth electrode	250V
Loop Impedance & Psc	Earth	Neutral	Line	253V
Rcd Test	Earth	Neutral	Line	253V

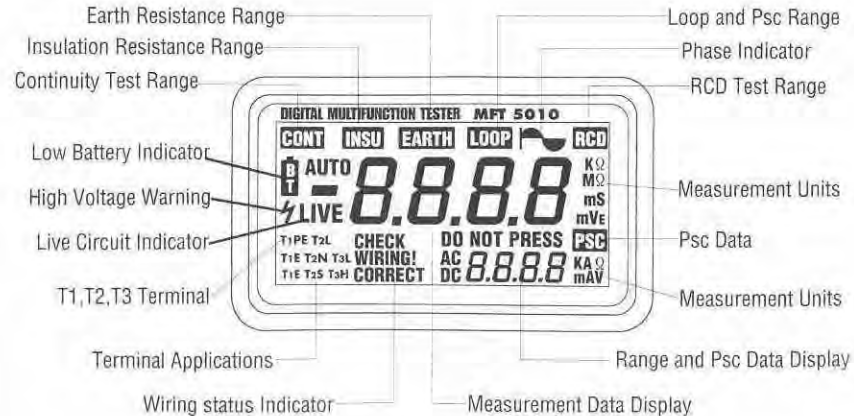
D.MEASUREMENT TECHNIQUES



2. Slide Switch



3. Display



E. FEATURES

Model MFT5010 has eight functions and MFT 4010 has seven functions in one unit:

1. Continuity test.

Live Circuit Warning beeps and "LIVE" displays on the LCD.

2. Insulation resistance.

Live Circuit Warning beeps and "LIVE" displays on the LCD.

3. Loop impedance.

a) Displays the mains voltage on the LCD.

b) Indicates the Phase Angle on the LCD.

Timing of the test current can be selected from the first and second cycle of sinusoidal mains voltages.

c) Automatic Overheat protection.

4. PSC (Prospective Short-Circuit Current).

a) Approx. 23 amp Test current.(at 180 Phase position)

b) If set the phase switch 0, Breaker will be tripped after test button press

5. RCD test.

a) Displays the mains voltage on the LCD.

b) Indicates the Phase Angle on the LCD.

Timing of the test current can be selected from the first and second cycle of sinusoidal mains voltages.

c) Automatic Overheat protection.

d) Auto ranging. (2000ms / 2.000sec)

6. AC voltage.

7. DC voltage.

8. Earth resistance. (5010 Only)

Available 3 or 2 pole measurement.

F. TECHNICAL DATA

100.7					
	Meßfunktionen Measuring functions Fonctions	Meßbereiche Ranges Calibres	Gebrauchsfehler Operating errors Précision	Betriebsbedingungen Operating conditions Conditions d'utilisation	Bemerkungen Remarks Remarques
U	Spannung Voltage Tension	1 ... 600 V AC	$\pm (3\% + 5D)$	$f = 45 \dots 450 \text{ Hz}$	$R_i = \text{ca. } 470 \text{ k}\Omega$
FI	FI-Schutzschaltung Leakage current breaker F.I. Disjoncteur différentiel	I _{AN} 10 ... 500 mA	$I_A = \pm (3\% + 3D)$	$U = 230 \text{ V} \pm 10\%$ $f = 45 \dots 65 \text{ Hz}$	
R _E	Erdungswiderstand Earth resistance Résistance de la mise à la terre	20 / 200 / 2000 Ω	$\pm (3\% + 5D)$		$I_p = 1A/500-50-5 \text{ mA}$ $U_{S,PE} \leq 20 \text{ V}$
R _{ISO}	Isolationswiderstand Insulation resistance Résistance d'isolement	20 / 200 / 2000 M Ω	$\pm (3\% + 20D)$ $\pm (5\% + 40D)$	$U_{01} = 250/500/1000 \text{ V DC}$ $I \geq 1 \text{ mA}$	$U_a = U_N \times 1,05$
R _S	Schleifenwiderstand Loop resistance Résistance de boucle	20 / 200 / 2000 Ω	$\pm (3\% + 5D)$	$U = 230 \text{ V} \pm 10\%$ $f = 45 \dots 65 \text{ Hz}$	$R_i \leq 80 \Omega$
	Drehfeldrichtung Rotary field direction Indicatif de l'ordre des phases			$U = 20 \dots 600 \text{ V}$ $f = 45 \dots 65 \text{ Hz}$	$R_i = \text{ca. } 470 \text{ k}\Omega$
R	Widerstand Resistance Résistance de continuité	20 / 200 Ω	$\pm (3\% + 3D)$	$U \geq 5,5 \text{ V DC}$ $I_k > 200 \text{ mA}$	$< 0 >$
	Schutzleiterkontrolle Protective earth control Contr. du conducteur de protect.	50 ... 250 V AC		$U = 50 \dots 250 \text{ V}$	Anzeige Display Symbole affiché
	Phasenschlußbestimmung Phase connection control Vérificat. du branchem. d. phases	Phase an Phase à		$U = 20 \dots 250 \text{ V}$ $f = 45 \dots 65 \text{ Hz}$	
	8 x 1,5 V IEC LR 6 (R6)		in % vom Meßwert in % of measured value en % de la lecture		

F. TECHNICAL DATA (CONT.)



IEC 1010 Over Voltage:
CAT II - 1000V
CAT III - 600V
Pollution Degree 2

* INSTALLATION I • II • III

INSTALLATION CATEGORY (OVERVOLTAGE CATEGORY) I

: Signal level, special equipment or parts of equipment, telecommunication, electronic etc., with smaller transient overvoltages than INSTALLATION CATEGORY II.

INSTALLATION CATEGORY (OVERVOLTAGE CATEGORY) II

: Local level, appliances, PORTABLE EQUIPMENT etc., with smaller transient overvoltages than INSTALLATION CATEGORY III.

INSTALLATION CATEGORY (OVERVOLTAGE CATEGORY) III

: Distribution level, fixed installation, with smaller transient overvoltages than INSTALLATION CATEGORY IV.

* IEC 529 1989 Safetystandard
IP CODE: IP20B

G. SPECIFICATION

Note: EN61557: Electrical safety in low voltage distribution systems up to 1000VAC and 1500VDC equipment for testing, measuring or monitoring of protective measures

1. Continuity Resistance Ranges(R): EN61557-4

Measuring Ranges	; 20.00 Ω / 200.0 Ω
Open circuit voltage	; 4V DC min.
Short circuit current	; 200mA DC min in 20 Ω Range
Accuracy	; $\pm 3\%$ rdg. ± 3 dgt. $\pm 0.1\Omega$
Number of measurements	; 1000 times

2. Insulation Resistance Range(Riso): EN61557-2

Test Voltage	; 250V/500V/1000V
Output Voltage Open circuit	; 250V $\pm 10\%$ / 500V $\pm 10\%$ / 1000V $\pm 10\%$
Output current	; 1mA DC at 0.25M Ω (250V) ; 1mA DC at 0.5M Ω (500V) ; 1mA DC at 1M Ω (1000V)
Output Short circuit current	; 1.3 mA approx.
Measuring Ranges	; 20.00M Ω / 200.0M Ω / 2000M Ω
Accuracy	; (20M Ω) $\pm 3\%$ of rdg. ± 5 dgt. ; (200M Ω) $\pm 3\%$ of rdg. ± 10 dgt. ; (1000M Ω) $\pm 3\%$ of rdg. ± 20 dgt. ; (2000M Ω) $\pm 5\%$ of rdg. ± 40 dgt.
Number of measurements	; 2000 times

G. SPECIFICATION(CONT.)

3. Loop Impedance Range(Rs): EN61557-3

Rated Voltage	; 230V AC $\pm 10\%$
AC Voltage Measuring Range	; MAX 253V AC
Test Current (at AC230V)	; 20 Ω Range 23A approx. ; 200 Ω Range 2.3A approx. ; 2000 Ω Range 0.23A approx.
Test Period	; Half Cycle of AC.
Accuracy (at AC230V)	; 20 Ω $\pm 3\%$ of rdg. ± 5 dgt. $\pm 0.1\Omega$. ; 200 Ω $\pm 3\%$ of rdg. ± 5 dgt. ; 2000 Ω $\pm 3\%$ of rdg. ± 5 dgt.
Over Temperature Indication	; 'Hot' on the LCD.

4. PSC (Prospective Short-Circuit Current):EN61557-3

Rated Voltage	; 230V AC $\pm 10\%$
AC Voltage Measuring Range	; MAX 253V AC
Test Current (at AC230V)	; 23A approx.
Test Period	; Half Cycle of AC.
PSC data calculation	; [LINE VOLTAGE / LOOP IMPEDANCE]
Over Temperature Indication	; 'Hot' on the LCD.

G. SPECIFICATION(CONT.)

5. RCD Ranges:EN61557-6

Rated Voltage	: 230V AC \pm 10%
AC Voltage Measuring Range	: MAX 253V AC
Trip Current Setting(at AC230V)	: 10/30/100/300/500mA.
Test Current Factor	: X1/2, X1, X5
Trip Time Duration	: 2000msec.
Earth Leakage Current	: Less than 1mA.
Accuracy (at AC230V)	: Trip Current \pm 3% of test current at 230V : Trip Time \pm 3% rdg, \pm 3dgt+1ms : ACV \pm 3% rdg. \pm 5dgt.
Over Temperature Indication	: 'Hot' on the LCD.

6. AC Voltage Ranges

Measuring Ranges	: 200V / 600V
Input Impedance	: Approx. 10M Ω
Input Frequency	: 45Hz ~ 450Hz
Accuracy	: \pm 3% rdg. \pm 5dgt.

7. DC Voltage Ranges

Measuring Ranges	: 200V / 1000V
Input Impedance	: Approx. 10M Ω
Accuracy	: \pm 3% rdg. \pm 3dgt.

G. SPECIFICATION(CONT.)

8. Earth Resistance Ranges(5010 Only):EN61557-5

Measuring Ranges	: 20 Ω / 200 Ω / 2000 Ω
Test Waveform	: Approx. 570Hz AC / Less Than 50V RMS.
Accuracy	: 20 Ω \pm 3% of rdg. \pm 5dgt. \pm 0.1 Ω : 200 Ω / 2000 Ω \pm 3% rdg. \pm 5dgt.

9. General Specifications

Operating Temperature	: 0°C - 40°C	
Storage Temperature	: -10°C - 50°C	
Operating Humidity	: 70% max.	
Storage Humidity	: 80% max.	
Dimensions	: 170 x 210 x 90	
Weight	: 3Kg	
Fuse Protection		
(0.5A/600V/fast blow)	: Continuity/Insulation/Earth Range.	
(6.3A/250V/delay blow)	: Loop.RCD Ranges.	
POwer Supply	: 8 x 1.5V Battery.(Type R-6 or AA)	
Battery Life	: 100hours	
Alattery Up to 2000M		
Indoor Use		
Normal Power Consumption	Continuting Insulation AC Volt DC Volt	Approx. 35mA
	Loop / PSC RCD Earth	Approx. 55mA

H. OPERATING INSTRUCTIONS

1. Measuring Continuity .(Resistance Test)

⚠ WARNING:

- ▶ Do not attempt to make resistance measurements with circuit energized. For best results, remove resistor completely from circuit before attempting to measure it.
- ▶ The results of measurements can be adversely affected by impedances of additional operating circuits connected in parallel or by transient currents.

CAUTION:

- ▶ Never turn the function dial while the Test button is depressed. This may damage the instrument.

Before testing always check the follows:

The "battery low" indicator is not showing.

- Set the function switch to CONT 20 Ω / 200 Ω as required.
- Connect the test leads to the instrument. The red lead is connected to the T2(center socket/marked "T2L" on the LCD) and black lead to the T1 (left hand socket/marked "T1PE" on the LCD).
- Connect the test leads to the circuit under test. Ensure the circuit is not live by checking that the "LIVE" is not lit on the LCD and No warning beeps.
- If the circuit is not live, press the TEST button. Read the value of resistance from the LCD. An output current of 200mA is maintained when resistance is less than 20 Ω .
- Press the test button and turn for continuous.

NOTE: To make accurate ohm measurements, short the ends of the test leads together and record the resistance reading. Deduct this value from actual readings.

2. Measuring Insulation Resistance

⚠ WARNING:

- ▶ Insulation test should be conducted on circuit that is de-energized. Ensure circuit is not live before commencing testing.
- ▶ Never touch the circuit under test during insulation testing.

CAUTION:

- ▶ Never turn the function dial while the test button is depressed. This may damage the instrument.

- Set the function switch to INSU 20M Ω /250V, 200M Ω /500V, 2000M Ω /1000V, as required.
- Connect the test leads to the instrument. The red lead is connected to the T2 (center socket/marked "T2L" on the LCD) and black lead to the T1 (left hand socket/marked "T1PE" on the LCD).
- Connect the test leads to the circuit under test. Ensure the circuit is not live by checking that the "LIVE" is not lit on the LCD and No warning beeps.
- If the circuit is not live, press the TEST button. Read the value of resistance from the LCD.
- Press the test button and turn for continuous.

3. Measuring DC Volts

⚠ WARNING:

- ▶ Do not attempt to make a voltage measurement of more than 1000V DC or of a voltage level that is unknown.

CAUTION:

- ▶ Do not attempt to make a voltage measurement if a test lead is plugged in the T3. Instrument damage and / or personal injury may result.

- Set the function switch to DCV 200V or 1000V as required.
- Press the TEST button and Turn for continuous .
- Connect the tests lead to the instrument. The red lead is connected to the T2 (center socket (plus) / marked "T2L" on the LCD) and black lead to the T1(left hand socket (minus) / marked "T1PE" on the LCD).
- Connect the test leads to the circuit under test.
- Read the value of DC volt with polarity from the LCD.

4. Measuring AC Volts

⚠ WARNING:

- ▶ Do not attempt to make a voltage measurement of more than 600V AC or of a voltage level that is unknown.

CAUTION:

- ▶ Do not attempt to make a voltage measurement if a test lead is plugged in the T3. Instrument damage and / or personal injury may result.

- Set the function switch to ACV 200V or 600V as required.
- Press the TEST button and Turn for continuous .
- Connect the test leads to the instrument. The red lead is connected to the T2 (center socket / marked "T2L" on the LCD) and black lead to the T1(left hand socket / marked "T1PE" on the LCD).
- Connect the test leads to the circuit under test.
- Read the value of AC volt from the LCD.

5. Measuring Loop Impedance and PSC

⚠ WARNING:

- ▶ Set the function selector switch to loop $20\Omega(\text{psc})$, 200Ω , 2000Ω , range before connecting the instrument terminal T1, T2, T3 to the mains(EARTH, NEUTRAL, LINE).
- ▶ Before pressing the test button, always check the "WIRING CORRECT" and normal line voltage value on the LCD.
- ▶ If other loads are connected to the same circuit as the breaker they may cause erroneous readings. To make the most accurate measurement disconnect all appliances and other loads from the breaker circuit which is under test.

⚠ CAUTION:

- ▶ Never turn the function selector switch while the test button is depressed.
- ▶ Never change the other functions(ACV/DCV/EARTH/CONT/INSU) at this wiring conditions. Instrument damage and / or personal injury may result.

- Set the power ON/OFF switch on the instrument to the ON.
- Set the function switch to loop 20Ω / psc, 200Ω , 2000Ω as required.
- Connect the power cord adapter(PA5010) and power cord(PC5010) to the instrument as shown in Fig.1 or fig.2.
- Set the PHASE switch to $0^\circ/180^\circ$ as required. If the wiring is the Fig.2 the phase Switch should be set 180° position in order to no trip ELCB.
(If ELCB trips at 180° position set the PHASE switch to 0° position.)
- If the warning beeps and flashing the terminal T1/T2/T3, check the wiring status.
- Before the pressing the Test button, confirm the "WIRING CORRECT" and line voltage value on the LCD.
- If the "WIRING CORRECT" and normal line voltage are displayed on the LCD, press and release the test button.

- Read the value of loop impedance from the LCD. Psc data will be displayed at the loop $20\Omega/\text{psc}$ range.
- After repeated testing, the unit may be overheated and the "Hot" is displayed. If this happens, disconnect the instrument from the mains and allow to cool down.
- The test result will be held for Approx.5 seconds.

Fig.1 Checking Alignment For Loop/ Psc Range

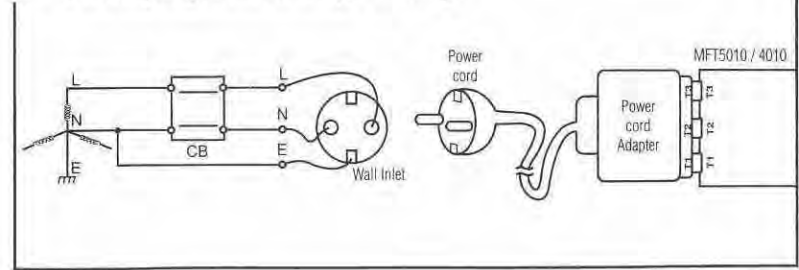
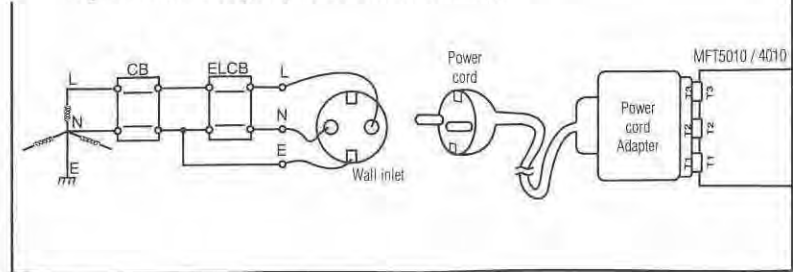


Fig.2 Trip Time Checking Alignment For RCD Range



6. Measuring RCD Trip Time

⚠ WARNING:

- ▶ Set the function selector switch to RCD 10mA/30mA/100mA/300mA/500mA range before connecting the instrument terminal T1, T2, T3 to the mains (EARTH, NEUTRAL, LINE).
- ▶ Where the measuring circuit has no probe and if a possible voltage between the protective conductor and earth will influence the measurements.
- ▶ Before pressing the test button, always check the "WIRING CORRECT" and normal line voltage value on the LCD.
- ▶ If other loads are connected to the same circuit as the breaker they may cause erroneous readings. To make the most accurate measurement disconnect all appliances and other loads from the breaker circuit which is under test.
- ▶ Never use in other types of RCCB since it is designed to be operated by current only.

CAUTION:

- ▶ Never turn the function selector switch while the test button is depressed.
- ▶ Never change the other functions(ACV/DCV/EARTH/CONT/INSU) at this wiring conditions. Instrument damage and / or personal injury may result.

PREPARATION:

- a) Set the power ON/OFF switch on the instrument to the ON.
- b) Set the ELCB rated tripping current switch to the rated trip current of the circuit breaker under test.
- c) Set the RCD FACTOR switch to $X\frac{1}{2}$.
- d) Connect the instrument to the ELCB which is to be tested as shown in Fig2.
- e) Confirm the "WIRING CORRECT" and normal line voltage value display on the LCD.
- f) If the warning beeps and flashing the terminal T1/T2/T3, check the wiring status.

NOTE: Touch voltage indication

In case E-N voltage (touch voltage) is more than 50V while RCD being checked the operation of the instrument will be stopped temporarily and to display "t-50V" on the LCD and buzzer for alert. It is requested to continue checking RCD after E-N problem being resolved.

NO TRIP TEST

- a) Set test tripping current to $X\frac{1}{2}$ range and the ELCB rated tripping current to the rated trip current of the breaker under test.
- b) Press and release the test button. Half the rated tripping current selected will pass through the breaker for 2000ms. The breaker will not trip if it is functioning correctly.
- c) While the test is being conducted, the meter display will be "mS"
- d) If the breaker trips, the display will be held for approx.5 seconds.
- e) Reverse the phase angle selector switch and repeat step(b). After repeated testing the unit may be overheated. If this happens, the "Hot" will be display on the LCD and disconnect the instrument from the mains and allow cool down.

TRIP TEST

- a) The trip test is designed to check whether the breaker trips correctly for non-delay type breakers.
- b) Set test tripping current to X1 range and the ELCB rated tripping to the rated trip current of the breaker under test.
- c) Press and release the test button. The rated tripping current will pass through the breaker for 2000msec. The beaker should trip and display the tripping time and the display will be held approx.5 seconds.
- d) After 5 seconds, the instrument is reset automatically.
- e) Reset the breaker and reverse the phase angle switch.
- f) Repeat step (c) to (d).
- g) The readings obtained in (c)~(f) should both be within the trip time specified for the breaker at its rated tripping current.
- h) If the breaker does not trip, there is a fault.

7. Measuring Earth Resistance (5010 Only)

⚠ WARNING:

- ▶ The instrument will produce a maximum voltage of about 50VAC across terminal T1(E) and terminal T3(H) or terminal T1(E) and terminal T2(S) in Earth Resistance function. Do not touch the test leads during an earth resistance test.
- ▶ Do not use in agricultural equipment to prevent damages of the equipment.

CAUTION:

- ▶ When connecting the lead wires, make sure that they are separated. If measurement is made with the lead wires twisted or in touch with each other, the reading of the instrument may be affected by induction voltage. If earth resistance of auxiliary earth spikes is too large, it may result in inaccurate measurement. Make sure to stick the auxiliary earth spikes into the moist parts of the earth. Also, ensure sufficient connections between the respective terminals and lead wires.
- ▶ When supplied series interference voltages more than 3V to between terminal "E" and "S" it prevents having accurate measurements. When the resistor value between terminal "P" and "H" is more than Max 5k Ω , it is impossible to measure.

NORMAL EARTH RESISTANCE MEASUREMENT

a) Connection of test leads

Stick the auxiliary earth spikes, S and H, into the ground as shown in Fig.3. They should be aligned at an interval of 5 to 10 meters from the earthed equipment under test. Connect the green lead wire to the terminal E(T1) of the instrument, the yellow wire to the terminal S(T2) and the red wire to terminal H(T3).

NOTE: Make sure to stick the auxiliary earth spikes in the moist part of the earth. Give enough water when the auxiliary earth spikes have to be stuck into the dry, stony or sandy part of the earth so that it may become moist.

b) Earth Resistance Measurement

Set the function switch to 2000 Ω position and press test button to make measurement. Then, if necessary turn the function switch to 200 Ω or 20 Ω position and make another measurement.

NOTE: If the earth resistance of auxiliary earth spike H is too high to make measurement, the main digit reads "----". When this time, reduce the earth resistance, for example by adding moisture to the part of the earth where the spike is stuck, and check the test lead for loose connection.

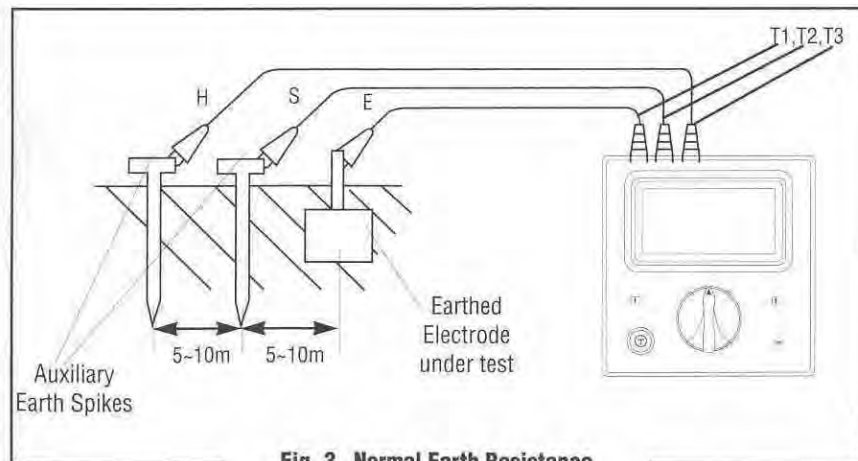


Fig. 3 Normal Earth Resistance

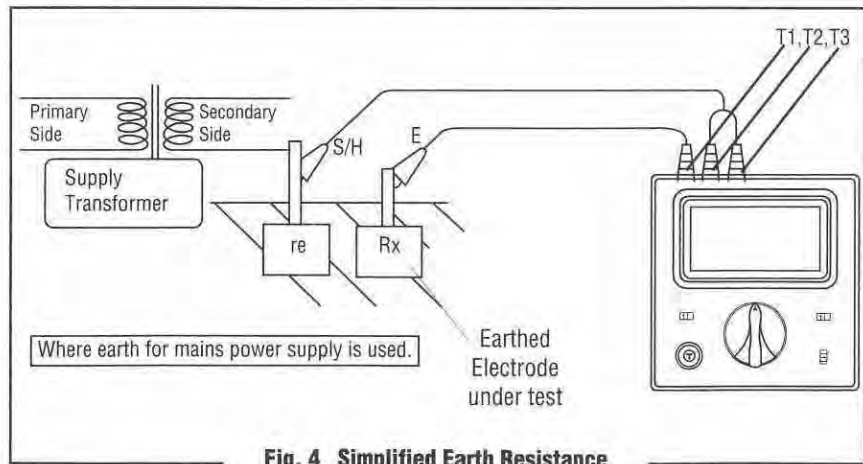
SIMPLIFIED EARTH RESISTANCE MEASUREMENT

Use this method when there is no space to stick auxiliary earth spikes. In this method, an existing earth electrode with a low earth resistance, such as metal water pipe, a common earth of a commercial power supply and an earth terminal of a building, can be used in place of S and H auxiliary earth spikes.

a) Connection of Test lead

Make connection as shown in Fig.4.

NOTE: Short H and S terminals with a shorting wire.



⚠ WARNING:

- ▶ Take caution to avoid electric shock hazard when making connection to an earth of a commercial power supply.

b) Earth Resistance Measurement

Set the function switch to 2000Ω position and press test button to make measurement. Then, if necessary turn the function switch to 200Ω or 20Ω position and make another measurement.

NOTE:

- ▶ The instrument does not trip any residual current circuit breaker in a power distribution circuit since its measuring current is less than 2mA.
- ▶ True earth resistance value R_x is calculated as follows.

$$R_x = R_E - r_e$$

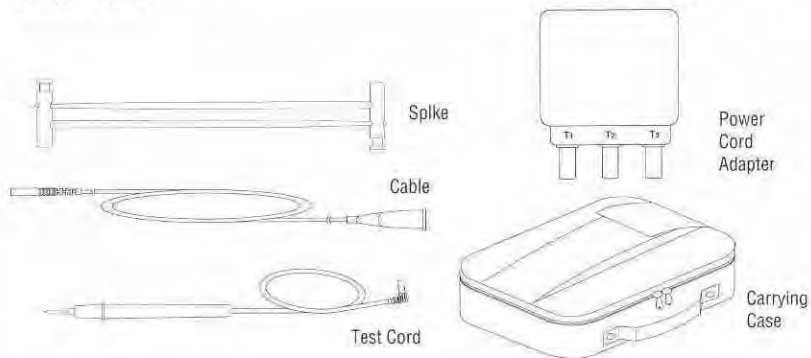
r_e : Earth resistance of a common earth of commercial power supply, etc.

Commercial power supply, etc.

R_E : Reading of the instrument.

I. ACCESSORIES

- | | |
|-----------------------------|---------|
| 1. SPIKE | SPK1000 |
| 2. Green CABLE(5M) | GC5 |
| Black CABLE(10M) | BC10 |
| Red CABLE(20M) | RC20 |
| 3. POWER CORD ADAPTER | PA5010 |
| 4. CARRYING CASE | CC5010 |
| 5. TEST CORD | TL70 |



- | | |
|-------------------------------|---------|
| 6. POWER CORD(Option) | PC5010 |
| 7. SPOOL(Option) | SPL5010 |
| 8. CARRING CASE(Option) | CC5010S |



J. MAINTENANCE

⚠ WARNING:

▶ Always disconnect the test leads from the instrument before attempting battery or fuse replacement.

1. Battery Replacement

When the LCD shows the low battery indicator, the batteries need replacing. Eight batteries (AA or equivalent) are required. Alkaline types are recommended.

- Remove the two screws from back of the housing and battery cover.
- Remove old batteries and replace with new ones observing the correct polarity as marked on the housing.
- Close the battery cover and replace the meter screw.

2. Fuse Replacement

Both the T2(0.5A/600V fast blow type) and T3(6.3A/250V time delay blow type) terminals are fuse protected.

When the T2 fuse (0.5A/600V) is blow, All of measuring does not function. When the T3 fuse(6.3A/250V) is blow, The LOOP, RCD and EARTH measuring does not function. Replace fuse as follows:

- Remove the battery cover.
- Remove the four screws from the back of housing.
- Carefully pull apart front and rear instrument housing.
- Remove old fuse(s) and replace with new fuse(s).
- Reassemble instrument in reverse order from above.

⚠ WARNING:

For Fuse replacement use only the specified unit:

600V operation 0.5A/600V fast blow. 250V operation, 6.3A/250V time delay if not search for proper fuse, to see service paragraph of your's manual.

3. Cleaning your MFT5010.

Use a mild detergent and slightly damp cloth to clean the surfaces of the MFT5010.

K. TROUBLE SHOOTING GUIDE

Problem

Probable Causes

Does not power up

- Dead or defective battery
- Broken wire from battery terminal to PCB.

Won't display current readings

- Open fuse
- Open test lead
- Improperly connected to circuit under test

L. SERVICE

For any assistance or need repair parts contact your nearest distributors or SUMMIT Co., Ltd. SUMMIT's address can be found at the back of this manual.