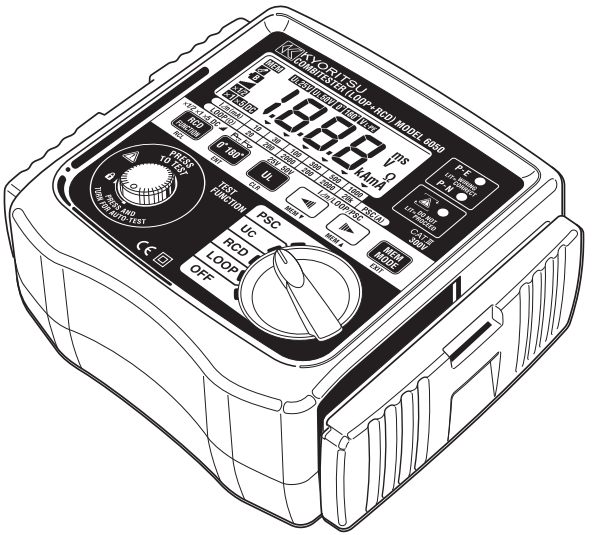
INSTRUCTION MANUAL



COMBITESTER(LOOP+RCD)

MODEL 6050

KYORITSU ELECTRICAL INSTRUMENTS WORKS, LTD.

CONTENTS

1. SAFE TESTING ⚠

Electricity is dangerous and can cause injury and death. Always treat it with the greatest of respect and care. If you are not quite sure how to proceed, stop and take advice from a qualified person. This instruction manual contains warning and safety rules which must be observed by the user to ensure safe operation of the instrument and retain it in safe condition. Therefore, read through these operating instructions before using the instrument.

IMPORTANT:

1. This instrument must only be used by a competent and trained person and operated in strict accordance with the instructions. KYORITSU will not accept liability for any damage or injury caused by misuse or non- compliance with the instructions or with the safety procedures.
2. It is essential to read and to understand the safety rules contained in the instructions or with the safety procedures.

The symbol ⚠ indicated on the instrument means that the user must refer to the related sections in the manual for safe operation of the instrument. Be sure to carefully read instructions following each symbol ⚠ in this manual.

⚠ **DANGER** is reserved for conditions and actions that are likely to cause serious or fatal injury.

⚠ **WARNING** is reserved for conditions and actions that can cause serious or fatal injury.

⚠ **CAUTION** is reserved for conditions and actions that can cause a minor injury or instrument damage.

⚠ **DANGER**

- This instrument corresponds to L-PE: 230V+10%-15%50Hz. (for some of ranges; L-L: 400V+10%-15%50Hz)
  Be sure to use it within this rated voltage.
- When conducting tests do not touch any exposed metalwork associated with the installation. Such metalwork may become live for the duration of the test.
- When testing, always be sure to keep your fingers behind the safety barriers on the test leads.
- For safety reasons only use accessories (test leads, probes, cases, etc)designed to be used with this instrument and recommended by KYORITSU. The use of other accessories is prohibited as they are unlikely to have the correct safety features.
- THE WIRING CHECK LED (P-E, P-N) of this instrument is to protect the user from electrical shock resulting from incorrect connection of Line and Neutral or Line and Earth.
  When the Neutral and Earth conductors are incorrectly wired, the WIRING CHECK LED function cannot identify the incorrect connection. Other procedures and test must be conducted to check and confirm that the wiring is correct prior to making measurement.
  Do not use this instrument to check the correct wiring of the power supply.
  Kyoritsu will not be held liable for any accident that may result from incorrect wiring of the power supply line.

⚠ **WARNING**

- **Never open the instrument case** - (except for battery replacement and in this case disconnect all leads first) because dangerous voltages are present. Only fully trained and competent electrical engineers should open the case. If a fault develops, return the instrument to your distributor for inspection and repair.
- If the overheat symbol appears on the display ( )disconnect the test lead from the circuit and allow to cool down.
- If abnormal conditions of any sort are noted (such as a faulty display, unexpected readings, broken case, cracked test leads, etc)do not use the tester and return it to your distributor for repair.
- Never attempt to use the instrument if the instrument or your hand is wet.
- Do not rotate function switch when test button is depressed.

⚠ **CAUTION**

- During testing it is possible that there may be a momentary degradation of the reading due to the presence of excessive transients or discharges on the electrical system under test. Should this be observed, the test must be repeated to obtain a correct reading. If in doubt, contact your distributor.
- Use a damp cloth and detergent for cleaning the instrument. Do not use abrasives or solvents.
- Before using the instrument, please insert the batteries rightly in accordance with the "10. BATTERY REPLACEMENT" of page 28.When not installing batteries, all the functions of the instruments don't work.

2. PROCEDURE OF REMOVING COVER

Model 6050 has a dedicated cover to protect against an impact from the outside and prevent the operation part, the LCD, and the connector socket from becoming dirty. The cover can be detached and put on the back side of the main body during measurement.

2.1 Method of removing the cover

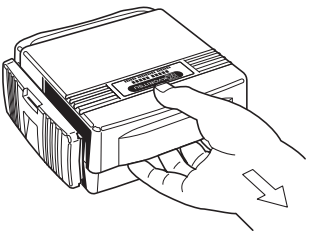


Fig. 1

2.2 Method of storing the cover

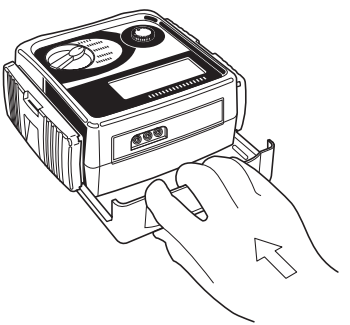


Fig. 2

3. FEATURES

3.1 Instrument Layout

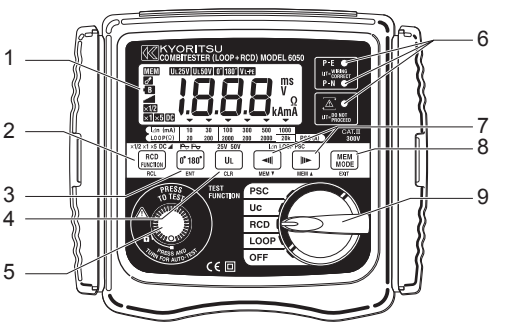
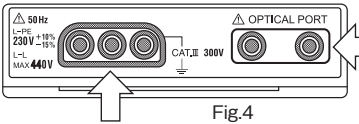


Fig. 3

1..... LCD
2..... RCD FUNCTION SELECT SWITCH
(MEMORY RECALL SWITCH)
3..... 0° /180° SELECT SWITCH
(ENTER SWITCH)
4..... UL VALUE SELECT SWITCH
(MEMORY CLEAR SWITCH)
5..... TEST BUTTON
6..... WIRING CHECK LED
LED indication of correct polarity is that the P-E and P-N LEDs are lit. P and N are reversed when the ⇆ reverse LED is lit.
7..... "I⊿n / LOOP / PSC" SELECT SWITCH
(MEMORY SELECT SWITCH)
8..... MEMORY MODE SWITCH
(MEMORY MODE EXIT SWITCH)
9..... FUNCTION SWITCH

Operation at Memory mode is shown in ( ).



Optical Adasper Model 8212
(Optional Accessory)

Fig.4

Test Lead Model 7125 or Model 7121 (Optional Accessory)

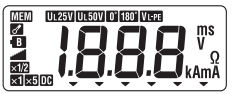


Fig.5

LCD DISPLAY

3.2 Test Lead

The instrument is supplied with Model 7125 Lead at socket outlets and Model 7121, which is an option, for measuring distribution board.

1. Model 7125

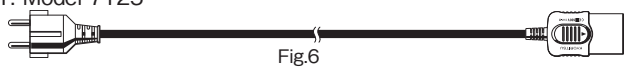


Fig.6

2. Model 7121 (Optional Accessory)

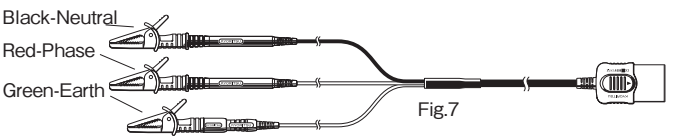


Fig.7

3.3 Optical Adapter Model 8212 (Optional Accessory)

For Model 6050, data can be transferred to PC via Optical Adapter Model 8212. Model 8212 is supplied with PC software "KEW REPORT".

Fig.8

Model 8212 operates PC/AT compatible machine on Windows®98/ME/2000/XP. Please refer to **"9.4 Transfer the stored**

data to PC" for further details.
Windows® is a registered trade mark of Microsoft in the United states.

3.4 Test Range (Function)

Model 6050 performs four functions.
1. LOOP.....Loop impedance tester
2. RCD.....RCD tester
3. Uc.....Contact voltage tester
4. PSC.....Prospective short circuit current tester

3.5 Applied Standards

Instrument operation:	IEC/EN61557-1,3,6,10
Safety:	IEC/EN61010-1 CAT Ⅲ(300V)-instrument
	IEC/EN61010-031 CAT Ⅲ(600V)-test lead
Protection degree:	IEC60529(IP54)

3.6 Features

Model 6050 has the following features:

● Wiring check	Three LEDs indicate if the wiring of the circuit under test is correct.
● Over temperature protection	Detects overheating of the internal resistor and of the current control MOS FET displaying a warning symbol ( ) and automatically halting further measurements.
● Phase angle selector	RCD test can be selected from either the positive (0°) or from the negative (180°) half-cycle of voltage. At both polarity, test minimum (best) and maximum (worst) trip times.
● Auto data hold	Measured result is being held until any switch other than MEM switch is pressed. Instrument is back to voltage measurement mode when applying voltage again during data hold function is operated.

● UL value selector	Select UL (limit of contact voltage value) 25V or 50V. Where Uc (contact voltage) exceeds UL value at RCD testing, "Uc H" will be displayed without starting the measurement.
● Voltage Indication	When connecting Test Lead to circuit, voltage between L-PE is displayed. If the voltage is lower than 100V, displayed as "V L-PE Lo". And if it is higher than 260V, displayed as "V L-PE Hi".But on L-L measurement range, displayed as "V L-PE Hi" if the voltage is 440V or more.
● Low battery warning	"B"symbol appears in the display if the battery voltage drops below 8V.
● Auto power off	Automatically switches the instrument off after a period of approximately 10 minutes.
● Display	The liquid crystal display has 3 1/2 digits with a decimal point and units of measurement (V, Ω,A,kA,mA,ms)
● Data memory, Communication facility	Can store 300 measured result. Data can be transferred to PC via Optical Adapter Model 8212.
● Optional Accessory	1) Model 7121 for measuring distribution board or lighting circuit test lead. 2) Optical Adapter Model 8212 (with PC software "Kew Report")
● Auto Test	Instrument becomes Auto test mode by turning Test button to right and locked it. Under Auto test mode, test starts automatically only by connecting Test Lead to a measuring circuit.

4. SPECIFICATION

Measurement Specification

Function	Range	Rated Voltage (AC)	Test Current	Accuracy
LOOP	20Ω	L-PE : 230V $^{+10\%}_{-15\%}$ 50Hz	3A	± (3%rdg+8dgt)
	200Ω	L-PE : 230V $^{+10\%}_{-15\%}$ 50Hz	15mA	± (3%rdg+8dgt) At L-L measurement: ± (3%rdg+12dgt)
	2000Ω	L-L : 400V $^{+10\%}_{-15\%}$ 50Hz	15mA	± (3%rdg+8dgt)
PSC	200A	L-PE : 230V $^{+10\%}_{-15\%}$ 50Hz L-L : 400V $^{+10\%}_{-15\%}$ 50Hz	15mA	PSC accuracy is a derived from measured loop impedance specification.
	2000A	L-PE : 230V $^{+10\%}_{-15\%}$ 50Hz	3A	
	20kA			

Function	Range	Rated Voltage (AC)	Test Current	Accuracy
Uc	100V	L-PE : 230V $^{+10\%}_{-15\%}$ 50Hz	max15mA 5mA only at I⊿n=10mA	+5%～+15% ± 8dgt

Function	Range	Rated Voltage (AC)	Accuracy
Voltage Measurement	100-260V L-L corresponding range: 100-440V	100-260V L-L corresponding range: 100-440V	±(2%rdg+4dgt)

Function		Rated Voltage (AC)	Accuracy	
			Trip Current	Trip Time
RCD	×1/2	L-PE : 230V$^{+10\%}_{-15\%}$ 50Hz	-8%～-2%	± (1%+3dgt)
	×1		+2%～+8%	
	×5			
	DC		± 10%	
	Auto Ramp		± 4%	

Note: Bias current (DC6mA) added to DCrange.

RCD Trip Current (I⊿n) and Trip Current Duration

		RCD Trip Current I⊿n(mA)					
		10	30	100	300	500	1000
RCD Trip Current Duration (ms)	× 1/2	1000	1000	1000	1000	1000	1000
	× 1	1000	1000	1000	1000	1000	200
	× 5	200	200	200	n.a.	n.a.	n.a.
	DC	1000	1000	1000	1000	200	n.a.
	Auto Ramp	Goes up by 10% from 20% to110% of I⊿n. 300ms×10					n.a.

n.a. :not applicable

● Instrument dimensions	186×167×89mm
● Instrument weight	980g

● Reference conditions	Specifications are based on the following conditions except where otherwise stated. 1. Ambient temperature : 23±5℃ 2. Relative humidity : 45% to 75% 3. Position : horizontal 4. AC power source : 230V,50Hz 5. Altitude : Up to 2000m
● Operating temperature and humidity.	0 to 40℃ , relative humidity 85% or less, no condensation.
● Storage temperature and humidity.	-20 to +60℃ , relative humidity 85% or less, no condensation.
● Battery type	Eight R6 or LR6 batteries Measurement times : approx 800 times or more. (Measure at the interval of 30 sec on DC 10mA range of RCD function.)
● Symbols used on the instrument	⧈ Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION. ⚠ Caution (refer to accompanying instruction manual)

● Operating Errors of Loop impedance (IEC 61557-3)

Range	Measuring range to keep operating error	Maximum percentage operating error
20Ω	0.4 ～19.99Ω	±30%
200Ω	20.0～199.9Ω	
2000Ω	200 ～1999Ω	

The influencing variations used for calculating the operating error are denoted as follows:
Temperature : 0℃ and 40℃
Phase angle : At a phase 0° to 18°
System frequency : 49.5Hz to 50.5Hz
System voltage : 230V+10%-15%
Supply voltage : 8V to 13.8V

● Operating Errors of trip current (IEC 61557-6)

Function	Operating error of trip current
×1/2	-10%～0%
×1	0%～+10%
×5	0%～+10%
Auto Ramp	-10%～+10%

The influencing variations used for calculating the operating error are denoted as follows:
Temperature : 0℃ and 40℃
Earth electrode resistance :

I⊿n(mA)	Earth electrode resistance(Ω)	
	UL50V	UL25V
10	2000	2000
30	600	600
100	200	200
300	130	65
500	80	40
1000	40	20

table.1

System voltage : 230V+10%-15%
Supply voltage : 8V to 13.8V

⚠ CAUTION

Even though the test current in the 2000 ohm range (15mA test current) is low some RCD's may trip due to sensitivity or where there may already be additional leakage in the circuit being tested.

The Loop impedance in a TN system is small and therefore it is not recommended to test in the 2000 ohm range. RCD's will have to be bridged to avoid tripping when using other test ranges.

5. LOOP IMPEDANCE / PSC TESTS

5.1 Principles of Measurement

5.1-1 Measurement of Fault Loop Impedance and Prospective Fault Current

If an electrical installation is protected by over- current protective devices including circuit breakers or fuses, the earth fault loop impedance should be measured.

In the event of a fault the earth fault loop impedance should be low enough (and the prospective fault current high enough)to allow automatic disconnection of the electrical supply by the circuit protection device within a prescribed time interval.

Every circuit must be tested to ensure that the earth fault loop impedance value does not exceed that specified or appropriate for the over- current protective device installed in the circuit.

For a TT system the earth fault loop impedance is the sum of the following impedances;

- Impedance of the power transformer secondary winding.
- Impedance of the phase conductor resistance from the power transformer to the location of the fault.
- The impedance of the protective conductor from the fault location to the local earth system.
- Resistance of the local earth system (R).
- Resistance of the power transformer earth system (Ro).

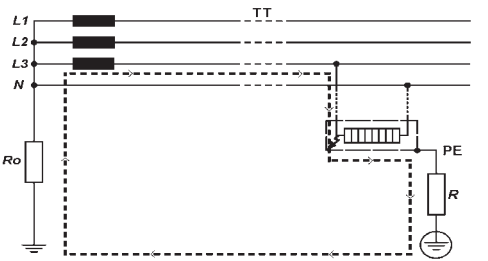


Fig.9

For TN systems the earth fault loop impedance is the sum of the following impedances.

- Impedance of the power transformer secondary winding.
- Impedance of the phase conductor from the power transformer to the location of the fault.
- Impedance of the protective conductor from the fault location to the power transformer.

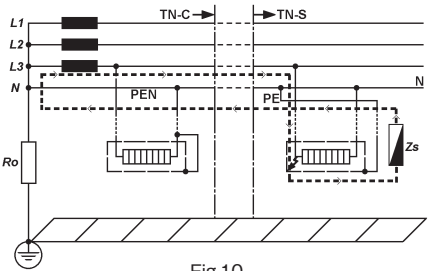


Fig.10

In accordance with the international standard IEC 60364 for a TT system the following condition shall be fulfilled for each circuit.

RA must be ≤50/Ia

where;

RA is the sum of the resistances of the local earth system R and the protective conductor connecting it to the exposed conductor part.

50V is the maximum voltage limit (it may be 25V in certain circumstances).

Ia is the value of current that causes automatic disconnection of the protective device within 5 seconds.

When the protective device is a residual current device (RCD), Ia is the rated residual operating current I⊿n.

For example in a TT system protected by an RCD the maximum RA values are as follows;

	Rated residual operating current I⊿n mA					
	10	30	100	300	500	1000
RA (at 50V) Ω	5000	1667	500	167	100	50
RA (at 25V) Ω	2500	833	250	83	50	25

Practical example of verification of the protection is a TT system according to the international Standard IEC 60364.

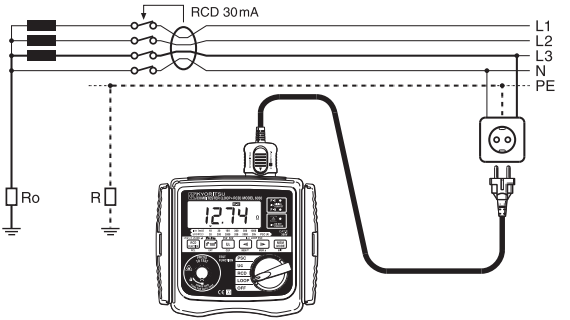


Fig.11

For this example the maximum value is 1667Ω,the loop tester reads 12.74 Ωand consequently the condition RA is ≤ 50/Ia is met.
It is fundamental for this example to test also the RCD to ensure that operation takes place quickly enough to respect the safety requirement.
According to the international Standard IEC 60364 for TN system the following condition shall be fulfilled for each circuit:

$$Zs \leq Uo/Ia$$

Where;
Zs is the earth fault loop impedance.
Uo is the nominal voltage between phase and earth.
Ia is the current that causes the automatic disconnection of the protective device within the time stated in the following table.

Uo (Volts)	T (seconds)
120	0.8
230	0.4
400	0.2
>400	0.1

Note:

- For a distribution circuit a disconnection time not exceeding 5s is permitted.
- When the protective device is a residual current device (RCD),Ia is the rated residual operating current I⊿n.

For instance in a TN system with a nominal voltage of Uo =230V protected by type gG fuses the Ia and maximum Zs values could be:

Rating (A)	Disconnecting time 5s		Disconnecting time 0.4s	
	Ia(A)	Zs(Ω)	Ia(A)	Zs(Ω)
6	28	8.2	47	4.9
10	46	5	82	2.8
16	65	3.6	110	2.1
20	85	2.7	147	1.56
25	110	2.1	183	1.25
32	150	1.53	275	0.83
40	190	1.21	320	0.72
50	250	0.92	470	0.49
63	320	0.71	550	0.42
80	425	0.54	840	0.27
100	580	0.39	1020	0.22

If the prospective fault current is measured, its value must be higher than the Ia value of the protective device concerned.
On 200A PSC range, for Loop impedance lower than 5 ohm (PSC greater than 50A approx 230V) is not possible to obtain an accurate PSC reading even if the unit will give a result. In these cases, for accurate PSC tests, please use the 2000A or 20kA ranges.

Practical example of verification of the protection is a TT system according to the international Standard IEC 60364.

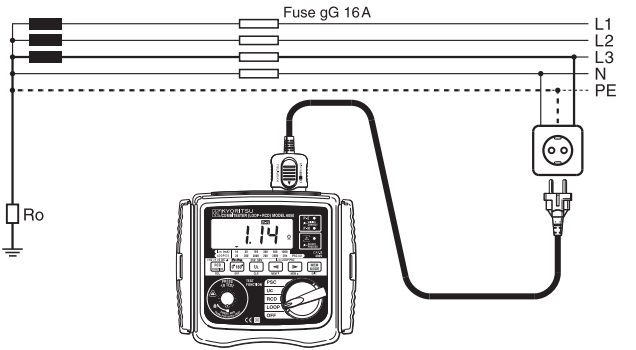


Fig.12

The maximum value of Zs for this example is 2.1Ω(16amp gG fuse,0.4 seconds).The loop tester reads 1.14Ωand consequently the condition Zs≤Uo / Ia is met.

5.1.2 Principles of the Measurement of Line Impedance and Prospective Short Circuit Current

Line impedance is the impedance, which is measured between Phase-terminal L and Neutral-terminal N of single-phase system, or between two phases of three-phase system. Measurement principal used in this instrument is the same as it for Fault loop impedance measurement, but measurement is performed between Terminal L and N, or between two phases.

Breaking current capacity of installed over-current protection devices should be higher than Prospective Short-Circuit current, otherwise it is necessary to change the rated current of involved over-current protection device.

Method of Impedance test between Line and Neutral and Prospective Short Circuited Current test

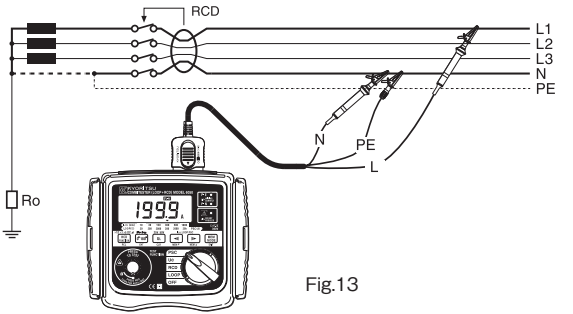


Fig.13

Method of Impedance test between Line and Line and Prospective Short Circuited Current test

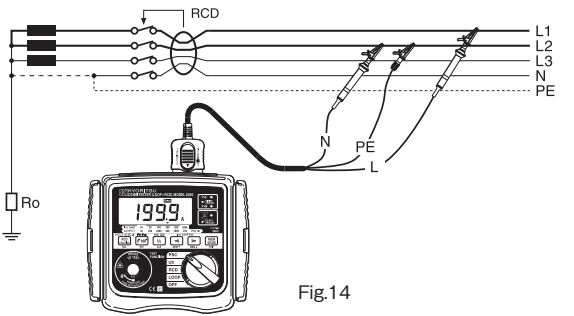


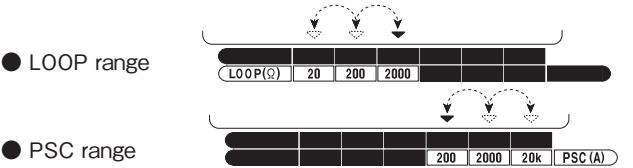
Fig.14

5.2 LOOP Impedance and PSC Testing

5.2.1 Preparation

(1) Turn Function switch and power on the instrument. Select LOOP or PSC.

(2) Select the range for a test with "I⊿n / LOOP / PSC" SELECT SWITCH. By pressing "I⊿n / LOOP / PSC" SELECT SWITCH, ▼ mark on LCD shifts and can select each range.



The Initial value	
LOOP Range	2000Ω
PSC Range	200A

5.2.2 Wiring Check

(1) Insert the Test Lead into the instrument.(Fig.15)
(2) Connect test lead to object to be tested.(Fig.11,12,13,14)
(3) Make sure that the P-E and P-N wiring Check LEDs are lit and the wiring in correct LED is not lit. If it is not correct, disconnect the tester and check the wiring for a possible fault.

5.2.3 Testing

(1) Press the test button. A beep will sound as the test is conducted and the value of loop impedance will be displayed.

> ⚠ **CAUTION**
> The RCD of a circuit shall be bypassed when measuring on LOOP 20 Ω range. Do not operate the Test button on RCD while RCD is bypassed. Be sure to get back the bypassed RCD after test.

Note: When Test Lead removed during a measurement, "no" is displayed on LCD and a measurement will be stopped. Please check Test Lead is rightly connected.

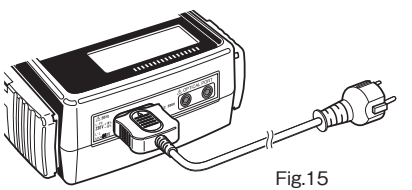


Fig.15

6. RCD TESTS

6.1 Principles of Measurement

The RCD tester is connected between phase and protective connectors on the load side of the RCD after disconnecting the load. A precisely measured current for a carefully timed period is drawn from the phase and returns via the earth, thus tripping the device. The instrument measures and displays the exact time taken for the circuit to be opened. An RCD is a switching device designed for breaking currents when the residual current attains a specific value. It works on the basis of current difference between phase currents flowing to different loads and returning current flowing through the neutral conductor (for a single-phase installation). In the case where the current difference is higher than the RCD tripping current, the device will trip and disconnect the supply from the current.

There are two classifications for RCDs; the first one due to the shape of the residual current wave form (types AC and A)and the second due to the tripping time (types G and S).

- RCD type AC will trip when presented with residual sinusoidal alternating currents whether applied suddenly or slowly rising. This type is the most frequently used on electrical installations.
- RCD type A will trip when presented with residual sinusoidal alternating currents (similar to type AC)and residual pulsating direct currents (DC)whether suddenly applied or slowly rising. This type of RCD is not commonly used at present, however, it is increasing in popularity and is required by the local regulations in some countries.
- RCD type G. In this case G stands for general type (without trip- out time delay)and is for general use and applications.
- RCD type S where S stands for selective type (with trip-out time delay).This type of RCD is specifically designed for installations where the selectivity characteristic is required. In order to assure successful protection on an electrical installation using RCD's they should be checked to test trip- out time t⊿.
- Trip- out time t⊿ is the time needed by the RCD to trip at a rated residual operating current of I⊿n. The standard values of tripping time are defined by IEC 61009 (EN61009) and IEC 61008 (EN 61008) and are listed in the table below for I⊿n and 5I⊿n.

Type of RCD	I⊿n	5I⊿n
General(G)	300ms max. allowed Value	40ms max. allowed Value
Selective(S)	500ms max. allowed Value	150ms max. allowed Value
	130ms min. allowed Value	50ms min. allowed Value

Typical examples of instrument connection
Practical example of 3-phase + neutral RCD test in a TT system.

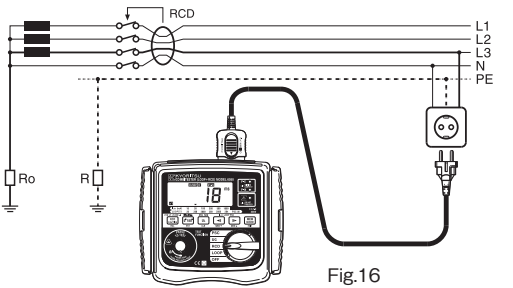


Fig.16

Practical example of 3-phase + neutral RCD test in a TN system

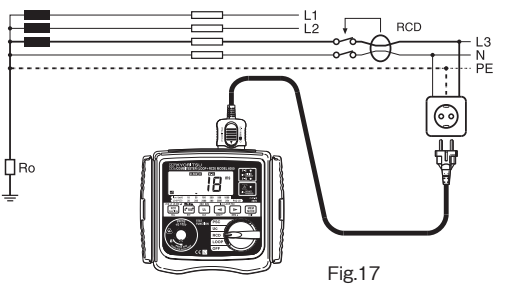


Fig.17

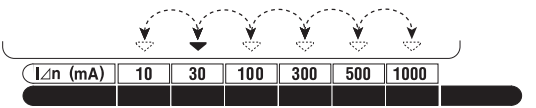
6.2 RCD Testing

6.2.1 Preparation

(1) Turn Function switch and power on the instrument. Select RCD.
(2) Press RCD Function switch to select RCD Function for test. Selected function will be displayed on LCD.

× 1/2	For testing RCD's to verify that they are not too sensitive.
× 1	For measuring the trip time.
× 5	For testing at I⊿n ×5.
DC	For testing DC sensitive RCD's.
AUTO RAMP TEST(◢)	For measuring the trip out current.

(3) Press the "I⊿n / LOOP / PSC" SELECT SWITCH to set the Rated Tripping Current (I⊿n) to the rated trip current of the RCD. Every time "I⊿n / LOOP / PSC" SELECT SWITCH is pressed, ▼ mark on LCD shifts. Select I⊿n with above switch.



(4) Press the UL value select switch to select switch UL value (25 or 50V).

The Initial value	
RCD Function	× 1/2
I⊿n	30mA
0° /180°	0°
UL	50V

6.2.2 Wiring Check

(1) Insert the Test Lead into the instrument. (Fig.15)
(2) Connect test lead to object to be tested. (Fig.16,17)
(3) Make sure that the P-E and P-N wiring Check LEDs are lit and the wiring in correct LED is not lit. If it is not correct, disconnect the tester and check the wiring for a possible fault.

6.2.3 Testing

(1) Press the TEST BUTTON

Operating time of RCD is displayed on LCD. At Auto Ramp, operating current value of RCD will be displayed.

- × 1/2.....The Breaker should not trip.
- × 1.....The Breaker should trip.
- × 5.....The Breaker should trip.
- DC..... The breaker should trip.
- Auto Ramp(◢).. The Breaker should trip. Check Trip Out Current.

(2) Press the 0° /180° switch to change the phase and repeat step(1).

(3) Change the phase again and repeat step (1).

- Be sure to return the tested RCD to the original condition after the test.

> ⚠ **CAUTION**
>
> - When the Uc voltage rises to UL value or greater, the measurement is automatically suspended and "UcH" is displayed on the LCD.

MAKE SURE TO KEEP CLEAR OF EARTHED METAL DURING THE OPERATION OF THESE TESTS.

Note:

- If the RCD does not trip, the tester will supply the test current for a maximum of 1000ms on the X1/2 and X1 ranges. The fact that the RCD has not tripped will be evident because the P- N and P- E LEDs will still be on.
- If "I⊿n" setting is grater than the rated residual current of RCD, RCD will trip and "no" may be displayed on LCD.
- If a voltage exists between the protective conductor and earth, it may influence the measurements.
- If a voltage exists between neutral and earth, it may influence the measurements, therefore, the connection between neutral point of the distribution system and earth should be checked before testing.
- If leakage currents flow in the circuit following the RCD, it may influence the measurements.
- The potential fields of other earthing installations may influence the measurement.
- Special conditions of RCDs of a particular design, for example S-type, shall be taken into consideration.

● The earth electrode resistance of a measuring circuit with a probe shall not exceed table1(page 12).

For the RCD range of Model 6050, distortion factor of test current is improved compared with our traditional instruments. Therefore, at operating time measurement of RCD, operating time of some RCD and our traditional instruments may differ a little.

7. Uc TESTS

7.1 Principles of Measurement

In fig.16, when grounding is incomplete and R exists, voltage occurs to R if fault current flows in R. Person may touch this voltage, and the voltage occurs to a person at this bout is called as Uc. At Uc test, the value, when Uc reaches maximum, is calculated.

7.2 Uc Testing

7.2.1 Preparation

(1) Turn Function switch and power on the instrument. Select Uc.

(2) Press the "I⊿n / LOOP / PSC" SELECT SWITCH to set the Rated Tripping Current (I⊿n) to the rated trip current of the RCD. Every time "I⊿n / LOOP / PSC" SELECT SWITCH is pressed, ▼mark on LCD shifts. Select I⊿n with above switch.

The Initial value	
I⊿n	30mA

7.2.2 Wiring Check

(1) Insert the Test Lead into the instrument.(Fig.15)

(2) Connect test lead to object to be tested.(Fig.16,17)

(3) Make sure that the P-E and P-N wiring Check LEDs are lit and the wiring in correct LED is not lit. If it is not correct, disconnect the tester and check the wiring for a possible fault.

7.2.3 Testing

(1) Press the TEST BUTTON.

(2) Measured result is displayed on LCD.
If the measured result is 100V or more, "UcH V" is displayed on LCD.

Note : When Test Lead removed during a measurement, "no" is displayed on LCD and a measurement will be stopped. Please check Test Lead is rightly connected.
If "I⊿n" setting is grater than the rated residual current of RCD, RCD will trip and "no" may be displayed on LCD.

8. AUTO-TEST

When applying voltage to the instrument, with Test button is turned and being locked, voltage value is displayed on LCD. And 3sec. later, a measurement on selected function is performed automatically. Be sure to release the locked Test button after a measurement.

9. STORE / RECALL A MEASURED RESULT

Measured result at each function can be stored in the memory of the instrument. (MAX : 300)

9.1 How to store data

Store the result according to following sequence.

(1) After a measurement, press MEMORY MODE SWITCH ("MEM MODE" SWITCH) while measured result is being displayed. Then instrument becomes MEMORY MODE, and " MEM " mark appears on the LCD. The action of each switch changes as shown under each switch.

(2) Select the Data No you want to store with MEMORY SELECT SWITCH ("MEM ▼▲ "SWITCH).

(3) Decide it with ENTER SWITCH("ENT" SWITCH).

(4) Select the Place No you want to store with MEMORY SELECT SWITCH ("MEM ▼▲ "SWITCH).

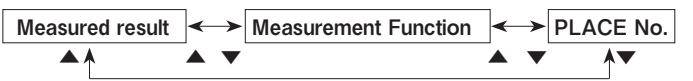
(5) Decide it with ENTER SWITCH("ENT" SWITCH).
Data will be stored and back to voltage measurement mode automatically.

- By pressing MEMORY MODE EXIT SWITCH ("EXIT" SWITCH) during an operation, can undo the last action.
- When making a measurement, press MEMORY MODE EXIT SWITCH("EXIT" SWITCH) and release the MEMORY MODE. Measurement cannot be performed when Test button is pressed while " MEM " mark is being displayed on the LCD.

9.2 Recall the stored data

Stored data can be displayed on LCD according to following sequence.

(1) Press MEMORY MODE SWITCH ("MEM MODE" SWITCH) on stand-by(at "Lo V" is displayed).
Then instrument becomes MEMORY MODE, and " MEM " mark appears on the LCD. The action of each switch changes as shown under each switch.
(2) Press MEMORY RECALL SWITCH ("RCL" SWITCH).
(3) Select the Data you want to recall with MEMORY SELECT SWITCH ("MEM ▼▲ "SWITCH).
(4) Decide it with ENTER SWITCH ("ENT" SWITCH).
Selected data can be called up.
(5) By pressing MEMORY SELECT SWITCH ("MEM ▼▲ "SWITCH), indication is changed as follows.



- By pressing MEMORY MODE EXIT SWITCH ("EXIT" SWITCH) during an operation, can undo the last action.
- When making a measurement, press MEMORY MODE EXIT SWITCH("EXIT" SWITCH) and release the MEMORY MODE. Measurement cannot be performed when Test button is pressed while " MEM " mark is being displayed on the LCD.

9.3 Delete the stored data

Stored data can be deleted according to following sequence.

(1) Press MEMORY MODE SWITCH ("MEM MODE" SWITCH) on stand-by (at "Lo V" is displayed).
Then instrument becomes MEMORY MODE, and " MEM " mark appears on the LCD. The action of each switch changes as shown under each switch.

(2) Press MEMORY RECALL SWITCH ("RCL" SWITCH).

(3) Select the Data you want to delete with MEMORY SELECT SWITCH ("MEM ▼▲ "SWITCH).
Select "ALL" when you delete all data.

(4) Press MEMORY CLEAR SWITCH ("CLR"SWITCH).
The "clr" is displayed with blinking on LCD.

(5) Press ENTER SWITCH ("ENT" SWITCH) and delete the selected data.

● By pressing MEMORY MODE EXIT SWITCH ("EXIT" SWITCH) during an operation, can undo the last action.

● When making a measurement, press MEMORY MODE EXIT SWITCH("EXIT" SWITCH) and release the MEMORY MODE. Measurement cannot be performed when Test button is pressed while " MEM " mark is being displayed on the LCD.

9.4 Transfer the stored data to PC

The stored data can be transferred to PC via Optical Adapter Model 8212 (Option).

● How to transfer the data:

(1) Firmly insert the D-SUB 9Pin female connector of Model 8212 into the socket(D-SUB 9Pin male) of PC.

(2) Insert Model 8212 into Model 6050 as shown in fig.18.
Test Leads shall be removed from Model 6050 at this time.

(3) Turn on Model 6050. (Any function is OK.)

(4) Start special software "KEW REPORT" on your PC and set the communication port. Then click "Down load" command, and the data in Model 6050 will be transferred to your PC. Please refer to the instruction manual of Model 8212 and HELP of KEW REPORT for further details.

Fig.18

● **Model 8212 system requirements**

(1) PC/AT compatible machine on which Microsoft Windows® 98/ME/2000/XP can operate.
(2) Pentium 233MHz or more recommended.
(3) RAM 64Mbyte or more.
(4) SVGA (800X600) or more.
XGA(1024X768) recommended.
(5) 20MB or more of free hard disk space recommended.
(6) One free COM port
(7) CD-ROM drive (necessary at installing)

● Trade mark

Windows® is a registered trade mark of Microsoft in the United states.
Pentium is a registered trade mark of Intel in the United states.

10. BATTERY REPLACEMENT

⚠ DANGER

● Never open the battery compartment cover while making measurement. To avoid possible electrical shock, disconnect the test probe before opening the cover for battery replacement.

⚠ CAUTION

● Install batteries in correct polarity as marked inside.

① Disconnect Test Lead from the instrument.
② Open the battery compartment cover by unscrewing the metal captive screw to reveal battery compartment. Always replace all eight batteries with new ones at the same time.

Battery type: 8 x R6P, 1.5V AA or equivalent

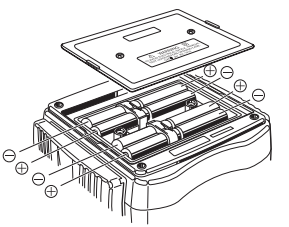


Fig.19

11. SERVICING

If this tester should fail to operate correctly, return it to your distributor stating the exact nature of the fault. Before returning the instrument ensure that:-
1. The batteries are in good condition.

Please remember to give all the information possible concerning the nature of the fault, as this will mean that the instrument will be serviced and returned to you more quickly.

12. CASE AND STRAP ASSEMBLY

Correct assembly is shown in Fig20,21. By hanging the instrument round the neck, both hands will be left free for testing.

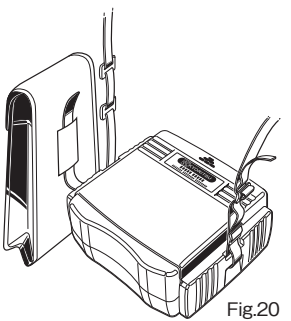


Fig.20

Pass the strap belt down through the side panel of the main body from the top, and up through the slots of the probe case from the bottom.

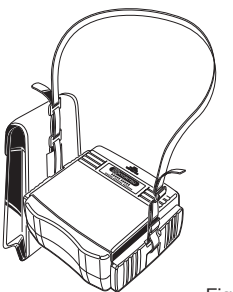


Fig.21

Pass the strap through the buckle, adjust the strap for length and secure.

DISTRIBUTOR

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