

# KEWTECH

KT56 digital multi function tester



Instruction manual

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### 1 Safety Notice

- 1.1 This instrument must only be used by a competent, trained person and operated in strict accordance with the instructions. Kewtech will not accept liability for any damage or injury caused by misuse or non-compliance with the instructions or safety procedures.
- 1.2 It is essential to read and understand the safety rules contained in the instructions. They must always be observed when using the instrument.
- 1.3 This meter has been designed with your safety in mind. However, no design can completely protect against incorrect use. Electrical circuits can be dangerous and/or lethal when lack of caution or poor safety practice is used.
- 1.4 Read this instruction manual carefully and completely.
- 1.5 Double check all switch settings and lead connections before making any measurements. **Do not touch** exposed wiring, connections or other 'LIVE' parts of an electrical Circuit.
- 1.6 This instrument is intended to be used on live installations rated at 230V +10% -15% AC phase to earth or phase to neutral. Under NO circumstances must it be connected to higher voltage or phase to phase. Maximum voltage

between mains test terminals and ground is 300V.

- 1.7 Never open the instrument case. There are no user serviceable parts inside.
- 1.8 Always inspect the unit and test leads for any signs of abnormality or damage. If abnormal conditions exist (e.g. broken lead, cracked case, faulty display, inconsistent reading etc.), do not attempt to take any measurements and return the unit to Kewtech for rectification.
- 1.9 If the unit does not power up, inspect your leads for damage or a blown fuse. (**Never assume the installation is not live**).
- 1.10 If at anytime during testing there is a momentary degradation of reading, this may be due to excessive transients or discharges on the system or local area. Should this be observed, the test should be repeated to obtain a correct reading. If in doubt always contact Kewtech.
- 1.11 For safety reasons always only use accessories (e.g. leads, probes, fuses, cases etc) recommend by Kewtech as they are designed to work with the tester. The use of any other items is prohibited as they may not have the same safety features built in.
- 1.12 Always keep your hands and fingers behind all finger guards on test leads used with this instruments.
- 1.13 This instrument is primarily protected by HRC ceramic fuses and other devices. **Do not** attempt to replace them if they fail. Should they fail please contact Kewtech.
- 1.14 Users of this equipment and or their employers are reminded that Health and Safety Legislation require them to carry out valid risk assessments of all electrical work so as to identify potential sources of electrical danger and risk of electrical injury such as from inadvertent short circuits. Where the assessments show that the risk is significant then the use of fused test leads constructed in accordance with the HSE guidance note GS38 Electrical Test Equipment for use by Electricians should be used.

## 2 Features and Principles of Measurement

### 2-1 Features

- ▲ LED mains status indication.
- ▲ Digital readout of trip time
- ▲ Constant current measurement
- ▲  $0^\circ$  and  $180^\circ$  phase selection
- ▲ DC test function for testing DC
- ▲ Excessive Fault Voltage ( $U_f$ ) warning and lockout

### 2-2 Principles of Measurement (Fault Loop Impedance)

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.

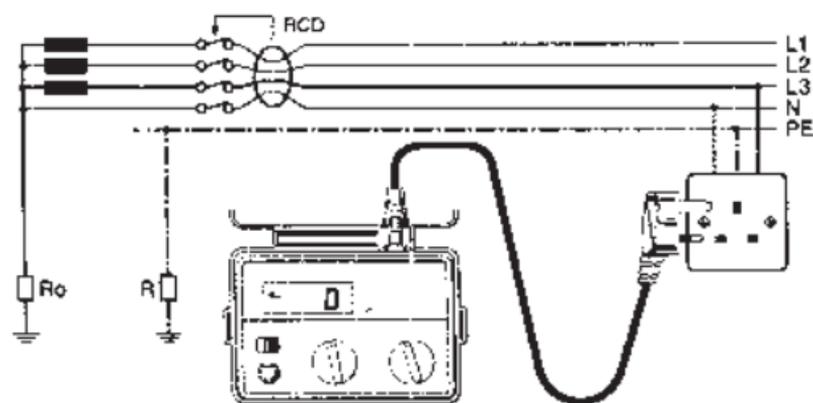
- ▲ RCD type A will trip when presented with residual sinusoidal alternating currents (similar to type AC) and residual pulsating direct currents (DC) whether suddenly applied or slowly rising. This type of RCD is not commonly used at present, however, it is increasing in popularity and is required by 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 RCDs they should be checked to test trip-out time  $t\Delta$ .
- ▲ Trip-out time  $t\Delta$  is the time needed by the RCD to trip at a rated residual operating current of  $I\Delta n$ . The standard values of tripping time are defined by IEC 61009 (EN 61009) and IEC 61008 (EN 61008) and are listed in the table below for  $I\Delta n$  and  $5I\Delta n$ .

Type of RCD	$I\Delta n$	$5I\Delta n$
General (G)	300ms	40ms
	max allowed value	max allowed value
Selective (S)	500ms	*150ms
	max allowed value	max allowed value
	130ms	*50ms
	max allowed value	max allowed value

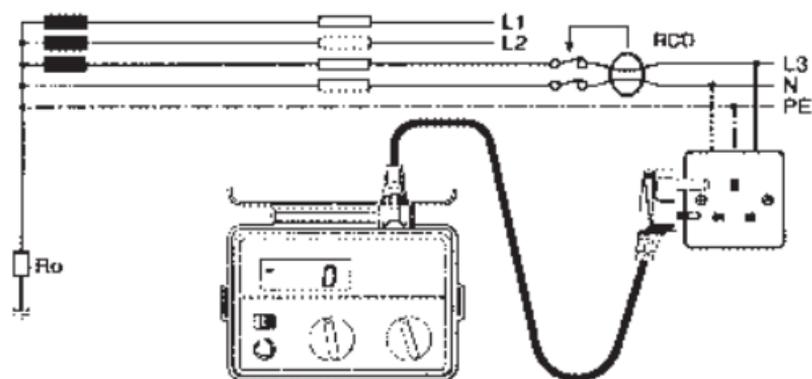
- ▲ Maximum  $5I\Delta n$  tripping time is limited to 50 ms as required by BS7671 when 'OL' is displayed.

## Typical examples of instrument connection

Practical example of 3-phase + neutral ROD test in a TT system.



Practical example of single phase RCD test in a TN system.



### 3 Introduction

3.1 Your KT56 Tester uses the latest state of the art Microprocessor Technology to give the best possible performance and accuracy.

3.2 Independent Constant Current Control

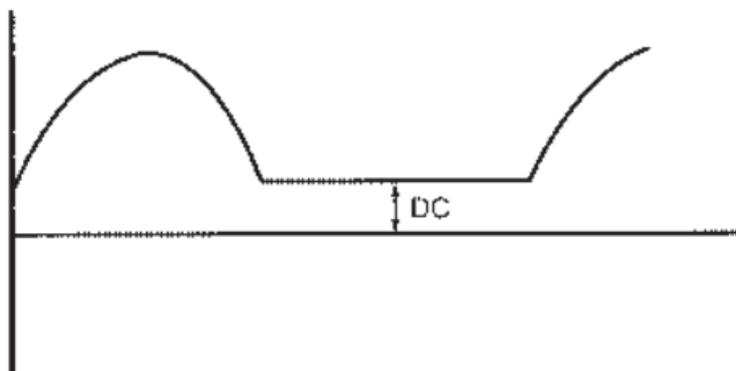
Constant current circuitry permits accurate and consistent readings even when the voltage fluctuates by 230V + 10% - 15%

3.3 DC Sensitive Breakers

When the KT56 is switched to the DC mode it will test 30 mA DC sensitive breakers. If the fault current to earth is not a pure sine wave but has a DC current component, it is possible that the breaker will not trip at its rated tripping current. It is only those breakers that are also sensitive to DC fault current that will trip with this type of fault current.

The KT56 is capable of testing these breakers by introducing a DC fault current-

#### Fluctuating DC Waveform



#### DC sensitive RCDs will trip

To check whether a DC sensitive RCD is functioning a DC fault is injected with the above waveshape (reference IEC 1008).

## 4 Specifications

### Measurement Specification

Test Current Settings	10, 20, 30, 100, 300, 500mA	
Test Current Factors	X1/2, X1, X5, DC	
Fault Trip Current Duration	2000ms (X1/2, X1, DC 50 ms (X5))	
Rated System Voltage	230+10% -15%	
Test Current Intrinsic Accuracy	X1/2	- 8% - 2%
	X1	+2% +8%
	X5	+2% +8%
	DC	±10%
Trip Time Intrinsic Accuracy	± (0.6% + 4dgts)	

### Reference Conditions

Ambient Temperature:	23±5 °C
Relative Humidity:	60±15%
Nominal System Voltage and Frequency:	230V, 50Hz
Altitude:	Less than 2000m

### Operating Error (Trip Current) EN61557-6

Function	Operating Error
x 1/2	-10% to 0%
x 1	0% to +10%
x5	0% to +10%

The influencing variations used for calculating the Operating Error are as follows;

Ambient Temperature:	0°C and 40 °C
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Earth electrode resistance:	Max 50Ω (max 20Ω at x 5 500mA only)
System voltage:	230V+ 10% -15%
Relative Humidity:	Less than 85%

### General Specification

Storage Temperature:	-20 °C to +60 °C
Storage Relative Humidity:	85% maximum
Weight:	540g
Maximum Altitude:	2000m
Dimensions:	175 X 115 X 85.7 mm
Over Range indication:	'OL'
Input Voltage greater than 260V indication:	'VP-E Hi'
Over Temperature indication:	

### Applied Standards

Instrument operating standard: - IEC/EN 61557-1, IEC/EN 61557-6

Safety standard: - IEC/EN 61010-1, CAT III (300v) - instrument

Protection degree: - IEC 60529 (IP40)

### Accessories

KAMP10 Mains test lead with IEC Connector  
Test lead carry pouch

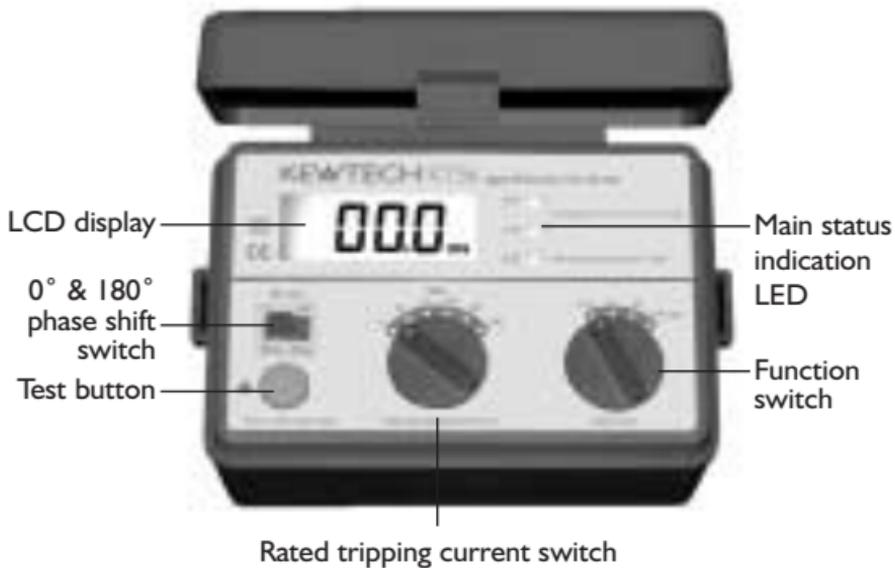
This manual and product may use the following symbols adopted from international Safety Standards.

 Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION.

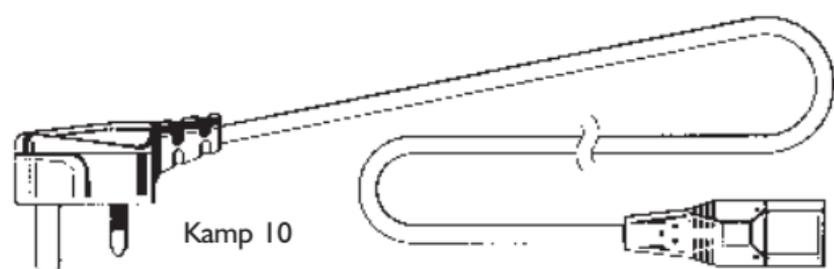
 Caution, risk of electric shock.

 Caution (refer to accompanying documents).

## 5 Instrument layout



## Test lead



## LCD display



## 6 Operating Instructions

6.1 Initial Checks: to be carried out before any testing;

- a) Always inspect your test instrument and lead accessories for abnormality or damage-

If abnormal conditions exist **DO NOT PROCEED WITH TESTING**. Have the instrument checked by Kewtech.

- b) Before pressing the test button; always check the LED's for the following sequence:

P-E Green LED must be ON

P-N Green LED must be ON

Red LED must be OFF

If the above sequence is **NOT** displayed or the **RED** LED is on for any reason, **DO NOT PROCEED AS THERE IS INCORRECT WIRING**. The cause of the fault must be investigated and rectified.

- c) If other loads are connected to the test circuit; these may cause erroneous readings. To make the most accurate readings, loads on the circuit should be disconnected.
- d) Use only the leads supplied with instrument or Kewtech approved equivalents.
- e) If the fault voltage ( $U_f$ ) exceeds 50V AC the display will indicate 'VN-E-Hi' and the tester will be unable to continue the measurement.
- f) If the over temperature symbol appears on the display disconnect the instrument and allow it to cool down.
- g) If the input voltage is greater than 260V the display will indicate 'VP-E Hi' and the measurement will be halted.
- h) When making a test with the selected range higher than the rated tripping current of the RCD, the RCD may trip and the display will indicate 'no'.

## 6.2 Preparation:-

- a) Connect the instrument to the circuit to be tested (see following sections for procedure). Make sure the LED's are lit as per the initial checks.
- b) If the sequence is not correct, disconnect the instrument and check the installation wiring for a possible fault.

## 6.3 Testing

- a) No Trip Test ( $X1/2$ )
- b) The No Trip Test is designed to ensure that the circuit breaker is operating within its specifications and is not too sensitive.
- c) Set test tripping current to  $X1/2$  range and the RCD rated tripping current to the rated trip current of the breaker under test.
- d) Press and release the Press to Test button. Half the rated tripping current selected will pass through the breaker. The breaker will not trip if it is functioning correctly.
- e) While the test is being conducted the meter display will be 'ms'.
- f) If the Press to Test button is released the result will be displayed for 3s before reverting to zero. If the button is held down, the result will be displayed until the button is released.
- g) If the breaker trips, the display will read the trip time. The display will be held for approx 10s.
- h) Reverse the phase angle switch and repeat above.

After repeated testing the unit may overheat. This is indicated by the over temperature sign. If this happens disconnect the unit from the mains and allow to cool down.

This applies to the No Trip Test, Trip Test, Fast Trip Test and DC Trip Test.

## 6.4 Trip Test (X1)

- a) Select the X1 test tripping current.
- b) Press the test button. The RCD should trip and the tripping time will be displayed on the instrument LCD in mS. While the test is being conducted the display will indicate 'ms'.
- c) Reset the breaker and reverse the phase angle switch. Press the Press to Test button and the breaker should trip.
- d) Reset the breaker and reverse the phase angle switch again. Press the Press to Test button the breaker should trip.
- e) The readings obtained in 5-4-d and 5-4-c should both be within the trip time specified for the breaker at its rated tripping current.
- f) If the breaker does not trip there is a fault.
- g) To hold the reading press and hold down the Press to Test button.

## 6.5 Fast Trip Test

- a) This is a special test required for a circuit breaker that is installed to reduce the risk associated with direct contact for breakers rated up to 30 mA.
- b) Set the test tripping current function switch to the X5 position.
- c) Set the RCD rated tripping current switch to 30 mA.
- d) Set the phase angle switch to the 0° position.
- e) Press and release the Test button. The breaker should trip.
- f) Reset the breaker. Change the phase angle switch to the 180° position and press the Test button.
- g) Rest the RCD to 0° and press the Test button.
- h) The trip times of the last two measurements should both be less than 40 ms. If the tripping times are greater than 40

ms the RCD may be faulty and must be re-checked.

## 6.6 Testing DC sensitive RCDs

- a) The following test is designed for those breakers which are sensitive to DC fault currents. It is primarily designed to test breakers of 30 mA rating.
- b) Set the RCD rated tripping current switch to 30 mA.
- c) Set the function switch to DC test.
- d) Select 0° phase angle.
- e) Press the Press to Test button, the breaker should trip with the trip time displayed in 'ms'.
- f) Repeat steps 5-6-b-5-6-e but with the phase angle switch to 180°.

### **Note**

If a voltage exists between neutral and earth it may influence the measurements, therefore, the connection between the neutral point of the distribution system and earth should be checked prior to testing.

If leakage currents flow in the circuit following the RCD this may influence the measurements.

The potential fields of other earthing installations may influence the measurement.

Specific requirements of RCD's of a particular design for example S type should be taken into consideration.

The earth electrode resistance of a measuring circuit with a probe shall not exceed 50Ω (20Ω at x 5 500mA only).

## 7 Servicing and Calibration

If this tester should fail to operate correctly, return it to Kewtech marked for the attention of the Service Department. stating exact nature of fault. Make sure that:

- a. operating instructions have been followed
- b. leads have been inspected
- c. the unit is returned with all accessories

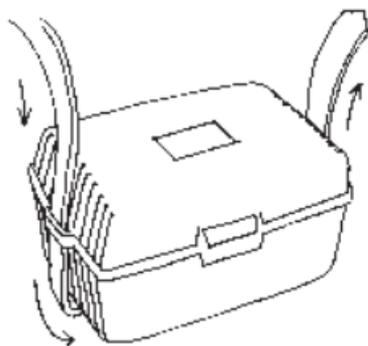
Regular re-calibration is recommended for this instrument. We recommend that with normal use, the instrument is calibrated at least once in every 12 month interval. When this is due for re-calibration return it to Kewtech marked for the attention of the Calibration Department and be sure to include all accessory leads, as they are part of the calibration procedure.

Optional lead ACCO16E lead is available for testing at distribution boards. This is fused with the fuses rated at 10A/600V high rupture ceramic types. If they should blow always return the instrument and leads to Kewtech for checking. The fuses are special and should only be replaced by equivalent types. Returning the product to Kewtech will ensure this. If other leads are used then reading may not be true unless they are calibrated with the instrument.

If this product needs cleaning use a damp cloth to wipe its surfaces. DO NOT use strong cleaning agents as these may damage the plastic surfaces. Kewtech reserve the right to change specifications and design without notice and without obligation.

## Case, strap, shoulder-pad and test lead pouch assembly

Assemble the shoulder strap through the case lugs and the test lead pouch in the following sequence:



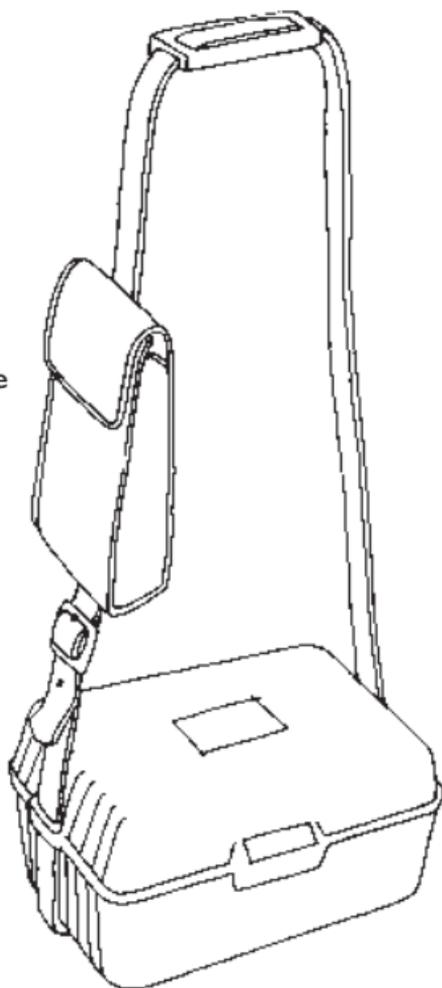
1 Pass the strap **down** through the first lug, under the case and **up** through the other lug.



2 Slide the shoulder pad onto the strap



3 Feed the strap **down** through the slots in the back of the test lead pouch.



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

Distributor

Kewtech Corporation Limited  
76 St. Catherine's Grove  
Lincoln LN5 8NA  
[www.kewtechcorp.com](http://www.kewtechcorp.com)

92-1617



04-03