Time Electronics
Calibration, Test and Measurement

User Manual

5030
Electrical Tester Calibrator

Revision 2303-1

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This manual provides operating and safety instructions for the Time Electronics product. To ensure correct operation and safety, please follow the instructions in this manual.

Time Electronics reserves the right to change the contents, specifications and other information contained in this manual without notice.

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1 Introduction

1.1 Overview

The 5030 is a high performance instrument designed for use in a calibration lab.
It is able to verify the performance of Loop, RCD, Insulation & Continuity Testers as individual or multifunction instruments.

The 5030 allows values to be selected for:

- RCD trip time.
- Loop impedance (Loop resistance) between L and PE of the test socket.
- Insulation resistance.
- Continuity resistance.

The 5030 can make measurements of:

- Supply voltage and frequency output of the mains test socket.
- Applied RCD test current and phase.
- Applied Insulation test voltage.
- Applied Continuity test current and voltage.

In order for the 5030 to provide a true value of the selected Loop impedance, it can measure the supply local loop impedance.

Front panel user interface is via a 4 line x 20 character LCD screen and user controls are simple and intuitive using 7 buttons.

A remote interface via RS-232 is available to allow PC control of the 5030. The 5030 can be controlled via Time Electronics EasyCal software to automate the calibration process. This provides increased speed of calibration and consistency of results. Produce traceable calibration certificates and test reports for quality standards with additional uncertainty information for ISO 17025 conformance.

1.2 Specifications

1.2.1 Technical Specifications

Loop

Function	Range / Values	Resolution	Accuracy
Loop Impedance Resistor Values	1800, 330.0, 180.0, 33.00, 18.00, 3.300, 1.800, 0.330, 0.150, 0.050 Ω	4 digit	± 0.5 % of displayed value ± 30 mΩ
Local Loop Compensation	0 to 9.999 Ω	0.001 Ω	± 0.5 % of value ± 30 mΩ
Test Current	30 A max (200 ms) / 50 W max	–	–

RCD

Function	Range / Values	Resolution	Accuracy
Trip Time	10 to 2000 ms	10 ms	± 0.5 ms
Current	6.000, 10.00, 30.00, 100.0, 300.0, 500.0, 1000 mA	4 digit	± 0.5 % of reading ± 1 % with x5 multiplier
Current Multipliers	x0.5, x1, x2, x5	–	–
Maximum Current	2500 mA	–	–
Waveforms	AC, DC & half wave rectified	–	–
Phase Detection	0° or 180°	–	–
Pre Trigger Delay	0 to 2000 ms	10 ms	–
Pre Trigger Threshold	0 to 100 % of nominal current	1 %	–

Insulation

Function	Range / Values	Resolution	Accuracy
Resistance	1 MΩ to 2000 MΩ	1 MΩ	1 % of value
	50 kΩ to 1990 kΩ	50 kΩ	1 % of value
Test Voltage Measurement @ 0.5 mA or 1.0 mA Load	50.0 to 99.9 V DC	0.1 V	1 % of reading
	100 to 1200 V DC	1 V	1 % of reading

Continuity

Function	Range / Values	Resolution	Accuracy
Resistance	0.1 Ω to 100.0 Ω	0.1 Ω	1 % of value + 20 mΩ
	250 Ω, 500 Ω, 1.00 kΩ, 2.50 kΩ, 5.00 kΩ & 10.0 kΩ	3 digit	1 % of value
Test Voltage Measurement (input resistance 10 MΩ)	0.0 to 50.0 V DC	0.01 V	0.5 % of range
Test Current Measurement (between 1 Ω and 2 Ω)	0 to 400 mA DC	0.1 mA	0.5 % of range
Power Dissipation	1 watt maximum	–	–

Voltage

Function	Range	Resolution	Accuracy
Line Voltage Measurement	200.0 to 260.0 V RMS	0.1 V	0.5 % of reading
Line Frequency Measurement	45.00 to 65.00 Hz	0.01 Hz	0.1 % of reading

1.2.2 General Specifications

Warm up..... 30 minutes to full accuracy.

Settling time ..... Less than 5 seconds.

Standard interfaces..... RS-232 and USB.

Temperature performance..... Operating: 10 to 35 °C, Full spec: 23 °C ± 5 °C, Storage: -10 °C to 50 °C.

Operating humidity/altitude ..... < 80 % non condensing / Altitude: 0 to 3 km.
Non operating altitude: 3 to 12 km.

Line power..... 220 to 240 V AC 50 Hz.
100 to 120 V AC 60 Hz (specify on order).
Power consumption 200 W maximum.

Dimensions / Weight..... W 430 x H 155 x D 255 mm / Weight: 8 kg.

Supplied with..... User manual, RS-232 cable, USB adaptor/cable.

1.2.3 Ordering Information

5030..... Electrical Tester Calibrator

C201 ..... Traceable calibration certificate (Factory)

C137 ..... Accredited calibration certificate (ISO 17025)

ECFLA..... EasyCal Calibration Software

1.3 Important Information

Safety Warnings

Observe all warnings before operating the 5030:

The 5030 is a class I Instrument with a metal case connected to Supply Protective Earth.

The supply Live and Neutral and Protective Earth wiring must be checked before connecting the 5030.

The 5030 must only be connected via the heavy duty lead supplied with the instrument.

Only double insulated testers may be connected to the front panel socket of the 5030.

The mains test socket and insulation/continuity terminals have an LED above. This indicates which connection to use for the test as well as indicates that the mains test socket is energized (live).

This instrument is to be serviced by trained personnel only.
Disconnect mains supply before removing cover or replacing fuses.

For operations involving removal of the 5030's cover, users should be aware that certain sections of the circuitry carry high voltages, which are hazardous. Very high currents causing burns can also be generated if certain terminals are inadvertently shorted.

Additionally note that when a device (such as a Multifunction Electrical Tester) is to be tested or calibrated, it is referred to as the UUT (Unit Under Test) in this manual. The UUT should be connected to the front panel mains test socket or insulation/continuity terminals via its supplied test leads. This will ensure that the leads used with the UUT are tested and calibrated at the same time. It may be necessary to connect the UUT to the mains test socket via an adapter suitable for calibration.

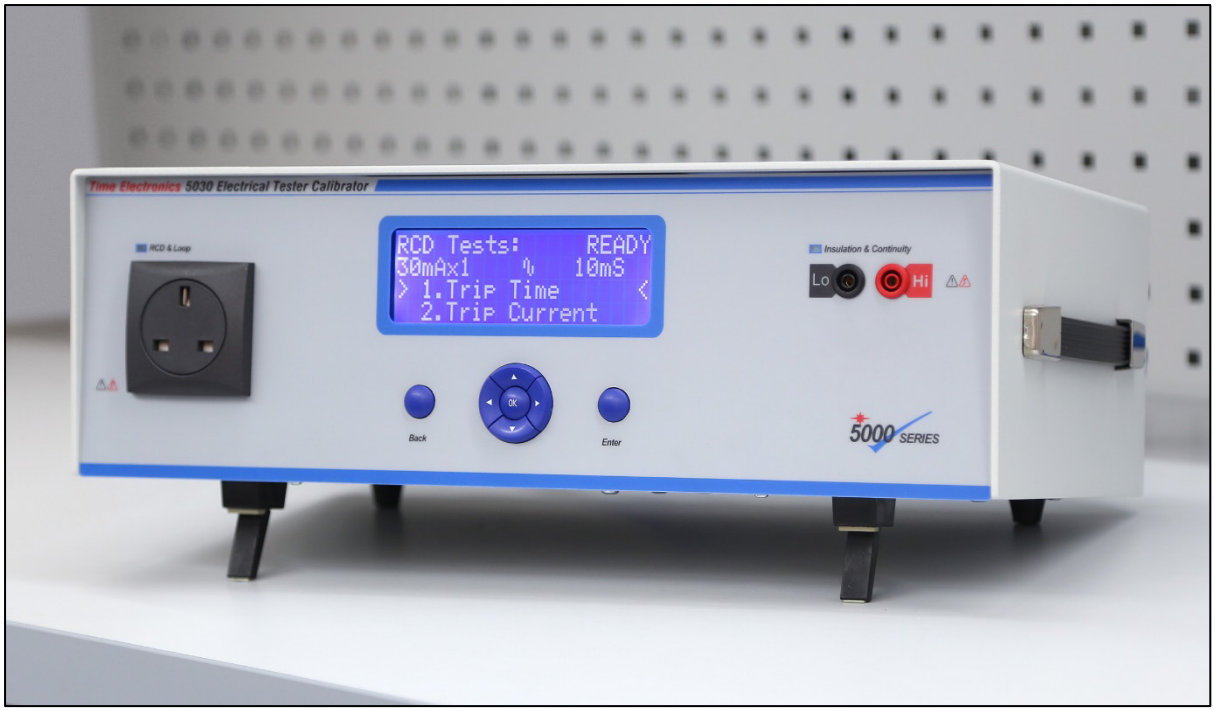
1.4 Installation

1.4.1 Positioning the Instrument

Benchtop Use

The 5030 should always be positioned on a flat, firm surface. The instrument base is fitted with four feet. The front feet have tilt legs to angle the instrument upwards for ergonomic front panel operation.

- A 10 cm area of free space is recommended at the rear of the instrument.
- Do not obstruct the fan inlet on the rear of the instrument.
- Do not obstruct any exhaust outlets on the bottom of the instrument.
- Do not place objects or materials under the instrument.



Cleaning

When cleaning the 5030 use an alcohol-free wipe such as a ‘durable screenclean 50’.

Packaging

The 5030 is supplied in a carton with protective inserts. Retain the shipping box and internal packaging for future use. If the unit is returned to Time Electronics for calibration, please use this original packaging to avoid possible damage in transit.

1.4.2 Mains (Line) Power Supply

A single phase mains supply is required. The supply must come from a mains power socket rated for at least 10A on a permanent spur or ring/radial circuit.

Extension leads or distribution boards must not be used to connect the instrument to the supply.

The supply circuit may be protected by a RCD of 30 mA or greater rating as all test currents flow in the live – neutral circuit.

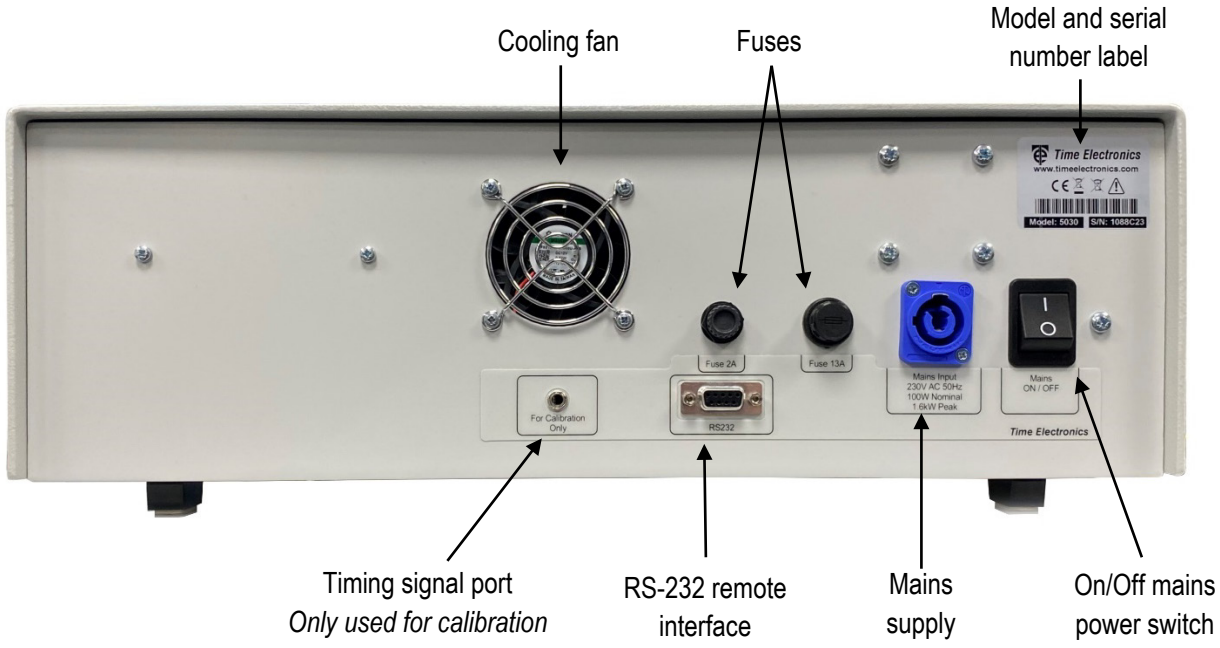
The 5030 must only be connected via the heavy duty lead supplied with the instrument. Note that the plug on the mains lead will be as specified on order (regional type required).

5030 mains input

Heavy duty power lead

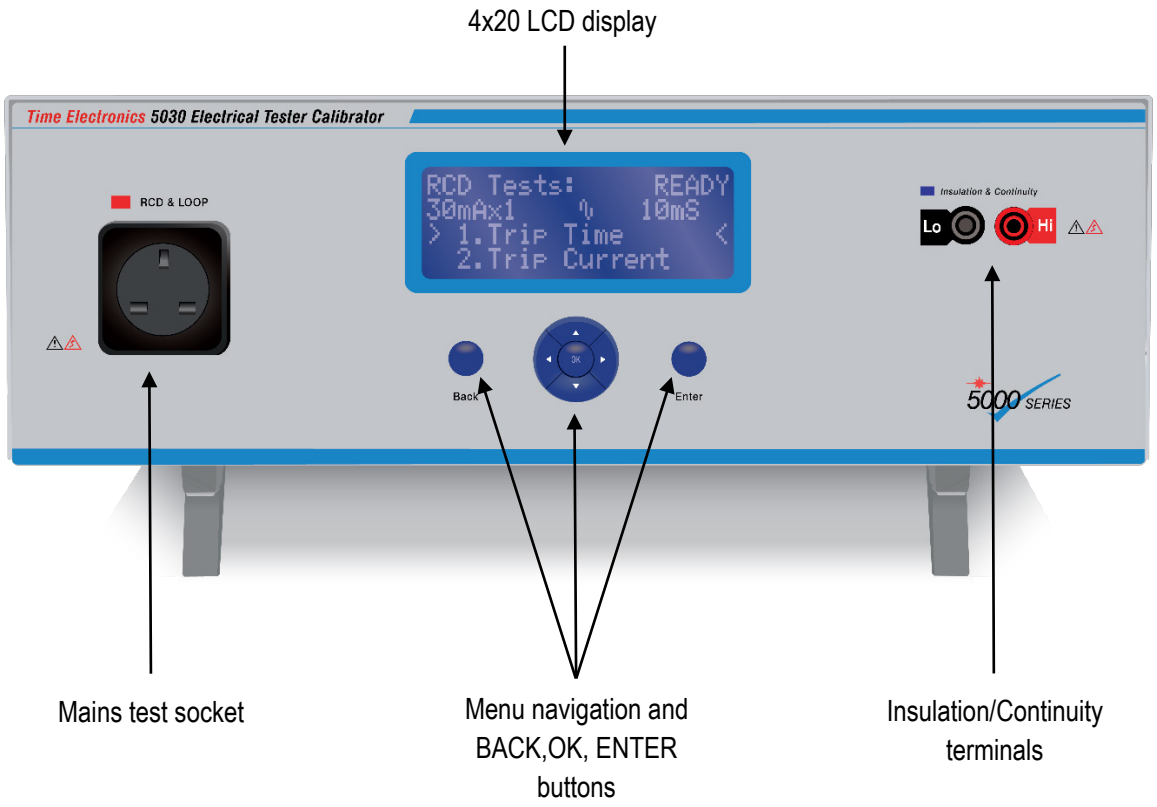
Connector type on lead

1.4.3 Rear Panel



2 Controls

The 5030 front panel provides user control is via a central navigation keypad. This is used to scroll through menus, select functions and settings. Measurements and settings are shown on the large clear LCD display.



Note: The 5030 can be fitted with a number of regional type mains sockets. This must be specified on order.

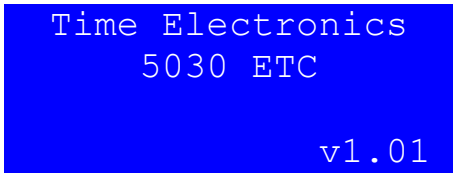
3 Operation

3.1 Turning the unit On/Off

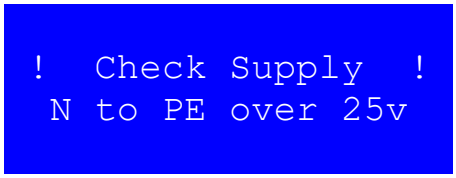
To Turn On

Turn the mains power switch at the rear panel of the instrument to ON (I).

The front panel display show a startup screen with the software version for 3 seconds:



The incoming mains supply voltage between N (neutral) and PE (protective earth) is measured. If this exceeds a level of 25Vrms a warning is displayed:



Turn OFF and correct the problem before continuing.

If the above test is passed, the first item in the Function menu will be displayed.

To Turn off

Turn the mains power switch on the rear panel of the instrument to OFF (O). The instrument may be switched off at any time without damage.

3.2 User Interface

The 5030 user interface is via menus on the front panel LCD display and navigation using the 7 push buttons.

The buttons and their use are:

BACK	Go back a level in the menu structure Exit a test in progress Cancel any value entry
▲ and ▼	Move the cursor up or down through a menu list. Decrement or Increment a digit in value entry.
◄ and ►	Decrement or Increment a menu choice currently selected in the menu list. Move the cursor to left or right to select a digit in value entry.
OK	Go forward one level in the menu structure. Start value entry mode and confirm (store) a value in value entry mode.
ENTER	Start any function which involves an active measurement or starts an output.

3.3 Function Menu

On startup the top level of the user interface menu structure will be displayed, this is the Function menu. The top left of the display will always indicate what function the user interface is currently in. Menu selection is indicated by a menu cursor on the left and right hand side of the display.

The ▲ & ▼ buttons to move the menu cursor up and down the list to highlight a menu item. Press OK to confirm selection of the menu item.

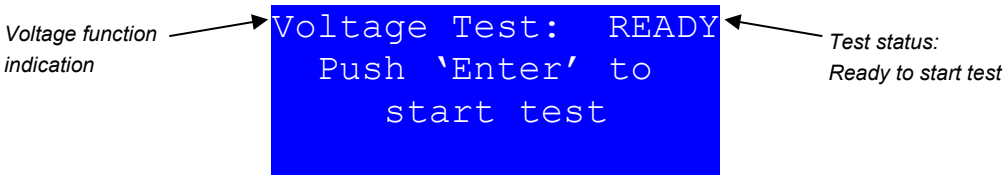
The functions available in the Function menu are:

1. Voltage
2. Loop
3. RCD
4. Insulation
5. Continuity
6. Setup

When the 5030 is displaying the Function menu, the mains test socket is not live. Any UUT to be tested or calibrated can be connected safely, switched on and any setup required preparing for calibration.

3.4 Voltage Function

On selection of the Voltage function from the Function menu, the display will show:

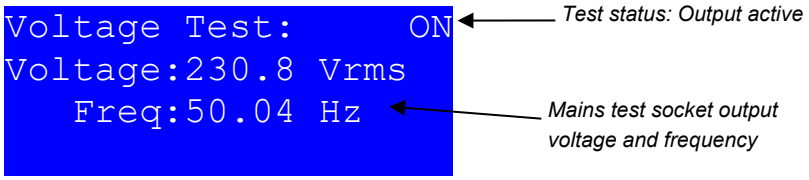


1. The UUT should be connected to the front panel mains test socket and ready to measure applied mains voltage.

2. The test status shows “READY” this indicates that the 5030 has is ready to perform a test. The user can start the test by pressing ENTER. Note the voltage function does not have any menu items to select.

3. The front panel mains test socket will be energized. When enabling the socket the UUT will be checked for a fault between L (Live) and PE (Protective Earth). (see 3.4.1 – UUT Fault condition)

4. If no fault is detected, the UUT will be powered and the display will show the mains test socket voltage and frequency. This measurement is updated once per second (1Hz reading rate).



5. The UUT can now be set to measure the supply voltage and frequency and compared with the supply measurement on the 5030.

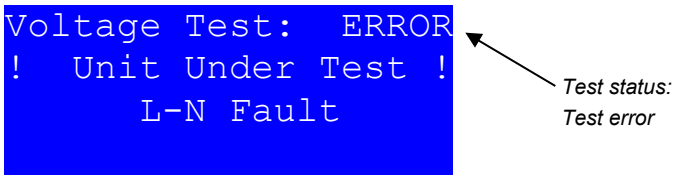
6. Press the BACK button to switch off the socket output and return to the Voltage function. Pressing BACK again will return to the Function menu.

Engineers Note: The Voltage function is very useful for powering up RCD testers that are powered from the mains. This allows you to check all the buttons on the UUT are working as well as any neon indicators without tripping an RCD in the building.

3.4.1 UUT Fault condition

In Voltage, Loop and RCD functions when the front panel mains socket is energized the 5030 checks for excessive current flow from L (Live) to PE (Protective Earth).
This is a typical failure mode for an Electrical Tester and is commonly caused by a short circuit in a control thyristor.

If this excess current is detected the output voltage on the mains test socket is immediately disconnected and the display will show:



The UUT should be disconnected, inspected and if necessary repaired before any more testing should be continued.

To return back to the previous function press the BACK button.

3.5 Loop Function

The 5030 can replicate loop impedances at a total of 10 test points for verification of both high and low current Loop Testers.

The test point is made up of the sum of the mains supply local loop impedance and a loop test resistor within the 5030. Before the test output is started the display shows the two parts of this sum. When the test is started, the two figures are summed so that the total can be compared with a reading on the UUT. In addition the mains voltage supplied to the UUT is measured so that a prospective short circuit current (PSCC) figure can be displayed for comparison with the UUT.

When the UUT performs a loop measurement, the connection should be via L (Live) and PE (Protective Earth) of the mains test socket. Internally in the 5030 the UUT test current is routed to the mains supply L (Live) and N (Neutral) so that the loop measurement will not trip an RCD that may be present on the line supply.

The displayed value of local loop impedance will vary depending on the measured supply local loop impedance to the 5030.

During calibration of the 5030, the loop test resistors are accurately measured and stored so that a calibrated value can be displayed. Because of this it is possible for the loop test setting points to be different following a calibration adjustment of the 5030, as well as one 5030 displaying different values from another.

3.5.1 Measuring the local loop

When the 5030 performs a loop test, the test point contains some impedance from the supply local loop. This means that a precision measurement of the supply local loop impedance between L (Live) and N (Neutral) is required.

To perform this measurement the 5030 briefly connects a 10 Amp load across the mains supply. During this procedure if there is a significant dip or spike disturbance in the mains supply the calculated result will not be valid and a message is shown.

It is recommended that the local loop impedance is measured on the following routine:

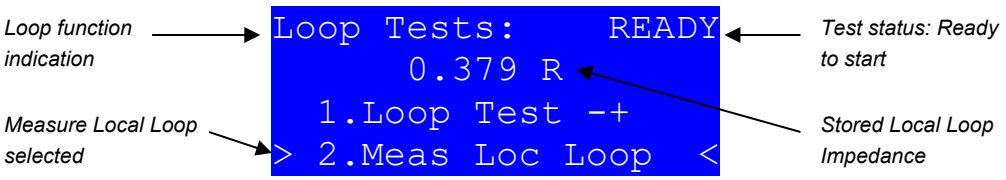
- At least once a week if used most days of the week.
- Before use if used less than weekly.
- Any time after the 5030 has been moved to a different mains supply socket.
- Any time after maintenance work has been carried out on the 5030 mains supply cabling or building supply.

Note: No more than 5 measurements should be made in a 30 minute period.

To measure the supply local loop:

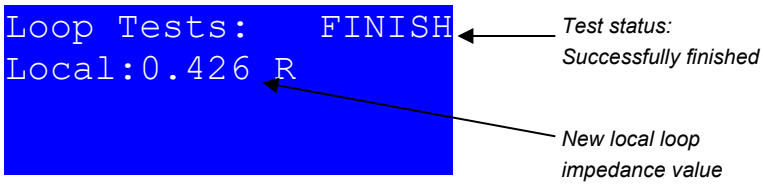
1. Select the Loop function from the function menu.

2. Press the ▼ button to select menu item 2. “Meas Loc Loop”



3. Disconnect any UUT from the front panel mains test socket.

4. Press ENTER to start the local loop measurement.



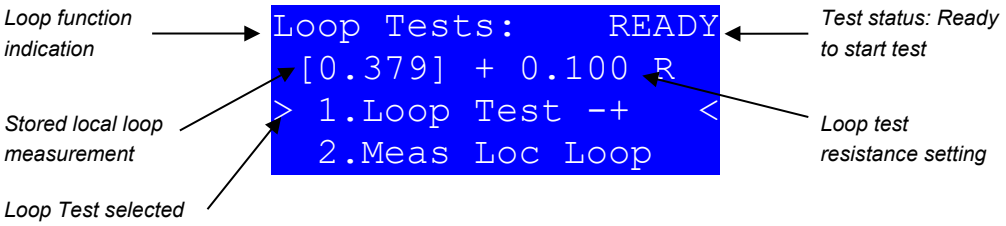
5. If the measurement has completed successfully, the output status will show “FINISH” and the new local loop value has been stored and is displayed. Press BACK to return to the Loop function menu.

6. If there was a mains disturbance during the local loop measurement the test status will indicate an error:

7. Press BACK to return to the Loop function menu, the local loop value will revert to the previously stored value.

3.5.2 Performing a Loop test

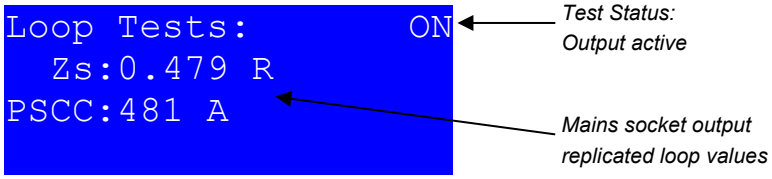
To perform a loop test on a UUT select the Loop function from the function menu, the display will show:



1. When menu item “1. Loop Test -+” is selected press ◄ and ► to increment or decrement through the 10 test point steps. As the steps are selected the new loop test resistance is displayed.

2. Connect the UUT to the front panel mains test socket and ensure it is switched to a loop impedance (Zs) mode.

3. Press the ENTER button, the mains test socket is energized. Any excess current from L to PE at this point will be indicated by an “ERROR” test status. (See 3.4.1 – UUT Fault condition)



4. On the UUT press the test button to start a loop measurement. Some Electrical Testers will auto-start measurement after detecting the mains voltage has been applied.

5. Compare the UUT measured Loop impedance (Zs) with the value displayed on 5030. The PSCC value is updated by measurements of the mains voltage once every second (1 Hz reading rate).

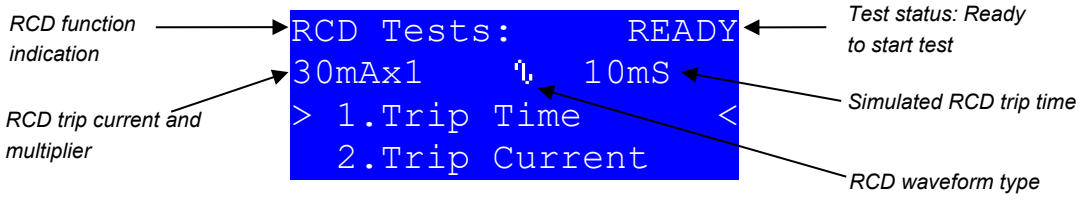
6. Press BACK to switch off the mains socket output and return to the Loop function menu.

3.6 RCD Function

The 5030 can simulate an RCD to allow verification and calibration of RCD testers via two modes, RCD Time mode and RCD Current mode.

When performing RCD tests there are a number of test parameters that need to be set to match the UUT. These parameters are Trip time (in RCD Time mode), Trip current, Current multiplier and Waveform type. Additionally some RCD testers will need specific threshold and delay settings. All of these parameters are available for the user to change in the RCD function menu.

3.6.1 Simulating an RCD trip time (RCD Time mode)



1. **Trip Time**: Move the menu cursor to highlight "1. Trip Time". Press ◄ and ► to decrement and increment the trip time. It is also possible to press the OK button and enter a user defined value.

Note: By pressing ◄ to decrement the trip time to the minimum the display will show "Current", this puts the RCD function into RCD Current mode, when a time is shown the RCD function is in RCD Time mode.

In RCD Time mode, pre-defined trip times available are:

`10 20 30 40 50 60 80 100 300 500 1000 1500mS`

2. **Trip Current**: Move the menu cursor down to highlight "2. Trip Current". Press ◄ and ► to decrement and increment the trip current.

Trip current points available are:

`6 10 20 30 100 300 500 1000mA`

3. **Current Multiplier**: Move the menu cursor down to highlight "3. I Multiplier". Press ◄ and ► to decrement and increment the trip current multiplier.

Current multipliers available are:

`x1 x2 x5`

Note: x5 multiplier only for trip currents up to and including 500mA.

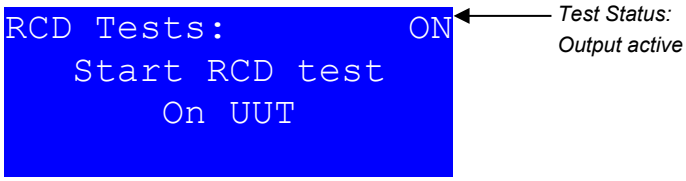
4. **Waveform type**: Move the menu cursor down to highlight “4.Waveform Type”. Press ◄ and ► to change through three different waveform types simulated. These are:

```
AC

Half Wave (or DC with ripple)

Smooth DC
```

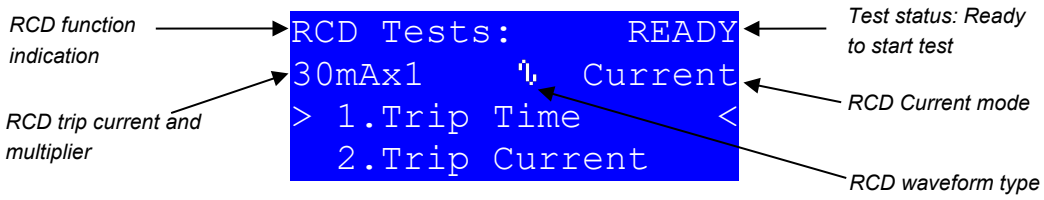
5. Press the ENTER button, the mains test socket is energized. Any excess current from L to PE at this point will be indicated by an “ERROR” test status. (See 3.4.1 – UUT Fault condition). If no fault is detected, the UUT will be powered and the display will show:



6. The operator should now conduct the RCD test on the UUT. When the UUT applies a test trip current greater than the Threshold setting, the 5030 will trigger to simulate an RCD. The 5030 will indicate the test is finished by changing the test status and also indicate the detected phase of the trip current, either 0° or 180°.

7. Press BACK to return to the RCD function menu.

3.6.2 Measure the RCD trip current (RCD Current mode)



1. **Trip Time**: Move the menu cursor to highlight "1. Trip Time". Press ◄ to decrement the trip time until "Current" is displayed instead of trip time. This puts the RCD function into RCD Current mode.

2. **Trip Current**: Move the menu cursor down to highlight "2. Trip Current". Press ◄ and ► to decrement and increment the trip current.

Trip current points available are:

```
6 10 20 30 100 300 500 1000mA
```

3. **Current Multiplier**: Move the menu cursor down to highlight "3. I Multiplier". Press ◄ and ► to decrement and increment the trip current multiplier.

Current multipliers available are:

```
x1 x2 x5
```

```
Note x5 multiplier only for trip currents up to and including 500mA
```

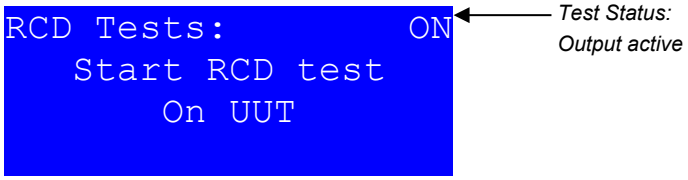
4. **RCD Waveform type**: Move the menu cursor down to highlight "4. Waveform Type". Press ◄ and ► to change through three different waveform types simulated. These are:

```
AC
```

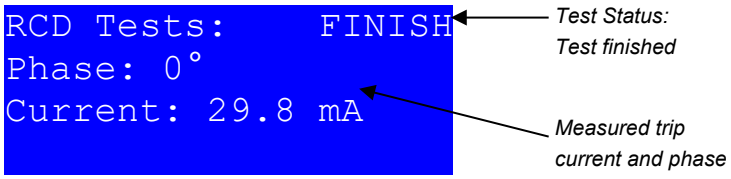
```
Half Wave (or DC with ripple)
```

```
Smooth DC
```

5. Press the ENTER button, the mains test socket is energized. Any excess current from L to PE at this point will be indicated by an "ERROR" test status. (See 3.4.1 – UUT Fault condition). If no fault is detected, the UUT will be powered and the display will show:



6. The operator should now conduct the RCD test on the UUT. When the UUT applies a test trip current greater than the Threshold setting, this will trigger the 5030 to start measurement of the applied current (after any delay setting). The 5030 will indicate the test is finished by changing the test status as well as indicating the measured current and detected phase of the trip current.



8. In RCD Current mode the UUT will sometimes indicate a trip error or time out as the trip time was very long, this is expected.

If the applied trip current was below the threshold, the display will remain unchanged and the test does not finish, see 3.6.3 – RCD Threshold setting.

If a current measurement was taken but is much lower than expected, this is typically because the threshold was triggered by a ‘Pre-test’ signal from the UUT. To prevent this a delay setting should be used, see 3.6.4 – RCD Delay Setting.

For further understanding and troubleshooting when measuring the RCD Current see 4. – RCD Test Waveform Problems.

9. Press BACK to return to the RCD function menu.

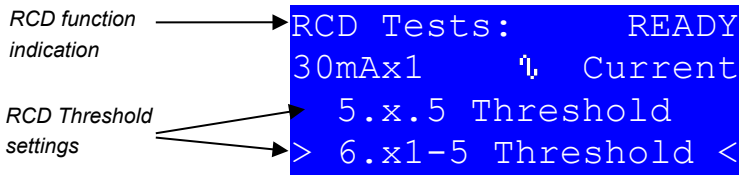
3.6.3 RCD Threshold setting

The Threshold setting sets the minimum level of applied RCD trip current until the 5030 acknowledges a valid start of test.

There are two settings for the threshold which correspond to the I Multiplier setting used in the test. Threshold values are set as a percentage (%) of the nominal trip current for the test. Typical values to use are:

x0.5 Threshold	80%
x1-x5 Threshold	80%

To change the threshold settings:



1. Move the menu cursor to highlight either “5. x.5 Threshold” or “6. x1-5 Threshold”. Press OK to enter a value for the setting.

2. Press ◄ and ► to move the digit cursor left and right, then ▲ and ▼ to increment and decrement the digits.

3. Once the required value is displayed press OK to store the setting. If the BACK button is pressed the value will be discarded and the old value remains.

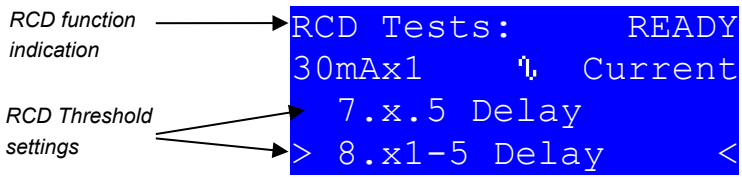
3.6.4 RCD Delay setting

The delay setting sets a delay for RCD Current mode tests. The delay period starts when the RCD threshold is detected to when the 5030 should start trip current measurement.

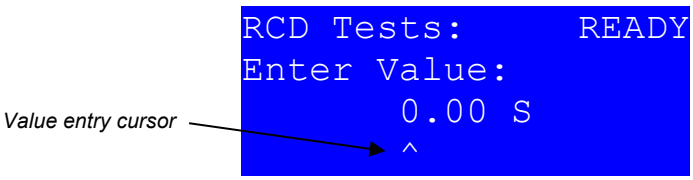
There are two settings for the delay which correspond to the I Multiplier setting used in the test. The delay is set in tens of mS. Typical values to use are:

x0.5 Delay	1600ms
x1-x5 Delay	0ms

To change the delay settings:



1. Move the menu cursor to highlight either “7. x.5 Delay” or “8. x1-5 Delay”. Press OK to enter a value for the setting.



2. Press ◄ and ► to move the digit cursor left and right, then ▲ and ▼ to increment and decrement the digits.

3. Once the required value is displayed press OK to store the setting. If the BACK button is pressed the value will be discarded and the old value remains.

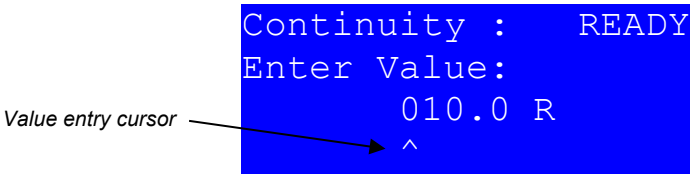
3.7 Continuity Function

The 5030 can provide accurate resistance as well as measure the applied voltage and current to allow Continuity testers to be calibrated and verified. Continuity tests require the UUT to be connected to the 4mm Insulation/Continuity terminals on the front panel.

3.7.1 Low resistance range

The low resistance range can provide a resistance of 0.1 to 199.9 Ohms. To perform a test using this range:

1. Move the menu cursor to highlight “1. Low Range”. Press OK, ◄ or ► to enable value entry of a resistance value.



2. Press ◄ and ► to move the digit cursor left and right, then ▲ and ▼ to increment and decrement the digits.

3. Once the required value is displayed press OK to store and return to the Continuity function menu. If the BACK button is pressed the value will be discarded and the old value will remain.

4. Press ENTER to set the resistance and enable the Insulation/Continuity terminals.

Note: It is possible to press ENTER during the value entry to store the value and enable the Insulation/Continuity terminals immediately.

5. Start the UUT on continuity resistance measurement across the terminals and compare the measured resistance with the setting on the 5030.

3.7.2 High resistance range

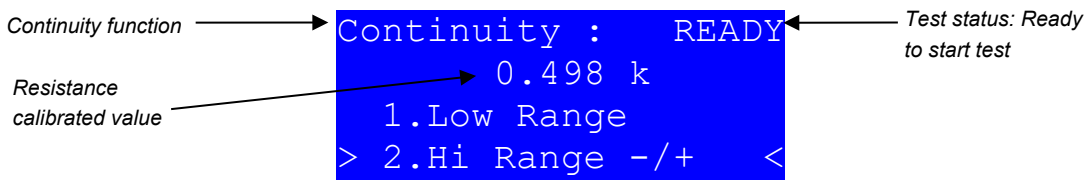
The high resistance range can provide a resistances from 0.25 to 10 kOhms in pre-determined steps.

During calibration of the 5030 the resistance of the steps is accurately measured and stored so that a calibrated value can be displayed. Because of this it is possible for the resistance of each step to be different following a calibration adjustment of the 5030, as well as one 5030 displaying different values from another.

The steps are nominally :

`0.250, 0.500, 1.0, 2.5, 5.0 & 10 kOhms.`

1. Move the menu cursor to highlight “2. Hi Range -/+”. Press ◄ or ► to decrement or increment the resistance setting point. The display will show the calibrated value.



2. Press ENTER to set the resistance and enable the Insulation/Continuity terminals.

3. Start the UUT on continuity resistance measurement across the terminals and compare the measured resistance with the setting on the 5030.

3.7.3 Current measurement (S/C Current)

The 5030 can measure the current that the Continuity tester produces while providing a 1 or 2 Ohm load.

1. Move the menu cursor to highlight “3. S/C Current”. Press ◄ or ► to change the load setting from 1 R to 2 R.

2. Press ENTER to set the load and enable the Insulation/Continuity terminals. The display will show the measured current.

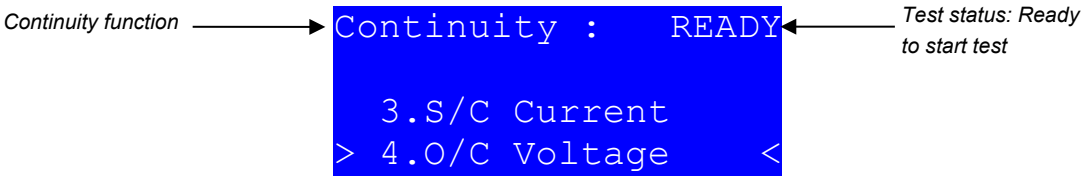
3. Start the UUT on continuity resistance measurement across the terminals. Record the measured current on the 5030 display. The display reading is updated once a second (1 Hz reading rate).

Note: The 5030 will only start measurement when the applied current is greater than 10% of the range.

3.7.4 Voltage measurement (O/C Voltage)

The 5030 can measure the voltage that the Continuity tester produces with no load connected (open circuit voltage).

1. Move the menu cursor to highlight “4. 0/C Voltage”. Note that there are no parameters to change on the O/C Voltage test.



2. Press ENTER to enable the Insulation/Continuity terminals. The display will show the measured voltage.

3. Start the UUT on continuity resistance measurement across the terminals. Record the measured voltage on the 5030 display. The display reading is updated once a second (1 Hz reading rate).

Note: The 5030 will only start measurement when the applied voltage is greater than 10% of the range.

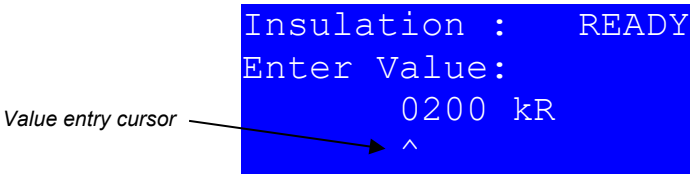
3.8 Insulation Function

The 5030 can provide accurate resistance as well as measure applied voltage to allow Insulation testers to be calibrated and verified. Insulation tests require the UUT to be connected to the 4mm Insulation/Continuity terminals on the front panel.

3.8.1 Low resistance range

The low resistance range can provide a resistance of 50 to 2000 kOhms, in 50 kOhm steps. To perform a test using this range:

1. Move the menu cursor to highlight “1. Low Range”. Press OK, ◄ or ► to enable value entry of a resistance value.



2. Press ◄ and ► to move the digit cursor left and right, then ▲ and ▼ to increment and decrement the digits.

3. Once the required value is displayed press OK to store and return to the Insulation function menu. If the BACK button is pressed the value will be discarded and the old value will remain.

4. Press ENTER to set the resistance and enable the Insulation/Continuity terminals.

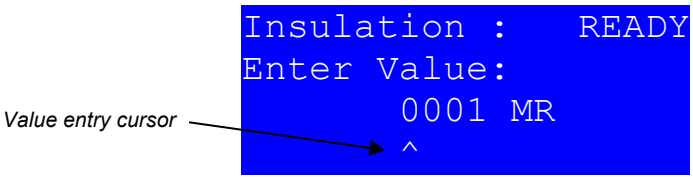
Note: It is possible to press ENTER during the value entry to store the value and enable the Insulation/Continuity terminals immediately.

5. Start the UUT on insulation resistance measurement across the terminals and compare the measured resistance with the setting on the 5030.

3.8.2 High resistance range

The high resistance range can provide a resistance from 1 to 2000 MOhms, in 1 MOhm steps. To perform a test using this range:

1. Move the menu cursor to highlight “2. Hi Range”. Press OK, ◄ or ► to enable value entry of a resistance value.



2. Press ◄ and ► to move the digit cursor left and right, then ▲ and ▼ to increment and decrement the digits.

3. Once the required value is displayed press OK to store and return to the Insulation function menu. If the BACK button is pressed the value will be discarded and the old value will remain.

4. Press ENTER to set the resistance and enable the Insulation/Continuity terminals.

Note: It is possible to press ENTER during the value entry to store the value and enable the Insulation/Continuity terminals immediately.

5. Start the UUT on insulation resistance measurement across the terminals and compare the measured resistance with the setting on the 5030.

1.1.1. Voltage measurement

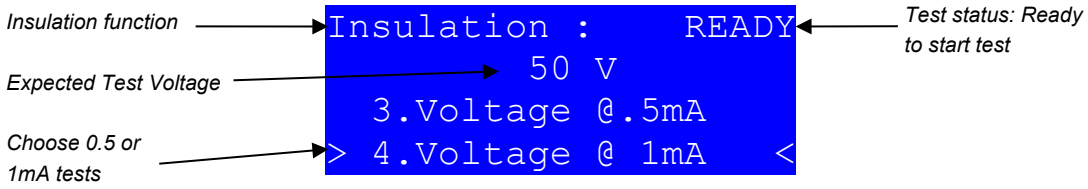
The 5030 can measure the voltage that an insulation tester produces whilst providing a load of 1mA or 0.5mA. To provide the load, the 5030 enables a resistance between the terminals. The value of the resistance depends on the selected test load and expected test voltage.

IET 17th Edition states that the standard load for calibration of Insulation testers should be 1mA, and IET 16th Edition states it should be 0.5 mA. The table below details the resistance selected by the 5030 according to the required load and test voltage:

Expected Test Voltage	Load Resistance @ 1mA	Load Resistance @ 0.5mA
50 VDC	50 kΩ	100 kΩ
100 VDC	100 kΩ	200 kΩ
250 VDC	250 kΩ	500 kΩ
500 VDC	500 kΩ	1 MΩ
1000 VDC	1 MΩ	2 MΩ

To perform a voltage measurement test:

1. Press ▲ and ▼ to move the menu cursor to highlight either “3. Voltage @ 0.5mA” or “4. Voltage @ 1mA” depending on the load required.



2. Press ◄ or ► to decrement or increment the test voltage :

`50, 100, 250, 500 or 1000 Volts DC`

3. Press ENTER to set the load and enable the Insulation/Continuity terminals. The display will show the measured voltage.

4. Start the UUT on insulation resistance measurement using the expected test voltage across the terminals. Record the measured voltage on the 5030 display. The display reading is updated once a second (1 Hz reading rate).

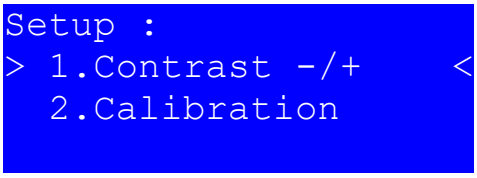
Note: The 5030 will only start measurement when the applied voltage is greater than 10% of the range.

3.9 Setup

The setup menu allows you to change the 5030 display contrast and enter calibration mode for adjustment of the 5030.

3.9.1 Adjust display contrast

1. Press ▲ and ▼ to move the menu cursor to highlight “1. Contrast -/+”.



2. Press ◄ or ► to increase or decrease the contrast control. This setting is immediately stored for next power up.

3.9.2 Calibration Adjustment

For further details on adjustment of the 5030, please contact Time Electronics or an authorized representative for the service manual.

To enter calibration mode:

1. Press ▲ and ▼ to move the menu cursor to highlight “2.Calibration”.

2. Press OK to allow entry of the calibration adjustment passcode and enable calibration mode.

4 RCD Test Waveform Problems

4.1 Settings

RCD Testers do not often produce a clean test waveform. Pre-test low amplitude currents may be present as well as switching spikes.

The 5030 allows both threshold and delay to be programmed separately for x.5 and x1,2,5 multiplier settings. See 3.6.3 – RCD Threshold setting and 3.6.4 – RCD Delay setting.

Pre-test waveforms are most problematic on the x.5 multiplier range where the pre-test and actual test can have similar amplitude waveforms. In this case a delay is set to provide a guard time prior to measuring the test current.

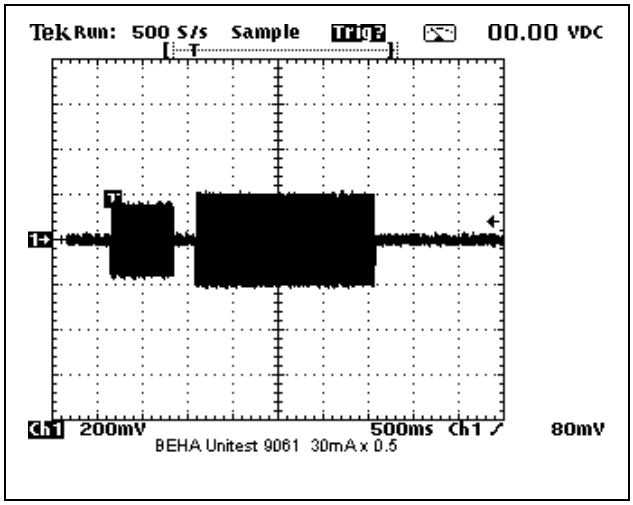
Checking of representative testers has shown the following settings to be optimal:

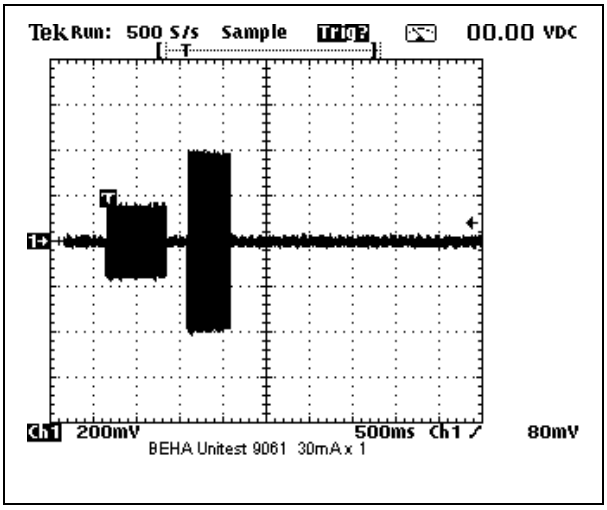
x.5 threshold	80%
x1,2,5 threshold	80%
x.5 delay	1600 mS
x1,2,5 delay	0 mS

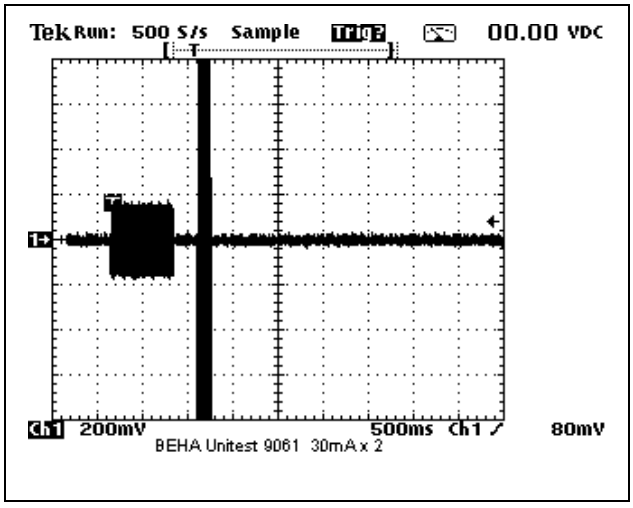
4.2 Sample Waveforms

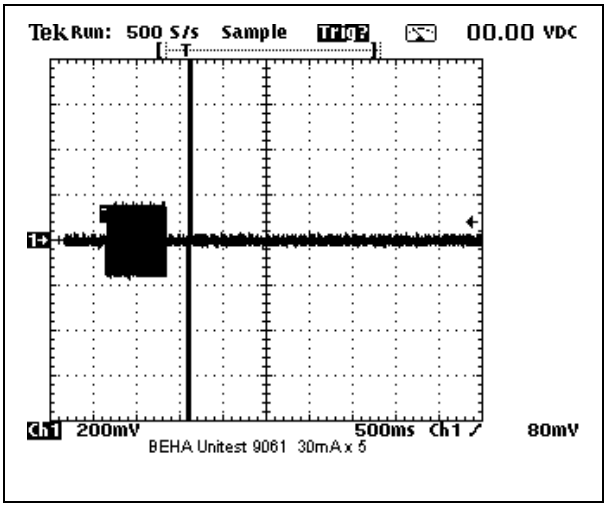
The following screen shots show pre test waveforms which may be encountered.

4.2.1 BEHA Unitest 9061



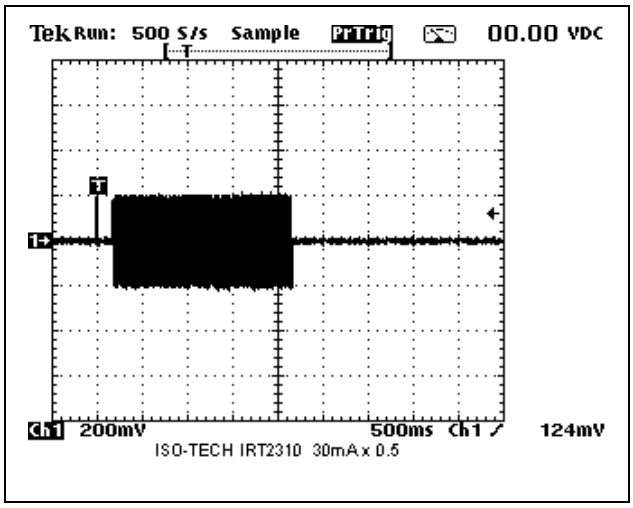


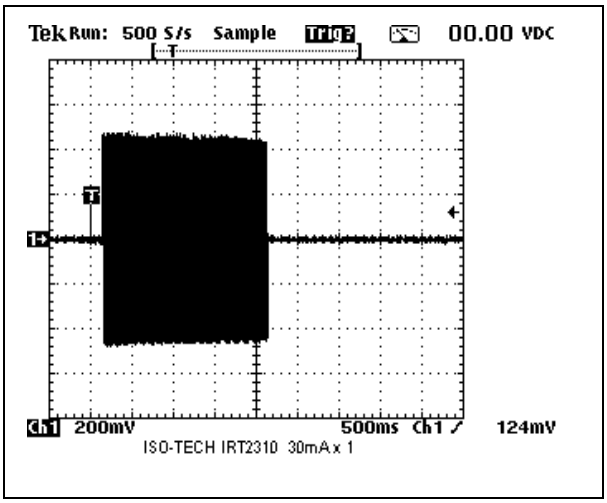


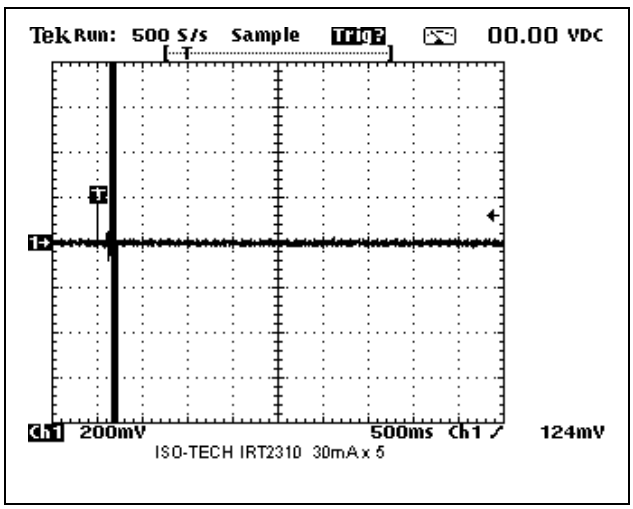


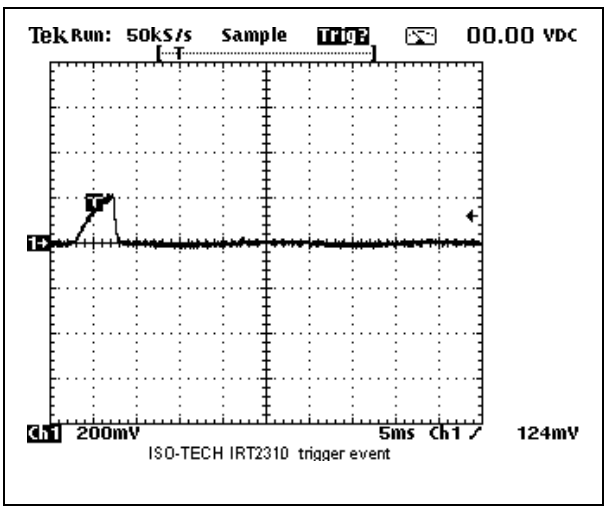
The sine wave pre-test current is 40% of the x1 amplitude and begins 950mS before the test waveform.

4.2.2 ISO-TECH IRT2310







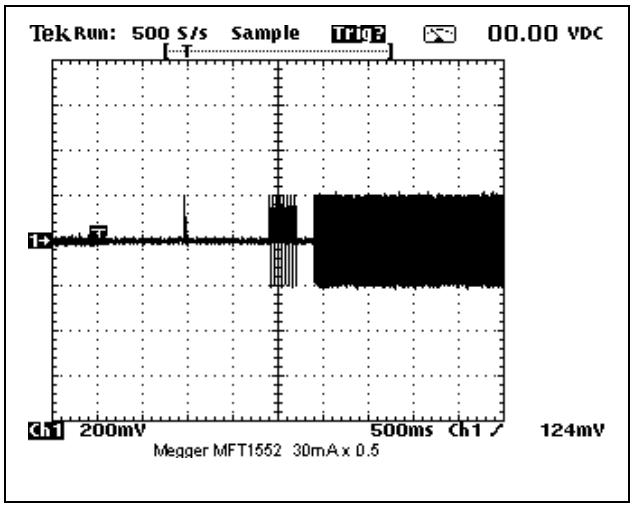


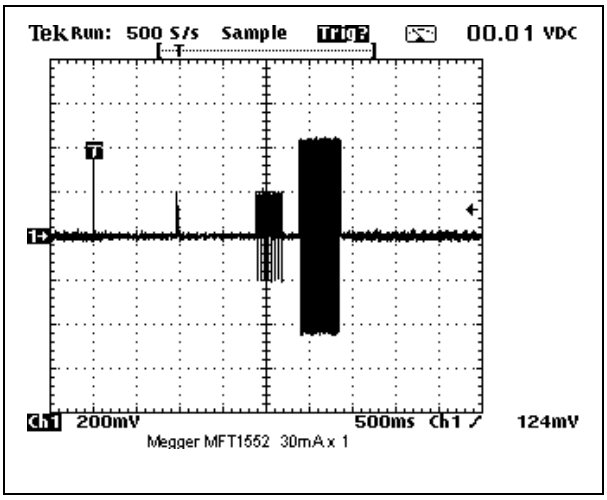
The pre-test pulse is a positive ¼ cycle current and is 50% of the x1 amplitude.

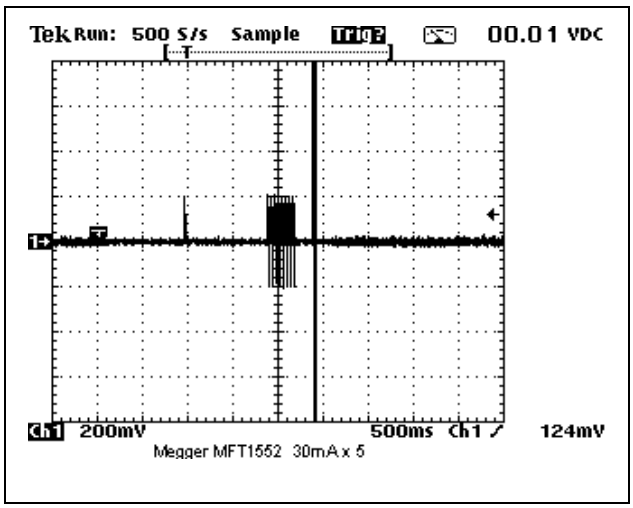
The delay from this pulse to the test waveform is 180mS.

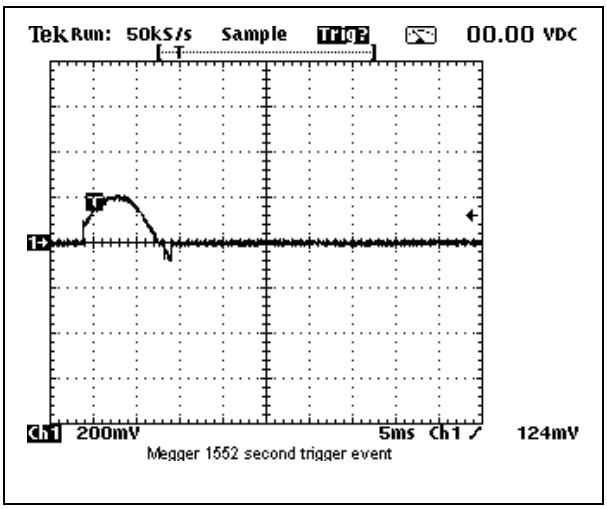
A delay >200mS will be suitable for the x0.5 ranges.

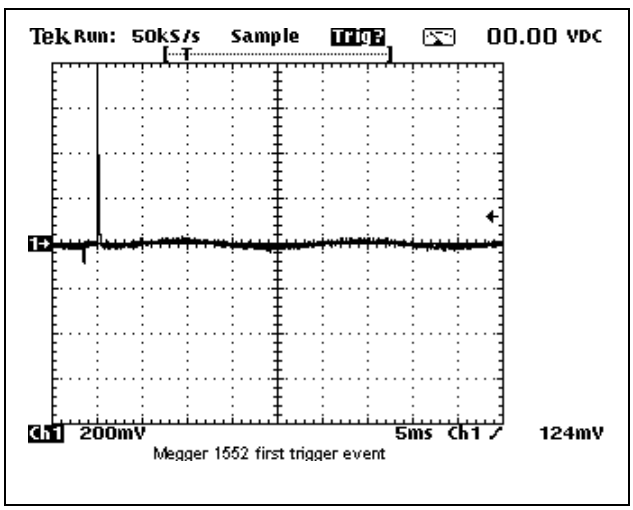
4.2.3 Megger 1552

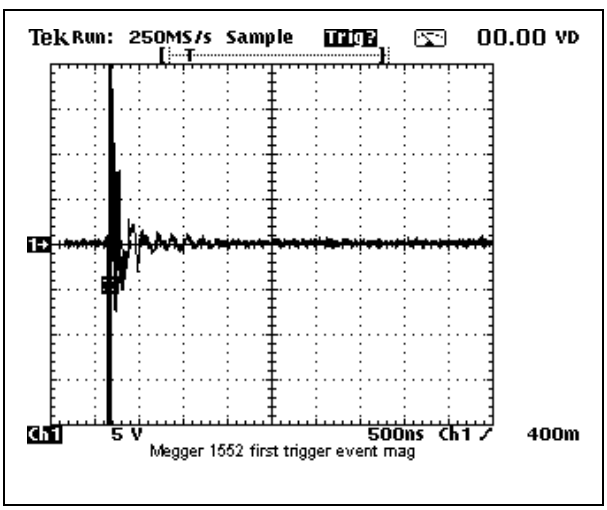












The Megger 1552 has three events prior to the acual test waveform.

The first is a high (up to 40V) but random amplitude narrow pulse which including ringing lasts for about 1uS. This pulse is 2350mS from the test waveform.

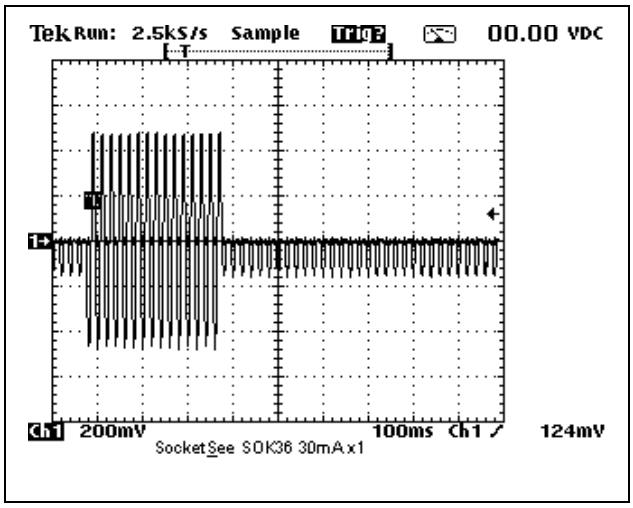
The second is a half sine wave pulse of 50% of the x1 amplitude. This pulse is 1400mS from the test waveform.

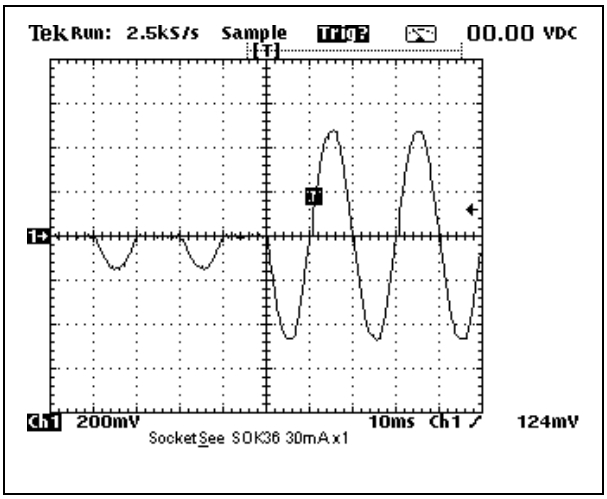
The third is a pre-test sequence of one cycle of 50% of the x1 amplitude followed by one cycle of zero amplitude, repeated 8 times.

The first narrow spike will be filtered out by the 5030. A delay >1500mS will be suitable for the x0.5 ranges.

4.2.4 Socket & See SOK36

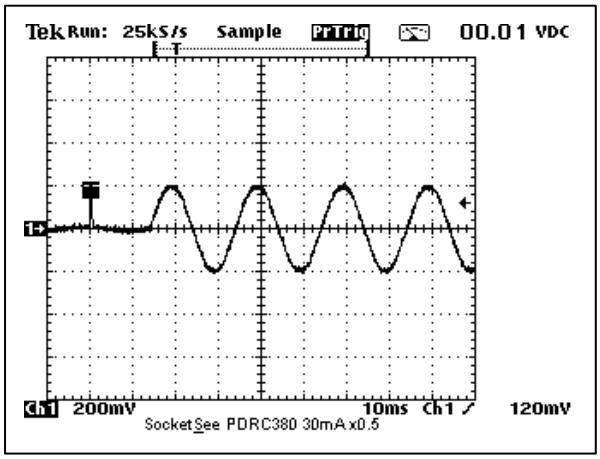
This has only one range of 30mA x1

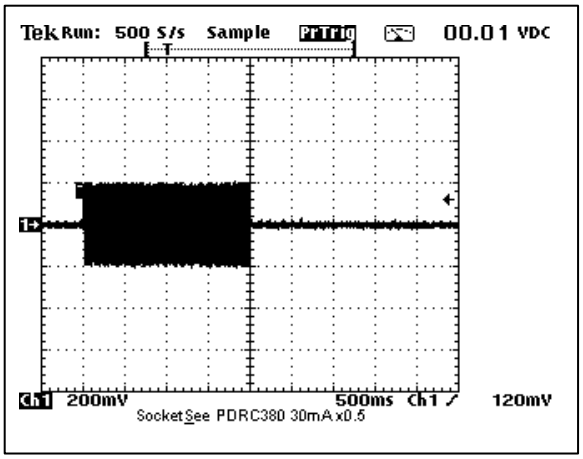


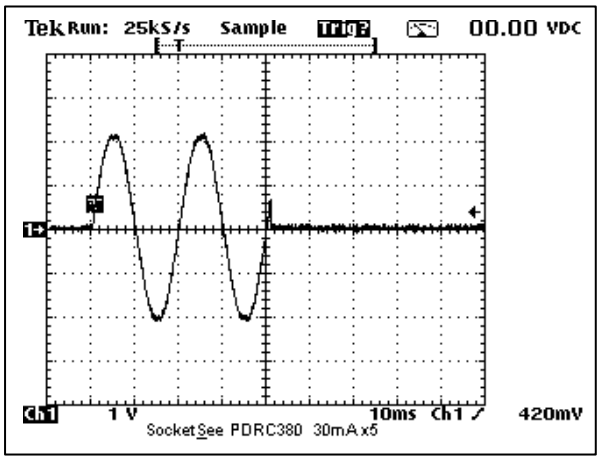


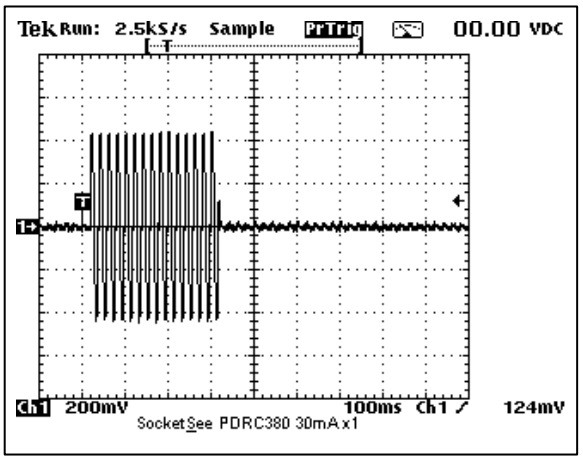
There is a continuous pre and post test half wave rectified current which is 30% of the x1 amplitude.

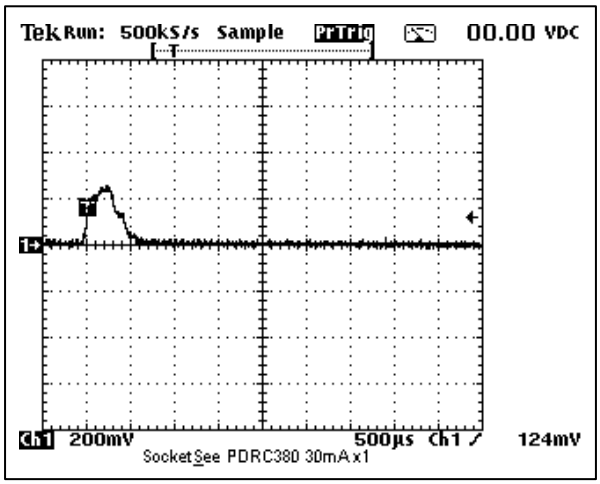
4.2.5 Socket & See PDRC380











The pre-test pulse is 500uS wide and is 50% of the x1 amplitude. It can be positive or negative.

The delay from this pulse to the test waveform is 15mS for the positive pulse, 25mS for negative pulse.

5 Remote Control

The 5030 supports remote control via commands sent as RS-232 data through a 9 pin female D-type connector on the rear panel.

The commands allow control of the selected function, function parameters, starting and stopping tests as well as readback of results.

5.1 Interface

To connect the remote interface to a PC use a “straight-through” RS-232 lead, male connector at one end, female connector at the other end.

The RS-232 data settings are:

Baud rate: 9600 bits/sec.

Stop bits: 1

Parity: None

Flow Control: None

Commands are sent as upper or lower case followed by a space then any optional parameters. The command string is terminated by a CR (carriage return) or LF (line feed) or both. It is also possible to chain two or more commands together using a ; (semi-colon).

For example:

```
FUNC LOOP;LVAL 3<CR>
```

Sets the 5030 into loop function and sets the loop to set-point 3.

5.2 Command list reference

5.2.1 Function modes, readback and trigger

Command	Parameter	Result
FUNC	"NONE","VOLT","LOOP", "LOCL" "RCDT","RCDC", "INSL", "INSH", "INSV", "CONL", "CONH", "CONI", "CONV",	Selects a specific function. Can only be changed when no test is in progress.
FUNC?	<none>	Return the set function prefixed by FUNC. Example: "FUNC CONI"
TEST	"ENTR","STOP"	Start (enable) the selected function test or stop one in progress.
TEST?	<none>	Return the test status of the selected function. Example: "Ready", "Running", "Error"
READ?	<none>	Return an immediate reading of the test prefixed with a function code.
TRIG	"A" "S"	Set readings to be sent continuously or a single reading only when requested by the READ? command.
TRIG?	<none>	Return the current trigger setting. Example "TRIG S"

5.2.2 Function parameters

Command	Parameter	Result
LVAL	"0" to "9"	Set loop value to step 0 to 9, corresponding to nominal loop values 0.05R to 1830R in loop tests
MAMP	"0" to "7"	Set RCD trip current value, 0 to 7 corresponding with 6mA to 1000mA
MULT	"0" to "3"	Set RCD multiplier value, 0 to 3 corresponding with x0.5 to x5
WAVE	"0" to "2"	Set RCD waveform type value, 0 to 2 corresponding with sine, half rectified, DC
TIME	"10" to "2000"	Set RCD trip time in mS
THRL	"0" to "99"	Set RCD x0.5 Threshold in %
THRH	"0" to "99"	Set RCD x1-5 Threshold in %
DEYL	"0" to "2000"	Set RCD x0.5 Delay in mS
DEYH	"0" to "2000"	Set RCD x1-5 Delay in mS
INSL	"50" to "2000"	Set Insulation resistance low range in kOhm
INSH	"1" to "2000"	Set Insulation resistance high range in MOhm
INSI	"0" and "1"	Set Insulation voltage test load 0 and 1 corresponds with 0.5mA and 1mA
INSV	"0" to "4"	Set Insulation expected test voltage 0 to 4 corresponding with 50V to 1000V
CONL	"1" to "1999"	Set Continuity resistance low range in tenths of Ohm
CONH	"0" to "5"	Set Continuity resistance high range 0 to 5 corresponding with 0.25kOhm to 10kOhm
CONR	"1" and "2"	Set Continuity S/C current test load in Ohm

5.2.3 System commands

Command	Parameter	Result
*RST	<none>	Reset the 5030
*IDN?	<none>	Return Identity string of make, model and firmware version. Example: "TIME ELECTRONICS 5030,1.00"

6 Re-Calibration

The 5030 should be re-calibrated at recommended intervals in order to ensure its outputs remain within specification. Normally re-calibration is done at 12 month intervals.

The 5030 calibration/service manual is supplied separately and available upon request from Time Electronics.

It is recommended that if possible, the unit be returned to the Time Electronics factory for periodic service maintenance and calibration.

7 Warranty and Servicing

Warranty

Time Electronics products carry a one-year manufacturer's warranty as standard.

Time Electronics products are designed and manufactured to the highest standards and specifications to assure the quality and performance required by all sectors of industry. Time Electronics products are fully guaranteed against faulty materials and workmanship.

Should this product be found to be defective, please contact us using the below details. Inform us of the product type, serial number, and details of any fault and/or the service required. Please retain the supplier invoice as proof of purchase.

This warranty does not apply to defects resulting from action of the user such as misuse, operation outside of specification, improper maintenance or repair, or unauthorized modification. Time Electronics' total liability is limited to repair or replacement of the product. Note that if Time Electronics determine that the fault on a returned product has been caused by the user, we will contact the customer before proceeding with any repair.

Calibration and Repair Services

Time Electronics offers repair and calibration services for all the products we make and sell. Routine maintenance by the manufacturer ensures optimal performance and condition of the product. Periodic traceable or accredited calibration is available.

Contacting Time Electronics

Online:
Please visit **www.timeelectronics.com** and select Support Request from the Contact links. From this page you will be able to send information to the Time Electronics service team who will help and support you.

By phone:
+44 (0) 1732 355993

By email:
mail@timeelectronics.co.uk

Returning Instruments

Prior to returning your product please contact Time Electronics. We will issue a return merchandise authorization (RMA) number that is to accompany the goods returning. Further instructions will also be issued prior to shipment. When returning instruments, please ensure that they have been adequately packed, preferably in the original packing supplied. **Time Electronics Ltd will not accept responsibility for units returned damaged.** Please ensure that all units have details of the service required and all relevant paperwork.

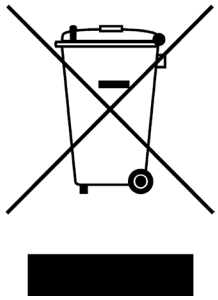
Send the instrument, shipping charges paid to:

Time Electronics Ltd
Unit 5, TON Business Park, 2-8 Morley Road,
Tonbridge, Kent, TN9 1RA.
United Kingdom.

Tel: +44(0)1732 355993
Fax: +44(0)1732 350198

Email: mail@timeelectronics.co.uk
Web Site: www.timeelectronics.com

Disposal of your old equipment



1. When this crossed-out wheeled bin symbol is attached to a product it means the product is covered by the European Directive 2002/96/EC.
2. All electrical and electronic products should be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or the local authorities.
3. The correct disposal of your old appliance will help prevent potential negative consequences for the environment and human health.
4. For more detailed information about disposal of your old appliance, please contact your city office, waste disposal service or return to Time Electronics.