GammaPAT

MI 3311

Short instructions

Ver. 1.3, Code no. 20 751 626

METREL®

Distributor:

Manufacturer:

METREL d.d.
Ljubljanska cesta 77
1354 Horjul
Slovenia

E-mail: metrel@metrel.si
http://www.metrel.si

CE Mark on your equipment certifies that this equipment meets the requirements of the EU (European Union) concerning safety and electromagnetic compatibility regulations

Table of contents

1 Start-up guide

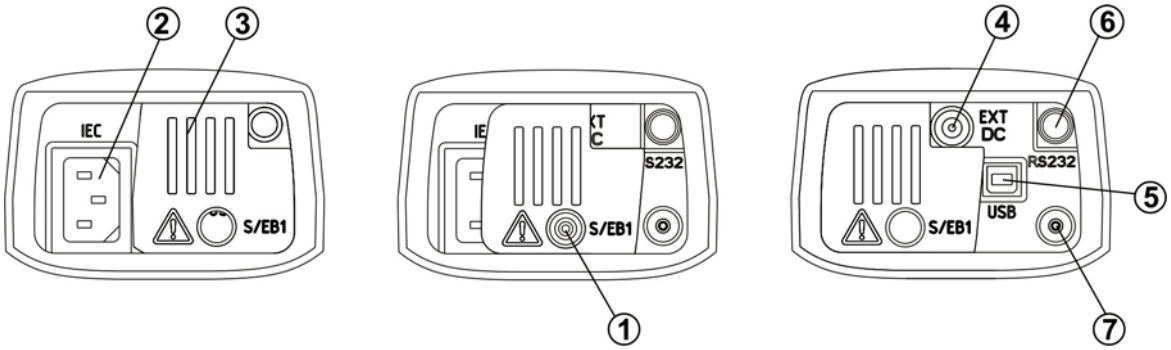
1.1 Safety and operational considerations

- ⚠ Warning on the instrument means »Read the Instruction manual with special care to safety operation«. The symbol requires an action!
- Read this instruction manual carefully, otherwise use of the instrument may be dangerous for the operator, for the instrument or for the equipment under test!
- If the test equipment is used in manner not specified in this instruction manual the protection provided by the equipment may be impaired!
- Do not use the instrument and accessories if any damage is noticed!
- The Instrument should not to be used for measurements while charging.
- Consider all generally known precautions in order to avoid risk of electric shock while dealing with hazardous voltages!
- Appliances MUST be fully disconnected from the mains supply before it is connected to the MI3311 GammaPAT in order to perform a PAT test.
- Do not touch any test leads/terminals while the appliance is connected to the MI3311 GammaPAT.
- Use only standard or optional test accessories, supplied by your distributor!
- Instrument servicing and adjustment is only allowed to be carried out by competent authorized personnel!
- Hazardous voltages can exist inside the instrument. Disconnect all test leads, remove the power supply cable and switch off the instrument before opening the battery compartment.
- Instrument contains rechargeable NiCd or NiMh battery cells. The cells should only be replaced with the same type as defined on the battery placement label or in this manual. Do not use standard alkaline battery cells while power supply adapter is connected, otherwise they may explode!
- If a test code with an earth bond test current higher than 200 mA is selected (manually or with barcode reader) the GammaPAT instrument will automatically perform the Earth continuity test with a 200 mA test current. Other test parameters remain unchanged. The operator must be competent to decide if performing the test with a 200 mA current is acceptable!
- The Substitute leakage current / Substitute leakage-P tests can be carried out as an alternative for the Leakage and Touch leakage tests if there are no mains supply dependent switches inside the equipment. The operator must be competent to decide if performing the substitute leakage current test is applicable!
- If a test code with a Leakage current is selected (manually or with barcode reader) the GammaPAT instrument will automatically perform a Substitute leakage test. Other test parameters remain unchanged. The operator must be competent to decide if performing the Substitute leakage test is acceptable!
- If a test code with a Touch leakage current is selected (manually or with barcode reader) the GammaPAT instrument will automatically perform a Substitute leakage-P test. Other test parameters remain unchanged. The operator must be competent to decide if performing the Substitute leakage-P test is acceptable!

1.2 Instrument description - Front and connector panel

Instrument description

1. Display
2. FAIL indicator
3. PASS indicator
4. TEST key
5. UP key
6. DOWN key
7. MEM key
8. TAB key
9. ON/OFF (2 sec), ESC key
10. Mains test socket

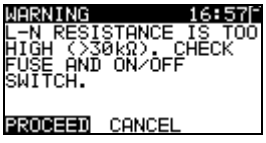


Connectors

1. S/EB1 Probe and Earth continuity terminal
2. IEC / Voltage input
3. Protection cover
4. Charger socket
5. USB connector for communication with PC
6. PS/2 connector for communication with barcode scanner and PC (RS-232)
7. PE terminal (for checking S/EB test lead)

1.3 Instrument description - Meaning of symbols

Warnings

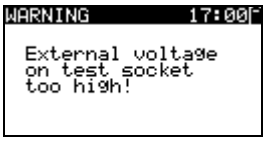


WARNING!

An excessively high resistance was measured in the fuse pre-test. This indication means that the device under test has extremely low power consumption or it is:

- not connected;
- switched off;
- contains a fuse that has blown.

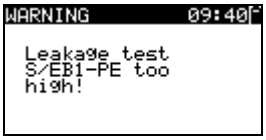
Select **PROCEED** or **CANCEL**.



WARNING!

Voltage on mains test socket between LN - PE terminals is higher than approximately 20 V (AC or DC)!

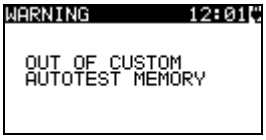
Disconnect the device under test (DUT) from the instrument immediately and determine why an external voltage was detected!



WARNING!

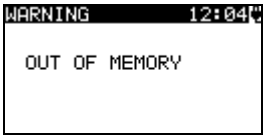
Current on test probe (S/EB1 - PE) is higher than approximately 10mA (AC or DC)!

Disconnect the test probe from the device under test (DUT) and determine why an external current was detected!



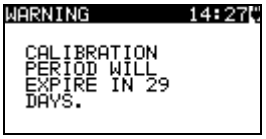
WARNING!

The Simple test memory has reached the limit of 50 sequences.

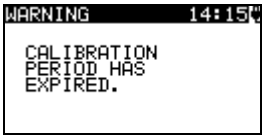


WARNING!

The internal memory is full!



WARNING!
The calibration period will expire in less than 1 month. The instrument counts down the days.



WARNING!
The calibration period has expired. Recalibrate the instrument!

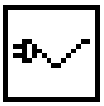
WARNING!

A high insulation test voltage will be present on the output of the instrument!

WARNING!

A high insulation test voltage is present on the output of the instrument.

Symbols

	Measurement in progress.
	Test result can be saved.
	Connect the test lead to the S/EB1 test socket.
	Flex the mains cable of appliance during the test.
	Check that the device under test is switched on (to ensure that the complete circuit is tested).
	Connect the cord to be tested to the IEC test terminal.
	The results of the Substitute leakage current / Substitute leakage–P tests are calculated based on a 110V power supply.
	Test passed.
	Test failed.

Battery and charging indications

	Battery capacity indication.
	Low battery. Battery is too weak to guarantee correct result. Replace or recharge the battery cells.
	Recharging in progress (if external charger is connected).

1.4 Battery handling

- When replacing battery cells or before opening the battery compartment cover, disconnect all test leads / accessories connected to the instrument and switch off the instrument. Hazardous voltage can exist inside the instrument!
- Insert all the battery cells correctly! If this is not performed correctly, the instrument will not operate and the batteries could be discharged.
- If the instrument is not used for a long period of time, remove all of the batteries from the battery compartment to protect the instrument from battery acid leakage.
- Alkaline or rechargeable Ni-MH battery cells (size AA) can be used. The operating hours are given for cells with a nominal capacity of 2100 mAh.

The battery will begin charging as soon as the power supply adapter is connected to the instrument. The in-built protection circuit controls the charging procedure...

WARNING!
Do not recharge alkaline battery cells!

Power supply socket polarity

Note:

- Only use the power supply adapter delivered from manufacturer or distributor of the test equipment to avoid possible fire or electric shock!

1.5 Warranty & Repairs

Metrel UK's instruments have a three year warranty against defects in materials or workmanship. Accessories and other supplementary products have a one year warranty against defects in materials or workmanship.
Any potentially defective items should be returned to Metrel accompanied by information regarding the faults that was incurred. It is recommended that any defective equipment is sent back to Metrel via the wholesaler from which the product was purchased.
All defective products will be replaced or repaired within policy period. For these items, a full refund will only be issued if a sufficient replacement is not available. Any shipping / return-shipping costs are not refundable.
Metrel UK shall not be held liable for any loss or damage resulting from the use or performance of the products. In no event shall Metrel UK be liable to the customer or its customers for any special, indirect, incidental, exemplary or punitive damages resulting from loss of use, interruption of business or loss of profits, even if Metrel UK has been advised of the possibility of such damages.
If the customer's unit is out of warranty but needs repairs a quote for repair will be provided via the wholesaler through which the instrument was sent in.

Notes:

- Any unauthorized repair or calibration of the instrument will infringe the product's warranty.
- All sales are subject to Metrel UK's Standard Terms and Conditions, a full copy of which is available Metrel UK's office. Metrel UK reserves the right to change the conditions at any time. Any typographical, clerical or other error or omission in any sales literature, quotation, price list, acceptance of offer, invoice or other documentation or information issued by Metrel UK shall be subject to correction without any liability on the part of the customer.
- Specifications and designs of goods are subject to change by Metrel UK at any time without notice to the customer. Metrel UK reserves the right to make any changes in the specification of goods which are required to conform with any applicable statutory or EC requirements or, where goods are to be supplied to Metrel UK's specification, which do not materially affect their quality or performance.
- If a condition was found to be invalid or void it would not affect the overall validity of the remainder of the conditions;
- Metrel UK are excluded from liability for any delays or failure to comply, where the reason is beyond Metrel UK's control;
- No order which has been accepted by Metrel UK may be cancelled by the customer except with the agreement in writing of Metrel UK and on terms that the customer shall indemnify Metrel UK in full against all loss (including loss of profit), costs (including the cost of all labour and materials used), damages, charges and expenses incurred by Metrel UK as a result of cancellation. The minimum charge for such cancellation will be 25 % of the total value of the goods ordered.

1.6 Contact Metrel UK

Metrel UK
Unit 1, Hopton House, Ripley Drive
Normanton Industrial Estate
Normanton,
West Yorkshire
WF6 1QT

Tel.:+44/ (0) 1924 24 50 00
Fax: +44/(0) 1924 24 50 07
E-mail: info@metrel.co.uk
Web: www.metrel.co.uk

Update your meter
Metrel offers a service of updating your software of firmware to the latest developments. Register on www.metrel.co.uk to receive updates of PC SW and firmware of the meters.

Calibrate your Meter
Metrel offers a calibration service of all Metrel equipment. Contact Metrel UK on 01924 245000 and ask for the calibrations department.

Repair
Metrel offers a repair service of all Metrel equipment. Contact Metrel UK on 01924 245000 and ask for the repairs department.

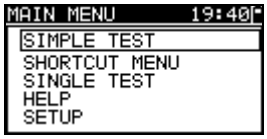
Ask a technical question
Metrel offers a Technical Advice Line every Mon-Thu from 8:00 a.m. till 5.00 p.m. and Fridays from 8:00 a.m. till 4 p.m..

Get training on Metrel meters
Metrel offers training on site or at the office subject to a charge.

2 Quick-test guide

2.1 Instrument test modes

Instrument has three main operation modes.

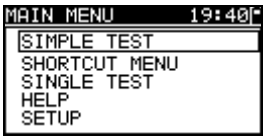


- <**SIMPLE TEST**> simple pre-programmed sequences; test sequences can be user customized.
- <**SHORTCUT MENU**> code-based test sequences, suitable for working with barcodes.
- <**SINGLE TEST>** individual tests.
- <**HELP**> help screens.
- <**SETUP**> menu for setup of the instrument.

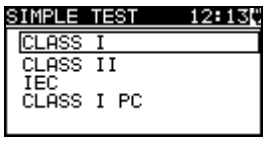
2.2 Carrying out a Simple test

① Set function

- In Main menu select **SIMPLE TEST**.



② Select the appropriate test sequence

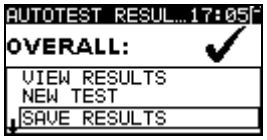


③ Carry out the simple test sequence

- Press TEST to start test sequence
- Certain tests will pre-select limits but will allow the user to adjust (if required).

④ View results

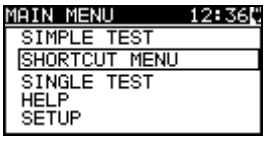
- After test sequence is finished Autotest Result screen and an overall PASS/FAIL indication is displayed.



2.3 Carrying out a Shortcut test sequence

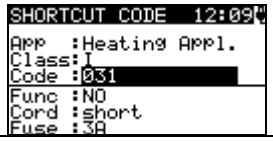
① Set function

- In Main menu select **SHORTCUT MENU**.



② Set appliance type and protective measures

- Use the TAB and UP and DOWN arrows to set the appliance type, class etc or select (scan) the appropriate code.

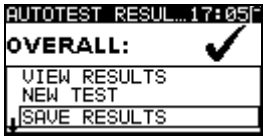


③ Carry out Shortcut autotest sequence

- Press TEST to Start autotest
- Certain tests will preselect limits but will allow the user to adjust (if required).

④ View results

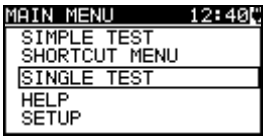
- After Shortcut test sequence is finished. Autotest Result screen and an overall PASS/FAIL indication is displayed.



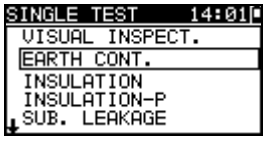
2.4 Carrying out a Single test

① Set function

- In Main menu select **SINGLE TEST**.



② Select the appropriate Single test

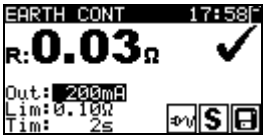


③ Carry out measurement or inspection

- Press TEST to start single test
- Certain tests will allow limits to be set (if required).

④ View results

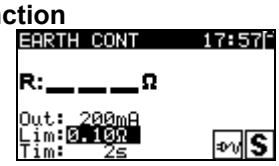
- After test is finished Result screen and PASS/FAIL indication is displayed



2.5 Measurements

2.5.1 Earth Continuity

① **Set function**

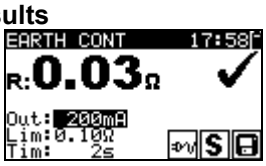


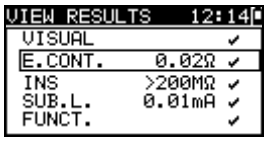
② **Set parameters and limits**
Output ... Size of test current
Limit.....Maximum earth continuity resistance
Time .....Test time.

③ **Connect the appliance to the instrument (as illustrated)**

④ **Carry out the test** TEST

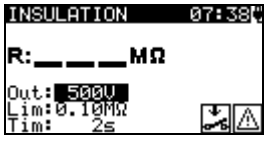
⑤ **View results**





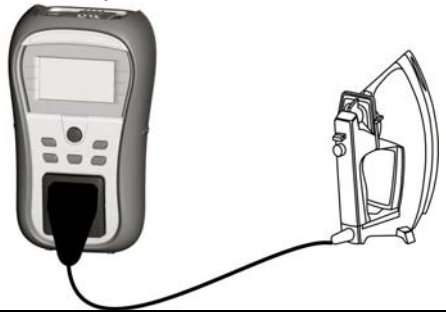
2.5.2 Insulation resistance

① **Set function**



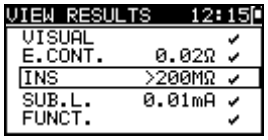
② **Set parameters and limits**
Output....Size of test voltage
Limit ..... Minimum insulation resistance
Time..... Test time.

③ **Connect the appliance to the Instrument (as illustrated)**



④ **Carry out the test** TEST

⑤ View results

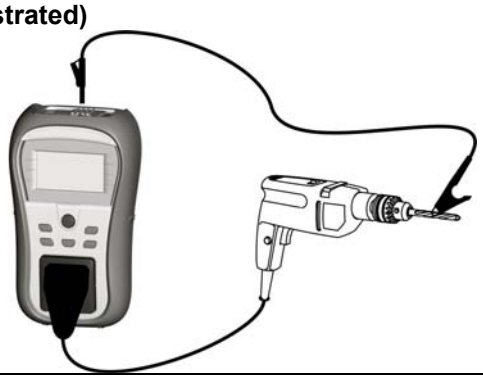


2.5.3 Insulation-P resistance

① Set function

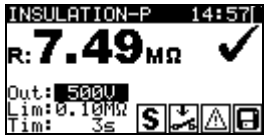
② Set parameters and limits
Output....Size of test voltage
Limit.....Minimum insulation resistance
Time.....Test time.

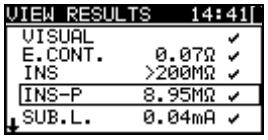
③ Connect the appliance to the Instrument (as illustrated)



④ Carry out the test TEST

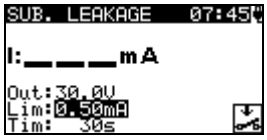
⑤ View results





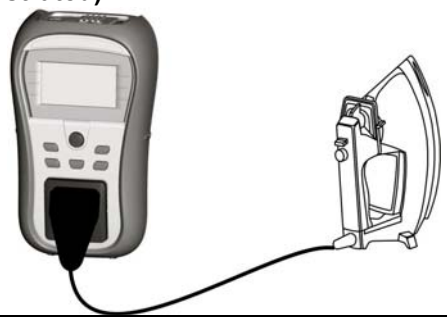
2.5.4 Substitute leakage

① Set function



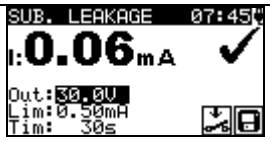
② Set parameters and limits
Output....Size of test voltage
Limit.....Maximum leakage current
Time.....Test time.

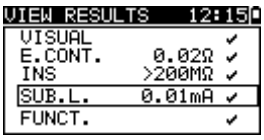
③ Connect the appliance to the Instrument (as illustrated)



④ Carry out the test TEST

⑤ View results





2.5.5 Substitute leakage-P current

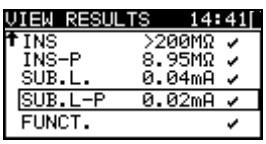
① Set function

② Set parameters and limits
Output ....Size of test voltage
Limit .....Maximum touch leakage current
Time .....Test time.

③ Connect the appliance to the Instrument (as illustrated)

④ Carry out the test TEST

⑤ View results



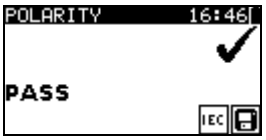
2.5.6 Polarity

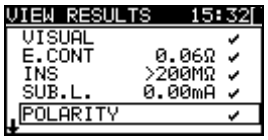
① **Set function**

② **Connect the IEC cable to the instrument (as illustrated)**

③ **Carry out the test** TEST

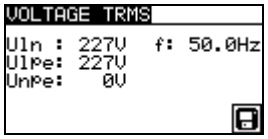
④ **View results**



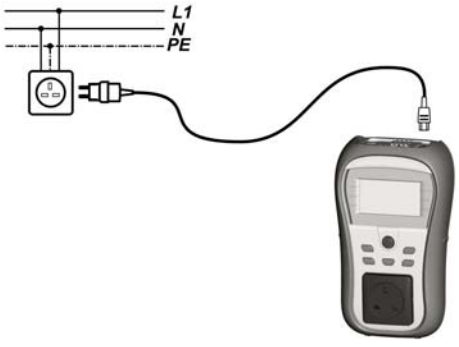


2.5.7 Voltage

① **Set function**



② **Connect the Instrument to the mains supply (as illustrated)**



③ **Carry out the test**

The voltage measurement will start automatically from every mode when the voltage applied to the IEC connector is higher than approximately 50 V (AC or DC)!

3 Step by step PC SW installation

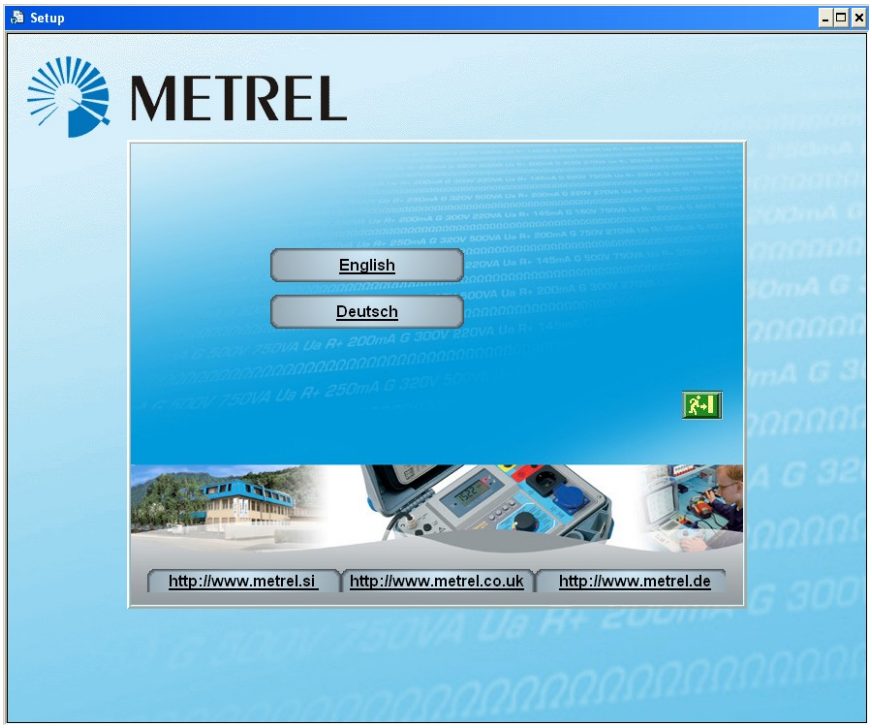
PATLink PRO and PATLink PRO Plus

Important: *The user should have full administrative privileges, in the case of Windows 7 is installed on you computer. Read the document in section Installing instructions → privileges troubleshooting on windows 7*

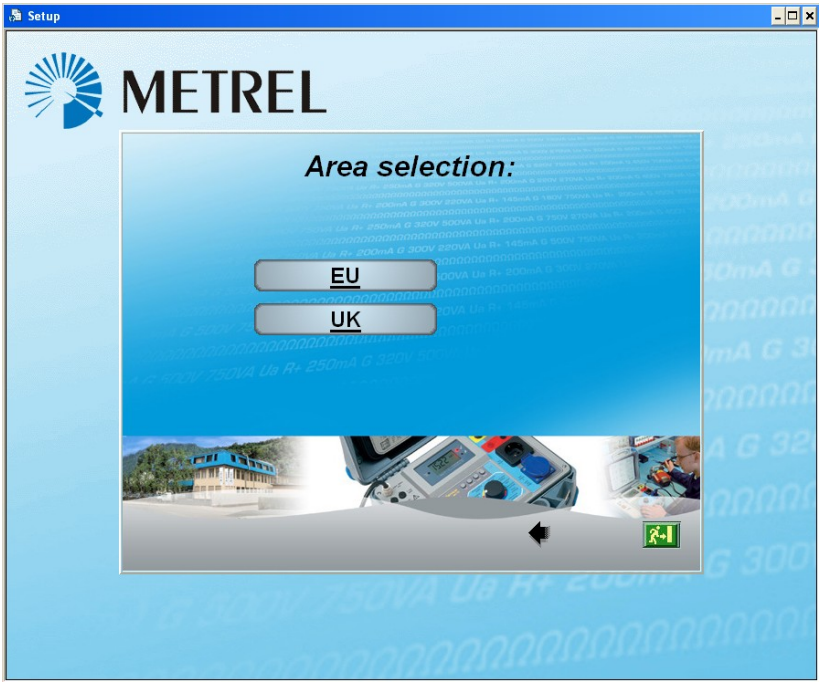
1. Insert a CD delivered with the instrument into the CD/DVD drive of your computer.

2. The software should automatically run. If this is not the case, double click on the CD/DVD drive icon on your computer to open the contents of the CD and double click on the “METREL.exe” program file.

3. The initial welcome screen will appear, select the language, area location and product name.



Language selection



Area selection

Product name selection

4. To install the software, Select PATLink PRO in the next screen

Product section

5. The installation of the software will now begin, on the welcome screen Select »Next« and follow the setup instructions.

6. After completing the installation, confirm finishing the installation leave the check box ticked to automatically start the program (a shortcut is automatically placed on the desktop and in the start menu for future software initiations).

7. To start PATLink PRO software, click the shortcut on the desktop or in the start menu Help files are available on the software to guide you through the various sections of the software.

8. Select “Installing USB”.
Read carefully Installing USB instruction manual available on CD and follow the instruction on how to establish connection between instrument and PC and download the data.

The USB drivers will be automatically installed on the windows 7 operating system.

Appendix A – Simple test codes (UK)

Type	Class	Earth continuity Limit	Out	Insulation Limit	Out	S. Leakage Limit	Polarity
CLASS I	I	0.20 Ω	200 mA	1.00 MΩ	500 V	0.75 mA	-
CLASS II	II	-	-	2.00 MΩ	500 V	0.25 mA	-
IEC	-	0.20 Ω	200 mA	1.00 MΩ	500 V	-	✓
CLASS I PC	I	0.20 Ω	200 mA	1.00 MΩ	250 V	0.75 mA	-

Appendix B – Autotest shortcut codes (UK)

Autotests marked bold are available if SHORTCUT setup is set to BASIC.

Type	Class	Fuse	Cord	Earth Bond Limit	Earth Bond Out	Insulation Limit	Insulation Out	S. Leakage Limit	Leakage Limit	T. Leakage Limit	Code
Portable or Handheld											
	I	3 A	short	0.10 Ω	10 A	1.00 MΩ	500 V	-	0.75 mA	-	001
	I	6 A	short	0.10 Ω	10 A	1.00 MΩ	500 V	-	0.75 mA	-	002
	I	10 A	short	0.10 Ω	25 A	1.00 MΩ	500 V	-	0.75 mA	-	003
	I	**13 A**	**short**	**0.10 Ω**	**25 A**	**1.00 MΩ**	**500 V**	**-**	**0.75 mA**	**-**	**004**
	I	3 A	short	0.10 Ω	10 A	1.00 MΩ	500 V	-	-	-	005
	I	6 A	short	0.10 Ω	10 A	1.00 MΩ	500 V	-	-	-	006
	I	10 A	short	0.10 Ω	25 A	1.00 MΩ	500 V	-	-	-	007
	I	**13 A**	**short**	**0.10 Ω**	**25 A**	**1.00 MΩ**	**500 V**	**-**	**-**	**-**	**008**
	I	3 A	midd	0.30 Ω	10 A	1.00 MΩ	500 V	-	0.75 mA	-	009
	I	6 A	midd	0.30 Ω	10 A	1.00 MΩ	500 V	-	0.75 mA	-	010
	I	10 A	midd	0.30 Ω	25 A	1.00 MΩ	500 V	-	0.75 mA	-	011
	I	**13 A**	**midd**	**0.30 Ω**	**25 A**	**1.00 MΩ**	**500 V**	**-**	**0.75 mA**	**-**	**012**
	I	3 A	midd	0.30 Ω	10 A	1.00 MΩ	500 V	-	-	-	013
	I	6 A	midd	0.30 Ω	10 A	1.00 MΩ	500 V	-	-	-	014
	I	10 A	midd	0.30 Ω	25 A	1.00 MΩ	500 V	-	-	-	015
	I	**13 A**	**midd**	**0.30 Ω**	**25 A**	**1.00 MΩ**	**500 V**	**-**	**-**	**-**	**016**
	I	3 A	long	0.50 Ω	10 A	1.00 MΩ	500 V	-	0.75 mA	-	017
	I	6 A	long	0.50 Ω	10 A	1.00 MΩ	500 V	-	0.75 mA	-	018
	I	10 A	long	0.50 Ω	25 A	1.00 MΩ	500 V	-	0.75 mA	-	019
	I	**13A**	**long**	**0.50 Ω**	**25 A**	**1.00 MΩ**	**500 V**	**-**	**0.75 mA**	**-**	**020**
	I	3 A	long	0.50 Ω	10 A	1.00 MΩ	500 V	-	-	-	021
	I	6 A	long	0.50 Ω	10 A	1.00 MΩ	500 V	-	-	-	022
	I	10 A	long	0.50 Ω	25 A	1.00 MΩ	500 V	-	-	-	023
	I	**13 A**	**long**	**0.50 Ω**	**25 A**	**1.00 MΩ**	**500 V**	**-**	**-**	**-**	**024**
	II	-	-	-	-	2.00 MΩ	500 V	-	0.25 mA	-	025
	II	**-**	**-**	**-**	**-**	**2.00 MΩ**	**500 V**	**-**	**-**	**-**	**026**

Type	Class	Fuse	Cord	Earth Bond Limit	Out	Insulation Limit	Out	S. Leakage Limit	Leakage Limit	T. Leakage Limit	Code
Heating and Cooking											
	I	**3 A**	**short**	**0.10Ω**	**10 A**	**-**	**-**	**-**	**0.75 mA**	**-**	**027**
	I	6 A	short	0.10 Ω	10 A	-	-	-	1.00 mA	-	028
	I	10 A	short	0.10 Ω	25 A	-	-	-	1.50 mA	-	029
	I	**13 A**	**short**	**0.10 Ω**	**25 A**	**-**	**-**	**-**	**2.25 mA**	**-**	**030**
	I	3 A	short	0.10 Ω	10 A	-	-	0.75 mA	-	-	031
	I	6 A	short	0.10 Ω	10 A	-	-	1.00 mA	-	-	032
	I	10 A	short	0.10 Ω	25 A	-	-	1.50 mA	-	-	033
	I	13 A	short	0.10 Ω	25 A	-	-	2.25 mA	-	-	034
	II	-	-	-	-	2.00 MΩ	500 V	-	0.25 mA	-	035
	II	**-**	**-**	**-**	**-**	**2.00 MΩ**	**500 V**	**-**	**-**	**-**	**036**

Type	Class	Fuse	Cord	Earth Bond Limit	Out	Insulation Limit	Out	S. Leakage Limit	Leakage Limit	T. Leakage Limit	Code
IT equipment EN 60950											
	I	-	short	0.10 Ω	100 mA	1.00 MΩ	500 V	3.5 mA	-	-	037
	I	-	midd	0.30 Ω	100 mA	1.00 MΩ	500 V	3.5 mA	-	-	038
	I	-	long	0.50 Ω	100 mA	1.00 MΩ	500 V	3.5 mA	-	-	039
IT equipment EN 60950 – 250V											
	I	**-**	**long**	**0.50 Ω**	**100 mA**	**1.00 MΩ**	**250 V**	**3.5 mA**	**-**	**-**	**040**

Type	Class	Fuse	Cord	Earth Bond Limit	Out	Insulation Limit	Out	S. Leakage Limit	Leakage Limit	T. Leakage Limit	Code
OTHER											
	I	3 A	short	0.10 Ω	10 A	1.00 MΩ	500 V	-	3.50 mA	-	041
	I	6 A	short	0.10 Ω	10 A	1.00 MΩ	500 V	-	3.50 mA	-	042
	I	10 A	short	0.10 Ω	25A	1.00 MΩ	500 V	-	3.50 mA	-	043
	I	**13 A**	**short**	**0.10 Ω**	**25 A**	**1.00 MΩ**	**500 V**	**-**	**3.50 mA**	**-**	**044**
										-	
	I	3 A	short	0.10 Ω	10 A	1.00 MΩ	500 V	-	-		045
	I	6 A	short	0.10 Ω	10 A	1.00 MΩ	500 V	-	-	-	046
	I	10 A	short	0.10 Ω	25 A	1.00 MΩ	500 V	-	-	-	047
	I	**13 A**	**short**	**0.10 Ω**	**25 A**	**1.00 MΩ**	**500 V**	**-**	**-**	**-**	**048**
	I	3 A	midd	0.30 Ω	10 A	1.00 MΩ	500 V	-	3.50 mA	-	049
	I	6 A	midd	0.30 Ω	10 A	1.00 MΩ	500 V	-	3.50 mA	-	050
	I	10 A	midd	0.30 Ω	25 A	1.00 MΩ	500 V	-	3.50 mA	-	051
	I	**13 A**	**midd**	**0.30 Ω**	**25 A**	**1.00 MΩ**	**500 V**	**-**	**3.50 mA**	**-**	**052**
	I	3 A	midd	0.30 Ω	10 A	1.00 MΩ	500 V	-	-	-	053
	I	6 A	midd	0.30 Ω	10 A	1.00 MΩ	500 V	-	-	-	054
	I	10 A	midd	0.30 Ω	25 A	1.00 MΩ	500 V	-	-	-	055
	I	**13 A**	**midd**	**0.30 Ω**	**25 A**	**1.00 MΩ**	**500 V**	**-**	**-**	**-**	**056**
	I	3 A	long	0.50 Ω	10 A	1.00 MΩ	500 V	-	3.50 mA	-	057
	I	6 A	long	0.50 Ω	10 A	1.00 MΩ	500 V	-	3.50 mA	-	058
	I	10 A	long	0.50 Ω	25 A	1.00 MΩ	500 V	-	3.50 mA	-	059
	I	**13 A**	**long**	**0.50 Ω**	**25 A**	**1.00 MΩ**	**500 V**	**-**	**3.50 mA**	**-**	**060**
	I	3 A	long	0.50 Ω	10 A	1.00 MΩ	500 V	-	-	-	061
	I	6 A	long	0.50 Ω	10 A	1.00 MΩ	500 V	-	-	-	062
	I	10 A	long	0.50 Ω	25 A	1.00 MΩ	500 V	-	-	-	063
	I	**13 A**	**long**	**0.50 Ω**	**25 A**	**1.00 MΩ**	**500 V**	**-**	**-**	**-**	**064**

	II	-	-	-	-	2.00 MΩ	500 V	-	0.25 mA	-	065
	II	**-**	**-**	**-**	**-**	**2.00 MΩ**	**500 V**	**-**	**-**		**066**

IEC leads **Surge protected = OFF / RCD protected = OFF**							
	Length	**Earth Bond**		**Insulation**		**Polarity**	**Code**
		Limit	**Out**	**Limit**	**Out**		
0.5mm² / 3A							
	<=5 m	**0.30 Ω**	**10 A**	**1.00 MΩ**	**500 V**	✓	**067**
	7.5 m	0.40 Ω	10 A	1.00 MΩ	500 V	✓	068
	10 m	0.50 Ω	10 A	1.00 MΩ	500 V	✓	069
	12 m	0.60 Ω	10 A	1.00 MΩ	500 V	✓	070
	15 m	0.70 Ω	10 A	1.00 MΩ	500 V	✓	071
	20 m	0.80 Ω	10 A	1.00 MΩ	500 V	✓	072
	30 m	1.00 Ω	10 A	1.00 MΩ	500 V	✓	073
	40 m	2.00 Ω	10 A	1.00 MΩ	500 V	✓	074
	50 m	2.00 Ω	10 A	1.00 MΩ	500 V	✓	075
0.75mm² / 6 A							
	<=5 m	0.20 Ω	10 A	1.00 MΩ	500 V	✓	076
	7.5 m	**0.30 Ω**	**10 A**	**1.00 MΩ**	**500 V**	✓	**077**
	10 m	0.40 Ω	10 A	1.00 MΩ	500 V	✓	078
	12 m	0.40 Ω	10 A	1.00 MΩ	500 V	✓	079
	15 m	0.50 Ω	10 A	1.00 MΩ	500 V	✓	080
	20 m	0.60 Ω	10 A	1.00 MΩ	500 V	✓	081
	30 m	0.90 Ω	10 A	1.00 MΩ	500 V	✓	082
	40 m	1.00 Ω	10 A	1.00 MΩ	500 V	✓	083
	50 m	1.00 Ω	10 A	1.00 MΩ	500 V	✓	084
1 mm²/ 10 A							
	<=5 m	**0.20 Ω**	**25 A**	**1.00 MΩ**	**500 V**	✓	**085**
	7.5 m	0.20 Ω	25 A	1.00 MΩ	500 V	✓	086
	10 m	**0.30 Ω**	**25 A**	**1.00 MΩ**	**500 V**	✓	**087**
	12 m	0.30 Ω	25 A	1.00 MΩ	500 V	✓	088
	15 m	0.40 Ω	25 A	1.00 MΩ	500 V	✓	089
	20 m	0.50 Ω	25 A	1.00 MΩ	500 V	✓	090
	30 m	0.70 Ω	25 A	1.00 MΩ	500 V	✓	091
	40 m	0.90 Ω	25 A	1.00 MΩ	500 V	✓	092
	50 m	1.00 Ω	25 A	1.00 MΩ	500 V	✓	093
1.25mm²/ 13A							
	<=5 m	**0.20 Ω**	**25 A**	**1.00 MΩ**	**500 V**	✓	**094**
	7.5 m	0.20 Ω	25 A	1.00 MΩ	500 V	✓	095
	10 m	0.30 Ω	25 A	1.00 MΩ	500 V	✓	096
	12 m	**0.30 Ω**	**25 A**	**1.00 MΩ**	**500 V**	✓	**097**
1.5mm²/ 15 A							
	<=5 m	**0.20 Ω**	**25 A**	**1.00 MΩ**	**500 V**	✓ standard	**103**
	7.5 m	0.20 Ω	25 A	1.00 MΩ	500 V	✓ standard	104
	10 m	0.20 Ω	25 A	1.00 MΩ	500 V	✓ standard	105
	12 m	0.30 Ω	25 A	1.00 MΩ	500 V	✓ standard	106
	15 m	**0.30 Ω**	**25 A**	**1.00 MΩ**	**500 V**	✓ standard	**107**
UNKNOWN							
	<=5 m	**0.20 Ω**	**25 A**	**1.00 MΩ**	**500 V**	✓ standard	**112**
	7.5 m	0.20 Ω	25 A	1.00 MΩ	500 V	✓ standard	113
	10 m	0.20 Ω	25 A	1.00 MΩ	500 V	✓ standard	114
	12 m	0.30 Ω	25 A	1.00 MΩ	500 V	✓ standard	115
	15 m	**0.30 Ω**	**25 A**	**1.00 MΩ**	**500 V**	✓ standard	**116**
	20 m	0.40 Ω	25 A	1.00 MΩ	500 V	✓ standard	117
	30 m	0.50 Ω	25 A	1.00 MΩ	500 V	✓ standard	118
	40 m	0.60 Ω	25 A	1.00 MΩ	500 V	✓ standard	119
	50 m	0.80 Ω	25 A	1.00 MΩ	500 V	✓ standard	120

IEC leads **Surge protected = ON RCD protected ? = OFF**							
	Length	**Earth Bond**		**Insulation**		**Polarity**	**Code**
		Limit	**Out**	**Limit**	**Out**		
0.5mm^2 / 3A							
	<=5 m	**0.30 Ω**	**10 A**	**1.00 MΩ**	**250 V**	**✓ standard**	**167**
	7.5 m	0.40 Ω	10 A	1.00 MΩ	250 V	✓ standard	168
	10 m	0.50 Ω	10 A	1.00 MΩ	250 V	✓ standard	169
	12 m	0.60 Ω	10 A	1.00 MΩ	250 V	✓ standard	170
	15 m	0.70 Ω	10 A	1.00 MΩ	250 V	✓ standard	171
	20 m	0.80 Ω	10 A	1.00 MΩ	250 V	✓ standard	172
	30 m	1.00 Ω	10 A	1.00 MΩ	250 V	✓ standard	173
	40 m	2.00 Ω	10 A	1.00 MΩ	250 V	✓ standard	174
	50 m	2.00 Ω	10 A	1.00 MΩ	250 V	✓ standard	175
0.75mm^2 / 6 A							
	<=5 m	0.20 Ω	10 A	1.00 MΩ	250 V	✓ standard	176
	7.5 m	**0.30 Ω**	**10 A**	**1.00 MΩ**	**250 V**	**✓ standard**	**177**
	10 m	0.40 Ω	10 A	1.00 MΩ	250 V	✓ standard	178
	12 m	0.40 Ω	10 A	1.00 MΩ	250 V	✓ standard	179
	15 m	0.50 Ω	10 A	1.00 MΩ	250 V	✓ standard	180
	20 m	0.60 Ω	10 A	1.00 MΩ	250 V	✓ standard	181
	30 m	0.90 Ω	10 A	1.00 MΩ	250 V	✓ standard	182
	40 m	1.00 Ω	10 A	1.00 MΩ	250 V	✓ standard	183
	50 m	1.00 Ω	10 A	1.00 MΩ	250 V	✓ standard	184
1 mm^2/ 10 A							
	<=5 m	**0.20 Ω**	**25 A**	**1.00 MΩ**	**250 V**	**✓ standard**	**185**
	7.5 m	0.20 Ω	25 A	1.00 MΩ	250 V	✓ standard	186
	10 m	**0.30 Ω**	**25 A**	**1.00 MΩ**	**250 V**	**✓ standard**	**187**
	12 m	0.30 Ω	25 A	1.00 MΩ	250 V	✓ standard	188
	15 m	0.40 Ω	25 A	1.00 MΩ	250 V	✓ standard	189
	20 m	0.50 Ω	25 A	1.00 MΩ	250 V	✓ standard	190
	30 m	0.70 Ω	25 A	1.00 MΩ	250 V	✓ standard	191
	40 m	0.90 Ω	25 A	1.00 MΩ	250 V	✓ standard	192
	50 m	1.00 Ω	25 A	1.00 MΩ	250 V	✓ standard	193
1.25mm^2/ 13A							
	<=5 m	**0.20 Ω**	**25 A**	**1.00 MΩ**	**250 V**	**✓ standard**	**194**
	7.5 m	0.20 Ω	25 A	1.00 MΩ	250 V	✓ standard	195
	10 m	0.30 Ω	25 A	1.00 MΩ	250 V	✓ standard	196
	12 m	**0.30 Ω**	**25 A**	**1.00 MΩ**	**250 V**	**✓ standard**	**197**
1.5mm^2/ 15 A							
	<=5 m	**0.20 Ω**	**25 A**	**1.00 MΩ**	**250 V**	**✓ standard**	**203**
	7.5 m	0.20 Ω	25 A	1.00 MΩ	250 V	✓ standard	204
	10 m	0.20 Ω	25 A	1.00 MΩ	250 V	✓ standard	205
	12 m	0.30 Ω	25 A	1.00 MΩ	250 V	✓ standard	206
	15 m	**0.30 Ω**	**25 A**	**1.00 MΩ**	**250 V**	**✓ standard**	**207**
UNKNOWN							
	<=5 m	**0.20 Ω**	**25 A**	**1.00 MΩ**	**250 V**	**✓ standard**	**212**
	7.5 m	0.20 Ω	25 A	1.00 MΩ	250 V	✓ standard	213
	10 m	0.20 Ω	25 A	1.00 MΩ	250 V	✓ standard	214
	12 m	0.30 Ω	25 A	1.00 MΩ	250 V	✓ standard	215
	15 m	**0.30 Ω**	**25 A**	**1.00 MΩ**	**250 V**	**✓ standard**	**216**
	20 m	0.40 Ω	25 A	1.00 MΩ	250 V	✓ standard	217
	30 m	0.50 Ω	25 A	1.00 MΩ	250 V	✓ standard	218
	40 m	0.60 Ω	25 A	1.00 MΩ	250 V	✓ standard	219
	50 m	0.80 Ω	25 A	1.00 MΩ	250 V	✓ standard	220

Type	Portable RCD					
	Earth Bond Limit	Out	Leakage Limit	RCD	Polarity	Code
	0.10 Ω	25 A	0.75 mA	30mA Auto	✓ active	400

Type	Class III equipment	
	Visual	Code
	✓	**500**

Meaning of symbols used in autotest shortcut codes tables:
✓ test/measurement enabled,
- test/measurement disabld