



**SigmaGT**  
**MI 3310 / MI 3310A**  
**Short instructions manual**  
*Version 1.2, Code no. 20 751 707*

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*Manufacturer:*

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


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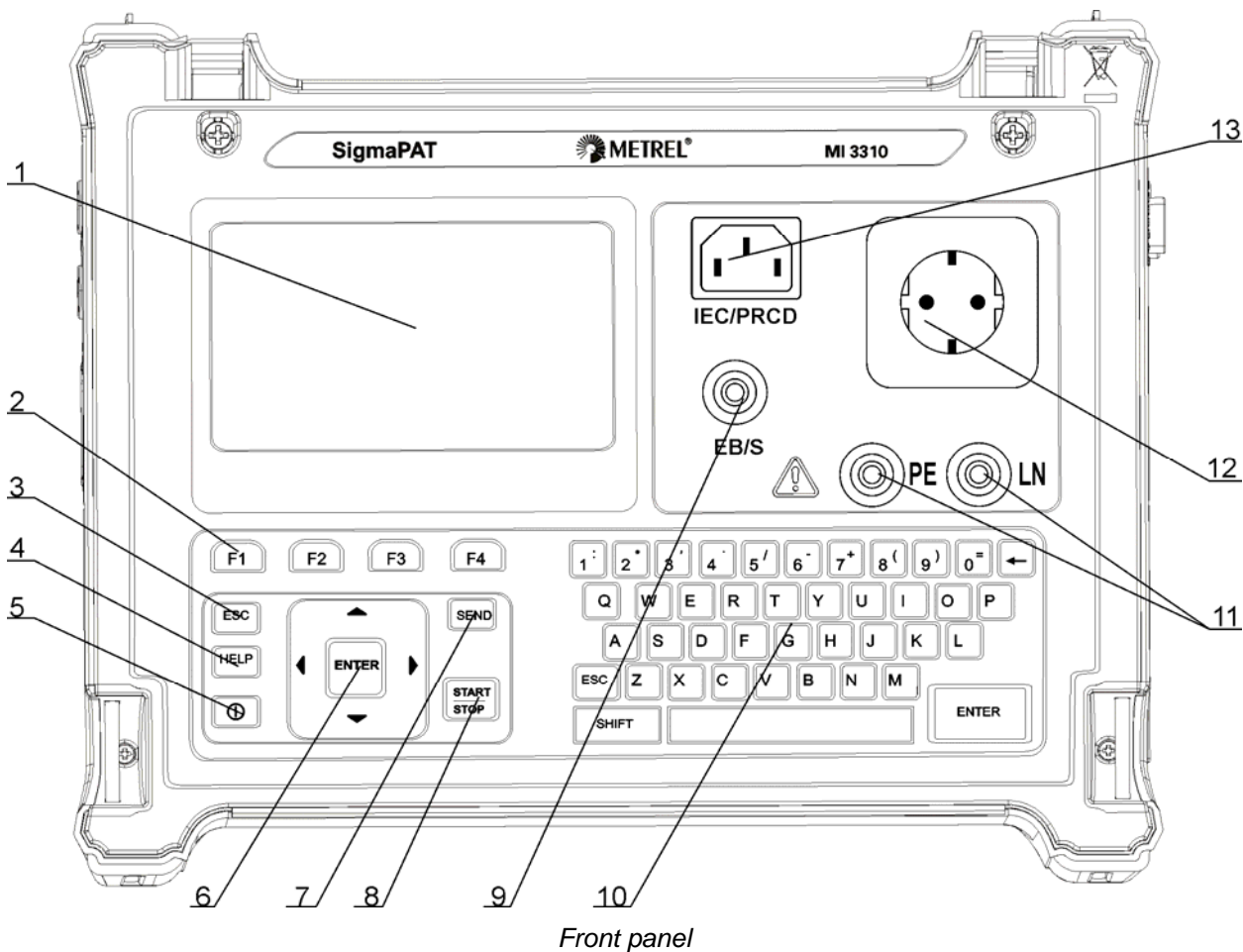
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# 1 Start-up guide

## 1.1 Safety and operational considerations

- › This document is a supplement to the Instruction manual!
- ›  Warning on the instrument means »Read the Instruction manual with special care to safety operation«. The symbol requires an action!
- › Read the 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 user manual the protection provided by the equipment may be impaired!
- › Do not use the instrument and accessories if any damage is noticed!
- › Consider all generally known precautions in order to avoid risk of electric shock while dealing with hazardous voltages!
- › Do not use the instrument in supply systems with voltages higher than CAT II 300 V!
- › Use only correctly earthed mains outlets to supply the instrument!
- › Use only standard or optional test accessories, supplied by your distributor!
- › Instrument servicing and adjustment is only allowed to be carried out by a competent authorized personnel!
- › In case a fuse has blown follow the instructions in user manual to replace it!
- › 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 Ni-Cd or Ni-MH 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 not supported by the instrument is selected the SigmaGT instrument will automatically perform the earth bond test with lower test current (200 mA or 10 A). The operator must be competent to decide if performing the test with lower test current is acceptable!
- › It is advisable not to run tested devices with load currents above 13 A for more than 15 minutes. Load currents higher than 13 A can result in high temperatures of main supply connector and fuse holders!

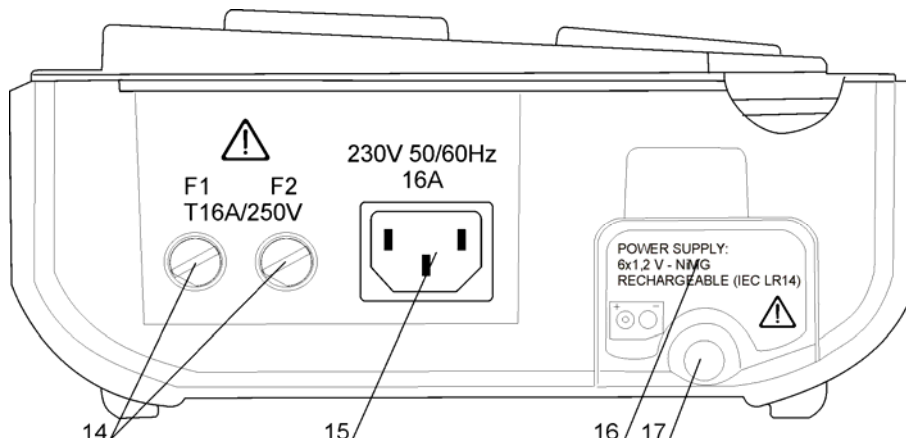
## 1.2 Instrument description - Front and connector panel



- |    |   |
|----|---|
| 1  | 240 × 128 dots graphic matrix display with backlight  |
| 2  | Function keys intended for displayed defined options.   |
| 3  | ESCAPE key  |
| 4  | HELP key  |
| 5  | ON / OFF key<br>To switch off the instrument press and hold ON/OFF key for about 2 seconds.   |
| 6  | Cursor keys and ENTER key   |
| 7  | SEND key  |
| 8  | START / STOP key  |
| 9  | Test probe EB/S, used as output for earth bond test and probe input in for class 2 equipment tests (insulation resistance – S, substitute leakage – S, and touch leakage currents).   |
| 10 | Alpha-numeric keyboard  |
| 11 | LN and PE sockets for testing the insulation resistance and substitute leakage current of fixed installed DUTs.<br><b>Warning!</b><br><b>These sockets are intended only for the connection to deenergized devices.</b>   |
| 12 | Test socket<br><b>Warning!</b><br>Dangerous voltage is present on the test socket during the measurement. Maximum output current is 16 A, test only devices with maximum rated supply current not higher than 16 A!<br>Note: For devices incorporated high reactive loading, e.g. motor with rated power > 1.5 kW, it is recommended to start measurement first and to turn on the tested device later. |
| 13 | IEC appliance connector for testing supply cords<br><b>Warning!</b>   |

The connector input is for test purpose only; do not connect it to the mains supply!

## 2.2 Connector panels

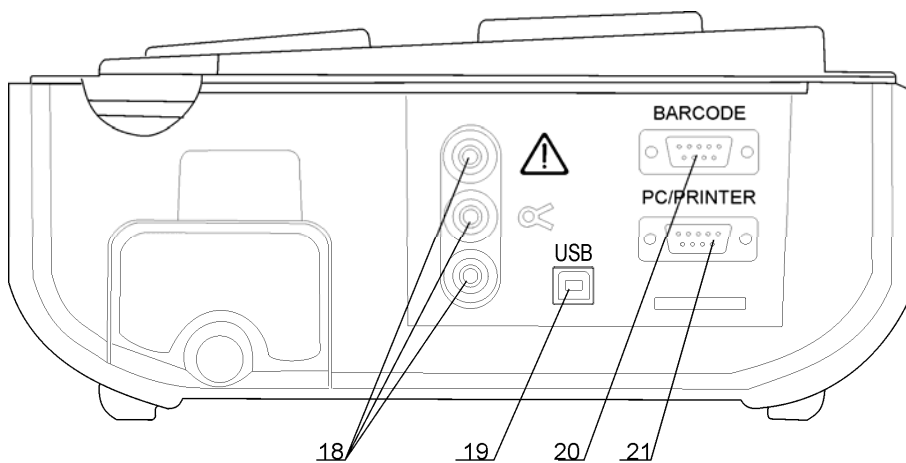


Left side connector panel

- 14 Two T16 A / 250 V fuses for instrument protection
- 15 Mains supply connector
- 16 Battery compartment cover
- 17 Fastening screw for battery compartment cover

**Warning!**

**Disconnect all accessory and tested equipment before opening the battery cover!**



Right side connector panel

- 18 Current clamp adapter input sockets  
Warnings!  
Do not connect any voltage source on this input. It is intended only for connection of current clamp with current output. Maximum input current is 30 mA!  
Green socket is connected to the functional earth of the system and is intended for connection with shield of current clamp only.
- 19 USB connector
- 20 Barcode reader connector
- 21 PC / PRINTER connector

## 1.3 Warnings, messages and symbols

### 1.3.1 Warnings and messages

<p><b>Mains voltage is not correct or PE not connected. Check mains voltage and PE connection!</b></p>	<p>Warning for improper supply voltage condition. Possible causes:</p> <ul style="list-style-type: none"> <li>- No earth connection or other wiring problem on supply socket.</li> <li>- Incorrect mains voltage.</li> </ul> <p>Determine and eliminate the problem before proceeding! <b>Warning:</b></p> <ul style="list-style-type: none"> <li>- <b>The instrument must be earthed properly!</b></li> </ul>
<p><b>Warning! Instrument is connected to an IT earthing system or PE not connected.</b></p>	<p>Supply voltage warning. Possible causes:</p> <ul style="list-style-type: none"> <li>- No earth connection,</li> <li>- Instrument connected to an IT earthing system.</li> </ul> <p><b>Warning:</b></p> <ul style="list-style-type: none"> <li>- <b>The instrument must be earthed properly!</b></li> </ul>
<p><b>No mains voltage. Connect PAT to mains voltage.</b></p>	<p>Instrument not connected to the mains supply voltage. For some measurements like differential / touch leakage tests, PRCD / RCD tests and active polarity, operating the instrument from mains voltage is required. Connect the instrument to the mains voltage and start selected test again.</p>
<p><b>L – N resistance too high (&gt;30 kΩ)! Check fuse and switch. Are you sure to proceed (Y/N)?</b></p>	<p>An excessively high resistance was measured in the fuse pre-test. Indication means that tested device has too low consumption or is:</p> <ul style="list-style-type: none"> <li>- Not connected,</li> <li>- Switched off,</li> <li>- Contains a fuse that has blown.</li> </ul> <p>Select <b>YES</b> or <b>NO</b> with Y or N key.</p>
<p><b>Resistance L – N low! Are you sure to proceed (Y/N)?</b></p>	<p>A low resistance of the device under test (DUT) supply input was measured in the pre-test. This means that it is very likely that an excessively high current will flow after applying power to the DUT. If the high current is only of short duration (caused by a short inrush current) the test can be performed, otherwise not. Select <b>YES</b> or <b>NO</b> with Y or N key.</p>

<p><b>Resistance L – N too low!</b> <b>Are you sure to proceed (Y/N)?</b></p>	<p>An extremely low resistance of the DUT supply input was measured in the pre-test. It is likely that fuses will blow after applying power to the DUT. If the too high current is only of short duration (caused by a short inrush current) the test can be performed otherwise it must be stopped. Select <b>YES</b> or <b>NO</b> with Y or N key. It is recommended to additionally check the DUT before proceeding with the test!</p>
<p><b>Leakage LN-PE high!</b> <b>Are you sure to proceed (Y/N)?</b></p>	<p>Dangerous leakage current (higher than 3.5 mA) will flow if power would be connected to DUT. Select <b>YES</b> or <b>NO</b> with Y or N key. Proceed with testing only if all safety measures have been taken. It is recommended to perform a thorough earth bond test on the PE of the DUT before proceeding with the test.</p>
<p><b>Leakage LN-PE too high!</b> <b>Are you sure to proceed (Y/N)?</b></p>	<p>Dangerous leakage current (higher than 20 mA) will flow if power would be connected to the DUT. Determine and eliminate the problem before proceeding!</p>
<p><b>Leakage LN-PE or EB/S too high!</b> <b>Are you sure to proceed (Y/N)?</b></p>	<p>Dangerous leakage current (higher than 20 mA) would flow if power were connected to the DUT. Select <b>YES</b> or <b>NO</b> with Y or N key. Proceed with testing only if all safety measures have been taken. It is recommended to perform a thorough earth bond test on the PE of the DUT before proceeding with the test.</p>
<p><b>External voltage on test socket too high!</b></p>	<p><b>DANGER!</b> - <b>Voltage on mains test socket or LN/PE terminals is higher than approximately 25 V (AC or DC)!</b> Disconnect the DUT from the instrument immediately and determine why external voltage was detected!</p>
<p><b>External voltage on EB/S too high!</b></p>	<p><b>DANGER!</b> - <b>Voltage on test probe (EB/S) is higher than approximately 25 V (AC or DC)!</b> Disconnect the test probe from the DUT and determine why external voltage was detected!</p>
<p><b>Test was skipped for safety!</b></p>	<p>Instrument skipped the required test because of a failed previous test.</p>



**Overheated!**

Temperature of internal components of the instrument reached their top limit. Measurement is prohibited until the internal temperature has reduced.

**Warning!**  
**More than 80 % of memory is occupied. Stored data should be downloaded to PC.**

Instrument memory is almost full. Download stored results to PC.

**Warning!**  
**Calibration has been expired.**

Recalibration of the instrument is required. Contact your dealer.









**Measurement aborted, contact voltage too high (> 50V).**

A too high contact voltage was detected before an RCD test being carried out. Check PE connections!




**Hardware error. Return the instrument to the repair centre.**

The instrument detects a serious failure.

### 1.3.2 Warning symbols and other symbols

	Remove the EB/S connection, especially if it is connected to any part that will begin to rotate or move when power is applied.
	Connect the test lead to the EB/S test socket.
  	<b>Warning!</b> A high voltage is / will be present on the instrument output! (Insulation test voltage, or mains voltage).
	The DUT should be switched on (to ensure that the complete circuit is tested).
	Connect the lead to be tested to the IEC test terminal.
	Connect current clamp adapter in this test.

### 1.3.3 PASS /FAIL indication

	Test passed.
	Test failed.
	Some tests in the autotest sequence were skipped, but all performed tests passed.

### 1.3.4 Alpha-numeric entry indication

When using alpha-numeric keyboard, entry type can be selected by using SHIFT key.

<b>1A</b>	Alpha-numeric caps entry (excluding special alphabet characters)
<b>1Ä</b>	Alpha-numeric caps entry (including special alphabet characters)
<b>:ä</b>	Special characters and small caps alphabetic entry (including special alphabet characters)

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### 1.3.5 Battery and mains supply indication

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Battery capacity indication.



Low battery! Battery is too weak to guarantee correct result. Replace or recharge battery cells.



Instrument connected to the mains supply voltage. When instrument is in idle mode recharging process is in progress.



Recharging in progress (if instrument is connected to the mains supply voltage).

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### 1.3.6 Bluetooth indication (MI 3310A only)

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Bluetooth communication is enabled. Remote device (printer or barcode reader) can now be connected with the instrument.



Remote Bluetooth device (printer or barcode reader) is connected with the instrument.



Searching for Bluetooth devices or connecting procedure with the selected Bluetooth device (printer or barcode reader).

---

## 1.4 Battery handling

- When replacing battery cells or before opening battery/fuse compartment cover, disconnect any test leads/accessory connected to the instrument and switch off the instrument. Hazardous voltage can exist inside the instrument!
- Insert all cells correctly! If this is not performed correctly, the instrument will not operate and the battery could be discharged.
- If the instrument is not used for a long period of time, remove all of the battery from the battery compartment to protect the instrument from leakage.
- Alkaline or rechargeable Ni-MH battery cells (size C) can be used. The operating hours are given for cells with a nominal capacity of 4500 mAh.

Do not recharge alkaline battery cells! The battery will begin charging as soon as the instrument is connected to the mains supply voltage. The in-built protection circuits control the charging procedure.



Battery charging symbols

### 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

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 shall not be held liable for any loss or damage resulting from the use or performance of the products. In no event shall Metrel 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 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:

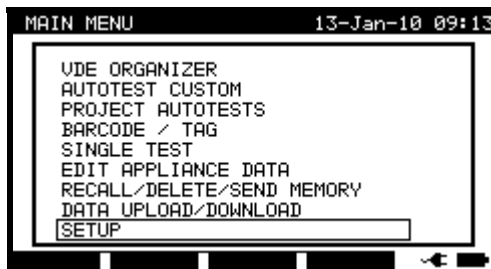
- Any unauthorized repair or calibration of the instrument will infringe the product's warranty.
- All sales are subject to Metrel Standard Terms and Conditions. Metrel reserves the right to change the conditions at any time. Any typographical, clerical or other error or omission in any sales literature, quotation, price list, acceptance of offer, invoice or other documentation or information issued by Metrel 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 at any time without notice to the customer. Metrel 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 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 are excluded from liability for any delays or failure to comply, where the reason is beyond Metrel control;
- No order which has been accepted by Metrel may be cancelled by the customer except with the agreement in writing of Metrel and on terms that the customer shall indemnify Metrel 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 as a result of cancellation. The minimum charge for such cancellation will be 25 % of the total value of the goods ordered.

## 2 Quick-test guide

### 2.1 Instrument test modes

Instrument has three operation modes.



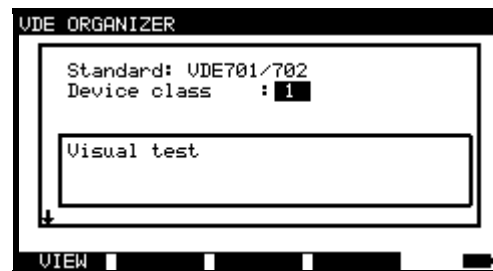
- <**AUTOTEST ORGANIZER**>, a group of pre-defined auto sequences, covering requirements of standard;
- <**AUTOTEST CUSTOM**>, a group of user defined pre-programmed auto sequences;
- <**PROJECT AUTOTEST**> a group of stored data for re-use;
- <**BARCODE / TAG**>, working with barcodes and RFID tags;
- <**SINGLE TEST**>, individual tests;
- <**EDIT APPLIANCE DATA**>, lists of user and appliance data;
- <**RECALL/DELETE/SEND RESULTS**>, manipulation with stored data;
- <**DATA UPLOAD/DOWNLOAD**>, upload/download different data from PC to the instrument (stored test results, list of default DUT and test site names, list of custom auto-sequences);
- <**SETUP**> the menu for general settings of the instrument.

## 2.2 Carrying out a Shortcut autotest sequences

### ① Set function

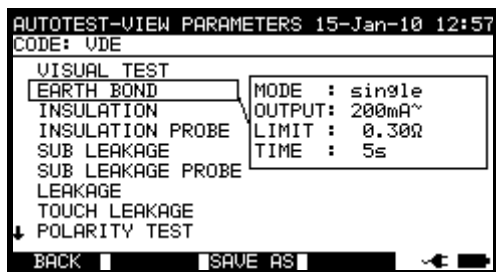
In Main menu select **AUTOTEST ORGANIZER**.

### ② Set appliance type and protective measures



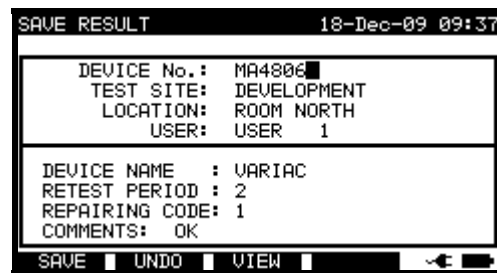
### ③ Carry out Shortcut autotest sequence

Before test view test parameters and limits.



### ④ Save and view results

After Shortcut test sequence is finished Save result menu is displayed.




### 2.3 Carrying out a Custom autotest

① **Set function**

In Main menu select **CUSTOM AUTOTEST**.

② **Select appropriate autotest sequence**



AUTOTEST CUSTOM 15-Jan-10 14:36

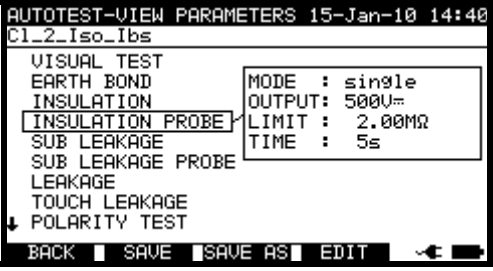
- ↑ Cl\_1\_Iso\_BLT
- Cl\_1\_Ia
- Cl\_1\_Ia\_BLT
- Cl\_2\_Iso
- Cl\_2\_Ibs
- Cl\_1\_IsoIa
- Cl\_1\_IsoIaBLT
- ↓ Cl\_2\_Iso\_Ibs

Press START to run Autotest

VIEW [ ] DELETE [ ] ← [ ] → [ ]

③ **Carry out Custom autotest sequence**

Before test set parameters and limits (if applicable).



AUTOTEST-VIEW PARAMETERS 15-Jan-10 14:40

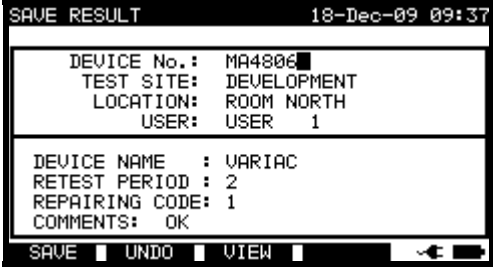
Cl\_2\_Iso\_Ibs

VISUAL TEST	MODE : single
EARTH BOND	OUTPUT: 500V=
INSULATION	LIMIT : 2.00MΩ
INSULATION PROBE	TIME : 5s
SUB LEAKAGE	
SUB LEAKAGE PROBE	
LEAKAGE	
TOUCH LEAKAGE	
POLARITY TEST	

BACK [ ] SAVE [ ] SAVE AS [ ] EDIT [ ] ← [ ] → [ ]

④ **Save and view results**

After test sequence is finished Save result menu is displayed.



SAVE RESULT 18-Dec-09 09:37

DEVICE No.:	MA4806
TEST SITE:	DEVELOPMENT
LOCATION:	ROOM NORTH
USER:	USER 1

---

DEVICE NAME :	VARIAC
RETEST PERIOD :	2
REPAIRING CODE:	1
COMMENTS:	OK

SAVE [ ] UNDO [ ] VIEW [ ] ← [ ] → [ ]



## 2.4 Carrying out a Project autotest

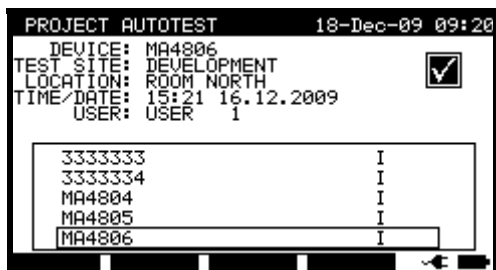
### ① Set function

In Main menu select **PROJECT AUTOTEST**.

### ② Search appropriate sequence

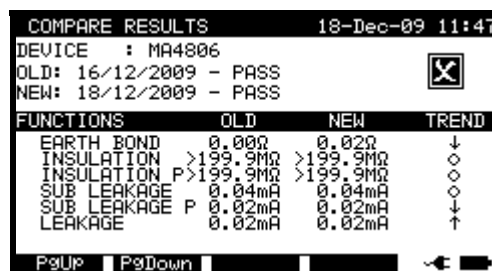
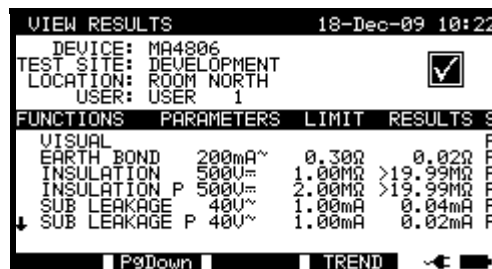
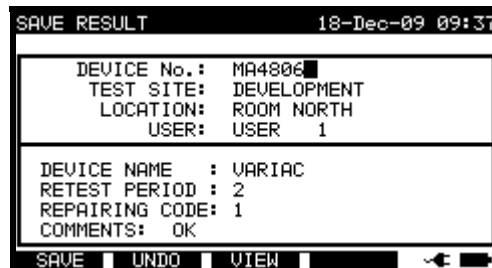


### ③ Select and carry out Project autotest sequence



### ④ Save, view and compare results

After test sequence is finished Save result menu is displayed.

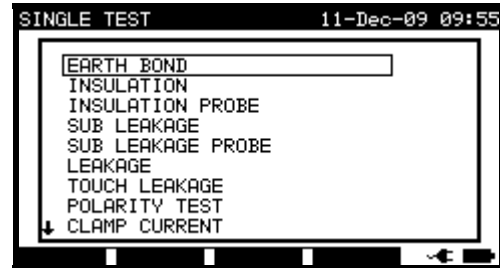


## 2.5 Carrying out a Single test

### ① Set function

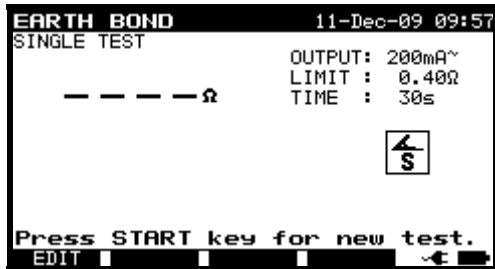
In Main menu select **SINGLE TEST**.

### ② Set appropriate Single test



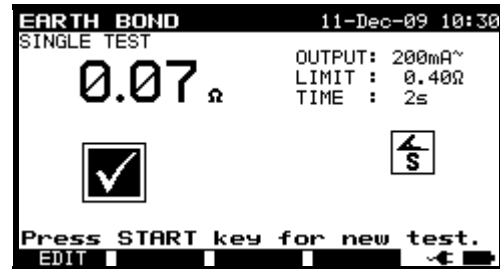
### ③ Carry out the measurement or inspection

Before test set test parameters and limits (if applicable).



### ④ View results

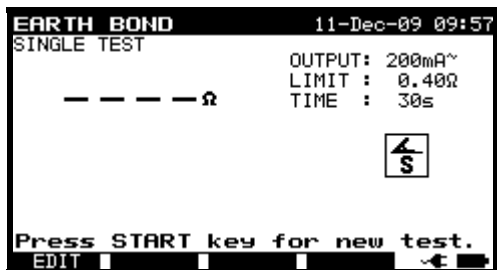
After test is finished result with PASS/FAIL indication is displayed.



## 2.6 Measurements

### 2.6.1 Earth Bond

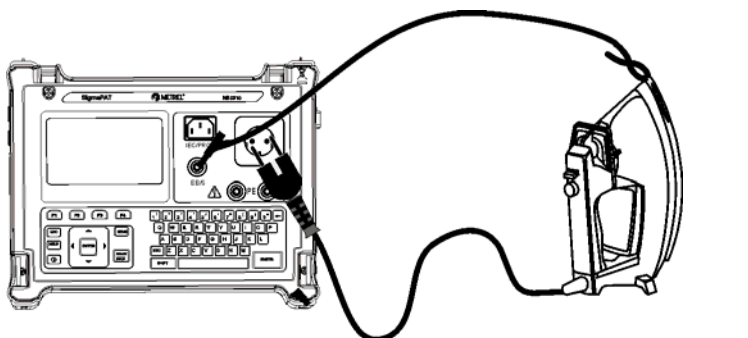
① Set function



② Set parameters and limits

<b>Output</b>	Nominal test current
<b>Limit</b>	Maximum earth bond resistance
<b>Time</b>	Test time

③ Test circuit for Earth Bond test



④ Carry out the test.

⑤ View results



### 2.6.2 Insulation resistance

① Set function

② Set parameters and limits

**Output** Nominal test voltage  
**Limit** Minimum insulation resistance  
**Time** Test time

③ Test circuit for Insulation test

④ Carry out the test

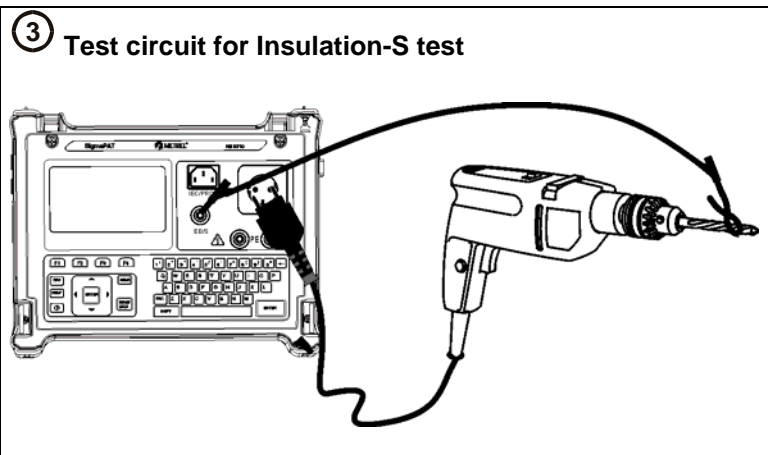
⑤ View results

### 2.6.3 Insulation-S resistance

① Set function

② Set parameters and limits

<b>Output</b>	Nominal test voltage
<b>Limit</b>	Minimum insulation resistance
<b>Time</b>	Test time



④ Carry out the test

⑤ View results

### 2.6.4 Substitute leakage current

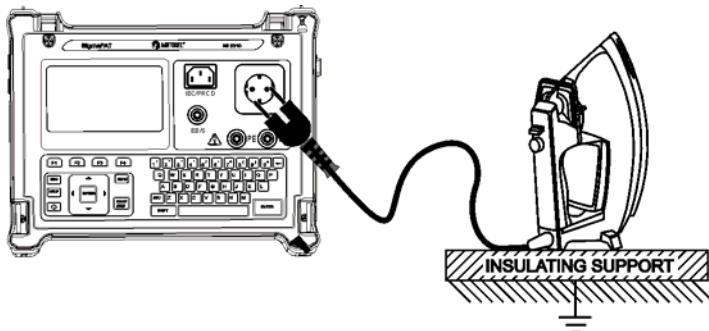
① Set function



② Set parameters and limits

**Limit** Maximum sub leakage current  
**Time** Test time

③ Test circuit for Substitute leakage test



④ Carry out the test

⑤ View results

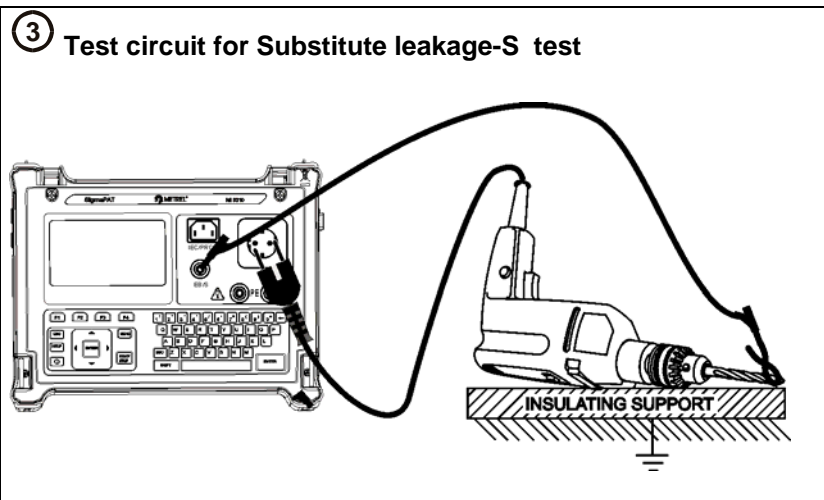


### 2.6.5 Substitute leakage-S current

① Set function

② Set parameters and limits

<b>Limit</b>	Maximum sub leakage current
<b>Time</b>	Test time



④ Carry out the test

⑤ View results

### 2.6.6 Differential leakage current

① Set function

② Set parameters and limits

**Limi** Maximum differential leakage current  
**t** Test time  
**Time**

③ Test circuit for differential leakage test

④ Carry out the test

⑤ View results



### 2.6.7 Touch leakage current

① Set function

② Set parameters and limits

**Limit** Maximum touch leakage current  
**Time** Test time

③ Test circuit for touch leakage test

④ Carry out the test

⑤ View results

2.6.8 (Active) Polarity

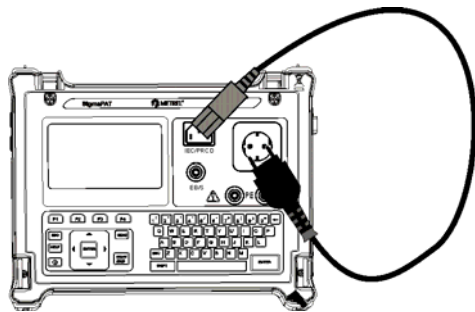
① Set function



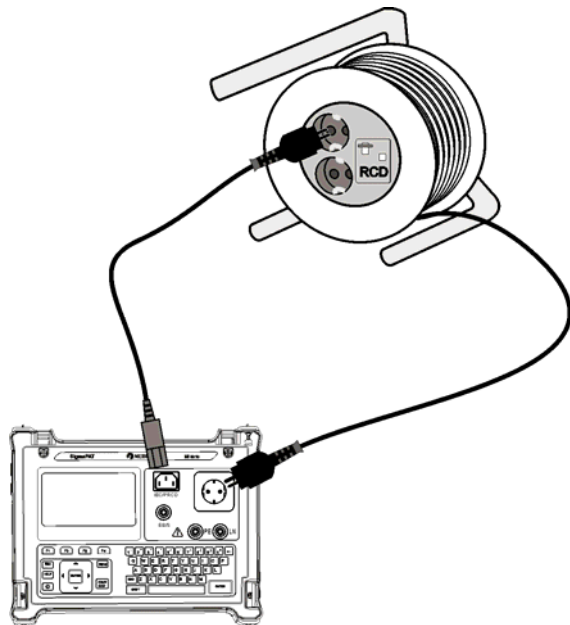
② Set parameters and limits

Test Type of polarity test

③ Test circuit for polarity test



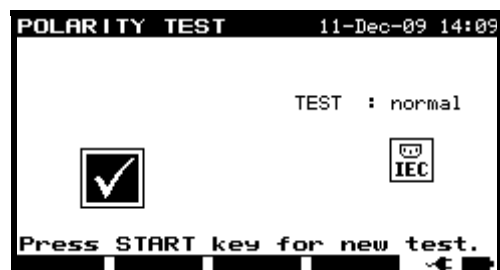
Polarity test – normal for IEC cord



Polarity test - active for RCD protected cord

④ Carry out the test

⑤ View results



2.6.9 TRMS current (using current clamp adapter)

① Set function

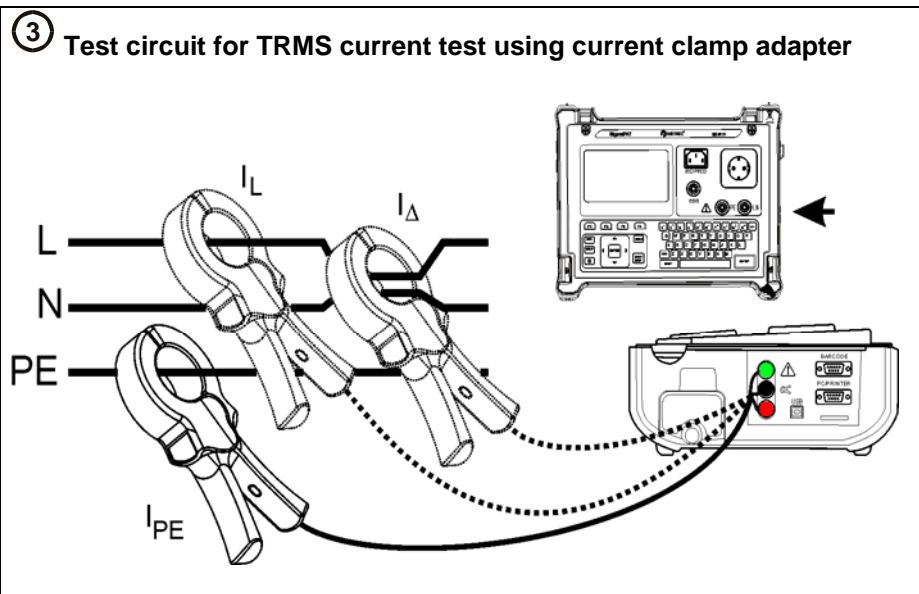
The screenshot shows the following text on the screen:

```

CLAMP CURRENT          11-Dec-09 14:17
SINGLE TEST
----- mA           LIMIT : 1.00mA
                       TIME : none
                       [Icon: Current Clamp]
Press START key for new test.
EDIT [ ] [ ] [ ] [ ]
    
```

② Set parameters and limits

Limit Maximum current  
Time Test time



④ Carry out the test

⑤ View results

The screenshot shows the following text on the screen:

```

CLAMP CURRENT          11-Dec-09 14:27
SINGLE TEST
0.39 mA           LIMIT : 9.00mA
                       TIME : 2s
                       [Icon: Checkmark] [Icon: Current Clamp]
Press START key for new test.
EDIT [ ] [ ] [ ] [ ]
    
```

2.6.10 PRCD / RCD testing

① Set function

② Set parameters

<b>Test</b>	Type of residual current device
<b>Idn</b>	Nominal test current
<b>Multi</b>	Actual test current
<b>Phase</b>	Starting angle
<b>Mode</b>	Type of PRCD/RCD test

③ Test circuit for RCD / PRCD test

Testing of standard RCD

Testing of portable RCD (PRCD)

④ Carry out the test

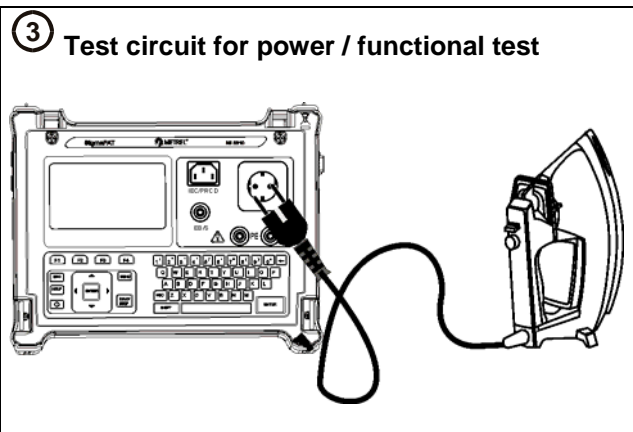
⑤ View results

2.6.11 Power / functional test

① Set function

② Set parameter

Time Test time



④ Carry out the test

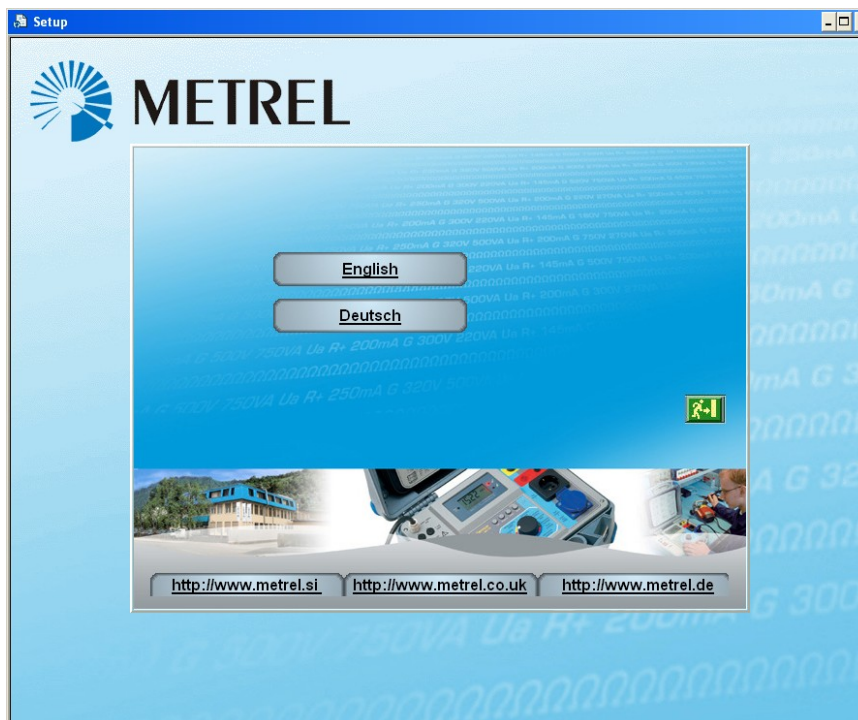
⑤ View results

### 3 Step by step PC SW installation

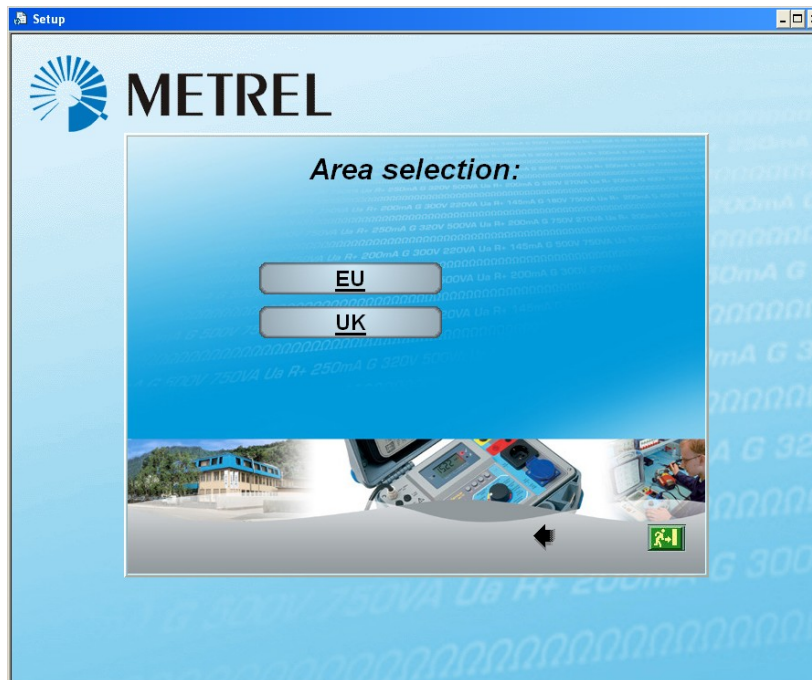
PATLink PRO and PATLink PRO Plus

***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

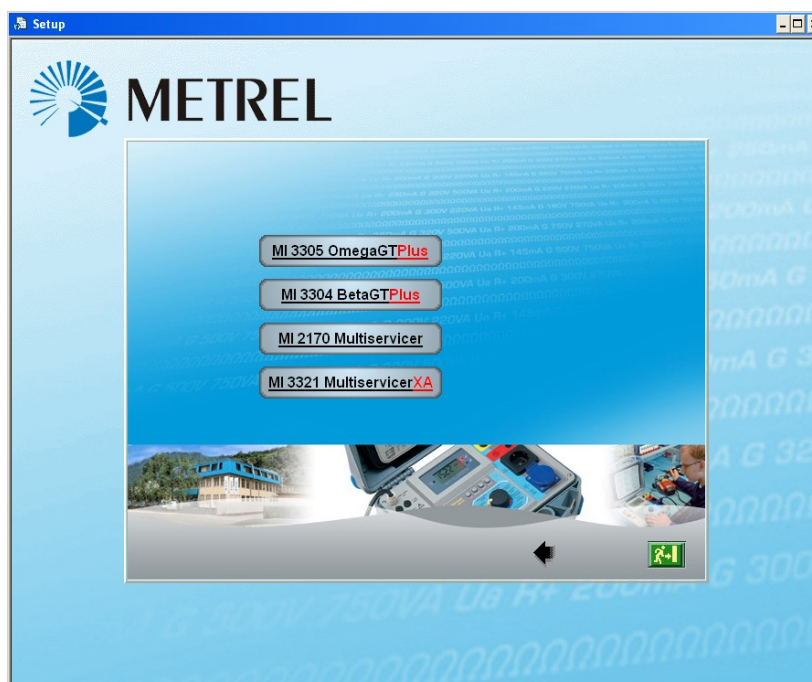
1. Insert a CD delivered with the instrument into the CD/DVD drive of your computer.
2. The software should automatically run. If this is not the case, double click on the CD/DVD drive icon on your computer to open the contents of the CD and double click on the “METREL.exe” program file.
3. The initial welcome screen will appear, select the language, area location and and product name.



*Language selection*



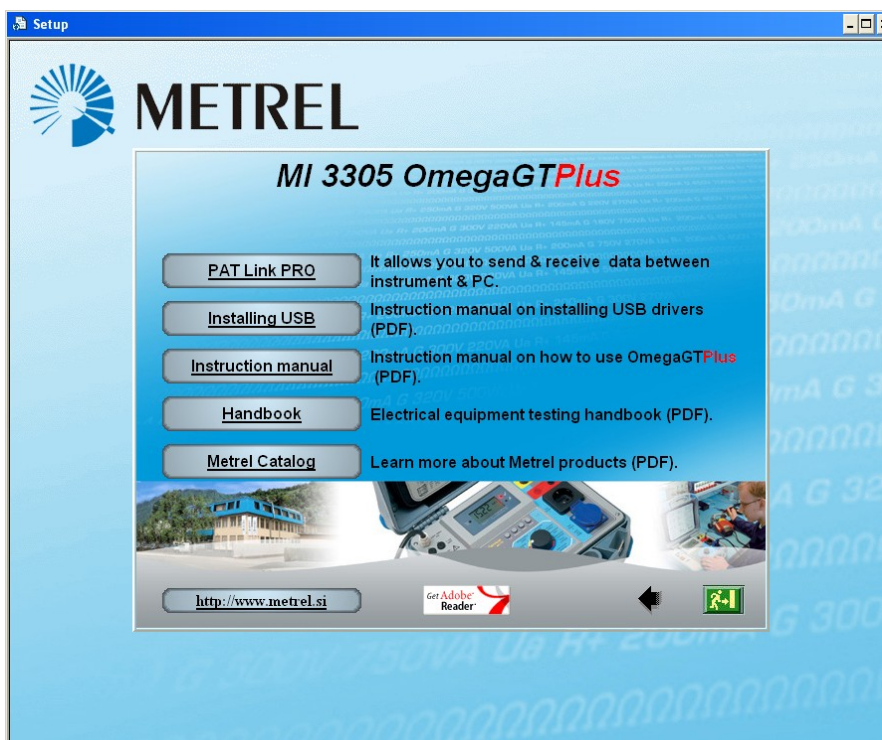
Area selection



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 dektop 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 OS.