PAT-800 and PAT-805

PORTABLE APPLIANCE TESTER

OPERATION MANUAL



PAT-800/805





OPERATING MANUAL

PORTABLE APPLIANCE TESTER PAT-800 and PAT-805

(6

SONEL SA ul. Wokulskiego 11 58-100 Świdnica, Poland

Version 1.09 13.01.2017

PAT-800 and PAT-805 meters are modern, high-quality meters, easy and safe in operation. Please acquaint yourself with the present manual in order to avoid measuring errors and prevent possible problems related to operation of the meter.

CONTENTS

| 1 | SA | FETY | 5 |
|---|-------|--|-----------|
| 2 | GE | NERAL DESCRIPTION AND FEATURES OF THE INSTRUMENT | 6 |
| 3 | SW | TTCHING ON AND GENERAL SETTINGS | 7 |
| | 3.1 | POWER SUPPLY | 7 |
| | 3.2 | START TEST AFTER SWITCHING THE METER ON | 8 |
| | 3.3 | GENERAL SETTINGS - MENU | 8 |
| | 3.3.1 | Setting date and time | 9 |
| | 3.3.2 | Communication with PC | .10 |
| | 3.3.3 | Firmware update | .11 |
| | 3.3.4 | Setting the bar-code reader | .11 |
| | 3.3.5 | Printer Settings | .12 |
| | 3.3.6 | Transferring data to a pen-drive | .13 |
| | 3.3.7 | Setting nominal network voltage | .14 |
| | 3.3.8 | Setting current values in the measurement of R_{PE} on IEC lead test (only | |
| | | PAT-805) | .15 |
| | 3.3.9 | Configuration of settings from PC | .16 |
| 4 | ME | EASUREMENTS | .19 |
| | 4.1 | PRELIMINARY TEST | .19 |
| | 4.2 | MEASUREMENT OF PROTECTIVE LEAD RESISTANCE USING 200MA CURRENT | .21 |
| | 4.3 | Compensation of the test lead resistance during the measurement of the | ΗE |
| | | PROTECTIVE LEAD RESISTANCE USING 200MA CURRENT (AUTO-ZERO) | .23 |
| | 4.4 | Measurement of protective lead resistance using 10/25A current (only | 7 |
| | | PAT-805) | .24 |
| | 4.4.1 | Two-wire measurement of protective lead resistance using 10/25A curren | t |
| | | (only PAT-805) | .25 |
| | 4.4.2 | Compensation of the test lead resistance during the measurement of the | |
| | | protective lead resistance using 10A or 25A current (auto-zero) | .25 |
| | 4.4.3 | Three-wire measurement of protective lead resistance using 10/25A curre (only PAT-805) | nt .26 |
| | 4.4.4 | Four-wire measurement of protective lead resistance using 10/25A curren (only PAT-805) | 1t .27 |
| | 4.5 | MEASUREMENT OF INSULATION RESISTANCE | .27 |
| | 4.5.1 | R _{ISO} measurement on devices of Class I | .28 |
| | 4.5.2 | R _{ISO} measurement on devices of Class II (III) | .29 |
| | 4.6 | MEASUREMENT OF SUBSTITUTE LEAKAGE CURRENT | .30 |
| | 4.7 | MEASUREMENT OF PE LEAKAGE CURRENT | .32 |
| | 4.8 | MEASUREMENT OF DIFFERENTIAL LEAKAGE CURRENT | .33 |
| | 4.9 | MEASUREMENT OF TOUCH LEAKAGE CURRENT | .35 |
| | 4.10 | MEASUREMENT OF CURRENT, POWER CONSUMPTION AND VOLTAGE | .36 |

| 4 | ¹ .11 | IEC LEAD TEST | |
|--------|------------------|---|----|
| 4 5 | Mł | EMORY OF MEASUREMENT RESULT DATA | |
| 5 | 5.1 | STORING THE MEASUREMENT RESULTS IN THE MEMORY | |
| 5 | 5.2 | VIEWING MEMORY DATA | |
| 5 | 5.3 | DELETING MEMORY DATA | |
| | 5.3.1 | Deleting bank data | |
| | 5.3.2 | Deleting the whole memory | |
| 6 | RE | PORT PRINTING | 46 |
| 7 | DA | TA TRANSMISSION | |
| 7 | 7.1 | COMPUTER CONNECTION ACCESSORIES | |
| 7 | 7.2 | DATA TRANSMISSION WITH USB PORT | 46 |
| 8 | CL | EANING AND MAINTENANCE | 47 |
| 9 | ST | ORAGE | |
| 10 | DIS | SMANTLING AND DISPOSAL | |
| 11 | AN | INEXES | |
| 1 | 1.1 | TECHNICAL SPECIFICATIONS | |
| 1 | 1.2 | Standard equipment | 54 |
| 1 | 1.3 | Optional accessories | 54 |
| 12 | MA | ANUFACTURER | |

1 Safety

PAT-800 and PAT-805 meters are designed for performing check tests on electrical equipment, providing measurement results which determine the safety status of tested devices. Therefore, in order to provide conditions for correct operation and the correctness of the obtained results, the following recommendations must be observed:

- Before you proceed to operate the meter, acquaint yourself thoroughly with the present manual and observe the safety regulations and specifications determined by the producer.
- Any application that differs from those specified in the present manual may result in a damage to the device and constitute a source of danger for the user.
- PAT-800 and PAT-805 meters must be operated only by appropriately qualified personnel with relevant certificates authorising the personnel to perform works on electric systems. Operating the meter by unauthorised personnel may result in damage to the device and constitute a source of danger for the user.
- The instrument must not be used with installations or equipment situated in dangerous environments, e.g. where fire or explosion hazards exist.
- It is unacceptable to operate the following:
 - \Rightarrow A damaged meter which is completely or partially out of order,
 - \Rightarrow A meter with damaged test leads insulation,
 - ⇒ A meter stored for an excessive period of time in disadvantageous conditions (e.g. excessive humidity). If the meter has been transferred from a cool to a warm environment with a high level of relative humidity, do not start measurements until the meter is warmed up to the ambient temperature (approximately 30 minutes).
- The meter may be supplied only from grounded mains sockets.
- Before measurements may commence, make sure the test leads are connected to the appropriate measurement sockets.
- Do not touch the tested device during measurements.
- Banana test sockets and the socket for testing IEC cables are protected against improper connection to the voltage up to 300V AC for 60 seconds.
- Repairs may be carried out only by an authorised service point.

NOTE!

Only standard and additional accessories for a given device should be used, as listed in the "Equipment" section. Use of different accessories can lead to errors in the test connection and can introduce additional measurement uncertainties.

NOTE!

The plug on the housing near handle must be always tightened. It can be unscrewed only when the device is transported by an aeroplane.

Note:

Due to continuous development of the meter's software, the actual appearance of the display, in case of some of the functions, may slightly differ from the display presented in this operating manual.

2 General description and features of the instrument

PAT-800 and PAT-805 digital meters are intended to measure the basic parameters of portable electrical devices (power tools, household appliances, etc.) important for their safety: protective conductor resistance, insulation resistance, continuity of connections, the leakage current.

The meter may be used to test the equipment, in accordance with the following standards:

- EN 60745-1 Hand-held motor-operated electric tools. Safety. Part 1: General requirements.
- EN 61029 Safety of transportable motor operated electric tools. General requirements.
- EN 60335-1 Household and similar electrical appliances. Safety. Part 1: General requirements.
- EN 60950 Information technology equipment Safety- Part 1: General requirements .
- VDE 0404-1 Prüf- und Messeinrichtungen zum Prüfen der elektrischen Sicherheit von elektrischen Geräten. Teil 1: Allgemeine Anforderungen.
- VDE 0404-2 Pr
 üf- und Messeinrichtungen zum Pr
 üfen der elektrischen Sicherheit von elektrischen Ger
 äten. Teil 2: Pr
 üfeinrichtungen f
 ür Pr
 üfungen nach Instandsetzung,
 Änderung oder f
 ür Wiederholungspr
 üfungen.
- VDE 0701-0702 Pr
 üfung nach Instandsetzung, Änderung elektrischer Ger
 äte. Wiederholungspr
 üfung elektrischer Ger
 äte. Allgemeine Anforderungen f
 ür die elektrische Sicherheit.

Basic functions of the instrument:

- □ Measurement of network voltage and frequency
- **Checking the resistance of L-N circuit**
- **Checking the fuse**
- Measurement of protective conductor resistance (Protection class I):
 - technical measurement method
 - measurement with sinusoidal current of network frequency and values: 200mA, 10A (only PAT-805) and 25A (only PAT-805)
 - adjustable measurement time
 - adjustable upper limit in the range of: $10m\Omega \dots 1.99\Omega$ with resolution 0.01Ω

□ Measurement of insulation resistance:

- three test voltages: 100V (only PAT-805), 250 (only PAT-805) and 500V
- measurement of insulation resistance up to 600MΩ
- automatic discharge of the capacitance of tested object after the insulation resistance measurement is completed
- adjustable measurement time
- adjustable lower limit within the range of 0.1 \dots 9.9 M Ω with resolution of 0,1M Ω

□ Measurement of substitute leakage current:

- adjustable measurement time
- adjustable upper limit in the range of: 0.01 ... 9.9 mA with resolution of 0.01mA/0.1mA

Measurement of PE leakage current

- adjustable measurement time
- adjustable upper limit in the range of: 0.01 ... 9.9 mA with resolution of 0.01mA/0.1mA

□ Measurement of differential leakage current:

- adjustable measurement time
- adjustable upper limit in the range of: 0.01 ... 9.9 mA with resolution of 0.01mA/0.1mA

□ Measurement of touch leakage current:

- adjustable measurement time
- adjustable upper limit in the range of: 0.01 ... 1.99 mA with resolution of 0.01mA

Power measurement:

- adjustable measurement time
- Current consumption measurement
- IEC lead test
- □ Other:
 - automatic selection of measuring range
 - 990 memory cells for storing individual measurement results with the option to transfer them to a PC via USB socket or printing
 - cooperation with the bar-code reader and printer
 - large, readable display with backlight option
 - ergonomic operation

Note:

The displayed E02 symbol informs that the 10/25A test set is damaged. The machine must be sent for repair.

3 Switching on and general settings

3.1 Power supply

The device is powered from the network 187 ... 265V, 50Hz.



Two 15A fuses protect L and N lines from the supply socket to the test socket, they are tripped when current consumption from the test socket is too high (>16A).

500mA fuse protects 200mA current controller for RPE measurement.

3.2 Start test after switching the meter on

After switching on, the meter performs self-test to check its correct operational condition and when this test is successfully completed, the meter automatically performs the following measurements:

- measurement of the voltage in the power supply socket, i.e. the voltage between L and N of power supply to the meter
- measurement of mains frequency
- checking the continuity PE in the power supply socket
- measuring the voltage between N and PE in the power supply socket

When everything is correct the following screen is displayed:



Notes:

- When the network voltage is below 187V the meter turns off automatically.

Additional information displayed by the meter

| an acoustic signal | Lack of PE continuity, the measurements are blocked (message Lon blinks). |
|--|--|
| U _{N-PE} 38 , 7 ^v , A and an acoustic signal | Voltage U_{N-PE} > 25V, the measurements are blocked (the voltage value blinks). |
| > CDS vand an acoustic signal | Mains voltage> 265V, measurements are blocked. |
| Û | Exchanged L and N, measurements are possible. |

3.3 General Settings - MENU

By pressing **SET** button the user enters the mode where the following actions are available:

- setting date and time
- communicating with PC
- updating firmware
- operating the meter with a bar-code reader and printer
- transferring data to a pen-drive

- setting nominal network voltage
- setting current values in the measurement of R_{PE} on IEC lead (only PAT-805).



Notes:

- The value or symbol to be changed is blinking.
- Exit MENU using STOP/ESC.

1

- Settings are stored in memory after switching off the meter.

3.3.1 Setting date and time





3.3.2 Communication with PC



3.3.3 Firmware update



Notes:

- New versions of software for the meter are available at www.sonel.pl.

- This function may be used only by the computer proficient users.

- During programming, do not turn off the power supply of the meter and the power supply should be stable. Do not disconnect the USB cable.

3.3.4 Setting the bar-code reader





Notes:

- The reader and printer have been programmed to read the codes in CODE128 standard (in PAT devices we use digits only). PAT accepts only 7-character codes (e.g. "1234567"), any other are considered invalid. Therefore, if you attempt to read a 6-character code (or shorter) the reader will read it, but PAT will not save it - the same applies to 8-character codes and longer.

- The bar-code contains only ID number of the device, no additional information is coded.

- Reader configuration:
- 1. Connect the reader to your PC.
- 2. Wait until the reader is installed on your system.
- 3. Point the reader at the following code pressing the button. The reader signals successful read-out by lighting green LED and a beep.



3.3.5 Printer Settings





Note:

- The printer must be connected to any of the USB socket of "Host" type.

- Supported types of printers: Brother QL-720NW, Brother PT-9700PC.

3.3.6 Transferring data to a pen-drive





Notes:

- Pen-drive must have FAT32 file system.
- Pen-drive must be plugged into the left USB socket of "Host" type.

- The content of memory is transferred to the pen-drive as a file in an independent format interpreted by "Sonel Reader" freeware and "Sonel PAT" commercial software.

Additional information displayed by the meter

| ~ | No communication or poor communication with the pen- |
|-------------|--|
| d) 5(| drive. |
| برر ۲۵۱۵ | Pen-drive memory is full. |

3.3.7 Setting nominal network voltage





Notes:

- Nominal network voltage is used in Isus function for calculating the leakage current, which is measured at a voltage of 40V and its value is rescaled to the nominal voltage.

3.3.8 Setting current values in the measurement of R_{PE} on IEC lead test (only PAT-805)





3.3.9 Configuration of settings from PC

"Sonel PAT" software and " Sonel Reader" freeware delivered with the meter, enable user to configure meter settings, both in terms of general data and individual parameters of each measurement function.

When using "Sonel PAT" software - start to configure the settings by pressing **Settings** 1 button displayed in the main window (**Main functions** tab), then in "Software settings" window press **Meter settings** 2.



When using "Sonel Reader" press Meter configuration PAT80x 1 button:



In both programs, window "PAT80x Settings" will be displayed:

| PAT 80x Settings | X |
|-----------------------------|---------------|
| General Manual Au | to |
| Date and time | |
| | |
| 5 styczeń 2012 - 09:07:38 🗘 | Off |
| | Manual |
| | |
| Barcode Scanner Label Pri | nter |
| Enabled O Disabled | ed 💿 Disabled |
| Voltage IEC Test 0 | Current |
| 220.0V 🗾 0.2A | |
| Client | |
| Name | Phone |
| | |
| | |
| 🚊 Download 🛛 🔭 Load | Save as |
| | |

Window for configuring general settings.

You can use this module to enter your contact details which will be visible on the reports printed directly from the meter (using an optional printer). Moreover, here you can set the date, time and language of reports printed by the meter.

In **Manual** and **Auto** tabs you can configure the parameters of all measurements performed both individually and included in auto-tests.

| 🔀 PAT 80x Settings | | | | | | | | x |
|--------------------|---------|------------------|--------|-------|---------|-----|-------|-----|
| | General | M | anual | Aut | 0 | | | |
| RPE RIS | O ISUB | IPE | IDELTA | Π | POWER | IEC | | |
| | | | | | | | | |
| | | . 1 | 0 | мо | | | | |
| | Limr | t 1, | | IVISZ | | | | |
| | lime | e 14 | • | sec. | | | | |
| | | | Unlim | ited | | | | |
| | Unorr | n <mark>2</mark> | 500 | · | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | _ |
| Download 📄 | Load | | | | Save as | | 👚 Upl | oad |
| | | | | | | | | |

Window for configuring manual measurements.

| PAT 80x Settings | | | × |
|-------------------|----------------------|-----------------|----------------|
| | General | Manual Auto | |
| | RPE RISO ISUB | IPE IDELTA IT | POWER |
| Class I | O Enat | oled 💿 Disabled | |
| Class III | Limit | 1,0 🛟 ΜΩ | |
| ter 2 ⊕ 3 | Time | 65 🌲 sec. | |
| ±.4 ⊕.5 = | Unom | 500V 🔹 | |
| ⊕ 6 | | | |
| ±.7 <u>⊕</u> 8 | | | |
| ⊕·9 ⊕·10 | | | |
| <u>⊕</u> 11 | | | |
| | | | |
| | | | |
| | | | |
| Download | Load | s 🔚 s | Save as Upload |

Window for configuring Auto-measurements.

The software enables user to read the current configuration of the meter, save the meter settings into a file, upload the configuration from a file, create files with different configurations, which is a simple way to prepare a number of configurations for various requirements, e.g. for different customers and quickly reset the meter according to current needs.

4 Measurements

Notes:

For the convenience of measurements on devices of Class II the socket marked with $\not \rightarrow$ symbol is connected with PE pin of the test socket. Do not connect dangerous voltage to this socket.

- Tested device must be turned on.

- Measurement activated with defined duration time = LONL - continuous measurement – lasts as long as **START** button is pressed. Maintaining the measurement is possible by pressing **ENTER** with **START** button kept pressed.

- Each measurement with duration = LONL - continuous measurement – maintaining the measurement by pressing ENTER may be stopped by pressing STOP/ESC.

- After completing each measurement use \checkmark , \blacktriangleright to see parameters (limits) including the date and time of measurement.

- All data can be entered using the program on your PC.

4.1 Preliminary test



Connect the mains plug of the tested device into the test socket of the meter.



2



RL-N Press the button of initial measurement (). After that meter is prepared for measurement.



Symbol indicates the need for visual inspection on the tested device. Please check the power cord insulation, quality of housing and mains plug (for cracks or damages) etc.



Press ENTER, if this test is successful (PASS is displayed) or STOP/ESC, when the test result is negative (FAIL is displayed).

Symbol - indicates the possibility to check the fuse removed from the tested device.



Contact the fuse with the test points. The efficiency of the fuse is indicated by displaying **OK** and an acoustic signal.

Notes:

- Tested device must be turned on.

- $R_{L\text{-}N}$ measurement is intended for resistance objects, in case of inductive objects, the result may be burdened with an additional errors.

- Fuse test is possible when READY message is displayed.

- Do not touch the two metal ends of the fuse with your fingers during the test, because a blown fuse may be diagnosed as good.

4.2 Measurement of protective lead resistance using 200mA current





device connected to PE.







Press START.

After measuring is completed, read the result. The measurement may be stopped before the set time runs out by pressing **STOP/ESC**.



Notes:

- Tested device must be turned on.

1

- Test circuit is electrically isolated from the mains and from PE mains lead.

4.3 Compensation of the test lead resistance during the measurement of the protective lead resistance using 200mA current (auto-zero)





Use the probe connected to **I2** socket (for PAT-800 - **R**_{PE}) and touch PE pin of the test socket.





3

Press START, to begin auto-zero. After finishing auto-zero process, for 1s is displayed message in and the meter enters the measuring function.

Completed auto -zero process is signalled during the measurement by displaying ZERO. In order to remove auto-zero proceed in the same manner, but disconnect the test lead from PE. After finishing, for 1s is displayed message DFF.

Measurement of protective lead resistance using 10/25A 44 current (only PAT-805)



Symbol LP indicates that 10/25, two-wire measurement is set,

symbol **III** indicates that threewire measurement is set, symbol

indicates that four-wire measurement is set. Another pressing of RPE 10/25A switches the current value and measurement type.



When parameters must be changed press **SET**. Setting is performed as in section 4.2.

Notes:

Note that any kind of adapter add extra resistance and thus the measurement result will be overestimated.

- For 10A and 25A current, there is no possibility of continuous measurement settings (Cont.) If such setting was set for the 200mA current, then switching the meter to measure with 10/25A current causes that a default value of 5 s. is set as measuring time.

- To avoid excessive heating of the measuring pin in PE socket, do not trigger the measurement with 25A current at short intervals.

The method of measurement and other observations are the same as for the measurement of 200mA.

Additional information displayed by the meter



4.4.1 Two-wire measurement of protective lead resistance using 10/25A current (only PAT-805)

Connect the mains plug of the tested device into the test socket of the meter. Use the probe connected to socket **I2** and touch metal parts of the tested device connected to PE.



The method of measurement and observations are the same as for the measurement of 200mA.

4.4.2 Compensation of the test lead resistance during the measurement of the protective lead resistance using 10A or 25A current (auto-zero)





In **R**_{PE} **10A** or **25A** mode, press **V**. Auto-zero screen will appear with blinking symbol **Deriv**.



2

Use the probe connected to 12 socket and touch PE pin of the test socket.



3

START

Press START, to begin auto-zero. After finishing auto-zero process, for 1s the in message is displayed and the meter enters the measuring function.

Completed auto -zero process during the measurement is signalled by displaying ZERO. In order to remove auto-zero proceed in the same manner, but disconnect the test lead from PE. After finishing for 1s the LF message is displayed.

4.4.3 Three-wire measurement of protective lead resistance using 10/25A current (only PAT-805)

Connect the mains plug of the tested device into the test socket of the meter. Use the power probe (or Kelvin crocodile clip) connected to U2 and 12 sockets and touch metal parts of the tested device connected to PE.



The method of measurement and observations are the same as for the measurement of 200mA.

4.4.4 Four-wire measurement of protective lead resistance using 10/25A current (only PAT-805)

Connect one probe (or crocodile clip) connected to I1, U1 sockets, to PE of power cable of the tested device. Use the power probe (or Kelvin crocodile clip) connected to U2 and I2 sockets and touch metal parts of the tested device connected to PF.



The method of measurement and observations are the same as for the measurement of 200mA.

4.5 Measurement of insulation resistance



Press RISO. After that meter is prepared for

Another pressing of Riso switches the test voltage to 100V, 250V and 500V (only 500V is available for PAT-800).

When parameters must be changed press **SET**. Setting is performed as in section 4.2

Notes:

- Tested device must be turned on.
- Test circuit is electrically isolated from the mains and from PE mains lead.
- The measurement result should be read after displayed values are stabilized.
- After the measurement the tested object is automatically discharged.

4.5.1 R_{ISO} measurement on devices of Class I



Connect the mains plug of the tested device into the test socket of the meter. The measurement is made between shorted L, N and PE. In addition, it is possible to carry out the measurement with the probe connected to **R**_{ISO}- socket (**R**_{ISO} for PAT-800).



The measurement ends after a preset time runs out or after pressing **STOP/ESC**.

After measuring is completed, read the result.

3



Notes:

- Before the measurement (also in AUTO test) check the resistance of the protective conductor R_{PE} , which should be correct.

4.5.2 R_{ISO} measurement on devices of Class II (III)

Connect the mains plug of the tested device into the test socket of the meter. L and N are shorted. Use the probe connected to socket R_{ISO} - (for PAT-800 - R_{ISO}) and touch the conductive accessible parts of the tested device.



It is also possible to perform measurement without the test socket - by using the following sockets: **R**_{ISO}- and **R**_{ISO}+ (only PAT-805).



The measurement is performed similarly as in 4.5.1.

4.6 Measurement of substitute leakage current





For Class II and for accessible parts not connected to PE in Class I, additionally connect I2 socket (for PAT-800 - R_{ISO}) to the probe which will be used for touching accessible parts of the tested device.

4





Notes:

- Tested device must be turned on.
- Test circuit is electrically isolated from the mains and from PE mains lead.
- Test voltage is 25 .. 50 Vrms

1

(2)

4.7 Measurement of PE leakage current



Incorrect result: I_{SUB} > LIMIT

Connect the mains plug of the tested device into the test socket of the meter. The measurement is made between shorted L, N and PE. In addition, it is possible to carry out the measurement with the probe connected to R_{ISO} - socket (R_{ISO} for PAT-800).





Settings and the measurement are as in 4.5.1.

Notes:

During the measurement in the test socket the voltage of mains is present.



- PE leakage current is measured directly on this line enabling the user to get precise measurement results even when the device consumes 10A or 16A current. Note that if the current leakage is not caused by PE line but by other earthed elements (e.g. water pipe) – it cannot be measured in this measurement function.

- Ensure that the location of the tested device is isolated.

- Tested device must be turned on.

- In the half-time of the measurement, the meter automatically changes the polarity of the test socket and as a result it displays the value of higher leakage current.

4.8 Measurement of differential leakage current



Press I_{Δ} . After that meter is prepared for measurement.



Connect the mains plug of the tested device into the test socket of the meter. The measurement is made between shorted L, N and PE. In addition, it is possible to carry out the measurement with the probe connected to R_{ISO} - socket (R_{ISO} for PAT-800).



Settings and the measurement are as in 4.5.1.

2

Notes:



- Differential leakage current is measured as a difference between L current and N current. This measurement takes into account not only PE leakage current, but also leakage currents caused by other earthed elements - e.g. water pipe. The disadvantage of this measurement is the presence of common current (supplied to the device through L line and returning via N line), which makes the measurement difficult. If this current is high, the measurement will be less accurate (as described in the technical data) than the measurement of PE leakage current.

- Tested device must be turned on.

- In the half-time of the measurement, the meter automatically changes the polarity of the test socket and as a result it displays the value of higher leakage current.

- The result of measurement may be affected by the presence of external fields and by the current used by the device.

4.9 Measurement of touch leakage current



Settings and measurements as in section 4.5.

Notes:

- The measurement should be performed at both positions of the mains plug of the tested device and as the result the higher current value should be accepted.

- The bandwidth of test current results from the measuring system with adjusted touch current which simulates human perception and reaction, in accordance with EN 60990: 2002.

4.10 Measurement of current, power consumption and voltage



During the measurement in the test socket the voltage of mains is present.

4.11 IEC lead test

1



Press IEC TEST. After that meter is prepared for measurement.





When parameters must be changed press SET. Setting is performed as in section 4.2. The following must be successively set: LIMIT for RPE, measurement time RPE, LIMIT for R_{ISO}, measurement time R_{ISO}.



2

Connect the mains plug into the test socket and the other into the IEC socket.







Press START. The measurement may be stopped before the set time runs out by pressing STOP/ESC. After measuring is completed, read the point [[]] or []] L.



Additional information displayed by the meter

| | Lack of continuity in conductor L. |
|---------------|------------------------------------|
| N — `— | Lack of continuity in conductor N. |
| | L and N are shorted. |
| | L and N are replaced. |

4.12 Automatic tests



Press AUTO. The screen with test selection will be displayed (1 \dots 20), the number of test blinks.



Notes:

- Only numbers of programmed tests are displayed

- If no test is programmed, after pressing **AUTO** the meter immediately enters the set-up mode (SET) is displayed).

- Programmed test is a test where at least for one class, one measurement is performed (set on

- Default programmed tests are: 1 ... 4 for all three classes.



To program an inactive test or change the parameters, after entering the AUTO mode ...







In this way, you may program the test by activating measurements in the following sequence: an initial measurement $\rightarrow R_E \rightarrow R_{ISO} \rightarrow I_{SUB} \rightarrow I_{PE} \rightarrow I_{\Delta} \rightarrow I_T \rightarrow S$.



After approving the last change by pressing **ENTER** press it two more times and the meter will enter standby mode displaying the following screen.



Notes:

- Readiness for next measurement is obtained automatically, but the individual measurements should be initiated by pressing **START**, as in single measurements.

- The duration of the measurement may be reduced by pressing **STOP/ESC**. The result remains as at the time of stopping the measurement and the meter turns into standby mode until the next measurement. Double pressing of **STOP/ESC** interrupts the cycle of automatic measurement and all the previous results are lost.

- If the result of one of the tests is improper (FII L), you may record it (finish the autotest by pressing **ENTER** and consider the tested device as faulty) or press **START** to repeat this test (e.g. when improper result was caused by an error in connections).

5 Memory of measurement result data

PAT-800/805 meters have memory divided into 10 banks of 99 cells. Each measurement result can be stored in a memory cell marked with a selected number and in a selected memory bank. Thanks to this, the user of the meter can, at his/her option, assign memory cell numbers to individual measurement points and the memory bank numbers to individual facilities. The user can also perform measurements in any sequence and repeat them without losing other data.

Memory of measurement result data **is not deleted** when the meter is switched off. Thanks to this, the data can be later read or sent to a computer. The number of a current memory cell or memory bank is not changed either.

Notes:

- In a single cell you may store a set of results and other data (time, barcode, Pass/Fail, limit, etc) for AUTO and IEC test or the result of a single measurement (+ time, code, Pass / Fail).

- It is recommended to delete the memory after reading the data or before performing a new series of measurements that may be stored into the same memory cells as the previous ones.

5.1 Storing the measurement results in the memory



Cell is filled with the result of AUTO test.





Switch between the number of a bank or number of a cell by pressing **SET** (chosen digit blinks), chose the number using \blacktriangle and \blacktriangledown .

Enter into the memory by pressing **ENTER**.



If you try to store data in an occupied memory cell, the following warning message will appear:





Press **ENTER**, to overwrite the result or **STOP/ESC**, to cancel saving.

Notes:

- If the meter is set to work with the barcode reader, before exiting to the screen with the measurement, the following screen will be displayed:



Read the bar-code of the tested device, then the meter will record the result and the code in selected memory cell, and it will proceed to the measurement screen. In order to skip reading the barcode press **ENTER**.

5.2 Viewing memory data



In the mode of displaying the mains voltage press **ENTER**.



3

1

To select a number of the data bank and cell, proceed as described in 5.1.



Using \blacktriangleleft and \blacktriangleright you may scroll through the components of the result and other data such as date/time of measurement and bar code.

5.3 Deleting memory data



In the mode of displaying the network voltage press **ENTER**.

5.3.1 Deleting bank data

2



Use \blacktriangle and \bigtriangledown set the number of a cell on 0. Press **SET** to select the number of a bank. Use \bigstar and \bigtriangledown set the bank number to be deleted.



(3)



Press **ENTER**. A message will be displayed asking you to confirm your choice and informing about the loss of data contained in the bank.



6 Report printing

To print a measurement report set the operation with printer in general settings (par. 3.2.6). The printer must be connected to any of the USB socket of "Host" type. To start printing, press button

). Te following will be displayed \mathcal{Prok} and \mathbf{OK} . Printing may be activated:

- after completing a single measurement, when the result is presented,
- After completing the measurement in AUTO mode, when the result is presented,
- while browsing the memory, if the selected cell contains data.

If the meter is set to work with the barcode reader, the meter will ask you to read the code (see par. 5.1). This does not apply printing from a memory cell which had the barcode already saved. Supported types of printers: Brother QL-720NW, Brother PT-9700PC.

7 Data transmission

7.1 Computer connection accessories

In order to operate the meter with a PC, an USB cable is required and appropriate software. The kit includes "Sonel Reader" software used for reading data. Increased ability to read data and create reports are provided by "Sonel PAT" software, which can be purchased from the manufacturer or authorized distributor.

The software may be used for many devices manufactured by SONEL S.A. which are equipped with the USB interface.

Detailed information regarding software is available from the manufacturer or an authorised distributor.

7.2 Data transmission with USB port

1. Connect the cable to the USB port of the computer and the USB socket of the meter.

2. In general settings, select data transmission (section 3.2.3).

3. Start the programme.

8 Cleaning and maintenance

NOTE!

Apply solely the maintenance methods specified by the manufacturer in this manual.

The casing of the meter may be cleaned with a soft, damp cloth using all-purpose detergents. Do not use any solvents or cleaning agents which might scratch the casing (powders, pastes, etc.).

The electronic system of the meter does not require maintenance.

9 Storage

In the case of storage of the device, the following recommendations must be observed:

- Disconnect all the test leads from the meter.
- Clean the meter and all its accessories thoroughly.

10 Dismantling and Disposal

Used electrical and electronic equipment should be collected selectively, i.e. it must not be placed with another kinds of waste.

Used electronic equipment should be sent to a collection point in accordance with the Used Electrical and Electronic Equipment Act.

Before the equipment is sent to a collection point, do not dismantle any elements.

Observe the local regulations concerning disposal of packages.

11 Annexes

11.1 Technical specifications

- \Rightarrow Abbreviation "m.v." used in the specification of measurement uncertainty means a standard measured value.
- ⇒ Ranges and uncertainties are additionally provided according to DIN VDE 404-1.

Measurement of network voltage

| Display range | Resolution | Measurement uncertainty (basic) | |
|---------------|------------|------------------------------------|--|
| 187,0265,0V | 0.1 V | ±(2% m.v. + 2 digits) | |

• measurement of the mains voltage between L and N of power supply to the meter

Measurement of network frequency

| Display range | Resolution | Measurement uncertainty (basic) |
|---------------|------------|------------------------------------|
| 45.055.0Hz | 0.1Hz | ±(2% m.v. + 2 digits) |

· measurement of the mains voltage frequency of power supply to the meter

Measurement of PE network (mains) voltage

| Display range | Resolution | Measurement uncertainty (basic) * |
|---------------|------------|--------------------------------------|
| 0.0 59.9 V | 0.1 V | ±(2% m.v. + 2 digits) |

measurement of the mains voltage between PE and N of power supply to the meter

* for U < 5V accuracy ic not specified

Resistance measurement for L - N circuit

| Display range | Resolution | Measurement uncertainty (basic) | |
|---------------|------------|--|--|
| 0999Ω | 1Ω | (E)(my) - E digita) | |
| 1.00 4.99 kΩ | 0.01 kΩ | $\pm(5\% \text{ III.v.} + 5 \text{ digits})$ | |

• test voltage: 4 ... 8V AC

short-circuit current: max. 5mA

Checking the fuse

- test voltage: 4 ... 8V AC
- test current: max. 5mA

Measurement resistance of protective conductor I=200mA (only Protection Class I)

| Display range | Resolution | Measurement uncertainty (basic) |
|---------------|------------|------------------------------------|
| 0.00 0.99 Ω | 0.01.0 | ±(4% m.v. + 2 digits) |
| 1.00 19.99 Ω | 0.01 \\ | ±(4% m.v. + 3 digits) |

| Influencing factor | Designation | Additional uncertainty |
|--------------------|----------------|--|
| Position | E1 | 0% |
| Supply voltage | E ₂ | 0% |
| Temperature | E ₃ | 0.1%/° C for R ≥ 0.5 Ω 0%/°C for R < 0.5Ω |

- unloaded output voltage: 4 ... 12V AC
- Test current: ≥ 200mA for R = 0.2 ... 1.99 Ω
- adjustable upper limit in the range of: $10m\Omega \dots 1.99\Omega$ with resolution 0.01Ω
- adjustable measuring time: 1...60s with a resolution of 1s, and "Cont" mode (continuous measurement) at point 0

Measurement resistance of protective conductor I=10A (only Protection Class I, only PAT-805)

| Display range | Resolution | Measurement uncertainty (basic) |
|---------------|------------|------------------------------------|
| 0999mΩ | 1mΩ | ±(3% m.v. + 4 digits) |
| 1.00 1.99 Ω | 0.01 Ω | ±(3% m.v. + 40 digits)* |

* for two-wire measurement

| Influencing factor | Designation | Additional uncertainty |
|--------------------|----------------|------------------------|
| Position | E1 | 0% |
| Supply voltage | E ₂ | 0% |
| Temperature | E ₃ | 0.1%/°C |

- unloaded output voltage: <12V AC
- Test current: \geq 10A for R \leq 0.5 Ω
- adjustable upper limit in the range of: $10m\Omega \dots 1.99\Omega$ with resolution 0.01Ω
- adjustable measuring time in the range of: 1...60s with resolution of 1s

Measurement resistance of protective conductor I=25A (only Protection Class I, only PAT-805)

| Display range | Resolution | Measurement uncertainty (basic) |
|---------------|------------|------------------------------------|
| 0999mΩ | 1mΩ | ±(3% m.v. + 4 digits) |
| 1.00 1.99 Ω | 0.01 Ω | ±(3% m.v. + 40 digits)* |

* for two-wire measurement

| Influencing factor | Designation | Additional uncertainty |
|--------------------|----------------|------------------------|
| Position | E ₁ | 0% |
| Supply voltage | E ₂ | 0% |
| Temperature | E ₃ | 0.1%/°C |

- unloaded output voltage: <12V AC
- test current: \geq 25A for R \leq 0.2 Ω
- adjustable upper limit in the range of: $10m\Omega \dots 1.99\Omega$ with resolution 0.01Ω
- adjustable measuring time in the range of: 1...60s with resolution of 1s

Measurement of insulation resistance using test voltage of 100V (only PAT-805)

Test range according to IEC 61557-2 for $U_N = 100V$: $100k\Omega$...99.9M Ω

| Display range | Resolution | Measurement uncertainty (basic) |
|---------------|------------|------------------------------------|
| 01999kΩ | 1kΩ | |
| 2.00 19.99 MΩ | 0.01ΜΩ | ± (5 % m.v. + 8 digits) |
| 20.0 99.9 MΩ | 0.1ΜΩ | |

| Influencing factor | Designation | Additional uncertainty |
|--------------------|----------------|---|
| Position | E ₁ | 0% |
| Supply voltage | E ₂ | 0% |
| Temperature | E ₃ | 0.1%/°C |
| Capacity | E ₇ | 0% for R ≤ 20MΩ unspecified for R > 20MΩ |

- Accuracy of generated voltage (Robc $[\Omega] \ge 1000^{*}$ UN [V]): -0+30% from the set value
- nominal current: min 1 ... 1.4 mA
- adjustable lower limit within the range of 0.19.9 MΩ with resolution of 0,1MΩ
- adjustable measuring time: "Cont" mode (continuous measurement) 4s...3min with a resolution of 1s
- detection of a dangerous voltage before commencing a measurement
- discharging the object tested

Note: For R <50k Ω , the uncertainty is not specified.

Measurement of insulation resistance using test voltage of 250V (only PAT-805)

Test range according to IEC 61557-2 for $U_N = 250V$: $250k\Omega$...199.9M Ω

| Display range | Resolution | Measurement uncertainty (basic) |
|---------------|------------|------------------------------------|
| 01999kΩ | 1kΩ | |
| 2.00 19.99 MΩ | 0.01MΩ | ± (5 % m.v. + 8 digits) |
| 20,0199,9ΜΩ | 0.1ΜΩ | |

| Influencing factor | Designation | Additional uncertainty |
|--------------------|----------------|--|
| Position | E1 | 0% |
| Supply voltage | E ₂ | 0% |
| Temperature | E ₃ | 0.1%/°C |
| Capacity | E ₇ | 0% for R ≤ 20MΩ unspecified for R> 20MΩ |

- Accuracy of generated voltage (Robc [Ω] ≥ 1000*UN [V]): -0+30% from the set value
- nominal current: min 1 ... 1.4 mA
- adjustable lower limit within the range of 0.19.9 MΩ with resolution of 0,1MΩ
- adjustable measuring time: "Cont" mode (continuous measurement) 4s...3min with a resolution of 1s
- detection of a dangerous voltage before commencing a measurement
- discharging the object tested

Note: For R <50k Ω , the uncertainty is not specified.

Measurement of insulation resistance using test voltage of 500V

Test range according to IEC 61557-2 for $U_N = 500V$: $500k\Omega$...599.9M Ω

| Display range | Resolution | Measurement uncertainty (basic) |
|---------------|------------|------------------------------------|
| 01999kΩ | 1kΩ | |
| 2.00 19.99 MΩ | 0.01MΩ | ± (5 % m.v. + 8 digits) |
| 20.0599.9MΩ | 0.1ΜΩ | |

| Influencing factor | Designation | Additional uncertainty |
|--------------------|----------------|--------------------------------|
| Position | E ₁ | 0% |
| Supply voltage | E ₂ | 0% |
| Temperature | E ₃ | 0.1%/°C |
| Capacity | E | 0% for R ≤ 20MΩ |
| | □ □ 7 | unspecified for R> $20M\Omega$ |

- Accuracy of generated voltage (Robc [Ω] ≥ 1000*UN [V]): -0+30% from the set value
- nominal current: min 1 ... 1.4 mA
- adjustable lower limit within the range of 0.19.9 M Ω with resolution of 0,1M Ω
- adjustable measuring time: "Cont" mode (continuous measurement) 4s...3min with a resolution of 1s
- detection of a dangerous voltage before commencing a measurement
- discharging the object tested

Note: For R <50k Ω , the uncertainty is not specified.

Measurement of substitute leakage current

| Display range | Resolution | Measurement uncertainty (basic) |
|---------------|------------|------------------------------------|
| 0.00 3.99 mA | 0.01 mA | (E)(m y + 2 digita) |
| 4.0 19.9 mA | 0.1 mA | \pm (5% m.v. + 2 digits) |

| Influencing factor | Designation | Additional uncertainty |
|--------------------|----------------|------------------------|
| Position | E1 | 0% |
| Supply voltage | E ₂ | 0% |
| Temperature | E ₃ | 0.075%/°C |

- opening voltage: 25 ... 50V
- internal resistance of the testing device 2kΩ ± 20%
- adjustable upper limit in the range of: 0.01 ... 9.9 mA 0.01 mA with resolution of 0.01mA/0.1mA
- adjustable measuring time in the range of: Cont , 1...60s with resolution of 1s

Measurement of PE leakage current

Note: In the half-time of the measurement, the meter automatically changes the polarity of the test socket and as a final result it displays the value of higher leakage current.

| Display range | Resolution | Measurement uncertainty (basic) |
|---------------|------------|------------------------------------|
| 0.00 3.99 mA | 0.01 mA | (E)(my) (2 digita) |
| 4.0 19.9 mA | 0.1 mA | \pm (5% III.V. + 2 digits) |

| Influencing factor | Designation | Additional uncertainty |
|---|----------------|----------------------------------|
| Position | E1 | 0% |
| Supply voltage | E ₂ | 0% |
| Temperature | E ₃ | 0.1%/°C |
| Power consumption of the tested unit | E4 | 0% |
| Low frequency magnetic field | E ₅ | 0.02 mA I <4mA 0 for I ≥ 4 mA |
| The shape of the network voltage (CF) | E ₈ | 0% |

- measurements are made using mains voltage
- bandwidth of current measurement 40Hz ... 100kHz
- uncertainty related to the measurement within the bandwidth up to 100kHz should not exceed ± 3dB for 100kHz
- adjustable upper limit in the range of: 0.01 ... 9.9 mA with resolution of 0.01mA/0.1mA
- adjustable measuring time in the range of: Cont , 4...60s with resolution of 1s

Measurement of differential leakage current

Note: In the half-time of the measurement, the meter automatically changes the polarity of the test socket and as a final result it displays the value of higher leakage current.

| Display range | Resolution | Measurement uncertainty (basic) |
|---------------|------------|------------------------------------|
| 0.00 3.99 mA | 0.01 mA | |
| 4.0 19.9 mA | 0.1 mA | \pm (5% III.v. + 2 digits) |

| Influencing factor | Designation | Additional uncertainty | |
|--|----------------|---|------------------------|
| Position | E1 | 0 | % |
| Supply voltage | E ₂ | 0 | % |
| Temperature | E ₃ | 0.19 | %/°C |
| Power consumption of the tested unit | L | Current common | Additional uncertainty |
| | E4 | 04A | 0 |
| | | 48A | ±0.03mA |
| | | 816A | ±0,08mA |
| Low frequency magnetic field | E ₅ | 2 digits I <4mA 0 digit for I ≥ 4 mA | |
| The shape of the network voltage (CF) | E ₈ | 0% | |

- bandwidth of current measurement 20Hz ... 100kHz
- uncertainty related to the measurement within the bandwidth up to 100kHz should not exceed ± 3dB for 100kHz
- adjustable upper limit in the range of: 0.01 ... 9.9 mA with resolution of 0.01mA/0.1mA
- adjustable measuring time in the range of: Cont , 4...60s with resolution of 1s

Measurement of touch leakage current

| Display range | Resolution | Measurement uncertainty (basic) |
|---------------|------------|------------------------------------|
| 0.0004.999mA | 0.001 mA | ± (5% m.v. + 3 digits) |

| Influencing factor | Designation | Additional uncertainty |
|---------------------------------------|----------------|------------------------|
| Position | E1 | 0% |
| Supply voltage | E ₂ | 0% |
| Temperature | E ₃ | 0,25µA/ºC |
| The shape of the network voltage (CF) | E ₈ | 0% |

- the bandwidth of test current results from the measuring system with adjusted touch current which simulates human perception and reaction, in accordance with EN 60990: 2002
- adjustable upper limit in the range of: 0.01 ... 1.99 mA with resolution 0,01mA
- adjustable measuring time in the range of: Cont , 1...60s with resolution of 1s

Power measurement S

| Display range | Resolution | Measurement uncertainty (basic) |
|---------------|------------|------------------------------------|
| 0999VA | 1VA | (E)(my) + 2 digita) |
| 13.99kVA | 0.01 kVA | \pm (5% III.v. + 3 digits) |

• adjustable measuring time in the range of: Cont , 1...60s with resolution of 1s

Current consumption measurement

| Display range | Resolution | Measurement uncertainty (basic) |
|---------------|------------|------------------------------------|
| 0.00 15.99 A | 0.01 A | ± (2% m.v. + 3 digits) |

• adjustable measuring time in the range of: Cont , 1...60s with resolution of 1s

Measurement of voltage at the test socket

| Display range | Resolution | Measurement uncertainty (basic) |
|---------------|------------|------------------------------------|
| 187.0 265.0 V | 0.1 V | ±(2% m.v. + 2 digits) |

Other technical specification

a) type of insulation double, EN 61010-1 and IEC 61557 compliant

NOTE!

During the measurement of S, I_{Δ} , I_{PE} and I_T PE of the power supply socket is connected to PE of the test socket.

| b) | measurement category | II 300V acc. to EN 61010-1 |
|----|---|----------------------------|
| c) | protection class of enclosure acc. to PN-EN 60529 | IP40 |
| d) | power supply for the meter | |
| e) | load current | max 16A (230V) |

| f) | dimensions | |
|----|-------------------------------|--|
| ġ) | meter weight | PAT-800 approx. 4.05kg, PAT-805 approx. 4,75kg |
| h) | storage temperature | –20+70°C |
| i) | operating temperature | 0+40°C |
| j) | humidity | |
| k) | nominal temperature | +20+25°C |
| I) | reference humidity | |
| m) | display | LCD, segment |
| n) | memory of measurement results | |
| o) | data transmission | USB 2.0 |
| p) | quality standard | development, design and manufacturing are ISO 9001 compliant |

q) the product meets the EMC requirements acc. toEN 61326-1:2009 and EN 61326-2-2:2006

Note:

During the measurement of PE continuity with PE 10/25 current the meter may produce interference with values exceeding allowable limits defined in EN 61326-1 and cause interference in other devices.

11.2 Standard equipment

Standard set of equipment supplied by the manufacturer includes:

- power lead 1pc WAPRZZAS1
- test lead banana/banana, black 1.2m 1pc WAPRZ1X2BLBB2X5 (WAPRZ1X2BLBB for PAT-800)
- black crocodile clip 1kV 1pc WAKROBL30K03 (WAKROBL20K01 for PAT-800)
- 1kV probe black 1pc WASONBLOGB3
- USB cable WAPRZUSB
- fuse 0314 015.VXP 15A 250VAC 6.3x32mm Littlefuse 2 pcs WAPOZB15PAT
- cover WAFUTL5
- operating manual

11.3 Optional accessories

Additionally, the following items that are not included in the scope of standard equipment can be purchased from the manufacturer or the distributors:

- barcode stickers
- PASS stickers (roll 50 pieces of stickers)
- FAIL stickers (roll 50 pieces of stickers)
- barcode stickers (roll 100 stickers)
- 1.2 m double-wire lead (10/25A) U1/I1 1pc (PAT-805) WAPRZ1X2DZBB1
- 1.2 m double-wire lead (10/25A) U2/I2 1pc (PAT-805) WAPRZ1X2DZBB2
- power probe Sonel 1pc (PAT-805) WASONSPGB1
- Kelvin crocodile clip 1pc (PAT-805) WAKROKELK06
- black crocodile clip 1kV 1pc WAKROBL20K01
- 1kV probe -black 1pc WASONBLOGB3
- test lead banana/banana, black 1.2m 1pc- WAPRZ1X2BLBB
- cable adapter Shuko / IEC (for testing extensions) WAADAPATIEC1
- three phase socket adapter 16A* WAADAPAT16P
- three phase socket adapter 16A, switchable** WAADAPAT16PR
- three phase socket adapter 32A* WAADAPAT32P
- three phase socket adapter 32A, switchable**– WAADAPAT32PR
- adapter for industrial sockets 16A*** WAADAPAT16F1

- adapter for industrial sockets 32A*** WAADAPAT32F1
- adapter IEC 60320 C6 Plug to IEC 60320 C13 Connector Block WAADAPATIEC2
- USB barcode reader WAADACK1
- USB printer for reports / codes, portable WAADAD1
- Sonel PAT software WAPROSONPAT1

* - These adapters have permanently shorted lines of three-phase socket: L1, L2, L3 and they are connected to L line of one-phase socket.

- ** These adapters have a rotary switch providing the following connections:
- 1 L of test socket connected to L1
- 2 L of test socket connected to L2
- 3 L of test socket connected to L3
- 4 L of test socket connected to L1+L2+L3 (shorted)

*** - These adapters are designed for testing security of devices powered from industrial sockets 16A and 32A, providing that the tested device does not consume current higher than 16A. The adapters enable users to perform all measurements available in PAT-800/805 meters on the network measurement socket.

NOTE!

Adapters for three-phase sockets and for 32A industrial sockets must not be used for the following measurements: leakage currents I_{PE} and I_{Δ} , power and current consumption (for detailed information on the use of adapters see PAT Adapters User's Guide).

12 Manufacturer

The manufacturer of the device, which also provides guarantee and post-guarantee service is the following company:

SONEL S.A.

ul. Wokulskiego 11 58-100 Świdnica Poland tel. +48 74 858 38 60 fax +48 74 858 38 09 E-mail: <u>export@sonel.pl</u> Web page: <u>www.sonel.pl</u>

Attention: Service repairs must be realised solely by the manufacturer.



OPERATING MANUAL PAT-800/805 version 1.09

WARNINGS AND GENERAL INFORMATION DISPLAYED BY THE METER

| -PE signal + acoustic | Lack of EP continuity, measurements are blocked message [an blinks). |
|----------------------------------|---|
| UN-PE | Voltage $U_{\text{N-PE}}$ > 25V, measurements are blocked (the voltage value blinks). |
| > CSS v + acoustic signal | Mains voltage > 265V, measurements are blocked. |
| Ð | Exchanged L and N, measurements are possible. |
| [ont | Lack of continuity or poor connection quality. |
| | Correct measurement result. |
| | Incorrect measurement result. |
| READY | The meter is ready for measurement. |
| -r | Non-continuity in the test circuit during $R_{\mbox{\tiny PE}}$ measurement with 10/25A current. |
| L— /— N | IEC conductor test: lack of continuity in conductor L. |
| ∟ N— ` — | IEC conductor test: lack of continuity in conductor N. |
| L> | IEC conductor test: L and N shorted. |
| | IEC conductor test: L and N exchanged. |
| 4 81 | Ready to delete memory bank. |
| E I , E2 | Internal error, return the meter to the service. |
| Kot | Too high temperature of 10/25A current adjuster. |
| FUSE | Blown fuse or internal damage. Check the fuse and replace it when blown. When it does not help, return the meter to the service. |
| UdEF | Voltage present on tested object. |
| ° di 50 | No communication or poor communication with the pen-drive. |
| ^{FILL} | Pen-drive memory is full. |



SONEL S.A. Ul. Wokulskiego 11 58-100 Świdnica Poland

T

+48 74 85 83 860 fax +48 74 85 83 809

http://www.sonel.pl e-mail: export@sonel.pl