# REVEXmax S
# REVEXmax W
## User's Manual

Version 1.2     09/2024

**ILLKO** s.r.o.

# Contents

# 1   Introduction

## 1.1   Safety

**WARNING**
**Read this User's Manual carefully and completely and follow all instructions contained therein. If not, the use of the instrument may be dangerous for the operator, devices under test or for the instrument!**

If there is reason to believe that safe operation has become impossible, put the instrument out of operation and secure it against any unintended operation. Safe operation must be presumed to be no longer possible, if:

- The instrument does not operate properly any longer.
- The instrument, cables, connectors, plugs or accessories exhibits visible damages.
- The instrument was stored in unfavourable conditions for a long period.
- The instrument was exposed to extraordinary stress caused by transport.

**WARNING**

- Make sure that the instrument, measuring cables and all other accessories are in flawless condition, e.g. no damaged insulation, no broken cables or plugs etc.
- Make sure that the AC outlet is easily accessible. If some trouble or malfunction occurs, immediately disconnect the REVEXmax adaptor from the outlet.
- If the equipment is used in a manner not specified by the manufacturer, the device's protection may be compromised.
- The instrument may only be powered from a 230 V / 50 Hz grounded mains outlet, which is protected with a fuse or circuit breaker with a maximum rating of 16 A.
- In order to check the proper PE connection to a mains outlet, REVEXmax generates a continuous current of ca. 1.5 mA / 50 Hz to the PE conductor. This test current can activate the insulation monitoring device in IT systems.
- Only a trained, skilled person, who is familiar with hazardous voltage operations, can handle the REVEXmax. Unexpected hazardous voltages can occur on devices under test (dangerously charged capacitors, etc.).

**WARNING**

- It is necessary to respect all safety regulations applicable to the particular measurement.
- Test Socket **(1)** of the REVEXmax must not be used for continuously powering the appliance. It is intended for test purposes only; max. test duration is 25 min @ ≤12 A and 60 s @ 12÷16 A.
- The functional test may only be performed after the DUT has successfully passed the safety test.
- Dangerous voltage or mains voltage may be present on Test Socket **(1)** during some tests.
- Devices under test which are connected to Test Socket **(1)** of the REVEXmax can be powered by mains voltage during some tests. The appliance can thus be activated.
- The **PE** terminal is connected to the PE terminal of Test Socket **(1)**. When using the REVEXmax, do not connect any voltage to the terminal **PE**. If connected, there is a danger of electric shock or damage to the REVEXmax.
- Use only standard or optional accessories supplied with the REVEXmax by your distributor.

The figures in this manual are only illustrative and may vary slightly from the actual state or the version on your instrument.

## 1.2   Performance REVEXmax

The REVEXmax S (STANDARD) / REVEXmax W (WELD) is a professional, compact, portable analyzer, designed to verify the electrical safety of appliances or arc welding equipments (WELD variant only). The REVEXmax has an extraordinary wide scope of use thanks to a lot of optional accessories, which enable testing practically any portable or hard-wired, one-phase or three-phase appliance.

## 1.3   Applied standards

- EMC . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . EN 55011:2009+A1:2010
EN 61326-1:2013
EN 61000-4-2:2009
EN 61000-4-3:2006+A1:2007+A2:2010
EN 61000-4-4:2012
EN 61000-4-5:2014
EN 61000-4-6:2014
EN 61000-4-11:2004
EN 61000-3-2:2014
EN 61000-3-3:2013

- LVD ............................................................ EN 61010:2010
  EN 61010-2-030:2010

The REVEXmax is designed to perform electrical safety testing based on

- EN 61557
- EN 60974-4

## 1.4   Terms and definitions

**Plugged-in equipment**
Term meaning electrically connected to the supply mains by means of a connection than can be detached without the use of a tool.

**Permanently installed**
Term meaning electrically connected to the supply mains by means of a permanent connection than can only be detached by the use of a tool.

**Accessible conductive part**
Part of the equipment, which is accessible to the operator.

**Mains part**
The part of electrical equipment forming a circuit that is intended to be connected to the supply mains.

**Protective earth conductor**
Conductor to be connected between the protective earth terminal and an external protective earthing system.

**Power supply cord**
Flexible cord, fixed to or assembled with electrical equipment for connection to supply mains.

**ID number (ID)**
Unique ID number for the DUT.

 Hazardous voltage.

 Warning concerning a point of danger! Read User's Manual and observe all precautions!

 Hint, notice.
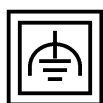
 Class II equipment with functional earthing.

# 2 Description of the instrument

## 2.1 General description

The REVEXmax S (STANDARD) / REVEXmax W (WELD) instrument is designed to verify the safety of electrical appliances in general. All AC measurements are measured by the method TRMS (true rms), and for some measurements the DC component value can be displayed. Measured circuits meet the requirements of EN 61557 and EN 60974-4 (requirements for measuring circuits), including the required input characteristics.

The REVEXmax performs the following tests:

- Earth bond test >1 A AC
- Insulation resistance test 500 V DC and 250 V DC
- Alternative (substitute) leakage current
- PE current during operation and touch leakage current
- Differential leakage current and touch leakage current
- Apparent power
- Mains voltage
- Current consumption
- Welding equipments output voltage and leakage current (WELD variant only)
- External voltage (WELD variant only)

With additional equipment can be measured:

- measurement of PE current during operation of three-phase portable appliance by means of optional adapters
- measurement of differential leakage current of three-phase portable appliance by means of optional adapters
- measurement of PE current during operation by means of current clamp
- measurement of differential leakage current by means of current clamp
- measurement of current consumption by means of current clamp
- measurement of apparent power by means of current clamp

The REVEXmax has furthermore additional features, which improve the safety of both the operator and the DUT. These include:

- check for dangerous contact voltage on the PE of power outlet (before the start of the measurement)
- check if the PE of the power outlet is grounded (before the start of the measurement)
- automatic check for leakage current amplitude of the device under test
- check of the appliance's current with automatic switch off the Test Socket **(1)**:
  - 0 ÷ 12 A .................... max. 25 min
  - 12 ÷ 16 A ................... max. 60 sec
- manual self-test

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Features and highlights:

- test results can be saved under an ID number which is unequivocally assigned to the respective DUT (barcode)
- the test structures created at the PC software can be loaded into the REVEXmax
- measurement data saved to the test instrument can be imported to PC software via the USB port and reports can be generated
- user-defined test sequences created at the PC software
- user-defined report templates created at the PC software

## 2.2 Terminals

1. Test Socket for connection of tested appliance's power supply cord
2. **Voltmeter** [−] - external voltage test terminal (WELD variant only)
3. **Voltmeter** [+] - external voltage test terminal (WELD variant only)
4. **PE** – terminal for connecting the exposed conductive part of the tested appliance (the terminal is connected to the PE terminal of Test Socket **(1)**)
5. **ITOUCH** – touch leakage current test terminal
6. **RISO** / **IALT** – insulation resistance / alternative leakage current test terminal
7. **RPE** – earth bond test terminal
8. EXT input - current clamp / three-phase adapter / other adapters connector
9. Fuse F 16 A / 500 V
10. USB - socket type A for connection USB 2.0 Full Speed HID (Human Interface Device), e.g. barcode scanner
11. USB – socket type B, PC connection
12. Power supply cord

**WARNING**

- Do not connect any external voltage to any terminal or connector. The only exception is the power supply cord **(12)** which is intended for powering the REVEXmax from the 230 V / 50 Hz mains outlet.
- Max. load on Test Socket **(1)** is 16 A (limited in time).
- Use original accessories only.
- Do not connect any external voltage between RPE terminal and the PE in Test Socket **(1)** or PE terminal.
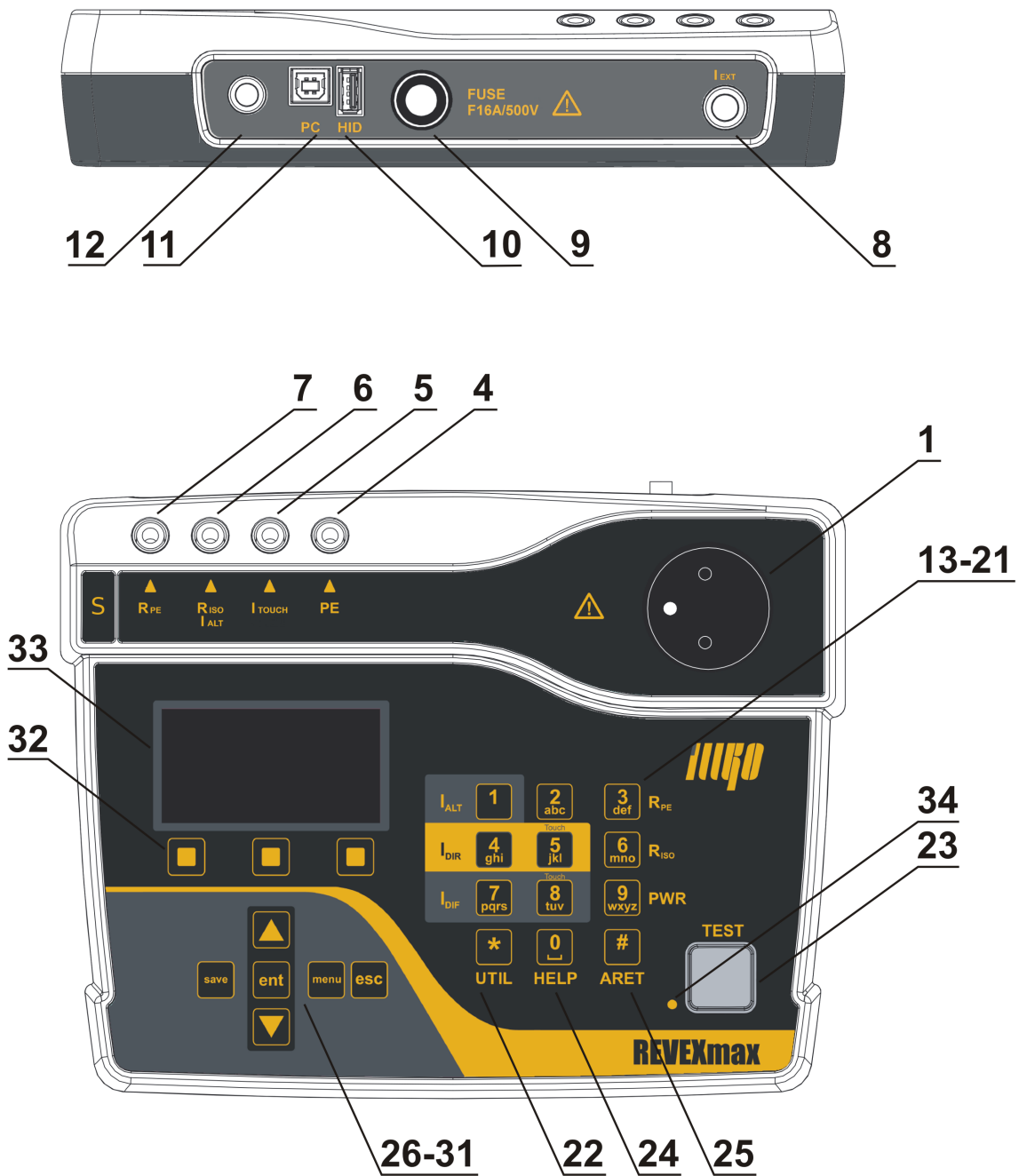
Figure 1: Front panel and rear panel (STANDARD variant)
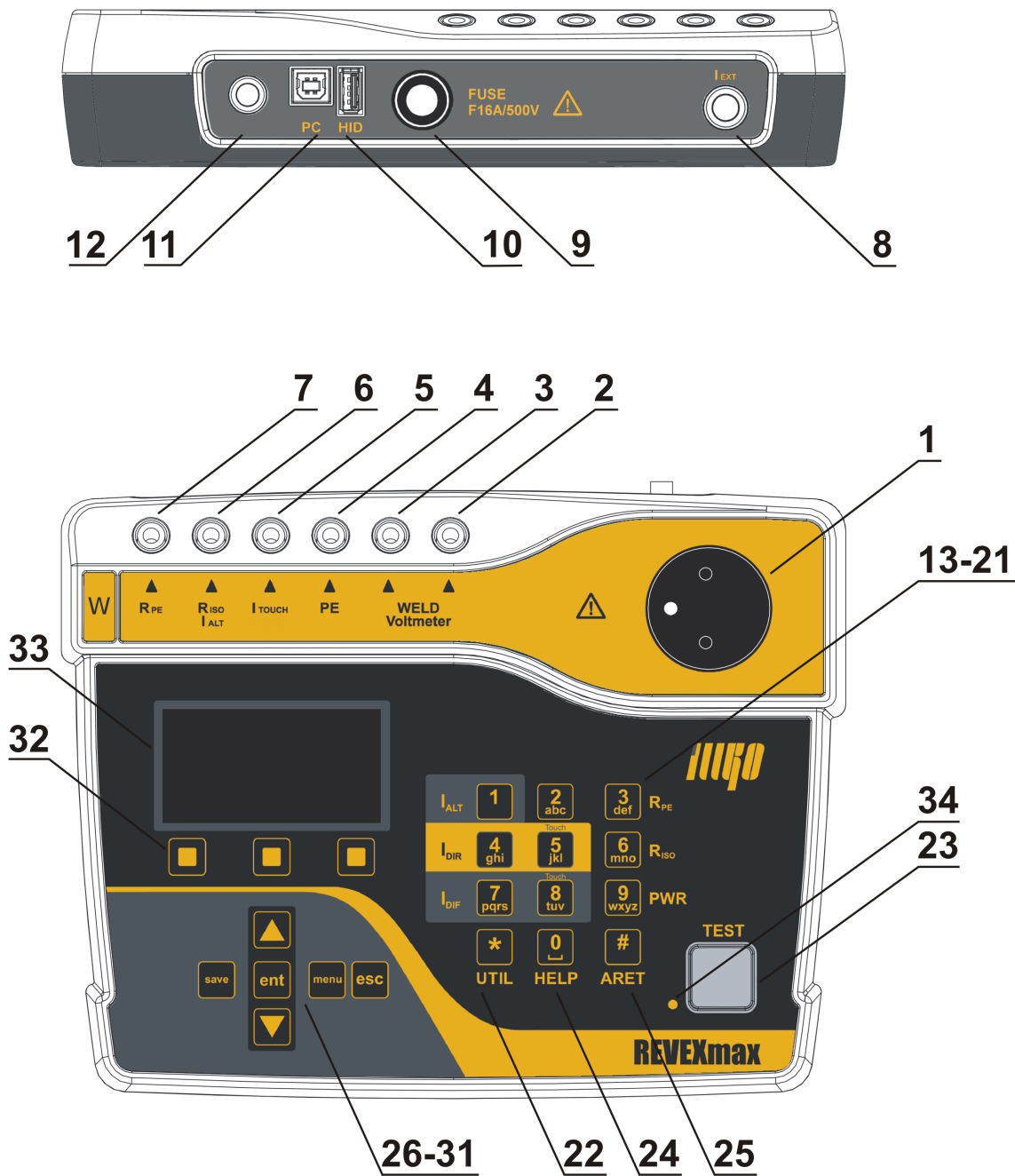
Figure 2: Front panel and rear panel (WELD variant)

## 2.3  Keyboard

13. [**1 IALT**] – Alternative leakage current
14. [**2**] – without function
15. [**3 RPE**] – Earth bond test
16. [**4 IDIR**] – Direct leakage current (PE current during operation)
17. [**5 IDIR TOUCH**] – Enclosure (touch) leakage currents (direct method)
18. [**6 RISO**] – Insulation resistance, selection of test voltage 500 V / 250 V DC
19. [**7 IDIF**] – Differential leakage current
20. [**8 IDIF TOUCH**] – Enclosure (touch) leakage currents (differential method)
21. [**9 Power**] – Apparent power consumption, current, mains voltage
22. [**\* UTIL**] – Other measuring method:
    - Welding equipment output leakage current (WELD variant only)
    - Welding equipment output voltage (WELD variant only)
    - Voltmeter (WELD variant only)
23. [**TEST**] – Starts measurement

## 2.4  Additional functions

24. [**0 HELP**] – display the help for selected measurement
25. [**# ARET**] – lock the TEST key
26. [**▲**] – scroll up
27. [**▼**] – scroll down, hold displayed data
28. [**save**] – save measured values
29. [**menu**] – main menu
30. [**ent**] – ENTER, find DUT according to ID, other functions depending on context
31. [**esc**] – ESCAPE, other functions depending on context
32. Context menu buttons - actual function is displayed above the button

## 2.5  Display of information

33. Graphic OLED display
34. LED indicator for measuring status

## 2.6   Graphic OLED display

- a) Measured function
- b) Real time clock / Measuring is in progress
- c) Selected method and ID of DUT
- d) Measured value
- e) Actual function of context button **(32)**
- f) Warning, notice, additional information
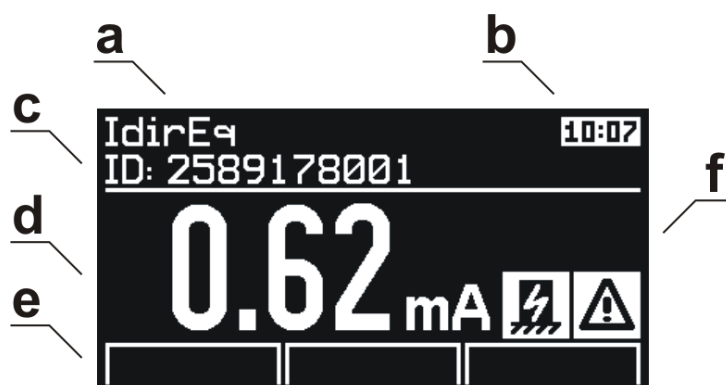


Figure 3: Graphic OLED display

## 2.7   Selection of the items in Menu or List

The item is selected using buttons:

$$[\blacktriangle] \text{ and } [\blacktriangledown]$$

Faster scroll in the lists:

$$[\textbf{Page-}] \text{ and } [\textbf{Page+}]$$

## 2.8   Users interface symbols

| | |
|---|---|
| **ARET** | lock the TEST key |
| **AUT.ARET** | automatic lock the TEST key |
| **HOLD** | displayed value is held |
| **L-N** ↶ | L-N reversal in Test Socket (**1**) |
| **SEQ** | test sequence is active |
| **CAL** | test lead resistance compensation is finished |
| **CAL** | the value of compensation is higher than measured value |
| **ESC** | press [**esc**] **key** |
| **TEST** | press [**TEST**] **key** |
| ✔ | the selection is active, self-test passed |
| ✘ | the selection is not active, self-test failed |
| ⬤ | measuring is in progress |
| ⚠ | warning – Test Socket (**1**) energizing |
| ⊐◦ | plug external accessories |
| 🌡°C | inner temperature is increasing when measuring PE resistance |
| ⚡ | notice - DUT must be isolated from ground |
| =U 500 | test voltage 500 V DC |
| =U 250 | test voltage 250 V DC |
| 🗎 | menu Properties of DUT |
| ▶⏸ | menu Test sequences |
| 🗋 | menu Empty file of DUT |
| 🔧 | menu Setup |

## 2.9   Abbreviations

| | |
|---|---|
| **L** | phase conductor |
| **N** | neutral conductor |
| **PE** | protect earth conductor |
| **ALT** | alternative (substitute) method |
| **DIF** | differential method |
| **DIR** | direct method |
| **Eq** | equipment |
| **R** | L-N reversal |
| **Ext** | external |
| **Touch** | touch |
| **M** | mains part |
| **W** | welding part |
| **�socket⎤** | connection: Test Socket **(1)** |
| **⎡RPE⎤** | connection: terminal **RPE** (Note: also applies to the other terminals) |

## 2.10   Included in the set

The set includes all accessories necessary for testing 230 V / 50 Hz appliances equipped with a movable power supply cord.
The set includes:

- The measuring instrument REVEXmax
- PC software ILLKO Studio licence (licence is loaded in the instrument)
- **P2011** - Test lead, black, 2 m
- **P3011** - Test tip, black
- **P2014** - Test lead, red, 2 m (WELD variant only)
- **P4016** - Crocodile clip, red (WELD variant only)
- USB cable A-B
- Spare fuse F 16 A / 500 V, 32 x 6.3 mm, 2 pcs
- User's Manual
- Calibration certificate
- Warranty card

## 2.11    Optional accessories

Carrying bag:

- **P6150** - Bag for instrument

Measuring cables and adapters:

- **P2012** - Test lead, blue, 2 m
- **P2020** - Test lead, black, 5 m
- **P3012** - Test tip, blue
- **P3031** - Test tip (2 mm), black
- **P4011** - Crocodile clip, black
- **P4012** - Crocodile clip, blue
- **P8030** - Adapter for testing PE conductor of extension power supply cords
- **P8031** - Adapter for testing PE conductor of UPS
- **P8090** - Adapter for testing power supply SELV with USB connector, type A and C

Special accessories:

- **P8010** - Current clamp transformer
- **P8015*** - Three-phase adapter, 16 A socket, 5 contacts
- **P8016*** - Three-phase adapter, 16 A socket, 4 contacts
- **P8017*** - Three-phase adapter, 32 A socket, 5 contacts
- **P8018*** - Three-phase adapter, 32 A socket, 4 contacts
- **P8080** - Set of adapters ATP for automatic testing ext. power supply cords
- **P9011** - Wireless barcode scanner (CCD), USB 2.0 Full Speed
- **P9025** - RFID reader, USB 2.0 Full Speed

(* three-phase appliances leakage currents can also be measured by the **I-LEAK 400 (P1041/1042/1043/1044)** instrument, from which it is possible to transfer the measured value to REVEXmax instrument)

Spare parts:

- **D0010** - Set of 10 pcs spare fuses F 16 A / 500 V, 32 x 6.3 mm

# 3   Putting into operation

## 3.1   Connecting to mains outlet

**If the mains outlet, mains cable, instrument's case or accessories are damaged, do not connect the REVEXmax to the mains outlet!**
**If Idir and Idif is being measured, use the grounded mains outlet only to supply the instrument!**

The REVEXmax can only be powered from 230 V / 50 Hz, which is protected with a fuse or circuit breaker with a maximum rating of 16 A. The instrument is automatically switched on after plugging into the mains outlet. Disconnect any DUT while connecting/disconnecting the REVEXmax to/from the mains outlet!

The REVEXmax automatically tests the protective PE (ground) pin of the mains outlet. If the PE connection is inadequate, then the message **(PE error)** is displayed.

In order to check the proper PE connection to a mains outlet, the REVEXmax generates a continuous current of ca. 1.5 mA / 50 Hz to the PE conductor. This test current can activate the insulation monitoring device in IT systems.

If the REVEXmax is connected to an IT earthing system, it is possible to measure – e.g. Rpe, Riso and Ialt.

If dangerous contact voltage arises on the PE, then the **(PE error)** indicator lights up when the operator presses the key [**TEST**]. If operator presses the [**TEST**] key after this, the measurement will not start.

**WARNING**
**If the test result for the ground pin of the mains outlet is unsatisfactory (in TT or TN systems), the outlet must be repaired before you plug in the REVEXmax to the outlet again!**

## 3.2   Self-test

It can sometimes be difficult to identify if the measuring instrument does not work properly, especially when measuring current leakage. The REVEXmax therefore has built in the possibility to promptly test the basic functionality. The functionality of the following functions can be tested:

- Insulation resistance
- Measurement of alternative (substitute) leakage current
- Measurement of PE current during operation
- Measurement of differential leakage current

**WARNING**

- Disconnect DUT before the REVEXmax self-test!
- This test does not substitute for calibration!
- The REVEXmax has to be connected to TT or TN mains.

The test result is displayed on the display using the symbols pass / fail. Test proceeds as follows:

- Disconnect the DUT.
- Press the [**menu**] key and release it.
- Use the [**▼**] key to select **(Setup)**, press the [**ent**] key for confirmation.
- Use the [**▼**] key to select **(Self-test)**, press the [**ent**] key for confirmation.
- Press the [**TEST**] key. The test will then start; after it is finished, the results are displayed: ✔ (self-test passed) or ✖ (self-test failed).
- The correct values are:
    - RisoM-PE: $2.00 \pm 0.05$ MΩ
    - IaltEq: $0.10 \pm 0.01$ mA
    - IdirEq: $0.10 \pm 0.01$ mA
    - IdifEq: $0.10 \pm 0.01$ mA

Contact service if the test results differ from the ones described above.

## 3.3   Help screens

The help screens are available in all functions. The Help screens contain schematic diagrams for illustrating how to properly connect the instrument for electric installation. After selecting the measurement you want to perform, press the [**0 HELP**] (once or repetitively) key in order to see the associated Help screens.
Press the [**0 HELP**] or [**esc**] to leave the Help.

# 4    Measurements

## 4.1    Selection of the function

The measured function can be selected automatically in sequence mode (see chapter 5.6) or manually (see Figure 4).
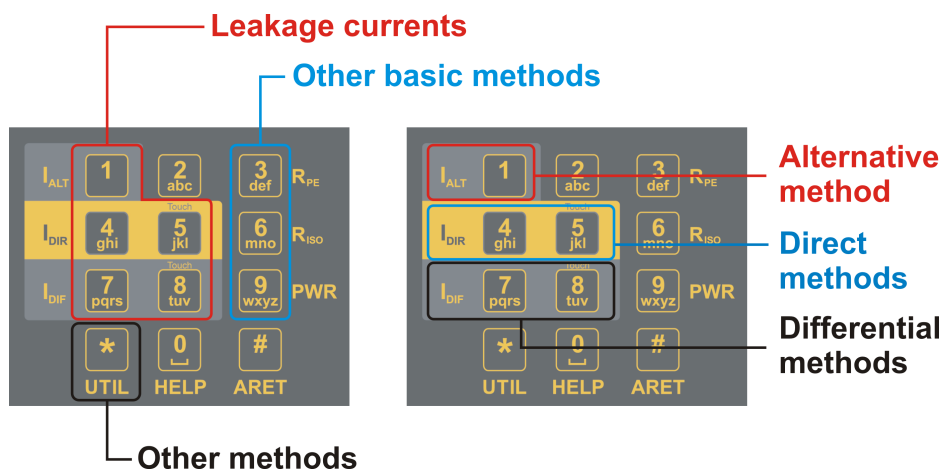


Figure 4: Keyboard

## 4.2    Measurement mode control

The beginning, process and ending of measurements are controlled by the [**TEST**] key. If the [**esc**] key was pressed during the measurement, then it will be cancelled (the measured value is not saved).

### 4.2.1    Measurement mode

The measurement can start in four different measurement modes:

- *One measuring cycle* – after the [**TEST**] key is pressed and released, one measuring cycle starts and is completed after a few seconds. The result of the measurement is displayed.
- *Continuous measurement* – press the [**TEST**] key; measurement is in progress and current measured values are displayed until the [**TEST**] key is released. The result of the measurement is displayed.
- *Locking the measurement* - press the [**#  ARET**] key and then press the [**TEST**] key. Then release both keys. The measurement is in progress and the current measured values are displayed until the [**TEST**] key is again pressed and released. Reverse steps are possible too: press the [**TEST**] key and then press the the [**#  ARET**] key.
- *Automatically locking the measurement* – this function can be set in the menu Setup. Measuring is similar to Locking the measurements but the [**#  ARET**] key is not used.

Measuring in process is indicated by the symbol ◓ .

### 4.2.2    HOLD function

When measurement is in progress, the current measured values are displayed. By pressing and releasing the [▼] key the last measured value is displayed even if the measurement has either ended or is in progress. This measured value is stored in temporary memory.
The HOLD function is indicated when the symbol **HOLD** on indicator changes to unremitting light. The HOLD function can be cancelled (when measurement is still in progress) by pressing and releasing the [▼] key.

### 4.2.3    Measurement of apparent power consumption

During some measurements, the apparent consumption is displayed in the upper display.

## 4.3   Earth bond - Rpe

**WARNING**

- Do not connect any external voltage between the RPE terminal and the PE in Test Socket **(1)** or PE terminal.
- If you are going to test equipment which can be charged to voltage >25 V (e.g. filter capacitors), discharge it before the test!

If external voltage is present on the device under test, the message **(Interference voltage at the input)** is displayed. This status is a dangerous fault condition; disconnect the DUT from the REVEXmax immediately to avoid damage!

Resistance measurement is also possible if the REVEXmax is connected to the IT mains.

We recommend performing the measurements for a max. of 30 secs. because of power dissipation inside the instrument (only for value <10.00 Ω). If the temperature inside exceeds the allowed limit, the symbol ⬛ is displayed and the acoustic signal sounds.

### 4.3.1   Test lead resistance compensation

Compensation means that the test lead resistance is measured and then automatically memorized and subtracted from all Rpe measurements. The real earth bond resistance is thus displayed. The compensation constant remains in the instrument's memory even if the instrument is switched off. Therefore, the lead compensation is valid until a new compensation is carried out.

**Procedure:**

- Press the [**3 RPE**] key and release it.
- Plug the test lead with the test tip into the **RPE** terminal.
- Plug the test tip of the test lead either into the **PE** terminal or press it against the ground pin of the Test Socket **(1)**. If you use two test leads (which are connected to the **PE** terminal and the **RPE** terminal), then make a short-circuit of their test tips.
- Press the [**TEST**] key and release it.
- Press the [**Cal**] key and release it. The measured value is saved.

The compensation is effective for test lead resistance <2.00 Ω. If the test lead resistance is >10.00 Ω and the compensation procedure has been carried out, compensation is cancelled and all the following displayed results are the sum of the earth bond + test lead resistance. The CAL symbol is not displayed.

If compensation is active (it means that test lead resistance <2.00 Ω was memorized), then the CAL symbol is displayed during Rpe measurements.

If the measured value is less than the saved compensation value during measurement (after subtraction, the memorized resistance will result in a negative number), the display shows the absolute value and the CAL symbol appears inversely. The cause may be replacing test leads for shorter ones with less resistance. In this case, it is necessary to re-compensate the test leads resistance.

### 4.3.2   Protective earth resistance

**Procedure:**

- Press the [**3 RPE**] key and release it.
- Plug the test lead with the test tip into the **RPE** terminal.
- Connect the tested appliance:

    - For a one-phase appliance with a movable power supply cord – plug in its mains plug to Test Socket **(1)**.
    - For a three-phase appliance with a movable power supply cord – connect the PE pin of its plug to the instrument's **PE** terminal by means of the optional test lead + crocodile clip.
    - For a hard-wired appliance – **firstly disconnect the appliance from the mains!** Connect its point of PE connection to the instrument's PE terminal by means of the optional test lead + crocodile clip.

- Press the test tip against the exposed conductive part of the tested appliance.
- Press the [**TEST**] key. If the CAL indicator lights up during measurement, it means that the test lead resistance is compensated.
- After finishing the measurement, the last measured value is displayed.

The lowest measured value can be displayed - press the [**3 RPE**] key during the measuring. The current and the lowest value are displayed now. When the measurement is finished, only the lowest value is displayed. To deactivate the function, press the [**3 RPE**] key again.

**WARNING**
If only >**10.00** Ω is displayed it means that the measured earth bond resistance is higher than the maximal value which can be measured by REVEXmax. The maximal value is **the sum resistance of the test leads and the resistance of the earth bond!**

## 4.4   Insulation resistance - Riso

The three insulation resistance tests take measurements on (500 V and 250 V):

- Mains – Protective earth [**M-PE**]
- Welding equip. output - Protective earth [**W-PE**] (500V, WELD variant only)
- Mains - Welding equip. output [**M-W**] (500V, WELD variant only)

- Do not touch the exposed conductive parts of the tested appliance while measurement is in progress – **RISK OF ELECTRIC SHOCK!**
- Do not disconnect the test leads while measurement is in progress or immediately after finishing the measurement. The capacitive component of the tested appliance can be charged to a voltage of up to 550 V; after the [**TEST**] key is released, this voltage is automatically discharged.
- Make sure the tested appliance is de-energized – its mains voltage must be disconnected before the start of the measurement!

- Before measuring resistance, the REVEXmax device checks if the DUT is de-energized. If so, then an acoustic signal sounds and the display shows a warning message (**Interference voltage at the input**).
- Resistance measurement is also possible if the REVEXmax is connected to the IT mains.

**Procedure:**

- Press the [**6 RISO**] key and release it. Press the key again to toggle between 500 V and 250 V.
- Press one of the function keys to select the type of measuring you require (only 500 V).
- If a Mains - Protective earth is measured, connect the appliance for testing:
  - For a one-phase appliance with a movable power supply cord – plug in its mains plug to Test Socket (**1**).
  - For a three-phase appliance with movable power supply cord – connect the PE pin of its plug to the instrument's **PE** terminal by means of the optional test lead + crocodile clip. Then connect the remaining current-carrying conductors by means of the test lead + test tip to the instrument's **RISO** / **IALT** terminal.
  - For a hard-wired appliance – **first disconnect the appliance from the mains!** Connect the point of the PE connection to the instrument's **PE** terminal by means of the optional test lead + crocodile clip. Then

connect the remaining current-carrying conductors by means of the test lead + test tip to the instrument's **RISO** / **IALT** terminal.

- If a Welding equipment output - Protective earth is measured, connect the appliance for testing:
  - For a one-phase or three-phase appliance with movable power supply cord – connect the PE pin of its plug to the instrument's **PE** terminal by means of the optional test lead + crocodile clip. Then connect the welding equipment output to the instrument's **RISO** / **IALT** terminal by means of the optional test lead + crocodile clip.
  - For a hard-wired appliance – **first disconnect the appliance from the mains!** Connect the point of the PE connection to the instrument's **PE** terminal by means of the optional test lead + crocodile clip. Then connect the welding equipment output to the instrument's **RISO** / **IALT** terminal by means of the optional test lead + crocodile clip.

- If a Mains - Welding equipment output is measured, connect the appliance for testing:
  - For a one-phase or three-phase appliance with movable power supply cord – connect the current-carrying conductors by means of the test lead + test tip to the instrument's **RISO** / **IALT** terminal. Then connect the welding equipment output to the instrument's **PE** terminal by means of the optional test lead + crocodile clip.
  - For a hard-wired appliance – **first disconnect the appliance from the mains!** Connect the current-carrying conductors by means of the test lead + test tip to the instrument's **RISO** / **IALT** terminal. Then connect the welding equipment output to the instrument's **PE** terminal by means of the optional test lead + crocodile clip.

- Switch on the tested appliance's mains switch.
- Press the [**TEST**] key. It is recommended that you hold the [**TEST**] key down for 5-10 seconds (or even longer if the displayed result is not stabilized); the influence of the tested appliance's internal capacitance can be eliminated by this method.
- After finishing the measurement the last measured value is displayed.

## 4.5 Alternative method - IaltEq

⚠️ Do not touch exposed conductive parts of the tested appliance while measurement is in progress – **RISK OF ELECTRIC SHOCK!**

ℹ️ The test voltage is max. 230 V, and the short circuit current is approximately 1.5 mA.
Leakage current measurement is also possible if the REVEXmax is connected to the IT mains.

### 4.5.1 Protective class I appliances

**Procedure:**

- Press the [**1 IALT**] key and release it.
- Connect the appliance for testing:
  - For a one-phase appliance with a movable power supply cord – plug in its mains plug to Test Socket (**1**).
  - For a three-phase appliance with movable power supply cord – connect the PE pin of its plug to the instrument's **PE** terminal by means of the optional test lead + crocodile clip. Then connect the remaining current-carrying conductors by means of the test lead + test tip to the instrument's **RISO** / **IALT** terminal.
  - For a hard-wired appliance – **first disconnect the appliance from the mains!** Connect the point of the PE connection to the instrument's **PE** terminal by means of the optional test lead + crocodile clip. Then connect the remaining current-carrying conductors by means of the test lead + test tip to the instrument's **RISO** / **IALT** terminal.
- Switch on tested appliance's mains switch.
- Press the [**TEST**] key.
- The last measured value is displayed after finishing the measurement.
- Switch off the tested appliance's mains switch.

### 4.5.2 Protective class II appliances - alternative touch leakage current

**Procedure:**

- Press the [**1 IALT**] key and release it.
- Connect the tested appliance: plug in its mains plug into Test Socket (**1**).
- Plug the test lead into the **PE** terminal.
- Switch on tested appliance's mains switch.
- Press the [**TEST**] key.
- Press the test tip against the exposed conductive part of the tested appliance.
- The last measured value is displayed after finishing the measurement.
- Switch off the tested appliance's mains switch.

## 4.6   PE current during operation – IdirEq / differential leakage current - IdifEq

If the test voltage is present in Test Socket **(1)**, then the tested equipment starts to run after its mains switch is switched on! Take into consideration all safety warnings referred to by the DUT!
**Do not touch the exposed conductive parts** of the tested object after the mains switch is switched on!

The REVEXmax is equipped with an electronic check for excessive leakage current during measurement. If the leakage current exceeds the limit value of approximately 10 mA, then the mains voltage is disconnected from the Test Socket **(1)**. This status is indicated by displaying **(Current >10.00 mA)** and the acoustic signal sounds.

**WARNING**

- The earth bond resistance (chapter 4.3) must be first tested; it is recommended that you also test the insulation resistance if it is possible too (chapter 4.4). Then you can carry out the leakage current measurement!
- The DUT must be isolated from the ground (from the earth potential) during IdirEq measurement!
- Test Socket **(1)** of the REVEXmax must not be used for continuous power supply of the appliance!

### 4.6.1   Protective class I one-phase appliances

**Procedure:**

- Press the [**4 IDIR**] key (direct method) or [**7 IDIF**] key (differential method) and release it.
- Press the [**4 IDIR**] or [**7 IDIF**] keys repetitively in order to measure with L-N reversal. Symbol L-N reversed is displayed.
- Connect the tested appliance: plug in its mains plug into Test Socket **(1)**.
- Press the [**TEST**] key.
- Switch on the tested appliance's mains switch.
- The HOLD function can be used (press the [▼] key).
- Switch off the tested appliance's mains switch.
- Finish the measurement (see chapter 4.2.1).

### 4.6.2   Three-phase and hard-wired appliances

Optional accessories are intended for leakage current measurement of both three-phase and hard-wired appliances. Three-phase adapter must be used for measurement of three-phase appliances with movable power supply cord. Current clamp must be used for measurement of hard-wired appliances.

It is necessary to plug in tested appliance by means of three-phase adapter and to select required measuring method by means of three-phase adapter's function switch before measurement (see chapter 7.4.4).

**Procedure:**

- Press the [**4 IDIR**] or [**7 IDIF**] key repetitively in order to select the external method. The symbol  is displayed.
- Connect either optional current clamp or three-phase adapter to the terminal **(8)**.
- If you use current clamp then enclose with its jaws either protective conductor or all current carrying (L+N) conductors of tested appliance.
- Switch on the tested appliance's mains switch.
- Press the [**TEST**] key.
- The last measured value is displayed after finishing the measurement.
- Switch off the tested appliance's mains switch.

## 4.7 Touch leakage current - IdirTouch / IdifTouch / IdirW

**WARNING**
Touch leakage currents are measured by the same measurement methods as leakage currents which are specified in chapter 4.6. Therefore, all safety warnings and operating instructions apply for these measurements as to those measured leakage currents listed in chapter 4.6.

### 4.7.1 Protective class II appliances

**Procedure:**

- Press the [**5 IDIR TOUCH**] key (direct method) or the [**8 IDIF TOUCH**] key (differential method).
- Press the [**5 IDIR TOUCH**] or [**8 IDIF TOUCH**] keys repetitively in order to measure with L-N reversal. Symbol L-N reversed is displayed.
- Connect the tested appliance: plug in its mains plug into Test Socket **(1)**.
- Plug the test lead into the **ITOUCH** terminal.
- Press the [**TEST**] key.
- Switch on tested appliance's mains switch.
- Press the test tip against the exposed conductive part of the tested appliance.
- The HOLD function can be used (press the [▼] key).
- Switch off the tested appliance's mains switch.
- Finish the measurement (see chapter 4.2.1).

### 4.7.2 Protective class I appliances

The same measuring circuit is used to measure the touch current and the leakage current. The instrument measures simultaneously both the leakage current and the touch current. To determine the leakage current and touch current value for Class 1 appliances, first measure the protective conductor current and then the touch current. The displayed value is the sum of the leakage current and the touch current, and this data can be stored in the device memory.
If you only want to measure the touch current (and not the sum of the current by the protective conductor and the touch current), connect the DUT directly to the mains socket (not to the Test Socket 1).

The measurement procedure is the same as the procedure in the chapter 4.7.1.

### 4.7.3   Welding equipment output leakage current

(WELD variant only)

> **i**  The same measuring circuit is used to measure the welding equipment output leakage current and the PE current during operation. The instrument measures simultaneously both the PE current during operation and the welding equipment output leakage current. To determine the PE current during operation and the welding equipment output leakage current value for Class 1 appliances, connect the DUT directly to the mains socket (not to the Test Socket 1).

**Procedure:**

- Press the [**\* UTIL**] key and release it. Then press the [**2**] key and release it.
- Press the [**IdirW**] key to measure with L-N reversal. The symbol L-N reversed is displayed.
- Connect the tested welding equipment: plug in its mains plug into socket of electrical installation.
- Plug the test lead into the **ITOUCH** terminal.
- Switch on the tested welding equipment's mains switch.
- Press the test tip against the first welding equipment output and press the [**TEST**] key. The last measured value is displayed after finishing the measurement.
- Press the test tip against the second welding equipment output and press the [**TEST**] key. The last measured value is displayed after finishing the measurement. If the measured value is less, repeat the previous step (save a higher value of leakage current).
- Switch off the tested welding equipment's mains switch.

## 4.8    Apparent power, mains voltage and current consumption - Power

### 4.8.1    Power, mains voltage and current consumption in Test Socket

If test voltage is present in Test Socket **(1)** – it is indicated by the (TEST) indicator, then the tested equipment starts to run after its mains switch is switched on! Take into consideration all safety warnings referred to by the DUT!

Do not touch the exposed conductive parts of the tested object after the mains switch is switched on – **RISK OF ELECTRIC SHOCK!**

**WARNING**
Test Socket **(1)** of the REVEXmax must not be used for continuous power supply of appliance!

**Procedure:**

- Press the [**9 Power**] key and release it.
- Connect the tested appliance: plug in its mains plug into Test Socket **(1)**.
- Press the [**TEST**] key.
- Switch on the tested appliance's mains switch.
- The HOLD function can be used (press the [▼] key).
- Switch off the tested appliance's mains switch.
- Finish the measurement (see chapter 4.2.1).

If the measured value of power is higher than the highest measurable value the symbol >>>> appears.

### 4.8.2    Measuring of power and current consumption by means of current clamp



**WARNING**

It is important to observe these principles for proper measurement: Both the REVEXmax and the tested appliance must be powered from identical phase.

**Procedure:**

- Press the [**9 Power**] key repeatedly in order to select the external method. The symbol  is displayed.
- Connect the optional current clamp to the terminal **(8)**.
- Switch on the tested appliance's mains switch.
- Enclose with current clamp's jaws live conductor L of the measured appliance.
- Press the [**TEST**] key.
- The last measured values are displayed after finishing the measurement.
- Switch off the tested appliance's mains switch.

If the measured value of power is higher than the highest measurable value the symbol $>>>>$ appears.

## 4.9    Automatic testing extension power supply cords

If the both ends of the extension power supply cord can't be easily moved to the measuring instrument, you can use a set of adapters for automatic testing extension power supply cords - ATP-A and ATP-B (P8080).

**WARNING**

Check that the extension power supply cord under test is not connected to the mains!

If the ATP-B adapter displays a **UL-N** warning, tested extension power supply cord is connected to the mains - is required immediately disconnect the ATP-B adapter.

**Procedure:**

- Press the [**\* UTIL**] key and release it. Then press the [**1**] key and release it.
- Plug the adapter ATP-A into the **PE** and **RPE** terminals.
- Perform the adapter resistance compensation (it is not necessary to do this before each measurement):

    - Connect the ATP-B adapter plug to the ATP-A adapter socket.
    - Press the [**TEST**] key and release it.
    - Press the [**Cal**] key and release it. The measured values are saved.

- Connect the plug of the extension power supply cord to the ATP-A adapter socket.
- Connect the plug of the ATP-B adapter to the socket of extension cord under test.
- Press the [**TEST**] key. If the | **CAL** | indicator lights up during measurement, it means that the adapter resistance is compensated.
- After finishing the measurement, the last measured values are displayed.

Sometimes it is not possible to determine which cable conductor is L/N (a.g. SCHUKO plug/socket) therefore the resistance of these conductors is marked as a (Rv1) and (Rv2).

These values are stored in the instrument memory and can be transferred to a PC software.

## 4.10    Welding equipment output voltage - Uo

(WELD variant only)

**WARNING**
If the welding machine is equipped with high-voltage ignition circuits arc (HF), this function must be switched off! Otherwise, the measurement results will be affected and the measuring instrument may be damaged.

**Procedure:**

- Press the [**\* UTIL**] key and release it. Then press the [**3**] key and release it.
- Connect the tested welding equipment: plug in its mains plug into the socket of electrical installation.
- Connect the welding equipment outputs to the instrument's **WELD** terminals by means of the optional test lead + crocodile clip.
- Switch on the tested welding equipment's mains switch.
- Press the [**TEST**] key.
- After finishing the measurement, the last measured values are displayed.
- Switch off the tested welding equipment's mains

If the effective value of voltage is less than 30 V, then the measurement is canceled (peak voltage value is not measured). This status is indicated by displaying **(Voltage <30.0 V)** and the acoustic signal sounds.

## 4.11    External voltage measurement - Voltmeter

(WELD variant only)

**Procedure:**

- Press the [**\* UTIL**] key and release it. Then press the [**4**] key and release it.
- Plug the test leads into the **Voltmeter** [+] and **Voltmeter** [−] . terminals.
- Press the [**TEST**] key.
- Use the test leads to measure voltage.
- After finishing the measurement, the last measured value is displayed.

The symbol "AC" or "DC" is displayed during measurement.
If it is necessary to apply mains voltage to the measuring socket **(1)** during the measurement, press the [**9 PWR**] key during measurement. To deactivate this function press the [**9 PWR**] key during measurement again.

# 5   Database operations

## 5.1   Storing measurement data

A set of data can be stored for each appliance. Data can be created and transferred to the REVEXmax from a PC and other data is created during the measurement. Each set of data (file) has its unique identification number (ID) assigned.

The structure of the file:

| Item | Transfer from PC | Description | Created |
|------|------------------|-------------|---------|
| ID | yes | 1-20 ASCII code charts | barcode scanner, ID editor |
| test sequence | yes | sequence of test steps | transfer from PC, assign of the test sequence |
| measurement data | no | | measurement and store of the value |
| final evaluation | no | | initial evaluation (passed) is possible to change manually |
| date of measurement | no | editable on a PC only | saving the measured value |

## 5.2   The structure of the data memory

Measured values and other possible data are stored as a file in a temporary memory where the ID is assigned and finally the file is transferred to the main memory. Conversely you can load a set of measurements of a particular appliance from the main memory to the temporary memory and then edit it.

> **i**   Measuring up to **16 000 DUTs** can be stored in the main memory.

To perform the whole procedure:

- Read the device ID number (use the barcode scanner, RFID reader) or enter the ID from the keyboard.
- Perform all required measurements.
- Check the visual inspection, functional test and measured values (**PASSED** is preset by default).
- Press the [**save**] key, the data will be transferred from the temporary memory to main memory.

The data stored in the temporary memory can be displayed after selecting the appropriate quantity. If a memory cell in the temporary memory is empty, the symbol $- - - -$ is displayed.

## 5.3   Entering characters

In this mode the text, setting, etc. can be entered and edited. When the keys are pressed repetitively, the alphanumeric symbols are entered:

| | |
|---|---|
| [0] | 0 *space* |
| [1] | 1 + − . , _ |
| [2] | 2 *A B C a b c* |
| [3] | 3 *D E F d e f* |
| [4] | 4 *G H I g h i* |
| [5] | 5 *J K L j k l* |
| [6] | 6 *M N O m n o* |
| [7] | 7 *P Q R S p q r s* |
| [8] | 8 *T U V t u v* |
| [9] | 9 *W X Y Z w x y z* |
| [*] | * : ; = ! ? @ $ % & |
| [#] | # ( ) < > { } [ ] / \ |

Context button:

| | |
|---|---|
| [< <] | move the cursor left |
| [> >] | move the cursor right |
| [< **Del**] | backspace |

Entry mode can be abandoned:

| | |
|---|---|
| [**ent**] | confirm entry and returns back |
| [**esc**] | discard modifications and returns back |

## 5.4   Identification number of device under test (ID)

The ID number is an individual number, which is assigned to only one DUT. An appliance ID of up to 20 alphanumeric characters can be entered.
The appliance ID can be entered with:

- keypad of REVEXmax
- barcode scanner or RFID reader
- external USB keyboard (necessary to confirm it by pressing the ENTER key)

The ID number should be entered before the start of the measurement. If the ID number already exists in the main memory (e.g. was transferred from a PC), then the data is loaded into temporary memory. If the user forgot to enter the ID number before the start of the measurement, it is possible to enter it before saving the data file into the main memory of the appliance. However, if the appliance with this ID exists already, the data will be rewritten completely!

**Barcode scanner, RFID reader, external keyboard**
Any device which has an USB 2.0 Full Speed HID (Human Interface Device) can be used with REVEXmax.

- Plug the barcode scanner, RFID reader or keyboard into the USB connector **(10)**.
- A confirmation beep confirms the barcode/RFID has been received. If an external keyboard is used, press the ENTER key to confirm the ID and the ID number will be displayed.
- The ID number is read only when measurement is not in progress and/or no menu / warning is displayed.

The ID number can be inserted via barcode scanner, RFID reader or keyboard in the ID editor mode too.

## 5.5   Working with test results

### 5.5.1   Viewing a list of tested DUTs

Use the [▲] or [▼] keys to display a list of tested DUTs, which are stored in the main memory. The data stored for each appliance can be viewed or edited. To modify/edit stored data, it is necessary to transfer the data to temporary memory and after modification send the data back to the main memory.
The list of appliances contains the following information:

- ID number
- measured values - if the device has been loaded onto the temporary memory and then stored in the main memory the symbol **(V)** − **value** is displayed
- test sequence – if a test sequence is made for the device, the symbol **(S)** − **sequence** is displayed

The symbol **(V)** next the ID of DUT is displayed even if no measurement has been performed. The symbol only informs the user about a data transfer from temporary memory to the main memory.

### 5.5.2   Searching for stored DUTs

The device allows the user to search for a DUT according to their ID numbers:

- Insert the ID number via the barcode scanner, RFID reader, external USB keyboard or (internal) keypad.
- REVEXmax starts searching.
- If the ID number is found, then it is confirmed by a long beep, the data file is transferred to the temporary memory and the ID number is displayed.
- If the ID number is not found, the message will be displayed and triple beep sounds.

For manual searching press the [**ent**] key and insert the ID number via the REVEXmax keypad and then press the [**ent**] key again.

DUT can be also selected directly from the list (database). Press the [▲] or [▼] keys to open the database. Then select the DUT via [▲] or [▼] keys and press the [**Load**] key.

### 5.5.3   Creating a new DUT file

Creating a new DUT file is performed as follows:

- Create a new ID number (see chapter 5.5.2).
- Confirm that it is a new device.
- Make a note of the device (type, serial number etc.) for archiving on a PC.
- Perform all measurements (if required).
- Evaluate the results of the visual inspection, functional test and measurement (default value is "PASSED") – see chapter 6.2.
- Press the [**save**] key to save the new record in the main memory.

The data file is created in temporary memory (see chapter 5.2) and then is transferred to the main memory. Therefore, it is flagged that a measurement was performed – the symbol (**V**) is displayed even if no values were measured.

### 5.5.4   Deleting a DUT from the main memory

A stored DUT can be deleted from the main memory one by one or by selecting DUTs. Deleting a DUT is performed as follows:

- Press the [▲] or [▼] keys to open the database.
- Use the [▲] or [▼] keys to highlight the ID number which should be deleted.
- Press the [**menu**] key.
- Press the [**Delete**] key and confirm [**Yes**].

When removing more records at once follow in a similar way - use the [**Mark**] key.

**WARNING**
Deleting records will not free up more space in the main memory. The memory is released only when the complete memory is erased (manually in the menu or before loading new data from the PC).

### 5.5.5   Modification of the ID number

Modification of ID number is performed as follows:

- Press the [▲] or [▼] keys to open the database.
- Use the [▲] or [▼] keys to highlight the ID number which should be modified.
- Press the [**menu**] key.
- Press the [**Rename**] key and insert a new ID – see chapter 5.3.
- Press to the [**ent**] key to confirm or press [**esc**] to leave.

During the modification, the ID is checking if the new ID contains up to 20 characters (a longer text is automatically reduced).
Furthermore, it is checked whether an appliance with the same ID is already present in the database. If this situation occurs, the new appliances' ID will not be saved and a message will be displayed (**ID is already in database**).

### 5.5.6   Viewing measured values and evaluation

The record on the stored values of the appliance can be viewed as follows:

- Press the [▲] or [▼] keys to open the database.
- Use the [▲] or [▼] keys to highlight the ID number which should be viewed.
- Press the [**ent**] key to open the file with the measured values and evaluation.
- Use the [▲] or [▼] keys to display the results.

If the data file has not transferred from the temporary memory to the main memory (the symbol **V** is not displayed), you cannot view the measured values and their evaluation. Therefore, when you press the [**ent**] key, you will hear a warning beep.

### 5.5.7   Modification of measured values and evaluation

Measured values cannot be edited, but it is possible to repeat the measurement. Measured values and the evaluation status of appliances stored in the database can be changed so that the data set, which is loaded into the temporary memory, performs a new measurement of the variables whose values you want to change. You can also change the evaluation status (see chapter 6.2). A changed data file is saved again to the main memory. The change is made in the following manner:

- Press the [▲] or [▼] keys to open the database.
- Use the [▲] or [▼] keys to highlight the ID number which should be modified.
- Press the [**Load**] key to transfer the set of data from the main memory to the temporary memory.
- Perform the new measurement or change the evaluation (see chapter 6.2).
- Press the [**save**] key to store the modified data set back to the main memory.

## 5.6   Test sequences

### 5.6.1   Description of the test sequence

The test sequence is the fastest and easiest way to test appliances. During the test, preprogrammed measurements run automatically in a sequential order. The complete test results can be stored together with the associated appliance ID.
The automatic measurement procedure consists of individual steps which are necessary to do step by step and each step has to be confirmed. The automatic procedure is created in the PC software. The steps of measurement are selected from the selection and become part of the definition of the appliance. The process can include all variables that the measuring device REVEXmax allows. Furthermore, you can define their order.
After activation, the test sequence with the symbol **SEQ** is displayed in the upper right corner of the display. The automatic process can be interrupted at any time and continue with the manual measurement mode.
The automatic procedure always consists of the following steps:

- Confirm whether the user wishes to start the measurement procedure
- The result of the visual inspections **(required)**
- Selected measuring methods (optional item)
- ...
- The result of the functional test **(required)**
- The measurement result **(required)**
- The question of whether the values are to be stored in the main memory

### 5.6.2   Creating a test sequence

The test sequence can only be created using the PC software. Here measurements can be defined, including their sequence. The procedure also automatically assigns the result of the visual inspection, functional test and measurement operation.

> Some measurements cannot be measured separately (e.g. IEq, Uline and S, etc.). If are these variables are independently selected, measurement is performed at the same time.

### 5.6.3   Assigning a test sequence to appliance

In order to use the automatic procedure, is necessary to activate it. The automatic measurement procedure can be activated in the following ways:

- An automatic process is transferred from the PC individually for a particular appliance, at the same time as the file's data. The test sequence is automatically activated before starting the measurement.
- If the file does not contain the loaded data for an test sequence, the appliance can assign any of the procedures stored on the REVEXmax (see chapter 6.3).

### 5.6.4   Using the test sequence

If the tested appliances are assigned to the automatic measurement procedure, it is possible to start a test of the appliance using the following procedure:

- Confirm the **Sequence wizard** measurements using the [**TEST**] key. If you press the [**esc**] key, the automatic procedure will be shut down and the measurement can be done without using the test sequence.
- Follow the instruction shown on the display or select the result of the evaluation.
- If you want to repeat a step, press the [**Repeat**] key. If the step was performed successfully and you wish to proceed, press [**TEST**].
- If you want to interrupt the automatic process and switch to the manual mode, press the [**End**] key. The steps which have been performed up to now will be retained.
- During the test sequence procedure, it is not possible to store the measured values with the [**save**] key. The results are stored after confirmation that the procedure is completed.

# 6   Instrument main menu

## 6.1   Main menu structure

- **DUT properties**
    - Measured values
    - Visual inspection result
    - Functional test result
    - Measurement result

- **Test sequences**
- **Empty file**
- **Setup**
    - System info
    - Self-test
    - Date – next calibration
    - Erase database
    - Measurement locking
    - Save last method
    - Date and Time
    - Keys beep
    - Volume
    - Language

The operating the menu is as follows:

- Press the [**menu**] key to open the Main menu.
- Use the [▲] or [▼] keys to select the desired function, confirm the selection by pressing the [**enter**] key.
- Use the [**esc**] keys to return.

## 6.2   Menu - DUT properties

### 6.2.1   Menu - Measured values

This menu can be used to display measured values with an evaluation status. All data are transferred from the temporary memory.

### 6.2.2   Menu - Visual inspection result

In this menu it is possible to set the result of visual inspection: Failed / Passed / N/A (not performed).

### 6.2.3   Menu - Functional test result

In this menu it is possible to set the result of functional test result: Failed / Passed / N/A (not performed).

### 6.2.4   Menu - Measurement result

In this menu it is possible to set the result of measurement operation: Failed / Passed / N/A (not performed).

> **i** The default setting for the visual inspection, functional test and measuring results is **PASSED**.

## 6.3   Menu - Test sequences

In this menu you can view a list of available measurement test sequences which can be assigned to the currently selected appliance.

Assigning the test sequences from the list of the currently selected appliance is done as follows:

- Press the [**menu**] key.
- Select the **Test sequences** item and press the [**ent**] key for confirmation.
- Select required test sequence.
- Press the [**ent**] key to check each individual step in the test sequence.
- Press the [**Load**] key to assign the test sequence to DUT.

> **i** The list of test sequences cannot be modified in REVEXmax – it is transferred from the PC software.

## 6.4   Menu - Empty file

In this menu the temporary memory is erased, i.e.:

- the ID number is empty
- all measured values are deleted
- the results of the visual inspection, functional test and measurement operation are set to PASSED
- the test sequence is deactivated

## 6.5   Menu - Setup

### 6.5.1   Menu - System info

These items can be displayed Serial number, Firmware version, Production date and The number of records.

### 6.5.2   Menu - Self-test

This option can be performed to verify the functionality of the REVEXmax. Disconnect equipment under test before the self-test. The self-test does not replace calibration. The procedure is described in chapter 3.2.

### 6.5.3   Menu - Date of next calibration

In this menu, you can set the next calibration date. The measuring device starts to display a warning message 45 days before the expiration date, e.g., **Date of the next calibration: 01.01.2020**. This information is displayed only once a day. If the calibration has expired, there is the message, e.g., **Calibration expired on 01.01.2020**. Enter into the menu, the date of the next calibration is performed by pressing the [**ent**] key. The date is inserted using the keyboard device. Confirm the selection by pressing the [**ent**] key or press the [**esc**] key to return without saving the changes.

> **i**  The '.' characters are automatically skipped in the editor.

### 6.5.4   Menu - Erase database

Use this option to erase the entire main memory device, i.e., database appliances. The essential instrument settings and a list of test sequences remain preserved. Erasing the memory must be confirmed by pressing the [**Yes**] key.

> **i**  How long it takes to erasing entries depends on the memory usage. It can take up to 2 minutes when all memory locations are occupied.

### 6.5.5   Menu - Measurement locking

This option allows you to automatically lock every measurement. When enabled, each time measurement is displayed the symbol **AUT.ARET** . The switch activation is done by pressing the [**ent**] key.

### 6.5.6   Menu - Save last method

This option allows you to save last measuring method. When enabled, last method is selected immediately after connection the REVEXmax to the mains. The switch activation is done by pressing the [**ent**] key.

### 6.5.7   Menu - Date and Time

The date and time can be set in this menu. The date is attached to each stored test result and then transferred to the PC software. Press the [**ent**] key to enter this submenu. Insert the date and time via the REVEXmax keypad and confirm by the [**ent**] key or press the [**esc**] key to return without saving the changes.

The '.' characters are automatically skipped in the editor.
When you transfer data from the PC to the REVEXmax, the internal clock is automatically synchronized with the PC's time.

### 6.5.8   Menu - Keys beep

In this menu, an audible indication of pressing a key can be enabled / disabled. The change is done by pressing the [**ent**] key.

### 6.5.9   Menu - Volume

In this menu, the volume is set of the audible indication. Press the [**ent**] key to change the level.

### 6.5.10   Menu - Language

The instrument language can be set in this menu. Press the [**ent**] key to change the language.

# 7    Additional information

## 7.1    Communication – data transfer

Data transfer between the REVEXmax and the PC is completely controlled by the PC software and it cannot be controlled directly from the measuring device. To transfer data, prepare the REVEXmax as follows:

- Connect the REVEXmax to a PC using a USB cable plugged into connector **(11)** (drivers must be installed on the PC for the proper use of USB communication).
- If the REVEXmax is in the mode of working with databases, shut it down and set the device to measuring mode.
- Before transferring data from a PC to the REVEXmax, memory will be erased. How long it takes to erasing entries depends on the memory usage. It can take up to 2 minutes when all memory locations are occupied. **Attention: data unsaved to the PC will be lost forever!**
- Do not operate with the instrument during data transfer.
- An informative window is displayed during data transfer.

## 7.2    Messages on the display

### 7.2.1    Warning messages

**PE error**
A fault occurred in the PE circuit. The cause may be:

- the PE conductor circuit is not sufficiently grounded (high impedance fault loop or IT system)
- voltage on the protective wire

All device functions are blocked. If it is the IT system, the user must confirm this condition (see Figure 5). The resistance of the PE conductor, substitute leakage current and insulation resistance can be only measured in IT systems. In other cases, we cannot continue measuring (see Figure 6).

> **i** | The test of the PE circuit is performed only once, immediately after connection to the mains.

Figure 5: Warning message: PE error (IT systems)

---
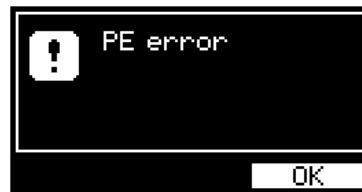
Figure 6: Warning message: PE error

**Interference voltage at the input**
The device has blocked the measuring. The cause may be:

- *Interference voltage on the DUT*
  The measuring instrument tests (before start of Riso and Rpe measurements) if interference voltage is not present on the DUT.
  If the warning message (Figure 7) appears, then check the disconnection of the DUT from the mains. Another reason could be that the measuring leads are too long. Please, use the original leads only.
- *Interference voltage in the mains*
  If during measurement a greater interference in the mains occurs, the REVEX-max disables the measuring and the warning message (Figure 7) appears.
  In this case, repeat the measurement later.
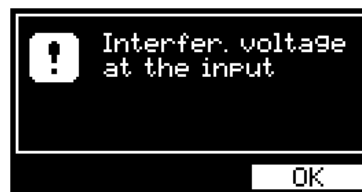


Figure 7: Warning message: Interference voltage at the input

**Current >10.00 mA**
If the leakage current of the appliance exceeds approximately 10.00 mA, power supply is disconnected from the Test Socket **(1)**, then an acoustic signal sounds and the display shows the warning message (Figure 8).

Figure 8: Warning message: Current >10.00 mA

**Measuring - time limit**

If the time of measuring exceeds the allowed limit (according to the appliance's current - see chapter 2.1), power supply is disconnected from the Test Socket **(1)**, then an acoustic signal sounds and the display shows the warning message (Figure 9).
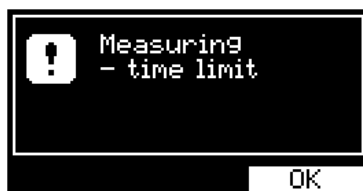


Figure 9: Warning message: Measuring - time limit

**Cannot be measured (calibration error / damaged data)**

The device automatically checks the adjustment constants and other data. If the data is damaged then the measurement cannot be performed. An acoustic signal sounds and the display shows the warning message (Figure 10 or Figure 11). In both cases, the device must be sent for repair to the manufacturer.
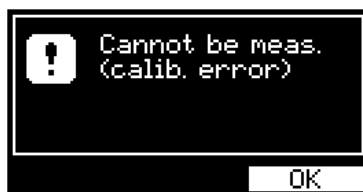


Figure 10: Warning message: Cannot be measured (calibration error)
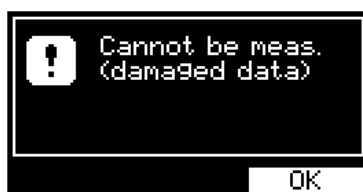


Figure 11: Warning message: Cannot be measured (damaged data)

**Empty database**

When you try to view a list of appliances with an empty memory, then an acoustic signal sounds and the display shows the warning message (Figure 12).



Figure 12: Warning message: Empty database

**Memory usage**

If the memory usage increase to 90%, then an acoustic signal sounds and the display shows the warning message (Figure 13). If the memory is full (100%), then it is necessary to erase the memory (see chapter 6.5.4) to continue to work with the device (store new appliances).



Figure 13: Warning message: Memory usage

**Measurement was cancelled**

If the [**esc**] key was pressed during the measurement, then it will be cancelled. An acoustic signal sounds and the display shows the warning message (Figure 14). The measured value is not saved.
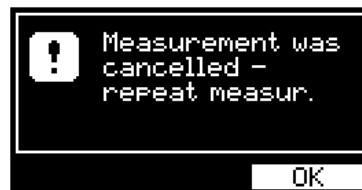


Figure 14: Warning message: Measurement was cancelled

**ID is already in database**

When you enter an ID which is already in the database, then an acoustic signal sounds and the display shows the warning message (Figure 15).



Figure 15: Warning message: ID is already in database

**Test leads: Rpe >2.0 $\Omega$**

The maximum value of the test leads' resistance is 2.0 $\Omega$. When you try to compensate for a higher value, an acoustic signal sounds and the display shows the warning message (Figure 16).
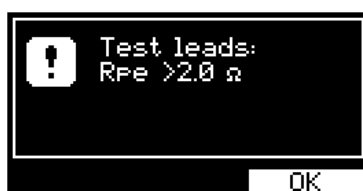


Figure 16: Warning message: Test leads: Rpe >2.0 $\Omega$

**Warning concerning of a point of danger**

Read the User's Manual and observe all precautions! Symbol (Figure 17) highlights the fact that it is necessary to follow the safety instructions in the manual.
A RISK OF INJURY OR DEVICE DAMAGE!



Figure 17: Warning concerning of a point of danger

**Warning concerning a DUT isolated placing**
Symbol (Figure 18) highlights the fact that all conductive parts must be isolated from accidental grounding.
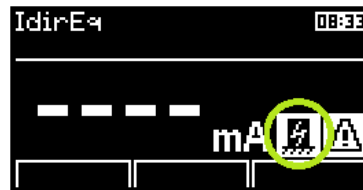


Figure 18: Warning concerning a DUT isolated placing

**Warning concerning heating the internal circuit when Rpe is measured**
When low Rpe values are measured, it may overheat the internal circuit of the REVEXmax. We recommend performing the measurements for a max. of 30 secs. (only for value <10.00 Ω). If the temperature inside exceeds the allowed limit, the symbol (Figure 19) is displayed and the acoustic signal sounds.



Figure 19: Warning concerning heating the internal circuit when Rpe is measured

### 7.2.2   Operational information

**Measuring in progress**

An animated symbol indicates that the measurement is running (Figure 20). It is displayed only during measurement and a LED indicator **34** simultaneously flashes.



Figure 20: Measuring in progress

**Locking the measurement**

The locking can be cancelled by pressing the [**TEST**] key or any key except for [▼] and [**esc**].



Figure 21: Locking the measurement

**Automatically locking the measurement**

The locking can be cancelled by pressing the [**TEST**] key or any key except for [▼] and [**esc**]. This setting can be enabled / disabled in Setup menu, see chapter 6.5.5.



Figure 22: Automatically locking the measurement

**HOLD function**

By pressing and releasing the [▼] key, the last measured value is displayed even if the measurement has either ended or is in progress. The HOLD function can be cancelled (measurement is still in progress) by pressing and releasing the [▼] key.



Figure 23: HOLD function

**Test sequence**

After activation, the test sequence symbol is displayed (Figure 24).



Figure 24: Test sequence

**Measured value is out of range**

If the value is higher / lower then max. / min. range, the maximal / minimal value is displayed with the symbol $>$ "higher then" (Figure 25) or $<$ "lower then" (Figure 26).



Figure 25: Measured value is out of range (max)



Figure 26: Measured value is out of range (min)

### 7.2.3 Setting information

**Test leads compensation**
The test leads' resistance is measured and then automatically memorized and subtracted from Rpe measurement (see chapter 4.3.1).



Figure 27: Test leads compensation

**Incorrect compensation for the test leads**
If the measured value is less than the saved compensation value during measurement (after subtraction, the memorized resistance will result in a negative number), the display shows the absolute value and the symbol $\boxed{\textbf{CAL}}$ on the display appears inversely (Figure 28). In this case, it is necessary to perform the compensation again (see chapter 4.3.1).



Figure 28: Incorrect compensation for the test leads

**External input activation**
After activation of the external input **(8)**, a symbol is displayed (Figure 29). The Test Socket **(1)** is not active.



Figure 29: External input activation

### 7.2.4   Database information

**The appliance has associated data about a performed measurement**
When data transfer from the temporary memory to the main memory is performed, then the symbol is displayed. The symbol is displayed even if no measurement has been performed.



Figure 30: The appliance has associated data about a performed measurement

**The appliance has associated data about a test sequence**
The procedure is activated automatically after loading the appliance data from the temporary memory to the main memory (see chapter 5.6).
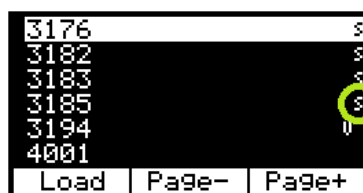


Figure 31: The appliance has associated data about a test sequence

## 7.3   Reset of the instrument

It is advised to execute an instrument RESET in the event of a malfunction. Disconnect the REVEXmax from mains, wait 30 s and plug it in again. If problems occur with the database system of REVEXmax, please reset the device and erase the memory (see chapter 6.5.4).
**Attention! All data stored in the main memory will be lost.**
If malfunction persists, contact your local distributor.

## 7.4    To use special accessories

### 7.4.1    Carrying bag for instrument (P6150)

The carrying bag P6150 is used for protection and transport of the device REVEX-max and wireless barcode readers P9011 (Figure 32).



Figure 32: Carrying bag for instrument

Insert the device into the bag and secure it with the strip fastened around its power supply cord (Figure 33).



Figure 33: Tightening the retaining strap

If you are not using the device, the power supply cord can be put into the pocket of the lid cover, close the lid, secure with Velcro and the whole bag close with side zippers (Figure 34).



Figure 34: Closing the carrying bag

The device in the bag can be worn on the neck during work. Unclip from strap short straps and clip them into the press studs that are located on both sides of the bag. The device will then remain in a horizontal position even after hanging on the neck (Figure 35).



Figure 35: Bag hanging on the neck

### 7.4.2    Adapter for testing extension power supply cords (P8030)

The adapter is designed to measure the continuity of the protective circuit extension cords. It facilitates the work and significantly improves the contact of their PE pins. Connect the banana plug adapter into the **RPE** terminal, plug the adapter into Test Socket **(1)** on the front panel REVEXmax and perform the test lead resistance compensation of the adapter (see chapter 4.3.1).

Then connect the plug of the measured extension cord into Test Socket **(1)**, lock the measurement (see chapter 4.3) and plug the adapter into the socket of the tested extension cord (Figure 36). The resistance of the PE circuit is now measured.
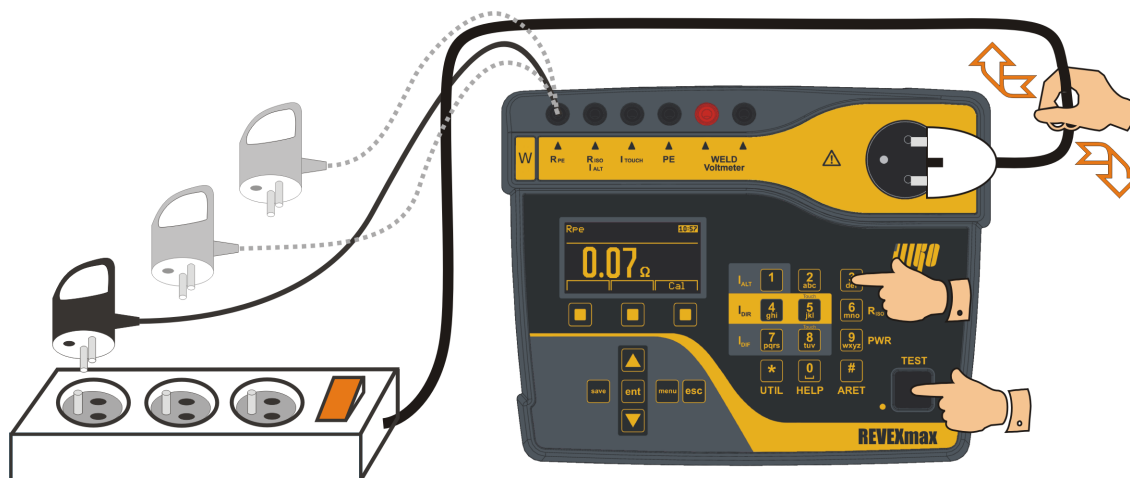


Figure 36: Adapter for testing extension power supply cords

### 7.4.3    Set of adapters ATP for automatic testing extension power supply cords (P8080)

The adapter set is used to measure the resistance of single-phase extension power supply cords. The main advantage is that both ends of the extension power supply cord need not be moved to the measuring instrument. The measurement procedure is described in chapter 4.9.

The set includes two adapters:

- ATP-A - connects to the device and to the extension power supply cord
- ATP-B - connects to the extension power supply cord only

**WARNING**

Check that the extension power supply cord under test is not connected to the mains!

If the ATP-B adapter displays a **UL-N** warning, tested extension power supply cord is connected to the mains - is required immediately disconnect the ATP-B adapter.
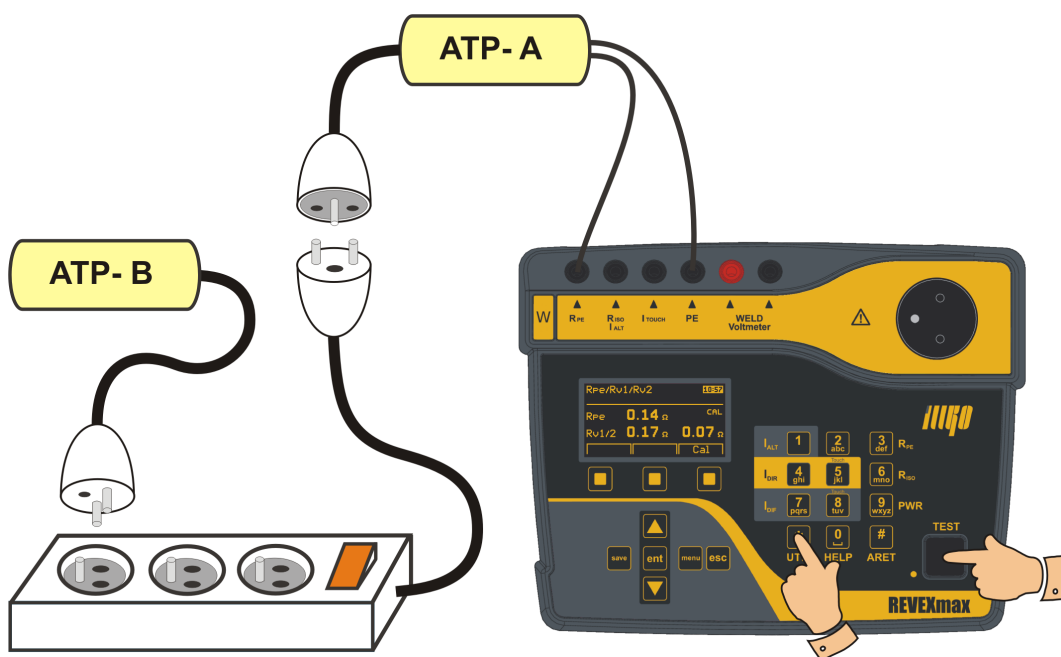
Figure 37: Using set of adapters for automatic testing extension power supply cords

### 7.4.4 Three-phase adapter (P8015-8018)

The three-phase adapter must be used for measuring three-phase appliances with a movable power supply cord. It is necessary to plug in tested appliance by means of the three-phase adapter and to select the required measuring method by means of the three phase adapter's function switch before measurement.
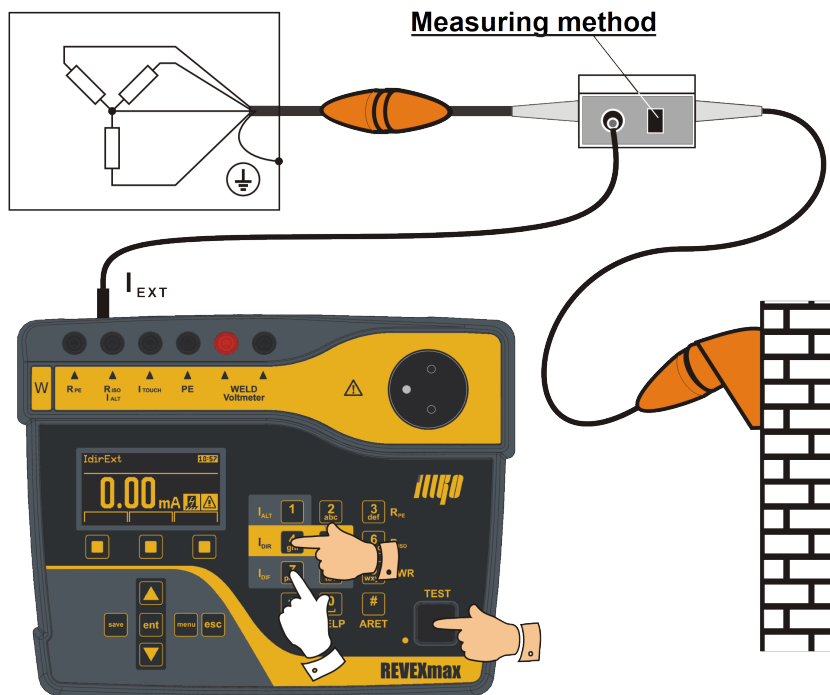


Figure 38: Using three-phase adapter

The three-phase adapters are produced in different versions:

**P8015** - Three-phase adapter, 16 A socket, 5 contacts
**P8016** - Three-phase adapter, 16 A socket, 4 contacts
**P8017** - Three-phase adapter, 32 A socket, 5 contacts
**P8018** - Three-phase adapter, 32 A socket, 4 contacts

## 7.5   Maintenance

Regularly check the technical safety and integrity of the insulation on the power supply cord, plastic case and all accessories. The plastic case should not be polluted with substances which can noticeably degrade the case's insulation quality.
Use soft cloth, slightly moistened with lukewarm soap water to clean the plastic case. Do not spill cleaning liquid over the instrument! Do not use cleaning liquids based on petrol, hydrocarbons, etc.
Wait until the instrument becomes totally dry before using it!

**WARNING**

**Do not expose the instrument to temperatures over $70\,°C$. If this temperature is exceeded, the plastic case can be damaged!**

## 7.6   Fuse

The REVEXmax includes one fuse replaceable by user:
**F 16 A / 500 V, 32 x 6.3 mm** - power supply of the instrument. If the fuse has blown, the REVEXmax does not turn on after connecting to mains voltage.

**WARNING**

- **Replace blown fuse with original one only, otherwise the instrument may be damaged and/or operator's safety impaired. It is not allowed to connect the instrument to voltage without secured fuse cover.**
- **Disconnect the REVEXmax from the mains before replacement of fuse!**

## 7.7   Recurrent tests and testing after repair

The REVEXmax is powered with a mains voltage of 230 V / 50 Hz and therefore all recurrent tests and testing after repair should be done in accordance with local regulations.

Insulation resistance between LN and PE in the REVEXmax must not be measured because of varistors in EMC filter.

The protective conductor must produce a test current approx. 1.5 mA. If leakage current is measured (instead of insulation resistance measurement), the value must remain below:

- 3.5 mA if the Direct or Differential leakage current measurement has been chosen
- 7 mA if the Equivalent leakage current has been chosen

## 7.8    Calibration and service

Measuring instruments should be regularly calibrated. **We recommend an interval of calibration 1 year.**

Furthermore, we recommend carrying out calibration after each repair.

Please contact us to fix an appointment for the inspection and calibration of your test instruments, for the address see below:

**ILLKO, s.r.o.**
**Masarykova 2226/18a**
**678 01 Blansko**
**Czech Republic**

**tel./fax: (+420) 516 417 355**
**e-mail: illko@illko.cz**
**http://www.illko.cz**

**WARNING**
Unauthorized persons are not allowed to open the REVEXmax. There are no replaceable components inside the instrument.

Please remember to include your address, email contact, phone number and **description of any faults** with the package.

## 7.9    Ecology

**Transportation packing**
Transport packaging is made of corrugated cardboard; it is recyclable.

**Instrument**
This symbol signifies that the product should not be thrown away into municipal waste at its end-of-life.
Please dispose of this product according to the relevant statutory requirements.

# 8   Technical specification

## 8.1   General data

Protective class ........................................... II (double insulation)
Over voltage class ................................................ CAT II/300V
Pollution degree ................................................................ 2
Degree of protection ...................................................... IP 20
**Reference condition:**
    Line voltage .................................... 230 V $\pm$ 1 % / 50 Hz $\pm$ 1 %
    Ambient temperature ........................................ (23 $\pm$ 2) °C
    Humidity .......................................... 45 $\div$ 55 % @ 23 °C
    Position ......................................................... arbitrary
**Operating condition:**
    Line voltage .................................. 230 V $\pm$ 10 % / 50 Hz $\pm$ 1 %
    Ambient temperature ........................................... 0 $\div$ 40 °C
    Humidity ......................... 75 % @ 23 °C (condensation not allowed)
    Elevation .................................................... max. 2 000 m
Supply current .......... max. 16 A (it depends on tested appliance, time limit)
Quiescent current ........................................................ < 25 mA
Dimensions (w x d x h) ................................... 250 x 195 x 50 mm
Mass (without accessories) ............................................. 1.7 kg
Storage temperature / storage humidity ............... -10 $\div$ 50 °C / max. 70 %
Case resistance to temperature ......................................... 70 °C
PE test .................................... before the start of the measurement
PC connection ....................................................... USB cable

## 8.2   Functions

**Notest:**
R - reading, D - digit

### 8.2.1   Earth bond

Entire measuring range ....................................... 0.00 $\div$ 10.00 $\Omega$
Resolution .................................................................. 0.01 $\Omega$
Reference error ........................................... $\pm$ (2 % of R + 2 D)
Operating error ........................................... $\pm$ (3 % of R + 3 D)
Operating range of use (according EN 61557-4) ................... 0.03 $\div$ 10.00 $\Omega$
Open-circuit voltage ....................................... 5 $\div$ 12 V AC
Test current (R $\leq$ 1 $\Omega$) ........................................... $\geq$ 1 A AC
Test lead compensation ........................................ yes (up to 2 $\Omega$)

### 8.2.2   Insulation resistance

Entire measuring range ........................................... 0.20 ÷ 100.0 MΩ
**Measuring sub range 0.20 ÷ 19.99 MΩ**
    Resolution ................................................................ 0.01 MΩ
    Reference error ........................................... ± (2 % of R + 2 D)
    Operating error ........................................... ± (3 % of R + 3 D)
**Measuring sub range 20.0 ÷ 100.0 MΩ**
    Resolution ................................................................ 0.1 MΩ
    Reference error ......................................... ± (4 % of R + 15 D)
    Operating error ......................................... ± (5 % of R + 15 D)
Operating range of use (according EN 61557-2) ............... 0.20 ÷ 100.0 MΩ
Nominal output voltage Un .................................... 500 / 250 V DC
Open-circuit voltage ...................................... (-0 %, +25 %) Un
Nominal test current .............................................. ≥ 1 mA DC
Short-circuit current ............................................. < 10 mA DC
Self-test ...................................................... 2.00 ± 0.05 MΩ

### 8.2.3   Alternative leakage current

Entire measuring range ....................................... 0.00 ÷ 20.00 mA
Resolution ......................................................... 0.01 mA
Reference error ..................................... ± (2 % of R + 2 D)
Operating error ...................................... ± (3 % of R + 3 D)
Operating range of use ..................................... 0.10 ÷ 20.00 mA
Nominal open-circuit test voltage ................. 230 V ± 15 %, 50 Hz ± 0.5 Hz
Short-circuit current ............................................. < 3.5 mA
Internal resistance of test voltage source ............................. > 80 kΩ
Self-test ...................................................... 0.10 ± 0.01 mA

### 8.2.4   Direct leakage current

Entire measuring range ....................................... 0.00 ÷ 10.00 mA
Resolution ......................................................... 0.01 mA
Reference error ..................................... ± (2 % of R + 2 D)
Operating error ...................................... ± (3 % of R + 3 D)
Operating range of use ..................................... 0.10 ÷ 10.00 mA
Test voltage ................................................... line voltage
Frequency characteristic of internal test circuitry ........... according EN 61557
Self-test ...................................................... 0.10 ± 0.01 mA

### 8.2.5    Differential leakage current

Entire measuring range .................................... 0.00 ÷ 10.00 mA
Resolution .................................................... 0.01 mA
Reference error .................................... ± (2 % of R + 3 D + *X)
Operating error ................................... ± (3 % of R + 4 D + *X)
Operating range of use .................................... 0.25 ÷ 10.00 mA
Test voltage ..................................................... line voltage
Frequency characteristic of internal test circuitry ............ according EN 61557
Self-test ................................................. 0.10 ± 0.01 mA

*X = S (0.001 I$\Delta$ + 0.001)  [D]
S ..... Apparent power of tested appliance [VA]
I$\Delta$ ... Displayed value of leakage current [mA]

### 8.2.6    Leakage current by means of three-phase adapter

Entire measuring range ...................................... 0.00 ÷ 20.00 mA
Resolution .................................................... 0.01 mA
Reference error .................................... ± (3 % of R + 10 D)[1]
Operating error ................................... ± (4 % of R + 15 D)[1]
Operating range of use .................................... 0.58 ÷ 20.00 mA

### 8.2.7    Apparent power

Entire measuring range ....................................... 10 ÷ 3680 VA
Resolution ...................................................... 1 VA
Reference error ........................................ ± (3 % of R + 2 D)
Operating error ........................................ ± (5 % of R + 5 D)

### 8.2.8    Mains voltage U$_{L\text{-}N}$

Entire measuring range ...................................... 207.0 ÷ 253.0 V
Resolution ...................................................... 0.1 V
Reference error ........................................ ± (1 % of R + 2 D)
Operating error ........................................ ± (2 % of R + 2 D)

### 8.2.9    Current consumption

Entire measuring range ....................................... 0.0 ÷ 16.0 A
Resolution ...................................................... 0.1 A
Reference error ........................................ ± (2 % of R + 1 D)
Operating error ........................................ ± (3 % of R + 2 D)

### 8.2.10   Current consumption by means of current clamp

Entire measuring range  ....................................... 0.0 ÷ 100.0 A
Resolution ......................................................... 0.1 A
Reference error  ........................................ ± (3 % of R + 4 D)[1]
Operating error ........................................ ± (4 % of R + 4 D)[1]

### 8.2.11   Apparent power by means of current clamp

Entire measuring range  ...................................... 10 ÷ 9999 VA
Resolution ......................................................... 1 VA
Reference error  ........................................ ± (5 % of R + 5 D)[1]
Operating error ........................................ ± (8 % of R + 5 D)[1]

### 8.2.12   External voltage DC (WELD variant only)

Entire measuring range  ...................................... 0.0 ÷ 130.0 V
Resolution ......................................................... 0.1 V
Reference error  ......................................... ± (2 % of R + 2 D)
Operating error ......................................... ± (3 % of R + 3 D)
Operating range of use ........................................ 3.0 ÷ 130.0 V
Input resistance ................................................ 1.1 MΩ

### 8.2.13   External voltage AC (WELD variant only)

Entire measuring range ........................................ 0.0 ÷ 90.0 V
Resolution ......................................................... 0.1 V
Reference error  ......................................... ± (2 % of R + 3 D)
Operating error ......................................... ± (3 % of R + 4 D)
Operating range of use ......................................... 3.0 ÷ 90.0 V
Input resistance ................................................ 1.1 MΩ

### 8.2.14   Welding equipment output voltage (WELD variant only)

Entire measuring range of TRMS voltage  .................... 0.0 ÷ 130.0 V DC
                                                            0.0 ÷ 90.0 V AC
Entire measuring range of peak voltage  ..................... 30.0 ÷ 130.0 V DC
                                                            30.0 ÷ 90.0 V AC
Resolution ......................................................... 0.1 V
Reference error  ......................................... ± (2 % of R + 3 D)
Operating error ......................................... ± (3 % of R + 4 D)
Frequency characteristic of internal test circuitry ......... according EN 60974-4
Input resistance ............................................ 200 Ω ÷ 5 kΩ

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[1]Current clamp or three-phase adapter error has to be considered additionally.

**ILLKO, s.r.o., Masarykova 2226, 678 01  Blansko, Czech Republic**

CE

# DECLARATION OF CONFORMITY

*Apparatus Identification:*    **REVEXmax S (IL2561)/REVEXmaxW (IL2560)**
*Apparatus Classification:*    Test and Measurement Equipment

*Statement of Conformity:*
Based on sample product test result using appropriate standards, and in accordance with the folloving EC directives ILLKO, s.r.o. hereby declares the REVEXmax S and REVEXmax W to be in conformity with:

EC Directive LVD 2014/35/EU

EC Directive EMC 2014/30/EU

**Sample Product Testing for EMC**:

*Tested by:*        INSTITUTE FOR TESTING AND CERTIFICATION, a.s.
                Testing Laboratory No. 1004.3
                Division 4 - MESIT QM
                Sokolovská 573
                Uherské Hradiště
                Czech Republic

| *Standard used* | *As Czech implementation of* |
| --- | --- |
| ČSN EN 55011 ed.3:2010 +A1:2011 | EN 55011:2009 +A1:2010 |
| ČSN EN 61326-1 ed.2:2013 | EN 61326-1:2013 |
| ČSN EN 61000-4-2 ed.2:2009 | EN 61000-4-2:2009 |
| ČSN EN 61000-4-3 ed.3:2006+A1:2008 +A2:2011 | EN 61000-4-3:2006+A1:2007+A2:2010 |
| ČSN EN 61000-4-4 ed.4:2013 | EN 61000-4-4:2012 |
| ČSN EN 61000-4-5 ed.2:2015 | EN 61000-4-5:2014 |
| ČSN EN 61000-4-6 ed.3:2014 | EN 61000-4-6:2014 |
| ČSN EN 61000-4-11 ed.2:2005 | EN 61000-4-11:2004 |
| ČSN EN 61000-3-2 ed.4:2015 | EN 61000-3-2:2014 |
| ČSN EN 61000-3-3 ed.3:2014 | EN 61000-3-3:2013 |

*Report ID: EMC:* Test Report No. 414103622AE1, issued 2017-12-21 – Test Report about Electromagnetic Test on the Measuring Instrument REVEXmax

**Sample Product Testing for safety**:

*Tested by:*        INSTITUTE FOR TESTING AND CERTIFICATION, a.s.
                Testing Laboratory No. 1004.3
                Division 4 - MESIT QM
                Sokolovská 573
                Uherské Hradiště
                Czech Republic

| *Standard used* | *As Czech implementation of* |
| --- | --- |
| ČSN EN 61010-1 ed.2 :2011 6, A13: 2009, A14: 2010, Opr.4: 2010, A15: 2012 | EN 61010:2010 |
| ČSN EN 61010-2-030:2011, Opr. 1:2016 | EN 61010-2-030:2010 |

*Report ID:* LVD: Test Report No. 414103622AL1, issued 2017-12-20 – Test Report about Electric Safety Test on the Measuring Instrument REVEXmax

ILLKO
MASARYKOVA 22??
678 01 BLANSKO

Issue Date: 2018-04-04

**Ivo Lipovský**
*Product Manager*
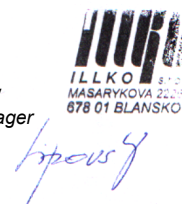
This manual is current when is delivered together with the device, but may not correspond to the older or newer version of firmware.

The firmware can be upgraded during calibration, repair, or by appointment. When the firmware was upgraded, please check our website www.illko.cz for modified User's manual.

Manufacturer, service: