

Operating Manual



UNIMET® 400ST

Testing system for
electrical safety

Software version: 3.2 and later



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1. How to get the most out of this manual

1.1 About this operating manual

This operating manual describes the UNIMET® 400ST with the software version indicated on the cover page. The functions and processes described may vary from those featured in other versions. It is designed for electrically skilled persons working in electrical engineering and electronics.

Please read this operating manual before using the devices. This documentation must be kept in an easily accessible location near to the device.

Although great care has been taken in the drafting of this operating manual, it may nevertheless contain errors and mistakes. The Bender Group cannot accept any liability for injury to persons or damage to property resulting from errors or mistakes in this manual.

Each of the registered trademarks which appears in this document remains the property of its owner.

1.2 Technical support

As a Bender customer, you will receive technical support and assistance in the event of queries relating to equipment you have purchased. Please contact our Service Department or your next Bender agency for more information:

Service-Hotline:
0700-BenderHelp (Phone and Fax)

Carl-Benz-Straße 8 • 35305 Grünberg • Germany
Tel: +49 6401 807-760 • Fax: +49 6401 807-629
E-Mail: info@bender-service.com • www.bender-de.com

1.3 Explanation of symbols and notes

The following terms and symbols are used to denote hazards and instructions in Bender documentation:



*This symbol indicates an immediate risk to life and limb.
Failure to observe the associated instructions and take appropriate precautions will result in death, serious physical injury or substantial damage to property.*



*This symbol indicates a potential risk to life and limb.
Failure to observe the associated instructions and take appropriate precautions may result in death, serious physical injury or substantial damage to property.*



*This symbol indicates a potentially dangerous situation.
Failure to observe the associated instructions and take appropriate precautions may result in minor physical injury or damage to property.*



*This symbol indicates important information about the correct use of the equipment purchased.
Failure to observe the associated instructions can result in equipment malfunctioning or cause problems in the environment in which it is being used.*



This symbol indicates tips for using the equipment and particular useful information. This type of information will help you to optimise your use of the equipment.

2. Safety instructions

2.1 Delivery

Inspect the dispatch packaging and equipment packaging for damage, and compare the contents of the package with the delivery documents. Equipment damaged in transit must not be used. If equipment has been damaged in transit, contact Bender immediately.

Equipment may only be stored in areas where it is protected against dust, damp, spray water and dripping water and where the specified storage temperatures can be assured.

The selling company's "General conditions of sale and delivery" always apply.

2.2 Intended use

The UNIMET® 400ST test system is exclusively intended for the area of use stipulated in the chapter entitled "System description" on page 9. Intended use also implies:

- Observance of all instructions in this operating manual and
- Compliance with any test intervals

Use which deviates from or is beyond the scope of these technical specifications is considered non-compliant. The Bender Group cannot accept any liability for damage resulting from such use.

2.3 Qualified personnel

Only appropriately qualified personnel may work on Bender products. Persons who are familiar with the assembly, commissioning and operation of the equipment and have undergone appropriate training are considered skilled persons. Such persons must have read this manual and understood all instructions relating to safety.

2.4 General safety instructions

Bender devices are designed and built in accordance with the state of the art and accepted rules in respect of technical safety. However, the use of such devices may introduce risks to the life and limb of the user or third parties and/or result in damage to Bender devices or other property.

- Only use Bender equipment:
 - As intended
 - In perfect working order
 - in compliance with the accident prevention regulations and guidelines applicable at the location of use
- Eliminate all faults immediately which may endanger safety.
- Do not make any unauthorised changes and only use replacement parts and optional accessories purchased from or recommended by the manufacturer of the equipment. Failure to observe this requirement can result in fire, electric shock and injury.
- Information plates must always be clearly legible. Replace damaged or illegible plates immediately.

2.5 Delivery conditions, guarantee, warranty and liability

The conditions of sale and delivery set out by Bender apply.

For software products, the "Softwareklausel zur Überlassung von Standard-Software als Teil von Lieferungen, Ergänzung und Änderung der Allgemeinen Lieferbedingungen für Erzeugnisse und Leistungen der Elektroindustrie" (software clause in respect of the licensing of standard software as part of deliveries, modifications and changes to general delivery conditions for products and services in the electrical industry) set out by the ZVEI (Zentralverband Elektrotechnik- und Elektronikindustrie e.V., the German Electrical and Electronic Manufacturers' association) also applies.

Delivery and payment conditions along with a copy of the software clause can be obtained from Bender in printed or electronic format.

3. System description

3.1 Function

The UNIMET® 400ST is used to test electrical safety. It has been designed for following areas of use:

- Recurrent test and test after repair of medical electrical equipment in accordance with IEC 62353:2007-05 or DIN EN 62353 (VDE 0751-1):2008-08 or ÖVE/ÖNORM 2009-01-01.
Tests are carried out on medical electrical equipment with **one** B, BF or CF applied part. Medical electrical equipment with several applied parts of different types (e.g. BF **and** CF) cannot be tested with UNIMET® 400ST in just one test process.
- "Prüfung nach Instandsetzung, Änderung elektrischer Geräte - Wiederholungsprüfung elektrischer Geräte" (Inspection after repair, modification of electrical appliances - Periodic inspection on electrical appliances) DIN VDE 0701-0702 (VDE 0701-0702):2008-06
- Hospital and care beds
- With appropriate adapter* also protection class I and II three-phase electrical equipment according to DIN VDE 0701-0702 and DIN EN 62353

* Use the DS32DCT three-phase current adapter to test devices **not** being in operation.
Use the DS32A three-phase current adapter to test devices during operation.

The test system supplies measurement results which it evaluates immediately in order to classify the test as "passed" or "failed". The test sequence which follows classification contains a visual inspection and a functional test in addition to the electrical tests. The test sequence can be carried out automatically or manually depending on the device under test.

The test results can be displayed on the screen, saved or printed out using an external printer. In the event of unexpected results, the DUT can be inspected in more detail by carrying out a single test. The device catalogue provides memory space for the test results from up to 600 tested beds or devices.

Tests can be transferred to a PC software program via the RS-232 interface. This software is included with the UNIMET® 400ST. For recurrent tests, the data stored in the PC software are transferred back to the UNIMET® 400ST. The RS-232 interface is also used for any subsequent updates of the internal operating software on the test system.

The test engineer catalogue can be beneficial if more than one person is working with the test system. Test engineers already registered on the system are simply selected from this folder. There is no need to re-enter the name of the test engineer. The names of up to ten test engineers can be stored.

The LC display is backlit. For entering data, a standard keyboard or barcode reader can be connected to the PS/2 interface.



UNIMET® 400ST has been designed solely for use with earthed systems. If the test system is used other than as intended, i.e. on an IT system, the measured values of any leakage currents will not be reproducible. The test result cannot be used. Alternative measurements of leakage currents, however, carried out with the UNIMET® 400ST in IT systems will deliver correct test results.

3.2 Standard-compliant tests

The UNIMET® 400ST carries out measurements and tests according to the following standards (see also chapter "7.1 Standards"):

- IEC 62353:2007-05
DIN EN 62353 (VDE 0751-1):2008-08
- DIN VDE 0701-0702 (VDE 0701-0702):2008-06
- ÖVE/ÖNORM EN 62353:2009-01-01

The UNIMET® 400ST carries out the following measurements and tests:

- Visual inspection
- System voltage
- Measurement of current consumption and calculation of power consumption
- PE resistance for Protection Class I equipment
- Insulation resistance
- Equipment leakage current according to the differential measurement method or by direct measurement
- Equipment leakage current -Alternative method
- Applied part leakage current -Alternative method
- Touch or PE conductor current according to the differential measurement method or by direct measurement
- Applied part leakage current -Alternative method (AC) and applied part leakage current with mains voltage on applied part
- Functional test

3.3 System components

The following accessories are supplied with the UNIMET® 400ST test system:

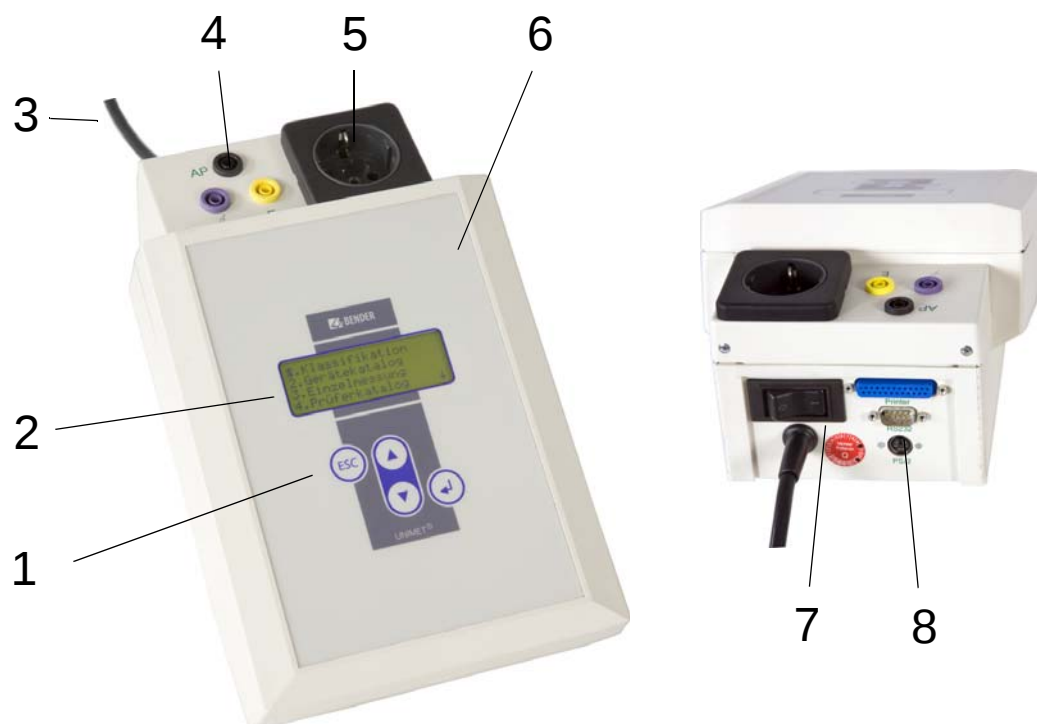
1	Carrying bag	For the storage and transport of the test system and its accessories. Accessories are kept in the side pocket and the inside pocket.
2	Test probe	for testing accessible parts of the DUT
3	Test terminal (safety claw grip)	for connection to accessible parts of the DUT
4	Interface cable (null modem cable)	Enables data to be exchanged between the test system and a PC (RS-232 interface)
5	Calibration certificate	Proof of the calibration work carried out in the factory
6	Technical device manual on CD	Test system manual
7	UNIData300 PC software (CD)	UNIData300 software for - backing up the device catalogue on a PC - transferring a firmware update to the UNIMET® 400ST
8	VK701-6 Adapter Schuko (German)	for testing extension cables and socket strips
9	VK701-7 Adapter for non-heating appliances	for testing device connecting cables
10	USB1.1 RS-232 converter	Enables data exchange between the RS-232 interface of the UNIMET® 400ST and the USB port of a PC (with installation CD)

The test system and its accessories



Fig. 3.1: Accessories

3.4 Operating elements



1	Control buttons
2	Backlit LCD for displaying the user menu and the measurement results. Four lines of 20 characters each.
3	Permanently attached power cable for connection to the supply voltage.
4	Sockets - violet: Connection for test probe for testing exposed parts of the device under test. - yellow (E): For a second measuring lead when the low-resistance continuity of the PE conductor is to be measured between two points (e.g., on single-phase, permanently installed electrical equipment or extension cables). - black (AP) For testing applied parts connected to the patient
5	Test socket: This is where the DUT's power supply cable is plugged in
6	Durable plastic enclosure, with pushbuttons for safe storage in the carrying bag.
7	Power switch with thermo-magnetic circuit-breaker
8	Interfaces - RS-232 interface, 9-pin, galvanically isolated, for connection to a PC - Centronics interface for connection to a printer - PS/2 port for connection to an external standard keyboard and a barcode reading wand or scanner.

4. Operation and setting

4.1 Commissioning



Warning

Inspect UNIMET® 400ST, its supply cable and measuring leads connected to it for visible damage on the outside. Equipment damaged in transit must not be used.

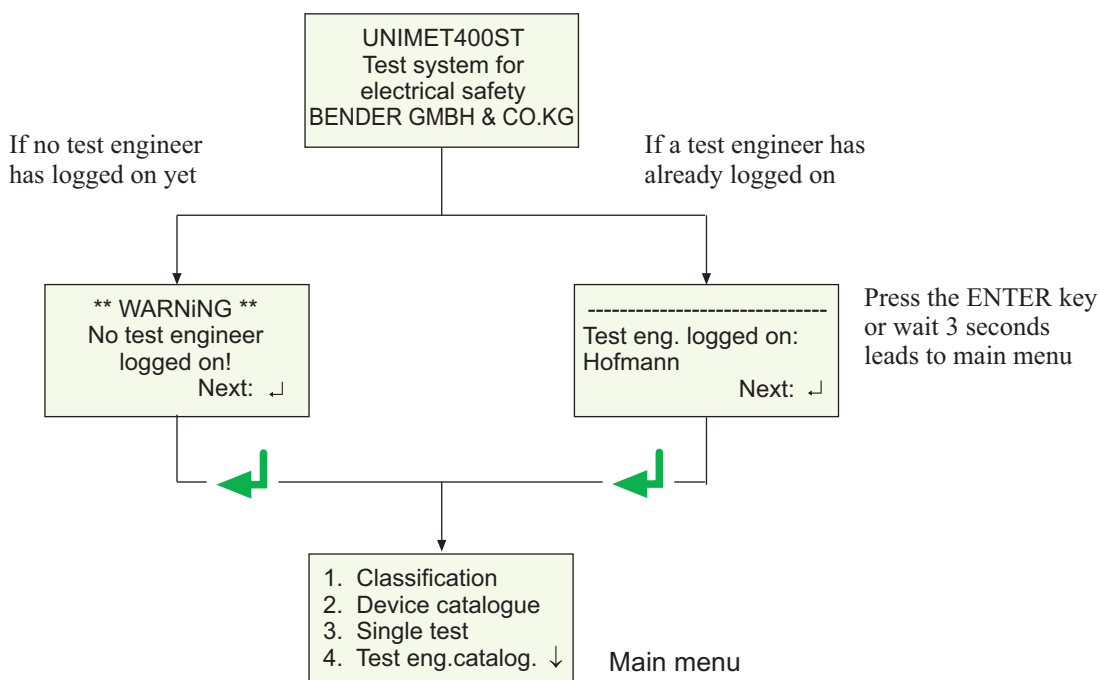


Caution

The UNIMET® 400ST must always be connected to the supply voltage indicated on the nameplate. Failure to observe this requirement may damage the test system and any device under test connected to it.

1. Set the UNIMET® 400ST down on an even surface with the coloured edges of the bag facing up. Open the two covers (Velcro fasteners).
2. Connect the UNIMET® 400ST to the supply voltage using the permanently attached power cable.
3. Switch on the device using the power switch.

The test system logs on with a beep (only when the buzzer is switched on) and displays the welcome text:



The test system is now ready for operation. The main menu appears.

4.1.1 Connecting a printer



Earthed printers can affect the measurements. Therefore, during the measurements, make sure that either

- the Centronics interface is not connected to an earthed printer or*
- the Centronics interface is electrically isolated via a suitable component.*

A printer can be connected to print out the test results. Providing that:

- The printer used has an IBM 8-bit character set
- The printer is set to IBM emulation

GDI printers (GDI = Graphic Device Interface) are **not** suitable for the UNIMET® 400ST.

You need a standard printer cable (25-pole D-Sub plug to Centronics) to connect the printer. This cable is not included with the equipment.

4.1.2 Connecting the keyboard and barcode scanner

A keyboard and/or barcode reading wand or barcode scanner can be used to make it easier to input the ID numbers and names of test engineers. UNIMET® 400ST supports the PS/2 interface to which either a standard keyboard, a PS/2 barcode reading wand or PS/2 barcode scanner can be connected. If an AR100 barcode reading wand is connected to a PS/2 switch cable (see "Ordering information" on page 59), it can be connected to a keyboard at the same time. If no keyboard is connected, then plug the keyboard simulator supplied with the AR100 barcode reading wand to this port.

The keyboard and barcode reading wand or barcode scanner can be plugged in and unplugged during operation. Adjustments on the UNIMET are not necessary. The keyboard and barcode reading wand must not be connected before switching on the UNIMET. This increases flexibility during testing. When the UNIMET detects a PS/2 keyboard, then the "Num-Lock" LED lights up. The LED indicates that the keyboard is ready.

4.2 Principle of operation

4.2.1 Operating the device

All the functions of the UNIMET® 400ST are controlled using the four control buttons and the displays on the screen. The current position on the menus is indicated by a flashing marker (cursor).

 	Use the arrow buttons to move the cursor up or down on the menus
	Use the Enter button to confirm selection of the current menu item.
ESC	The ESC button enables you to leave functions without making changes. It also enables you to return to the main menu.

4.2.2 Operation via the keyboard

An external keyboard makes it easy to enter the names and ID numbers of the test engineers. You can also operate the UNIMET entirely via the keyboard. The Cursor block "↑", "↓", "←" "ENTER" and "ESC" buttons have the same function as the buttons on the front of the UNIMET.

Note when entering text:

- The text entry cannot be longer than 20 characters. The UNIMET will truncate longer entries to 20 characters.
- You can enter all characters which can be selected directly on UNIMET.
- Upper and lower case is available but not umlauts.
- The numeric keypad can only be used to enter digits. The LED "Num-Lock" therefore lights up constantly.
- When entering text, the following buttons can be used to edit the text:
"←", "→" (Cursor block), "←" (Backspace), Del, Home.
- Entries via the keyboard can also be combined with texts read in from the barcode scanner and barcode reading wand.
- Save the entry after entering the last character by
 - by holding down the Enter button "↵" on the UNIMET for approx. 3 seconds
 - or by pressing the "↵" ENTER key on the keyboard once.

4.2.3 Reading in with the barcode reader

Refer to the operating instructions for the barcode reading wand or barcode scanner.

The AR100 barcode reading wand (see "Ordering information" on page 59) reads more reliably by sweeping it quickly over the barcode. Also follow the instructions for the barcode reading wand. Barcodes can be read both forwards and backwards.

The data string which is read in can be up to 20 characters long. The UNIMET will truncate longer entries to 20 characters.

When reading in the names and ID numbers of new test engineers, the input screen will remain open. This allows you to check the entry and change or replace it if necessary.

- You can delete the entry and go to the previous menu by holding down
 - the "ESC" button on the UNIMET for approx. 3 seconds
 - or by pressing the "ESC" button on the external keyboard once.
- Save the entry by holding down
 - by holding down the Enter button "↵" on the UNIMET for approx. 3 seconds
 - or by pressing the "↵" Enter button on the external keyboard once.

You can use the barcode scanner or barcode reading wand to call up tests from the device catalogue again using the ID number. In this case, after successfully reading in the barcode, it will immediately switch to the next screen of the operating process.

4.3 Main menu

All UNIMET® 400ST functions and sub menus can be accessed from the main menu.

Menu item	Mode	Page
1. Classification	Answer the questions that appear on the screen. The test system will identify the required test steps and limits to be observed. The assisted test sequence will guide you through all necessary steps to be taken.	29
2. Device catalogue	The test results, tests and limits of the device tested by the test system are stored in the device catalogue.	44
3. Single test	Test steps can be called up in the form of single tests and repeated as often as required.	52
4. Test engineer catalogue	Select test engineer, enter new test engineer, delete test engineer	16
5. Device setting	Settings for test probe, type query, warm-up phase, company name, clock, RS-232 interface, buzzer, language and update	19
6. Info	Provides information about the device names, software version and serial number of the device.	28

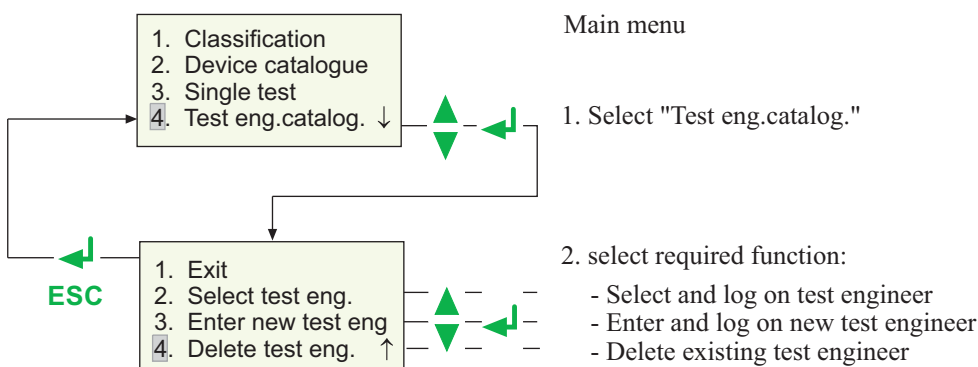
Each sub menu is accessed by selecting it with the arrow buttons and confirming by pressing the "↵" button.

4.4 Test engineer catalogue

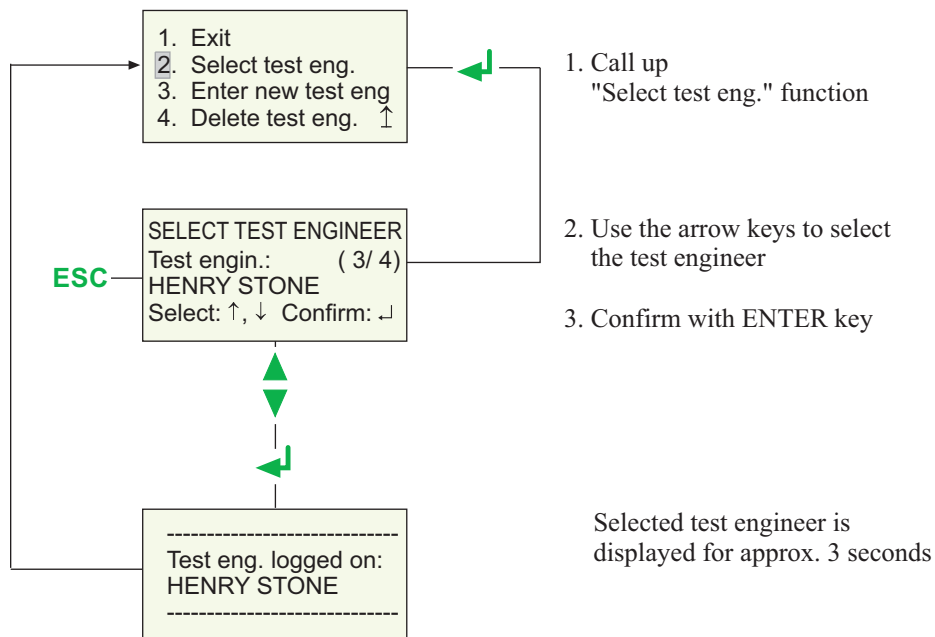
The names of the test engineers are stored in the "Test engineer" catalogue. The test engineer whose name appears in the test protocol is also logged on here. You should therefore set the name of the test engineer before carrying out the first test.

The test engineer catalogue can be particularly beneficial if more than one person is working with the test system. Test engineers already registered on the system are simply selected from the test engineer catalogue using the arrow buttons. There is no need to re-enter the name of the test engineer.

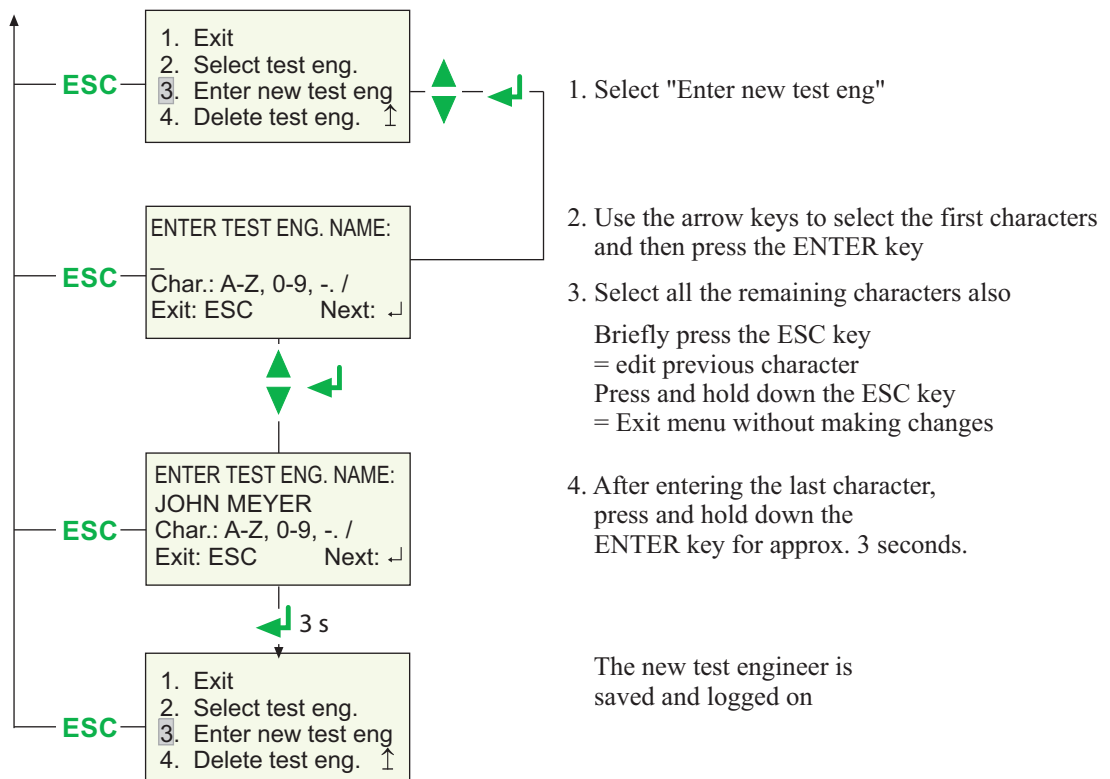
A name of a test engineer cannot be longer than twenty characters. The names of up to ten test engineers can be stored.



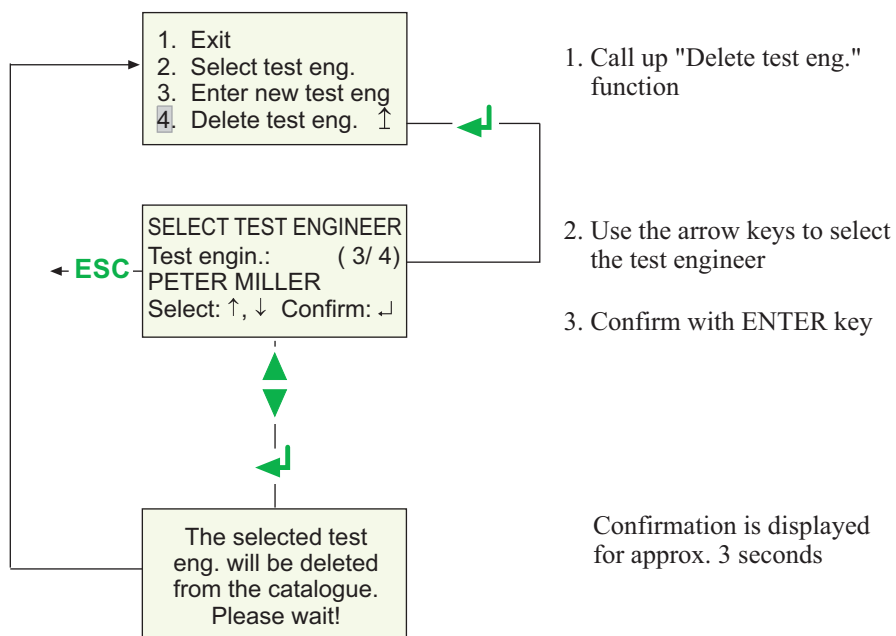
Select the name of a test engineer (log on) as follows:



To enter the name of a new test engineer:



To delete the name of a test engineer:

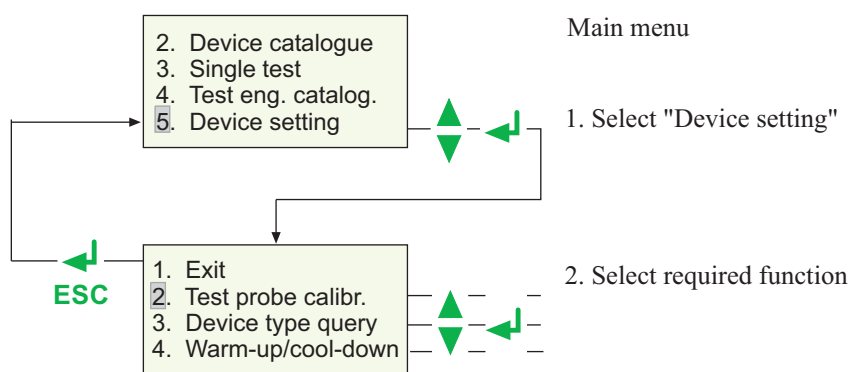


4.5 Device settings

Some of the following settings are used in generating reports to record the test results. You should therefore check these settings before carrying out the first test.

Menu item	Mode	Page
1. Exit	Returns to the main menu	-
2. Test probe calibration	Zero calibration test probe	20
3. Device type query	This is where you determine whether another device type is to be queried and stored in addition to the device ID.	21
4. Warm-up/cool-down	Setting for devices which require a warm-up period before the test and cool-down period after the test.	21
5. Change comp. name	The company name entered here will appear on the printout of the test protocol and after switching on the device on line 4 of the welcome menu.	22
6. Time/date	Set system time and date.	22
7. RS-232 parameters	Set data transfer speed	23
8. Buzzer On/Off	Switch buzzer on or off	24
9. Summer/wintertime	Switch automatic daylight saving on/off	24
10. Language/Sprache	Select German or English for user menus and protocol text. Activate settings for use in Austria.	25
11. Firmware update	Load new version of operating software	25

To access the device settings:



4.5.1 Calibrate test probe

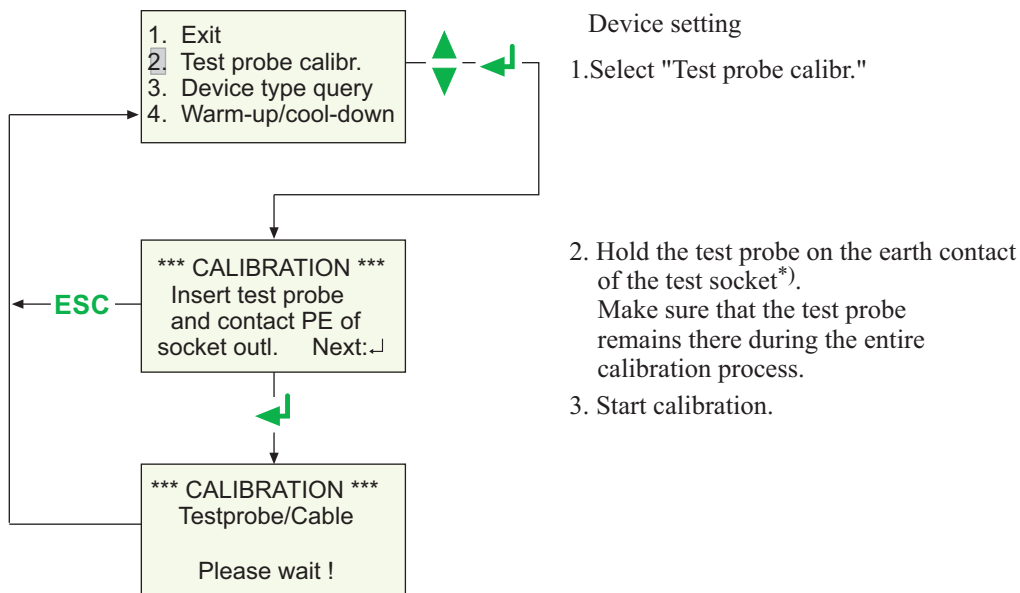
Zero balance must be carried out for the UNIMET® 400ST test probe. As with an ohmmeter, this ensures that the ohmic resistance of the test probe will not affect the PE conductor test result.

Recalibrate each time after connecting

- another test probe,
- another measuring lead,
- or a three-phase adapter

to the test system.

Proceed as follows to calibrate the test probe:



^{*)} With permanently connected Protection class I devices or extension cables also, the low resistance continuity of the PE conductor can be tested. The measurement is carried out between the test probe and the measuring lead connected to the yellow socket E.

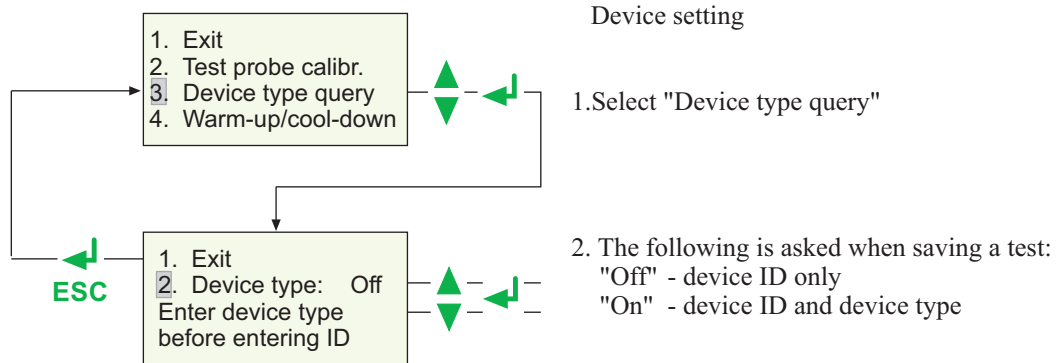
Before the test, a single zero calibration must be carried out with the test probe and the measuring lead.

Carry out a zero calibration again if you want to run the PE conductor test with the test probe on equipment with Schuko plug.

Failure to follow these instructions may lead to false test results.

4.5.2 Device-type query

Test results are often stored in the PC software. If the device to be tested is to be sorted in the software according to type, the type name can be entered in the UNIMET when carrying out the test. In this case, select "Device type: On". The setting applies until it is changed again.

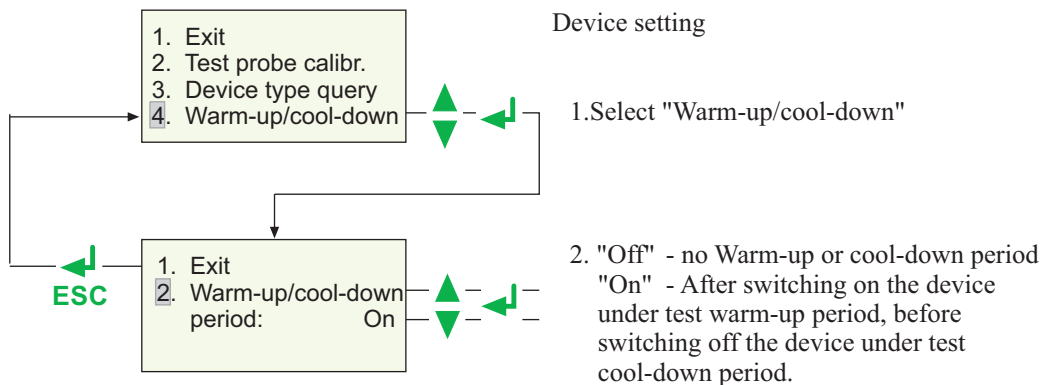


4.5.3 Warm-up and cool-down period

Once they have been switched on, an increasing number of DUTs need to complete a self-test and warm-up period, followed by a cool-down period prior to shutting down. Examples include computers, processor-controlled devices and laser equipment. For these devices, the UNIMET® 400ST may only start the measurements once the DUT has warmed up or "booted up". Otherwise, there is a risk that the parts of the device to be tested will only have switched on partially or not at all, and therefore will not be tested.

Once the measurements are complete, the UNIMET may only shut down the DUT once it has shut down or cooled down. Otherwise, on laser equipment, there is the risk of overheating or, on a computer, of sectors of the hard disk becoming unusable.

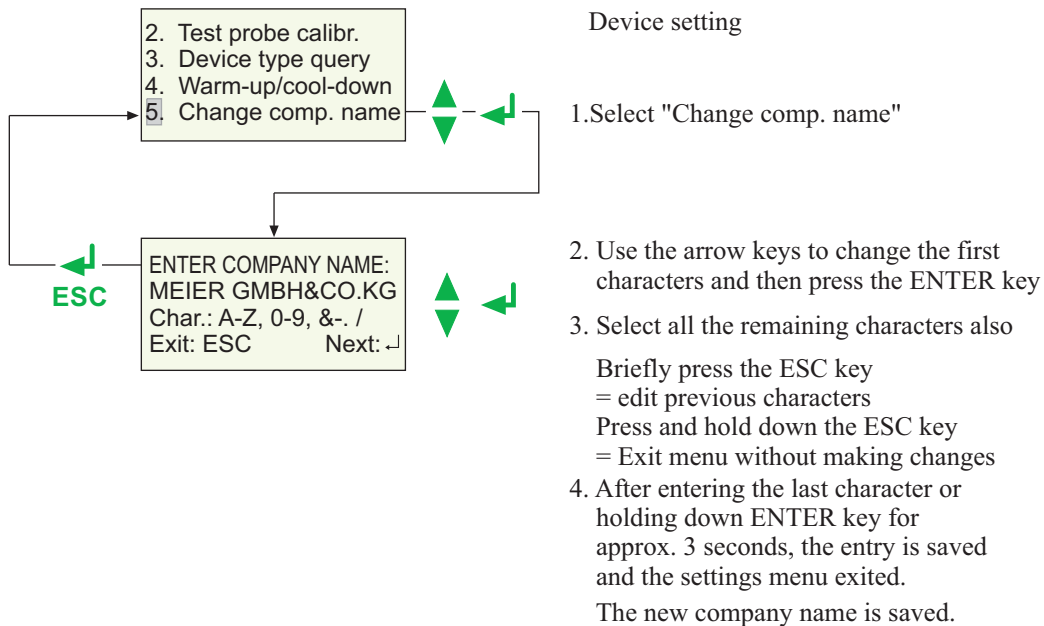
Select "Warm-up/cool-down period: On".



The settings selected for the "Warm-up/cool-down period" applies to all devices under test for which the test has been put in operation. The setting remains until it has been changed again.

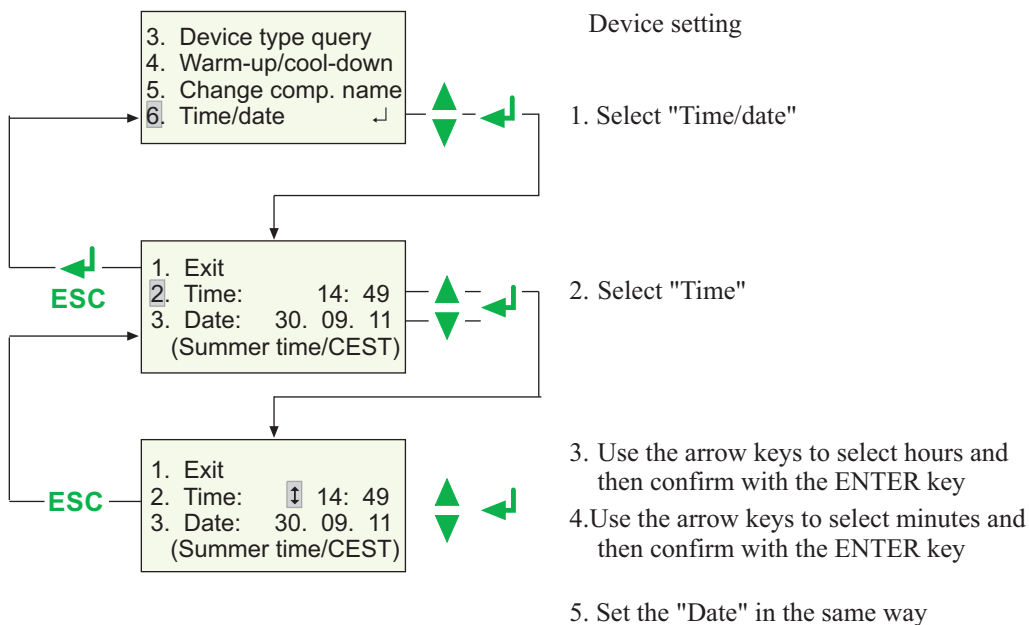
4.5.4 Changing the company name

The company name must consist of no more than 20 characters. It is printed as a header on the test protocol.



4.5.5 Time/date

Proceed as follows to set the time and date:



The UNIMET® 400ST clock is powered by a battery with a service life of approximately four years (see also chapter "6.2 Changing the battery").

On the sub menu 7 (see chapter "4.5.8 Summertime/winter time") you can also set whether the switchover to summer/winter time is to be automatic. If the note on the 4th line of the "Time/date" setting refers to the current date: If the automatic switchover is enabled and the following appears during the summer: 'Summer time/ CEST' and during the winter 'Winter time/CET'.

CEST = Central European Summer Time
CET = Central European Time

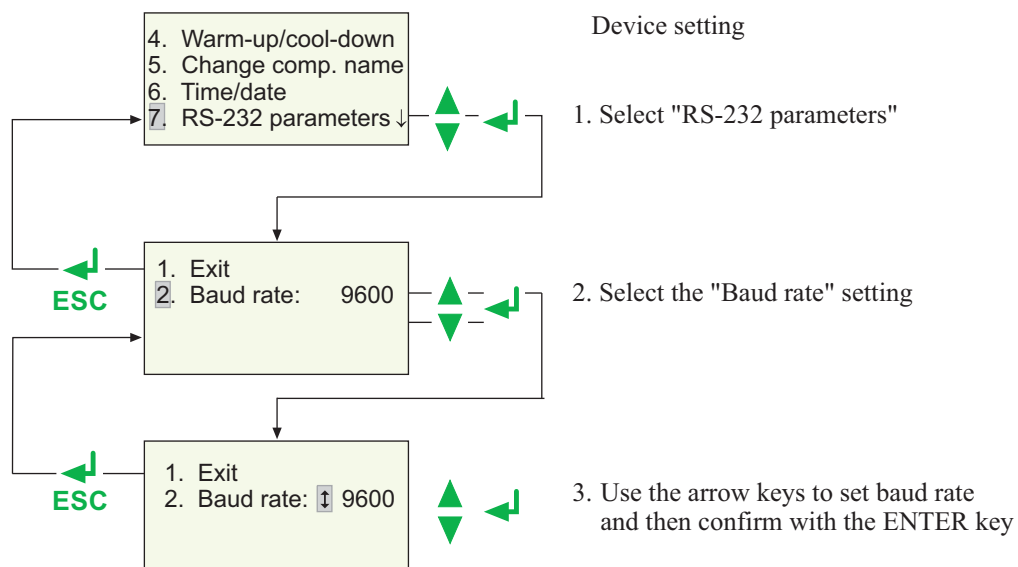
4.5.6 RS-232 parameters

The UNIMET® 400ST can be connected to a PC via the RS-232 interface. The baud rate indicates the data transmission rate in bits per second.



The baud rate on the test system and the PC (or in the PC software) must always be set to the same value! In case of different settings, data transmission cannot be carried out.

Proceed as follows to adjust the parameters of the RS-232 interface:



The following baud rates are available for the setting: 9600, 19200, 38400, 57600 baud

The other parameters of the RS-232 interface are fixed as follows:

Data bit	7
Stop bit	2
Parity	even

The interface cable supplied (null modem cable or USB1.1-RS-232 converter) is required for the data transfer. The data transfer is always initiated by the PC software. No operation is required on the test system for this to happen. For further information, please see the instruction manual for the PC software.

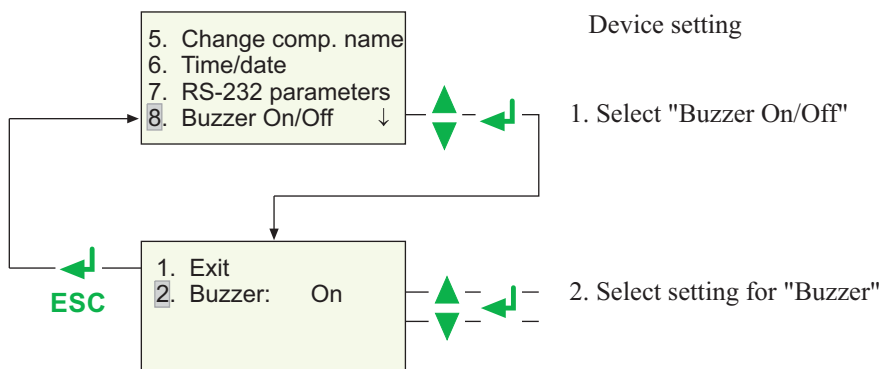


Caution

The data transfer may not start if one test or measurement is being carried out. Failure to observe this requirement may damage the UNIMET® 400ST and any device under test connected to it.

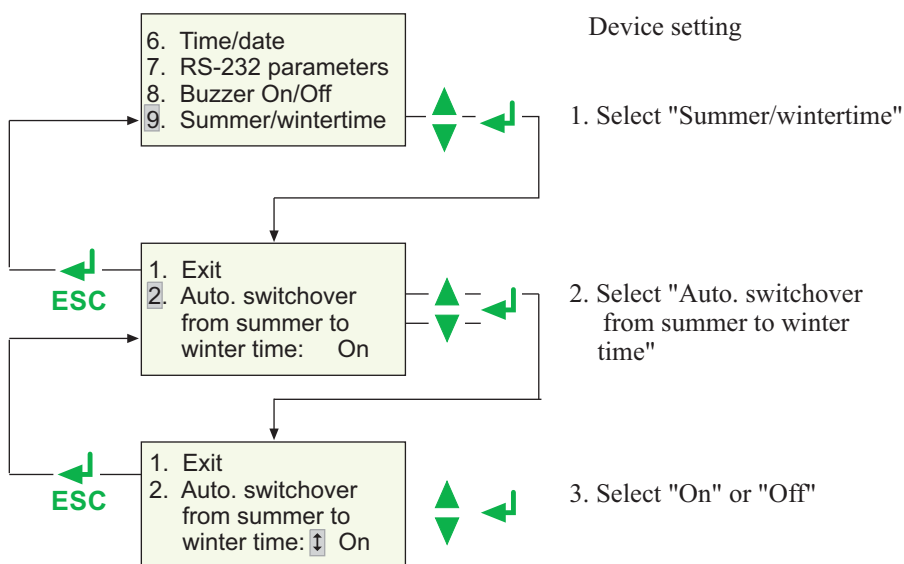
4.5.7 Buzzer On/Off

Proceed as follows to turn the UNIMET® 400ST buzzer on or off:



4.5.8 Summertime/winter time

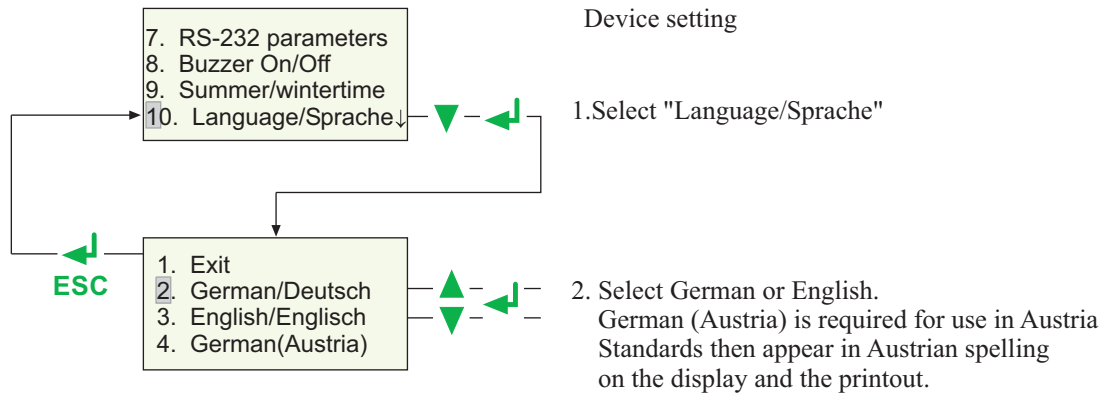
Proceed as follows to select whether the switchover to summer/winter time should occur automatically:



Automatic switchover to summer/winter time applies to most European countries (exceptions are e.g. England). Turn off the automatic switchover when using the test system in areas where this time change does not apply.

4.5.9 Language/Sprache

User menus and printouts of the test protocol may be in German or English. Proceed as follows to select the language:



4.5.10 Firmware update

UNIMET® 400ST is controlled by an operating software (firmware). New versions are available at Bender. The update is provided as a file with the extension ".hex".



An update will not delete data saved in the device catalogue. However, we strongly recommend making a backup copy before updating the device catalogue on a PC! Other information is available in the chapter "Backing up the device catalogue" on page 46.



From version 3.00 onwards, UNIMET® 400STs are equipped with a new hardware. When trying to install the operating software 3.00 on an older device, it cancels the update.

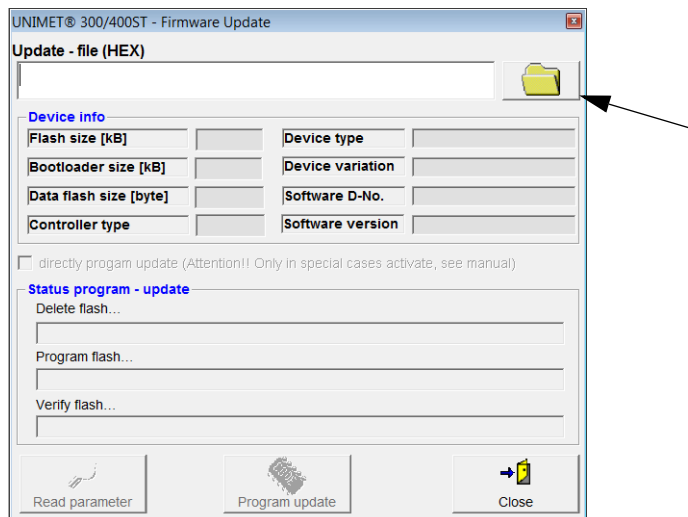
To transfer the updates from the PC to the UNIMET, you will need the PC software UNIData300.

To prepare the update:

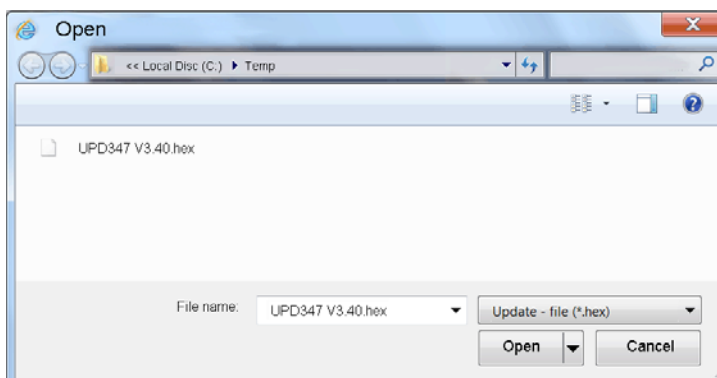
1. UNIData300 is on the CD supplied with the device. It is designed to operate on PCs with Windows® 2000 (with Service Pack 3) or higher.
 - If the version of the program on your PC is older, first uninstall the older UNIData300 version.
 - Open the folder UNIData300 and install the software by executing the file "UNIData300Vxxx.exe" on your PC.
2. Copy the update file (e.g. UPD347 ..Vxxx.hex) to the hard drive of your PC.
3. Connect the interface cable supplied for data transfer (null-modem cable or USB1.1-RS-232 converter) to the PC and UNIMET® 400ST.

Proceed as follows to carry out the update:

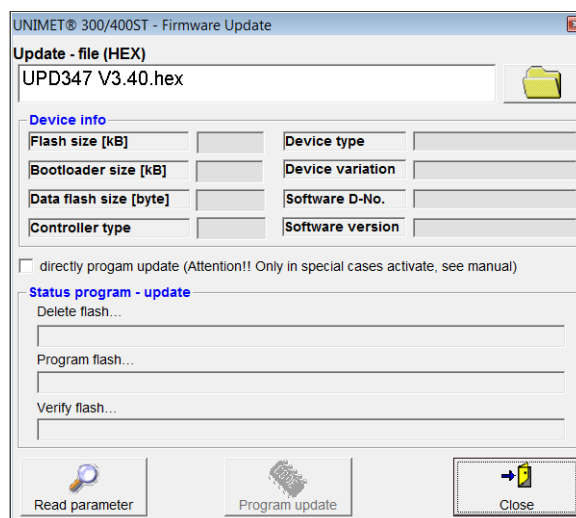
1. Start the UNIData300 software ("Start -> Program -> UNIMET®300ST -> UNIData300").
2. Select "Extras -> Firmware-Update UNIMET".
3. Click on the icon  (Open folder) to select the update file.



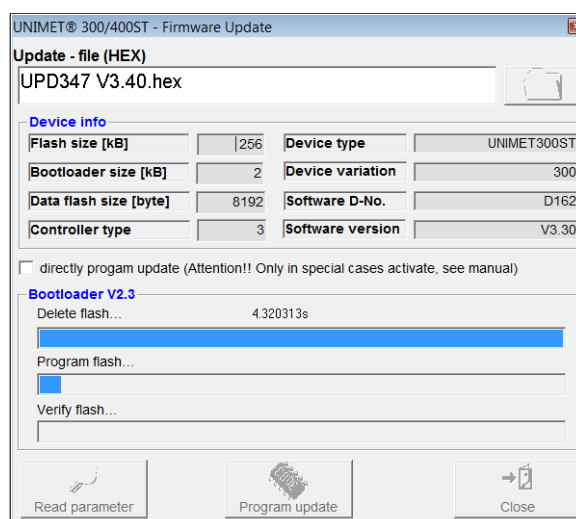
4. Select the update file "UPD347 Vxxx.hex" and click on "Open"



5. Information must be read from the UNIMET for the update. Click on "Read parameters" button.



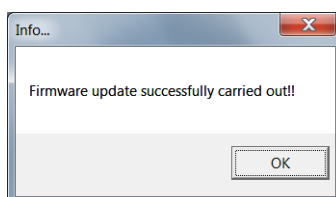
6. The information read out is displayed (device info). Click on the "Update program" button. The UNIMET flash memory is deleted, re-programmed and then checked (verified). The progress of the update is displayed.



Caution

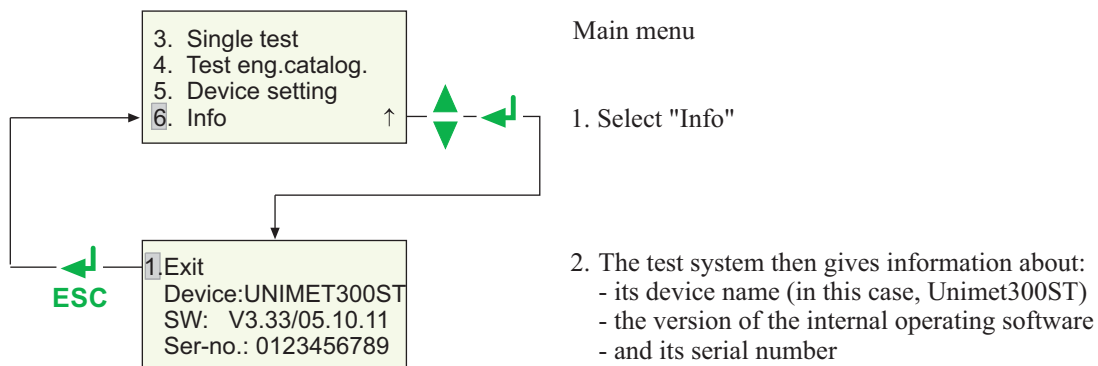
The data transfer takes about 3 minutes. Allow the data transfer to complete undisturbed. If the data transfer is interrupted, UNIMET® 400ST no longer has any operational operating software. The device must then receive a new operating software from Bender for installation.

7. Wait until the update is finished. UNIMET restarts and then displays the main menu. UNIData300 confirms that the update has been successful with the following message:



4.6 Info

The menu item "Info" on the main menu gives you the following information:



5. Testing and measuring

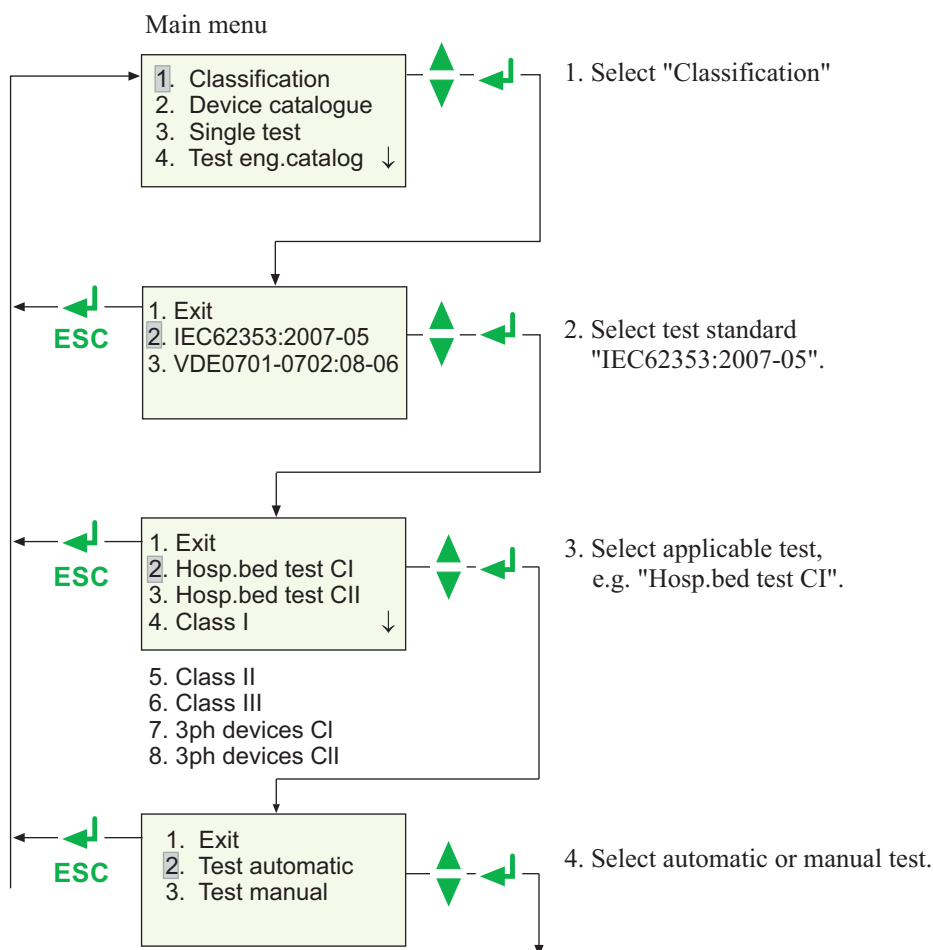
5.1 Testing via classification

5.1.1 Classification

Answer the questions that appear on the screen. The test system will identify the required test steps and limits to be observed. The assisted test sequence will guide you through all necessary steps to be taken. In addition to electrical tests, the test sequence also contains a visual and functional test.

Example 1:

Classification of an electrical hospital and care bed:



Manual or automatic test

The test sequence can be carried out automatically or manually for each device under test.

Automatic testing

During automatic testing, the test probe or test terminal comes into contact with one point of the DUT. The test sequence then runs through all the test steps automatically.

Manual testing

During manual testing, it is possible to repeat each test step as often as required and bring the test probe into contact with a number of accessible parts on the DUT consecutively.

R-PE	
Value:	0.004 Ω
Limit:	0.300 Ω
Repeat: $\uparrow$	Next: $\downarrow$

UNIMET® 400ST saves the "worst" measurement in each case. When measuring leakage currents and the PE conductor resistance, this is the highest measured value; when measuring the insulation resistance, this is the lowest measured value.

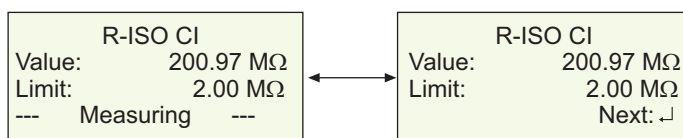
Manual testing of hospital and care beds (UNIMET® 400ST)

The manual test is basically carried out the same way. However, manual measurements where the bed is in operation (e.g. leakage currents) and the measuring of the insulation resistance are different. These measurements are carried out as follows:

- With leakage currents, the supply voltage to the bed is uninterrupted; with the insulation measurement, the measuring voltage is uninterrupted.
- With the measurement where the bed is supplied with voltage, the head and footboard are operated along with other electrically actuated adjustment devices. The adjustment devices are operated until their limit switch responds.
- Various accessible metal parts of the bed can be scanned with the test probe.
- The measurement is repeated until the ENTER button " $\leftarrow$ " is pressed.

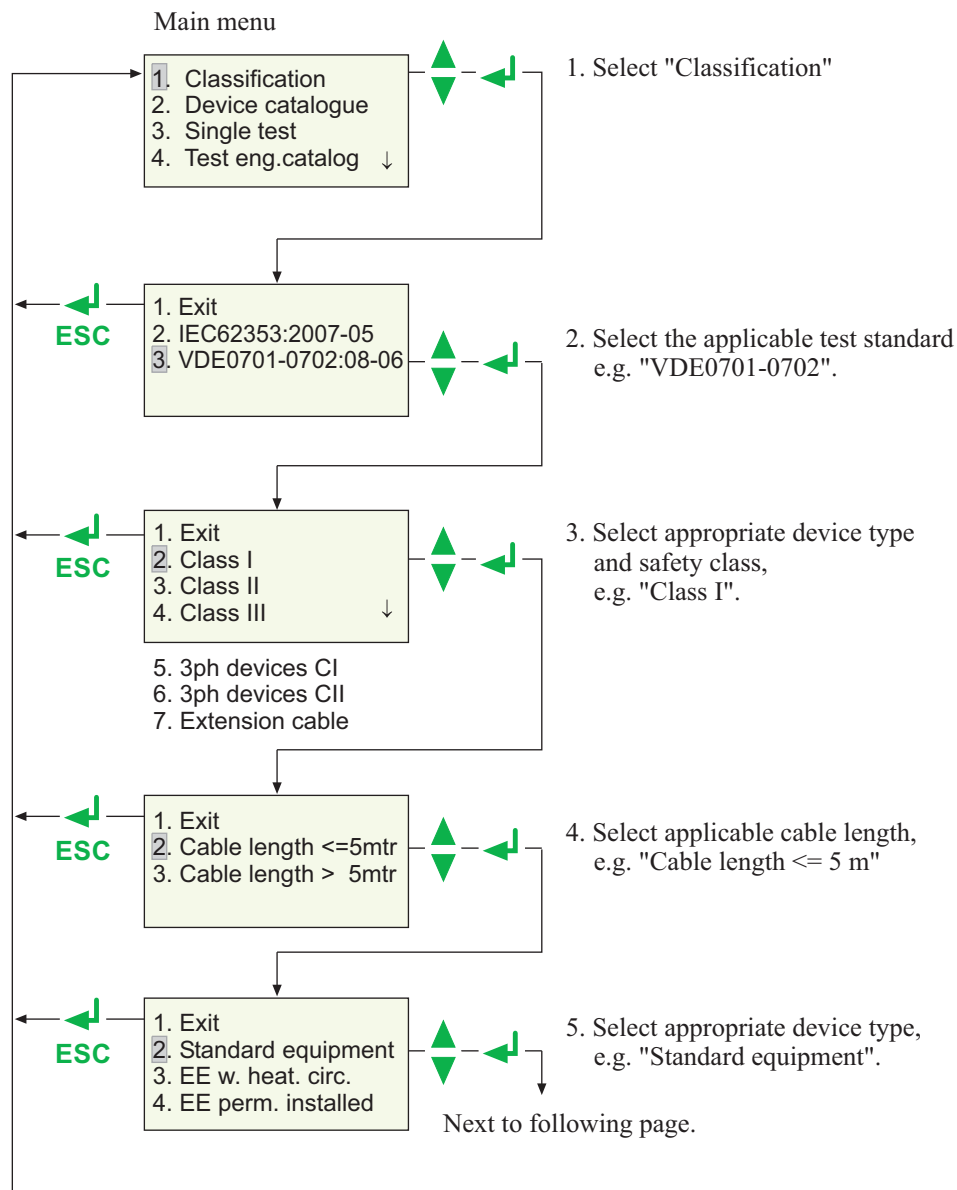
In this way, changes in the measured values caused by operating the adjustment devices on the bed are reliably detected.

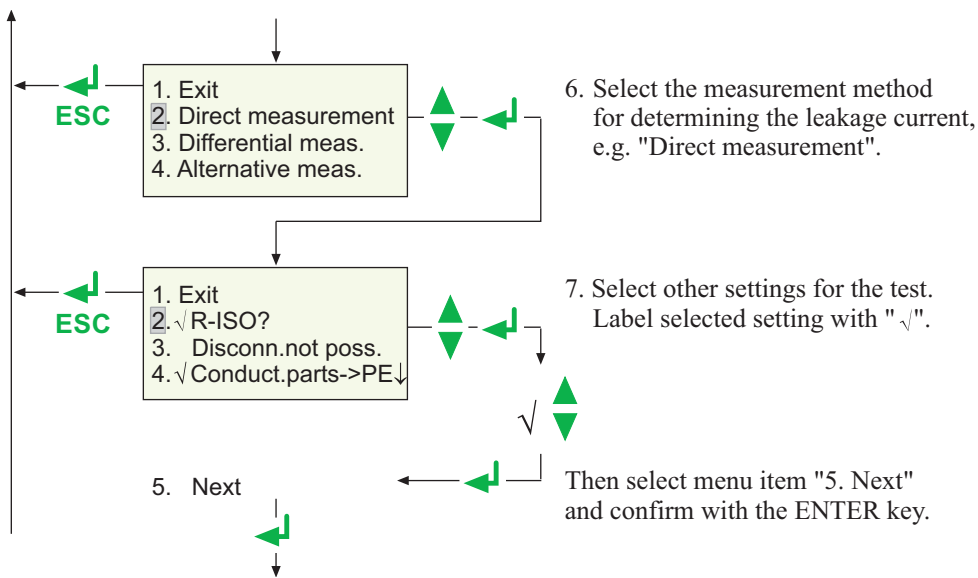
The display alternates as follows:



Example 2:

Classification of electrical equipment (e.g. angle grinders) according to DIN VDE 0701-0702:





Carry out R-ISO

During insulation measurement, a voltage of 500 V is applied between the active conductor and earth. Insulation testing may damage sensitive devices. Only activate insulation measurement if permitted by the manufacturer's instructions provided with the DUT.

Note: If the setting "No mains disconnection available" is selected, the insulation measurement cannot be selected.

No mains disconnection available

Choose this setting if the device cannot be disconnected from the mains.

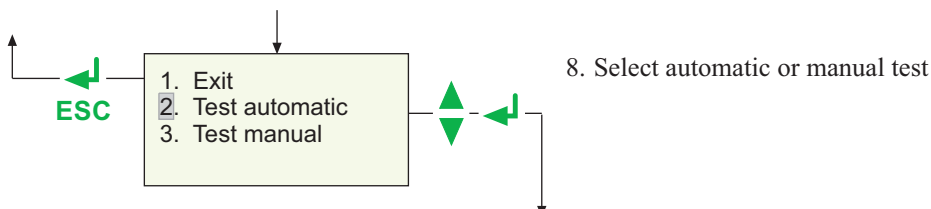
Conduct. parts -> PE

All accessible conductive parts are connected to PE. This setting can be used if you know that all metal accessible parts of the enclosure are connected to the PE conductor. During device testing, the test probe then only has to be brought into contact with one metal point on the enclosure.

If not all metal parts of the enclosure are connected to PE, deactivate this function. During device testing, an additional equipment leakage current test resp. touch current test (Class II) is carried out. In this case, the manual test will be selected automatically.

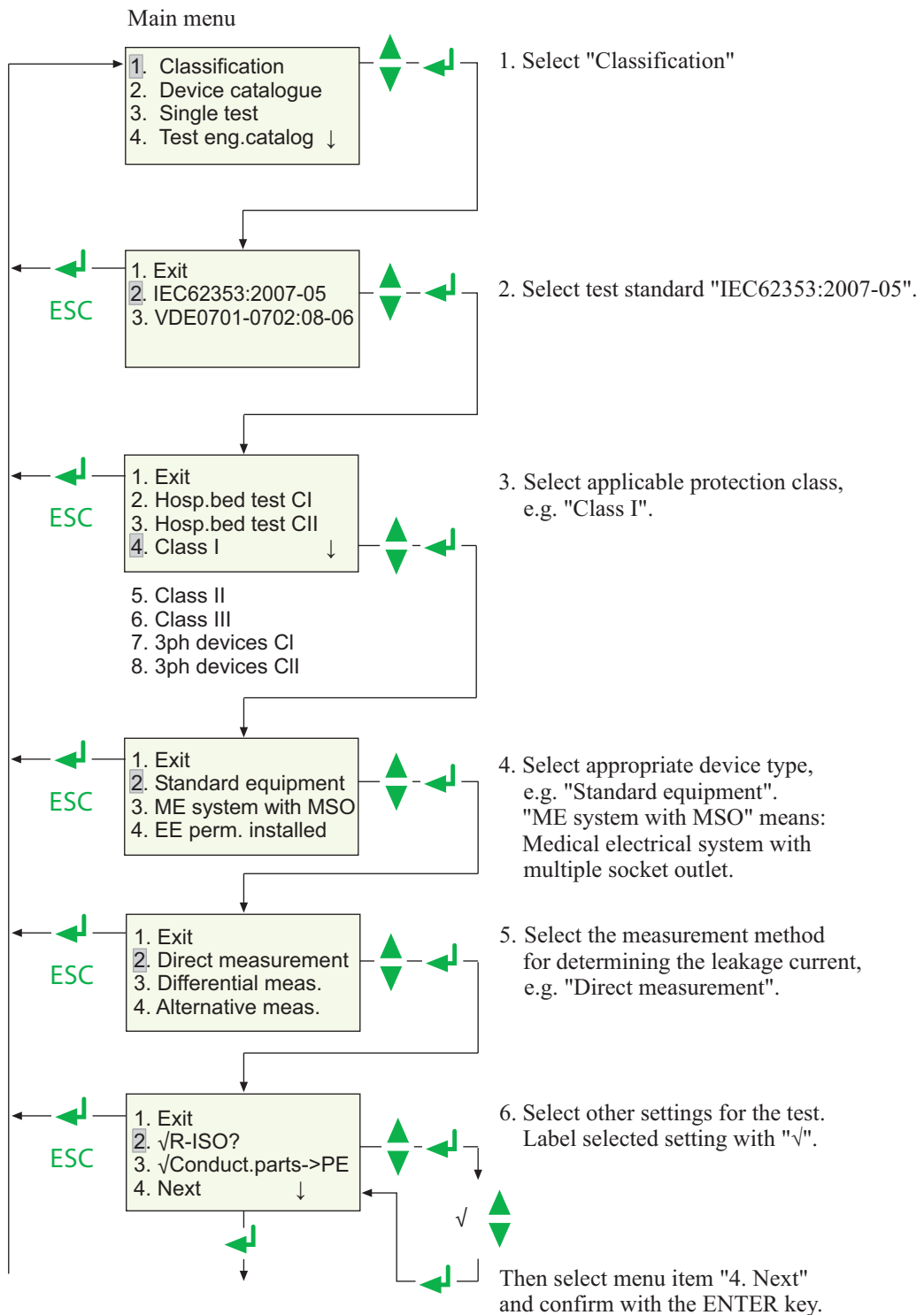
During device testing, proceed as follows:

During PE conductor testing, use the test probe to scan all parts of the enclosure connected to PE. During equipment leakage current testing or touch current testing (Class II), test all parts not connected to PE.



Example 3:

Classification of medical electrical equipment in accordance with IEC 62353:2007-05:



Carry out R-ISO

During insulation measurement, a voltage of 500 V is applied between the active conductors and earth. Insulation testing may damage sensitive devices. Only activate insulation measurement if permitted by the manufacturer's instructions provided with the DUT.

Note: If the setting "No mains disconnection available" is selected, the insulation measurement cannot be selected.

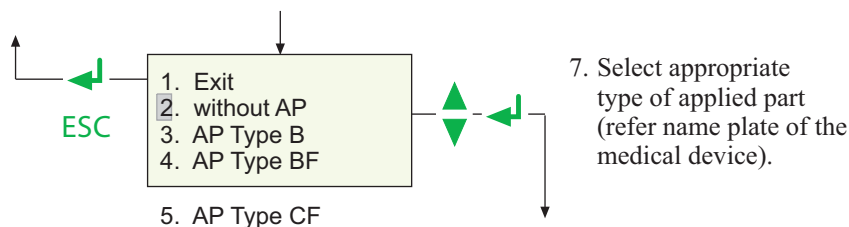
Conduct parts -> PE

All accessible conductive parts are connected to PE. This setting can be used if you know that all metal accessible parts of the enclosure are connected to the PE conductor. During device testing, the test probe then only has to be brought into contact with one metal point on the enclosure.

If not all metal parts of the enclosure are connected to PE, deactivate this function. During device testing, an additional equipment leakage current test resp. touch current test (Class II) is carried out. In this case, the manual test will be selected automatically.

During device testing, proceed as follows:

During PE conductor testing, use the test probe to scan all parts of the enclosure connected to PE. During equipment leakage current testing or touch current testing (Class II), test all parts not connected to PE.



Type B applied part



Applied part complying with the specified requirements of DIN EN 60601-1 to provide protection against electric shock, particularly regarding allowable patient leakage current and patient auxiliary leakage current.

Type BF applied part

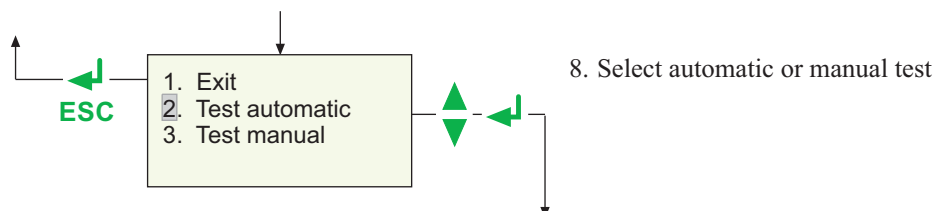


Type F applied part complying with the specified requirements of DIN EN 60601-1 to provide a higher degree of protection against electric shock than that provided by Type B applied parts.

Type CF applied part



Type F applied part complying with the specified requirements of DIN EN 60601-1 to provide a higher degree of protection against electric shock than that provided by Type BF applied parts.



5.1.2 Tests



Caution

The test system must not be used for testing electrical installations. It is exclusively intended for devices and systems listed under "System description" on page 9.



Caution

During testing of the insulation resistance with DC 500 V on faulty DUTs or in the event of direct contact with the test probe there is the risk of an electric shock. The touch current is limited to max. 2.5 mA.



Caution

During testing of the equipment leakage current -alternative method- with AC 250 V on faulty DUTs or in the event of direct contact with the test probe there is the risk of an electric shock. The test current is limited to 3.5 mA.



Caution

The leakage current flowing during the test of a faulty DUT can cause the residual current protective device (RCD) to operate.



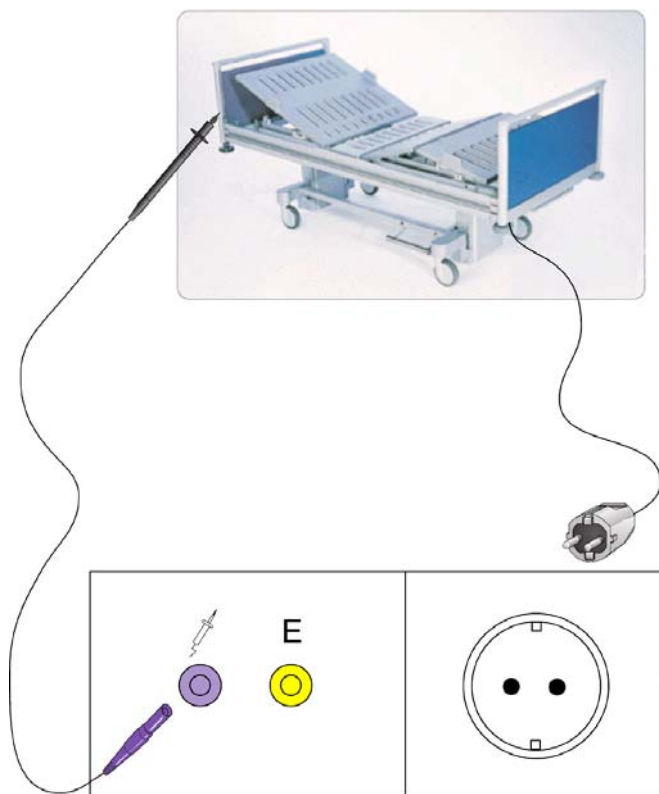
Caution

When leakage currents are measured during a test, the DUT must be set up in an insulated state. This ensures that no leakage currents can flow via accidental earth connections.

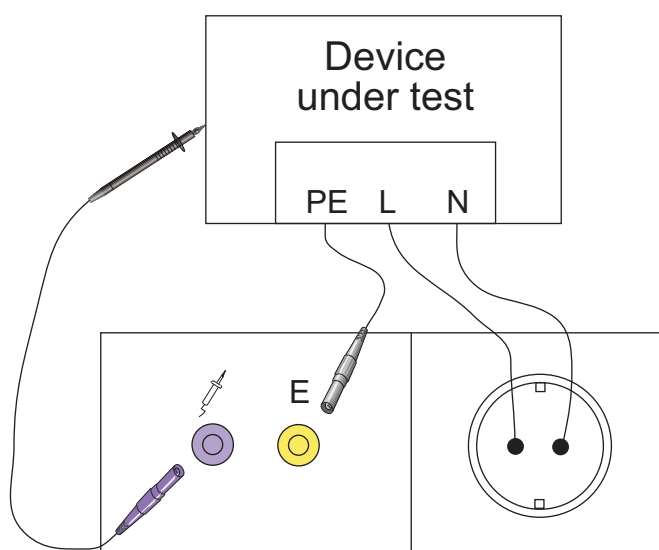
Accessible conductive parts of the DUT and the measuring leads may be live, and therefore must not be touched.

Connect the DUT to the test system.

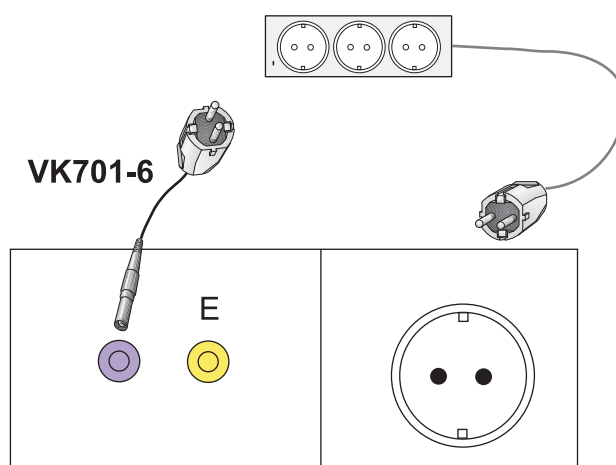
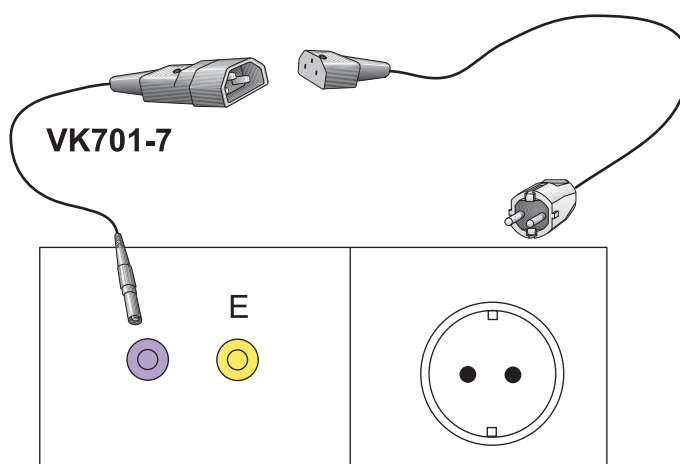
1. To connect hospital beds, care beds and electrical equipment with a plug-in connector, proceed as follows:



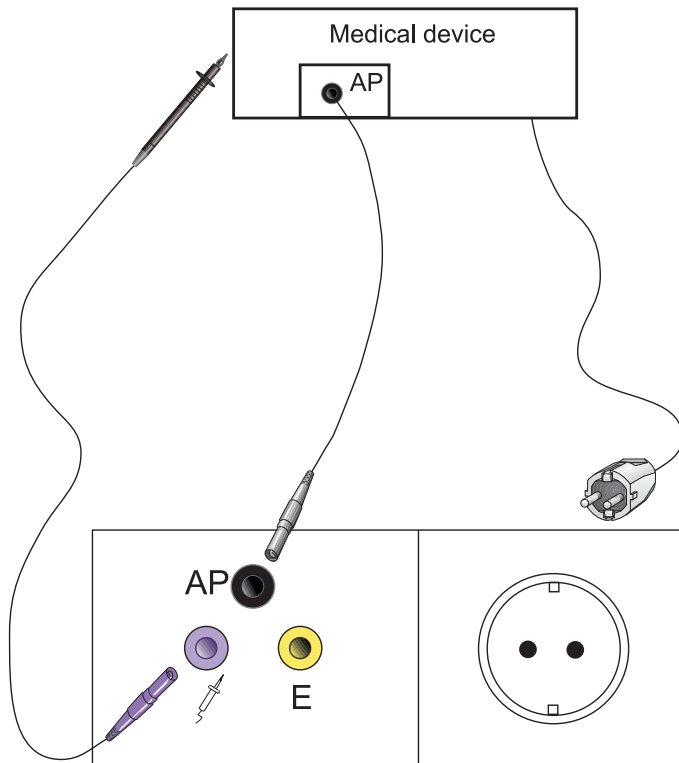
2. For connecting single-phase permanently installed equipment to the test system
 - Switch off the power to the device
 - Disconnect the power supply connection.



3. Testing of extension cables
- Connect connecting cables and extensions as follows:



4. Connect medical electrical equipment with plug-in connector as follows:



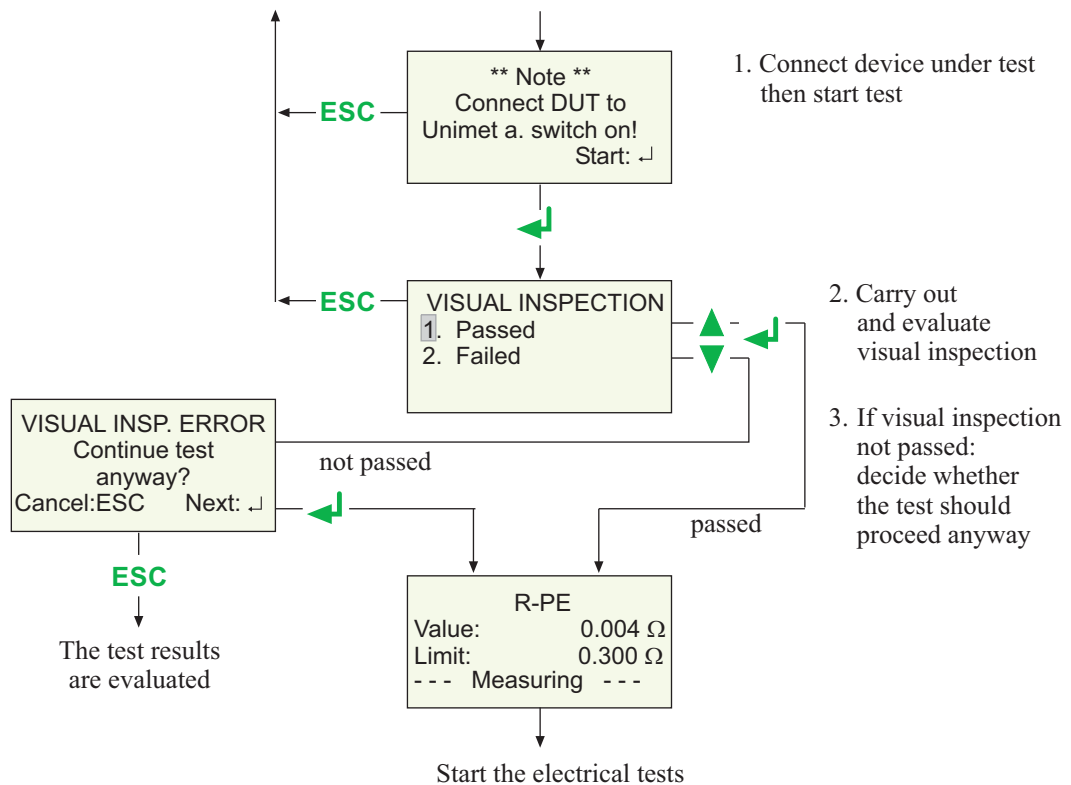
Caution

Only connect medical electrical equipment which has **an** type B, BF or CF applied part . Medical electrical equipment with several applied parts of different types (e.g. BF **and** CF) cannot be tested with UNIMET® 400ST in just one test process.



If the medical electrical equipment features an applied part with several connections (e.g. ECG), a PatBox will facilitate the connection to the UNIMET's AP socket (see "Ordering information" on page 59).

Follow the instructions on the UNIMET® 400ST display:

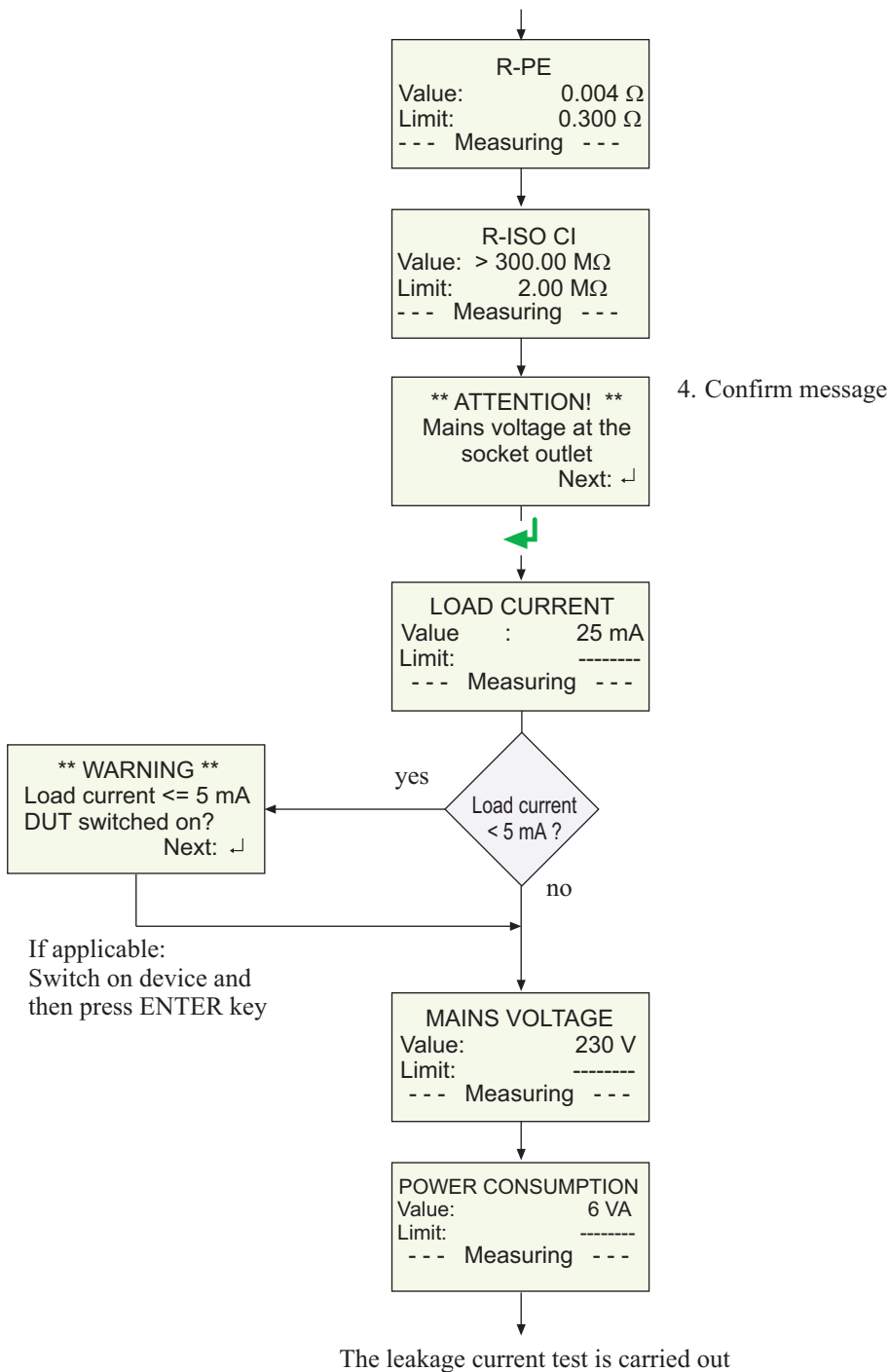


During the PE conductor test, the low-resistance continuity of the PE conductor is tested with a high current (> 2 A). This produces heat energy. If the PE conductor test is repeated very often and without breaks during manual testing or single tests, the test system will prevent overheating by aborting the test. A message will appear.

****Danger****
Test will be stopped
Transformer overheat
(Measur. Time > 2 min)

After the test is terminated, testing the PE conductor is permitted again after a few seconds.

After the visual inspection, the following tests are carried out for the "Class I bed test" example:



Please note that DUTs with a power consumption of up to 3700 VA can be supplied with power via the UNIMET® 400ST test socket. If DUTs with higher power consumptions are connected, the thermomagnetic circuit-breaker integrated into the UNIMET® 400ST power switch will trip. After removing the DUT, the test system can be switched on after a few seconds.

Test sequence with warm-up and cool-down period

If "Warm-up/cool-down period" is activated on the device settings, UNIMET will wait until the DUT is powered up or until it is ready for operation. Once the DUT is connected to the mains supply, the following message appears:

WARM-UP PERIOD:
Boot up DUT!

Next: ↵

Wait until the DUT is powered up and then confirm by pressing the ENTER button "↵".

After the last test step carried out at this phase position, UNIMET will wait for the DUT to shut down.

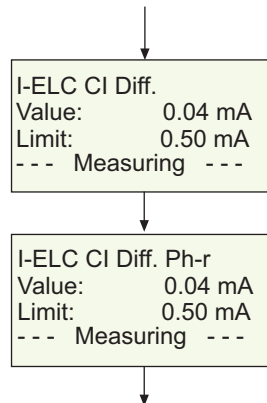
COOL-DOWN PERIOD:
Shut down DUT!

Next: ↵

Wait until the DUT is powered down and then confirm by pressing the ENTER button "↵".

With all test sequences which put the DUT into operation, a test is carried out with the phase position reversed. In this case, the DUT is powered up and powered down one more time.

Now, the leakage current test is carried out:



The function test is carried out

Checking the limits

UNIMET® 400ST monitors whether the limits are kept to throughout the test sequence.

If a limit is violated when measuring the PE conductor resistance, the test engineer can decide whether to abort the test or continue to its completion:

**** ATTENTION! ****
Limit for R-PE
exceeded!
Abort: ESC Repeat: ↵

With all the other measurements during which the limit has not been kept to, the test is continued. However, the test system does not permit any hazardous currents:



Faulty DUTs can exhibit dangerous leakage currents. During all leakage current measurements, testing will be aborted immediately if a measured value > 20 mA is reached. UNIMET® 400ST then shows:

**** Danger! ****
Leak.current > 20 mA
Test finished
Continue: ↵

Functional test



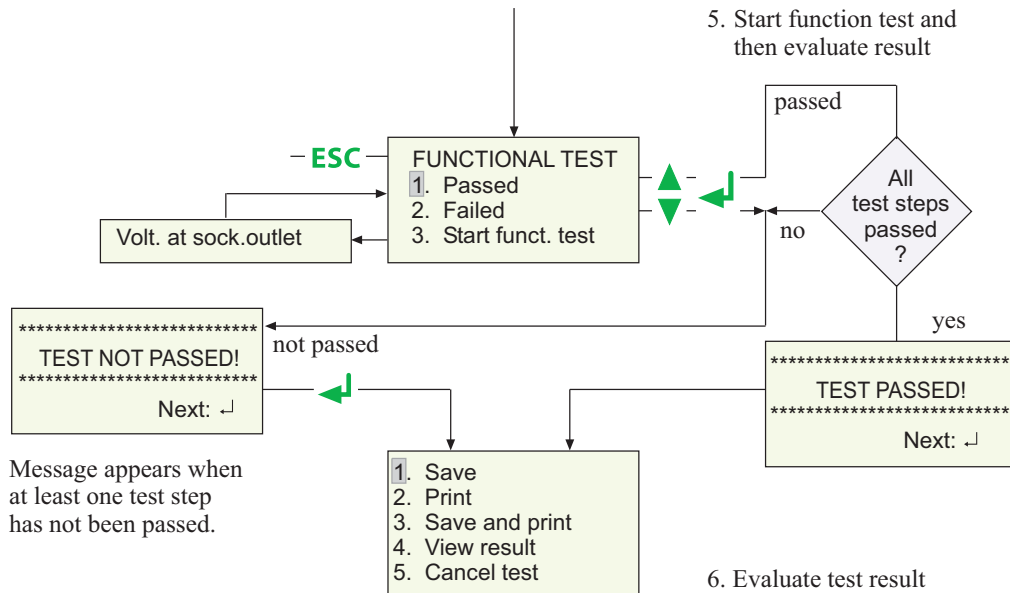
Caution

Only DUTs which have successfully passed the electrical tests may be tested for correct functioning.

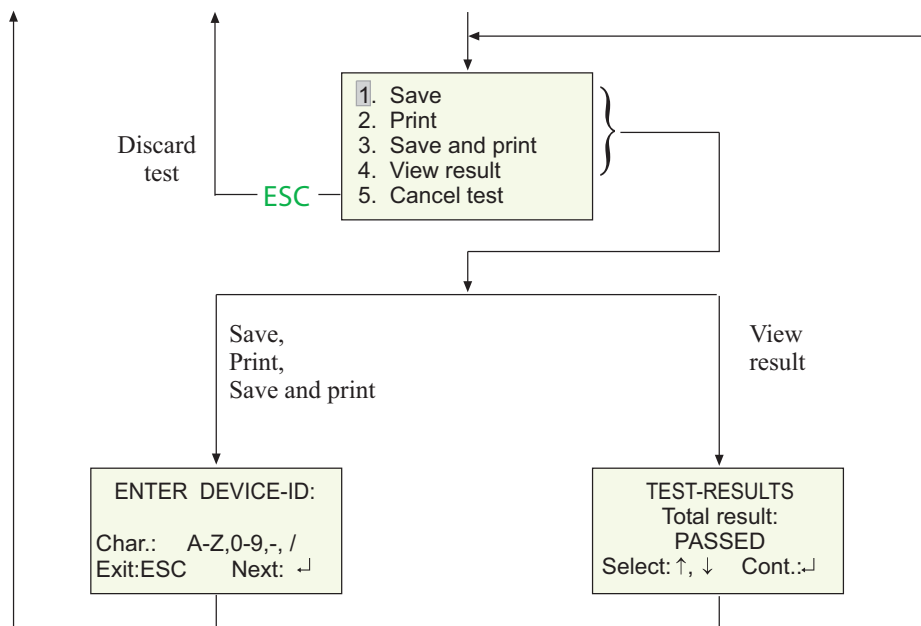
DUTs can suddenly start while starting the functional test (example: jigsaw). This can lead to damage and injuries.

Switch the DUT off before starting the functional test. First select "Starting the test". Then switch the DUT on again.

For the functional test, the DUT is put into operation via the test socket on the test system.



5.1.3 Evaluating the test result



ESC short = Edit previous characters
 ESC long = Exit menu without making change

↑, ↓ = select next or previous test step
 ↵ = back to previous menu

↵ short = Accept characters
 ↵ long = Accept result, carry out selected action and exit menu

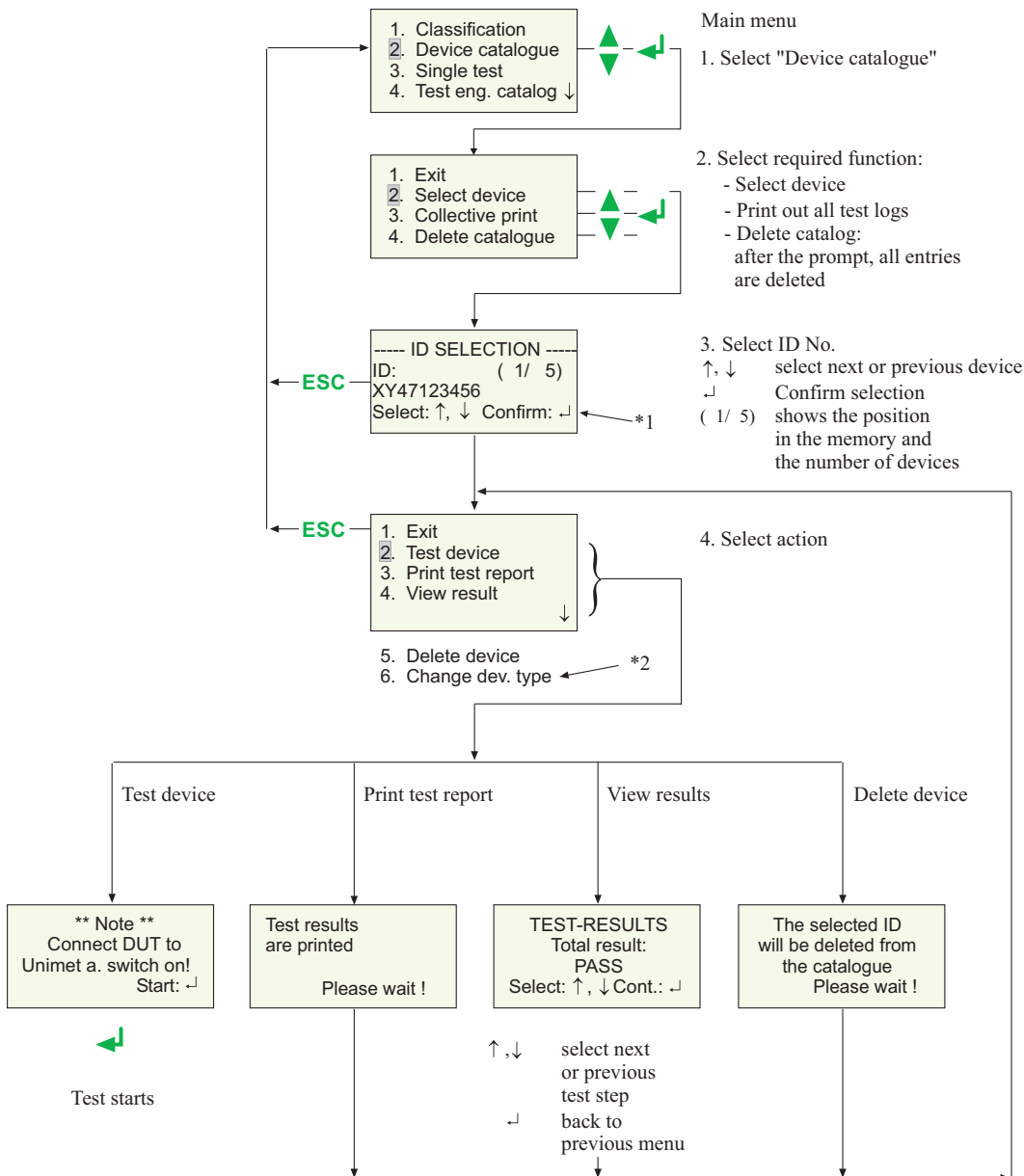
If "Device type query" in the device settings is enabled, the device type has to be entered before entering the device ID.

5.2 Recurrent test and device catalogue

The test results, tests and limits of the devices tested by UNIMET® 400ST can be stored in the device catalogue. In the case of recurrent tests, the devices are simply called up in the device catalogue and tested again. Other functions are print protocol, display results, delete device or delete entire catalogue.

The content of the device catalogue can be transferred to a PC program. Similarly, data records selected in the PC program can be transferred to the device catalogue. These functions are described in the PC software guide.

Proceed as follows to use the device catalogue:

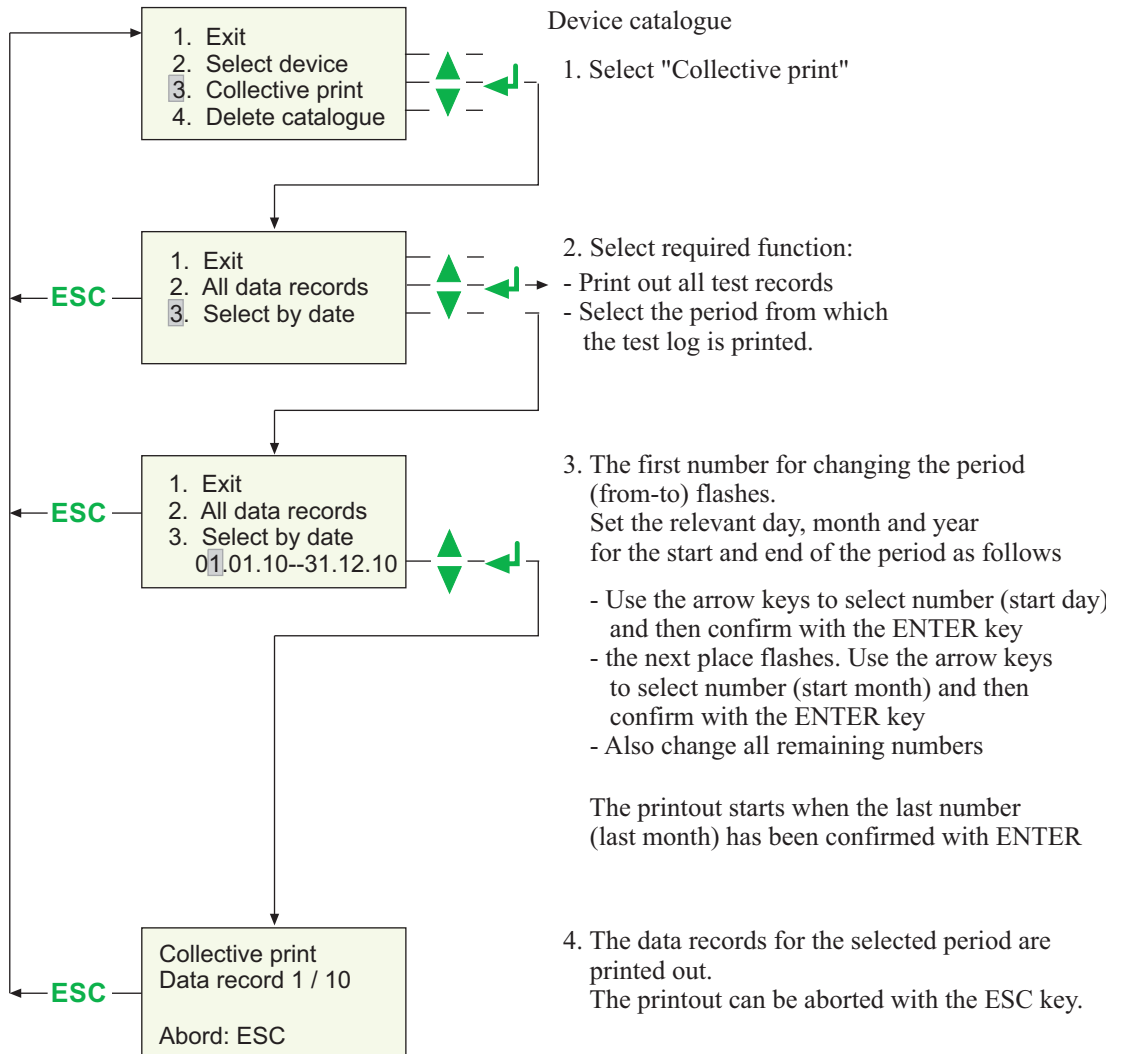


*1 If "Device type query" in the device settings is enabled, the device type is displayed in the last line for approximately 2 seconds when scrolling in the device catalogue.

*2 If "Device type query" in the device settings is enabled, an additional menu item "Change device type" will also appear.

5.2.1 Collective printout

Each DUT stored in the test system can be printed out as a measurement protocol. Select either all the protocols or only the protocols for a desired period.



5.2.2 Backing up the device catalogue

The device catalogue contains the ID numbers, the test results and the classification of tested devices for the recurrent test. These data can be backed up on a PC with the Bender-PC software UNData300.



The following pages provide a brief introduction to the software UNData300. The UNData300 software Help menu provides a detailed description.

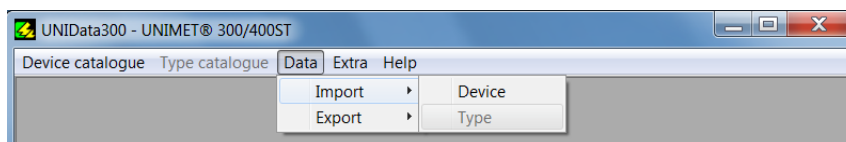
Proceed as follows to start UNData300:

1. UNData300 is on the CD supplied with the device. It is designed to operate on PCs with Windows®2000 (with Service Pack 3) or higher.
 - If the version of the program on your PC is older, first uninstall the older UNData300 version.
 - Open the folder UNData300 and install the software by executing the file "UNData300Vxxx.exe" on your PC.
2. Connect the interface cable (null modem cable or USB1.1-RS-232-Converter) to the PC and UNIMET® 400ST.
3. Switch on UNIMET
4. Start the UNData300 software ("Start -> Program -> UNIMET®300ST -> UNData300"). UNData300 adapts itself to the required interface (e.g. COM1) and to the baud rate set on the UNIMET. The settings for imports and exports appear at the bottom edge of the screen.

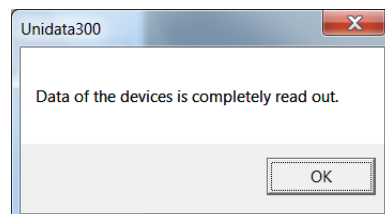
Test device : UNIMET®400ST -> V3.40	SerNr.: 0908143476	COM 7	Baud rate : 9600		03.01.2013	14:30
-------------------------------------	--------------------	-------	------------------	--	------------	-------

To import data to the PC:

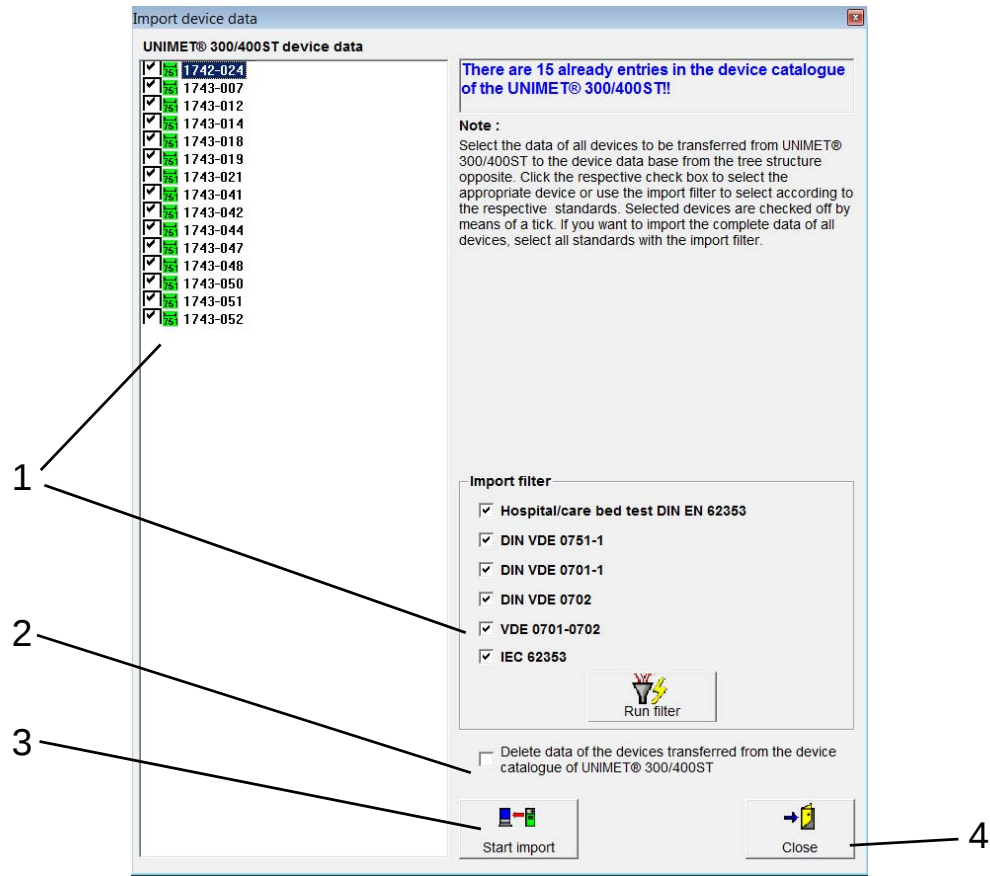
1. Select "Data -> Import" to import data from the UNIMET to the PC software

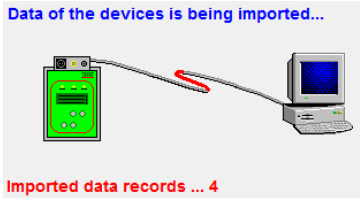


As soon as data import has been completed successfully, UNData300 displays the following message:



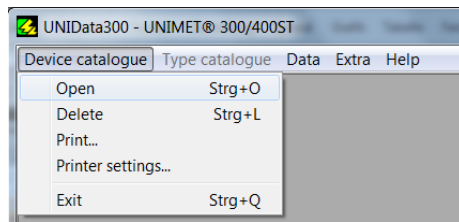
2. Now select the data to be saved in the UNIData300 device database.



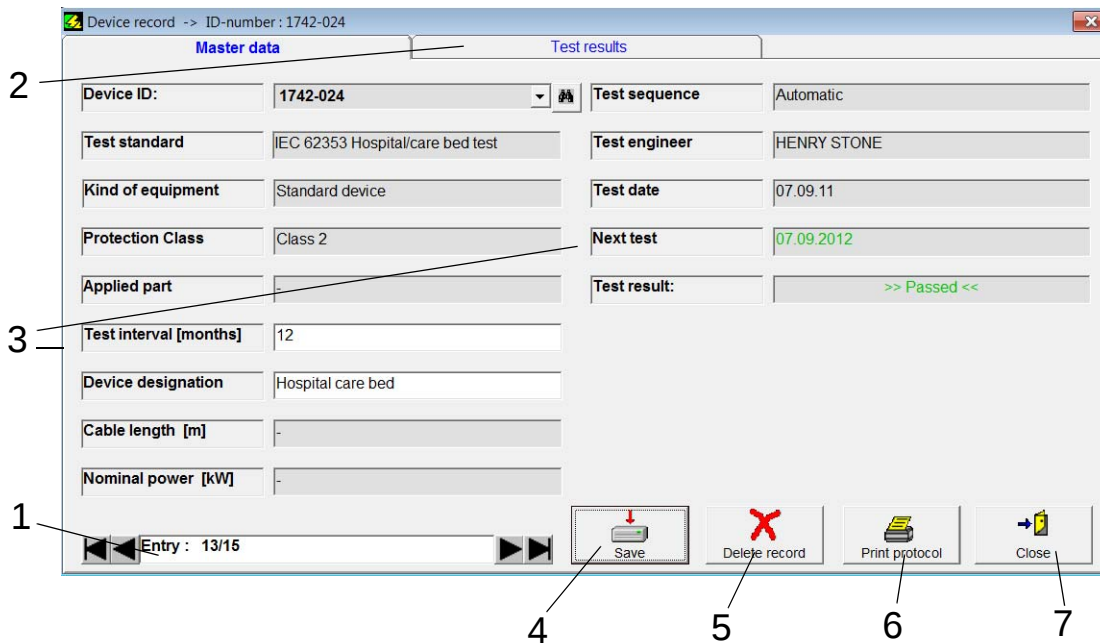
1	Select the data to be stored: - Click on the individual data in the left window, or - Select according to test standard and activate the import filter. Once all the standards are activated, all the data to be stored will be selected.
2	Decide whether the device catalogue in the UNIMET is to be deleted.
3	Start the import. UNIDat300 shows the progress of data transfer.  Wait until the data is stored.
4	Close the Import window.

To use the data read in on the PC:

Select the "Device catalogue" -> "Open".

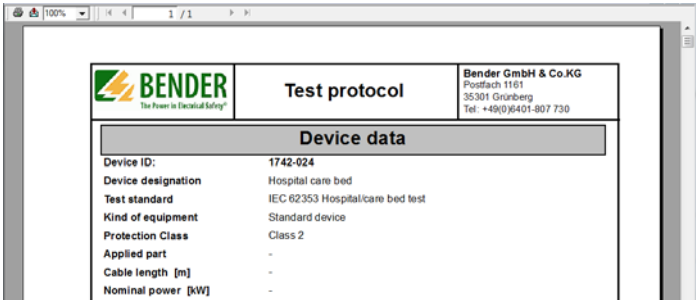


The device catalogue data stored on the PC are displayed:



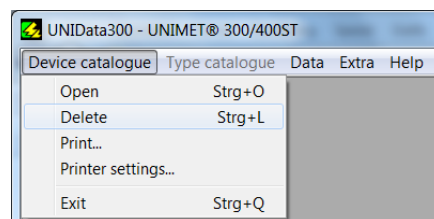
The following functions are available:

1	Use the arrow buttons to select a device. All the known data for this device will be displayed. Only the fields "Test interval (months)" and "Device name/type" can be changed.
2	After clicking on this tab, you will see the results for the current device.
3	Enter a test interval to export a selection of all devices (after updating) which are due for testing.
4	"Update" accepts your entries in the fields "Device name/type" and "Test interval (months)" in the device database. Once the field "Test interval (months)" is full, UNIData300 updates the field "Next test".
5	The current device is deleted.

6	A print preview will appear:  - Click on  to print. - Click on  to export the test protocol. Formats: PDF, MS-Word, Excel, RTF, HTML 4.0. - In the menu "Extra" -> "Protocol settings" you can enter the company name (4 lines max.) and insert the company logo for the protocol.
7	Click on "Close" to leave the program window.

To delete the device database of UNIData300:

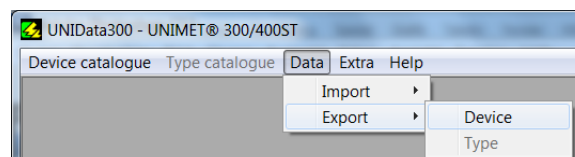
Select the "Device catalogue" -> "Delete".



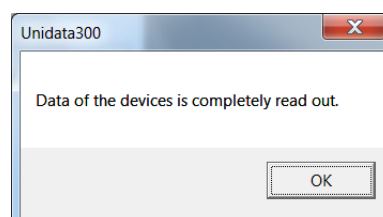
Confirm the prompt "Delete all". The device database of UNIData300 will be deleted.

To export data from the PC to the UNIMET:

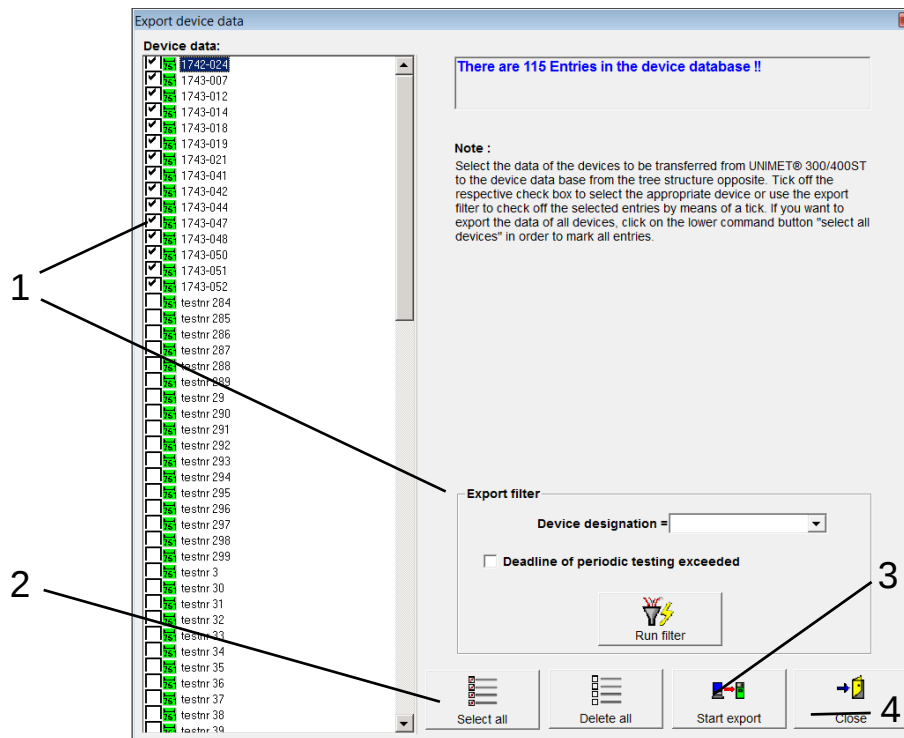
1. Select "Data" -> "Export" to transfer the data stored in the PC software to the device catalogue of the UNIMET.



UNIData300 makes the stored data available and displays the message:



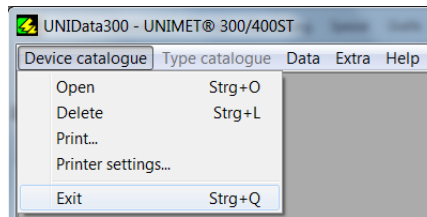
2. Now select the data to be exported. Select the individual data or click on "Select all". Export the selected data with "Start export".



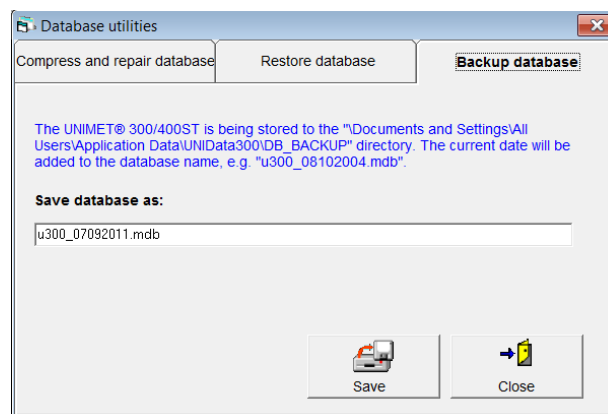
1	Select the data to be exported: - Click on the individual data in the left window, or - Select according to test standard and activate the export filter. .
2	If all the data are to be exported, just click on "Select All".
3	Start the export. UNIData300 shows the progress of data transfer.  Wait until the data are transferred.
4	Close the Export window.

To end UNIData300:

Select "Device catalogue" -> "Exit".

**To save a copy of the device database of UNIData300:**

The menu "Extra -> Database utilities -> Backup database" enables you to back up the database on the hard drive of your PC.



The copy of the database can be found in the folder "C:\\Documents and Settings\\All Users\\Application Data\\UNIData300\\DB_BACKUP" resp. "C:\\ProgramData\\UNIData300\\DB_BACKUP".

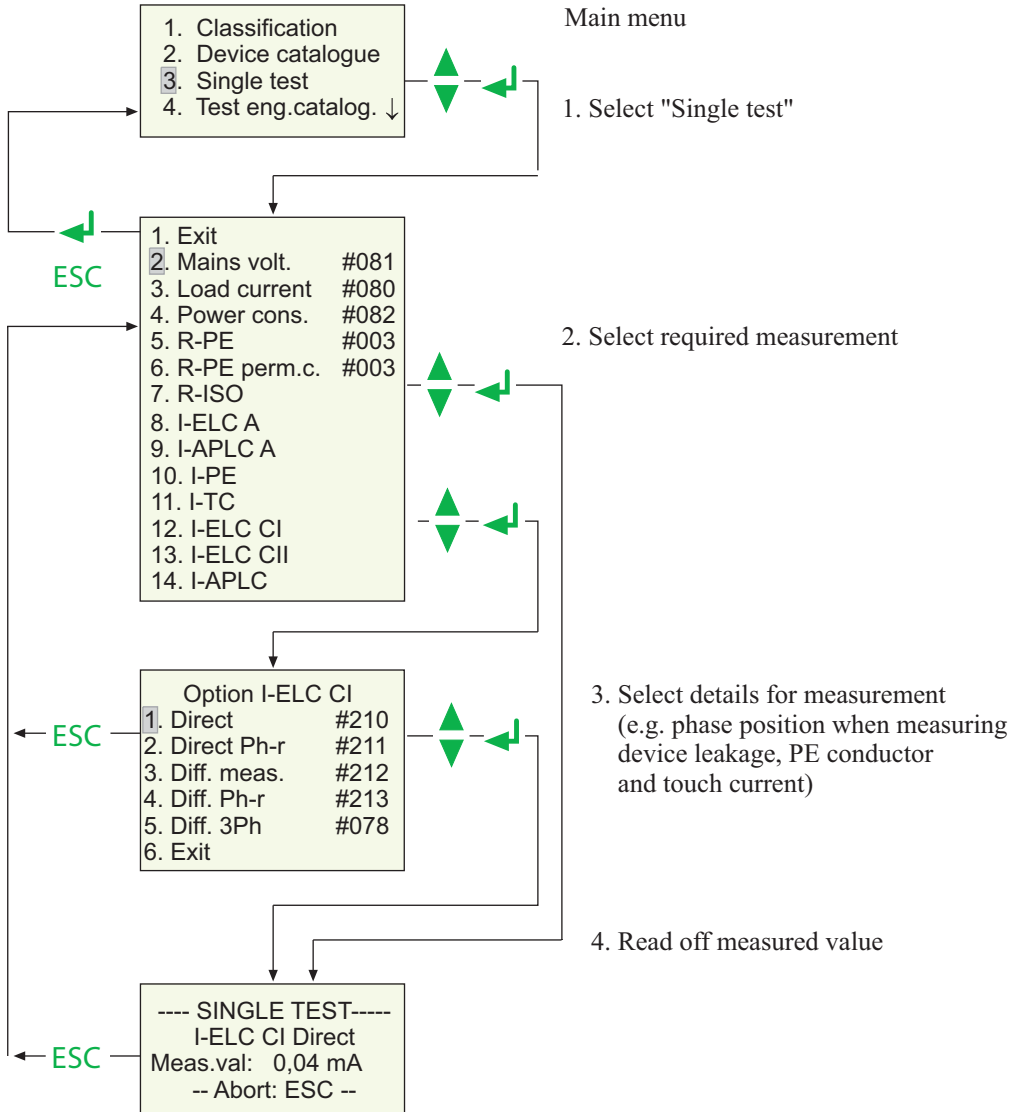
To back up the original device database of UNIData300:

The PC's hard disk is no location where your data is stored absolutely safe. With a backup copy of the device database, you will avoid loss of data.

The original device database "u300.mdb" can be found in the folder "C:\\Documents and Settings\\All Users\\Application Data\\UNIData300\\Database" resp. "C:\\ProgramData\\UNIData300\\Database". Regularly backup the device database on another data medium.

5.3 Single test

Test steps can be called up in the form of single tests and repeated as often as required. For example, if a limit value is not complied with during a classified test sequence, the test step concerned can be examined in more detail using a single test.



During the PE conductor test, the low-resistance continuity of the PE conductor is tested with a high current (> 2 A). This produces heat energy. If the PE conductor test is repeated very often and without breaks during manual testing or single tests, the test system will prevent overheating by aborting the test. A message will appear.

****Danger****
Test will be stopped
Transformer overheat
(Measur. Time > 2 min)

After the test is terminated, testing the PE conductor is permitted again within a few seconds.

6. Maintenance and calibration

6.1 Calibration

Like any other test instrument, the UNIMET® 400ST requires a regular measured values check. The calibration interval is 36 months. The test system can only be calibrated and adjusted by Bender or centre approved by Bender.

6.2 Changing the battery

The UNIMET® 400ST clock is powered by a battery with a battery life of approximately four years (see also chapter "4.5.5 Time/date"). If the battery voltage is too low, the following message appears after switching on the test system:

```

** Battery flat! **
Change the battery
Set time/date
Next: ↵

```

The test system battery can only be changed by Bender or a centre approved by Bender.

The battery is always replaced by Bender as part of the calibration procedure.

6.3 Error messages

The UNIMET® 400ST monitors its device functions continuously. In the unlikely event on an error occurring, a message will appear on the display:

```

** ERROR **
xxxxx
Contact Service!
Next: ↵

```

xxxxxx stands for the type of error given out. There are the following different types of errors:

Type of error	Meaning
I2C bus (Code 002)	Hardware error internal bus
RT clock (Code 004)	Device-real-time clock is not running
Cal values (Code 016)	Errors in memory for the calibration values. In certain cases, this can be eliminated by correcting the calibration values in the UNIMET® 400ST database

Type of error	Meaning
Database (Code 032)	This error appears when a bad data record which cannot be corrected is detected in the device database. The error can be eliminated if the data record where this error occurs is deleted.
Firmware (Code 128)	With a UNIMET® 400ST, the firmware of a UNIMET® 301 or UNIMET® 300ST has been installed or vice versa

If several errors occur simultaneously, a different error code is given out.
Proceed as follows:

1. Shut down the UNIMET® 400ST and remove the mains connector.
2. Make a note of what happened prior to the fault: operator inputs, type of DUT, ambient conditions etc.
3. Keep the device serial number to hand.
4. Call Bender technical support and describe the type of error and the error code.

6.4 Disposal

Abide by the national regulations and laws governing the disposal of this device. Ask your supplier if you are not sure how to dispose of the old equipment.

Directive 2002/96/EG on waste electrical and electronic equipment and Directive 2002/95/EG on the restriction of certain hazardous substances in electrical and electronic equipment apply in the European Community.

In Germany, these policies are implemented through the "Electrical and Electronic Equipment Act" of 16 March 2005. According to this, the following applies:

- Electric and electronic equipment are not to be included in household waste. This is indicated by the symbol:



- Batteries and accumulators are not to be included in household waste but must be disposed of in accordance with the regulations.
- Old electrical and electronic equipment from users other than private households which was introduced to the market after 13th August 2005 must be taken back by the manufacturer and disposed of properly.

7. Data

7.1 Standards

7.1.1 Application standards

The UNIMET® 400ST carries out the following measurements and tests:

- DIN EN 62353 (VDE 0751-1):2008-08
"Medical electrical equipment - Recurrent test and test after repair of medical electrical equipment" (IEC 62353:2007-05); German version: EN 62353:2008
- DIN VDE 0701-0702 (VDE 0701-0702):2008-06 „Prüfung nach Instandsetzung, Änderung elektrischer Geräte - Wiederholungsprüfung elektrischer Geräte - Allgemeine Anforderungen für die elektrische Sicherheit“ (Inspection after repair, modification of electrical appliances - Periodic inspection on electrical appliances - General requirements for electrical safety)
- ÖVE/ÖNORM EN 62353:2009-01-01
"Medizinische elektrische Geräte - Wiederholungsprüfungen und Prüfung nach Instandsetzung von medizinischen elektrischen Geräten (IEC 62353:2007)" ("Medical electrical equipment - Recurrent test and test after repair of medical electrical equipment").

7.1.2 Design standards

The requirements of the following standards were taken into account in the design of the UNIMET® 400ST:

- DIN VDE 0404-1 (VDE 0404-1):2002-05
"Prüf- und Messeinrichtungen zum Prüfen der elektrischen Sicherheit von elektrischen Geräten - Teil 1: Allgemeine Anforderungen" (Testing and measuring equipment for checking the electric safety of electric devices - Part 1: General requirements)
- DIN VDE 0404-2 (VDE 0404-2):2002-05
"Prüf- und Messeinrichtungen zum Prüfen der elektrischen Sicherheit von elektrischen Geräten - Teil 2: Prüfeinrichtungen für Prüfungen nach Instandsetzung, Änderung oder für Wiederholungsprüfungen" ("Testing and measuring equipment for checking the electric safety of electric devices - Part 2: Testing equipment for tests after repair, change or in case of repeat tests")
- DIN VDE 0404-3 (VDE 0404-3):2005-04
"Prüf- und Messeinrichtungen zum Prüfen der elektrischen Sicherheit von elektrischen Geräten - Teil 3: Prüfeinrichtungen für Wiederholungsprüfungen und Prüfungen vor der Inbetriebnahme von medizinischen elektrischen Geräten oder Systemen" ("Testing and measuring equipment for checking the electric safety of electric devices - Part 3: Equipment for recurrent tests and tests prior to commissioning medical electrical devices or systems")

7.2 Test steps

A classified test sequence with the UNIMET® 400ST comprises a number of individual test steps. The test steps are sorted on the basis of measurement numbers.

Meas No.	Name of measurement	Short text	Unit	Standard
3	PE resistance, permanently attached cord	R-PE	Ohm	VDE 0701-0702 + DIN EN 62353 + IEC 62353
4	PE resistance permanently connected equipment	R-PE	Ohm	VDE 0701-0702 + DIN EN 62353 + IEC 62353
5	Insulation resistance Class II	R-ISO	MOhm	DIN EN 62353 + IEC 62353
6	Insulation resistance Class I	R-ISO	MOhm	DIN EN 62353 + IEC 62353
53	Insulation resistance AP-PE	R-ISO	MOhm	DIN EN 62353 + IEC 62353
54	Insulation resistance AP enclosure	R-ISO	MOhm	DIN EN 62353 + IEC 62353
106	Insulation resistance Class I	R-ISO	MOhm	VDE 0701-0702
107	Insulation resistance Class II	R-ISO	MOhm	VDE 0701-0702
120	Insulation resistance conductor	R-ISO	MOhm	VDE 0701-0702
206	Insulation resistance AP-LN	R-ISO	MOhm	DIN EN 62353 + IEC 62353
44	Equipment leakage current Class 1 -alternative method	I-ELC	mA	DIN EN 62353 + IEC 62353
46	Equipment leakage current Class 2 -alternative method	I-ELC	mA	DIN EN 62353 + IEC 62353
109	Equipment leakage current Class 1 -alternative method	I-ELC	mA	VDE 0701-0702
110	Equipment leakage current Class II -alternative method	I-ELC	mA	VDE 0701-0702
43	Applied part leakage current - Alternative method Class I NEP	I-APLC	mA	DIN EN 62353 + IEC 62353
45	Applied part leakage current - Alternative method Class I	I-APLC	mA	DIN EN 62353 + IEC 62353
47	Applied part leakage current - Class II -Alternative method	I-APLC	mA	DIN EN 62353 + IEC 62353
205	Applied part leakage current - Alternative method internal power source	I-APLC	mA	DIN EN 62353 + IEC 62353
80	Load current measurement		A	VDE 0701-0702 + DIN EN 62353 + IEC 62353

Meas No.	Name of measurement	Short text	Unit	Standard
81	Operating voltage		V	VDE 0701-0702 + DIN EN 62353 + IEC 62353
82	Power consumption		kVA	VDE 0701-0702 + DIN EN 62353 + IEC 62353
111	PE current - Direct	I-PE	mA	VDE 0701-0702
112	PE current - Direct Ph-r	I-PE	mA	VDE 0701-0702
113	PE current - Differential	I-PE	mA	VDE 0701-0702
114	PE current - Differential Ph-r	I-PE	mA	VDE 0701-0702
76	PE current 3Ph - Differential	I-PE	mA	VDE 0701-0702
115	Touch current - Direct	I-Touch	mA	VDE 0701-0702
116	Touch current - direct Ph-r	I-Touch	mA	VDE 0701-0702
117	Touch current - Differential	I-Touch	mA	VDE 0701-0702
118	Touch current - Differential Ph-r	I-Touch	mA	VDE 0701-0702
77	Touch current 3Ph - differential	I-Touch	mA	VDE 0701-0702
210	Equipment leakage current Class I - Direct	I-ELC	mA	DIN EN 62353 + IEC 62353
211	Equipment leakage current Class I - Direct Ph-r	I-ELC	mA	DIN EN 62353 + IEC 62353
212	Equipment leakage current Class I - Differential	I-ELC	mA	DIN EN 62353 + IEC 62353
213	Equipment leakage current CI - Differential Ph-r	I-ELC	mA	DIN EN 62353 + IEC 62353
78	Equipment leakage current CI 3Ph Differential measurement	I-ELC	mA	DIN EN 62353 + IEC 62353
214	Equipment leakage current Class II - Direct	I-ELC	mA	DIN EN 62353 + IEC 62353
215	Equipment leakage current CII Direct Ph-r	I-ELC	mA	DIN EN 62353 + IEC 62353
216	Equipment leakage current Class II - Differential	I-ELC	mA	DIN EN 62353 + IEC 62353
217	Equipment leakage current Class II - Differential Ph-r	I-ELC	mA	DIN EN 62353 + IEC 62353
79	Equipment leakage current CII 3Ph Differential measurement	I-ELC	mA	DIN EN 62353 + IEC 62353
280	Applied part leakage current -U-AP	I-APLC	mA	DIN EN 62353 + IEC 62353

Meas No.	Name of measurement	Short text	Unit	Standard
282	Applied part leak. curr. U-AP Ph-r	I-APLC	mA	DIN EN 62353 + IEC 62353
300	Applied part leakage current CI U-AP NEP	I-APLC	mA	DIN EN 62353 + IEC 62353
302	Equipment leakage current CI U-AP NEP Ph-r	I-APLC	mA	DIN EN 62353 + IEC 62353
304	Applied part leakage current CII U-AP	I-APLC	mA	DIN EN 62353 + IEC 62353
306	Applied part leakage current CII U-AP Ph-r	I-APLC	mA	DIN EN 62353 + IEC 62353

7.3 Technical data

Supply voltage AC 230 V $\pm$ 10 %
 Frequency range 45 ... 65 Hz
 Power consumption max. 50 VA
 Maximum load current 16 A
 Max. connectable load at 230 V 3700 VA
 Protection class II
 Ambient temperature 0 ... 50 °C
 Storage temperature -10 ... +70 °C
 Degree of protection IP20

Testing of PE resistance

Test voltage approx. 5 V, system frequency
 Short-circuit current > 2 A
 Measuring range 0.001 Ω ... 29.999 Ω
 Measuring accuracy 0.001 Ω ... 1.0 Ω : $\pm$ 2.5 % of MV $\pm$ 2 digits
 1.001 Ω ... 29.999 Ω : $\pm$ 5 % of MV $\pm$ 2 digits

Leakage current, differential measuring method

Measuring range 0.02 mA ... 19.99 mA
 Measuring accuracy $\pm$ 5 % v. M. $\pm$ 5 digits

Leakage current, direct measurement

Measuring range 0.001 ... 19.999 mA
 Measuring accuracy 0.001 ... 19.999 mA: $\pm$ 5 % of MV $\pm$ 2 digits

Equipment leakage current -Alternative method

Measuring range 0.001 ... 19.999 mA
 Measuring accuracy 0.001 ... 9.999 mA: $\pm$ 5 % of MV $\pm$ 2 digits
 10.000 ... 19.999 mA: $\pm$ 7 % of MV $\pm$ 2 digits
 Test voltage (Equipment leakage current measurement - alternative method)
 approx. system voltage, system frequency
 Test current max. 3.5 mA

Insulation resistance

Test voltage approx. DC 500 V
 Max. test current 2.5 mA
 Measuring range 0.01 Ω ... 199.99 M Ω
 Measuring accuracy 0.01 Ω ... 99.99 M Ω : $\pm$ 5 % of MV $\pm$ 2 digits
 100.00 Ω ... 199.99 M Ω : $\pm$ 10 % of MV $\pm$ 2 digits

Load current measurement

Measuring range 0.01 A to 16 A
 Measuring accuracy $\pm 2.5\%$ v. M., ± 3 digits

Voltage measurement

Measuring range 90 ... 264 V
 Measuring accuracy $\pm 2.5\%$ v. M., ± 2 digits

Apparent power

Measuring range 5 ... 3700 VA
 Measuring accuracy $\pm 5\%$ of MV, ± 5 digits

General data

Dimensions (without bag) ca. 168 x 272 x 124 mm (W x D x H)
 Weight (without accessories or bag) approx. 2.2 kg
 Calibration interval: 36 months

of MV = of measured value

7.4 Ordering information

Type	Comments	Art. No.
UNIMET® 400ST Standard	Test system for electric hospital and care beds; tests according to IEC 62353; DIN EN 62353; DIN VDE 0701-0702; $U_s = AC\ 230\ V$; max. load 3500 VA; Plug/socket: German	B 96024000
PatBox	For measuring of up to 10 patient connections with UNIMET® 1100/800/400/300ST according to IEC 62353	B 96020096
VK701-6	Adapter German Schuko	B 96020067
VK701-7	Adapter for non-heating appliances	B 96020066
RS-232/RS-232 interface cable	Cable for connecting the test system with a PC, 9-pole, female-female (Null modem cable)	B 96012012
Test probe	3 m measuring lead with black test probe	B 928748
Test terminal	Test terminal black	B 928741
AR100	Barcode scanner	B 96020078
PS/2	Barcode reading wand	B 96020082
	USB1.1 RS-232 converter	B 96020086
	Flex keyboard	B 96020093
DS32A	Three-phase adapter for testing mobile equipment during operation, CEE 3pol. 16 A plug/socket, CEE 5pol. 32 A plug/socket, for UNIMET® 1100/800/400/300ST	B 96020098
VK701-8	ADAPTER KIT 16 A für DS32A for the measurement of 16-A-three-phase devices in conjunction with the three-phase adapter DS32A	B 96020097

Other models and software are available on request.

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