Operating manual

UNIMET® 800ST

Testing system for electrical safety

Power in electrical safety

TGH1381en/01.2006

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1. How to use this operating manual effectively

1.1 About this operating manual

This operating manual describes the UNIMET® 800ST with the software version 2.2. Other versions may have deviating functions or involve different operating steps. This manual is intended for experts in the areas of electronics and electrical engineering.

Before using the equipment, please take the time to read this Operating Manual carefully. Keep these documents to hand in the vicinity of the equipment.

This manual has been compiled with great care. Nevertheless, errors cannot be entirely excluded. The BENDER companies do not accept any liability for injuries to persons or damages to equipment due to errors in this manual.

The registered trademarks used in this manual are trademarks of their respective owners.

1.2 Technical Support

As a customer, you will receive technical support and answers to any questions you may have relating to the devices you have purchased. In the event of a query, please contact Technical Sales at BENTRON®.

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1.3 Explanation of symbols

The following designations and symbols are used in BENDER documentation for hazards and warnings:

This symbol indicates an immediate danger to life and health of persons. Failure to observe these instructions means that death, serious injury or considerable damage to property shall occur if the corresponding precautions are not taken.

This symbol indicates a potential danger to life and health of persons. Failure to observe these instructions means that death, serious bodily injury or considerable damage to property may occur if the corresponding precautions are not taken.

This symbol indicates a potentially dangerous situation. Failure to observe these instructions means that minor bodily injury or damage to property can occur if the respective precautions are not taken.

This symbol provides important information about the proper use of equipment. Failure to observe these instructions can lead to malfunctions in the equipment or in its vicinity.

This symbol gives tips on operation and useful information, which may assist you to make optimal use of all of the equipment's functions.

1.4 Overview of chapters

Chapter 1: How to use this Operating Manual effectively
... provides tips and useful information on how to use this manual.

Chapter 2: Safety instructions
... describes the dangers during installation and when operating the device.

Chapter 3: Description of system
... informs about the system's properties, functions and components.

Chapter 4: Operating and setting
... informs about commissioning, operating principles and settings.

Chapter 5: Testing and measuring
... describes the classification, testing and test evaluation.

Chapter 6: Functions of the UNIMET® 800ST that can be used via a PC
... explains remote control and how updates are carried out.

Chapter 7: Maintenance and calibration
... explains the steps that should be taken during calibration or in the event of a malfunction.

Chapter 8: Data
... provides information on standards, the testing procedure and technical data.

2. Safety instructions

2.1 Delivery

Check that the packaging is undamaged and compare the contents with the delivery papers. Never commission a damaged device. BENTRON® must immediately be notified of any damage in transit.

Devices may only be stored in rooms in which they are protected against dust, dampness, splashes and dripping water and in which the specified storage temperatures are maintained.

The distributor's "General Terms of Sale and Delivery" apply in all cases.

2.2 Intended use

The testing systems UNIMET® 800ST are to be used exclusively for the applications described in the Chapter "3. System description".

Intended use also embraces

- the observance of all notes and instructions in this Operating Manual and
- adherence to the defined test intervals.

Any other form of utilization does not fall under intended use. The BENDER companies shall not be held liable for damages resulting from inappropriate use.

2.3 Skilled personnel

The BENDER devices must be operated by appropriately trained and qualified persons. Here, qualified means that the person is familiar with the assembly, commissioning and operation of the device and has received appropriate training in this area. The personnel must have read this Operating Manual and fully understood all the safety notes prior to working on the device. BENTRON® would be happy to demonstrate how the device is operated.

2.4 General safety notes

BENDER devices are built using state-of-the-art technology and under observance of all the applicable safety regulations. Nevertheless, the utilization of the devices can endanger the life and health of the user or other persons or cause damage to the BENDER devices or other property.

- Only use BENDER devices:
  - within the scope of their intended use
  - when they are in perfect condition and all safety requirements have been fully complied with
  - in accordance with the rules and regulations on accident prevention that are applicable for the place of utilization.
- Eliminate all faults which may have an adverse effect on safety.

- Never make any unpermitted modifications and only use spare parts and add-on units that have been purchased from or recommended by the manufacturer of the devices. Failure to do this may result in fires, electrical shocks and injury.
- Information labels must be clearly legible at all times. Damaged or illegible information labels must be replaced immediately.

2.5 Warranty and liability

Warranty and liability claims for personal injuries and damage to property are excluded if they are attributable to one or more of the following causes:

- Use of the UNIMET® 800ST other than for the intended purpose.
- Inappropriate installation, commissioning, operation and maintenance.
- Operation of equipment with defective safety devices or which are not correctly positioned or are not capable of functioning.
- Failure to observe the instructions in this Operating Manual and the supplement "Important Safety Notes for BENDER Products" with regard to transportation, storage, and installation.
- Unauthorized structural modifications.
- Failure to observe the technical data.
- Inappropriate repairs and the use of spare parts or accessories which do not have manufacturer's approval.
- Cases of disaster, uncontrollable external factors and force majeure.

2.6 Warranty statement

The BENTRON® testing system UNIMET® 800ST comes with a 36-month guarantee for error-free design and perfect material quality under normal storage and operating conditions. The guarantee period commences from the date of delivery.
This guarantee does not cover maintenance work of any kind.
The guarantee applies for the original purchaser and does not extend to products or individual components that were not used in an appropriate manner or on which modifications were carried out. All guarantees shall be rendered void in the event of the testing system being used for applications outside the scope of intended use or under abnormal conditions.

The warranty obligation is limited to the repair or replacement of devices that are sent to BENTRON® within the warranty period. The warranty obligation is also subject to confirmation on the part of BENTRON® that the device is faulty and that the fault is not attributable to incorrect handling or modifications to the device, to the utilization of the device outside the scope of intended use or to abnormal operating conditions.

Any warranty obligation shall lapse if repairs or modifications are carried out on the devices by persons other than those authorized by BENTRON®.
The warranty provision above apply exclusively and supersede all other contractual or legal guarantee obligations including, but not limited to, the legal warranty of marketability, suitability for use and expediency for a specified use.

BENTRON® shall not accept liability for any direct or indirect collateral or consequential damage irrespective of whether these are attributable to legal, illegal or other actions.

3. System description

3.1 Areas of application

The UNIMET® 800ST is used to test electrical safety. It is designed for use in various application areas:

- Periodic testing and testing prior to the commissioning of ME equipment or ME systems in compliance with DIN VDE 0751-1:2001-10.
- Periodic testing of hospital and care beds.
- Single-phase electrical equipment,
  "Repair, modification and testing of electrical devices" DIN VDE 0701-1 Part 1:2000-09,
  "Periodic testing of electrical devices" DIN VDE 0702-2 Part 1:2004-06.
- If an appropriate adapter (DS32) is used, testing of three-phase electrical equipment in protection classes I and II in accordance with VDE 0701-1 is also possible. When using the three-phase adapter DS32, the DUT **is not tested in** the operating mode.

UNIMET® 800ST is only intended for use in earthed systems. If, contrary to its intended use, the testing system is used in an IT system, the measured values for leakage current will not be reproducible. The test results cannot be used.

3.2 Function

The testing system provides measurement results which are immediately evaluated to determine whether the test has been "passed" or "failed". One classification triggers a test sequence which embraces a visual inspection and a function test in addition to the electrical tests. This test sequence is saved in the "Test specifications" folder. Depending on the DUT, the test can be carried out automatically, semi-automatically or manually.

The test results can be shown on the display, saved or output using an external printer. In the event of conspicuous test results, the DUT can be further evaluated by carrying out a single measurement. Devices that have been measured can be saved in the "Device protocols" folder under their device ID. The data memory can store up to 2000 data records. Double assignment of device IDs are allowed if the IDs are assigned to different clients.

Using an RS-232 interface, test specifications and device protocols can be transferred to a PC software (option, see chapter "8.4 Ordering information" on page 74). In the case of periodic testing, the data that is stored in the PC software is transferred back to the UNIMET® 800ST. The RS-232 interface can also be used for later updates of the testing system's internal operating software.

The "Test specifications" folder comes in very useful if the testing system is used by several members of staff. Test engineers that are already known are simply selected in the "Test engineer" folder. The test engineer's name does not have to be entered repeatedly. The "Test engineer", "Test specifications" and "Device protocols" folders share the same data memory. Hence, the number of test engineers that can be entered is only limited by the memory space that is available.

The large colour display is illuminated. Graphics explain how the DUT is connected. Operating steps can be performed quickly and comfortably using the touch screen. A conventional keyboard (PS/2) can also be connected.

3.3 Tests conforming to standards

The UNIMET® 800ST carries out measurements and tests which are based on the following standards (see also chapter "8.1 Standards" on page 69):

- Medical electrical equipment - Periodic testing according to DIN VDE 0751-1:2001-10, ÖVE/ÖNORM E 8751-1+A1/Edition 2003-05-01 and the future IEC 62353, if published.
- Electrical equipment
  "Repair, modification and testing of electrical equipment" according to DIN VDE 0701-1 Part 1:2000-09, "Periodic testing of electrical equipment" according to DIN VDE 0702-2 Part 1:2004-06.

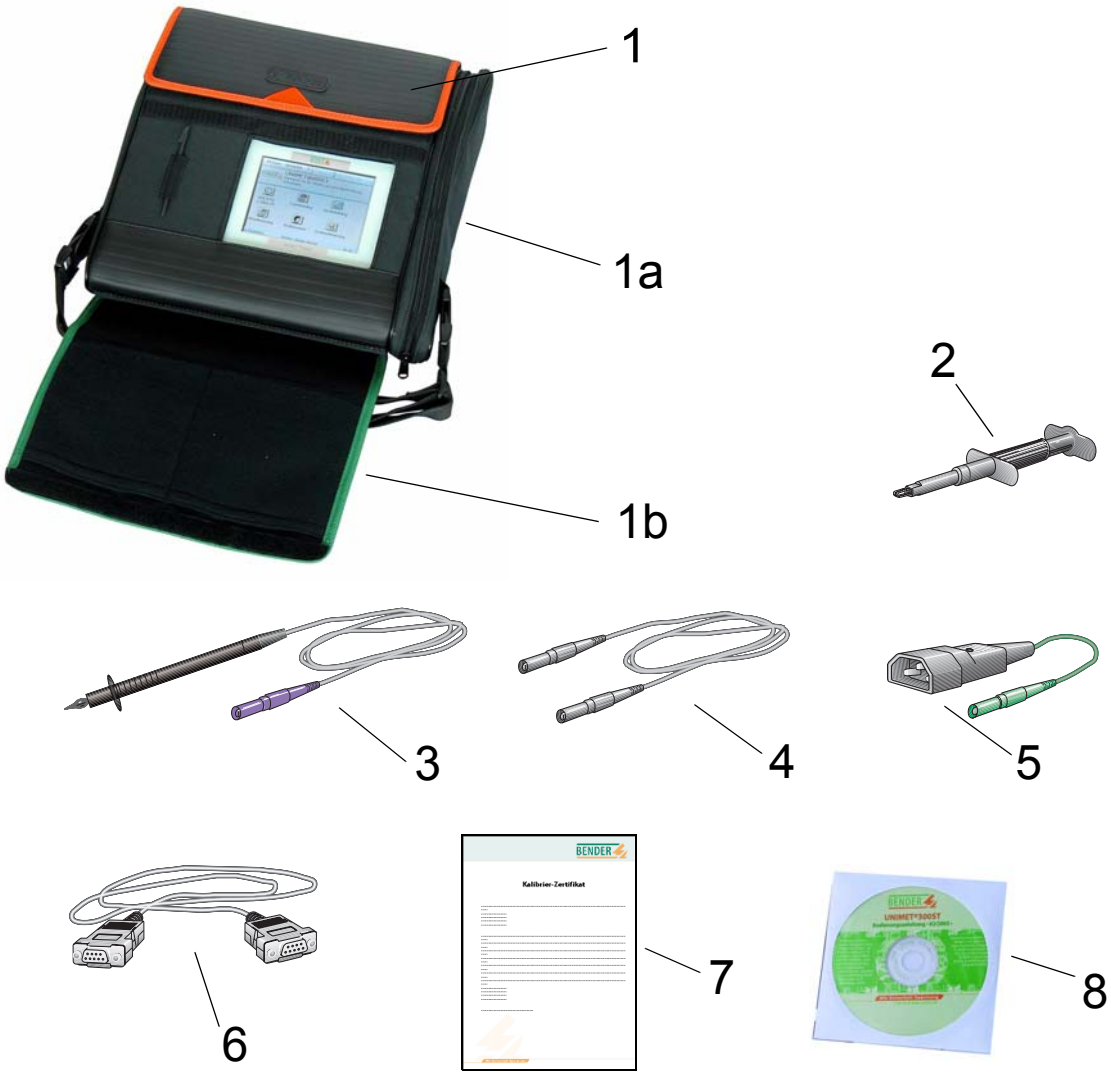
The UNIMET® 800ST carries out the following measurements and tests:

Measurement	VDE 0751, ÖVE/ ÖNORM E 8751-1	VDE 0701	VDE 0702	Direct measurement	Residual current measurement	RMS measurement	AC	DC
PE conductor resistance (permanently installed and portable devices)	X	X	X				X	
Insulation resistance (Class I and Class II)	X	X	X					X
Insulation resistance (Applied part – PE)	X							X
Substitute device leakage current (Class I and Class II)	X	X	X				X	
Substitute patient leakage current	X						X	
Device leakage current (Class I and Class II)	X			X	X	X		
PE conductor current		X	X	X	X	X		
Touch current		X	X	X	X	X		
Patient leakage current	X						X	X
Patient leakage current with mains voltage on applied part	X						X	
Mains voltage	X	X	X				X	
Current consumption	X	X	X			X		
Apparent power	X	X	X			X		
Test of power supply cord		X	X					

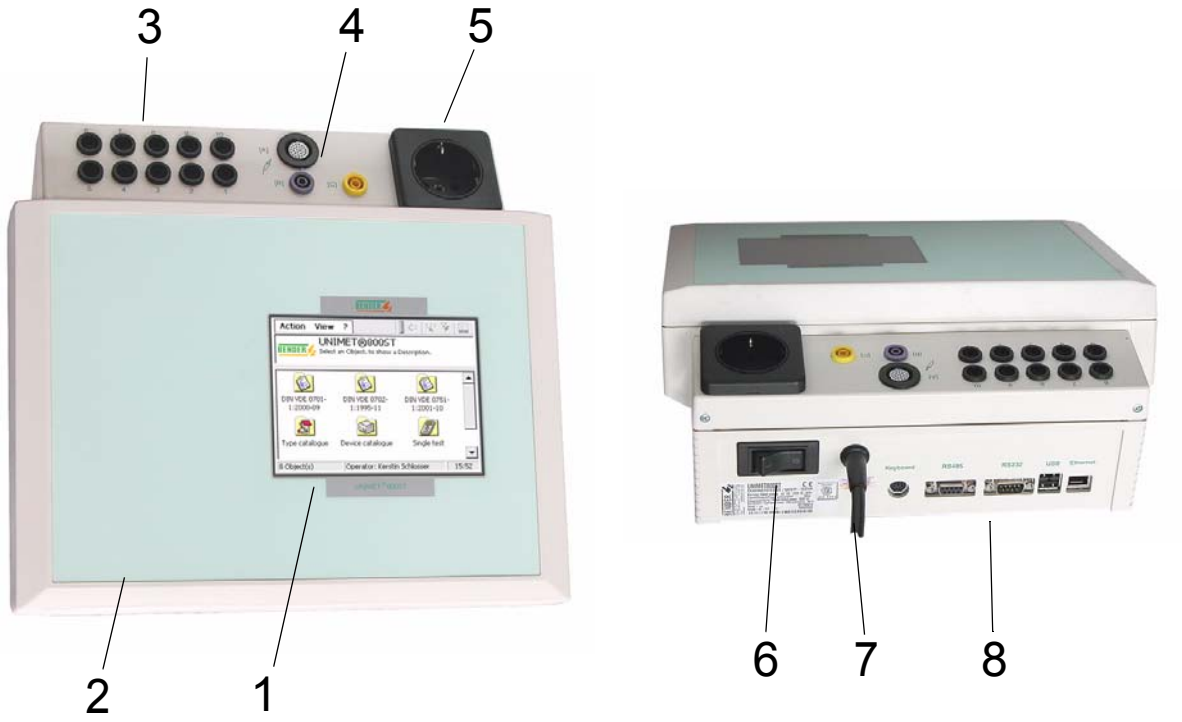
3.4 System components

The following accessories are supplied with the UNIMET® 800ST:

1	Carrier bag	for storing and transporting the testing system and its accessories. Accessories are stored in the side pocket (1a) and inside pocket (1b). A loop is provided to accommodate the stylus that is used to operate the touch screen.
2	Test clip (safety-claw-type grip)	for connecting to accessible parts of the DUT.
3	Test probe, single-pole	to scan accessible parts of the DUT.
4	Measuring cable	to test permanently installed devices.
5	Adapter for non-heating devices VK701-7	for testing power supply cables.
6	Interface cable (null-modem cable)	allows the exchange of data between the testing system and the PC.
7	Calibration certificate	Proof of calibration carried out at the factory.
8	Technical manual (CD)	This manual on CD-ROM.



3.5 Control elements



1	Touch screen for operating and display. A stylus for operating the touch screen is provided.
2	Robust plastic enclosure, with push buttons to secure the device in the carrier bag.
3	10 jacks (1...10) for connecting patient electrodes.
4	Measurement sockets - [B] (violet) for connecting the supplied single-pole test probe. - [A] for active test probes TP800 with push button (option). - jack [C] for equipotential bonding (e.g. socket for the single-pole extension cords with terminal when testing permanently installed equipment).
5	Socket outlet: The mains cable of the DUT is plugged in here.
6	Mains switch with thermal-magnetic circuit breaker.
7	Fixed supply cord for connection of supply voltage.
8	Interfaces: - PS/2 Connection for external keyboard and barcode reader. - RS-485 Serial interface for the BENDER service. - RS-232 Interface, 9-pole, electrically isolated, for connecting to a PC. - USB Interface for connecting a printer (host) and a PC (device for Bender Service only). - Ethernet Network connection (optional)

4. Operating and setting

4.1 Commissioning

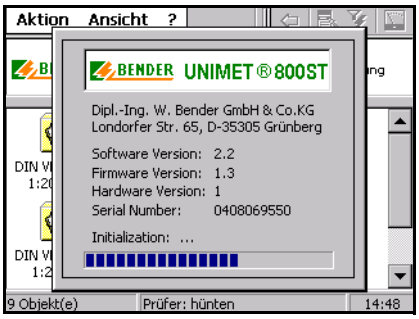
Caution

Please make sure that the UNIMET® 800ST is always supplied with the voltage specified on the nameplate . Failure to do this may cause damage to the testing system and to any DUT that may be connected.

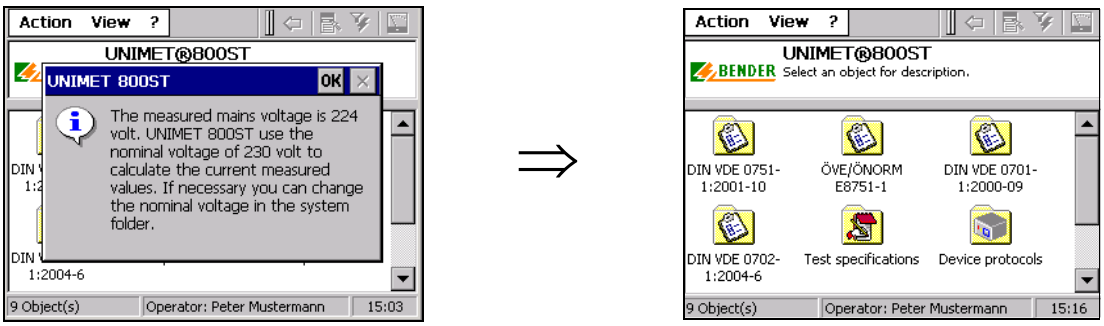
1. Lay the UNIMET® 800ST on an even surface with the coloured covers of the bag facing upwards. Open both covers (Velco fasteners).
2. Connect the UNIMET® 800ST to the supply voltage using the fixed supply cord.
3. Switch the device on at the mains switch (6).

The testing system requires approx. 25 seconds to start and carry out a self test. Here, the testing system also checks the supply voltage. If the testing system identifies an IT system (e.g. in the operating theatre) or a fault, a warning message will be displayed.

The software, firmware and hardware version as well as the serial number are displayed during the self test.



If the system voltage measured differs from the set system voltage by more than 5 V, a respective message will appear. UNIMET® 800ST converts the current values measured into nominal voltage (see also chapter "4.5.3 Nominal voltage" on page 31). Click on "OK". The start process will be continued. After the self test, the main folder of the testing system is displayed.



4.1.1 The touch screen

The device is operated using the touch screen. Please use the stylus when operating the touch screen (supplied with the device). The carrier bag that comes with the testing system has a loop for holding the stylus.

Caution

Do not use any pointed objects or objects with sharp edges such as pens or pencils to operate the touch screen. Such objects may damage or even destroy the screen.

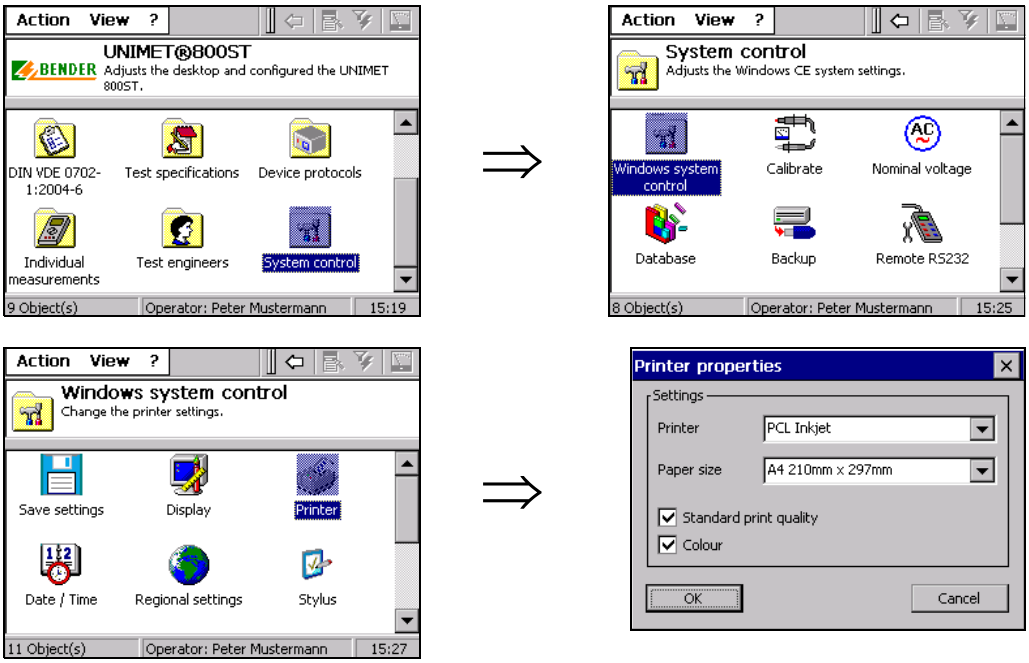
4.1.2 Connecting the printer

Printers which meet the following requirements can be connected to print out the test results:

- GDI printer (GDI = Graphic Device Interface) with USB interface.
- PCL-compatible printer (PCL=Printer Common Language). Almost all laser printers and HP DeskJet printers meet these requirements. The Canon BJC-85 is also supported by means of an integrated printer driver.

Proceed as follows when connecting for the first time:

1. Connect the printer to one of the testing system's two USB interfaces.
2. Switch the printer on. Now the testing system will be able to identify the type of printer that is connected.
3. Adjust the settings on the testing system to suit the printer.
   - To do this, double click on the following icons starting in the main folder: -> [System control] ->[Windows System control] -> [Printer]. If the "System control" icon is not visible in the main folder, drag the scroll bar on the right hand side of the screen downwards.
   - Select the printer that is connected from the list. A driver does not have to be installed for the printer. Select the paper size, print quality and colour.



Save your settings permanently (see chapter "4.5.1.1 Save settings" on page 26). The settings will only need to be changed if another printer is connected.

4.1.3 Connecting an external keyboard

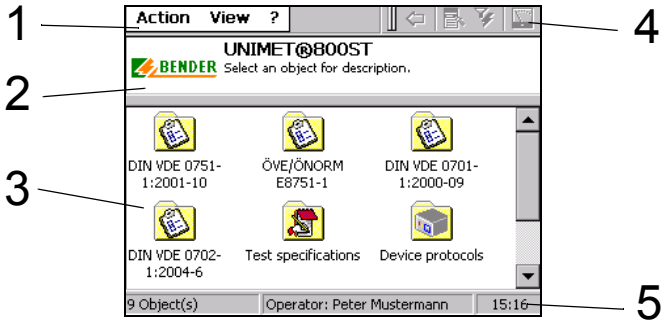
A conventional keyboard (PS/2) can be connected using the "Keyboard" jack. Switch the UNIMET® 800ST off before connecting the keyboard. UNIMET® 800ST will recognize the keyboard the next time it is started: the keyboard can then be used immediately.

4.1.4 Other device settings

Other device settings can be found in „Chapter 4.5 Device settings“. Some of the settings are required to generate test result reports. We therefore recommend that you check the setting before carrying out the first test.

4.2 Operating principle

The operating system of UNIMET® 800ST is based on WINDOWS® CE. PC users will therefore be familiar with the user interface.

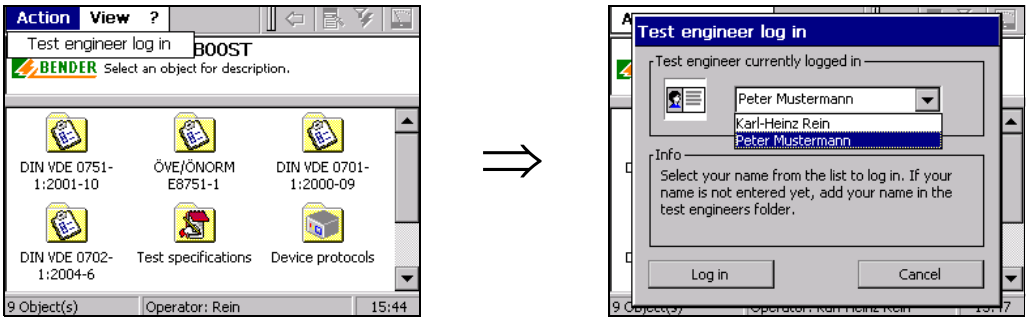


1. Menu bar	This is used to log in the test engineer, to select various display options for the icons, to select the required language and to access information about the software and hardware of the testing system.
2. Info window	If a program function (icon) is clicked on in the main window, a short description will be displayed in the Info window. Warning messages are also shown in this window, e.g. when UNIMET®800 is operated in an IT system or when hardware problems are detected.
3. Main window	The different folders of the Unimet can be accessed from the main window.
4. Toolbar	Buttons to start the context menu, the selection filter or measurements.
5. Status bar	Provides information on the number of objects in the main window, the test engineer that is logged in and the time.

4.2.1 Menu bar

4.2.1.1 "Action" menu

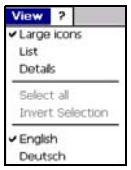
The "Action" menu is used to log in a test engineer. The name of the test engineer that is logged in will be assigned to future tests. Select your name from the list and confirm with "Log in".



Select "test engineers" in the main window to edit and enter the names of new test engineers.

4.2.1.2 "View" menu

The "View" window allows you to select different display options and various languages. The settings are saved and will also remain saved when the testing system is switched off.



Large icons	provide a clear layout when there is only a limited number of objects. This display option is used throughout most of this operating manual.
List	enhances clarity when there is a large number of objects (example: selecting from the "Device protocols" folder with a large number of entries).
Details	same properties as List but with more information (such as measurement numbers when listing the individual measurements).
Mark all	is used to select all entries in the "Test specifications" and "Device protocols" folders.
Revert marking	is used to return to the selection of the highlighted entries in the "Test specifications" and "Device protocols" folders.
English	English version of the user interface.
German	German version of the user interface.

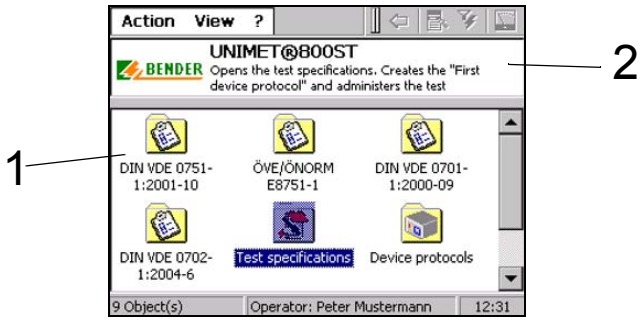
4.2.1.3 "?" icon

Click on the "?" icon in the menu bar to view details relating to the UNIMET® 800ST software. Details provided include the serial number, the firmware (operating software), the hardware and all software components of UNIMET® 800ST. Please have this information ready if you need to make queries over the phone. Click on "OK" to exit this view.

4.2.2 Main window

The main folder is displayed in the main window (1) after the UNIMET® 800ST has been switched on.

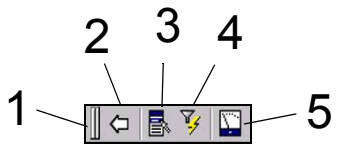
- Click on an icon once to display a short description in the Info window (2).



- Double click on the required item in order to activate the function or to open the respective folder.

4.2.3 Toolbar

The toolbar provides fast access to the functions of the UNIMET® 800ST. The buttons may be active or inactive depending on the options available. Inactive buttons are shown in grey.



1 Changing the width of the toolbar.

2 **Back arrow** is used to exit the current folder. The Back arrow will, for example, be active if you switch to the "Test specifications" or "Device protocols" with a double click. A single click on the Back arrow returns you to the main folder.

3 The **context menu** will, for example, be active when a test specification, a device protocol or a test engineer is clicked on and when several program functions are available. A single click on the icon (or the respective button on the keyboard) opens the context menu with all the program functions that are available.

4 If there are numerous test specifications and device protocols, the **selection filter** simplifies searching. If the filter is active, test data can be sorted and filtered.

5 **Measuring instrument** to speed up the start of a measurement. The measuring instrument is activated in the "Test specifications" or "Device protocols" folder and when carrying out single measurements by clicking on an icon. Simply click on the measuring instrument start the test or a single test step.

4.2.3.1 How to use the context menu when only one entry is activated

Activate a device ID in the "Device protocols" folder. After clicking on the icon of the context menu , the following program functions appear:

4.2.3.2 How to use the context menu when several entries are activated

If there are a lot of device IDs stored in the "Device protocols" folder, you can select the way of presentation by clicking "View" and "List" or "Details". Proceed as follows to select specific device protocols for printing all data.

There are different possibilities to activate several device IDs under "Device protocols":

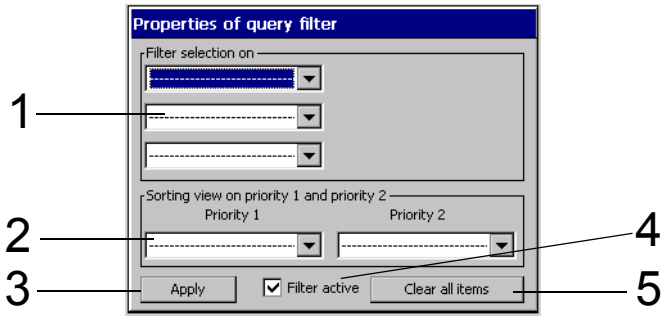
- To draw a border around the selected icon with a stylus
- or when a keyboard is connected
  - to hold down the shift key and click on the first and last ID of a group of device IDs with the stylus
  - or to hold down the "Ctrl" key and click on several individual device IDs.

Activated device IDs are highlighted. After clicking on the icon of the context menu , the following program functions appear:

Another example of how the "Context menu" function is used can be found in „Chapter 4.4.3 Log in, edit or delete test engineer“.

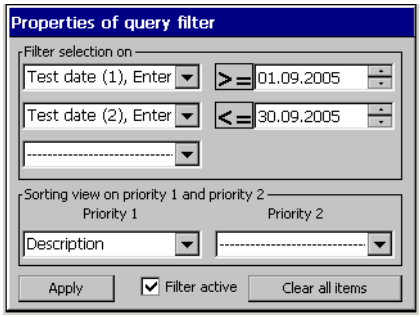
4.2.3.3 How to use the selection filter

Choose the "selection filter" icon from the tool bar. Click on "Filter active" to change the settings. You can choose between filter or sort or filter and sort at the same time.



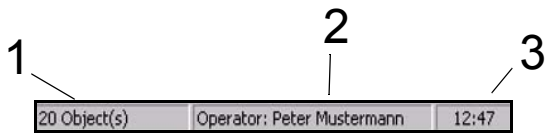
1	Selection filter according to	Three filter conditions can be specified. Only entries which satisfy all the conditions will be displayed (AND relation). - Fields with the addition "search for" allow full-text search. - When activating the test data cycle you can select test data received or sent by the PC. - The test date can be narrowed down by means of logical operators (e.g. <, >, =, ...). - All other fields can be used to select one of the listed entries.
2	Sorting according to view	Two sort criteria can be defined. First sort according to priority 1 then priority 2..
3	Accept	Accept settings and exit the function.
4	Filter active	Activates/deactivates filter. Settings can only be carried out when the filter is active. Changed settings will also be maintained when the filter is deactivated..
5	Delete all entries	Deletes all filter and sort conditions.

Example:
A lot of device IDs are stored in the "Device protocols" folder. But only device protocols of devices that are due to be tested in September 2005 are to be displayed. The device protocols are displayed according to their device designation. The following settings are necessary:



4.2.4 Status bar

Provides information on the number of objects in the main window, the test engineer that is logged in and the time.



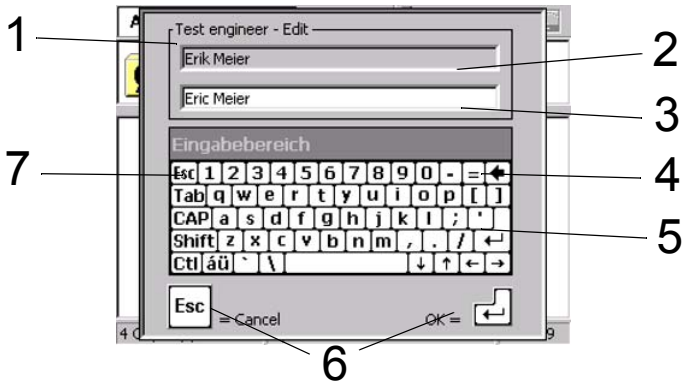
1 Number of objects in the main window

2 Name of the test engineer that is logged in

3 Time

4.2.5 The software keyboard

The software keyboard, which is used to enter text and numbers, is displayed on the screen of the UNIMET® 800ST. You can now make the required entries by clicking the keys with the stylus (or via the connected hardware keyboard).



1 Description of the input field.

2 Old content of the input field.

3 New content of the input field.

4 Delete one character to the left of the cursor (backspace).

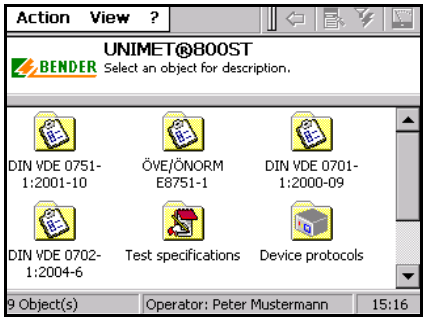
5 Accept input and close software keyboard (ENTER).

6 ECS and ENTER keys, alternative operating options to 5 and 7.

7 Cancel input and exit software keyboard without saving changes (ESCAPE).

4.3 Main folder

The main folder is the first operating level. The folders and functions of the Unimet can be accessed via this folder.



VDE 0751-1:2001-10 ÖVE/ÖNORM E8751-1 VDE 0701 T1:2000-09 VDE 0702 T1:2004-06	Classification in accordance with the respective standard. Answer the queries in the display. The testing system determines the necessary tests and the applicable limit values. This test specification can be saved under a type name in the "Test specifications" folder.
Test specifications	The "Test specifications" folder contains stored test specifications and the date when they have been saved.
Device protocols	The "Device protocols" folder contains stored device protocols. Test results, measurement values as well as the next test date are saved under the respective device ID.
Single measurement	Test steps can be called up as single measurements and repeated as required.
Name of test engineer	Select test engineer, enter a new test engineer, delete test engineer
System control	Settings for view, date, time and printer. The Windows settings are combined in one folder.

Activate the required function by double clicking on the appropriate icon.

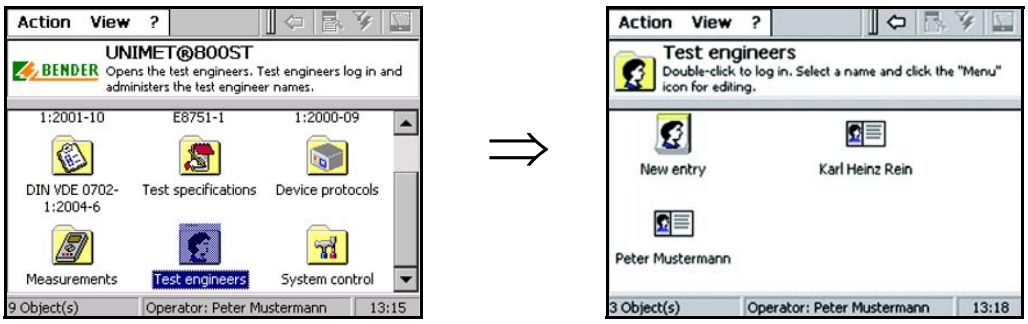
4.4 Test engineer names

The names of the test engineers are saved in the "Test engineers" folder. The test engineer that is documented in the device protocol is logged in here. Hence, the name of the test engineer must be set before commencing with the first test.

The "Test engineers" folder comes in very useful if the testing system is used by several members of staff. Test engineers that are already known are simply selected in the "Test engineers" folder. The test engineer's name does not have to be entered repeatedly. The "Test engineers", "Test specifications" and "Device protocols" folders share the same data memory. Hence, the number of test engineers that can be entered is only limited by the memory space that is available. The name of the test engineer can contain a maximum of 20 characters.

4.4.1 This is how you access the "Test engineers" catalogue

Starting at the main folder, double click on each of the following:
-> [Test engineers]. If the "Test engineers" icon is not visible in the main folder, drag the scroll bar on the right hand side of the screen downwards.



4.4.2 This is how you select the name of a test engineer (log in)

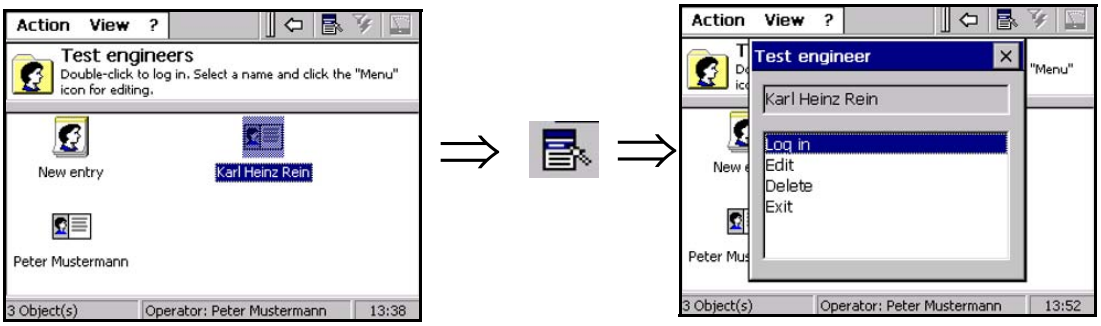
The name of the test engineer that is logged in is allocated to all of the following device protocols. The name of the test engineer is, for example, printed on the device protocol of a device.

1. Double click in the required test engineer name (e.g. "Peter Mustermann") or
2. click on "test engineers", -> click on the "Context menu" icon in the toolbar, -> click on "Log in"
3. or select -> "Log in test engineer" under "Action".

4.4.3 Log in, edit or delete test engineer

The "Context menu" in the toolbar is used to edit the names of existing test engineers. Proceed as follows:

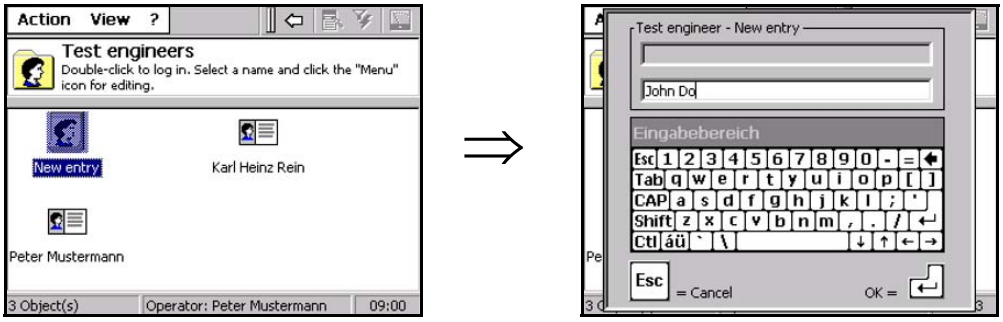
1. Click on the name of test engineer.
2. Click on the "Context menu" icon in the toolbar.
3. Select the required action.



Log in	Logs in the test engineer.
Edit	The keyboard can be used to edit the name of test engineer. ESC = name of the test engineer remains unchanged ↵ = save edited name of test engineer
Delete	The highlighted name will be deleted.
Exit	The name of the test engineer remains unchanged. The "Context menu" function is exited.

4.4.4 This is how you enter a new test engineer name

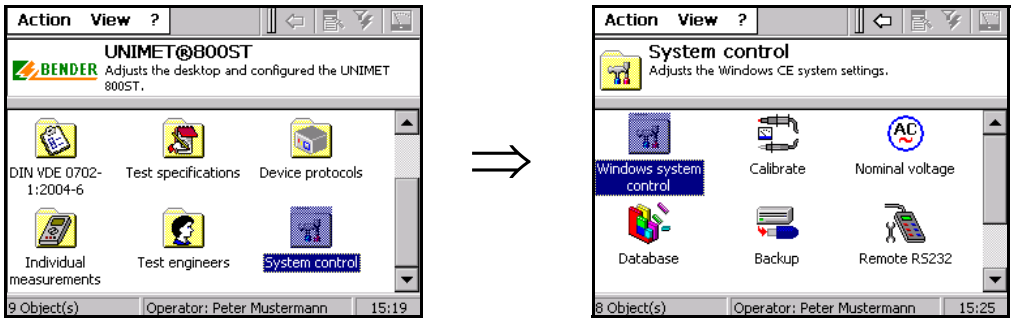
1. Click on "New entry".
2. Enter the name using the stylus and the software keyboard.



ESC	Exit software keyboard without saving changes.
←	Delete one character to the left of the input cursor.
↵	Accept input.

4.5 Device settings

The "System control" folder is used to enter the settings for your testing system. This is how you get to the device settings:



4.5.1 Windows system control

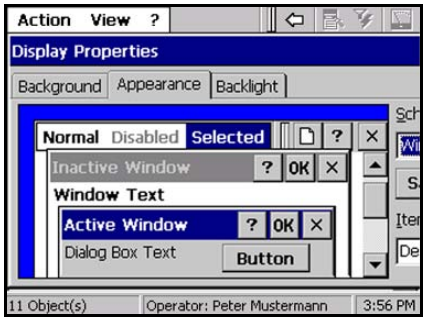
Unimet utilizes the Windows® CE system. The system settings can be changed as follows:

4.5.1.1 Save settings

The "Save settings" function is used to save the various Windows settings so that these will also be retained for the next session (e.g. printer, view properties, regional settings etc.).

4.5.1.2 Display

The settings for the background properties, the appearance of the windows and the backlight are made in the "Display properties" menu.

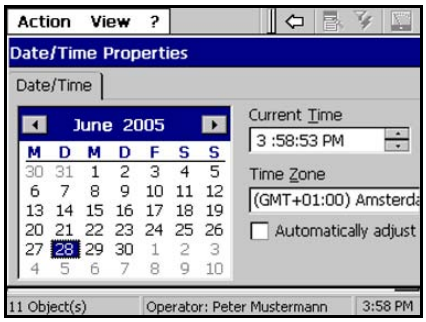


4.5.1.3 Printer

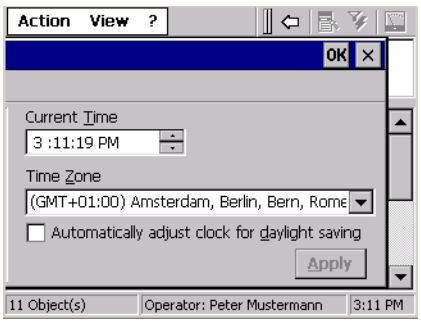
Please refer to chapter "4.1.2 Connecting the printer" on page 16 for details on how to set up an external printer.

4.5.1.4 Date / Time

This menu is used to set the date, time, time zone and automatic summer / winter time adjustment.

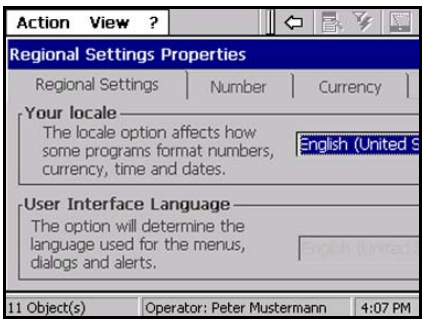


You can shift the input window to display all other functions of this window (e.g. button "OK"). For this purpose, click on the blue title bar to move the window to the desired direction.



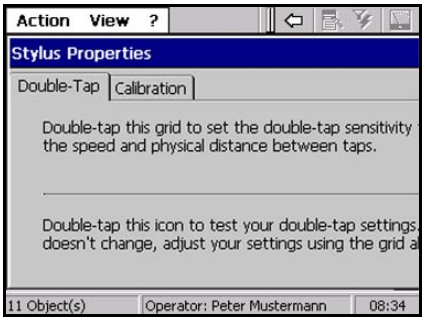
4.5.1.5 Regional settings

Regional settings. e.g. numbers, currencies, date and time.



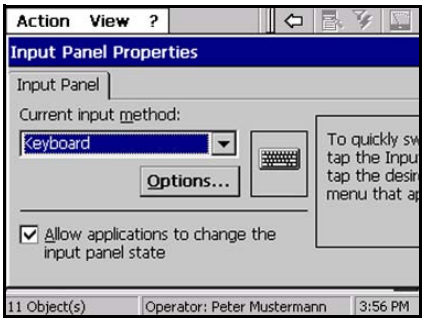
4.5.1.6 Stylus

Your personal stylus setting for the double click is made under "Stylus properties". Double on the grid. In this way, UNIMET® 800ST learns the speed at which your future double clicks will be carried out.
Under "Calibration", you can calibrate the touch screen for the utilization of the stylus.



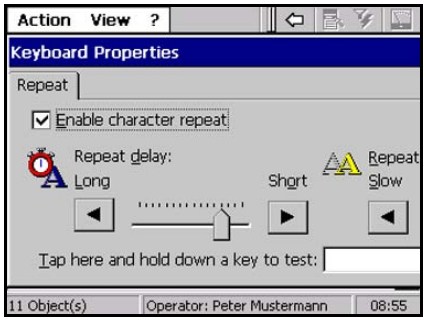
4.5.1.7 Input panel

The appearance of the software keyboard can be altered in the "Input panel" menu.



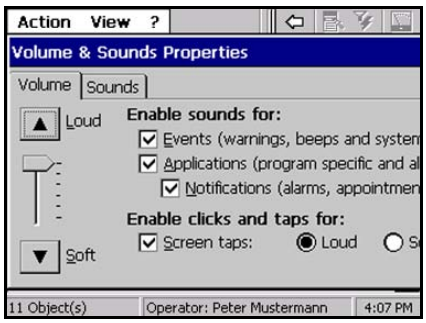
4.5.1.8 Keyboard

The settings that are made in this menu only affect a hardware keyboard that is connected to the PS/2 interface. Here, you can activate character repeat and alter the delay and repeat rate.



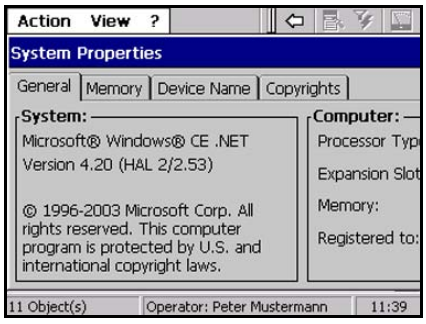
4.5.1.9 Volume and sounds

This menu is used to set the volume and define the sounds that should be generated for specific events. The sounds will only be generated after an update.



4.5.1.10 Windows CE system

This menu provides general information on Windows® CE (CE version, processor type, etc) as well as information on the utilization of the memory, the name of the device and copyright information.

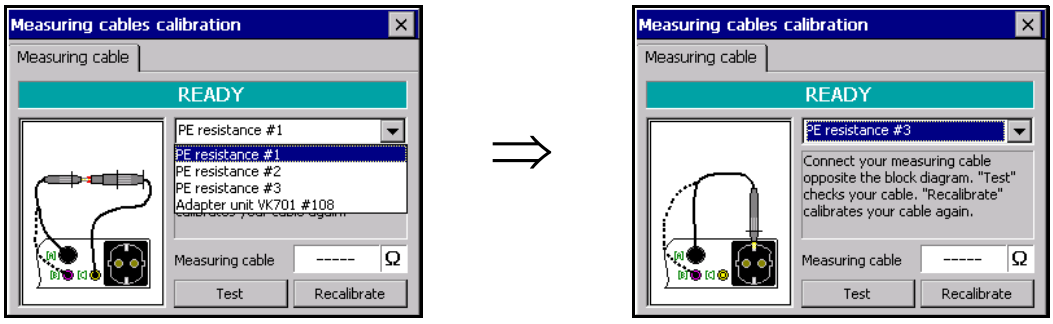


Other functions in the "system control" folder.

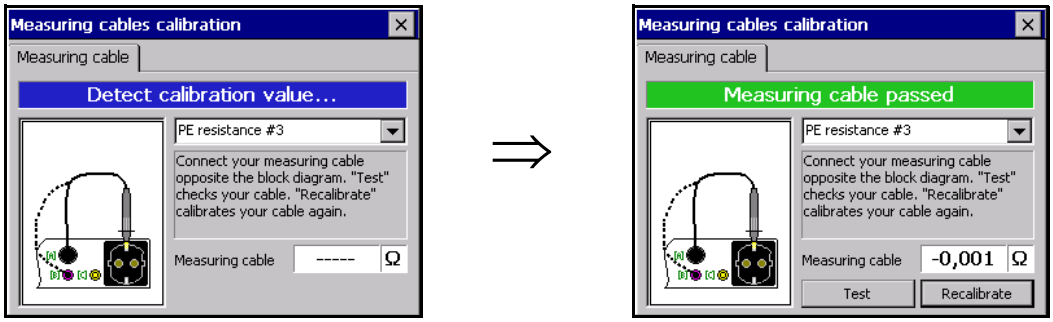
4.5.2 Calibration of the active test probe/measuring cable

Zero calibration must be carried out for the active test probe of the UNIMET® 800ST. Similar to an ohmmeter, this guarantees that the ohmic resistance of the test probe does not influence the test results of the PE conductor test. Always repeat this calibration process when a new test probe or measuring cable is connected to the testing system. A zero calibration is also required before starting a test with the VK701 adapter.

1. Select the measurement number of the PE conductor test (e.g. #3 to test a device with a power cable). If all three measurements (#1 ... #3) are used, a zero calibration can be saved for each measurement number.



2. Connect the active test probe as shown in the graph.
3. Press "Test" to test your active test probe.
4. Press "Recalibrate" to calibrate your active test probe.

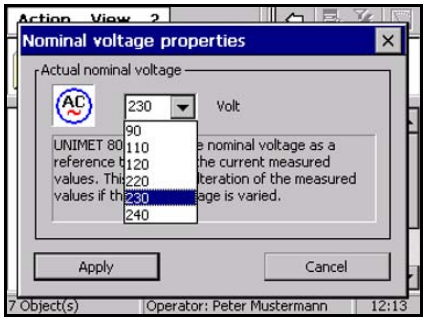


Information about calibration of the complete device can be found in chapter "7.1 Calibration" on page 67.

4.5.3 Nominal voltage

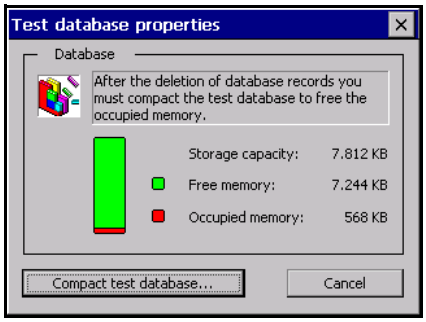
The UNIMET® 800ST can be used within the range AC 90...264 V. To achieve comparable measurement values with a fluctuating mains voltage, many standards require that the measurement values be converted to nominal system voltage or even to 106 % or 110 % of the nominal system voltage.

Hence, it is necessary to set the nominal system voltage. The standard setting is 230 V. The required conversion of the measurement values is carried out automatically by UNIMET® 800ST.



4.5.4 Database

UNIMET® 800ST uses a common database for the "Test specifications", "Device protocols" and the "Test engineers" folders. Gaps, which remain unused, are created each time an entry is deleted. We therefore recommend that you compress the database on a regular basis so that this space can be used again. One minute is required for 1000 data records.



4.5.5 Backup (USB)

A USB stick is used to backup the operating software and test database of the Unimet. Regular backups are recommended. In particular, data should be saved before an update of the Unimet operating software is carried out.

Connect a USB stick to the USB interface of the UNIMET® 800ST to carry out a backup. A storage space of approximately 20 MB is required.

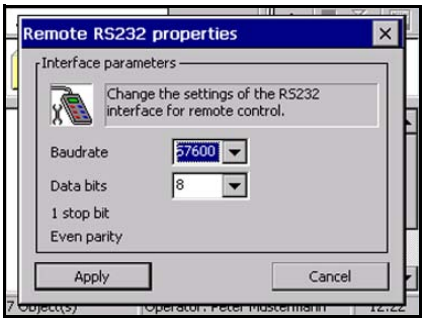
How to copy the backup file on the USB stick back to the UNIMET® 800ST:

1. Switch the UNIMET® 800ST off.
2. Insert the USB stick.
3. Switch the UNIMET® 800ST on.
4. Choose from the window whether the operating software of the UNIMET® 800ST or the test database (test specifications and device protocols) is to be copied back.

4.5.6 Remote RS-232

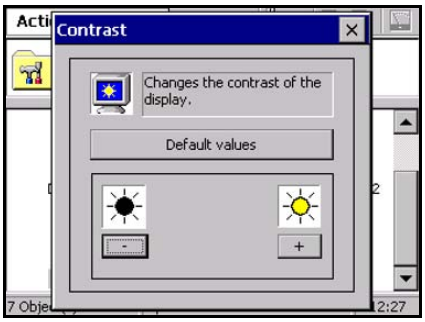
The RS-232 interface is used to connect the UNIMET® 800ST to a PC. This window is used to set the baud rate and data bits. The baudrate is the data transmission speed in bits per second.

The value of the baud rate and the data bits set at the testing system and at the PC (resp. in the PC software) must always be the same! When different settings are used, data transmission cannot be carried out.



4.5.7 Contrast

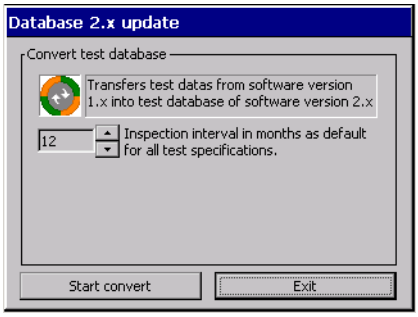
The required contrast is set in the "Contrast" menu.



-	Reduce contrast
+	Increase contrast
Standard setting	Set contrast to default value

4.5.8 Database 2.x Update

Version 2.x of UNIMET® 800ST provides new functions. Test specifications (type catalogue) and device protocols (device catalogue) saved with version 1.x of UNIMET® 800ST must be converted to the current format.



Adjust the test interval that applies to all test specifications stored up to now. Start the conversion process.
When the conversion is completed, change the test specifications that require a specific test interval.

5. Testing and measuring

5.1 Test concept

The integrated "Test specifications" and "Device protocols" folders form the basis for time and cost-saving testing with the UNIMET® 800ST.

Classification

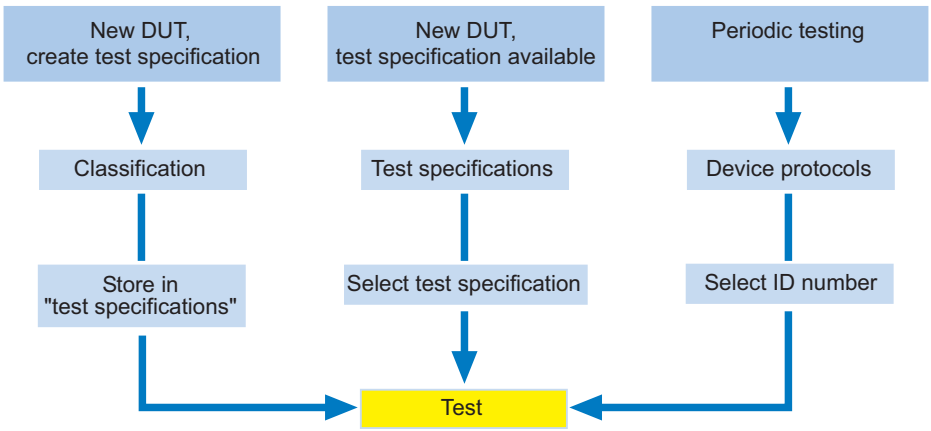
The UNIMET® 800ST allows testing in accordance with VDE 0751, ÖVE/ÖNORM E8751-1, VDE 0701 and VDE 0702. In the case of DUTs that have not yet been entered into the "Test specifications" folder, the necessary test steps and the appropriate limit values are determined in a dialogue between the test engineer and the UNIMET® 800ST. This classification can then be saved as a test specification for a specific device type in the "Test specifications" folder and can therefore be used for all further devices of the same type.

"Test specifications" folder

Devices that have already been classified (e.g. infusion pump AFX) are saved under the type designation in the "Test specifications" folder. When a new device, the test specification of which has already been entered, is tested for the first time, it is only necessary to call up the test specification.
Once the test has been passed, the DUT is saved in the "Device protocols" folder under the ID number. This saves a lot of time when new devices are purchased. A further advantage: all devices with the same test specification are tested under the same conditions.

"Device protocols" folder

The "Device protocols" folder contains saved device protocols. The test results, measured values as well as the date of the next device test are saved under the ID number.
In the case of periodic testing, only the ID number has to be selected, that's all. Connect DUT - test - finished. This saves a lot of time. In this way, a DUT is always tested according to its associated test specification.



Single measurement

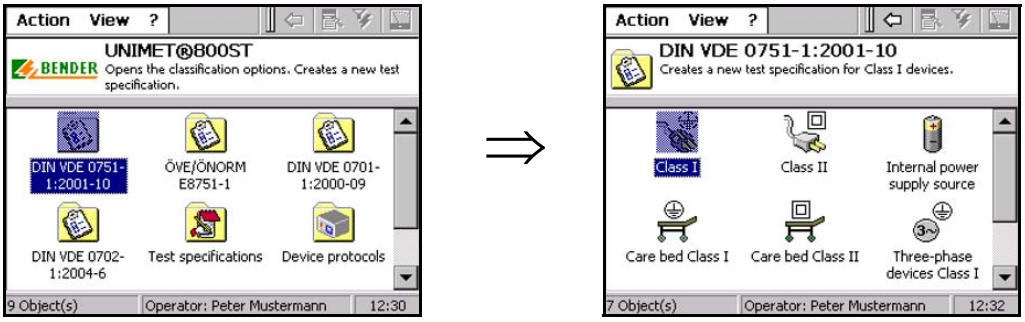
Test steps can be used to carry out single measurements and can be repeated as required. If, for example, a limit value has been exceeded during the classified test sequence, the test step in question can be examined more closely using a single measurement.

5.2 Classification

Starting in the main folder, select the appropriate test standard. Answer the queries in the display. The testing system determines which tests have to be carried out and the applicable limit values. The result of the classification is stored as a test specification in the "Test specifications" folder.

Example 1:
Classification of a ME device (e.g. ultrasound device) in accordance with DIN VDE 0751-1:2001-10. This is a class I device with two patient connections.

Select "DIN VDE 0751-1:2001-10" from the main folder and "Class I" in the sub folder.



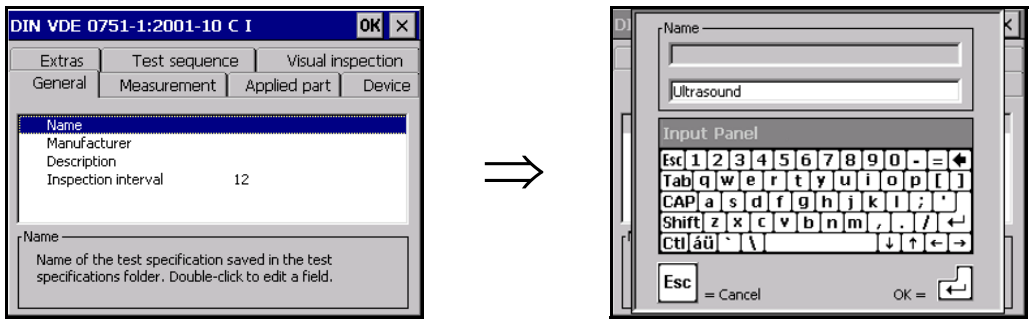
The rest of the classification is presented in tab form. Tabs that have already been visited are highlighted with the symbol "√". Change the settings of all tabs to suit the device that is to be tested. Then click on OK to confirm your entries. If you want to cancel a classification, click on X.

5.2.1 General

Always enter a type name. Otherwise, it will not be possible to save the classification. Example: Ultrasound.

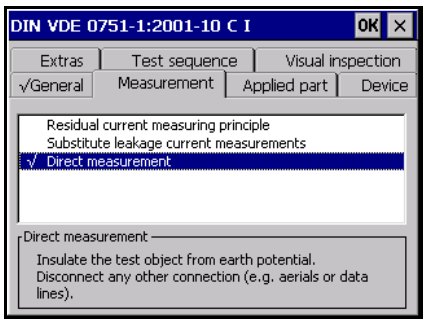
Manufacturer and device designation provide additional information on the device. Decide whether you wish to enter this information immediately or edit the type at a later point in time. Also determine a test interval for periodic testing. When the DUT has passed the test, UNIMET® 800ST determines the next test date.

Click on an entry once to display this entry once again in the lower Info field. A double click on the entry opens the software keyboard and the entry can be edited (also with an external keyboard).



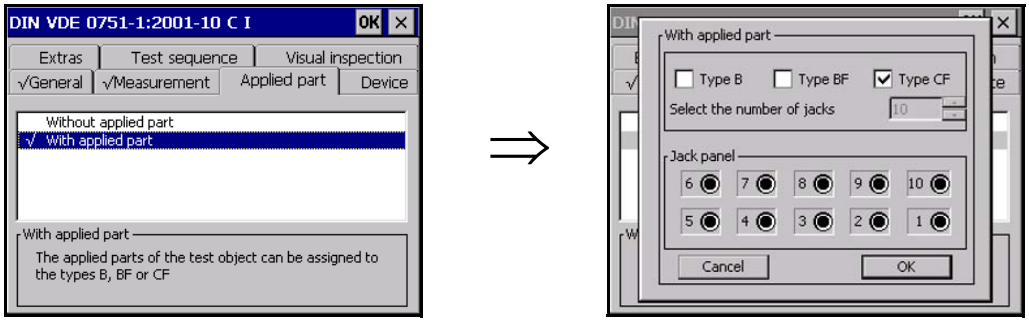
5.2.2 Measuring method

The test standards allow you to choose between three measuring methods to determine the leakage currents. Click on the entry once to show a comment on the measuring method in the lower Info field. A double click on an entry selects this measuring method. The measuring method currently being used is highlighted with the symbol "√". Example: Direct measurement.



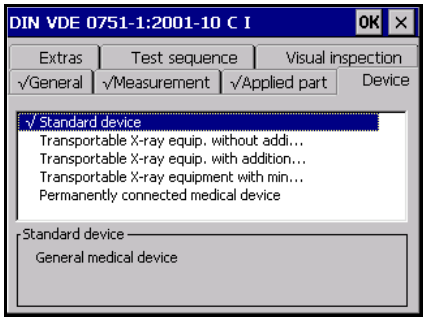
5.2.3 Applied part

Our example device has patient connections. You should therefore select "with applied part". Your selection is highlighted with the symbol "√".
The type of the applied part is defined in the next window (see nameplate of ME device). Example: Type CF.
According to DIN VDE 0751, always all jacks have to be bridged and measured together. Therefore, in our example, it is not necessary to set the number of jacks and this setting is therefore inactive.



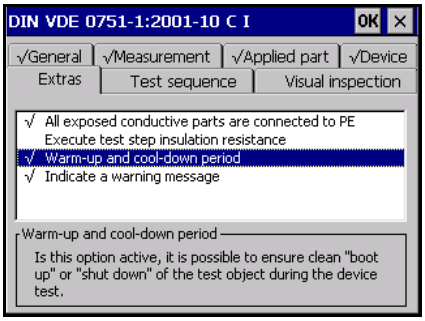
5.2.4 Device type

Select the device type. Click on the entry once to show a comment on the device type in the lower Info field. A double click on an entry selects this device type. The device type currently being used is highlighted with the symbol "√". Example: General device.



5.2.5 Extras

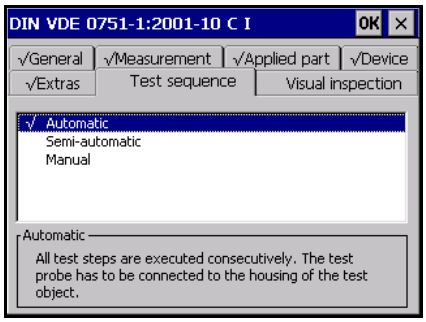
Various settings are combined in the "Extras" menu. Click on the entry once to show an explanatory text in the lower Info field. A double click on an entry activates this function. Activated entries are highlighted with the symbol "√". Example: see display representation.



All accessible conductive parts are connected to PE	This function can be used if it is known that all accessible metal parts of the enclosure are connected to the PE conductor. When testing the device, it is only necessary to bring the active test probe into contact with a metal part of the enclosure. If not all metal parts of the enclosure are connected to the PE conductor, this function should be deactivated. An additional measurement of the device leakage current resp. touch current (Class II) will now be carried out during the device test. This will, however, only be performed correctly if a semi-automatic test sequence is classified. Proceed as follows during the test: When carrying out the PE conductor test, scan all parts of the enclosure that are connected to the PE conductor using the active test probe. When measuring the device leakage current resp. touch current (Class II), scan all parts that are not connected to the PE conductor.
Carry out insulation measurement	The insulation measurement applies a voltage of 500 V between the active conductors and the PE conductor. The insulation test may cause damage to sensitive devices. Only activate insulation measurement if permitted to do so in the manufacturer's instructions that come with the DUT.
Warm-up and cool-down period	An increasing number of DUTs require a self test or a warm-up period after being switched on and a cool-down period before switching off . Examples here include computers, process-controlled devices and laser equipment. With such devices, UNIMET® 800ST can only start to take measurements after the warm-up or "booting" period. Otherwise, there is a danger that the parts of the device that are to be tested are not yet switched on and will therefore be excluded from the test. After the measurement, the UNIMET® 800ST is only allowed to switch off the DUT when this has run down or cooled. Otherwise, there is a danger of overheating when measuring laser devices or destroying sections of the hard disk when measuring a computer.
Display warning messages	If this function is activated, a warning message will be displayed before the mains voltage of the DUT is connected. The DUT will only be connected to the mains voltage after this message has been acknowledged. This serves to eliminate the danger of dangerous devices such as grinders being switched on unexpectedly.

5.2.6 Test sequence

Depending on the DUT, the test can be carried out automatically, semi-automatically or manually. Click on the entry once to show an explanatory text in the lower Info field. A double click on an entry activates this function. Activated entries are highlighted with the symbol "√". Example: Automatic.



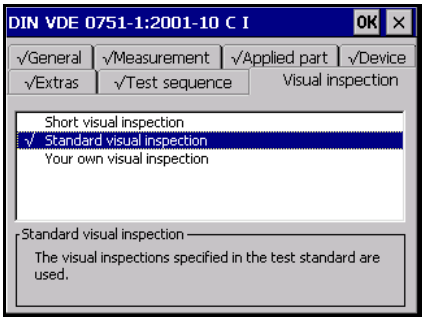
Automatic test sequence	When carrying out an automatic test, contact is established at one point between the DUT and the test probe or test clip. The measuring sequence will automatically include all test steps.
Semi-automatic test sequence	During the semi-automatic test, test steps requiring a test probe are only started on request. In this way, a test step can be repeated. This is necessary when different accessible parts of the DUT are to be measured. The current test step is started by clicking on the button "Measure" or by pressing the active test probe tightly to the DUT. In each case, UNIMET® 800ST saves the "worst" measured value. You can reach the next test step by clicking on the button "Proceed" or by pressing the pushbutton at the grip of the active test probe (option). Test steps not requiring a test probe are carried out in turn such as with the automatic measuring sequence.
Manual test sequence	When carrying out a manual test, each test step can be repeated as often as required. Here, several accessible parts of the DUT are contacted with the active test probe. In each case, the UNIMET® 800ST saves the last measured value. You can go to the next test step by clicking on the button "Proceed" or by pressing the pushbutton at the grip of the active test probe (option) .

When a fault is detected during the automatic or semi-automatic test sequence, the test step can be repeated. For this purpose, UNIMET® 800ST changes to the manual mode. The rest of the test steps are continued automatically or semi-automatically.

5.2.7 Visual inspection

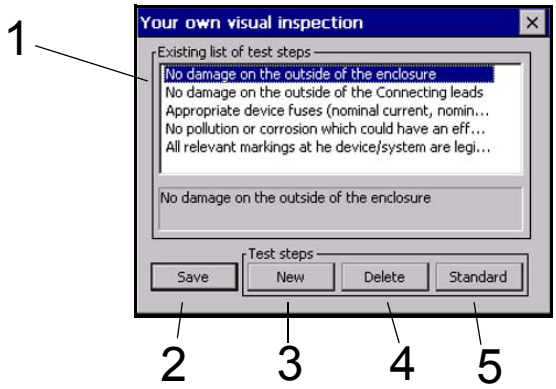
When testing a device, a visual inspection is also carried out. UNIMET® 800ST can save and document the test steps of this visual inspection. Click on the entry once to show an explanatory text in the lower Info field. A double click on an entry activates this function. Activated entries are highlighted with the symbol "√".

Example: Standard visual inspection.



Short visual inspection	During the test, it is only possible to activate or deactivate the option "Visual inspection passed".
Standard visual inspection	During the test, the criteria from the respective standard will be queried.
Your own visual inspection	Create your own test steps for the visual inspection. The criteria of the respective standards can be used as a template. Texts can be edited, deleted or added.

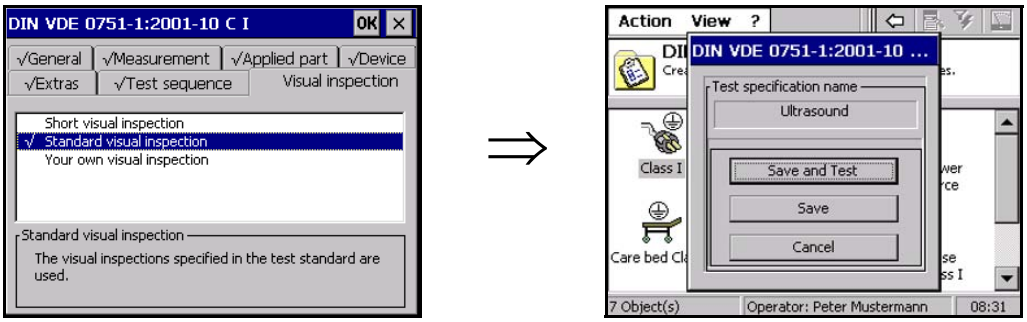
This is how you create your own visual inspection:



1	Current test steps of the visual inspection. The first test step is highlighted (click once). Double click to edit the test step.
2	Saves the current test steps of the visual inspection.
3	A new test step is added below the existing test steps. Here, the software keyboard opens automatically.
4	Deletes the highlighted test step.
5	The test steps of the respective standard will be activated. Any of your own test steps will now be deleted.

5.2.8 Exit classification

When you have entered all your settings, click on OK to confirm your entries.

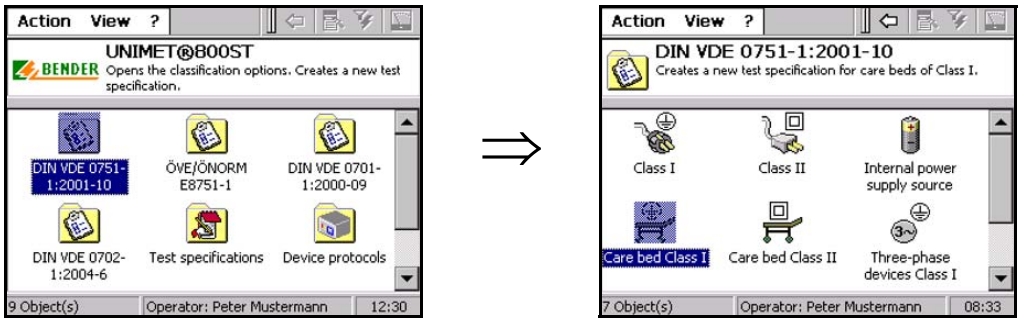


The classification process is now complete. You now have the following options:

Save and test	The classification is saved under the type name in the "Test specifications" folder. The test will then commence.
Save	The classification is saved under the type name in the "Device protocols" folder.
Cancel	The classification is not saved.

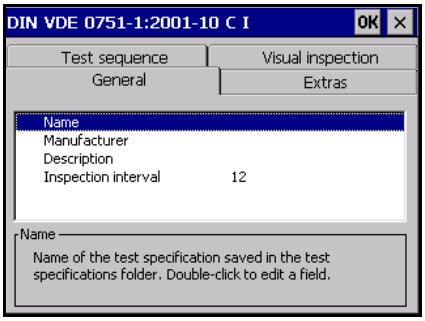
Example 2:
Classification of a care bed or hospital bed of Class I.

Select "DIN VDE 0751-1:2001-10" in the main folder and "Care bed Class I" in the submenu.



The rest of the classification is presented in tab form. Due to the presettings of the UNIMET® 800ST for care beds, only a few tabs now have to be edited. Even the visual inspections have been adapted to suit these DUTs. Make the settings as described in Example I.

Always enter a type name. Otherwise, it will not be possible to save the classification. Example: Ultrasleep. Change the settings on all tabs to suit the device that is to be tested. Then click on OK to confirm your entries. If you want to cancel classification, click on X.



5.3 Device test

On completion of a classification, a test can be started by selecting

- "Save and test",
- or by activating an existing test specification in the "Test specification folder and
  - clicking on the "measuring instrument" icon or
  - clicking on "Start device test" in the context menu.
- Activating an existing device protocol in the "Device protocols" folder and
  -clicking on the "measuring instrument" icon or
  - clicking on "Start device test" in the context menu.

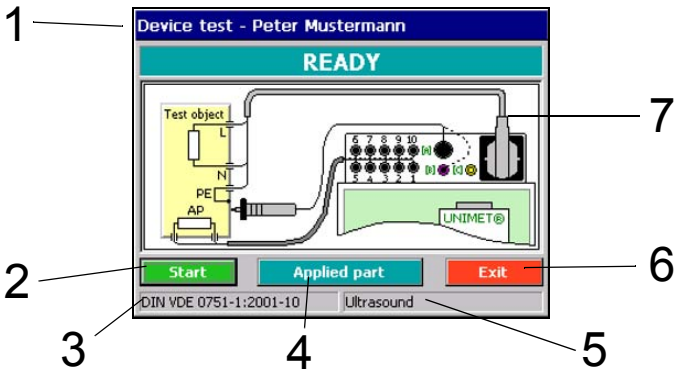
The test is carried out in the following sequence:

1. Visual inspection
2. Electrical tests
3. Function test

5.3.1 Connecting the DUT

UNIMET® 800ST now displays the appropriate wiring diagram for the classification. This diagram offers information on the active test probe connection and all the other connections to the DUT.

In the wiring diagram below, the active test probe is connected to jack [A]. In this case it is the active test probe TP800 (option).
The single-pole active test probe supplied with the UNIMET® 800ST is connected to jack [B].



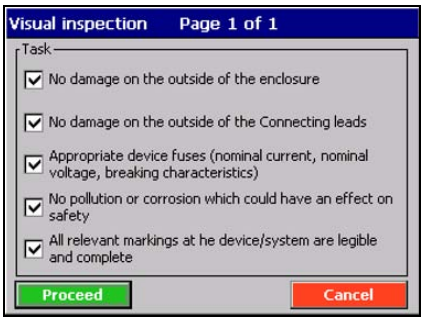
1	Test engineer currently logged in
2	Start of test
3	Test standard
4	If an applied part is available: Additional information on applied part.
5	Test specification or device ID number.
6	Cancel test
7	Wiring diagram

Now proceed as follows:

1. Connect the DUT to the UNIMET® 800ST.
2. Click on "Start".

5.3.2 Execute visual inspection

Carry out the visual inspection on the basis of the listed test steps. All visual inspections are preset as passed☑. Should this not apply for one of the test steps, click on the symbol ☑. The marking will disappear ☐ ; the test step and hence the entire test will be saved as having failed.
If the number of test steps is so high that they cannot be displayed on one page, a button is shown on the screen with the symbol "<" or ">". This allows you page forwards and backwards.



Click on "Proceed" to continue the test sequence with the electrical tests.

5.3.3 Execute electrical tests

UNIMET® 800ST now starts the electrical part of the tests. The electrical tests are executed in the following order:

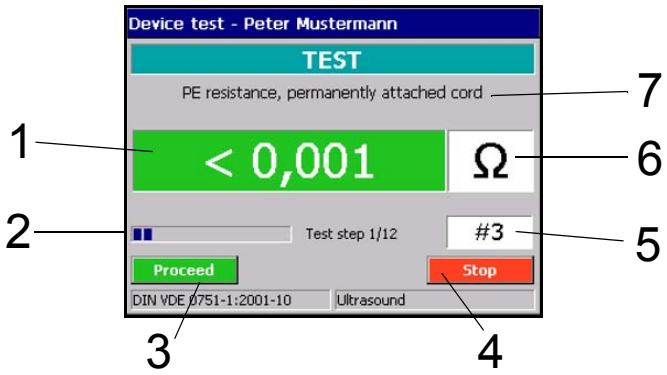
1. All test steps during which the DUT is not in operation (e.g. PE conductor, insulation and substitute leakage current measurements).
2. Test steps in operational state with given phase position (e.g. touch current , residual current , patient leakage current measurements).
3. Test steps as under 2 but with reversed phase position.

This serves to ensure that the DUT is not switched on and off too frequently.

UNIMET® 800ST ensures that the limit values are observed even during the test sequence. In the event of a limit value has been exceeded in one test step, the test engineer can decide whether he wishes to cancel or carry on with the test.

Defective DUTs may have dangerous leakage currents. During the "direct measurement" of leakage current, all test steps are terminated immediately when a measured value of > 20 mA is reached.

Description of the test steps during the PE conductor test



1 Measured value. The background colour is
- green when the limit value is observed
- red when the limit value is exceed
- black when there is no limit value.

2 Status display and test step counter.

3 Proceed" button
(only for manual or semi-automatic test sequence,
or when a limit value has been exceeded and the test is not terminated).

4 Exits the test.

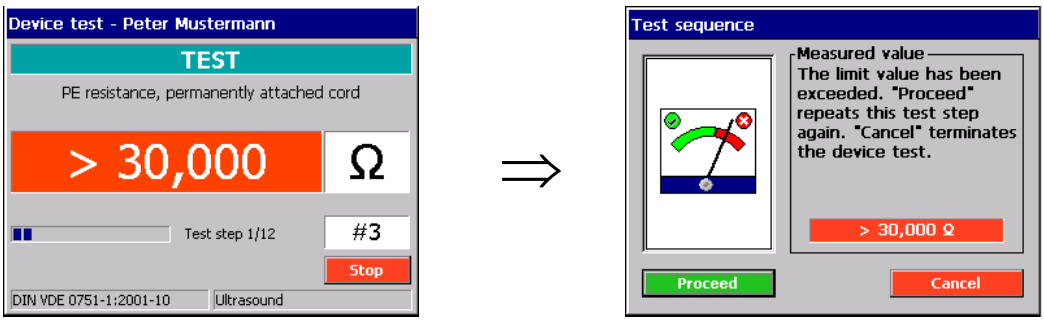
5 Measurement number. The measurements taken by the BENDER devices are numbered.
See also chapter "8.2 Test steps" on page 71.

6 Measured value unit.

7 Name of the current test step.

5.3.3.1 PE conductor test

Class I devices undergo a PE conductor test.
If the limit value has been exceeded, the measured value is displayed followed by a warning message. A decision can now be made as to whether or not the test should be continued. If the test is continued, the UNIMET® 800ST will automatically switch to the manual test sequence. The test step will be repeated until the test engineer starts the next test step with "Proceed".



Stop or cancel	Exits the test.
Proceed	Continues the test.

During the PE conductor test, the low-resistance continuity of the PE conductor is tested at a high current level (max. 8 A). This creates thermal energy.
If the PE conductor test is repeated very often and without an interval during a manual test sequence or during a single measurement, the UNIMET® 800ST will prevent overheating by terminating the test. A message will be displayed. A new test of the PE conductor will be possible after a short cooling-down period.

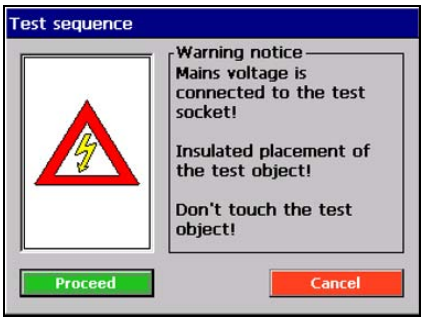
Depending on the classification, there may be further tests during which the DUT is not in operation (e.g. PE conductor test, insulation, substitute leakage current measurements).

Caution

When testing the insulation resistance, the maximum DC touch current does not exceed 10 mA if the DUT has a fault or if the active test probe is touched directly. A DC touch current of max. 15 mA is permissible in accordance with IEC 61010.

Switching on the DUT

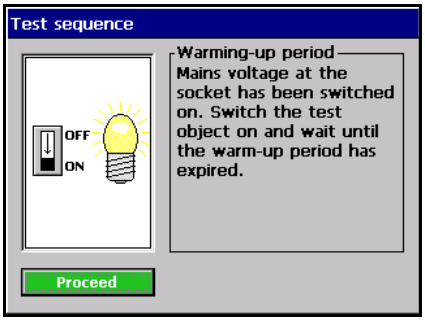
If the function "Display warning messages" was activated during the classification on the "Extras" tab, the following warning message will be displayed before the DUT is connected to the supply voltage.



Cancel	Exits the test
Proceed	Continues the test. The DUT will be supplied with mains voltage.

Warm-up period

If the function "Warm-up and cool-down period" was activated during the classification on the "Extras" tab, the UNIMET® 800ST will wait until the DUT has booted or is ready-to-operate. The following message is displayed after the DUT has been fed with supply voltage.



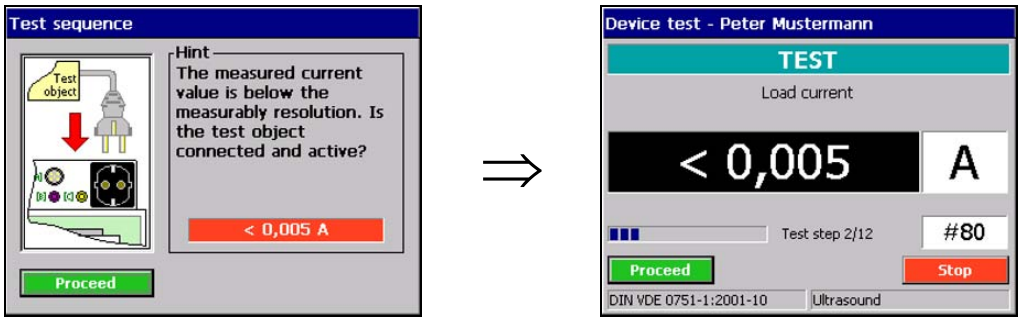
Proceed	Continues the test.

Power consumption

UNIMET® 800ST measures the power consumption of the DUT.

Please note that only DUTs with a power consumption of max. 3700 VA can be supplied using the socket outlet of the UNIMET® 800ST. If DUTs with a greater power consumption are connected, the thermal-magnetic circuit breaker integrated into the mains switch of the UNIMET® 800ST will trip. If the DUT is removed, the testing system can be switched on again just a few seconds later.

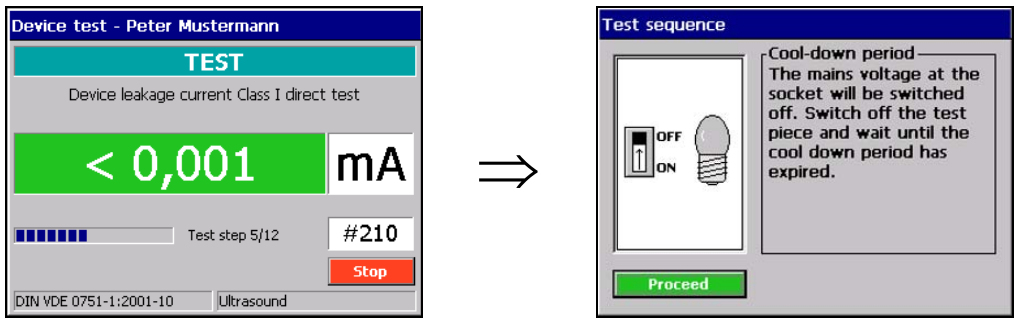
If the load current is less than 0.005 A, the UNIMET® 800ST will query whether the DUT is really switched on.



If the DUT is switched on, click on "Proceed".

Cool-down period

If the function "Warm-up and cool-down period" was activated during the classification on the "Extras" tab, the UNIMET® 800ST will stop after the last test step that was executed with this phase position until the DUT has been run down.

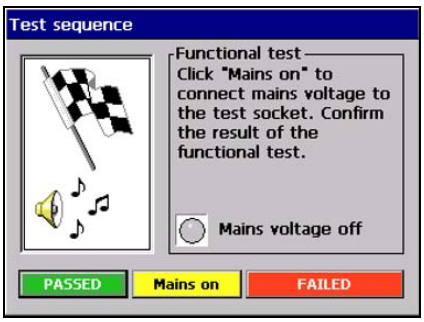


Proceed — Continues the test, e.g. in reversed phase position.

UNIMET® 800ST then continues the tests also in reversed phase position. Depending on the setting, also the warm-up and cool-down period is considered.

5.3.4 Execute function test

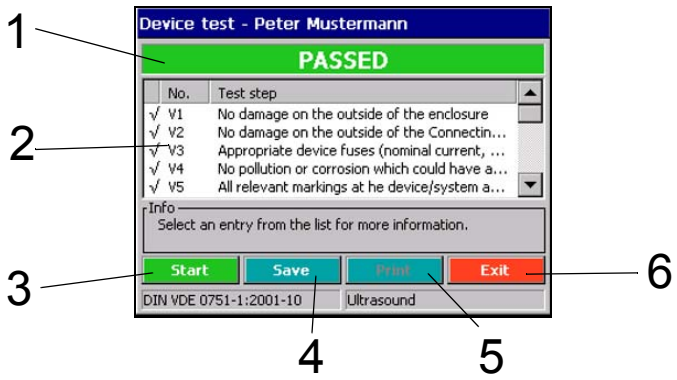
The function test is executed on completion of the electrical tests.



Mains on	The DUT is operated via the socket outlet of the UNIMET® 800ST. Please refer to the instructions provided by the manufacturer of the DUT. Three-phase DUTs and DUTs with a power consumption greater than 3700 VA cannot be supplied from the socket outlet. Connect the DUTs to the appropriate supply voltage.
PASSED	The function test was passed.
FAILED	The function test was not passed. The entire test will be saved as "failed".

5.3.5 Documenting the test result

The result of the test is displayed on completion of the function test.



1 Overall result of test. The background colour is
- green if the test was passed
- red if the test was failed.

2 Executed test steps.

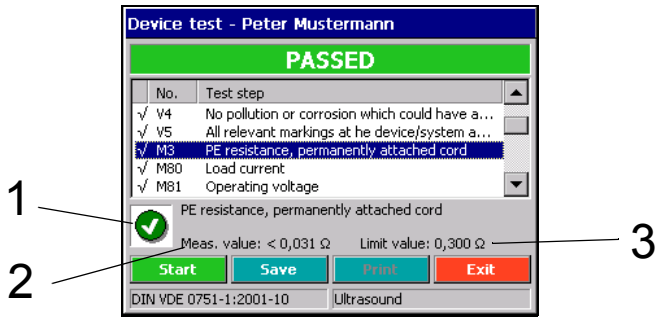
3 Restarts the test. The existing test results will be overwritten.

4 Saves the test in the "Device protocols" folder.

5 Prints the test. The "Print" function will only be activated after the test is saved.

6 Exits the device test. If the device protocol has not yet been saved, a warning message will be displayed.

Click on a test step to view details.

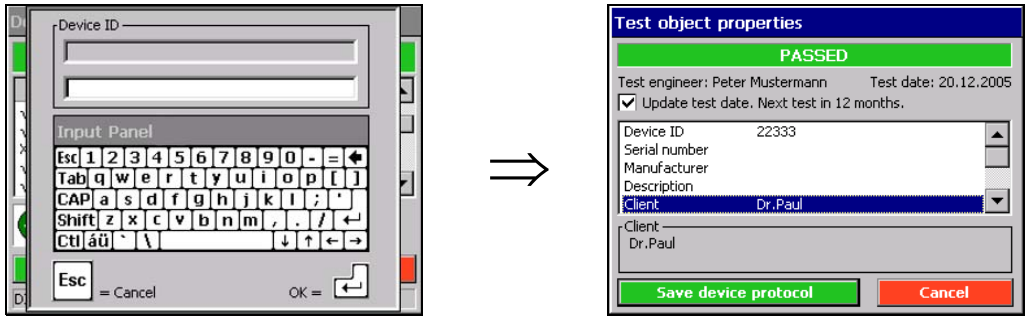


1 Evaluation of the test steps
- √ passed
- x failed

2 Measured value

3 Limit value

The device ID is also needed to save data in the "Device protocols" folder. Other details such as serial no., client, room, department, test costs or comments can also be saved. When the device test was successful, the date of the test will be updated by the set test interval. Enter at least the device ID and click on "Save device protocol". Terminate the test by clicking on "Exit".



With UNIMET® 800ST the test data of different clients can be managed. This is particularly important for the service personnel. Always use the same spelling when entering your client's names.
Should you have assigned the same device ID to two different clients, UNIMET® 800ST will recognize this. The device protocols of the of the two DUTs will be saved and managed.

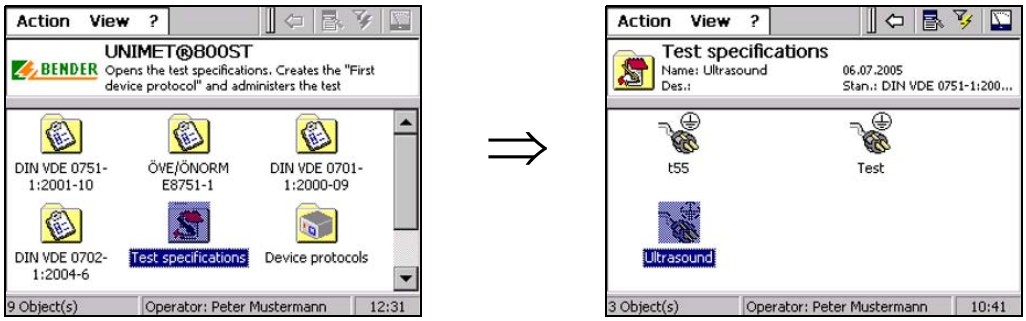
5.4 "Test specifications" folder

All the test specifications and the respective test steps and limit values that were determined during the respective classification are stored in the "Test specifications" folder. If there are several devices of the same type, the "Test specifications" folder offers the following advantages:

- Less time is required: the classification only has to be carried out once.
- Quality assurance: All DUTs with the same "Test specifications" are tested under the same conditions.
- The contents of the "Test specifications" folder can be transferred to a PC program. Data records selected in the PC program can also be transferred to the "Test specifications" folder. These functions are described in the PC software instructions.

5.4.1 This is how to get to the "Test specifications" folder

Select "Test specifications" in the main folder. Now select the respective test specification.

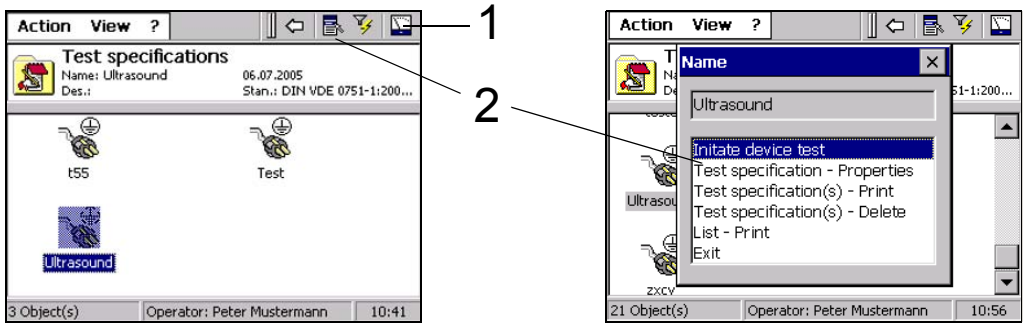


If a very large number of type names are saved in the "Test specifications" folder, you can achieve a better overview by selecting the display type "List" or "Details" under "View".
You can also achieve a better overview by using a selection filter.

5.4.2 This is how you start a test from the "Test specifications" folder

Click on the required test specification and then proceed as follows:

- Click on the "Measuring instrument" icon in the toolbar (1),
- **or** click on the "Context menu" icon in the toolbar and then on "Initiate device test" (2).



When a DUT has already been tested and stored previously, you should start the periodic test from the "Device protocols" folder.

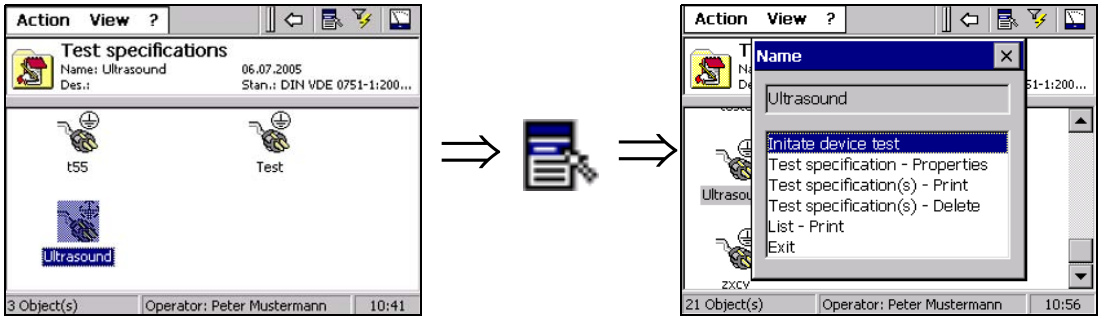
5.4.3 "Test specifications" folder: start test and edit test specification

The settings saved under a test specification apply for all device protocols that have been created according to this test specification. Any changes in the test specifications will immediately apply for all associated device protocols.
When deleting a test specification, please note that all device protocols of this type will also be deleted from the "Device protocols" folder.

The "Context menu" in the toolbar is used to edit an existing device protocol. Proceed as follows:

1. Click on the type name.
2. Click on the "Context menu" icon in the toolbar.
3. Select the required action.

With a double click on the type name you can also edit a test specification. Please remember that the following restrictions apply.



Initiate device test	Starts the test. When the test is completed, save the test results in the "Device protocols" folder.
Test specification - Properties	Fundamental changes that affect the test steps can only be made by carrying out a new classification. Here, it is only possible to edit the following functions: **Tab:** **Function:** General - Name (only when not transmitted to PC) - Manufacturer - Device designation - Inspection interval Extras - Display warning message - Warm-up and cool-down period Test sequence - Automatic - Semi-automatic - Manual
Test specification(s) - Print	Prints highlighted test specifications (list of test steps)
Test specification(s) - Delete	Deletes highlighted test specifications and their associated device protocols.
List - Print	Prints list of highlighted test specifications.
Exit	The test specification remains unchanged. The "Context menu" function is exited.

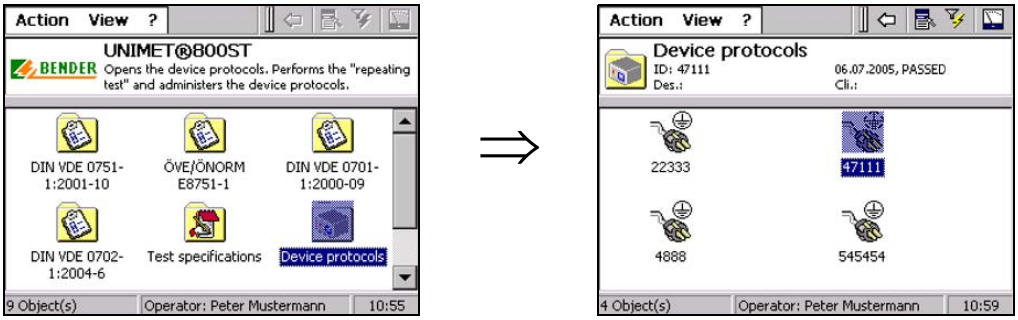
5.5 "Device protocols" folder

All the tested devices are stored in the "Device protocols" folder along with their device ID and the test results. When carrying out a periodic test , the devices are simply called up in the "Device protocols" folder and tested again.

The contents of the "Device protocols" folder can be transferred to a PC program. Similarly, selected data records in the PC program can be transferred to the "Device protocols" folder. These functions are described in the instructions that come with the PC software.

5.5.1 This is how you enter the "Device protocols" folder

Select "Device protocols" in the main folder. Then select the device ID of the DUT in the "Device protocols" folder.

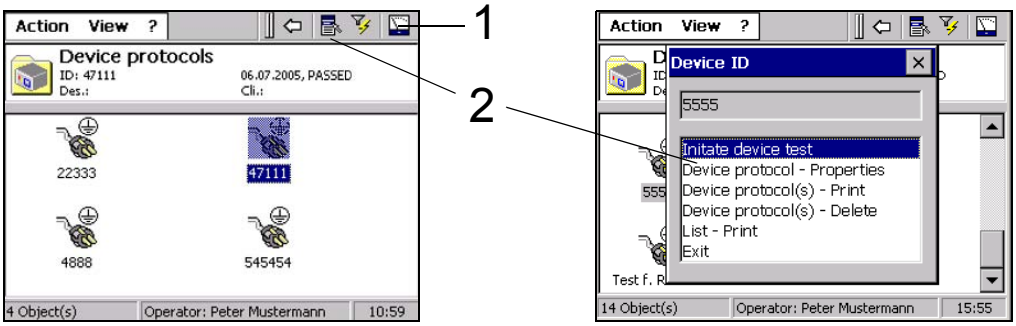


If a very large number of device IDs are saved in the "Device protocols" folder, you can achieve a better overview by selecting the display type "List" or "Details" under "View".
You can also achieve a better overview by using the selection filter.

5.5.2 This is how you start a test from the "Device protocols" folder

Click on the required device ID and then proceed as follows:

- Click on the "Measuring instrument" icon in the toolbar (1),
- **or** click on the "Context menu" icon in the toolbar and then on "Initiate device test" (2).

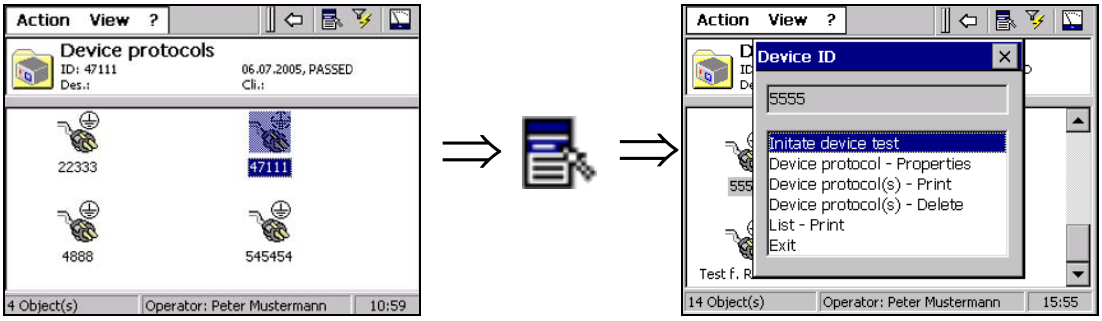


5.5.3 "Device protocols" folder: Start test and edit protocol

The "Context menu" in the toolbar is used to edit a device protocol that is saved under a device ID. Proceed as follows:

1. Click on device ID.
2. Click on the "Context menu" icon in the toolbar.
3. Select the required action.

The device protocol can also be edited after a double click in the device ID. Please remember that the following restrictions apply.



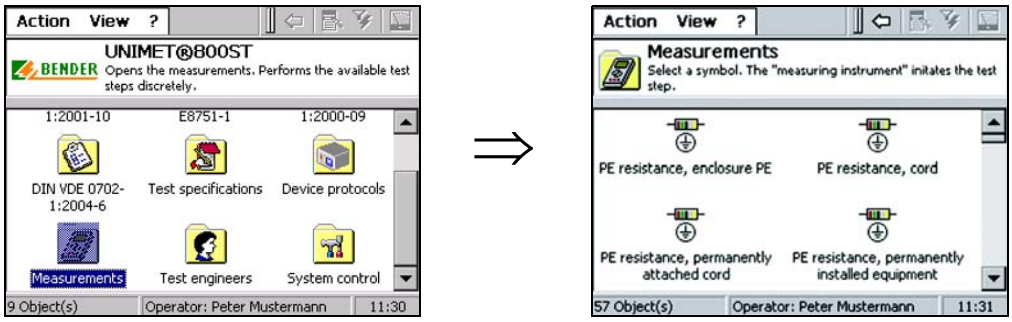
Initiate device test	Starts the test. When the test is completed, save the test results in the "Device protocols" folder. The old device protocol will be overwritten.
Device protocol - Properties	Fundamental changes that affect the electrical tests can only be made by carrying out a new classification. Here, it is only possible to edit the following functions: **Tab:** Properties **Function:** - Serial no. - Manufacturer - Designation - Client - Building - Department - Room - Test costs - Comment - Date of the next test
Device protocol(s) - Print	Prints highlighted device protocols.
Device protocol(s) - Delete	Deletes highlighted device protocols.
Print - List	Prints list of of highlighted device protocols.
Exit	The device protocol remains unchanged. The "Context menu" function is exited.

5.6 Single measurement

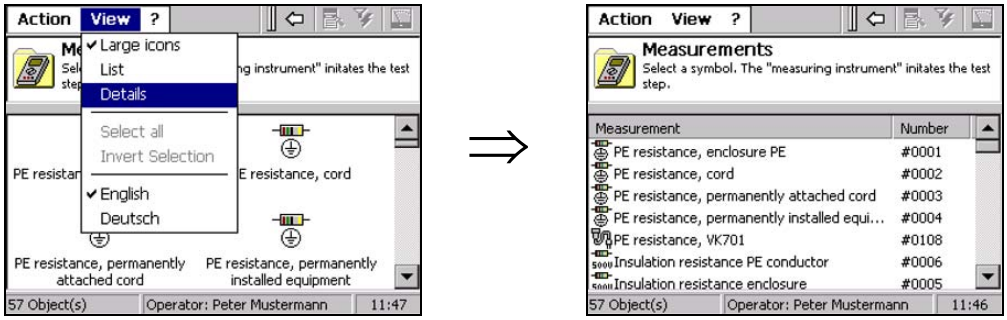
Test steps can be called up as single measurements and repeated as required. If, for example, a limit value has been exceeded during the classified test sequence, the test step in question can be examined more closely using a single measurement.

5.6.1 This is how you access "Single measurements"

Select "Single measurements" in the main folder.

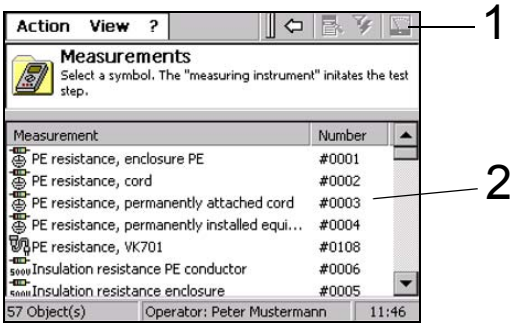


In order to get better overview of the numerous single measurements, select the display type "List" or "Details" under "View".



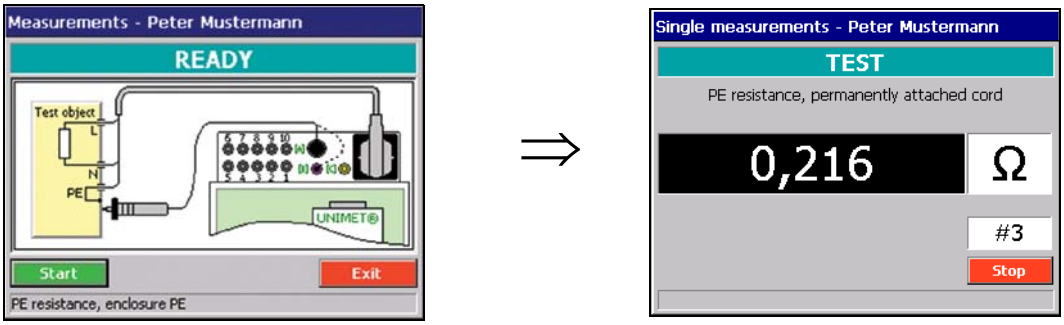
5.6.2 This is how you start a "Single measurement"

- Highlight the required measurement and then click on the "Measuring instrument" icon in the toolbar (1)
- **or** double click on the required measurement (2).



Example: Measurement of the PE conductor resistance of a device with a fixed supply cord.

During the PE conductor test, the low-resistance continuity of the PE conductor is tested at a high current level (> 8 A). This creates thermal energy.
If the PE conductor test is repeated very often and without an interval during a manual or semi-automatic test sequence or during a single measurement, the UNIMET® 800ST will prevent overheating by terminating the test. A message will be displayed. A new test of the PE conductor will be possible after a short cooling-down period.



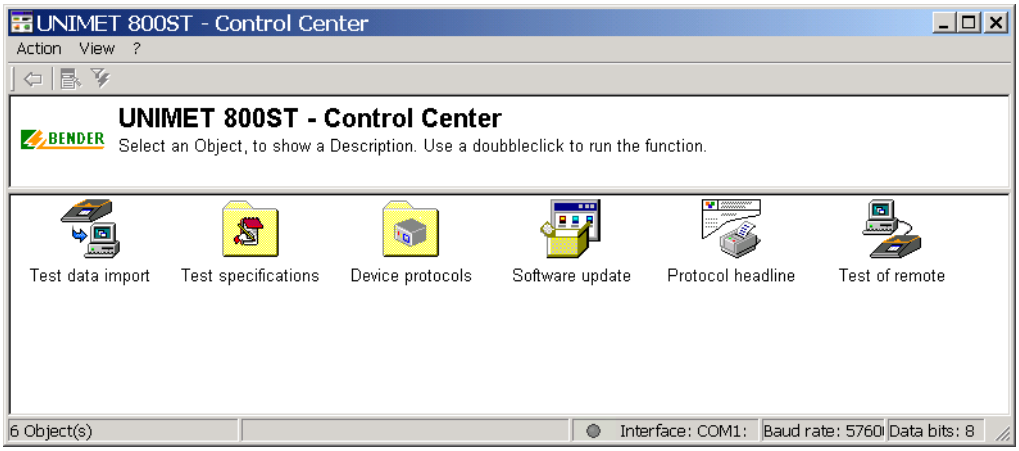
Start	Starts the test step.
Exit or Stop	Exits the test step.

6. Functions of the UNIMET® 800ST that can be used via a PC

6.1 System requirements, functions, preparations

The UNIMET® 800ST can be connected to a PC using the null-modem cable that comes with the unit. Various device management programs support the communication with the UNIMET® 800ST or even allow the testing device to be controlled remotely. If you wish to create your own software, we can, on request, provide you with the complete command set of the UNIMET® 800ST.

The PC software "UNIMET800ST-Control Center" provides tools that are used, e.g. for software update, test of remote control and test data management.
The software is designed to operate on a PC with the operating system Windows® NT, Windows® 2000 or Windows® XP.
This program uses Microsoft® MDAC (MDAC = Microsoft Data Access Components). MDAC is required by programs which include a data base. The operating systems Windows® Me/ 2000/XP already include MDAC. When database functions of the "UNIMET800ST-Control Center" do not operate properly, we recommend to install MDAC 2.8.



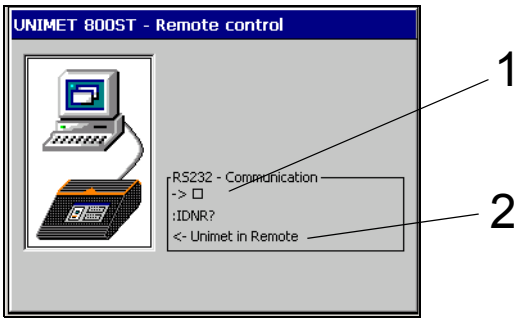
Test data import	Imports test specifications and device protocols from the test system. The selection filter set in UNIMET® 800ST can be used to preselect data.
Test specifications	Test specifications stored on the PC are listed. Selected test specifications can be exported, printed (with logo and header text) or deleted.
Device protocols	Device protocols stored on the PC are listed. Selected device protocols can be exported, printed (with logo and header text) or deleted.
Software Update	To update the operating software of the UNIMET® 800ST.
Protocol headline	A logo and a header text for the print-out of test data can be entered here. Which can be stored and transferred to the UNIMET® 800ST test system.
Test of remote control	Tests the communication between UNIMET® 800ST and a PC. Information can be queried and single measurements can be carried out.

6.1.1 This is how you prepare the UNIMET® 800ST for communication with a PC

1. Install the software (e.g. „UNIMET800ST-Control Center") on your computer.
2. Connect the UNIMET® 800ST to the PC using the null-modem cable.
3. Switch the UNIMET® 800ST on and stay in the main folder.
4. Start the PC software.

6.2 Test of remote control

UNIMET® 800ST continuously checks its RS-232 interface. The remote control mode cannot be used whilst UNIMET® 800ST is carrying out a device test or a single measurement. If you still try to send a command, UNIMET® 800ST will send the reply #INUSE#. During the back-up of test data and the operating software or during printing, the remote control is switched off.
If a command is received while the UNIMET® 800ST is ready to process commands, it will switch to the remote mode. Normally, testing device UNIMET® 800ST receives these commands from a device management software. When a connection is successfully established, the following message appears on UNIMET® 800ST:



1 Command received from UNIMET® 800ST.

2 Reply sent by UNIMET® 800ST.

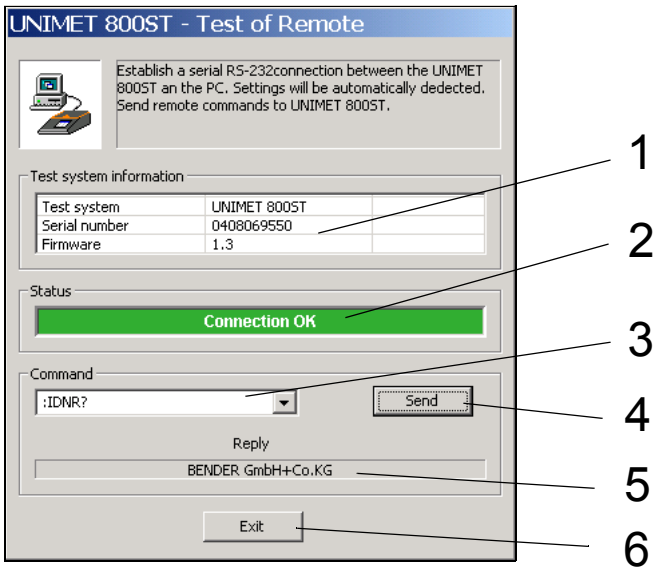
6.2.1 Testing the remote control function

In the event of a communication fault between a device management software and the UNIMET® 800ST, the cause of the error can be narrowed down. If the PC and the UNIMET® 800ST communicate successfully, the hardware (PC, null-modem cable, the UNIMET® 800ST) can be excluded as being the cause of the fault.

1. Start the PC software "UNIMET800ST-Control Center".
2. Activate the function "Test of remote control".
3. Enter a valid command (3, see next page).
4. Click on "Send" (4, see next page).

If the communication is successful, UNIMET® 800ST will sent a reply to the PC. This reply will be displayed on the screen of the PC (see screen display on the following page).

The UNIMET® 800ST also confirms the successful connection on its own display.



1 Display of the serial number and firmware version of the connected UNIMET® 800ST.

2 Provides information on the status of the connection to the UNIMET® 800ST.

3 Input or selection of a command from the list.

4 Sends the command to UNIMET® 800ST.

5 Displays reply from UNIMET® 800ST.

6 Exits the function "Test of remote control".

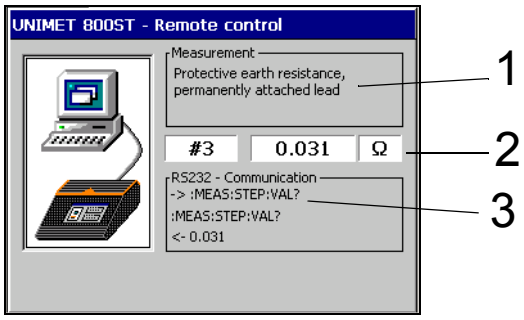
6.2.2 Extract from the command list of the UNIMET® 800ST

Command	Argument	Comment
:MEAS		Start of the tree :MEAS.
:MEAS:STEP	MESSNR	Start of a test step. The required separator is a SPACE. e.g. :MEAS:STEP 3.
:MEAS:STEP:VAL?		The measured value of the test step previously started is queried.
:MEAS:STEP:EXIT		Exits the test step.
:MEAS:STEP:UNIT?		The unit of the previously started test step is queried.
:MEAS:STEP:NAME?		The measurement name (complete) of the previously started test step is queried.
:MEAS:STEP:SHOR?		The measurement name (short form) of the previously started test step is queried.
:IDNR?		Manufacturer of the testing system is queried.
:IDNM?		Device designation of the testing system is queried.
:IDNF?		Firmware is queried (software version of the measurement technique module).
:IDNH?		Hardware version of measurement technique module is queried.
:IDNS?		Serial number of the device is queried.

6.2.3 Example: Remote control of the PE conductor resistance measurement

The PE conductor resistance of a device with power supply cord is to be measured.

1. Connect the DUT to the UNIMET® 800ST.
2. Start the PC software "UNIMET800ST-Control Center" and activate the function "Test of remote control".
3. Start the PE conductor resistance measurement with the command **:MEAS:STEP 3** .
4. Then query the measured value with the command **:MEAS:STEP:VAL?** .
   UNIMET® 800ST displays the following:



1 Current test step

2 Measurement number, measured value, unit

3 Current command tree

5. Exit the measurement with the command: **MEAS:STEP:EXIT.**

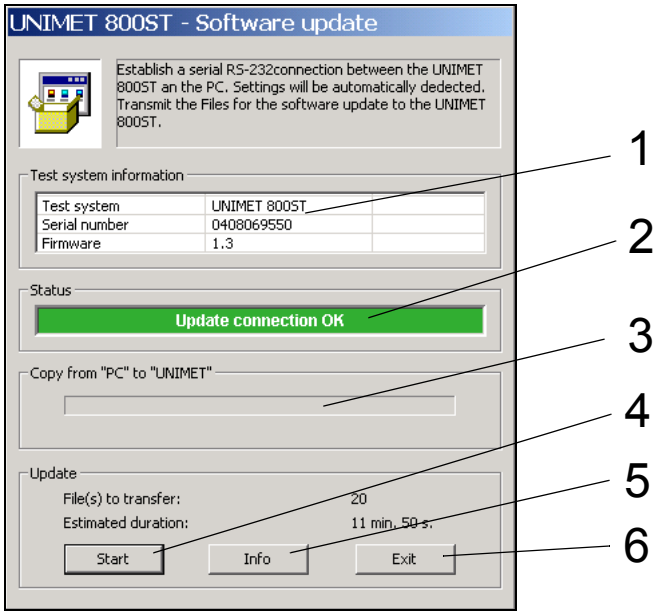
6.3 Software update

If an update is necessary, proceed as follows:

1. Ask BENTRON® to forward the software update for UNIMET® 800ST.
2. Backup the old operating software and its test data (e.g. to an USB stick, see chapter "4.5.5 Backup (USB)" on page 31).
3. Install the software update for UNIMET® 800ST on your PC.
4. Start the PC software "UNIMET800ST-Control Center" and activate the function "Software update". The update will be carried out in two steps:
   - Step 1: Transfer of the update files from the PC to the UNIMET® 800ST.
   - Step 2: Update of the operating software in UNIMET® 800ST.

6.3.1 Step 1: Transferring the update files

1. Interface parameters are automatically determined.
2. Click on "Start" (4).
3. Wait until all the files are transferred.
4. Click on "Exit" (6) to exit the function "Software Update".
5. Switch the UNIMET® 800ST off at the mains.



1 Display of the serial number and firmware version of the connected UNIMET® 800ST.

2 Provides information on the status of the connection to the UNIMET® 800ST.

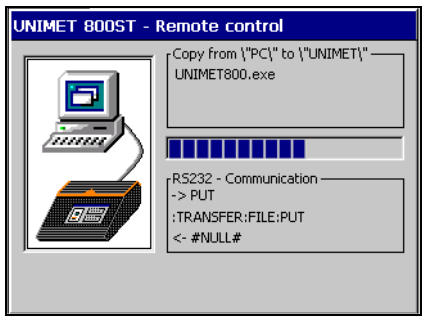
3 Provides information on the progress of the update.

4 Starts the update.

5 Provides information about the properties of the update files.

6 Aborts or exits the update.

You will see the following display on UNIMET® 800ST while the data is being transferred:

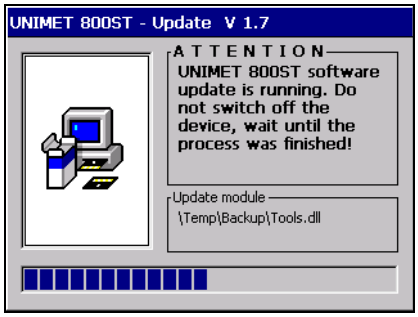


6.3.2 Step 2: Updating the operating software

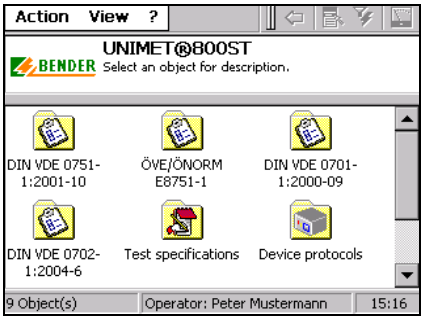
The update procedure must not be interrupted. Do not switch off the supply voltage to the UNIMET® 800ST during the update. Failure to observe this can result in the operating software of the testing device being destroyed.

Each time the UNIMET® 800ST is switched on it checks whether update files are available for a new software.

1. Switch the UNIMET® 800ST on at the mains. The update will start automatically. The progress of the update is displayed.



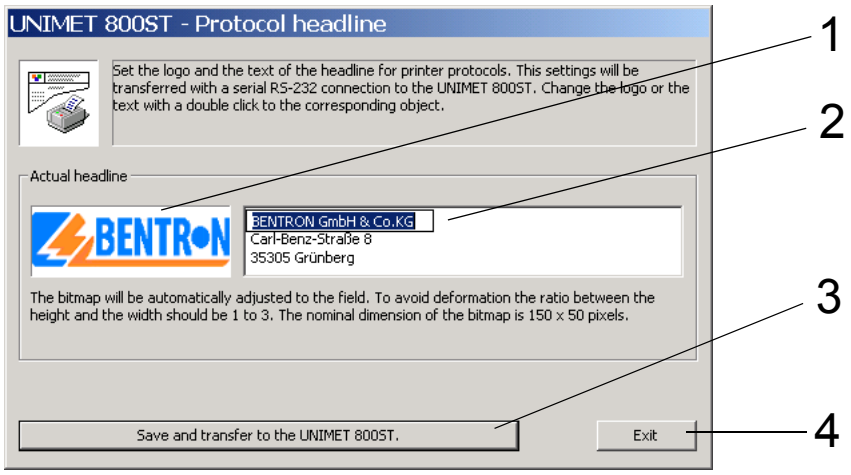
2. Wait until the UNIMET® 800ST has updated its files. When the update procedure is completed, the main folder appears on the display.



6.4 Header text for print-out, test data import , data management

6.4.1 Input of logo and header text

Allowes you to insert a logo and header text for the test data print-out. The logo and the header text can be stored and transferred to the UNIMET® 800ST test system.



1 Logo for test data print-out. Double click to select another logo (BMP file).

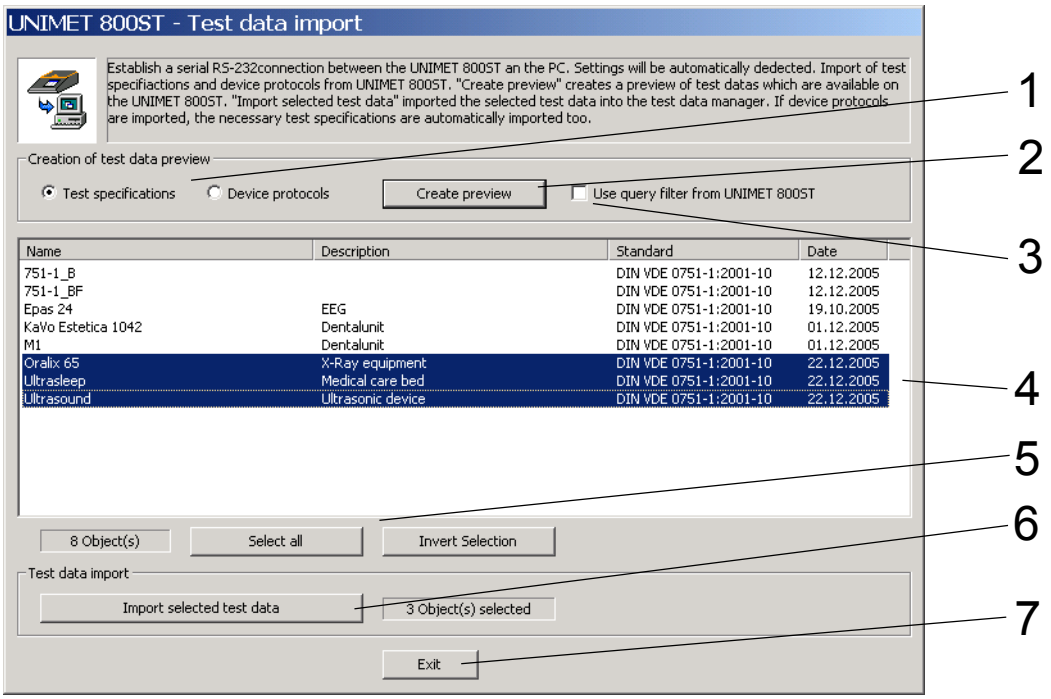
2 Header text for test data print-out. Double click on a text line to enter another text.

3 Saves and transfers logo and header text to the UNIMET® 800ST. print-out of printers connected to the UNIMET® 800ST will be with this logo and header text than.

4 Exits the function "Protocol headline".

6.4.2 Test data import

Imports either test specifications or device protocols. A preview appears showing which test data can be imported. The selection filter of the UNIMET® 800ST can be used to preselect test data. Highlight test data entries to determine which data is to be imported.



1 Select test specifications or device protocols to be imported from the test system.

2 Create a preview of the data to be imported. Click on individual entries or groups to highlight them.

3 If activated: Use the selection filter set in UNIMET® 800ST.

4 Preview: Select the test specifications or device protocols to be imported.

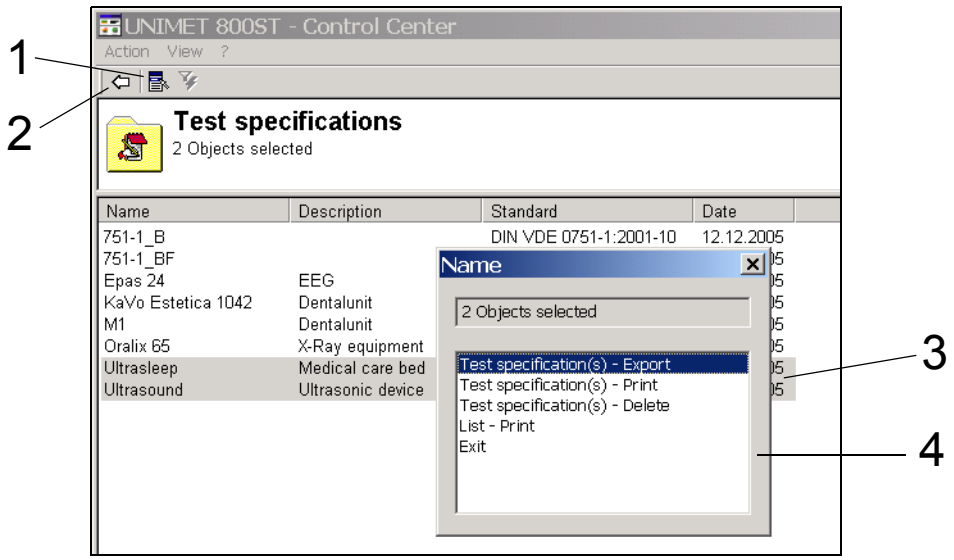
5 Further possibilities for selection: "Select all" or "Invert selection".

6 Imports test data of highlighted type. The import of device protocols always includes the import of the associated test specifications.

7 Exits the function "Test data import".

6.4.3 How to export, print or delete test specifications

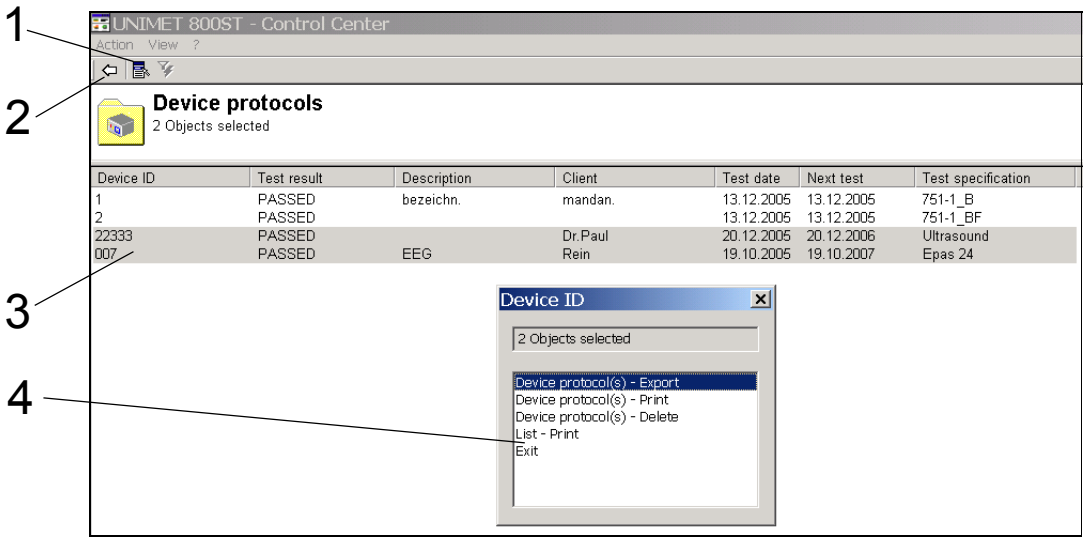
1. Highlight individual or several test specifications to determine which test specifications are to be exported, printed or deleted.
2. Click on the "Context menu" icon in the toolbar (or the respective button on the keyboard or the right hand button of the mouse).
3. Select the required action with a double click.



1	Context menu icon
2	Exits the function "Test specifications".
3	Selected test specifications
4	- Exports the highlighted test specifications - Prints the highlighted test specifications (limit values, test steps) with logo and header text - Deletes the highlighted test specifications - Prints a list of the highlighted test specifications - Exits the context menu

6.4.4 How to export, print or delete device protocols

1. Highlight individual or several device protocols to determine which device protocols are to be exported, printed or deleted.
2. Click on the "Context menu" icon in the toolbar (or the respective button on the keyboard or the right hand button of the mouse).
3. Select the required action with a double click.



1 Context menu icon

2 Exits the function "Device protocols".

3 Selected device protocols

4 - Exports the highlighted device protocols
- Prints the highlighted device protocols (measuring values, test results) with logo and header text.
- Deletes the highlighted device protocols
- Prints a list of the highlighted device protocols
- Exits the context menu

6.4.5 How to save a backup of the test database

The hard disk of the PC is no safe place to keep your data. You can prevent data loss by saving a copy of test data management's test database. Save the test database "user2.mdb" to a separate data medium on a regular basis. The test database can be found in the folder "C:\Dokuments and settings\All Users\Application data\UNIMET 800ST - Control Center".

7. Maintenance and calibration

7.1 Calibration

Similar to all measuring devices, the measured values of the UNIMET® 800ST need to be checked regularly. The calibration interval is 36 months. The calibration and adjustment of the testing system may only be carried out by BENTRON® or persons who have been authorized by BENTRON®.

7.2 Changing the battery

The clock of the UNIMET® 800ST is operated by a battery that has a lifespan of approx. three years. The battery of the testing system may only be changed by BENTRON® or persons who have been authorized by BENTRON®.

The battery is always replaced by BENTRON® during the calibration process.

7.3 Maintenance

No maintenance is necessary other than the maintenance that is carried out during the scheduled calibration processes.

7.4 Device faults

UNIMET® 800ST continuously monitors its device functions. If a fault occurs, a message will be shown on the display in plain text.
Proceed as follows:

1. Make a note of the error message.
2. Switch the UNIMET® 800ST off and disconnect from the mains.
3. Make a note of what happened in the run-up to the error: operating steps, type of DUT, ambient conditions etc.
4. Have the serial number of the device at hand.
5. Contact Technical Service at BENTRON® and explain the fault type.

8. Data

8.1 Standards

8.1.1 Applied standards

The UNIMET® 800ST carries out measurements and tests that are based on the following standards:

- DIN VDE 0751-1(VDE 0751 Part 1):2001-10
  "Repair, modification and testing of medical electrical devices".
- DIN VDE 0701-1 (VDE 0701 Part 1):2000-09
  "Repair, modification and testing of medical electrical devices, General Requirements."
- DIN VDE 0702-1 (VDE 0702 Part 1):2004-06
  "Periodic testing of electrical devices"
- ÖVE/ÖNORM E 8751-1+A1/Edition 2003-05-01
  "Periodic test and test after repair of medical electrical devices, Part 1: General Requirements."

8.1.2 Design standards

The UNIMET® 800ST was designed in accordance with the following standards:

- DIN VDE 0404-1 (VDE 0404 Part 1):2002-05
  "Testing and measuring devices for the testing of the electrical safety of electrical equipment - Part 1: General Requirements."
- DIN VDE 0404-2 (VDE 0404 Part 2):2002-05
  "Testing and measuring devices for the testing of the electrical safety of electrical equipment - Part 2:": Testing equipment for tests after repairs, modification, or for periodic tests."
- DIN VDE 0404-3 (VDE 0404 Part 3):2005-04
  "Testing and measuring equipment for testing the electrical safety of electrical devices - Part 3: Equipment for periodical tests and tests prior to commissioning medical electrical devices or systems."

8.1.3 Terms used

The terms used originate predominantly from the standards which the UNIMET® 800ST uses as a basis for testing.

Term	Explanation
Detachable power supply cord	Flexible cord intended to be connected to electrical equipment by means of a suitable appliance coupler for mains supply purposes.
ME equipment	Medical electrical equipment provided with not more than one connection to a particular supply mains intended by its manufacturer to be used in the: a) diagnosis, treatment or monitoring of a patient; and has an applied part or transfers energy to or from the patient or detects such energy to or from the patient; or b) for compensation or alleviation of disease, injury or disability...
Applied part (AP)	Part of ME equipment that in normal use necessarily comes into physical contact with the patient for ME equipment or an ME system to perform its function...
F-type isolated (floating) applied part	Applied part in which the patient connections are isolated from other parts of the ME equipment to such a degree that no current higher than the allowable patient leakage current flows if an unintended voltage originating from an external source is connected to the patient, and thereby applied between the patient connection and earth.
Type B applied part 	Applied part complying with the specified requirements of IEC 60601-1 to provide protection against electric shock, particularly regarding allowable leakage current and patient auxiliary current.
Type BF applied part 	F-type applied part complying with the specified requirenments of IEC 60601-1 to provide a higher degree of protection against electric shock than that provided by Type B applied parts.
Type CF applied part 	F-type applied part complying with the specified requirements of IEC 60601-1 to provide a higher degree of protection against electric shock than that provided by Type BF applied parts.
Accessible part	Part of electrical equipment other than an applied part that can be touched by means of a standard test finger.
Direct cardiac application	Use of applied part that can come in direct contact with the patient's heart.
Electrically skilled person	Person with relevant education and experience to enable him or her to perceive risks and to avoid hazards which electricity can create.
Permanently installed	Meaning electrically connected to the supply mains by means of a permanent connection that can only be detached by the use of a tool.
Class I ME equipment	ME equipment in which protection against electric shock does not rely on basic insulation alone, but which includes additional safety precaution in that means are provided for accessible parts of metal or internal parts of metal to be protectively earthed.

Term	Explanation
Class II ME equipment 	ME equipment in which protection against electric shock does not rely on basic insulation only, but in which additional safety precautions such as double insulation or reinforced insulation are provided.
Internally powered	Adjective referring to electrical equipment that is able to operate from an internal electrical power source.
Measuring device (MD)	Measuring device. The measuring device must load the source of the leakage current with a specific impedance. In the case of alternating current, the measuring device must have a specific frequency curve. Detailed information is provided in the standard relating to the DUT.
Mains part (MP)	Electrical circuit that is intended to be connected to the supply mains.

8.2 Test steps

A classified test sequence with UNIMET® 800ST comprises several individual test steps. The test steps are sorted according to measurement numbers.

Measurement number	Designation
1	PE resistance, enclosure PE
2	PE resistance, cord
3	PE resistance, fixed supply cord
4	PE resistance, permanently installed equipment
5	Insulation resistance enclosure
6	Insulation resistance PE conductor
44	Substitute device leakage current Class I AP PE conductor
45	Substitute patient leakage current Class I
46	Substitute device leakage current Class II AP enclosure
47	Substitute patient leakage current Class II
53	Insulation resistance AP PE conductor
54	Insulation resistance AP enclosure
80	Load current
81	Operating voltage
82	Power consumption
108	PE resistance, VK701

Measurement number	Designation
109	Substitute device leakage current Class I
110	Substitute device leakage current Class II
111	PE current direct test
112	PE current direct test ph. rev.
113	PE current residual current
114	PE current residual current ph. rev.
115	Touch current direct test
116	Touch current direct test ph. rev.
117	Touch current residual current
118	Touch current residual current ph. rev.
120	Insulation resistance cord L1+L2->PE
121	Insulation resistance cord VK701 L1->PE
122	Insulation resistance cord VK701 L2->PE
123	Insulation resistance cord VK701 L3->PE
124	Insulation resistance cord VK701 N->PE
125	Insulation resistance cord VK701 L1 L2 L3 N->PE
151	Continuity VK701 L1
152	Continuity VK701 L2
153	Continuity VK701 L3
154	Continuity VK701 N
155	Conductors not reversed VK701 L1->L2
156	Conductors not reversed VK701 L1->L3
157	Conductors not reversed VK701 L1->N
158	Conductors not reversed VK701 L2->L3
159	Conductors not reversed VK701 L2->N
160	Conductors not reversed VK701 L3->N
210	Device leakage current Class I direct test
211	Device leakage current Class I direct test ph. rev.
212	Device leakage current Class I residual current
213	Device leakage current Class I residual current ph. rev.
214	Device leakage current Class II direct test

Measurement number	Designation
215	Device leakage current Class II direct test ph. rev.
216	Device leakage current Class II residual current
217	Device leakage current Class II residual current ph. rev.
280	Patient leakage current U-AP
282	Patient leakage current ph. rev. U-AP
284	Substitute patient leakage current int. power source
286	Patient leakage current DC
289	Patient leakage current DC ph. rev.
292	Patient leakage current AC
295	Patient leakage current AC ph. rev.

8.3 Technical data

Supply voltage ..... AC 90 ... 264 V
Frequency range ..... 50 ... 60 Hz
Power consumption ..... max. 80 VA
Load current ..... max. 16 A
Connectable load at 230 V ..... max. 3700 VA
Type of protection ..... Class II equipment

PE conductor resistance test

Measuring range ..... 0.001 Ω ... 29.999 Ω
Short-circuit current ..... max. 8 A
Test voltage ..... max. 8 V, system frequency
Measuring accuracy ..... 0.001Ω ... 1.0 Ω: ± 2.5% of the measuring value ± 2 digits
..... 1.001Ω ... 29.999 Ω: ± 5% of the measuring value ± 2 digits

Insulation resistance

Measuring range ..... 0.01 MΩ ... 299.9 MΩ
Test voltage ..... max. DC 550 V
Test current ..... max. 10 mA
Measuring accuracy ..... ± 5% of the measuring value ±2 digits

Substitute leakage current

Measuring range ..... 0.001 ... 19.99 mA
Test voltage ..... max. AC 250 V
Test current ..... max. 3 mA
Measuring accuracy ..... ± 5% of the measuring value ± 5 digits

Leakage current according to the residual current measuring method

Measuring range ..... 0.02 mA ... 19.99 mA
Measuring accuracy ..... ± 5 % of the measuring value ± 2 digits

Voltage measurement

Measuring range ..... 90 ... 264 V
Frequency range ..... 50 ... 60 Hz
Measuring accuracy ..... ± 2.5 % of the measuring value, ± 2 digits

Load current measurement

Measuring range ..... 0.01 A to 16 A
Frequency range ..... 50 ... 60 Hz
Measuring accuracy ..... ± 2.5 % of the measuring value, ± 3 digits

Apparent power

Measuring range ..... 5 ... 3600 VA
Frequency range ..... 50 ... 60 Hz
Measuring accuracy ..... ± 2.5 % of the measuring value, ± 2 digits

General data

EMC IEC61326-1
Operating temperature ..... 0 °C ... + 40 °C
Storage temperature ..... -10 °C ... + 70 °C
Relative humidity (up to 31 °C) ..... max. 80%
Relative humidity (>31 ...40 °C) ..... linear decreasing, max. 50 %
..... condensation must be avoided
Protection class IP20
Dimensions (without bag) ..... approx. 168 x 272 x 124 mm (W x D x H)
Weight (without accessories and bag) ..... approx. 3.5 kg
Calibration interval ..... 36 months

8.4 Ordering information

Type	Comment	Article no.
UNIMET® 800ST Standard	Testing system for medical electrical and electrical equipment; Test in accordance with DIN VDE 0751, DIN VDE 0701 and DIN VDE 0702; Us: AC 100…240 V, max. load 3500 VA, PE test current approx. 8 A Plug/socket outlet: earthing contact (German)	B 9602 8000
VK701-6	Earthing contact adapter	B 9602 0067
VK701-7	Adapter non-heating apparatus	B 9602 0066
Interface cable RS-232/RS-232	Cable for connecting the testing system to a PC, 9 pole, jack-jack (null-modem cable)	B 9601 2012
TP800	Active test probe with switch	B 9602 0080
Active test probe	Measuring cable 3 m with black test probe	B 928 748
Cable, 150 cm	Measuring cable, 150 cm, 4 mm plug	B 928 703
Test clip	Test clip, black	B 928 741
Printer	Ink jet, A4	B 9602 0081
Stylus Pen	Touch screen stylus	B 928 749

Other versions and software on request.

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Manufacturer:

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