

# UNIMET® 1100ST

The universal test system for medical electrical devices and electrical equipment for industrial applications  
– fast, reliable, convenient



# UNIMET® 1100ST – The test system which offers safety for the future

## UNIMET® 1100ST – a universal test system

The increasing use of electrical equipment in hospitals and in industry places a high premium on their reliable performance.

Any possible equipment faults and functional failure involve high levels of risk to human beings and to associated equipment.

It pays to guard against these risks by testing the electrical safety of such items of electrical equipment for industrial applications and medical electrical devices after production and in daily use. In this way, the safety of the user is ensured and the availability of the equipment is increased, which in the end reduces costs.

The UNIMET® 1100ST is a compact, universal testing system for testing according to all appropriate standards.

## Quality management as required by ISO 9001 in respect of manufacturers of medical electrical equipment

Manufacturers of medical electrical equipment who are certified under ISO9001 must provide evidence that the products have been tested and that they have met the specified requirements. The basis for the testing activity is also the IEC 60601-1 or the version applicable in a specific country.

In this context it is especially advantageous that the UNIMET® 1100ST itself is manufactured and calibrated under the requirements of ISO 9001.

## Electrical equipment

The daily use of electrical equipment makes it easy to quickly forget the dangers which can arise from defective equipment. Even in industry, defective equipment items can be the cause of interruptions to production and the exposure of personnel to danger. Here, too, periodic testing can provide the remedy.

The basis for this is DIN VDE 0701 "Repair, modification and testing of medical electrical equipment." DIN VDE 0702 should be used for regular periodic testing.



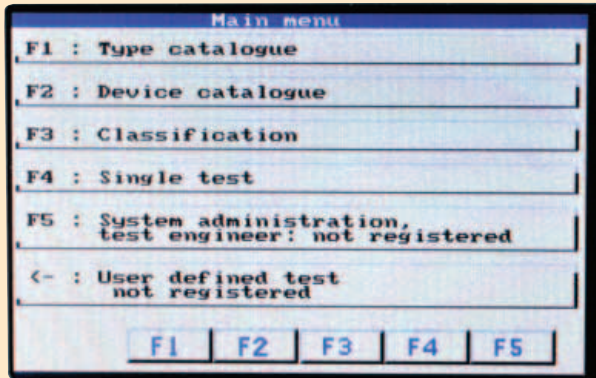
### Tests conforming to standards:

- ▶ IEC 60601-1: 1998 + A1: 1991  
+ A2: 1995
- ▶ ANSI / AAMI ES1
- ▶ UL 60601-1
- ▶ IEC 61010-1: 2001-02
- ▶ DIN VDE 0751-1: 2001-10
- ▶ DIN VDE 0701-1: 2000-09
- ▶ DIN VDE 0702: 2004-06



# Simple handling thanks to the catalogue system

The type and device catalogue which is integrated into the UNIMET® 1100ST system provides a basis for testing that will save time as well as money.



## Classification

For new devices which are not yet entered in the type catalogue, the necessary test steps and the associated limit values are quickly and reliably determined thanks to dialogue between the UNIMET® 1100ST and the test engineer.

This classification scheme is then stored in the type catalogue, so to speak as a set of test regulations for a specified type of device, and it is consequently available to be called up for all other devices of this type.

## Type catalogue

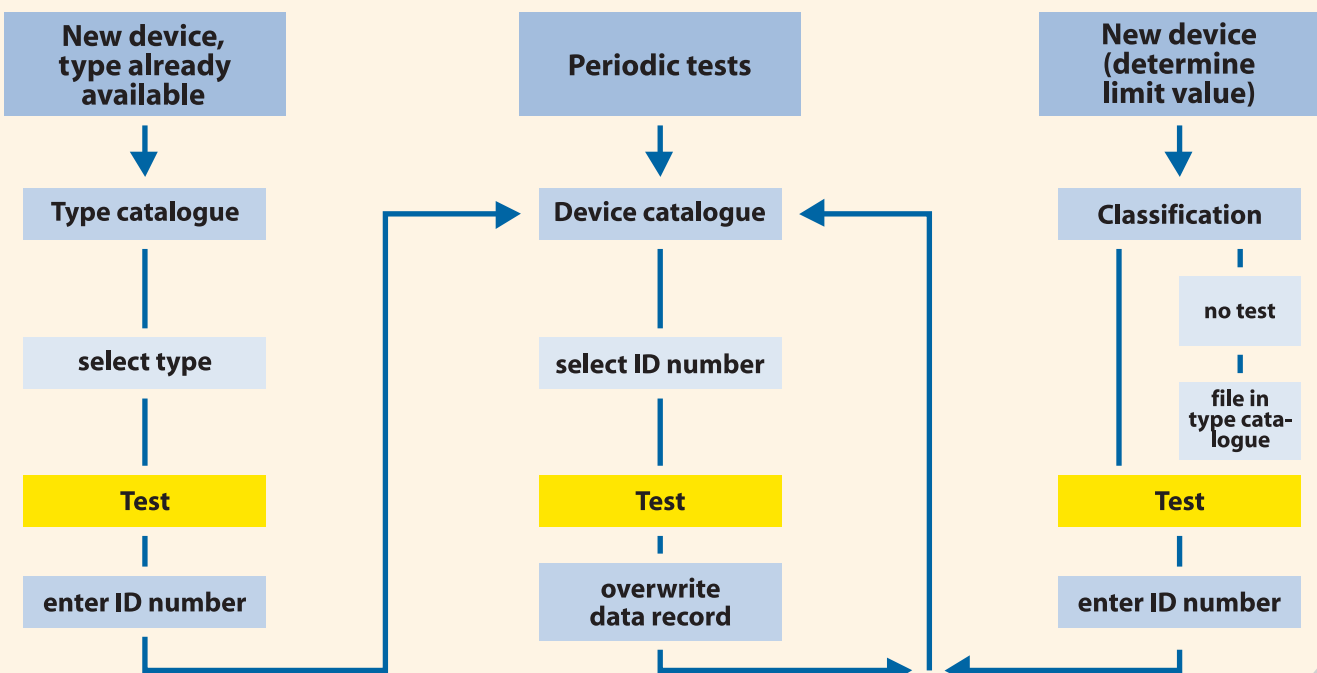
In the type catalogue records the classification features of the devices according to the type designations, for example: drilling machine XY, infusion pump AFX. When a new device is tested for the first time and its type is already available in the master device data, all that is necessary is to call up the type designation. After it has undergone testing, the DUT is stored under the identification number in the device catalogue.

This means an enormous amount of time is saved when new purchases are made. Another advantage: all devices of the same type are tested under the same conditions.

## Device catalogue

In the device catalogue, the data for the individual devices are stored according to the identification numbers. For periodic tests, all that need to be called up via the keyboard or barcode is the identification number.

Connect the DUT – perform the test – and that's all. This means enormous savings on time and costs for repeat tests. This procedure providing a clear "passed / failed" verdict enables not only skilled persons but also instructed persons to carry out reliable tests.



# Easy operation, safe and simple

## Mobile and international

The compact and robust device is designed for mobile use. International standards, a choice of national languages and a long-range mains part make UNIMET® 1100ST the ideal testing device for international use.

## Open system concept

The multi-interface concept allows simple control of external add-on devices, or permits the UNIMET® 1100ST itself to be controlled from a PC. This makes the device flexible, for example in final inspection and testing of devices.

## Data memory

The integrated data memory allows 1000 data records to be stored in the type catalogue and the device catalogue.

## Interfaces

The measurement data can be exchanged directly between UNIMET® 1100ST and a PC via the RS232 interface or USB interface. A standard commercial PC printer can be connected to the Centronics interface or USB interface. It is also easy to implement software updates via the RS232 interface, for example when standards are modified.



Socket outlet – Active test probe

### Socket outlet

Devices up to a maximum load of 3.8 kVA (16 A) can be connected to the socket outlet. Sufficient enough to test also high-power equipment, such as laser equipment, during operation (also three-phase devices with DS601).

### Active test probe

Test probe with integrated switching contact, which starts the measurement. This is particularly beneficial for testing large equipment.

### Connection to applied part

With ten jacks and automatic switchover, for example to the patient auxiliary current and patient leakage current measurement in conformity with IEC 60601-1.

### TM 1000 keyboard module

The keyboard module is integrated into the front cover for direct entry of ID numbers, type of equipment and other information.



Connection to applied part – TM 1000 keyboard module



Function keys – Protective conductor test current

### Function keys

Operation is made very simple thanks to the ergonomically arranged function keys and the user-friendly graphic display.

### Protective conductor test current

Standard 10 A – Optional 25 A

**Note:** Country-specific test sockets / connecting cables are available on request.



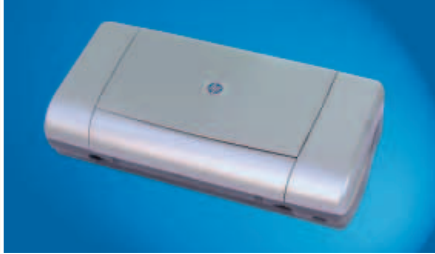
Interfaces



UNIMET® 1100ST

# Extensive range of accessories

## Accessories (optional):



**Inkjet printer**

### Inkjet printer

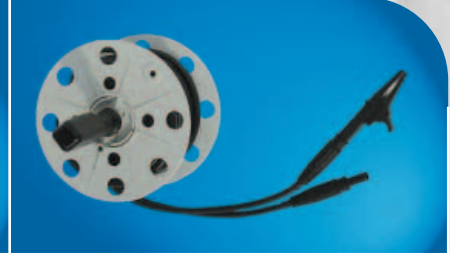
For immediate print-outs of test protocols in DIN A4 format.



**Barcode scanner**

### Barcode scanner

For rapid identification of the DUT.



**TP16 cable drum**

### TP16 cable drum

For convenient PE conductor measurement on large equipment.

### VK701 adaptor

For testing extension cords and power supply cords, CEE connectors and power supply cords with earthing pins. The automatic test includes checking the wiring and the connection between the individual poles of the plug and the socket outlet. In addition, the insulation resistance of the conductors against the PE conductor is measured.



**VK701 adaptor**



**TB3 testbox for safety tester**



**Trolley TW1000 for easy transport**

### T1000 carrying bag

For convenient storage of the UNIMET® 1100ST, the printer, barcode wand, cables, etc.

### PK3 test kit

Contains a number of adaptors to connect medical electrical equipment to the UNIMET® 1100ST.

### DS601 three-phase adaptor

To test medical electrical three-phase DUTs in operating condition, according to IEC 60601-1.



**T1000 carrying bag**



**PK3 test kit**



**DS601 three-phase adaptor**

# Two partners which understand one another...

Modern equipment management aims for high availability of the equipment and cost saving, and nowadays this calls for more than simple measurement. There is a demand for targeted relief from burdensome routine work, such as documentation. UNIMET® 1100ST offers variable paths towards this goal, which can be coordinated with the requirements in each case and are consistently adaptable to the practical requirements. A particularly advantageous feature here is the bi-directional transfer of data between the UNIMET® 1100ST and the PC. Measurement data can be transmitted to the PC and / or to a equipment management program. In the other direction, the equipment which is due for testing can be transmitted back to UNIMET® 1100ST, where it is ready to be called up from the device catalogue. This saves an enormous amount of time and also avoids transmission errors.

## Your advantages:

- Transparency of costs and services
- Time pressure on test engineers is relieved
- Paper-free test procedures
- Transmission errors are avoided
- Significant reduction of costs for documentation and device stock maintenance
- Optimised deployment of personnel

## A practical example: Equipment management in hospitals and industry

The high volume of investment tied up in extensive stocks of devices calls for a modern equipment management system. This not only fulfils the legal requirements, but also allows weak points to be detected at an early stage and creates transparency of costs and services. As a result, the decisions to be taken about new investments are made easier.

The data exchange between the UNIMET® 1100ST and high-performance software packages such as vFM and MTDATA guarantees time-saving transfer of data without paper. The data are then available in the PC, to be used (for example) as the basis for taking decisions on future procurement of devices. In combination with vFM or MTDATA, UNIMET® 1100ST therefore represents a major contribution towards cutting costs.

## Data transfer software UNIData1100

The UNIData1100 data transfer software is used for data exchange between a PC and UNIMET® 1100ST via an RS232 interface. It manages data, enables test protocols to be printed out and can also be used to back up data.

## Practical example: Final inspection and testing after production

Your own test regulations for final inspection can be compiled, taking the individual requirements of the device manufacturer into account. In the final inspection department, UNIMET® 1100ST can be remote-controlled by a PC. The measurement results can be transferred into routine test certificates. In this way, UNIMET® 1100ST assists with the requirement to reduce the time taken for testing, and to satisfy quality guidelines such as ISO 9001.



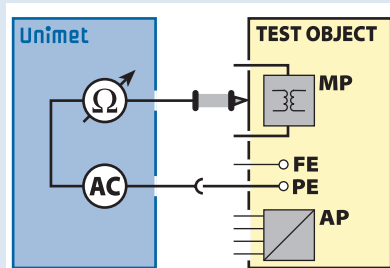
# Measurement carried out accurately in compliance with the standards

## Protective conductor

### Protective conductor resistance

The principle of measurement is identical for IEC 60601-1, VDE 0751, VDE 0701, VDE 0702. The difference lies in the limit values and the test current.

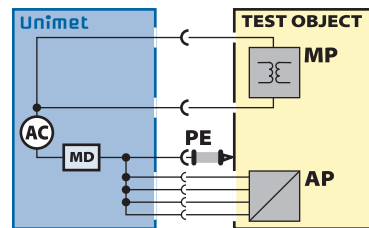
- IEC 60601-1, test current 25 A, 5 s
- DIN VDE 0751, test current 0.2...10 A, 5 s
- DIN VDE 0701, test current > 0.2 A
- DIN VDE 0702, test current > 0.2 A



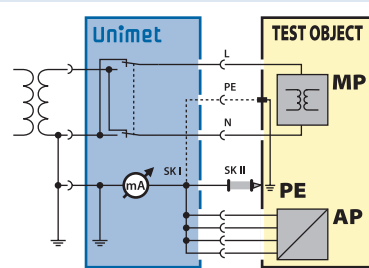
## DIN VDE 0751

### Substitute device leakage current

Measurement between short-circuited mains plugs and earth and/or the enclosure.

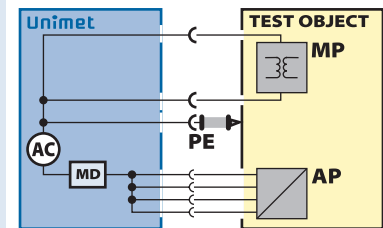


### Device leakage current – direct measurement<sup>1)</sup>

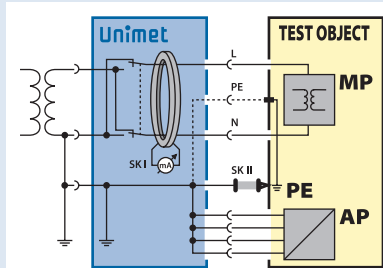


### Substitute patient leakage current

Measurement between short-circuited patient connections and earth, and/or the enclosure.



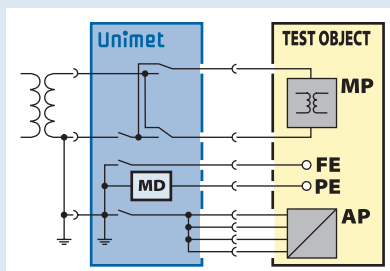
### Device leakage current – residual current measurement



## DIN VDE 0750 / IEC 60601-1

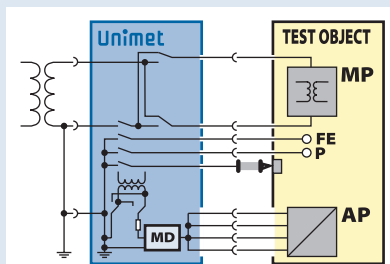
### Earth leakage current

Leakage current which flows in the protective conductor of Class I equipment.



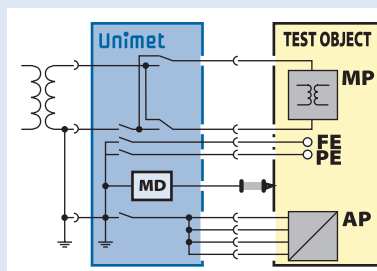
### Patient leakage current

Leakage current which can flow from the applied part to earth via a patient.



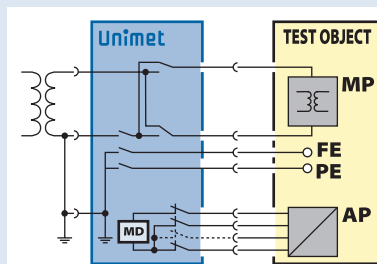
### Enclosure leakage current<sup>2)</sup>

Current which flows to earth or to another part of the enclosure, when the enclosure or parts thereof are touched.



### Patient auxiliary current

Current which flows between the individual connections of the applied part.



### Measurements according to IEC 60601-1

UNIMET® 1100ST satisfies the requirements of IEC 60601-1 for the measurement to be performed under all normal and single fault conditions. The requirement that the patient auxiliary current must be measured from every single patient connection to all other patient connections that are linked together is accurately satisfied by the UNIMET® 1100ST, thanks to the automatic switchover between the patient jacks.

### Normal conditions

- Normal and reversed pole connections to the supply system
- Functional earth with and without earthing of the measuring circuit
- F-type applied part with and without earthing of the measuring circuit

### Single fault conditions

- Interruption of the protective conductor
- Interruption of a system conductor
- Patient leakage current to earth for F-type applied part with 110 % of the nominal system voltage

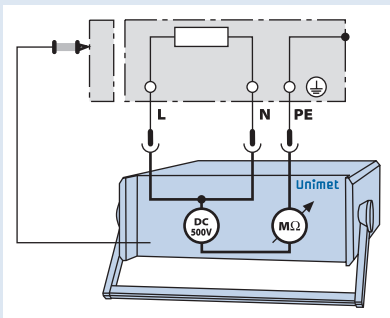
<sup>1)</sup> The DUT shall be set up so that it is insulated from earth. <sup>2)</sup> Measurements at Class I and Class II equipment are only to be carried out at exposed conductive parts which are not connected to the protective conductor.

**Note:** Only a few measurements are illustrated above, please refer to the UNIMET® 1100ST CD for further measurements.

## DIN VDE 0701/0702

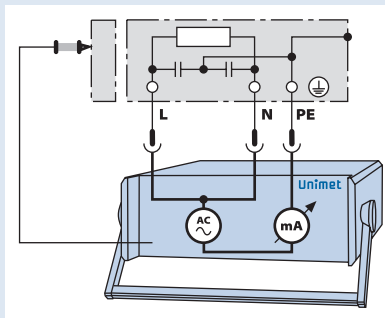
### Insulation resistance

Measurement according to VDE 0701/ VDE 0702. Measuring voltage: DC 500 V.



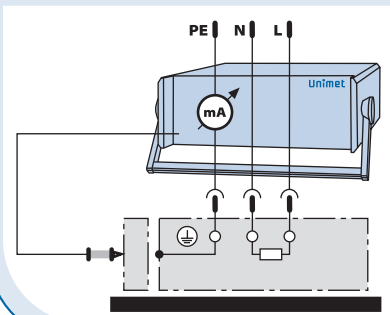
### Substitute device leakage current

Measurement according to VDE 0701/ VDE 0702. Measuring voltage: AC 230 V.



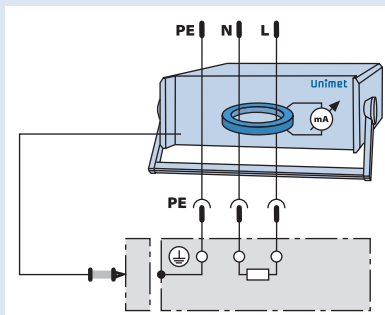
### Protective conductor current (Class I) Touch current (Class II)

Measurement according to VDE 0701, VDE 0702, direct measuring procedure.



### Protective conductor current (Class I) Touch current (Class II)

Measurement according to VDE 0701, VDE 0702, residual current measuring procedure.



## Technical data:

### General Data

Nominal system voltage	AC 100...240 V
Frequency range	48...62 Hz
Max. power consumption	100 VA...350 VA
Max. load	3.8 kVA (16A)
Protection class	Class I

### Measuring ranges

System voltage measurement	90 V...264 V
Load current measurement	0,01 A...16 A
Apparent power measurement	5 VA...3.8 kVA
Leakage, substitute leakage and auxiliary current	0.001 mA...19.999 mA
Residual currents	0.02 mA...19.999 mA

### Protective conductor testing

AC test (0.3 W)	> 10 A optional 25 A
Measuring range	0.001 Ω...29.99 Ω

### Substitute leakage currents, test voltage / operating voltage

Max. test current	2.5 mA
-------------------	--------

### Insulation resistance

Test voltage	DC 500 V
Max. test current	2.5 mA
Measuring range	0.04 MΩ...299.99 MΩ
Interfaces	RS232, RS485, Centronics
Dimensions (W x H x D) mm	345 x 410 x 140
Weight without printer	8 kg...11 kg

Worldwide distribution by:



**BENTRON® GmbH & Co.KG**

Postfach 1161 • 35301 Grünberg • Germany  
 Carl-Benz-Straße 8 • 35305 Grünberg • Germany  
 Tel.: +49 (0) 6401-807 730 • Fax: +49 (0) 6401-807 739  
 E-Mail: info@bentron.de • www.bentron.de

Manufactured by:



**Dipl.-Ing. W. Bender GmbH & Co. KG**

Postfach 1161 • 35301 Grünberg • Germany  
 Londerfer Straße 65 • 35305 Grünberg • Germany  
 Tel.: +49(0)6401 / 807-0 • Fax: 807 259  
 E-Mail: info@bender-de.com • www.bender-de.com

Power in electrical safety

Member of the  **BENDER GROUP**

Right to modifications reserved! – 2136en / 1106/2000/NBe / JD-Druck  
 © Dipl.-Ing. W. Bender GmbH & Co. KG, Germany