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# 1. Introduction

Direct measurement of impulse voltages of more than 1000 V is a special case in electrical metrology:

- Voltage measurement using an oscilloscope requires not only special probes but also qualified and experienced operators.
- A proper measuring procedure using a sphere gap in accordance with VDE 0433 / Part 2 is very time-consuming. Apart from having to take into consideration the ambient conditions (atmospheric pressure, temperature), the evaluation of the measurement using the "50% method" also poses certain problems.

The ISOTEST HV impulse voltmeter was designed especially for the measuring of impulse voltages, e.g. for measuring unipolar short-time impulses emitted by an ELMED ISOTEST® device.

The measuring device allows simple and reliable testing of the high voltages from ELMED ISOTEST® devices (and others). Quality assurance standards prescribe this check as a compulsory part of the quality assurance tests.

The ISOTEST HV impulse voltmeter is a precision measuring instrument for use not only in laboratories but also on construction sites. The value of the high voltage being measured can be read off directly in kV from the illuminated graphic LCD with a resolution of 100 volt.

Using the supplied accessories, ELMED ISOTEST® devices can be easily connected to the HV impulse voltmeter for performing voltage measurements.

Adapters for other instruments are available on request.

## 2. Explanation of safety symbols being used in this manual

The following symbols are used in this operating manual:

- Safety symbols indicate the presence of adjacent safety notes.
- Special symbols indicate important information that should strictly be observed.

This symbol indicates that the relevant action imposes a hazard for life and limb.



Danger

This symbol indicates information provided for improving the understanding of processes.



NOTE

## 3. Operation

### 3.1 General Instructions



Immediately after unpacking, inspect the voltmeter and the accessories for damage and/or missing parts.

If damage is discovered, notify the supplier immediately.

Under no circumstances is the voltmeter to be put into operation in a damaged condition.

Before using the voltmeter for measuring, the 4 included AA cells must be inserted into the battery compartment on the back. Ensure the correct polarity!

### 3.2 Safety

The high-voltage impulse voltmeter ISOTEST HV has been exclusively designed for manual measuring of impulse voltages and may only be used for this purpose.

- The equipment is not designed for continuous stationary operation!
- Other use than described above is inappropriate use!

Please note that:



operating the equipment in explosion-hazard environments is strictly forbidden.

Proper use extends to reading these operating instructions as well as meeting all relevant requirements, especially safety regulations. Furthermore, all inspection and maintenance should be performed within the specified time intervals.

If ISOTEST HV is not used as described above, safe operation cannot be guaranteed.

The manufacturer does not assume any liability for injuries of persons or damage to equipment if the test equipment is not properly used. Liability lies with the operator of the equipment.



The high voltage impulse voltmeter ISOTEST HV is exclusively to be used for the measuring of the output voltage of devices that

- work with impulse voltage on condition that the rms-value of the output voltage in the event of short circuit does not exceed 3 mA.
- comply with the technical data (see chapter 4.4)

For measuring high voltages the rules and standards VDE 0104 (rules for testing stations and laboratories over 1 kV) and VDE 0105 have to be adhered to.

When measuring it is of utmost importance to pay special attention to proper grounding of the impulse voltmeter and the ISOTEST holiday detector, i.e.

- With the grounding (included in the delivery) a low-impedance connection has to be established between one of the black jacks of the impulse voltmeter and a grounding point provided by the customer (protective earth conductor).
- The ISOTEST<sup>®</sup> holiday detector has to be grounded by the grounding cable (also included in the delivery). For this purpose the ISOTEST holiday detector has to be connected to the second black grounding jack of the impulse voltmeter by the cable with the black 6 mm connectors.

## EC Declaration of Conformity

It is herewith confirmed that the product listed below

ISOTEST HV (impulse voltmeter)

meets the safety requirements within the scope of the conformity evaluation procedure of the related competent authority, which are defined in the regulation 2004/108/EG of the European Council for the approximation of laws of the member states with respect to electromagnetic compatibility. The same applies to the provisions of the law on electromagnetic compatibility of instruments (EMVG) as of 9 November 1992.

This declaration applies to all units that are manufactured in accordance with the appropriate manufacturing documentation which is part of this declaration. For the evaluation of products regarding the electromagnetic compatibility relevant harmonized standards have been used.

DIN EN 61326-1:2006

**Design-engineering modifications that have such significant effects on the technical specifications and the proper use defined in this operation manual so as to change the instrument considerably shall nullify this declaration of conformity.**

This declaration shall be legally binding for the manufacturer

ELMED Dr.-Ing. Mense GmbH, Heiligenhaus

signed by



Claudia Mense

Managing Director

Heiligenhaus, 23 July 2010

### 3.3 Operating Elements

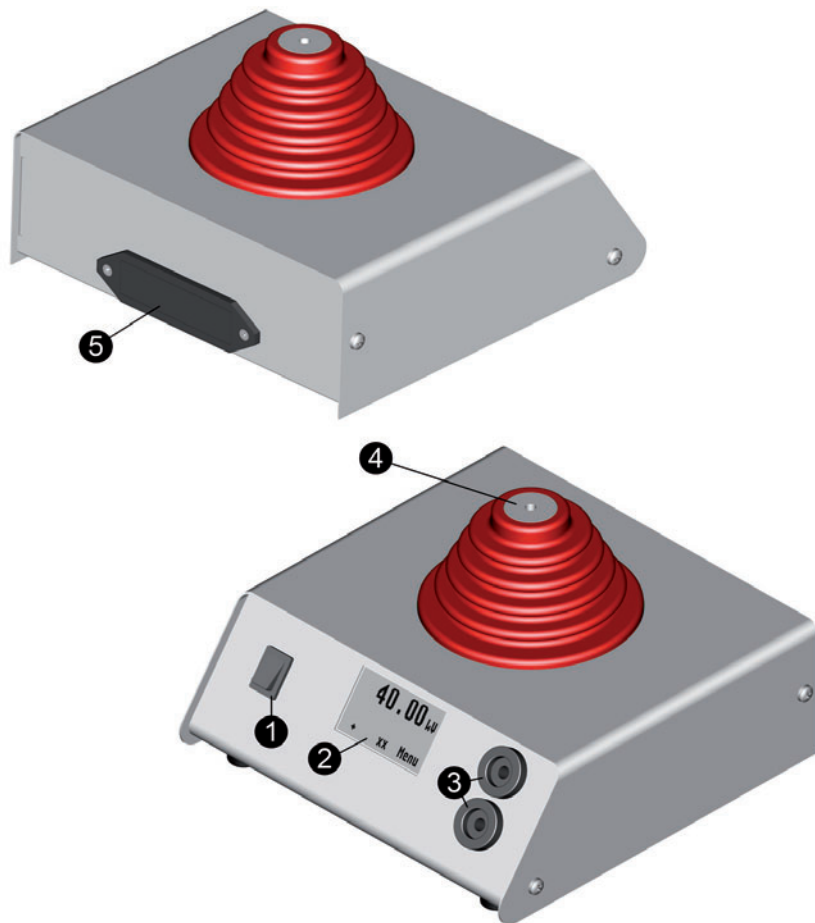


Fig. 1: ISOTEST HV with the operating elements

## ❶ ON / OFF switch

Position "O" : Voltmeter OFF

Position "I" : Voltmeter ON, display in operation

## ❷ Illuminated graphic LCD

display of the measured value in kV (resolution 100 V)

battery level indicator

repetition rate

## ❸ 6 mm jacks for grounding cable

Earthing and connection to the ISOTEST<sup>®</sup> holiday detector  
**(in accordance with VDE, compulsory for measurements of more than 1000 V !)**

## ❹ Connection for highvoltage measuring

contact area / connection of the high voltage side of the test object (when possible use appropriate test adapters...)

## ❺ Battery case

4 Mignon-cells (AA / LR6)

## 3.4 Measuring

### 3.4.1 Preparation for the Measurement



The ISOTEST HV impulse voltmeter may only be used for measuring the output voltage of testing devices that correspond to the requirements specified under 3.2.

Particular attention must be paid to the correct earthing of the voltmeter and the ISOTEST<sup>®</sup> holiday detector (see 3.2 and 3.4.2)!



### 3.4.2 Measurement Configuration

Before connecting the ELMED ISOTEST<sup>®</sup> holiday detector and the high-voltage impulse voltmeter, ensure that the ELMED ISOTEST<sup>®</sup> holiday detector is switched off!

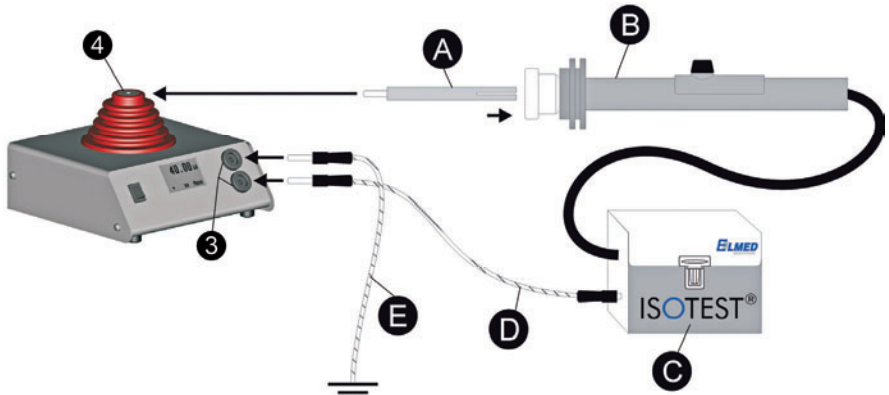


Fig. 2: Measurement configuration

Figure 2 shows the correct measurement configuration using an ELMED ISOTEST<sup>®</sup> device. The device should be set up as follows:

1. Earth the impulse voltmeter by connecting the earthing cable (E) to one of the 6mm jack ③ on the front.  
Make a low-impedance connection to an earthing point on site (PE/earthing conductor) using the clamping jaw of the supplied earthing cable.
2. Earth the ISOTEST<sup>®</sup> device by connecting the earthing jack of the ISOTEST<sup>®</sup> device to the 6 mm jack ③ of the impulse voltmeter.
3. Insert the adapter (A) as far as possible into the electrode clamping device of the test handle and tighten the plastic nut.
4. For ISOTEST<sup>®</sup> devices with adjustable test voltage, set the voltage to be measured.
5. Apply the adapter on the measuring surface ④ of the impulse voltmeter.
6. Turn on the main switch of the impulse voltmeter and the ISOTEST<sup>®</sup> holiday detector.  
Info:  
The battery charge condition is permanently displayed (battery level indicator)
7. Press the safety button on the test handle of the ISOTEST<sup>®</sup> holiday detector.



While measuring the safety button of the ISOTEST<sup>®</sup> holiday detector must be pressed down during the whole process.



Should there be no measurement within 5 minutes after switching on the device or after the last measurement the energy saving mode is automatically activated.

In the energy saving mode the display is not illuminated and blinks intermittently indicating „Please turn off power“.



Even in the energy saving mode the batteries are slowly discharged.

Therefore the device has to be switched off on the main switch after measuring in order to avoid a discharging of the batteries.

### 3.5 Extended display



Further to the display of the impulse voltage value the corresponding DC voltage value is displayed in the bottom line of the display.

ISOTEST<sup>®</sup> devices work with "equivalent impulse voltages"\*.

As to the sparking distance these voltages are equivalent to DC voltage values.

\* The impulse voltage values have been determined in extensive test series under application-related conditions and according to scientific criteria.

## **4. Maintenance**

### **4.1 Maintenance**

Apart from occasional replacement of the battery, the impulse voltmeter ISOTEST HV requires no maintenance.

Do not throw the ISTEST test equipment or expose it to heavy impact.

If the impulse voltmeter becomes soiled, particularly on the orange-red insulator, it must be cleaned before any measurement is carried out. Clean the test equipment and the accessories, using a soft, dampened or dry cloth. Use only mild detergents.

### **4.2 Inspection / Calibration**

To maintain the high reliability and the high quality standard of ISOTEST® test equipment as long as possible, the equipment should be inspected and calibrated by the manufacturer each year.

Observing the recommended inspection intervals contributes to continuous functional safety of the equipment and avoids expensive repair. During inspections, all equipment functions are checked and the unit is calibrated. The results of an inspection are stored in a database and documented in manufacturer certificate traceable to the PTB (Physikalisch-Technische Bundesanstalt, The German Bureau of Standards). A clearly visible label indicates the due date of the next inspection.

### **4.3 Storage**

If the test equipment is not used over more than 4 weeks, the following measures should be taken:

1. Remove the batteries from the test equipment.
2. Clean the impulse voltmeter and the accessories.
3. Protect the equipment and the accessories from damage by storing it in a dry room.
4. To avoid condensation at temperatures below the dew point, ensure that the equipment is stored at normal ambient temperature.

Storage temperature: -20°C - +50°C (heating time constant > 10K/h)

## 4.4 Repairs

Damaged components or components that do not work according to their specifications must be replaced immediately. To ensure the unit's safety and functionality, only original spare parts may be used for repair.



ELMED test equipment, accumulators and batteries must be disposed of according to legal requirements.

If your ISOTEST test equipment requires inspection or repair, please send the unit with all transportation fees prepaid to:

ELMED Dr. Ing. Mense GmbH  
Service  
Weilenburgstr. 39  
D- 42579 Heiligenhaus



Proper maintenance work and repairs in accordance with the regulations can only be ensured if such work is carried out by the manufacturer or by qualified and authorised service centres.

## 4.4 Technical Data

**Functions:** impulse voltage measuring  
battery level indicator  
repetition rate

**Power source:** 4 Mignon-cells (AA/LR6)

**Power consumption:** approx. 50 mA

**Display:** illuminated graphic LCD (128 x 64)

### Measuring precision:

Function	Measuring range	Relative error	+ absolute error in digits
Impulse voltage* (average value)	10 - 35,0 kV	± 10 %	±5
Impulse voltage* (average value)	5 - 9,9 kV	± 20 %	±5

\* Condition of the impulses

Predominantly unipolar impulses, post-pulse oscillation up to 5 ms is permissible.

For further details, please see the table below:

Parameter	Minimum	Maximum
Duration	≥ 1 μs	≤ 100 μs
Repetition rate	≥ 10 Hz	≤ 100 Hz
Rise rate		≤ 5 kV/μs
Decay time	ca. 50 ns	
Load capacity		< 20 pF

**Ambient temperature:** 0°C - 40°C

**Storage temperature:** -20°C - +50°C  
(heating time constant > 10K/h)

**Weight:** 1,65 kg (without accessories)

**Dimensions:** 200 x 120 x 200 mm (W x H x D)

**Accessories:** Test adapter: 6 mm plug connector on MS tube  
13 x 1,5 mm

Ground cable: 1m cable, both ends with 6 mm plug connectors

10 m cable with 6 mm plug connector and clamping jaw





