Megger

Easytest 20 kV

Quick Commissioning Tester

USER GUIDE

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Consultation with Megger

The present system manual has been designed as an operating guide and for reference. It is meant to answer your questions and solve your problems in as fast and easy a way as possible. Please start with referring to this manual should any trouble occur.

In doing so, make use of the table of contents and read the relevant paragraph with great attention. Furthermore, check all terminals and connections of the instruments involved.

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Terms of Warranty

Megger accept responsibility for a claim under warranty brought forward by a customer for a product sold by Megger under the terms stated below.

Megger warrant that at the time of delivery Megger products are free from manufacturing or material defects which might considerably reduce their value or usability. This warranty does not apply to faults in the software supplied. During the period of warranty, Megger agree to repair faulty parts or replace them with new parts or parts as new (with the same usability and life as new parts) according to their choice.

Megger reject all further claims under warranty, in particular those from consequential damage. Each component and product replaced in accordance with this warranty becomes the property of Megger.

All warranty claims versus Megger are hereby limited to a period of 12 months from the date of delivery. Each component supplied by Megger within the context of warranty will also be covered by this warranty for the remaining period of time but for 90 days at least.

Each measure to remedy a claim under warranty shall exclusively be carried out by Megger or an authorized service station.

To register a claim under the provisions of this warranty, the customer has to complain about the defect, in case of an immediately detectable fault within 10 days from the date of delivery.

This warranty does not apply to any fault or damage caused by exposing a product to conditions not in accordance with this specification, by storing, transporting, or using it improperly, or having it serviced or installed by a workshop not authorized by Megger. All responsibility is disclaimed for damage due to wear, will of God, or connection to foreign components.

For damage resulting from a violation of their duty to repair or re-supply items, Megger can be made liable only in case of severe negligence or intention. Any liability for slight negligence is disclaimed.

Contents

1 Safety Advice

1.1 General Notes

Safety precautions

This manual contains basic advice for the installation and operation of the *Easytest*. It is essential to make this manual accessible to the authorised and skilled operator. He needs to read this manual closely. The manufacturer is not liable for damage to material or humans due to non-observance of the instructions and safety advices provided by this manual.

Locally applying regulations have to be observed!

Symbols used in this manual

Important instructions concerning the protection of staff and equipment as well as technical safety within this document are labelled with one of the following symbols:

Symbol	Description
 **WARNING**	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 **CAUTION**	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or material damage.
	Notes have important information and useful tips on the operation of your equipment. Non-observance may result in useless measurement results.

Working with equipment of Megger

All electrical regulations of the country where the system is operated have to be observed as well as national regulations for prevention of accidents and existing regulations for the safety and operation of equipment of the involved companies.

After working with the equipment, make sure to de-energise, protect against re-energising, discharge, ground and short-circuit the instrument and installations that have been worked on.

Original accessories ensure safe operation of the equipment. It is not allowed and the warranty is lost if other accessories than the original ones are used with the equipment.

Operating personal

Only trained and/or instructed staff is permitted to deal with this system and its peripherals. Keep any other person away from it.

Only authorised persons with sufficient expertise are allowed to operate the device.

Repair and maintenance

Repairs and service must only be done by Megger or authorised service departments of Megger. Megger recommends having the equipment serviced and checked once per year at a Megger service location.

Megger also offers direct on-site support. Please contact our service office for more information.

1.2 General Cautions and Warnings

Intended application

Safe operation is only realised when using the equipment for its intended purpose (see chapter *2.3 Functional Description*). Using the equipment for other purposes may lead to human danger and damage of equipment of involved installations.

The limits described under technical data may not be exceeded. Operating products of Megger in condensing environment may lead to flash-over, danger and damage. The instruments should only be operated under tempered conditions. It is not allowed to operate Megger products at direct contact with humidity, water or near aggressive chemicals nor explosive gases and fumes.

Behaviour at malfunction of normal operation

The equipment may only be used when working properly. When irregularities or malfunctions appear that cannot be solved consulting this manual, the equipment must immediately be put out of operation and marked as not functional. In this case inform the person in charge who should inform the Megger service to resolve the problem. The instrument may only be operated when the malfunction is resolved.

Fife safety rules

The five safety rules must always be followed when working with HV (High Voltage):

1. De-energise
2. Protect against re-energising
3. Confirm absence of voltage
4. Ground and short-circuit
5. Cover up or bar-off neighbouring energised parts

Using cardiac pacemaker

Physical processes during operation of high voltage may endanger persons wearing a cardiac pacemaker when near these high voltage facilities.

Fire fighting in electrical installations

- Recommended extinguishing agent: carbon dioxide (CO_2)
- Carbon dioxide is electrically non conductive and does not leave residue. It is safe to use in energized facilities as long as the minimum distances are observed.
- It is essential to observe the safety instruction on the extinguishing agent.
- Applicable is DIN VDE 0132.

WARNING

Be careful when working with high voltage

Working on high voltage systems and equipment – especially in non-stationary operation – requires particular care and safety-conscious action on the part of test personnel. VDE regulations 0104 on setting up and operating electrical test systems, as well as EN 50191 and national standards and regulations must be strictly adhered to.

- The *Easytest* generates a dangerous voltage of up to 20 kV during testing. This is supplied via a HV cable to the test object.
- The test system may not be operated without supervision.
- When the test system in use, a second person must always be within sight and calling distance, in order to use the emergency off switch in the event of danger.
- Never fail to use safety equipment or put it out of operation.
- To prevent dangerous charge accumulation, earth all metal parts in the vicinity of the high voltage equipment.
- All cables which are out of operation and not tested must be shorted and earthed.
- The system and all auxiliary equipment must be connected in accordance with the regulations. The applicable EN, DIN, VDE and national standards and regulations must be strictly adhered to.
- Check whether there are any unsecured live systems or components in the immediate vicinity of the test system which might you or the system might accidentally come into contact with. This particularly applies to components which carry high voltage or where the voltage is unknown.

  Secure these components using insulating covers. If technical reasons make it impossible to do this, switch them off or have this action carried out at the site for the duration of your work after consulting whoever is responsible. Make sure this is done properly.

2 Technical Description

2.1 Technical Data

Technical data

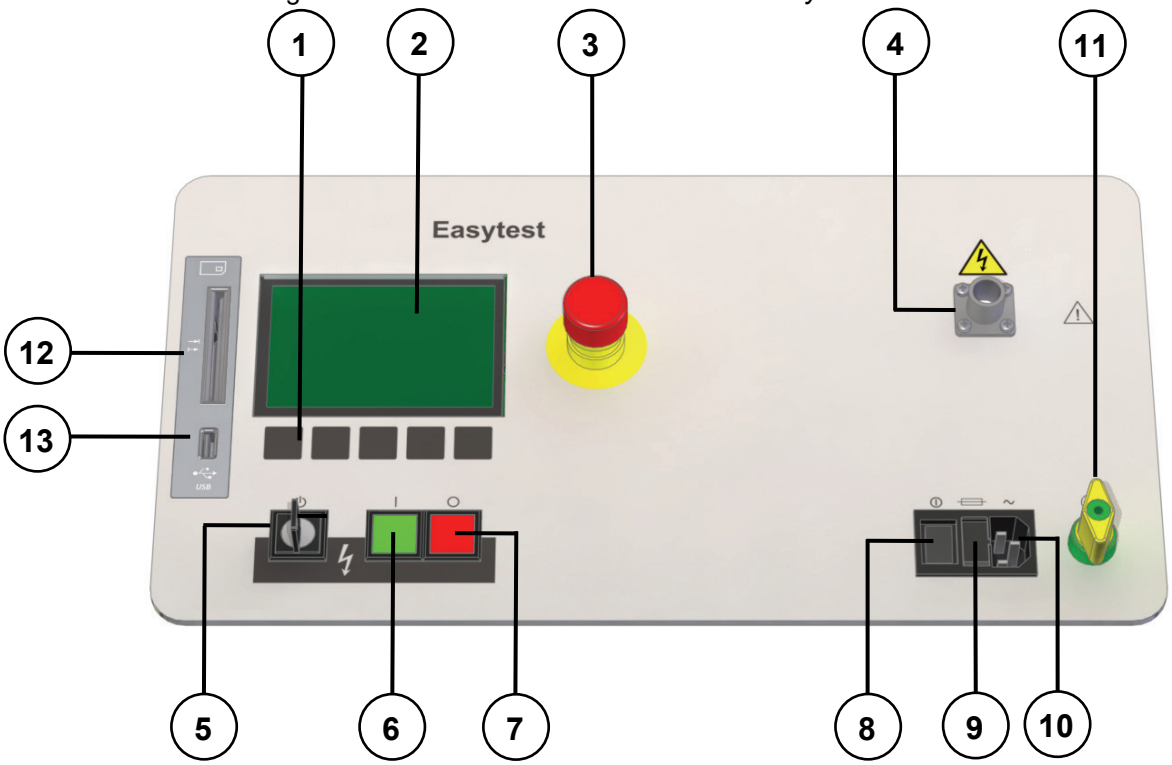
The following parameters are specified for the *Easytest* receiver:

Parameter	Value
Output voltage (DC)	0 ... -20 kV
Source output current	15 mA
Display ranges	0 ... 1 mA, 0 ... 50 mA
Leakage current measurement	0 ... 1 mA, resolution 5 %
Output voltage AC test	0 ... -20 kVDC, 0 ... +20 kVDC
AC test frequency	0,1 Hz for C ≤ 0,5 µF 0,05 Hz for C > 0,5 µF ≤ 1,0 µF 0,02 Hz for C > 1,0 µF < 2,5 µF 0,01 Hz for C > 2,5 µF < 5,0 µF
Voltage wave shape	Resembling a rectangle
Testable cable capacitance	≤ 5,0 µF
Sheath test and pinpointing output voltage	0 ... - 5 kVDC / 0 ... -10 kVDC
Output current Sheath test Sheath fault pinpointing	 DC, Imax = 15 mA 1:3, Imax = 25 mA
Test duration Range Interval	 0 ... 60 min First 5 minutes: adjustment in 1-minute steps Thereafter: adjustment in 5-minute steps
Safety circuit FOhm	BE and PE monitoring
External voltage protection (output separation) (optional)	max. 12 kVAC (optional)
Power supply 230 V ±10 %, 50 ... 60 Hz or 115 V ±10 %, 50 ... 60 Hz	 Front panel fuse: 6.3 A MT Front panel fuse: 10 A MT
Power consumption	max. 750 VA
Operating temperature range	-20 °C ... +50 °C
Operating humidity	+30 °C, 93 % relative humidity
Storage temperature range	-25 °C ... +60 °C
Protection class (DIN VDE 0140 T.1)	I
Type of protection	IP 40 according to EN 60529, IP 54 with lid closed
Dimensions (W x H x D)	480 x 290 x 495 mm
Weight	17 kg 19 kg, including wiring harness

2.2 Device Structure

Front view

The following illustration shows the front view of the *Easytest*:



Controls and connections

The Easytest system has the following controls and connections:

Control	Description
1	Membrane keypad
2	Display
3	Emergency off switch
4	HV output
5	HV “interlock” key-operated switch
6	HV on button
7	HV off button
8	Power switch
9	Fuse
10	Power supply
11	Protection earth socket
12	Smartcard slot used to log test data on *WinkisVLF* system card (optional)
13	USB slot used to log test data on a USB stick (optional)

2.3 Functional Description

Operation modes

The *Easytest* system offers the following operation modes:

- **DC testing** (Hipot) up to 20 kV negative output voltage for testing the dielectric strength of new or disconnected cables (particularly for paper insulated lead cables (PILC))
- **AC testing** up to 20 kV AC voltage for testing the dielectric strength of new or disconnected cables.
- **Sheath fault testing:** up to 5 kV / 10 kV
- **Sheath fault pinpointing:** up to 10 kV; duty cycling 1:3

Features

The *Easytest* combines the following features in a single device:

- Test parameters like test duration and test voltage can be specifically specified for each operation mode. Setting the test duration to 0 minutes causes a permanent test which can be interrupted by the HV off button (7).
- The test voltage can be adjusted using the navigation buttons even if the test is already running.
- Leakage current measurement
- Automatic current range switch
- Automatische Strombereichsumschaltung
- Constantly updated bargraph indicating the progress of the running test

Options

Depending on the present system configuration, the *Easytest* offers the following additional functions:

- **Logging function** to analyze / archive test data using *Excel* or *WinkisVLF*
- **External voltage protection**
- **Trolly** for easier transport of the *Easytest* unit

Standard scope of delivery

The following items are included with the standard shipment of the *Easytest*:

- 2.5 m mains power cable
- 1.5 m earthing cable
- 3.5 m HV connection cable
- Phase terminal
- Earth connection terminal
- Accessory bag
- Manual

3 Setting Up the System

Safety instructions for setting up

- Select a location which is sufficient for the weight and size of the system and ensures that it stands securely.
- When setting up the *Easytest* system, make sure no other systems or components are impaired in their function. If other systems and components have to be modified in order to set up and operate the test systems, make sure these actions are reversed when the work is finished. Always take the special requirements of these systems and components into account and only carry out work on them after consulting and obtaining approval from whoever is in charge of them.
- Install protective equipment (such as railings, chains or bars) to block access to the hazard zone and prevent the risk of touching live parts.

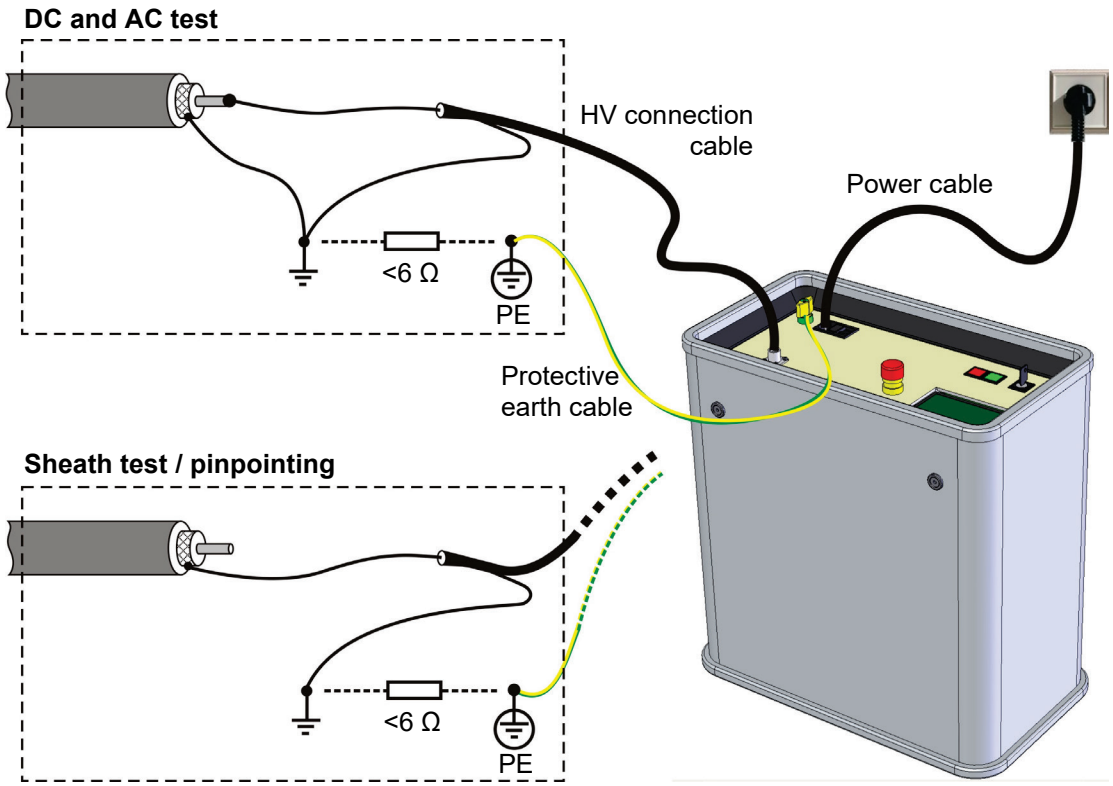
3.1 Electrical connection of the *Easytest* System

Safety instructions on electrical connection

- Always follow the safety instructions in section *1.2 General Cautions and Warnings* - in particular the five safety rules - before connecting the test object.
- The *Easytest* may only be connected to or disconnected from a test object when it is switched off, and only when the test object is earthed and shorted.
- After releasing the test object, make sure that dangerous voltage cannot reach unprotected places or technical equipment.
- The discharge switch installed in the device is merely an apparatus for safely discharging capacitance, and not an earthing and shorting device as described by VDE 0104.
- All voltage transformers have to be disconnected from the cable under test before starting a test measurement.

Connection diagram

The following illustration shows the basic connection diagrams for the various operation modes:



Connection sequence

Connect the system in the following order:

Step	Action
1	Connect the earthing cable to the protective earth of the station and then fasten it to the earth socket (11) of the test system.
2	Plug the high voltage connection cable into the HV output of the test system (4) and fasten it by turning the lock. Then connect the HV connection cable to the phase or the screen of the cable under test (depending on the operation mode). The screen of the HV connection cable has to be connected to system earth.
3	Plug the supplied power cable to the power connection of the test system (10) and connect it to a mains socket.

3.2 Switching On the System

Switch-on procedure

Before it is switched on using the power switch (8), the device is in the ‘off’ state. In this state, the HV output is earthed. For devices with external voltage protection (optional), the HV source and the internal earthing of the device are separated from the HV output by the HV circuit breaker. The capacitive voltage divider for measuring the external voltage (optional) is directly connected to the HV output.

When the power switch is turned on, the system is in the ‘standby’ state. The controls are activated and the display shows the welcome screen, followed by the main menu.

3.3 Safety Mechanisms

Introduction

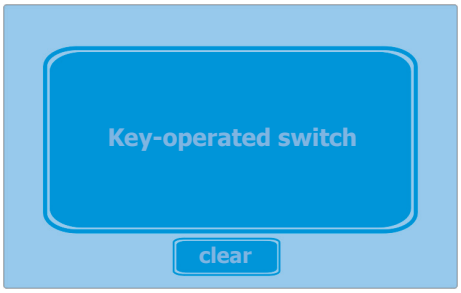
From ‘standby’ mode onwards, the system is constantly monitored by a number of safety mechanisms.

If one of these mechanisms reports a malfunction, either the entire system is stopped (coming along with an individual error message) or, in the case of a test voltage deviation, the system solely indicates the problem.

If a running test is interrupted, the cable under test is discharged via the internal discharge switch. If the interruption is caused by the optional external voltage protection (see next page), the cable under test is not discharged!

Interlock (key-operated switch)

You can activate or deactivate an HV interlock using the key-operated switch (5). In the vertical position ⏻, the HV interlock is activated and no measurements can be performed. The display shows the following message:



You can deactivate the HV interlock by turning the key a quarter turn clockwise. Afterwards, the system message has to be acknowledged using the **clear** soft key.

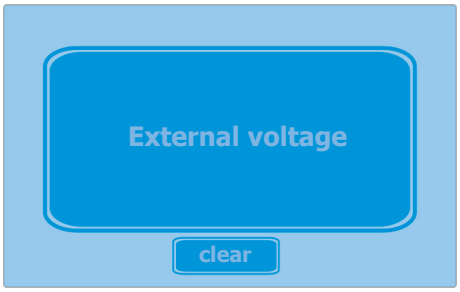
‘F-Ohm’ safety circuit

The F-Ohm safety circuit monitors the loop resistance of the system earth (test cable screen) and the safety earth. If the resistance is more than 6 ohms, a system message notifies you of the fault in the safety circuit.

The operator must rectify the cause of the fault and then press the **clear** soft key to continue using the system.

External voltage protection (optional)

If external voltage protection is available, the external voltage detector monitors the presence of AC voltage at the HV output (from 'standby' mode onwards). If it is more than 1000 VAC, a system message appears and a continuous warning signal sounds. An internal circuit breaker then separates the HV output from the rest of the HV system in the device. This prevents the test object from discharging.



The operator must rectify the cause of the fault and then press the **clear** soft key to continue using the system.

In some operation modes, the external voltage detector is disabled by default (see sections *4.4.1 Hipot Operation Mode* and *4.4.3 Sheath Fault Testing / Pinpointing*)

WARNING	Devices equipped with the optional external voltage protection do not discharge the cable under test, if an abrupt power outage (e.g. power failure) takes place. In that case, the cable under test has to be manually discharged and grounded. Even in the case of an abrupt switch-off using the power switch (8), a device equipped with external voltage protection does not discharge the cable under test. Thus, it is recommended to use the **HV off** button (7) to terminate a running test in order to ensure proper discharging of the cable under test. Afterwards, the device can be switched off using the power switch.

Emergency off switch

If the system detects that the emergency off switch has been pressed, it is switched to the 'standby' state. A system message appears to notify the operator.

The operator must rectify the cause of the fault and then press the **clear** soft key to continue using the system.

Over-temperature protection

The device is protected by an over-temperature protection. If an excessive temperature is detected during operation, the device is switched to the 'standby' state. A system message appears to notify the operator.

The operator has to take a break in order to cool down the device and then press the **clear** soft key to continue using the system.

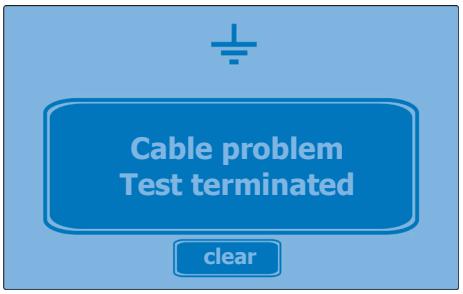
Test voltage deviation

If the actual test voltage value differs more than 1000 V from the selected reference value, the voltage indicator in the display starts flashing every second. Furthermore, an acoustic signal sounds in the same cycle.

Possible causes for such a voltage deviation may be, among others, leakage currents at cable terminations or very wet joints.

If a voltage deviation is indicated, the operator has to weigh up whether a voltage breakdown at the fault location can still be provoked despite of the reduced test voltage and, thus, whether it makes sense to continue the test.

If the voltage deviation lasts until the test duration is expired, a system messages appears to notify the operator about the voltage deviation during test:



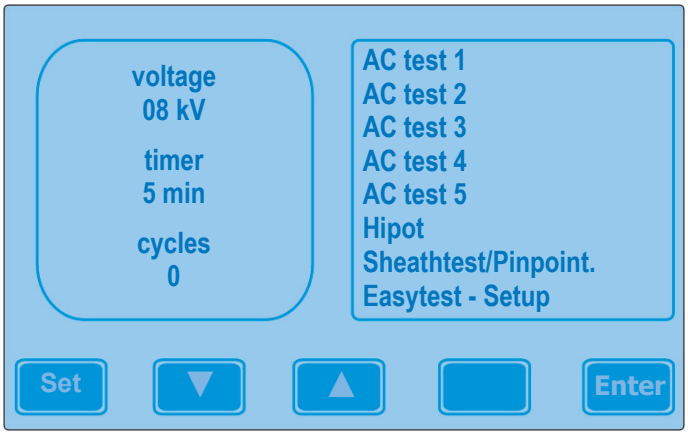
During sheath fault pinpointing and permanent DC tests, a test voltage deviation is not indicated.

4 Operating the System

Main menu

In the main menu you can scroll through the test profiles in the main menu using the ▼ and ▲ soft keys and read the settings for each profile in the left section of the display.

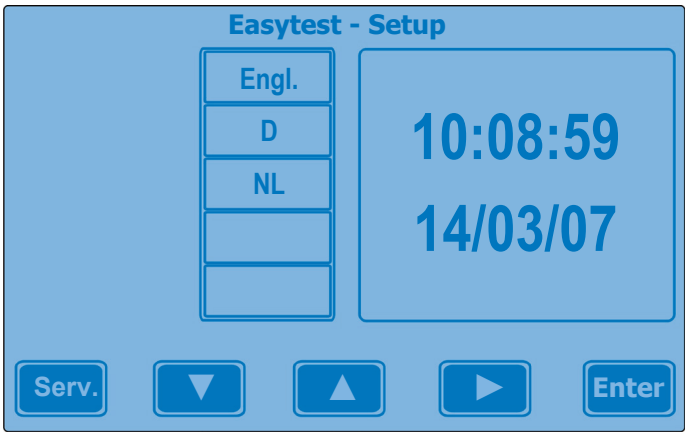
Furthermore, the **Easytest - Setup** is accessible via the main menu.



4.1 Configuring the System

In order to access the Esaytest setup, the menu item **Easytest – Setup** has to be selected in the main menu using the ▼ und ▲ soft keys. Afterwards, the setup can be accessed using the **Enter** soft key.

The system menu offers the possibility to change the system language and the internal system time. Since a properly adjusted system time is exclusively important for the optional logging function to generate comprehensible data, the system time can only be adjusted at devices possessing this function.



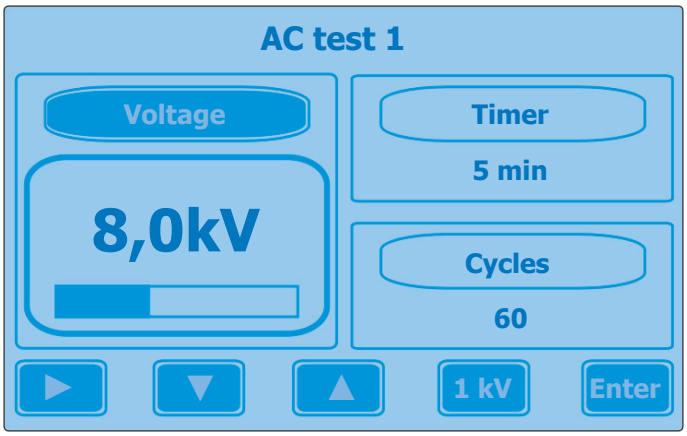
Use the ► soft key, to scroll through the available parameters (e.g. language, hours, minutes). The value of the active parameter can be adjusted using the ▼ und ▲ soft keys.

In order to save the changes, the setup window has to be left using the **Enter** soft key.

4.2 Adjusting Profile Settings

Test profiles

The *Easytest* system is delivered with a number of predefined test profiles (at least one per operation mode). The parameters of this test profiles can be adjusted by selecting the appropriate profile in the main menu using ▼ und ▲ soft keys and accessing the profile page using the **Set** soft key. Afterwards, the following profile page appears in the display:



Use ► to navigate through the available parameters voltage, timer and cycles (only for AC test) and use ▼ and ▲ to change the respective value. The **Enter** soft key has to be used to either discard or save the changes and return to the main menu.

For the first 5 minutes, the test duration can be adjusted in 1-minute steps. From the 5 minutes threshold onwards, the duration can only be adjusted in 5-minute steps. Setting the test duration to 0 minutes causes a permanent test which can be interrupted by the HV off button (7).

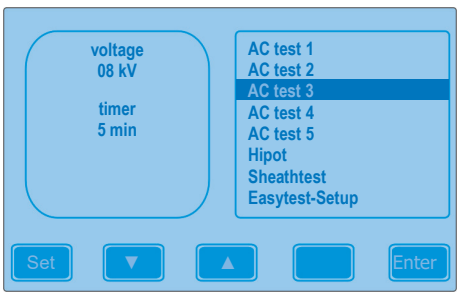
The test voltage can be adjusted in steps of 1 kV or 100 V. The step size can be switched by pressing the **1 kV** soft key or the **100V** soft key respectively. The minimum selectable test voltage is 1 kV.

If a *WinkisVLF* system card is used (see section *4.3.2 Logging to a WinkisVLF System Card*), the test voltage can only be adjusted in steps of 1 kV.

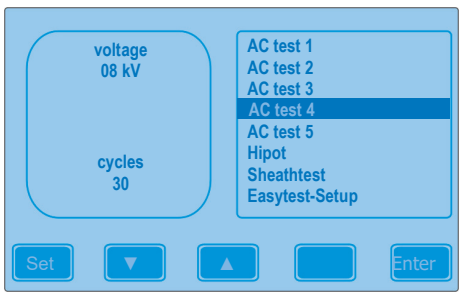
Test duration / periods (in the case of AC tests)

You can also set the number of periods as criteria for the duration of an AC test. The test duration is adjusted based on a test frequency of 0.1 Hz. For test capacitances above >0.5 µF, the time is automatically adjusted at the beginning of an AC test.

Whether the test duration of an AC test profile is determined by a defined time period or by a defined amount of periods is distinguishable via the profile view in the main menu.



Defined time period



Defined number of periods

4.3 Logging Function (optional)

Introduction

The measured data gathered by the *Easytest* system can be logged in an easy way using either a USB stick or a *WinkisVLF* system card.

During sheath fault pinpointing and permanent DC tests, the measured data is not logged.

4.3.1 Logging to a USB Stick

Prerequisites

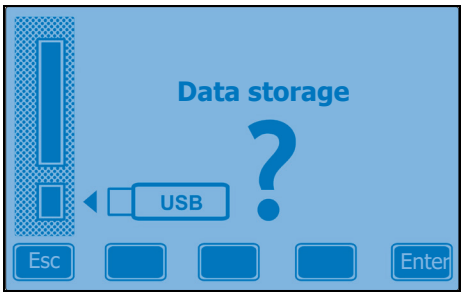
For logging measured data, it is recommended to use a USB stick of the type *Sandisk Cruzer*®.

The USB stick must not be plugged in the slot (13) until a system message asks to do so. Prior to and during a test, the USB stick must not be plugged in.

Procedure

During operation, the measured data is temporary stored in the internal system memory.

After a test has been finished, the following message appears in the display asking for the USB stick to be plugged in:



In order to initiate the data transfer, a USB stick has to be plugged in the appropriate slot (13). After up to 10 seconds (depending on the memory size of the stick), the USB- symbol appears in the upper right display reporting that the stick has been identified by the system.

By pressing the **Enter** soft key, the measured data is transferred to the stick which will take a few seconds. Afterwards, the system returns to the main menu.

By pressing the **Esc** soft key, the measured data is discarded and the system immediately returns to the main menu.

File format

The test data is written in a **data** file (*.csv) using the CSV (Comma-Separated Values) format. Furthermore a summary of the measuring results is written in a separate **header** file (*.txt). The names of the files result from the following pattern:

<Prefix><Date><Consecutive number>.< File extension>

Prefix:	**H** … header file **D** … data file
Date:	Format **YMMDD**
Consecutive number:	Double-digit number which is counted up by one for each logging event

Example: *H7041103.txt* – a header file from 11th of April 2007 with the number 03.

As a result of the described file name pattern, the files on the stick can be ordered by name.

The data can be viewed using Excel or comparable applications.

Header file

The header file consists of generic information about parameters, type, duration and result of the logged test procedure. The way the data is arranged, it can be used as test protocol.

One can easily add any comments using an adequate editor.

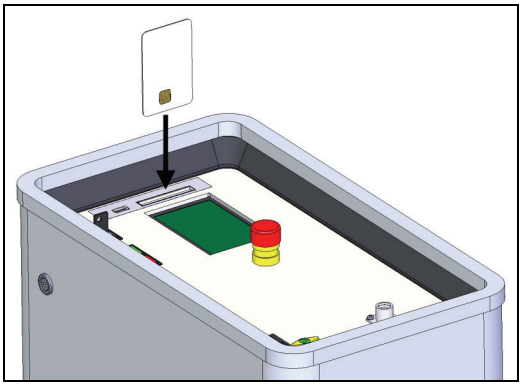
Data file

The actual test data is logged to the data file. About every 5 seconds or following the cycle of the AC voltage respectively, an entry is added to the date file which contains information about time, voltage (in V) and current (in µA). In this way, the complete test procedure can be followed by means of the logged data.

4.3.2 Logging to a *WinkisVLF* System Card

Prerequisites

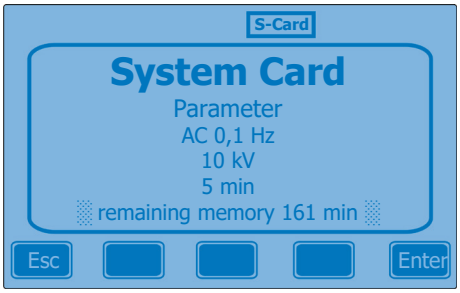
In order to log test data to a system card, a card prepared for usage in the *Easytest* system has to be plugged in the appropriate slot (12) before the test is started.



The test data is only properly logged, if the card is already plugged in the slot prior to the test start and remains there during the complete test duration. It is crucial not to start the test procedure before the S-Card symbol is visible.

Procedure

If a formatted card is detected and accepted by the system, the following message appears in the display:



If the card is parameterised via *Winkis VLF*, the respective parameters are shown in the display.

The example above is derived from a parameterised system card which has been initialised for an AC test with a test voltage of 10 kV and a duration of 5 minutes.

In this case, a test procedure in compliance with the shown conditions can be directly started unsing the **Enter** soft key. The data of the test is written to the system card.

If the parameters on the system card do not match with the designated values or if the system card is not parameterised, the main menu can be accessed using the **Esc** soft key and an appropriate test profile can be selected. The data of the test starting thereupon is written to the system card.

The data on the system card can be viewed and archived using the *Winkis VLF* software. For a detailed description of *Winkis VLF*, please refer to the online help of the application.

Remaining memory

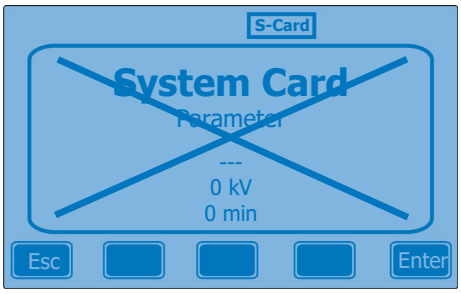
After a system card has been plugged into the system, the remaining memory (in minutes) is indicated on the display (see previous page). With an empty system card, test data of 178 minutes can be logged.

If the card run out of memory, no more data can be logged. The data has to be transferred to the *WinkisVLF* database in order to clear the memory space.

If the remaining memory of a parameterised system card does not cover the preset test duration, the test cannot be started and the remaining memory shown on the display flashes.

Error message

If the card inserted into the unit is not supported or not formated or if the card is inserted the wrong way round, the following message appears in the display:



Formatting and parameterising a system card

In order to format / parameterise a system card and to evaluate the logged data, version **1.4.01.19** (or higher) of *WinkisVLF* is required.

In order to prepare a system card for usage in an Easytest system, *WinkisVLF* has to be started on a client PC and the card has to be plugged into the connected card reader.

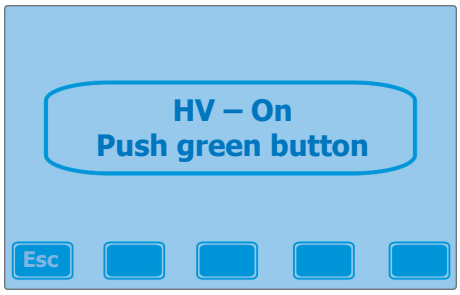
For detailled information how to prepare and parameterise a system card, please refer to the *WinkisVLF* online help.

When parameterising a system card, it has to be ensured, that the limits of neither the test device nor the cable under test are exceeded.

4.4 Performing Tests

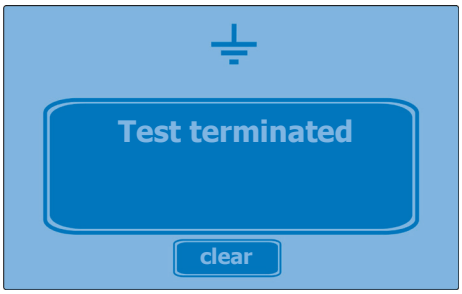
Switching HV on/off

Once you have selected the appropriate test profile from the main menu and selected **Enter** to open it, you are prompted to activate the high voltage.



Switch HV on using the illuminated **HV on** button (6). Afterwards a note appears on the display notifying that the red illuminated **HV off** button (7) can be used to switch HV off.

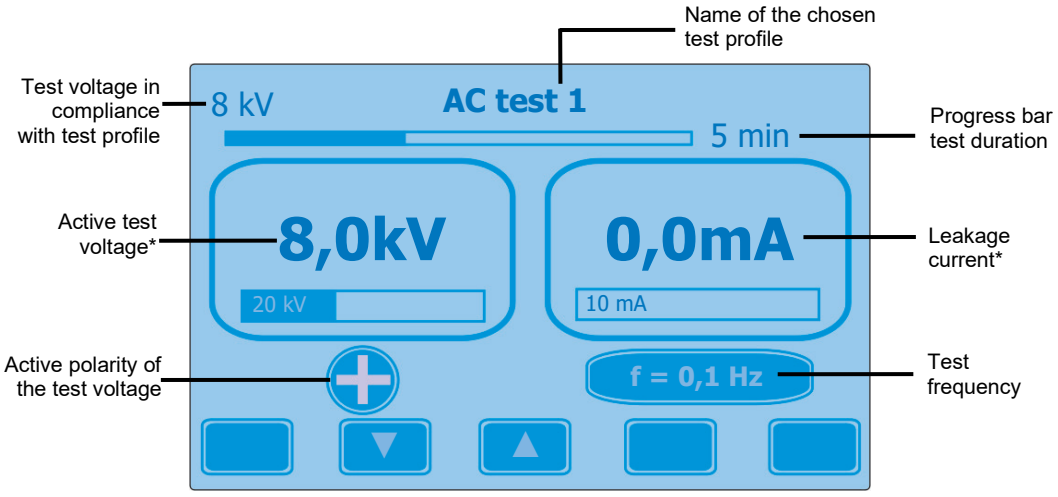
If the operator stops a running test using the **HV off** button, the following system message appears as soon as the system is fully discharged (indicated by the ⏚ symbol):



An permanent test (timer = 0 minutes) can only be interrupted using the **HV off** button (if no breakdown occurs).

Test screen layout

After HV is switched on, the display shows the test screen which represents all relevant test parameters in depending on the chosen test profile:



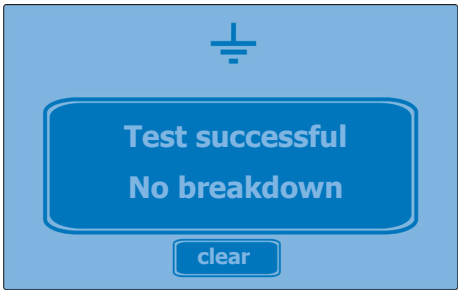
* The respective numeric values for maximum deflection are shown on both of the bar graphs

The test voltage can be adjusted during the test using the ▼ und ▲ soft keys. This does not apply for tests with given parameters adopted from a system card.

4.4.1 Hipot Operation Mode

During a **time-limited** DC test, the breakdown detection of the system is active. If a breakdown occurs during a test, the system automatically terminates the test, discharges the cable under test and shows the following system message:

If no breakdown occurs at run time, the following system message informs about the successful completion of the DC test.



Furthermore, a **permanent** test (timer = 0 minutes) can be used to, e.g., convert cable faults. During a permanent test, the breakdown detection and, if available, the external voltage protection are inactive. The test can only be interrupted using the **HV off** button.

4.4.2 AC Operation Mode

Test frequency adaptation

If a test profile with a **preset amount of test periods** is selected, the system automatically performs a frequency an adaptation at the beginning of the test.

For this purpose, the capacity of the cable under test is detected and used to determine the appropriate test frequency by means of the following specifications:

Test frequencies:
- 0.1 Hz for C ≤ 0.5 µF
- 0.05 Hz for C > 0.5µF ≤ 1.0 µF
- 0.02 Hz for C > 1.0 µF ≤ 2.5 µF
- 0.01 Hz for C > 2.5 µF ≤ 5 µF

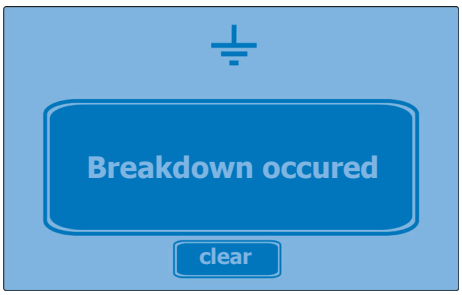
Afterwards, the actual test duration is recalculated by means of the determined test frequency and the specified test periods.

For an AC test profile with **preset test duration**, the test frequency adaptation does not affect the test duration.

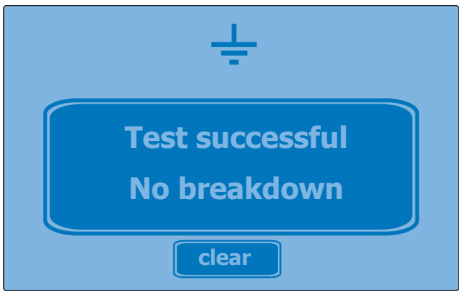
CAUTION	During recommissioning tests at very aged XLPE cables, a test voltage of 2 U_0 and a test duration of 2 minutes must not be exceeded in order to avoid damaging the cable during the test.

Breakdown detection

During an AC test, the breakdown detection of the system is **always active**. If a breakdown occurs during a test, the system automatically terminates the test, discharges the cable under test and shows the following system message:



If no breakdown occurs at run time of a **time-limited** AC test, the following system message informs about the successful completion of the test.



4.4.3 Sheath Fault Testing / Pinpointing

Test voltage

In this operation mode, the test voltage can only be adjusted between 0 and the maximum voltage specified in the test profile (using the ▼ und ▲ soft keys).

Mode toggle

During operation, the operation mode can be toggled between sheath fault testing (DC mode) and sheath fault pinpointing with duty cycling 1:3 (1 second HV, 3 seconds pause) using the **Mode** soft key.

The active setting is continuously shown in the lower left display:

DC 1/3 **->** Sheath fault testing

DC 1/3 **->** Sheath fault pinpointing

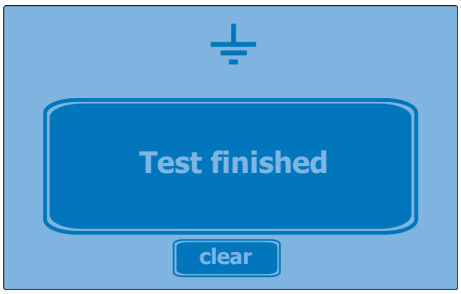
Sheath fault pinpointing

Pinpoint location of a sheath fault is based on the step voltage method. The test current coming from the pulsed (1:3) DC source is flowing into the ground at the point of fault and results in a maximum step voltage at the fault. This peak is located with an earth fault locator (e.g. ESG 80-2). When approaching the fault position, the step voltage increases and decreases after the fault with a change in polarity.

Breakdown detection

During sheath fault testing / pinpointing, the breakdown detection and, if available, the external voltage protection of the system are **always inactive**.

If the specified duration of a **time-limited** test is expired, the following system message is shown:



During a **permanent** test (timer = 0 minutes), the operation can only be interrupted using the **HV off** button.

Tento symbol indikuje, že výrobek nesoucí takovéto označení nelze likvidovat společně s běžným domovním odpadem. Jelikož se jedná o produkt obchodovaný mezi podnikatelskými subjekty (B2B), nelze jej likvidovat ani ve veřejných sběrných dvorech. Pokud se potřebujete tohoto výrobku zbavit, obraťte se na organizaci specializující se na likvidaci starých elektrických spotřebičů v blízkosti svého působiště.

Dit symbool duidt aan dat het product met dit symbool niet verwijderd mag worden als gewoon huishoudelijk afval. Dit is een product voor industrieel gebruik, wat betekent dat het ook niet afgeleverd mag worden aan afvalcentra voor huishoudelijk afval. Als u dit product wilt verwijderen, gelieve dit op de juiste manier te doen en het naar een nabij gelegen organisatie te brengen gespecialiseerd in de verwijdering van oud elektrisch materiaal.

This symbol indicates that the product which is marked in this way should not be disposed of as normal household waste. As it is a B2B product, it may also not be disposed of at civic disposal centres. If you wish to dispose of this product, please do so properly by taking it to an organisation specialising in the disposal of old electrical equipment near you.

Този знак означава, че продуктът, обозначен по този начин, не трябва да се изхвърля като битов отпадък. Тъй като е B2B продукт, не бива да се изхърля и в градски пунктове за отпадъци. Ако желаете да извърлите продукта, го занесете в пункт, специализиран в изхвърлянето на старо електрическо оборудване.

Dette symbol viser, at det produkt, der er markeret på denne måde, ikke må kasseres som almindeligt husholdningsaffald. Eftersom det er et B2B produkt, må det heller ikke bortskaffes på offentlige genbrugsstationer. Skal dette produkt kasseres, skal det gøres ordentligt ved at bringe det til en nærliggende organisation, der er specialiseret i at bortskaffe gammelt el-udstyr.

Sellise sümboliga tähistatud toodet ei tohi käidelda tavalise olmejäätmena. Kuna tegemist on B2B-klassi kuuluva tootega, siis ei tohi seda viia kohalikku jäätmekäitluspunkti. Kui soovite selle toote ära visata, siis viige see lähimasse vanade elektriseadmete käitlemisele spetsialiseerunud ettevõttesse.

Tällä merkinnällä ilmoitetaan, että kyseisellä merkinnällä varustettua tuotetta ei saa hävittää tavallisen kotitalousjätteen seassa. Koska kyseessä on yritysten välisen kaupan tuote, sitä ei saa myöskään viedä kuluttajien käyttöön tarkoitettuihin keräyspisteisiin. Jos haluatte hävittää tämän tuotteen, ottakaa yhteys lähimpään vanhojen sähkölaitteiden hävittämiseen erikoistuneeseen organisaatioon.

Ce symbole indique que le produit sur lequel il figure ne peut pas être éliminé comme un déchet ménager ordinaire. Comme il s'agit d'un produit B2B, il ne peut pas non plus être déposé dans une déchetterie municipale. Pour éliminer ce produit, amenez-le à l'organisation spécialisée dans l'élimination d'anciens équipements électriques la plus proche de chez vous.

Cuireann an siombail seo in iúl nár cheart an táirgeadh atá marcáilte sa tslí seo a dhiúscairt sa chóras fuíoll teaghlaigh. Os rud é gur táirgeadh ghnó le gnó (B2B) é, ní féidir é a dhiúscairt ach oiread in ionaid dhiúscartha phobail. Más mian leat an táirgeadh seo a dhiúscairt, déan é a thógáil ag eagraíocht gar duit a sainfheidhmíonn i ndiúscairt sean-fhearas leictrigh.

Dieses Symbol zeigt an, dass das damit gekennzeichnete Produkt nicht als normaler Haushaltsabfall entsorgt werden soll. Da es sich um ein B2B-Gerät handelt, darf es auch nicht bei kommunalen Wertstoffhöfen abgegeben werden. Wenn Sie dieses Gerät entsorgen möchten, bringen Sie es bitte sachgemäß zu einem Entsorger für Elektroaltgeräte in Ihrer Nähe.

Αυτό το σύμβολο υποδεικνύει ότι το προϊόν που φέρει τη σήμανση αυτή δεν πρέπει να απορρίπτεται μαζί με τα οικιακά απορρίματα. Καθώς πρόκειται για προϊόν B2B, δεν πρέπει να απορρίπτεται σε δημοτικά σημεία απόρριψης. Εάν θέλετε να απορρίψετε το προϊόν αυτό, παρακαλούμε όπως να το παραδώσετε σε μία υπηρεσία συλλογής ηλεκτρικού εξοπλισμού της περιοχής σας.

Ez a jelzés azt jelenti, hogy az ilyen jelzéssel ellátott terméket tilos a háztartási hulladékokkal együtt kidobni. Mivel ez vállalati felhasználású termék, tilos a lakosság számára fenntartott hulladékgyűjtőkbe dobni.Ha a terméket ki szeretné dobni, akkor vigye azt el a lakóhelyéhez közel működő, elhasznált elektromos berendezések begyűjtésével foglalkozó hulladékkezelő központhoz.

Questo simbolo indica che il prodotto non deve essere smaltito come un normale rifiuto domestico. In quanto prodotto B2B, può anche non essere smaltito in centri di smaltimento cittadino. Se si desidera smaltire il prodotto, consegnarlo a un organismo specializzato in smaltimento di apparecchiature elettriche vecchie.

Šī zīme norāda, ka iztrādājumu, uz kura tā atrodas, nedrīkst izmest kopā ar parastiem mājsaimniecības atkritumiem. Tā kā tas ir izstrādājums, ko cits citam pārdod un lieto tikai uzņēmumi, tad to nedrīkst arī izmest atkritumos tādās izgāztuvēs un atkritumu savāktuvēs, kas paredzētas vietējiem iedzīvotājiem. Ja būs vajadzīgs šo izstrādājumu izmest atkritumos, tad rīkojieties pēc noteikumiem un nogādājiet to tuvākajā vietā, kur īpaši nodarbojas ar vecu elektrisku ierīču savākšanu.

Šis simbolis rodo, kad juo paženklinto gaminio negalima išmesti kaip paprastų buitinių atliekų. Kadangi tai B2B (verslas verslui) produktas, jo negalima atiduoti ir buitinių atliekų tvarkymo įmonėms. Jei norite išmesti šį gaminį, atlikite tai tinkamai, atiduodami jį arti jūsų esančiai specializuotai senos elektrinės įrangos utilizavimo organizacijai.

Dan is-simbolu jindika li l-prodott li huwa mmarkat b'dan il-mod m'għandux jintrema bħal skart normali tad-djar. Minħabba li huwa prodott B2B , ma jistax jintrema wkoll f'ċentri ċiviċi għar-rimi ta' l-iskart. Jekk tkun tixtieq tarmi dan il-prodott, jekk jogħġbok għamel dan kif suppost billi tieħdu għand organizzazzjoni fil-qrib li tispeċjalizza fir-rimi ta' tagħmir qadim ta' l-elettriku.

Dette symbolet indikerer at produktet som er merket på denne måten ikke skal kastes som vanlig husholdningsavfall. Siden dette er et bedriftsprodukt, kan det heller ikke kastes ved en vanlig miljøstasjon. Hvis du ønsker å kaste dette produktet, er den riktige måten å gi det til en organisasjon i nærheten som spesialiserer seg på kassering av gammelt elektrisk utstyr.

Ten symbol oznacza, że produktu nim opatrzonego nie należy usuwać z typowymi odpadami z gospodarstwa domowego. Jest to produkt typu B2B, nie należy go więc przekazywać na komunalne składowiska odpadów. Aby we właściwy sposób usunąć ten produkt, należy przekazać go do najbliższej placówki specjalizującej się w usuwaniu starych urządzeń elektrycznych.

Este símbolo indica que o produto com esta marcação não deve ser deitado fora juntamente com o lixo doméstico normal. Como se trata de um produto B2B, também não pode ser deitado fora em centros cívicos de recolha de lixo. Se quiser desfazer-se deste produto, faça-o correctamente entregando-o a uma organização especializada na eliminação de equipamento eléctrico antigo, próxima de si.

Acest simbol indică faptul că produsul marcat în acest fel nu trebuie aruncat ca şi un gunoi menajer obişnuit. Deoarece acesta este un produs B2B, el nu trebuie aruncat nici la centrele de colectare urbane. Dacă vreţi să aruncaţi acest produs, vă rugăm s-o faceţi într-un mod adecvat, ducând-ul la cea mai apropiată firmă specializată în colectarea echipamentelor electrice uzate.

Tento symbol znamená, že takto označený výrobok sa nesmie likvidovať ako bežný komunálny odpad.Keďže sa jedná o výrobok triedy B2B, nesmie sa likvidovať ani na mestských skládkach odpadu. Ak chcete tento výrobok likvidovať, odneste ho do najbližšej organizácie, ktorá sa špecializuje na likvidáciu starých elektrických zariadení.

Ta simbol pomeni, da izdelka, ki je z njim označen, ne smete zavreči kot običajne gospodinjske odpadke. Ker je to izdelek, namenjen za druge proizvajalce, ga ni dovoljeno odlagati v centrih za civilno odlaganje odpadkov. Če želite izdelek zavreči, prosimo, da to storite v skladu s predpisi, tako da ga odpeljete v bližnjo organizacijo, ki je specializirana za odlaganje stare električne opreme.

Este símbolo indica que el producto así señalizado no debe desecharse como los residuos domésticos normales. Dado que es un producto de consumo profesional, tampoco debe llevarse a centros de recogida selectiva municipales. Si desea desechar este producto, hágalo debidamente acudiendo a una organización de su zona que esté especializada en el tratamiento de residuos de aparatos eléctricos usados.

Den här symbolen indikerar att produkten inte får blandas med normalt hushållsavfall då den är förbrukad. Eftersom produkten är en så kallad B2B-produkt är den inte avsedd för privata konsumenter, den får således inte avfallshanteras på allmänna miljö- eller återvinningsstationer då den är förbrukad. Om ni vill avfallshantera den här produkten på rätt sätt, ska ni lämna den till myndighet eller företag, specialiserad på avfallshantering av förbrukad elektrisk utrustning i ert närområde.