



Short user guide

KE3700

KE3550

xDSL MULTITEST

Version 018.002.002

© KURTH ELECTRONIC GmbH

All rights reserved, including those of the translation

Reprint and data processing, also in extracts, only with written permission of Kurth Electronic GmbH

All trademarks and logos mentioned herein belong to their registered owners

Made in
Germany



Application

The KE3700/KE3550 is a fast, easy to use and cost-effective multitester for installing and troubleshooting DSL services in hybrid ADSL1/2/2+/VDSL2 and bundled networks. With its variety of interfaces, it supports broadband network technologies such as vectoring, G.fast, bonding, SHDSL*, Gigabit Ethernet and GPON*.

Usage

The KE3700/KE3550 provides powerful fault diagnosis for immediate troubleshooting in the network, outdoor cabling, customer devices or indoor cabling. Even in hybrid networks, where FTTH is also installed, measurements can be performed on any LAN port using the Ethernet ports of the KE3700/KE3550. Therefore, the KE3700/KE3550 is the ideal solution for many broadband technologies.

Operation

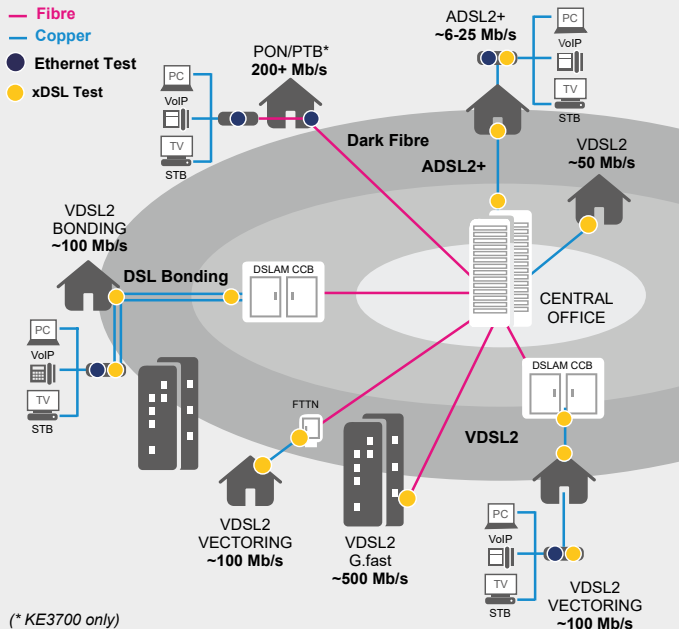
With its small dimensions, robust design and intuitive operation, it is the perfect tester for installers and service technicians. Automatic recognition of the xDSL service and definable test procedures enable the user to complete his orders quickly and efficiently. The large display increases the ease of use and when saving the results, the technician has options for exporting the tests and compiling reports.

At a glance

- Multitasking tests without loss of synchronization
- ADSL-VDSL2, G.fast and bonding in one device
- Annex A/B/J/L/M with automatic xDSL detection
- VDSL2 vectoring (ITU-T G.993.5)
- Web browser
- GbE port for advanced Ethernet testing
- Modem / router and terminal mode
- IP ping, traceroute with IPv4 (IPv6 ready)
- FTP-Up/Download-Test, HTTP-Downloadtest up to 700 MBit/s
- Sunlight readable colour TFT
- High-performance battery
- Including software for administration and protocols
- Integrated Wi-Fi

(* KE3700 only)

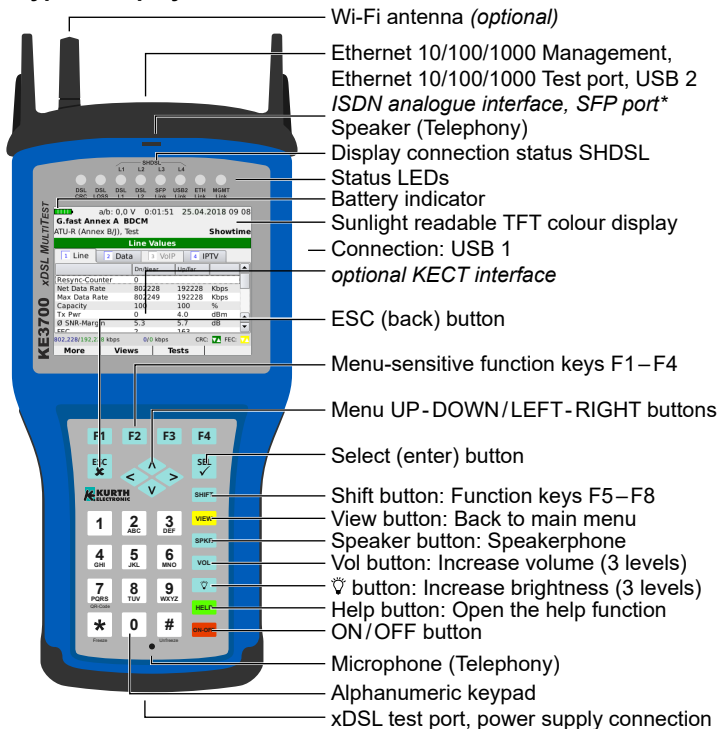
Fields of application



Documentation and software

Current operating instructions and software updates can be found at www.kurthelectronic.de in our download area. Under *Service and Support > Downloads* you will find the corresponding files such as current firmware and operating instructions for downloading.

Keypad/Display/Connections

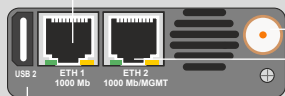


Status LEDs

(* KE3700 only)

- DSL CRC - orange > Indicates a CRC error
- DSL LOSS - orange > Loss display with beep
- DSL L1 - green > DSL connection established
- DSL L2* - green > DSL line 2 connection established (bonding)
- SFP Link* - green > Indicates active SFP transceiver
- USB2 Link - green > Indicates active USB connection, e.g. when saving
- ETH Link - green > Indicates active Ethernet connection
- MGMT Link - green > Indicates active connection: Management port to PC

Upper side ports: Ethernet Ports



1 Gbit/s port for Ethernet tests
10/100/1000 Mbit/s

Connection Wi-Fi antenna

Device management port

10/100 /1000Mbit/s

USB 2: Function expansion

(e.g. external keyboard, USB storage)



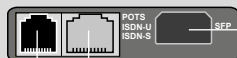
Yellow LED: Link / Data

LED lights continuously: Connection has been established

LED flashes: Transmit / receive activity

Green LED: Transmission speed

Upper side ports (optional): ISDN (BRI)/Analogue (POTS)/SFP



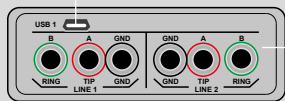
Slot for SFP modules Copper /Fibre for GPON
+ Ethernet Measurements (*KE3700 only*)

Warning: Do not run a software update with a plugged-in SFP module!

RJ45 ISDN S_0 port

RJ11 Analogue Phone port (POTS)
ISDN U_{k0} port

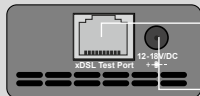
Side Ports: KECT Copper Testing (optional)



USB 1: Function expansion

Connections for Copper Tests KECT
Line 1 and 2 for 2x shielded test leads
with device side three-prong plug TF

Bottom Ports: xDSL Ports



RJ11/RJ45 xDSL Test Port

Power supply connection

SHDSL + S2M Interface (optional, upper side) (*KE3700 only*)

See chapter SHDSL in the Operating Manual.

Keypad

During the development of the KE3700/KE3550, emphasis was placed on fast and simple operation:

F1–F4: Menu-related function keys, fast access to functions

ESC: Based on PC functions, the ESC key is used to cancel or end functions.

SEL: SELECT button. Press this key to select.

ON / OFF: On and off button

Arrow keys ▲ ▼ ◀ ▶

The arrow keys are used to UP ▲ / DOWN ▼ and LEFT ◀ / RIGHT ▶ scroll.

Keypad: Alphanumeric keyboard 1–0, A–Z, special characters, shortcut keys:

7: Display QR code for active xDSL or automatic copper measurement

*: Freezing a copper measurement, #: Unfreeze the measurement

Text input:

F1: abc → **123** Switch between letters and numbers.

Special characters can be found under the * and # keys.

*: . - / @ : _ + , [] ; = ?

#: # \$ % & ' () { } ~

F2: Delete the entire input line with **Clr**

F3: Delete single digits with **DEL**

F4: Delete individual digits from right to left with ←

Line Values			
1 Line	2 Data	3 VoIP	4 IPTV
	Dn/Near	Up/Far	
CRC	0	0	
HEC	0	0	
Ø Signal Attenuation	0.0	0.0	dB
1 Help	0	391.00	
2 Reset errors	0	0	ms
3 Save measurement	0	0	kbps

Caution: KE3700/KE3550 may only be operated with the original KE power supply unit supplied and never with an output voltage above 18 V/DC! Damage to the device due to non-observance will be repaired at the owner's expense!

Always plug the power supply unit into the device first and then into the power outlet.

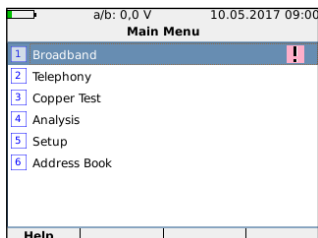
Note: Please fully charge the battery before first use!

If the charge control LED changes from orange to green, charging is complete. To check the charge indicator after initial charging, switch the unit off and on again for approx. 1 minute with the power supply unit connected. During this time, the battery display calibrates and shows the correct value.

Power On > Main Menu

After the short boot process with subsequent self-test, the screen with the device information appears. The main menu appears with the following options:

1. **Broadband > Interface selection**
2. *Telephony (optional)*
3. *Coppertest (optional)*
4. **Analysis > Calling up measurements**
5. **Setup > Basic device settings**
6. **Address Book > Creating and editing address book entries**




Setup


1. Display & Signals:


- 1.1. **Automatic Off** after last keystroke. Possible settings: *Always on/ 3 Min./5 Min./15 Min./30 Min. and 60 Min.* During a running test the KE3x00 does not switch off.
- 1.2. **Backlight and Display:**
 - 1.2.1 **Backlight** – Possible settings: *Always on/Always off/30 Seconds/3 Minutes.* Sets the time until the screen is dimmed to conserve battery power. If *Off/30 sec./3 min.* is selected, 1.2.2 **Brightness dimmed** also appears as a further menu item. Possible settings are from level 1 to 7, where 1 is dark and 7 is light.
 - 1.2.3 **Brightness:** Display brightness, level 1 to 7: 1 dark and 7 bright.
- 1.3. **Date and Time:**
 - 1.3.1 **Date and Time**
 - 1.3.2 **Date format** DD/MM/YYYY or MM/DD/YYYY
 - 1.3.3 **Time format** either *24 hours* or *12 hours*
 - 1.3.4 **Number format** x xxx,xx or x,xxx.xx
- 1.4. **Confirm power off:** Warning when switching off prevents unintentional switching off, *on* or *off*
- 1.5. **Storage media:** Switching between internal SD card and storage medium via USB as storage location.
- 1.6. **Measurement min/max:**
 - 1.6.1 **Show Min/Max value** (Coppertest > Line multimeter)
 - 1.6.2 **Show Coppertest length** (Coppertest > Line multimeter)
- 1.7. Switching the **signal tones** on and off (e.g. keypad / sync / sync loss / CRC / FEC / low battery status)
- 1.8. **Alarm settings:**
 - 1.8.1 **A/B threshold:** Activation *On/ Off* and definition of threshold value for displaying the voltage at the top of the display.


2. **Language:** Defining the menu language
3. **Software Updates:** Checks whether an update exists and allows it to be executed (greyed out if no update exists).
Attention: Do not perform software update with a SFP module plugged in!
4. **Management Port:** Choice between *Auto* / *Static*. With *Static*, you can enter your own, fixed IP address.
5. **QR Configuration:** Selection of xDSL and copper test results to be included in QR code output.
6. **Reset Management IF:** Resetting and restarting the management interface.
7. **System information:** Here you will find information on the built-in modules such as HW version and SW version, licenses and interfaces.
8. **Licence information:** Licence information for the device software.
9. **Start VNC:** Starts Virtual Network Computing (VNC), which displays the screen content of the tester on a local computer and allows remote control of the device (installation via KE-Manager).
10. **Modem Debug:** Creates an additional debug log file, *Ein* or *Aus*
11. **Check capacity status:** Indication of the capacity and the state of charge of the built-in battery

General operating help

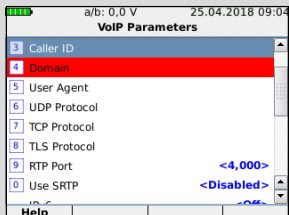
< ✕ > deactivated, activate with  key

<  > activated, all entries are correct
> Test possible

<  > activated, complete entries
> Test possible

<  > activated, correct entries
> Test not possible

Red bar:
Input/check
absolutely necessary!



1. Interface

Possible settings: <xDSL> and <Ethernet>

(<SFP>, <Wi-Fi> and <SHDSL> optional).

If the G.fast modem is installed, menu item 4

G.fast (On/Off) appears for activation.

The menu view changes depending on the selected interface.

2. xDSL Interface

Possible settings e.g.: <Annex A/M> /

<Annex B/J>. A second synchronization

approach is required for Annex J, since the

filters are switched from Annex-B to Annex-J.

3. Terminal mode (xDSL) with automatic xDSL service detection

with **1** / Start of synchronization

Display of line values

Resync-Counter: Number of resyncs performed

Net Data Rate: Current Up-/Downstream

Max Data Rate: Max. Up-/Downstream

Capacity: Display in %

Tx Pwr: Transmitting power in dBm

Ø SNR-Margin: Difference between line SNR

and required SNR in dB

FEC: Performed error corrections

CRC: Checksums errors

HEC: ATM-Header Error Check

Bitswap: Data of a disturbed transmission

channel diverted to other channels

Ø Line Atten.: Attenuation in dB

INP: Impulse Noise Protection

Interleave: Delay in ms or 0 for Fast Path

Line Loss: Loss of synchronized

connection

LOF: ATM receiving station has lost

frame description

LOM: Loss of Margin counter for line changes

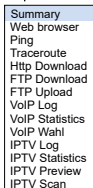
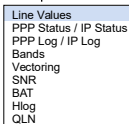
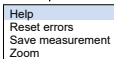
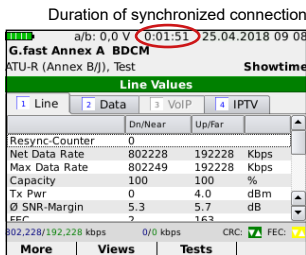
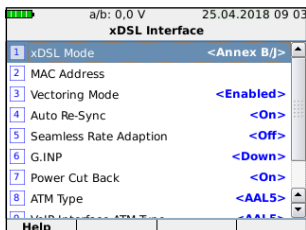
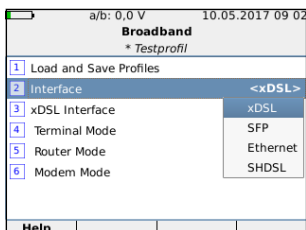
SES: Severely errored seconds

UAS: Number of seconds without transmission

ES: Errored Seconds (Bit error rate)

Total Sync: Synchronization history

Elec. Loop Length: Display of the cable length calculated from the measured values



Function keys and selection options

F1 More (Selection with SEL)

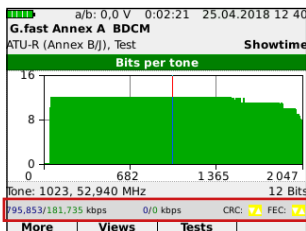
- Help (help functions)
- Reset errors (displayed errors are set to zero)
- Save the measurement or directly in the measurement by pressing the SEL key. A window opens in which the storage space can be entered as name/number. After confirmation with SEL, the measurement is stored in the internal memory and can be edited with the KE Manager software included in the delivery.
- Zoom for graphs (only for SNR/BAT/Hlog/QLN)

F2 View

(line values, bands, vectoring ...)

- Line values (see page 9)
- IP status / IP protocol
- Bands (display of single bands for SNR margin, line attenuation, signal attenuation and TXPower)
- Vectoring (Vectoring status information Status/G.INP/Error Samples)
- SNR/BAT/Hlog/QL (Graphs for bits per tone, SNR, Hlog, QLN (Downstream blue, Upstream green)).

Viewing Bits per tone



Status bar with Data Rate and CRC/FEC

F3 Test

- Data tests, VoIP and IPTV tests, web browser

4. Router Mode

Connecting the KE3700/KE3550 to the xDSL connection and to the PC. Replaces the modem and router.

5. Modem Mode

Connecting the KE3700/KE3550 to the xDSL connection and to the PC. Replaces the mode.

Terminal mode (Ethernet)

Connection to the Ethernet interface of a modem/router or a hub/switch. Settings are available for ping, traceroute, HTTP download, FTP download and FTP upload.

Analysis

You can call up stored **broadband and copper measurements** and analyze them in the device. Not only the stored snapshot is displayed, but the entire measurement sequence from the start of synchronization. In the selection menu you can start the display with **F2** <Info> (depending on the duration of the synchronization time this can be a longer process). With **F3** <Edit> you can rename a measurement file and with **F4** <Delete> you can delete the file. Since the display is not an active representation of the measured values, it is displayed with a different background colour and a red border.

Line Values			
1 Line	2 Data	3 VoIP	4 IPTV
Resync-C...	0		
Net Data ...	803436	194441 Kbps	
Max Data ...	811512	194441 Kbps	
Capacity	99	100 %	
Tx Pwr	0	4.0 dBm	
Ø SNR-Ma...	5.9	0.0 dB	
FEC	0	0	
CRC	0	0	

More **Views** **Tests**

Help
Reset errors
Save measurement
Zoom

Line Values
PPP Status / IP Status
PPP Log / IP Log
Bands
Vectoring
SNR
BAT
Hlog
QLN

Summary
Web browser
Ping
Traceroute
Http Download
FTP Download
FTP Upload
VoIP Log
VoIP Statistics
VoIP Wahl
IPTV Log
IPTV Statistics
IPTV Preview
IPTV Scan

Address book

In the Address book, you can create phone numbers, IP addresses, VoIP access data and SIP details, frequently used URLs, user names and passwords.

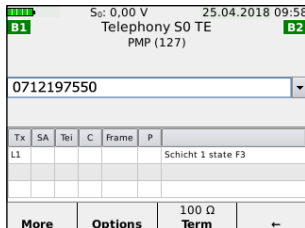
With **F1** > **Add contacts** you can create a new address entry and add details to the categories above mentioned in the next menu with **F2**.

These can then be called up in the corresponding menus (with the < key) and you do not have to repeat the entry.

New Contact		
dial_number		Your label
ipv4	192.168.101.2	Your label
sip_domain		Your label
sip_address		Your label
sip_userAgent		Your label
123	Clr	Del
		←

ISDN and Analogue interface (option)

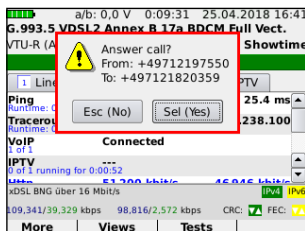
The KE3700/KE3550 with its optional ISDN interface covers all functions for the installation and maintenance of S_0 -/NT and U_{k0} - as well as analogue connections: It checks S_0 interfaces in TE, NT and fixed connection mode. You can choose between the connection types Analogue, ISDN S_0 TE, ISDN S_0 NT and ISDN U_{k0} .



For ISDN S_0 NT tests, please use the included red ISDN connection cable.

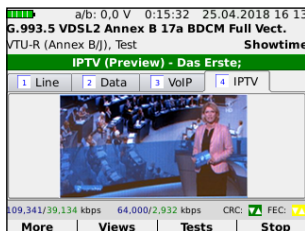
VoIP (option)

The KE3700/KE3550 works as a VoIP terminal with active telephone function. VoIP connections can be established via xDSL and Ethernet. SIP (Session Initiation Protocol) is available as VoIP signaling protocol. To assess the voice quality, the MOS and R-factor are determined and displayed on the basis of the data stream. All settings can be stored in profiles (xDSL, Ethernet and Wi-Fi).



IPTV (option)

IPTV profiles are uploaded to the KE3700/KE3550 using the KE Manager. The device requests a data stream from a server (replaces the set-top box (STB) or modem depending on the connection type) and checks the regularity of the incoming packets, the loss of packets and the switch-on or switch-over time of the program.



Wi-Fi (option)

In addition to wired networks, you can also connect wirelessly to a network that supports the IEEE802.11 standard. In addition to the ability to use a wireless network for Internet access, you can also perform general network tests and view the status of the wireless access point.

Configuration

Select the interface **<Wi-Fi>** from the main menu. You can now connect to a Wi-Fi network under Wi-Fi interface:

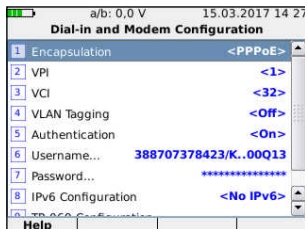
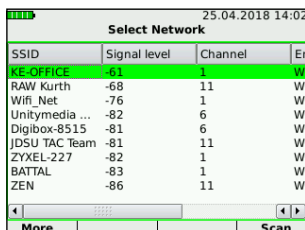
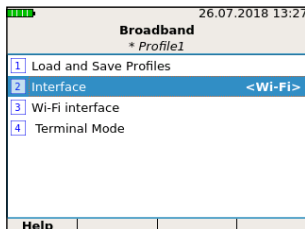
Select Network: Select an accessible network and automatically connect to it if necessary by entering the password. Here you can also see the channel, the MAC address and the signal strength of the access point.

Manual network: Connect to a known access point by manually entering all required data.

WAP: Automatically connect to an access point via WAP.

Evaluation

The configuration and evaluation of network tests via Wi-Fi works exactly as you are used to from the other interfaces.

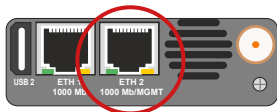


KE-Manager Software

You install the KE Manager software on your PC by double-clicking on the setup file in the Explorer window. A Windows installation wizard guides you through the necessary steps.

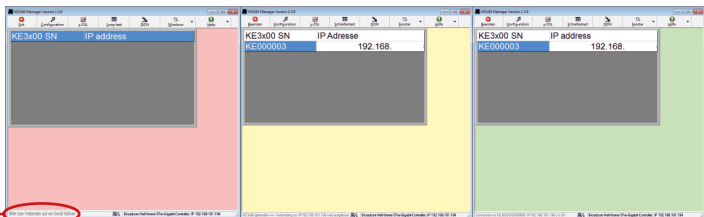
Connect the Multitester to your network/PC

Switch on the xDSL Multitester. Use an RJ45 Ethernet cable and connect the Multitester via the management port (top of the device) to an Ethernet port on your network or directly to the Ethernet port on your PC.



Starting the KE-Manager

Click on the KE Manager icon on your PC desktop. The KE Manager loads and shows you the connection status to the PC using various colours.



red > No connection

yellow > Device found,
connection is
being established

green > Connection
established

The connection status is displayed in the bottom line:

- Please click on a device to connect
- KE3x00 found → Connection to IP 192.xxx is established
- Connection to KE3x00 (serial number, IP 192.xxx) is OK

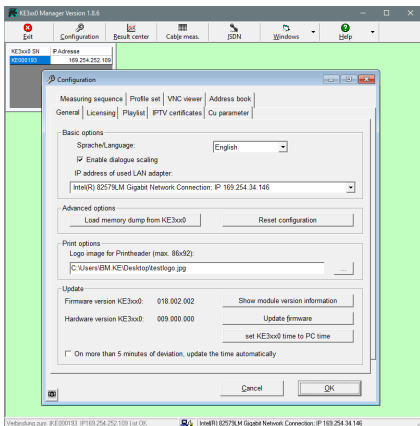
The green background indicates the established connection. The serial number and IP address are displayed in the window in the upper left corner. If there are several KE multitesters in the network, you can find the one you are looking for by viewing the serial number. Now you can make settings for the KE Multitester via the KE Manager.

The KE-Manager is a flexible tool for managing the KE3700/KE3550 and for downloading measurement data. Like the KE3700/KE3550, the KE-Manager is well arranged and largely intuitive to operate.

Configuration

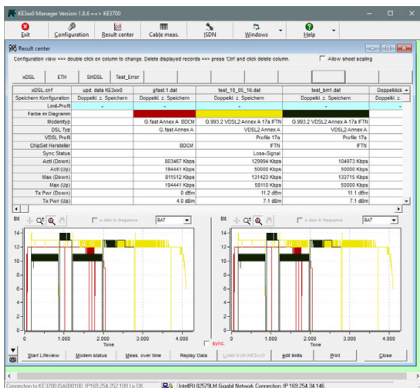
Creation of profiles, settings for basic options such as language selection and licensing as well as uploading channel lists (IPTV profiles) and updating the device firmware. Detailed update instructions are stored in the KE Manager under *Help*.

Important: Always connect the KE Multitester to the power supply before starting the update process! If you unintentionally switch off during the update, you will have to send in the device.



Result Centre

Gives precise information about the active and stored tests. Available for xDSL, Ethernet, SHDSL and evaluation of test errors. The display of the parameters is individually configurable.



Line measurement

Here you can view the measured values of the automatic line analysis (copper test).

The screenshot displays the 'Cable measurement & loop test' window. It shows the following parameters:

- Cable: Basic V12-100m/µs Ø 0.6mm C 0.042NF
- Durchmesser: 0.6 mm
- Spezifische Leitfähigkeit: 55.6 m/Ohm mm²
- Kapazitive Last: 42 µF
- Wellenausbreitungsgeschwindigkeit: 200 m/µs
- Temperatur: 20 °C
- Temperaturkoeffizient: 0.029 K⁻¹

test1	Result	Value
Kabelprüfung (A-B)	Kabel	A/B
Spannung (A-E, DC)	U ^h	0.060 V
Strom (A-B)	I ^h	0.0 mA
Leitfähigkeit	I ^h	0.2 mA
Widerstand (A-B)	R ^h	> MAX
	L(R)	> MAX
Kapazität (A-B)	WUmax	> MAX
	C	0.09 µF
LCL (956 kHz)	L(LC)	2.14 m
Massfehler (Ports 1-4 (bina))	L(L)	0.24 dB

Buttons: Load file from PC, Load file from (S23x0), Export to CSV, Close.

ISDN

View of stored ISDN tests.

The screenshot displays the 'ISDN test' window for a KE300 SN with IP address 192. The table below shows the test results:

Zeitstempel	Zähler	Tx	SA	TB	C	Frame	P	IN(S)/NR/Kommentar
18.04.2017 13:48:30	20	TE	0	124	C	I	2	5 R 1 CONN_LACK
18.04.2017 13:48:30	21	TE	0	124	C	I	3	5 R 1 DISC
18.04.2017 13:48:30	22	NT	0	124	C	I	4	6 R 1 DISC
18.04.2017 13:48:31	23	NT	0	124	C	I	5	4 R 1 REB
18.04.2017 13:48:31	24	TE	0	124	C	DISC	F	4 6 R 1 REB_COMP
18.04.2017 13:48:31	25	NT	0	124	R	UK	F	
18.04.2017 13:48:41	26	L1						Schicht 1 state F3
18.04.2017 13:48:41	27	NT						Frame mit PRN-Übernahmefehler (2 Bytes)
18.04.2017 13:48:41	28	L1						Schicht 1 state F4
18.04.2017 13:48:45	29	L1						Schicht 1 state F4
18.04.2017 13:48:45	30	L1						Schicht 1 state F5
18.04.2017 13:48:45	31	L1						Schicht 1 state F6
18.04.2017 13:48:45	32	L1						Schicht 1 state F7
18.04.2017 13:48:45	33	L1						Schicht 1 aktiviert
18.04.2017 13:48:45	34	TE	0	124	C	SMBIE	P	
18.04.2017 13:48:45	35	NT	0	124	R	UK	F	
18.04.2017 13:48:45	36	TE	0	124	C	I	0	0 R 2 SETUP

Buttons: Start Liveview, Load file from (S23x0), Save to PC, Load file from PC, Export to CSV, Close.

Firmware update

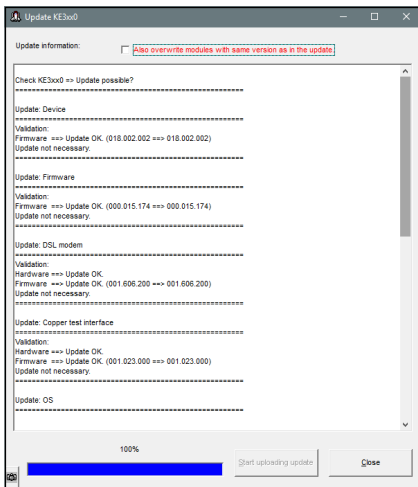
You can use the KE Manager to install firmware updates on your KE3700/KE3550. We recommend that you keep your device's firmware up to date to take advantage of latest features and optimizations. The currently installed firmware version can be viewed in the device under **Setup > System Information**.

You can always download the latest firmware from our homepage at www.kurthelectronic.de/software-downloads/?lang=en.

Click on **Configuration** in the KE Manager menu bar. A new window opens: In the configuration menu you can select the desired language and press the button **Update Firmware** at the bottom right for the software update.

You can select the KE-Multi-Tester firmware file from your hard disk or an external drive via the Explorer of your PC (the files always have the extension *.upd*). In the selection window, click **Open**.

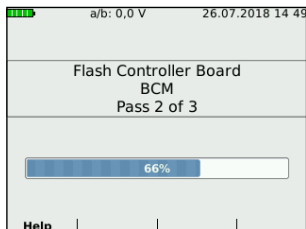
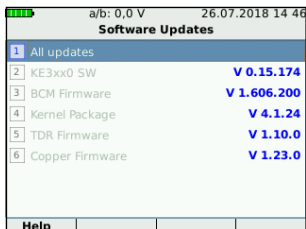
The KE-Manager checks whether the selected firmware is more current than the firmware already installed on the KE Multitester. You can then start the upload of the file to the device. After successful transfer, install the new firmware on the device.



Once you have uploaded the.upd file to the device, the **Software Updates** menu item under **Setup** is activated.

**Warning: Do not perform software update with a SFP module plugged in!
Only perform the update with the power supply connected!**

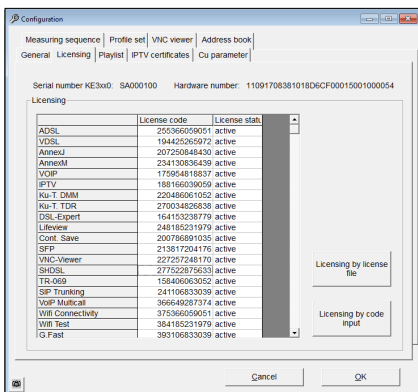
The update process is initiated by selecting this menu item. After this automated process, the device is restarted. If several modules are to be updated, you may also need to initiate their pending updates.



Activation of software options

You can activate software options for your device via the KE Manager. To do so, connect the manager to your device and select the **Licencing** tab in the **Configuration** menu item.

A window with available software options of your device and the activation status opens. To unlock another software option, double-click on the desired option and enter the corresponding license key. After successfully entering the key, the option is activated on your device within a few seconds and is available after a restart.



General Data

Graphic TFT Display	3.5" 240 (RGB) x 320
Languages	German, English, French, Spanish, Italian, Dutch
xDSL Test Port	RJ11/RJ45 (one port)
LAN Port	RJ45
GbE Port	RJ45
Power supply	Built-in LiPo battery
Capacity	approx. 5 hours in xDSL test mode
Low batt indication	Coloumb counter
Power supply	100 – 230 V AC 50/60 Hz, 12 – 18 V/DC

Scope of delivery

Unit comes with:

AC power supply and charger, test leads RJ11-RJ45, RJ11 banana plug with rubber insulated crocodile clips, Ethernet cable for PC connection, bag made of rugged cordura with additional space. Windows software for download of results and upgrade of unit.

Dimensions:

Size	230 x 114/90 x 70 mm 9" x 4.5/3.5" x 2.8"
Weight	1,100/1,300 g
Housing	High impact resistant ABS, with drop protection
Display protection	2 mm Plexiglass

Environmental conditions:

Operation temperature:	0° – +50°C
Storage temperature	-20° – +60°C
Humidity:	up to 93%, non-condensing

The device was manufactured according to the following guidelines:

Electromagnetic Compatibility Directive 2014/53/EC

LVD Directive 2014/53/EC

IEC/CISPR: 11:2009 + A1:2010, 16-1-2:2006 Edition 1.2, 16-2-1:2008 + A1:2010, 16-2-3:2008 + A1:2010

IEC: 61000-4-1:2016, 61000-4-2:2008 Edition 2, 61000-4-3:2006 + A1:2007 + A2:2010, 61000-4-8:2009, 61326-1:2012, 61326-2-1:2012



Safety instructions

The KE3700/KE3550 may only be operated with the accessories originally provided. Using the device with accessories that are not original or for applications for which it was not intended can lead to incorrect measurements and may damage the device. The relevant safety regulations in VDE 0100, 0800 and 0805 must be adhered to.

- The usage of connections other than those provided can damage the device. The device should not be used with high-voltage current. Kurth Electronic assumes no liability for damage resulting from improper use.
- Never apply external voltage to the device.
- Open the device only to change the batteries. There are no other parts in the device that need to be serviced or calibrated.
- The measuring device is protected from splashing water and dust by the front film covering. However, it is not water proof.
- Never pull unnecessarily on the cables connected to the device.

Last revision: 03/2021