

Operating Instructions

3-447-204-03

1/8.23

Network and LAN Cable Tester

KE7200

KE7200 PRO Kit

REMOTE UNIT

KE7010

KE7010 Kit

KE7010 PRO Kit

Safety Precautions



For proper and safe use, please read and follow these instructions carefully and completely.

The instructions must be provided to every user of the instrument.

Keep for future reference.

General

- The instrument may only be used by adequately trained specialists.
- Observe and comply with all safety regulations applicable for your work environment.
- Wear suitable and appropriate personal protective equipment (PPE) during all work.
- In particular, the relevant safety regulations in VDE 0100, 0800, and 0805 must be adhered to.

Accessories

- Use only the specified accessories (included in delivery or listed as optional) with the instrument.
- Carefully and completely read and adhere to the product documentation for optional accessories. Retain these documents for future reference.

Handling

- The instrument may only be used in data and telecommunications networks that are free of external voltages.
External voltages greater than 60 V DC can destroy the instrument and also represent a potential health hazard to the user!
- Never pull unnecessarily on the cables connected to the instrument.
- Use the instrument in undamaged condition only.
Inspect the instrument before use. Pay particular attention to damage, broken insulation, or kinked cables.
- Use the accessories and all cables in undamaged condition only.
Inspect all cables and accessories before use. Pay particular attention to damage, broken insulation, or kinked cables.
- If the instrument or its accessories do not function flawlessly, permanently remove the instrument/accessories from operation and secure them against inadvertent use.
- If the instrument or accessories are damaged during use, such as if they are dropped, permanently remove the instrument/accessories from operation and secure them against inadvertent use.
- If there are any signs of interior damage to the instrument or accessories (e.g., loose parts in the housing), permanently remove the instrument/accessories from operation and secure them against inadvertent use.
- The instrument and accessories may only be used for the tests/measurements described in the documentation for the instrument.

Operating Conditions

- Do not use the instrument and its accessories after long periods of storage under unfavorable conditions (e.g., humidity, dust, or extreme temperatures).
- Do not use the instrument and the accessories after extraordinary stressing due to transport.
- Do not expose the instrument to direct sunlight.

- Only use the instrument and the accessories in compliance with the specified technical data and under the specified conditions.
- Do not use the product in potentially explosive atmospheres. Danger of explosion!

Batteries

- Use batteries in undamaged condition only. There is a risk of explosion and fire if the batteries are damaged!
- Inspect the batteries before use. Pay particular attention to leaky and damaged batteries.
- Only use the instrument with the battery compartment lid inserted and closed.

Measurement Cables and Establishing Contact

- Never touch conductive ends or wires.
- Make sure that good contact has been made.

Data Security

- Always create a backup copy of your measurement data.
- The instrument is equipped with a data memory to which personal and/or sensitive data can be stored. Observe and comply with the applicable national data protection regulations. Take appropriate measures to prevent unauthorized access to the data.

Application

Please read this important information!

Intended/Proper Use

The KE7200 is a network and LAN cable tester.

It is used for initial startup tests, for checking data and telecommunications networks, and for troubleshooting. The results can be stored in the instrument or transferred to a PC. In the associated PC software, the results can be documented and logs created.

The instrument is used in data and telecommunications networks (Ethernet/RJ-45 cables, coaxial cables/lines, telecommunications cables/lines) without external voltage. It is hooked up using its RJ-45 socket and the supplied or optionally available accessories (see data sheet).

The KE7200 can be used to perform the following tests/measurements:

- Cable tests with error display:
Detection of reversed connections, short circuits, interruptions, overdrafts (split pairs; as of 2 m), testing of the data line assignment with pin and pair assignment (wire mapping), cable length measurement, and determination of the distance to the error with TDR function
- Network tests (Ethernet cable only):
IP test with listing of active network subscribers with name, IP address, and MAC address; detection of network speed 10/100/1000 Mbit; ping test, including stress tests
- Power over Ethernet test (Ethernet cable only):
PoE/PoE++ test according to IEEE802.3af/at/bt
- Port finder function (Ethernet cable only):
Link blink function for identifying ports on routers/switches/hubs
- Search tone mode (Ethernet cable only):
Transmission of a search tone signal and identification of the associated network port via tone detection with the P310*/P410** probe search signal receiver
- [With software option only] Branch detection
(coaxial cables/lines, telecommunications cables/lines only):
For precise localization (existence and distance) of branches/stub lines (bridge taps) in telecommunications networks in buildings.

The external voltage protection of the KE7200 against accidentally applied external voltage is 60 V DC. The instrument emits a warning and displays whenever external voltage is present, and tests can only be conducted after the external voltage has been eliminated.

Some measurements/tests require the KE7010 remote unit or the P310/P410 probe search signal receiver. For this reason, different instrument combinations are offered (see scope of delivery and data sheet).

The safety of the user and the instrument is only guaranteed during proper use.

* P310 included in the KE7200 PRO kit; optionally available for purchase separately

** P410 included in KE7207 and KE7208; optional available for purchase separately

Improper Use

Using the instrument for any purposes other than those described in these instrument operating instructions constitutes improper use.

Liability and Guarantee

Gossen Metrawatt GmbH assumes no liability for property damage, personal injury, or consequential damage resulting from improper or incorrect use of the product, in particular due to failure to observe the product documentation. The same applies to maintenance measures that are not carried out properly or in good time. Moreover, all warranty claims will be void in such cases. Nor will Gossen Metrawatt GmbH assume any liability for lost data.

Instructions

Information on These Instructions

Read these instructions carefully and attentively. They contain all the information for safely using this instrument. Follow them to protect yourself and others from injury and to avoid damaging the instrument.

The latest version of these instructions is available on our website:

<https://www.gmc-instruments.de/en/services/download-center/>

Description of Various Models

This documentation describes the different combinations and optionally available functions of the instruments. For this reason, functions may be described that do not apply to your particular instrument. In addition, the illustrations may differ from your instrument.

Errors and Suggestions for Improvement

These instructions have been prepared with the utmost care to ensure accuracy and completeness. Unfortunately, however, errors can never be avoided completely. Continuous improvement is part of our quality goal, so we are always grateful for tips and suggestions.

Equal Treatment

For better readability, the masculine form may be used in these instructions in a grammatically neutral sense. Naturally, the feminine and diverse form are always understood as being included.

Trademark Rights

Product designations used in this document may be subject to trademark law, brand law, and patent law. They are the property of their respective owners.

Copyright

This document is protected by copyright. Modification of content, reproduction, duplication, processing, or translation in any form (including excerpts) will require the written consent of Gossen Metrawatt GmbH. This applies in particular to storage and processing in electronic systems.

Scope of Delivery

Please check the scope of delivery for completeness and intactness.

KE7200 (D720A)

KE7200* network tester and 2 KE7010 remote units

2 × short RJ-45 test cords, 1 × long RJ-45 test cord, 1 × RJ-11 test cord to banana plug, including plug-on crocodile clips, 1 × RJ-45 coax. adapter set (2 × RJ-45 plug adapters to BNC, 2 × BNC plug adapters to F-female), carrying pouch

includes KE7200 Manager PC software (download from website)

KE7200 PRO Kit (D723A)

KE7200* network tester and 4 KE7010 remote units and P310** probe

2 × short RJ-45 test cords, 1 × long RJ-45 test cord, 1 × RJ-11 test cord to banana plug, including plug-on crocodile clips, 1 × RJ-45 coax. adapter set (2 × RJ-45 plug adapters to BNC, 2 × BNC plug adapters to F-female), carrying pouch

includes KE7200 Manager PC software (download from website)

Branch detection (D720S)

Software option for the KE7200 for the detection of branches / stub lines (bridge taps) in build-ings.

Note: Only included if the software option is part of the order. Alternatively, it can also be ordered later from our service (see "Contact, Support, and Service" on page 26).

KE7010 (D701B)

1 × KE7010 remote unit for KE7200

KE7010 Kit (D701C)

4 × KE7010 remote unit for KE7200

KE7010 PRO Kit (D701D)

4 × KE7010 remote unit for KE7200 and P310** probe

* 4 × 1.5 V (AA, LR6, alkaline/mignon) batteries required for operation. Not included with the instrument.

** 9-volt battery required for operation. Not included with the instrument.

Optional Accessories

Some applications require optional accessories. For detailed information, please refer to the data sheet; these instructions only mention the accessories required in each case and describe their use.

Instrument Overview

KE7200

Main testing instrument

Instrument Overview



Keypad

ESC	Go back.
ON/OFF	On and off button. This button has a delay of approx. 1 sec. when switching off.
Arrow keys	The arrow keys are for scrolling UP ▲ / DOWN ▼ and LEFT ◀ / RIGHT ▶.
SEL	SELECT key. Selects a function or starts a test.

Symbols on the Instrument



Warning of a source of danger (please follow documentation!)



European conformity marking



The instrument must not be disposed of in the household trash; see page 27.

KE7010 Remote Unit



Active remote unit with microprocessor

RJ-45 socket

Pass/Fail indication with green LED

A maximum of 32 KE7010 units can be managed and used with the KE7200. To identify individual KE7010 units, each remote unit can be assigned an ID from 1 - 32. The ID can be written down on the back of the KE7010.

Symbols on the Instrument



Warning of a source of danger (please follow documentation!)



European conformity marking



The instrument must not be disposed of in the household trash; see page 27.

P310 Probe



The P310 probe is a non-contact test loudspeaker that receives the search tone signal transmitted by the KE7200 and makes it audible.

A flashlight function with a pure white light guarantees clear color identification of the wire markings in dark server cabinets. The flashlight turns on automatically when the instrument is on and turns off automatically when the instrument switches off.

The probe's test tip is made of fiber-reinforced plastic with a bayonet catch for easy replacement on site. See data sheet for test tip replacement.

At the lower end of the probe, there is a socket connector for an earphone (3.5 mm jack plug) to allow signals to be heard more readily.

The probe is switched on and used by holding down the HIGH or LOW keys. The HIGH position is the most sensitive level for locating weak signals. The LOW position is for specifying which network port has been found, for example.

The P310 cannot detect the search signal in shielded cables! You will therefore find the search signal on the associated network port.

The P310 is also part of the EasyTest system for locating cables and wires. More information is included in the EasyTest product documentation.

Symbols on the Instrument



Warning of a source of danger (please follow documentation!)



European conformity marking



The instrument must not be disposed of in the household trash; see page 27.

Specifications

KE7200

Connections	RJ-45 socket; Adapter: RJ-45 to coaxial cable, RJ-11 to banana plug, including crocodile clips for banana plug
Cable Test (Ethernet cable, coaxial cable, telecommunications cable)	Detection of reversed connections, short circuits, interruptions, split pairs (as of 2 m), testing of the data line assignment with pin and pair assignment (wire mapping) Clear graphical display for fast error identification TDR function: Measurement of individual wire lengths from 2 m to 200 m Cable database: 15 wiring versions predefined for cable test and creation of own definitions possible as of 2 wires, including Profinet; 16 cable types predefined with VF for TDR length measurement and creation of own cable types possible Check for external voltage before test start
Network Tests (Ethernet cable)	IP test • Connection to the network via DHCP or with static IP (own IP and MAC address configurable) • List of active network subscribers with name, IP address and MAC address • Detection of network speed 10/100/1000 Mbit Ping test • Targeted ping of individual addresses and simultaneous ping stress test • Ping frame sizes adjustable from 32-1024 bytes • Display of ping results (received/lost) and response times (min./max./average)
Power over Ethernet Test (Ethernet cable)	Activation of PoE/PoE+/PoE++/LTPoE functions Measurement of the voltage in V and determination of the power (up to 90 W) according to IEEE802.3af/at/bt
Port Finder Function (Ethernet cable)	Link blink function for identifying ports on routers/switches/hubs: Transmission of an NLP signal that switches the link LED associated with the port on and off in the same cycle on the most common hubs, switches, or routers.
Tone Mode (telecommunications cable)	Emission of a search tone signal; using the probe search signal receiver, the associated network port can be clearly identified on the patch panel, etc. 4 search frequencies available for selection: 1000 Hz; 880/1000 Hz; 2600 Hz, and 2600/1900 Hz Compatible probes: P310 (D130B), P410 (D140B)
Branch Detection (coaxial cable, telecommunications cable)	Precise localization of branches / stub lines (bridge taps) in telecommunications networks in buildings. Determines existence of and distance to the branch / stub line. Can be purchased as an option.
Additional Functions	• Memory function for 14,000 entries • Self-test
External Voltage Protection	60 V DC
Housing	Stable, impact-resistant ABS housing with fall protector
Display	Illuminated display, adjustable time for display backlighting
Power Supply	4× 1.5 V (AA, LR6, alkaline/mignon) batteries, with the operating period depending on the test type, the display backlighting duration, and the battery type and condition Automatic device switch-off (time adjustable)
Dimensions	195 × 100 mm
Weight	380 g (without batteries)
Menu Languages	German, English
Operation Environment	Working temperature 0 °C ... +50 °C Storage temperature -25 °C ... +75 °C Humidity 90%, non-condensing

KE7010

Function	Active remote unit with microprocessor Pass/Fail indication with green LED ID freely programmable from 1-32 (at most 32 KE7010 units can be managed and used by the KE7200)
Connection	RJ-45 socket
Housing	Stable, impact-resistant ABS housing
Dimensions	78 × 45 mm
Weight	30 g
Power Supply	Via RJ-45
Operation Environment	Working temperature 0 °C ... +50 °C Storage temperature -25 °C ... +75 °C Humidity 90%, non-condensing

P310

Function	Traditional search signal receiver (probe)
Features	Filter signal LED Flashlight function Test tip made of carbon fiber reinforced plastic 3.5 mm headphone socket Separate battery compartment
Housing	Stable, impact-resistant ABS housing with silicone actuation keys
Dimensions	220 × 40/34 × 25 mm
Weight	80 g without a battery
Power Supply	9-V battery; approx. 100-hour operating period (depending on the battery type and condition)
Range	Signal identification occurs directly at the network port (at the patch panel, router, hub, switch).

Initial Startup

KE7200

The instrument is powered by 4× 1.5 V (AA, LR6, alkaline/mignon) batteries (not included with the instrument).



Before inserting the batteries, disconnect all test cords and switch off the instrument. Only use batteries according to the specification.

The battery compartment is located on the back of the instrument. First loosen the two lower screws of the edge protector (Philips screwdriver required). Remove the edge protector by pulling it downwards. Insert the batteries. Pay attention to polarity. Only use batteries of the same type and production time. Do not mix new and old batteries.

Finally, select the instrument setting for either regular or rechargeable batteries; see “KE7200 Settings” on page 12 in this regard.

Operating Period

The operating period depends on the test type, the display backlighting duration, and the battery type and condition.

Measurement always with display backlighting

- Switched on but without a test > approx. 40 hours
- Cable test without a KE7010 remote unit > approx. 35 hours
- Cable test with a KE7010 remote unit > approx. 18 hours
- IP test > approx. 15 hours

The available measuring time can be extended by switching off or limiting the time of the display backlighting.

P310

The instrument is powered by 9-V battery (not included with the instrument).



Switch the instrument off. Only use batteries according to the specification.

The battery compartment is located on the back of the instrument. Open the battery compartment (Philips PH2 screwdriver required), insert the battery, and close the battery compartment again.

Self-Test

During the self-test, the KE7200 checks its functionality.

Note: The self-test does not relieve the user of his responsibility to verify compliance with the safety regulations (page 2).

The option of a self-test is offered during the switch-on process and can be started by pressing SEL. Then follow the instructions for the self-test.



During the flash test, all data on the device are deleted.

Back up all data beforehand (see page 22) or skip the flash test by pressing ESC.

If the instrument does not function flawlessly, permanently remove it from operation and secure it against inadvertent use.

KE7200 Settings

All device settings are made in the menu **Settings > Instrument Settings**. The possible operating steps are displayed in the respective menu in the lower status line.

They are preset to empirical values; there is also a **Reset to Factory Settings** function if something does not work as intended when creating cable or wiring functions.

> **Language:** Either German (default) or English.

> **Unit of Measure:** m (meter) or ft (foot).

> **Battery Type:** The instrument can be powered by either regular or rechargeable batteries (see "Initial Startup" on page 11). Since the voltage of rechargeable batteries is lower, the capacity information can be switched between regular and rechargeable batteries here.

> **Backlighting:** Switch-on time after each key press in seconds. Set the time with the ▲ or ▼ button, select with **SEL**.

> **Auto Power Off:** Time of automatic switch-off of the instrument after the last keystroke. Set with button ▲ or ▼, select with **SEL**.

> **Key Beep:** On or Off.

> **Acoustic Signal:** On or Off. The acoustic signal is issued after the cable measurement.

> **Contrast:** LCD contrast setting. Set with ▲ or ▼, confirm with **SEL**.

> **Reset to Factory Settings:** This returns all settings to the factory default values.

> **Program Update:** You can update the firmware/software of your KE7200.

 **All data are deleted during an update!**

The firmware/software depends on your instrument. The table at

<https://www.kurthelectronic.de/ke7200-downloads/?lang=en>

indicates which firmware/software you need for your KE7200 and lets you contact our support for the needed update file.

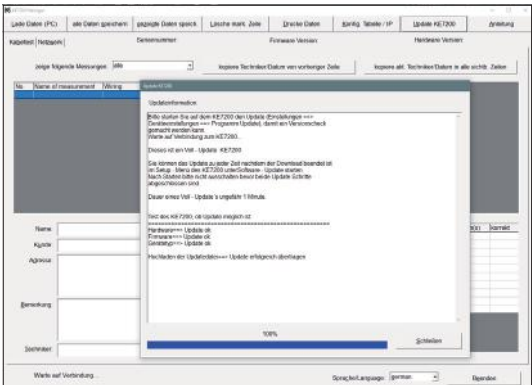
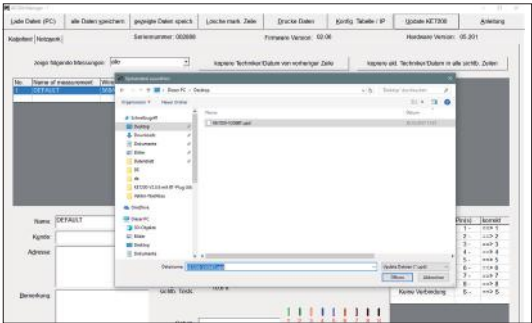
To perform the instrument update, you need the update file (.upd) and the KE7200 Manager PC software (for more information on the KE7200 Manager, see page 22).

Connect the KE7200 to the PC, then start the KE7200 Manager there, and select the **Update KE7200** tab. Select the **.upd** file to be installed in the dialog, and click on **Open**.

You will now be guided through the process with the **Update Information** window. In the KE7200, select **Settings > Device Settings > Program Update**.

Then press the LEFT ◀ and RIGHT ▶ keys simultaneously.

The update process will then start. After approx. 1 minute, the update process will finish and the KE7200 will switch off.



Test/Measurement Settings

In order to perform all tests/measurements correctly, you need to make basic test settings.

In the **Settings** menu, you can select the **Wiring Type** for the test/measurement, select the **Speed** (VF factor) for the TDR function, define the **Cable Type**, and specify the **IP Address** of the KE7200.

The **Settings > Test Settings** submenu provides additional specific test settings, giving you the possibility of creating own cable and wiring definitions, managing the KE7010 remote units, and specifying the MAC address of the KE7200.

Settings > Wiring

Here you can select the desired wiring type from the list of various options (which PIN for which wire). This can still be changed during the cable test, however. The specification of the correct wiring type is important, as all information on the wire pair and PIN assignment is based on this. Without this information, it will not be possible for an OK statement to be issued by the test. In addition, only the correct wiring definition will allow a split pair error message to be sent.

15 common variants are predefined.

The following abbreviations are used:

UTP= Unshielded Twisted Pair

STP = Unshielded Twisted Pair

CR = Cross Connect

Settings > Speed

Here the propagation speed of the signal in the cable, the VF factor, is entered as a percentage of the speed of light. This information is required for length measurements with the TDR function.



Only with the correct VF factor will the cable lengths be determined correctly!

The VF factor predefined for the selected cable type is displayed by default (for cable selection, see page 14; for cable definitions, see page 14). The value can also be set manually via the ▲ or ▼ keys.

The data can be obtained from the cable manufacturer. If no information is available on the cable, the VF factor can also be determined with a piece of cable of known length.

Determining the VF Value

First conduct the cable test on a piece of cable without the remote unit. After completion this, go to the **Speed** menu. Here, the measured length will be displayed for the set VF. Now adjust using the ▲ or ▼ keys until the known cable length is displayed. The VF value to be read is the propagation speed of this cable.

You can use it to create your own cable definition in the **Test Settings > Cable Definition** menu.

Settings > Cable

Various frequently used cable types are predefined here (for a list, see page 14). The cable to be tested/measured is selected from the list of different cables.

The name and the corresponding VF value are assigned to the respective cable type (see page 14). The cable type name appears in the stored or printed result. In contrast, the VF value is needed for the TDR function.

You can also add to and change the predefined cable types (see page 14).

Settings > Test Settings

> Cable Definition

The cable definitions are created here with a name and VF value, which can be selected for the cables to be tested/measured (see page 14).

Predefined cable types and associated VF values:

BELD DATATWIST 72%	BELD 3600 PB29 72%	UC300 HS24 S/F 67%	LEONI E5-70 S/ 80%
BELD MEDIATWIST 72%	BELD 4800 PB29 70%	UC500 AS23 F/F 79%	LEONI F6-80 S/ 80%
BELD 10 GX 68%	DRAKA UC300 67%	UC900 HS23 S/F 79%	
BELD 1200 NP28 72%	DRAKA UC500-15 79%	UC900 SS23 S/F 77%	
BELD 2400 PB28 72%	IS PROFINET 66%	LEON D1-20 SF/ 75%	

Additional cable types can be created as well. Profiles that have already been created can also be overwritten.

After selecting the cable type to be edited, or alternatively an item without an entry, select it with **SEL**. **Name:** is displayed. A unique cable name can be entered here. There are 15 available character slots. At the flashing cursor position, the ▲ and ▼ keys can now be used to scroll through the alphabet, all digits 0–9 and an empty position. The digit or letter to be positioned at the cursor position is selected with **SEL**. Once the name has been entered, confirm with **SEL**. **Speed: xx%** will appear. This is the propagation speed in the cable, the VF value, as a percentage of the speed of light. Enter either the value specified by the cable manufacturer, the previously determined value, or an approximate value.

Tip: Phone and Cat3 cables have a value of approx. 64-68, Cat5/6 cables approx. 72, and Cat6/7 approx. 77.

After entering the VF value, save with **SEL**. This allows you to quickly and easily predefine the cable types you use.

> Wiring Definition

Correctly selecting the wiring version to be tested is essential for obtaining good/bad information. Only if this pin to pair assignment matches can crosstalk be checked reliably. With the KE7200, not only a wire-to-pin assignment is checked but also whether the pair assignment is correct. This is done at a high frequency in order to obtain relevant information.

There are 15 different predefined wiring options to help you make the selection. The abbreviations UTP, STP, and CR contained therein are described on page 13. After selecting the **Wiring Definition** menu item, the **Created Wiring Definitions** list will appear:

Name	Pin to pin	Wire pair	Name	Pin to pin	Wire pair		
568A UTP	1	1	3	568A STP	1	1	3
	2	2	3		2	2	3
	3	3	2		3	3	2
	4	4	1		4	4	1
	5	5	1		5	5	1
	6	6	2		6	6	2
	7	7	4		7	7	4
	8	8	4		8	8	4
	S	NC			S	S	
568A UTP CR	1	3	3	568A STP CR	1	3	3
	2	6	3		2	6	3
	3	1	2		3	1	2
	4	7	4		4	7	4
	5	8	4		5	8	4
	6	2	2		6	2	2
	7	4	1		7	4	1
	8	5	1		8	5	1
	S	NC			S	S	
568B UTP	1	1	2	568B STP	1	1	2
	2	2	2		2	2	2
	3	3	3		3	3	3
	4	4	1		4	4	1
	5	5	1		5	5	1
	6	6	3		6	6	3
	7	7	4		7	7	4
	8	8	4		8	8	4
	S	NC			S	S	
568B UTP CR	1	3	2	568B STP CR	1	3	2
	2	6	2		2	6	2
	3	1	3		3	1	3
	4	7	4		4	7	4
	5	8	4		5	8	4
	6	2	3		6	2	3
	7	4	1		7	4	1
	8	5	1		8	5	1
	S	NC			S	S	
USOC UTP	1	1	4	USOC STP	1	1	4
	2	2	3		2	2	3
	3	3	2		3	3	2
	4	4	1		4	4	1
	5	5	1		5	5	1
	6	6	2		6	6	2
	7	7	3		7	7	3
	8	8	4		8	8	4
	S	NC			S	S	
ISDN S BUS	1	1	none	TEL 2P UTP	1	NC	none
	2	2	none		2	NC	none
	3	3	2		3	3	2
	4	4	1		4	4	1
	5	5	1		5	5	1
	6	6	2		6	6	2
	7	7	none		7	NC	none
	8	8	none		8	NC	none
	S	NC			S	NC	

TEL 1P UTP	1	NC	none	PROFINET	1	1	1
	2	NC	none		2	2	1
	3	NC	none		3	3	2
	4	4	1		4	NC	none
	5	5	1		5	NC	none
	6	NC	none		6	6	2
	7	NC	none		7	NC	none
	8	NC	none		8	NC	none
	S	NC			S	S	

PROFINET CR	1	3	1				
	2	6	1				
	3	1	2				
	4	NC	none				
	5	NC	none				
	6	2	2				
	7	NC	none				
	8	NC	none				
	S	S					

S = shield

NC = not connected

Creating/Changing Wiring Definitions

Here, too, you can create your own versions, although you can only do so by changing an existing definition.. It is useful to note the pin/pair assignment of the wiring version being created in advance.

After selecting a wiring definition to be changed, you will be taken to the **Name** menu. A unique wiring name, such as "568C," can be entered here. There are 15 available character slots. At the flashing cursor position, the ▲ and ▼ keys can now be used to scroll through the alphabet, all digits 0–9 and an empty position. The desired digit or letter at the cursor position can be selected with **SEL**.

Once the name has been entered, confirm with **SEL**. The **Connections** menu will open, where the PIN is assigned to the PIN and wire pair as corresponds to the wiring version. This assignment is necessary both for recognition of the correct assignment in the tested cable and of split pairs with regard to crosstalk and for good/bad information after a successful test. The scroll bar is set to **Pin 1**.

Select with **SEL**, which will bring you to the **Connection** menu for **Pin 1**. Now the possible sections of all 8 pins that can be assigned to Pin 1 will appear. Use the ▲ and ▼ keys to select the correct pin with **SEL**. The next step is the Pair menu, where you can assign the selected pins to a pair with **SEL**.

You will now be back in the **Connections** menu, where you can see the assignment of the **Pin 1**. Use the ▼ key to move the scroll bar to the next item, and continue with the assignment as before.

If you create any incorrect assignments, you can only overwrite them. Alternatively, you can select the **Device Settings > Reset to Factory Settings** menu item. This will reset all changed wiring definitions.

> Remote Unit ID

The KE7010 remote units required for correct and quick cabling verification are included with No. 32 to simplify inventory management. Under **Main Menu > Settings > Test Settings > Remote Unit**, a connected remote unit can simply be reprogrammed to the desired number. After changing the number, we recommend writing the new number in the space provided on the back of the device.

> MAC Address

The KE7200 is shipped with a predefined MAC address. In order to work in networks with MAC address verification, the address can be freely defined here.

Settings > IP Address

The IP address of the KE7200 is set here. This address is always used as device address, including for an IP test, such as as static network address. It can be changed at any time. Simply use the ▲ and ▼ / ◀ and ▶ keys to set the address and save it with **SEL**. However, the change can also be made directly in the same way, such as during an IP test.

Application

You can perform various tests with the devices.

- Cable test *page 17*
- Cable/wire search via the port finder function (link blink function) or search tone (tone mode) *page 19*
- PoE/PoE++ test (according to IEEE802.3af/at/bt) *page 19*
- IP-Test (including network speed) and ping test *page 20*
- Detection of branches / stub lines (bridge taps) *page 21*

The KE7200 checks the connected line for external voltage before each start of the test options. If present, the test will not be started, and the voltage level will be displayed.



External voltage present:

- **The actual external voltage may be much higher than displayed! The level of the external voltage is only displayed with an exact value up to 74.7 V. All external voltages > 74.7 V are displayed as 74.7 V.**
- **Stop the test immediately if external voltage is present and disconnect all test leads!**
- **A safety-critical condition may exist, and/or the unit may be damaged. Fix the faulty network condition before continuing the test.**

The test can only be performed after the external voltage has been switched off. External voltage has nothing to do with PoE for this detection. For PoE systems that are working correctly, the supply of voltage must always be activated.

Cable Test

The cable test can be performed with or without the KE7010 remote unit. If it is done without the KE7010, only field length measurement and checking for crosstalk due to split pairs will be performed.

When the KE7010 is connected at the end, the length measurement using the TDR method is sufficiently accurate to determine whether the field is in the 90 m range. This test measures up to a maximum of 200 m. For measuring installed cables, we recommend performing the length measurement separately without the KE7010. This measurement is more accurate with regard to the length, since a clear end can be detected without the KE7010.



The cable lengths can only be determined correctly using the correct VF factor! See page 13 f.

Test Execution

Up to 32 KE7010 remote units can be connected simultaneously to the ports to be measured using the included patch cables. If only one KE7010 is used, it must be taken to the next port after the test has been completed. If an assistant is involved, he can detect whether the test resulted in any errors by the flashing rhythm of the LED after the test has been completed. If no error has been detected (slow flashing every 1 second), he can proceed to the next port.

However, we recommend the use of several KE7010 units, one for each room. With the 32 possible KE7010 units, a patch field area with, say, up to 32 ports can be easily covered, even with somewhat larger systems. The main advantage is clearly time savings, as only one person is needed. At the same time, there is a clear assignment of the measurements with the KE7010 in the documentation.

Connect the KE7200 with the 0.5 m patch cable (included) to the port to be tested on the patch panel.

Start the test with the scroll bar for **Cable Test** by pressing the **SEL** button. The progress information is displayed with the **Cable Test Running**, and the progress is displayed in %. If the test was free of errors, a long beep will sound, and the OK checkmark will be displayed. The LED on the remote will flash steadily every 1 second.

If any errors are detected, two short beeps will sound, and the LED on the KE7010 will flash: 4× briefly (0.5 seconds), then a pause of 1 second, then again 4× briefly and so on.

The KE7200 always shows the number of the KE7010 remote unit in the upper left corner of the display, followed by the type of wiring. This can be changed by pressing the ▼ key, after which the set VF value is displayed. This is set either by selecting a cable type or by setting it directly beforehand.

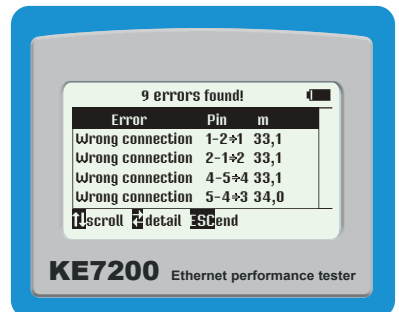
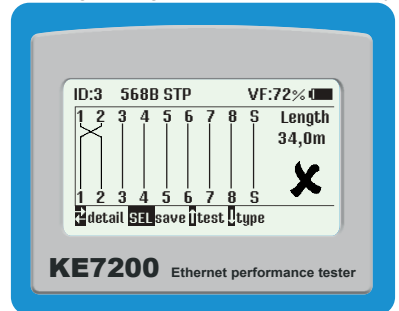
The main window displays the **Wire Mapping**. Here, any existing wiring errors can be readily identified. A split pair is displayed with a branching to the connected wire and back again, with the measured field length appearing in the right field. Lengths below 2 m are not displayed. The measurement is too inaccurate in this close range. The maximum length measurement is approx. 200 m, but this will also depend on the cable itself.

The lower display line is the dialog line. Possible operating steps for the respective test are displayed here.

Use the ◀ and ▶ keys to display the calculated details for each wire. For example, an interruption or a short circuit can be clearly assigned to the near or far end. If the error is somewhere in between, the value can be read in meters. The ◀ key shows the wire lengths, the ▶ key the number of errors, the type of error, the affected pin, where it should be if incorrectly connected and where it is now, and the length of the error.

By its nature, only the linked pair can be defined for split pairs. In some cases, individual interconnections between other wires are also detected. This is due to the fact that crosstalk also affects other neighboring wire pairs due to the split pair.

As a rule, it is also necessary to ensure that the configured wiring version (e.g., 568A) corresponds to the actual wiring.



Storing Data

After the measurement has been completed, it can either be exited with **ESC**, or the **Save Data** menu can be opened by pressing the **SEL** key. The predefined name of the measurement – **Default** – followed by a number is displayed here. If the data is to be assignable later, you will need to enter a unique name here. We recommend customer names or a number. The entry is made by pressing the **▲** or **▼** keys, which allows scrolling through the alphabet and the numbers from 0-9. Press **SEL** to insert the desired character. The cursor position can be changed with the **◀** and **▶** keys.

This name will remain entered until it is overwritten again. This means that, when saving the next measurement, if the customer is still then same, nothing will have to be changed. The number of the measurement will increase automatically. You can then sort, print, and save the data in the KE7200 Manager PC software (see page 22) according to the customer number or the name. It should be noted that it is necessary to adjust the memory setting at the start of a new measurement series at another system.

The second line displays the available memory space. A total of about 14,000 entries are possible.

Cable/Wire Search via the Port Finder Function (link blink function) or Search Tone (tone mode) (Ethernet cable only)

The KE7200 has two ways of identifying a known socket at the patch panel, switch, or hub:

Portfinder Function (link blink function)

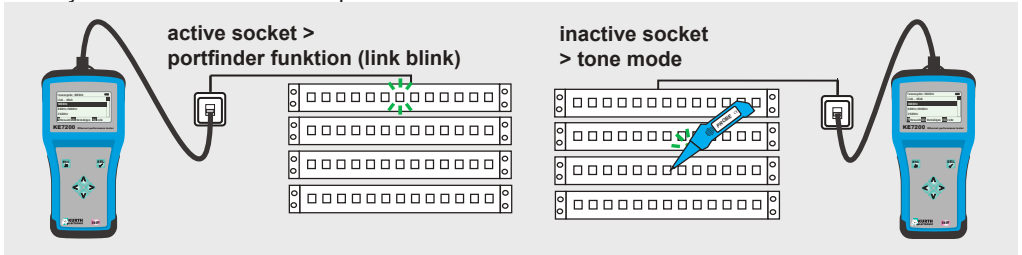
Plug the test cable of the KE7200 into the socket located in the room and select the **Link Blink** test in the **Cable/Wire Search** menu.

It is verified whether the socket is active in the network. This is displayed in the status line of the KE7200. When the connection is active, information about the Ethernet connection with the respective detected speed is displayed. The associated port on the patch panel/router/hub/switch will flash.¹

If the port is not active, **No Connection** will be displayed. Then you will need to proceed with tone mode.

Search Tone (tone mode)

Then you can switch to the tone mode in which one of 4 tones (1000 Hz; 880/1000 Hz; 2600 Hz, and 2600/1900 Hz) is transmitted to all wire pairs by the KE7200. The P310 probe can then be used to search for the search tone at the patch panel/router/hub/switch and to unequivocally identify the associated network port.



¹ It may be necessary for the filtering of the NLP signal to be deactivated in the settings of the hub/router/switch.

PoE/PoE++ Test (according to IEEE802.3af/at/bt) (Ethernet cable only)

Connect the KE7200 to the network. Start the test with the **SEL** key. The KE7200 activates the PoE port and outputs the corresponding information in the display regarding whether PoE/PoE+/PoE++ is present or not.

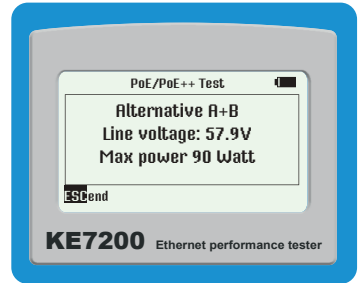


The PoE standards are displayed according to the expected nominal voltages. Higher voltages (fault conditions) can damage the instrument and pose a potential safety hazard.

If PoE can be activated, this will happen. To begin with, the max. load is applied to remove the cable charge. The maximum available power is then measured according to the IEEE802.3af/at/bt standard. This regulates which voltage must be present on the line when a certain current is flowing. If this voltage is below the standard value, the KE7200 will switch the load back until the voltage is within the normal range again.

This power is calculated and then displayed. This information is important in any network with PoE subscribers, as disturbances will occur again and again due to the load on the power supply in the switch being at the limit. If a small additional load is now added, such as due to changed operating conditions like the switching on of infrared illumination, the network will collapse and the switch will only supply the emergency power. This cannot be detected without appropriate test equipment. Some PoE switches also provide 30 W per port. These then work outside the specification.

The test will need to be restarted for each measurement.



IP Test, Including Network Speed and Ping Test (Ethernet cable only)

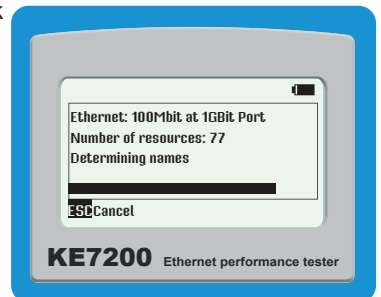
During the network test, the KE7200 can search the network for IP addresses and thus subscribers. This can be done in DHCP mode or with a fixed IP address. If the network also monitors MAC addresses, the MAC address of the KE7200 can be adapted (see page 12).

The DHCP mode is first activated by selecting **IP Test > DHCP Request**. As soon as a network connection is established, it is displayed in the status line, and the IP address assigned to the KE7200 by DHCP is displayed. The request for occupied IP addresses in the assigned address space starts immediately. The number found is also displayed.

The KE7200 now queries all addresses for information and lists it. If names are available, they are displayed – if not, only the IP address.

This process can take some time, especially if there are many subscribers in the network. You can see the progress by the change in the IP addresses found. At the top of the screen, **Network** is displayed. Selection with **SEL** shows general network information such as **Connection Speed**, own **IP Address**, and **Network Mask**. The **▼** key scrolls to the next page. This will display the following:

- **Domain name of the network**
- **IP of the DNS server**



- IP of the DHCP server
- IP of the router

Press the **SEL** key to save this data.



It may happen that not all computers in a network will always respond within the query time of the test device, as they may be occupied with other tasks. This is due to the system-specific nature and does not represent an error. The query can be repeated as often as desired.

The subscriber list is opened with **ESC**. By selecting a subscriber, the IP and MAC address are displayed in addition to the **Name**, the **IP Address**, and the **MAC Address**. This address can then be pinged in this menu.

Selecting with **SEL** opens the **Ping** menu. The frame size is displayed in the upper left corner. The **▲** and **▼** keys can be used to set the frame size between **32** and **1024 bytes**.

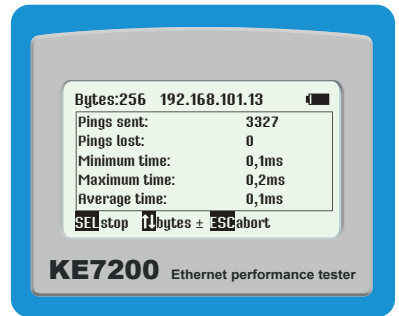
Start of the ping test with **SEL**.

The KE7200 now continuously sends pings to the selected address. This is done at maximum speed in order to perform a stress test for all components at the same time.



It may happen that the network component is overloaded by the ping stress test and stops responding.

The success of the test is indicated by the number of pings sent and the number of pings lost. In addition, you can also see the response times (maximum, minimum, and average).



Detection of Branches / Stub Lines (bridge taps) – Requires Branch Detection Software Option (coaxial cable and telecommunications cable only)

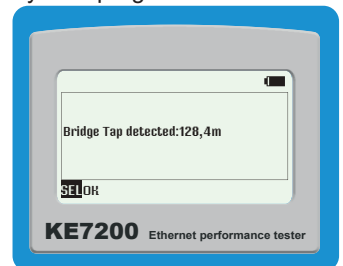
The branch detection software option (D720S) is a function extension that enables the detection of branches / stub lines. Not only can it be used to detect any branches / stub lines that may be present, but it can also locate them precisely up to a cable length of 150 meters. The branches / stub lines, which are difficult to detect, cause signal reflections (echoes) that have a negative effect on the signal and lead to DSL network problems.

You can order the software option with your order or purchase it later from our service department (for contact information, see page 26).

Start the test with the scroll bar on **Branch** by pressing the **SEL** key. The progress information is displayed with **Branch Detection Running** and **Progress in %**. If the test was free of errors, a long beep will sound, and the OK checkmark will be displayed. The LED in the remote flashes evenly every 1 second.

If an error is detected, two short beeps will sound, and the LED on the remote unit will flash: 4× briefly (0.5 seconds), then a pause of 1 second, then again 4× briefly and so on.

The result is displayed on the main screen. Here the branch line is readily visible with the exact distance. Lengths below 2 m are not displayed. The measurement is too inaccurate in this close range.

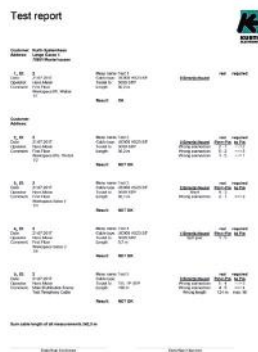


Data Transmission and Management of Measurements and Log Generation with KE7200 Manager PC Software

The KE7200 Manager PC software is a flexible tool for configuring the KE7200 and for downloading test/measurement data from the measuring instrument.

It provides the following functions:

- Configuration of the manager (columns, language)
- Display of the KE7200 hardware version
- Display of the current KE7200 software/firmware version
- KE7200 firmware update
- Display of the KE7200 operating instructions
- Transfer of tests/measurements from the KE7200 to a PC
- Adding/deleting of loaded test/measurement data
- Storing of tests/measurements
- Retrieval of stored tests/measurements
- Log generation (printing)



Test	Result	Status	Date
Test 1	OK	Pass	2017-01-01
Test 2	OK	Pass	2017-01-01
Test 3	OK	Pass	2017-01-01
Test 4	OK	Pass	2017-01-01

Installing KE7200 Manager

KE7200 Manager is only available as a Windows versions for systems as of Windows 10 and newer.

You can download the KE7200 Manager for free from our website:

<https://www.kurthelectronic.de/ke7200-downloads/?lang=en>

Run the .exe file on the PC to install the program. This creates a screen shortcut on the desktop for launching KE7200 Manager.

Starting KE7200 Manager and Transferring Measurements

Connect the KE7200 to the PC with an Ethernet cable.

Then launch KE7200 Manager on the PC. Once the program has been called up, KE7200 Manager will display its version number. Enter the IP address of the KE7200 under **Config.Table / IP** (can be viewed or configured in the instrument; see "Settings > IP Address" on page 17). Close the program.

Now open Windows **Control Panel** and call up **Network and Sharing Center > Change Adapter Settings**. Select the appropriate Ethernet adapter from all those displayed and open its **Properties**. Select **Internet Protocol, Version 4 (TCP/IPv4)** from the list and open **Properties**. Select **Use Following IP Address** and enter the IP address of the KE7200 for **IP Address** and click in the **Subnet Mask** field so that it is filled in automatically. Confirm with **OK**.

Then restart KE7200 Manager on the PC. Select **Transfer Measurements** in the KE7200. The stored data are transferred immediately after synchronization and appear in KE7200 Manager. The KE7200 can now be disconnected again.

If no stored measurement data are available, this will be displayed. The data on the KE7200 can now be deleted or aborted with **ESC**.

Program Operation

You can switch between the cable tests and network tests via the tab (see marking in the screenshot).

KE7200 Manager - tes.eth

Load data (PC) Save all Data Save viewed Data Remove sel. Row Print Data Config. sheet / IP Update KE7200 Manual

Cable test Network Serial number: 002639 Firmware version: 02.06 Hardware version: 05.201

Show following measurements: all copy operator/date from row before copy act. operator/date into all visible rows

No.	Name of measurement	Wiring	Error 1	Error 2	ID/ Room	Date	Save name
1	Testobjekt	568B STP	No error	No error	2	05.03.2018	DEFAULT_0000
2	Testobjekt	568B STP	Wrong connection	Wrong connection	2	06.03.2018	DEFAULT_0003
3	Testobjekt	568B STP	Short	Wrong connection	2	07.02.2018	DEFAULT_0007
4	Testobjekt	568B STP	Split pair	No error	2	21.07.2017	DEFAULT_0008
5	Testobjekt	TEL IP UTP	Wrong connection	Wrong connection	2	21.07.2017	DEFAULT_0001

Name: Testobjekt Cable type: UC900 HS23 S/F

Customer: Type of test: 568B STP

Address: Length: 36,2 m
118,9 ft

Comment: Hauptgebäude EG Kfm. Abt. 1/2 Sum Cable Length of all visible tests: 242,3 m
795,0 ft

Operator: Hans Meier ID Remote unit: 2 Date: 06.03.2018

Remote connector

3 Error(s) found

Error(s) found	Pin(s)	proper
Wrong connection	2 - 1	==> 2
Wrong connection	5 - 2	==> 5
Wrong connection	1 - 5	==> 1

Wait for connection...

Sprache/Language: english Exit

KE7200 Manager - Messung-Netzwerk-20-10-16.eth

Load data (PC) Save all Data Save viewed Data Remove sel. Row Print Data Config. sheet / IP Update KE7200 Manual

Cable test Network Serial number: 002442 Firmware version: 02.04 Hardware version: 05.201

Show following measurements: all copy operator/date from row before copy act. operator/date into all visible rows

No.	Name of measurement	Name of client	IP address	MAC address	Connection	Domain	Date
1		DHCP relay	192.168.101.1	0.0.0.C.29.F4.1C.33	100Mbit full duplex(1Gbit-Port)	kurthelectronic.de	
2			192.168.101.2	0.0.6C.AE.8B.3D.26.62	100Mbit full duplex(1Gbit-Port)	kurthelectronic.de	
3			192.168.101.3	0.0.6C.AE.8B.3D.26.66	100Mbit full duplex(1Gbit-Port)	kurthelectronic.de	
4		KE-DC	192.168.101.4	0.0.0.C.29.F4.1C.33	100Mbit full duplex(1Gbit-Port)	kurthelectronic.de	
5		KE-EX	192.168.101.5	0.0.0.C.29.CC.66.28	100Mbit full duplex(1Gbit-Port)	kurthelectronic.de	
6		KE-FS	192.168.101.6	0.0.0.C.29.2C.F3.7A	100Mbit full duplex(1Gbit-Port)	kurthelectronic.de	
7		KE-MAX	192.168.101.7	0.0.0.C.29.DB.E2.1D	100Mbit full duplex(1Gbit-Port)	kurthelectronic.de	
8		KE-MGMT	192.168.101.8	0.0.0.C.29.37.C1.BC	100Mbit full duplex(1Gbit-Port)	kurthelectronic.de	
9			192.168.101.9	0.0.0.C.29.26.E7.72	100Mbit full duplex(1Gbit-Port)	kurthelectronic.de	
10		XC-A14CFE	192.168.101.11	0.0.8.0.37.A1.4C.FE	100Mbit full duplex(1Gbit-Port)	kurthelectronic.de	
11		XR9C934E244C0A	192.168.101.12	0.0.9C.93.4E.24.4C.A	100Mbit full duplex(1Gbit-Port)	kurthelectronic.de	
12			192.168.101.13	0.0.9C.93.4E.5C.44.A2	100Mbit full duplex(1Gbit-Port)	kurthelectronic.de	
13			192.168.101.14	0.0.0.4.0.61.EB.D	100Mbit full duplex(1Gbit-Port)	kurthelectronic.de	
14		KE-DR-ENTWURF	192.168.101.15	0.0.0.80.77.98.67.EE	100Mbit full duplex(1Gbit-Port)	kurthelectronic.de	
15			192.168.101.16	0.0.0.2.E7.2.3B.3B	100Mbit full duplex(1Gbit-Port)	kurthelectronic.de	
16			192.168.101.17	0.0.0.C.29.F4.1C.33	100Mbit full duplex(1Gbit-Port)	kurthelectronic.de	

Name: 12 Domain name: kurthelectronic.de Ethernet connection: 100Mbit full duplex(1Gbit-Port)

Customer: IP address KE7200: 192.168.101.112 IP address router: 192.168.101.1

Address: IP mask KE7200: 255.255.255.0 Client name: DHCP relay

Bemerkung: IP address DNS server: 192.168.101.4 IP address Client: 192.168.101.1

Operator: IP address DHCP server: 192.168.101.4 MAC address Client: 0.0.0.C.29.F4.1C.33

Date:

Wait for connection...

Sprache/Language: english Exit

The selection tabs on the top are the same for both displays.

> Load Data (PC)

Tests/measurements that have already been saved can be opened for display here (.eth file).

> Save All Data

Here the data transferred by the KE7200 are selected for saving on the PC (.eth file).

> Save Displayed Data

Once the data has been selected, it is saved as a separate list (.eth file).

> Delete Marked Line

This deletes a complete line of test/measurement results.

> Print Data

A print version (log) of the measurements is created. You can store your company logo here to display it in the log. A graphics file (.bmp, .dip, .jpg, .gif, .wmf, .emf, .ico, .cer) is displayed at the top right edge of the sheet. We recommend a maximum size of 400 px in width × 250 px (width × height) at a resolution of 300 dpi. You can also make further settings to customize the appearance of the test report.

> Configuration Table/IP

The IP address of the KE7200 for data transmission is entered in the upper area here. See “Starting KE7200 Manager and Transferring Measurements” on page 22

The presentation of the displayed data (table columns) can be changed in the lower area.

> KE7200 Update

This menu item is used for installing software/firmware updates; see page 24.

> Instructions

Calls up the instructions for the KE7200.

> Show Following Measurements

After all data records have been downloaded from the KE7200, it is possible that they involve data or measurements from different customers. However, this assignment must already be done in the KE7200 when saving on location. You can sort the data by customer or make a selection.

A list with all saved data sets will open. You can then select the customer you want to summarize, comment on, and print out as a report.

This selection can then be saved with **Save Shown Data** by entering their data (customer name, number, etc.).

> Customer Address, Comment, Technicians

In the lower area, you have the option of entering the customer address, the technician, and any comments. The address entered in the first data set is shown as the first item on the report. The technician, location name, and comments can be entered separately for the individual data sets.

Storage and Transport



Caution: Improper storage will cause damage to the product.

Store the instrument packed and protected from environmental influences.



Caution: Improper transport will cause damage to the product.

Transport the instrument packed and protected from environmental influences.

Only transport the instrument in the supplied bag. Alternatively, we recommend the accessories available for the device (transport case); details can be found on the data sheet.

Maintenance

Cleaning: Make sure that the surfaces of the instrument and accessories are clean.



Caution: Risk of injury

The instrument and accessories must be de-energized before starting and during cleaning. Switch the instrument off and disconnect it from all cables/lines/adapters.

Never immerse the instrument/accessories in water or other liquids.



Caution: Equipment damage

Never touch the instrument/accessories with wet hands.

Unsuitable cleaning agents, such as aggressive or abrasive agents, will cause damage to the instrument/accessories.

Use a cloth that has been slightly dampened with water for cleaning. Avoid the use of cleansers, abrasives, or solvents.

Contact, Support, and Service

Gossen Metrawatt GmbH can be reached directly and simply – we have a single number for everything! Whether you require support or training or have an individual inquiry, we can answer all of your questions here:

+49 911 8602-0 Monday to Thursday: 8 a.m. to 4 p.m.
Friday: 8 a.m. to 2 p.m.
Also available by e-mail: info@gossenmetrawatt.com

Do you prefer support by e-mail?

Measuring and Test Technology: support@gossenmetrawatt.com
Industrial Measuring Technology: support.industrie@gossenmetrawatt.com

Please contact GMC-I Service GmbH for repairs, replacement parts, and calibration:

+49 911 817718-0 Beuthener Straße 41
90471 Nürnberg
Germany
service@gossenmetrawatt.com
www.gmci-service.com

Statement of Conformity

Relevant Standards and Guidelines

The equipment has been manufactured in accordance with the following guidelines:

EMV Directive 2014/30/EU

CISPR 11 + A1

CISPR 16-1-2 Edition 1.2

CISPR 16-2-1 + A1

CISPR 16-2-3 + A1

IEC 61000-4-1

IEC 61000-4-2 Edition 2

IEC 61000-4-3 + A1 + A2

IEC 61000-4-8

IEC 61326-1

IEC 61326-2-1

CE Declaration

The instrument fulfills all requirements of applicable EU directives and national regulations. We confirm this with the CE mark. You can find the CE declaration on our website:

<https://www.gmc-instruments.de/services/download-center/>

Disposal and Environmental Protection

Proper disposal makes an important contribution to the protection of our environment and the conservation of natural resources.



Caution: Environmental Damage

Improper disposal results in environmental damage. Follow the instructions concerning return and disposal included in this section.

The following comments refer specifically to the legal situation in the Federal Republic of Germany. Owners or end users who are subject to other national requirements are required to comply with the respectively applicable national requirements and to implement them correctly on site. Relevant information can be obtained from the responsible national authorities or national distributors, for example.

Waste Electrical Equipment, Electrical or Electronic Accessories, and Waste Batteries (including rechargeable batteries)

Electrical equipment and batteries (including rechargeable batteries) contain valuable raw materials that can be recycled, along with hazardous substances that can cause serious harm to human health and the environment, and they must be recycled and disposed of correctly.



The symbol on the left depicting a crossed-out garbage can on wheels refers to the legal obligation of the owner or end user (German electrical and electronic equipment act ElektroG and German battery act BattG) not to dispose of used electrical equipment and batteries with unsorted municipal waste ("household trash"). Waste batteries must be removed from the old device (where possible) without destroying them, and the old device and the waste batteries must be disposed of separately. The battery type and its chemical composition are indicated on the battery's labelling. If the abbreviations "Pb" for lead, "Cd" for cadmium or "Hg" for mercury are included, the battery exceeds the limit for the respective metal.

Please observe the owner's or end user's responsibility when it comes to deleting personal data – any other sensitive data – from old devices before disposal.

Old devices, electrical or electronic accessories and waste batteries (including rechargeable batteries) used in Germany can be returned free of charge to Gossen Metrawatt GmbH or the service provider responsible for their disposal in compliance with applicable regulations, in particular laws concerning packaging and hazardous goods. More information regarding returns can be found on our website.

Handling Packaging Materials

We recommend retaining the respective packaging materials in case you require servicing or calibration in the future.



Warning: Danger of asphyxiation from foils and other packaging materials
Children and other vulnerable persons may suffocate if they wrap themselves in packaging materials or their components or foils or if they pull them over their heads or swallow them.

Keep packaging materials and their components and foils out of the reach of babies, children, and other vulnerable persons.

In accordance with the German Packaging Act (VerpackG), the user is obligated to correctly dispose of packaging and its components separately and not together with unsorted municipal waste ("household trash").

Private end consumers can dispose of packaging free of charge at the responsible collection point. Packaging that is not subject to system participation is returned to the appointed service provider. More information regarding returns can be found on our website.

© Gossen Metrawatt GmbH
Prepared in Germany • Subject to change, errors excepted

All trademarks, registered trademarks, logos, product names, and company names are the property of their respective owners.