Operating manual
Ethernet Performance Tester

KE7200

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Introduction

The *KE7200* you purchased is an easy-to-operate, intuitive LAN tester.
Please read the entire instruction manual first to help you use the *KE7200* effectively.

The device was manufactured according to the following guidelines:

73/23/EEC
DIN VDE 0800
DIN EN 61010
DIN EN 41003
DIN IEC 60068-2-1, 60068-2-2, 60068-2-3, 60068-2-14, 60068-2-27, 60068-2-6-fc, 60068-2-78, 60068-2-29

Should you have additional questions regarding the operation and use of this device, please contact:

Kurth Electronic GmbH
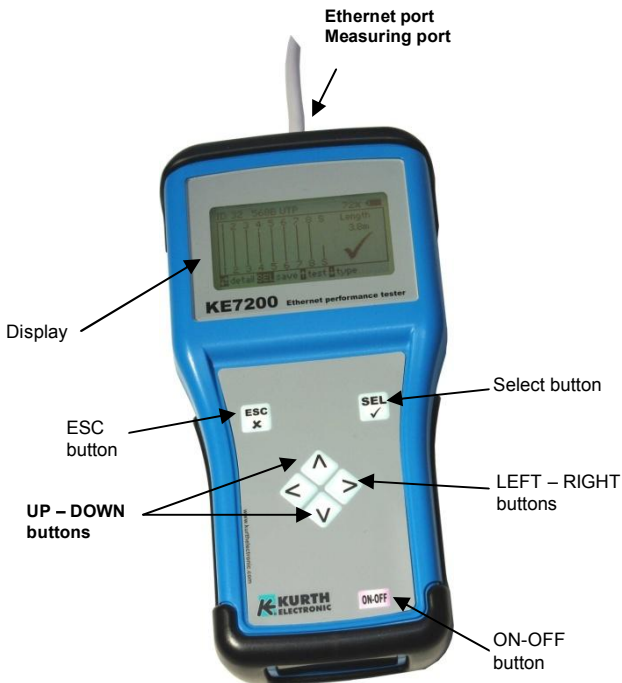Fernmeldetechnik
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Ethernet port
Measuring port

Display

Select button

ESC
button

**UP – DOWN
buttons**

LEFT – RIGHT
buttons

ON-OFF
button

Safety Instructions

The *KE7200* 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 observed.

- The use 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.

- Never open the device. There are no parts in the device that need to be serviced or calibrated. To change the battery, open the battery compartment. See the instructions in Appendix A.

- The measuring device is protected from splashing water and dust by the front film covering. It is not water-tight, however.

- Never pull unnecessarily on the device's cables. To hang it up, use the eyelet in the device and the provided strap.

- As remote unit, only use the KE7010 that was supplied or which can be ordered.

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The KE7200 is essential for:

- Testing and starting up
- 10/100/1000 Mbit LAN networksAccepting new installations
- Checking existing installations
- Acceptance test record
- Cable measurements
- Error removal
- Measuring PoE performance
- IP tests; static or with DHCP
- Ping and stress tests

Measuring length, tracing all kind of cables

Measurement and display of:

Cable test
- Wire Mapping
- Short
- Open
- Reversal
- Split pair
- Shield
- Distance to open or short
- Measuring Length of each wire with TDR up to 150m
- External voltage indication and measuring inhibit to protect the unit
- Stores Results in Memory

Power over Ethernet

- indication of PoE Version A and B
- Available power in Watts according to IEEE 802.3af

Cable and / or Patch port search
- Link Blink with NLP
- Cable tracing with 4 different trace tones

Test active 10/100/1000 Mbit network
- Information about service type
- Static IP or DHCP
- Network scan
- List all found subscribers
- Display name, IP address, MAC address
- Targeted ping of individual addresses
- Display lost responses, min/max/average response times
- Stress test devices by constant ping
- Ping frame size adjustable from 32 to 1024 bytes
- Stores results in memory

Other
- Transfer the results to PC
- Printout using a PC with the KE Manager software
- 16 different predefined wiring versions
- - Own versions can be created
- Cable types with predefined VF value
- - Own cable types can be created
- Illuminated graphical display
- Automatic shutoff time can be set
- Display illumination time can be set

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Remote KE7010 unit
- Active remote unit with microprocessor
- Display of pass/fail with green LED
- Remote ID self programmable from 1– 32
- Max. 32 remotes

Power supply
4 x UM-3 / AA battery or 4 x rechargeable batteries of
the same size

Battery life
*with a good quality battery (such as a GP Super
Alkaline or Varta Industrial)*
Measurement always with the illuminated display
- Powered on with no testing: approximately
  40 hours
- Cable test without remote: approximately 35
  hours
- Cable test with remote: approximately 18
  hours
- IP test: approximately 15 hours

The available measuring time can be extended by
setting shorter time out times for the device or the
backlight.

**Note: Different durations may result with batteries
of different quality. Only use batteries from the**

same manufacturer with the same capacity. Remove the batteries if the device will not be used for a long time. If the battery compartment is damaged by leaking batteries, it can be exchanged.

Using the KE7200

Keypad

When the KE7200 was developed, emphasis was placed on fast and easy operation. For this reason, the KE7200 has only seven buttons despite its many test options.

ESC

Similar to a PC, the ESC button means "undo the last step" or "go back one step"

ON/OFF

Button for turning the device On and Off. This button has a delay of approx. 1 sec. when turning off to prevent accidental turn off.

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Four arrow buttons

The arrow buttons are for scrolling UP▲ /DOWN ▼and LEFT◄ /RIGHT►.

SEL button

The SELECT button. Press this button to select a function or start a test.

Test settings

Wiring

You can select from the list of different possible types of wiring (which pin to which wire). This can even be changed during the cable test. It is important to specify the correct type of wiring since all of the information concerning the wire pairs and pin assignment are based on it. Without this information, there can be no Good result from a test. The proper identification of errors in the case of split pairs also requires a correct definition.

Sixteen popular versions are predefined. The following abbreviations are used:

UTP = **U**nshielded **T**wisted **P**air cable

STP = **S**hielded **T**wisted **P**air cable

CR = cross connected cable in conjunction with wiring version T568A or T568B

KE7200 comes with 16 predefined wiring versions and 10 predefined cable versions. With the setup function, new definitions can be created at any time, or existing ones can be revised. For details, see Appendix A.

Velocity

This is the percent propagation velocity of the signal in the cable with reference to the speed of light. This information is necessary to measure length with the TDR function. The value must be correct if the measurements are to be precise.

Obtain the data from the cable manufacturer. If there is no data available on datasheet or web – page, the VF factor can be determined from a piece of cable with a known length.

First perform the *cable test* on this piece of cable without a remote. After the test is finished, go to the *Velocity* menu. The measured length for the set VF is displayed here. Press the ▲

or ▼ buttons until the known cable length is displayed. The displayed VF value is the VF of this cable. You can then create your own table definition in the *Test settings/cable definition* menu. Best if the reference cable is appr. 10m or 30 ftRemote unit ID

Either none or all of the remote units necessary for correctly and quickly testing the cables are delivered with number 32 to simplify storage.

Select this function to easily reprogram a connected remote unit to the desired number. After changing the number, write down the new number with a pencil in the provided field.

MAC address
The KE7200 comes with a MAC address set. All of the devices have the same address. To work in networks with MAC address verification, the address can be defined here.

IP address
The IP address of the KE7200 is set. This address is used as the device address, even during the IP test, for example as a static network address. It can be changed at any time. Simply set the address with the ▲ and ▼ / ◄ and ► buttons and save with **SEL**. The change can also be made directly during the IP test in the same manner.

The

Device settings

All of the device settings are made in the *Settings/device settings/* menu.

These are preset empirical values and can be left unchanged. If you change some by accident and you want to geet back to the factory settings – you can use "Reset to defaults."

In any case, to every menue position the possible operating steps are shown on the bottom status line of the menu.

Language
German (default)
or English

Units
m (meters) or ft (feet)

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Battery type
The KE7200 can be operated with 4 AA batteries, or 4 AA rechargeable batteries. Since the voltage is lower with rechargeable batteries, the capacity information has to be set to the battery type used. This can be batteries or rechargeable batteries.

Illumination
Set the time with the ▲ *or* ▼ button in seconds, select with **SEL**. The Duration of illumination starts again each time a button is pushed.

Power off
The time when the device automatically turns off after the last button has been pressed. Set with the ▲ *or* ▼ button in seconds, select with **SEL**.

Button press beep
On or off

Acoustic signal
On or off. This signal comes after the cable measurement and indicates OK or fault..

Contrast
LCD contrast setting value, default: 14. Set with ▲ or ▼, confirm with **SEL**

Reset to defaults
All of the settings are reset to the factory defaults.

Program update
If new or improved functions or bug fixes are offered, these can be incorporated using the Manager. To use Program update, follow the instructions in the menu.

Software update
Select with SEL.

You can obtain additional instructions about the KE Manager and the software or function upgrades and updates in .

Test settings

Cable definitions
You can select from the list of the different cables in use. The cable type is assigned to the name and associated VF value. The VF value is needed for measuring length. The cable type only appears in the saved or printed results. Enter the cable that is being used. You can create your own definitions..

Implementation of the tests

The KE7200 tests the connected line for external voltage each time before starting one of the four possible tests. If external voltage is present, the test is not started and the level of the voltage is displayed in volts. The test may only be run after the external voltage has been turned off.
External voltage does not have anything to do with PoE during this type of detection. With PoE systems working properly, the voltage supply always needs to be activated.

Cable test
The cable test can be run with or without the KE7010 remote unit. If it is run without the 7010 remote, only the distance to the panel is measured and crosstalk from split pairs is checked.

When the remote unit is connected to the end, measuring the length using the TDR method is sufficiently precise for determining whether the panel lies within the 90 m range. This test can measure a maximum of 150 m.
We recommend measuring the length for billing issues of installed cables separately without the remote. This measurement of length is more precise since a specific end is detectable without the remote.

Performing the test
Using the supplied patch cables, connect up to 32 remote units to the ports in the building to be measured. If only one remote is being used, the remote needs to be brought to the next connection point after the test. When using a helper, the helper can determine whether the test yielded any errors by the flashing rhythm of the LED. If no errors are found, the LED flashes slowly once every second and the remote can be brought to the next port.

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However, we recommend using several remotes, one for each room. With the possible 32 remotes, somewhat larger facilities or a section of a facility can be easily covered.
The main advantage is that it saves time since only one person is required. At the same time, the measurements are clearly assigned by the remote ID in the documentation.

With the 0.5 m patch cable, connect the KE7200 (supplied) to the port to be tested in the patch panel.
With the scrollbar on "Cable test," start the test by pressing the SEL button. The message "Cable test running" indicates that the test is underway and the progress is displayed as a percentage. If the test is without errors, a long beep sounds and the okay checkmark is shown in the display. The LED in the remote flashes once every second. The wiremap shows the correct wiring result.
If an error is found, two short beeps sound, the LED in the remote flashes quickly 4 times (0.5 seconds in length), then pauses for one second, and then flashes again quickly 4 times, etc.
The number of the remote unit is always displayed in the KE7200 at the top left of the display. This is followed by the type of wiring. This can be changed by pressing the ▼ button. Then the set VF value is displayed. It is either selected by choosing a cable type, or by setting it directly beforehand.

The wire mapping is displayed in the main window. This clearly identifies any circuitry errors. Split pairs are displayed with a branch to the linked wire which then returns. The measured distance to the panel appears in right field. Distances of less than 2 m are not shown. The measurement is too imprecise at this close range.

The maximum length that can be measured is approximately 150 m. However, this depends on the cable itself.

The bottom display line is the dialogue line. The possible operating steps for the current test are displayed in this line.

Navigate with the ◄ / ► buttons to see the identified details per wire. This allows for example an open or short to be clearly assigned to the near or far end. If the fault is somewhere in between, then its location is indicated in meters or feet.
The ◄ button reveals the length of the wires and the ► button indicates the number of errors, type of errors, the affected pin, where it should be and where it actually is, if misconnected, as well as the distance to the fault. In the case of split pairs, of course only

the linked pair can be defined. Sometime individual couplings between other wires can be identified. Because of the split pair, the crosstalk also relates to other neighboring wire pairs. **Make sure that the selected wiring version (such as 568A or 568B etc.) corresponds to the actual cabling.**

Save the data
After the measurement has been taken, you can either exit measuring by pressing ESC, or you can save the measurement. Press the SEL button to open the *Save the data* menu. The default name of the measurement is displayed, followed by a number. A unique name must be provided if you want to associate the data at a later time. We recommend the customer name or number. Enter the name by pressing the ▲ or ▼ button. This allows you to scroll through the alphabet and numbers 0-9. Press SEL to enter the desired character. Change the cursor position by pressing ◄ and ►.
The name remains entered until it is overwritten. That is, if the customer remains the same, you do not have to change anything when saving the next measurement. The number of the measurement is automatically incremented. Afterward, you can sort, print out and save based on the customer number or name. Remember that this setting may need to be changed before starting a series of measurements at a different facility.
The available memory is displayed in the second line. A total of approximately 14,000 entries is possible.

Cable/wire trace Patch Port identification
The KE7200 has two different ways of identifying a known connection box on the patch panel, switch or hub. Insert the test cable of the KE7200 into the outlet box in the room and select Test Link/Blink in the *Cable/wire trace* menu. This only tests if the box is active in the network. The response is displayed in the status line. If there is an active connection, the message appears: "Ethernet 10/100/1000 Mbit connection"
and only the identified speed is displayed. The NLP is transmitted down to the hub or switch and the Link LED on the corresponding port is blinking slowly. (4 sec pause, 1 sec on)
If the port is not active, "No connection" is displayed. Then you can switch to one of the 4 tone transmission modes. The trace tone is transmitted on all of the wire pairs. The assigned port in the patch panel can be clearly identified with the PROBE by hold the button "high" pressed and moving with the probe tip close over the open Patch Panel ports

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PoE test according to IEEE 802.3af
Connect the KE7200 on the end of the ETH cable where the POE device will be connected.
Select the menue position POE Test and start the test by pressing the SEL button. The KE7200 activates the PoE port and shows in the display whether the PoE is available or not. If the PoE can be activated, KE7200 starts the activation process regarding 802.3af. . Then the maximum load is applied to drain the cable charge. The maximum available power is then measured. The standard regulates the voltage that can be on the line when a specific current is flowing. If the voltage is below the standard value, the KE7200 reduces the load until the voltage lies within the defined range. This power is then calculated and displayed.

This information is important in every network with PoE powered devices since faults repeatedly arise because the power supply in the switch has reached the limit or the line is too long or has other defects like bad connections etc. If a small, additional load is created, for example from different operating conditions such as turning on an infrared light at night at a IP-Camera, the network fails and the switch only provides the emergency power. This situation cannot be detected without the proper test equipment.

IP test
In the IP test, the KE7200 will search the network for IP addresses and users. This can be done in DHCP mode or with a fixed IP. If the network is also monitoring MAC addresses, the MAC address of the KE7200 can be changed.
First, DHCP mode is started by selecting "IP test/DHCP request". A connection to the network is established. Once this is available, it is shown in the status line. The IP address allocated to the KE7200 via DHCP is displayed. The search for allocated IP addresses starts immediately in the assigned address space. The KE7200 then queries all of the addresses for information which it lists. If names are available, they are displayed; if not, only the IP address is displayed.
This procedure can take a while, especially if there are many users in the network. The display monitors the found IP addresses.
After the search is finished, "Network" is displayed at the top position. Press SEL to show general network information such as the connection speed, the actual IP address and netmask. Press the ▼ button to go to the next page. The following is displayed:

Domain name of the network
IP address of the DNS server
IP of the DHCP server
IP of the router

Press SEL to save these data.

Press ESC to open the user list. When a user is selected, the IP and MAC address are displayed in addition to the name (if available). To test the connection, this address can then be pinged in this menu.
Select SEL to open the PING menu. The range is displayed in the top left corner. You can change it from 32 to 124 bytes with the ▲ / ▼ buttons.
Start pinging by pressing SEL.
The KE7200 continuously transmits pings to the selected address and is waiting for the answer. This is done at the maximum possible speed so that a kind of stress test is simultaneously performed for all components.

The success of the test is displayed by the number of sent pings and the number of lost pings. Then the maximum, minimum and average response times are displayed. If there are many lost packets – it indicates that some parts in the link are may be defect. This can be cabling as well as Net work cards or the computer himself.

Transmit measurements
The saved measurements can be sent to the KE Manager for further use.
Start the Manager on the PC.
Connect the KE7200 to the PC using an Ethernet cable. In the main menu, select "*Transmit measurements.*"
The saved data are transmitted immediately after synchronization and appear in the Manager window. The KE7200 can now be disconnected from the network. You can connect either direct to a NIC in the PC or to any port on a network where the PC is connected.

If there are no saved measurements, this is reported.

After uploading, the data on the KE7200 can be deleted. If they should not be deleted, press ESC.

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Appendix A

Changing the battery

Changing batteries:
First loosen the two bottom screws in the corner guard. Pull the corner guard downward.
The four AA batteries are in a holder. Remove the dead batteries and replace them with new batteries. Note the polarity. Do not combine new and old batteries. Always use batteries of the same type and date of manufacture.
Return dead batteries to the supplier or a recycling facility, don't dump it.

Test settings

Cable definitions
You can enter the different types of cables used. The types which already have been entered can also be overwritten.

After selecting the cable type to be changed or the last position without an entry, select it by pressing SEL. The display shows "Name:". You can enter a unique cable name. Fifteen characters are available. At the flashing cursor position, press the ▲ and ▼ buttons to scroll through the alphabet and the numbers 0-9 including a space. Select the character or number at the cursor position by pressing SEL. Once the name is entered, confirm it by pressing SEL. The following appears:

"Velocity: xx%". This is the percentage propagation velocity in the cable in relation to the speed of light. The VF value. Enter either the value indicated by the cable manufacturer, the previously determined value, or an approximate value. The value is approximately 64 – 68 for telephone and Cat3 cables, approximately 72 for Cat5/6, and approximately 77 for Cat6/7.

Note that the cable lengths can only be correctly measured when the VF is correct.

After entering the VF value, save it by pressing SEL. This allows you to quickly and easily predefine the cable types that are being used.

Wiring definitions

You can add to the wiring versions used.

It is helpful if you write down the pin/pair assignment of the wiring version to be created.

Sixteen common versions are predefined. The abbreviations UTP, STP, and CR are described on . The list appears after the menu item "*Wiring definition*" is selected. The first item is "NO TEST". Do not change this one.

After selecting a wiring version to be changed or the last "*NOT USED*" item, the "*Name:*" menu appears

You can enter a unique wiring name such as "568C." Fifteen characters are available. At the flashing cursor position, press the ▲ and ▼ buttons to scroll through the alphabet and the numbers 0-9 including a space. Select the character or number at the cursor position by pressing SEL. Once the name is entered, confirm it by pressing SEL.

The "*Connections*" menu appears. The assignment *PIN to PIN and wire pair* can be made that corresponds to the wiring version. This assignment is needed for identifying split pairs and good/bad information after the test. The scroll bar is at

Pin	to	Pin	line pair
1		*NC*	*none.*

Select it by pressing SEL. You are then in the menu

"*Connection to pin 1*"

An option appears where you can select all 8 pins that can be assigned to pin 1. Press the ▲ and ▼ buttons to select the right pin and press SEL.

You then go the menu

"*Pair*"

You can now assign the selected pins to a pair by pressing SEL. You then go to the menu

"*Connections*"

The assignment of the first pin is displayed. Press the ▼ button to move the scrollbar to the next item and continue as before with the assignment.

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The assignments cannot be deleted. If you make incorrect assignments while practicing, you can correct them. As an alternative, you can select the item "Device settings/reset to defaults." This resets all definitions that you have created.

KE Manager – Windows Software

Installing the KE Manager

Run the KE Manager, supplied as K7200_manager_setup.exe, on the Windows PC. The program is installed and an icon is created on the desktop that you can use to open the Manager. A new icon is created for any updates. Before starting the new installation, you should therefore delete the old icon from the desktop to prevent any confusion.
The directory *Kurth_Electronic* is created in the program folder.

**The KE Manager is only available in a Windows version.
Operating systems: Windows 2000 – Windows 7**

Functions
The KE Manager is a flexible tool for managing the KE7200 and downloading measurement data. It has the following functions:

- Configuring the Manager
- Setting the language
- Displaying the KE7200 hardware version
- Displaying the current device software version
- Updating, if available
- Displaying the operating instructions
- Downloading saved tests
- Supplementing downloaded data
- Printing and saving tests
- Retrieving saved tests
- Uploading/downloading between the KE7200 and the PC

PC setup
The PC must have at least one free Ethernet port.

Starting the KE Manager
After the program is opened, double-click the Manager icon to start the Manager and display its version number.
A few settings are necessary. After connecting the KE7200 and starting "*Transmit measurements,*" the data are sent to the Manager.

The following selection options are offered:

Load data (PC)
Saved test sequences can be reloaded here.

Save data
Sequences loaded by the KE7200 are saved on the PC or on the network.

Save displayed data
After the data are selected, they are saved as a separate list.

Delete selected line
A line is deleted.

Print data
A print version is created and can be printed on any printer.

Print options
You can indicate a graphics file as a header for the printout of the test reports.

Configuration table
The display of the shown data can be changed here.

Update
This item is reserved for any required software updates.

Instructions
The operating manual is opened.

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Manager function

After all the records have been downloaded from the KE7200, the data or measurements may be from different customers. However this assignment must be performed on site when saving. See <u>Save measurements</u>

Selecting/sorting by customer
The selection "Display the following measurements" is at the top left. A list opens with all the saved records. You can then select the customer whose records you want to compile, comment on and print as a log.
You can then save the selection with "*Save displayed data*" by specifying your information (customer name, number, etc.).

Customer address
In the bottom section, you can enter the customer address, technician and any comments.
The address entered in the first record is output as the first item in the log. You can then enter the technician, room name and comments separately for the individual records.

Display results
The saved results from the selected line are displayed again at the bottom right.
The results are output as a wire map and error list.

The footer provides information about the connection status and the language.

The IP list is shown on the second page. The use and information are the same as the first page.

Overview of technical data

KE7200 active network tester

Copper wiring test:
Test of the data line assignment with the PIN and pair assignment.
Sixteen predefined connection versions; easily create your own
definitions starting with 2 wires.
Clearly laid-out graphic display for quickly identifying errors.
Identification of split pairs (crosstalk) starting at 1 m with a graphic
display.
Measure the individual wire lengths with TDR and display in m or ft.

Power over Ethernet test:
Activate PoE functions, measure voltage and determine output
according to IEEE 802.3af

IP network test:
Connection by DHCP or static
Set your own IP and MAC address
List active stations by name (if defined), IP and MAC address
Ping test of selected addresses, the ping range can be set from 32
to 1024 bytes
Display ping results for received/lost and times

Cable trace:
Link - blink function with NLP
Trace tone for tracing cables with capacitive probe
Choose from four frequencies:
1. SOLID: 1,000 Hz
2. ALT: 1000/800 Hz
3. SOLID: 2,600 Hz
4. ALT: 2600/1,900 Hz

Surge projection:
Up to 100 V

Housing:
Stable and impact resistant, weather resistant ABS housing

Power supply:
Four 1.5V alkaline batteries with a life greater than 40 hours

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or four NImH rechargeable batteries with an operational lifetime
that depends on the capacity.
Neither is included.

Dimensions:
195 x 95/70 x 45 mm
7,6 x 3,7/2,7 x 1,6"

Weight:
380 g without battery
Operating environment:
Operating temperature: -5 to +50°C
Storage temperature: -25 to +75°C
Relative humidity: 90%, no condensation

KE7010 active remote unit

Housing:
Solid, impact-resistant and water-resistant ABS housing
Performance features:
ID programmable for 01 - 32
LED for Good/error display
Surge protection up to 100V

Dimensions:
61 x 41 x 26 mm
2,2 x 1,5 x 1"

Weight:
30g

Basic Set comes with:
KE7200 network tester; 2 KE7010 remote units; 3 CAT6 test
cables, 0.5m long; 1 RJ45/RJ11 test cable, 4/5 pin, 2m long; 1
RJ45 test cable with two 4-mm banana plugs with alligator clips,
2m long; 1 RJ45/BNC adapter; 1 BNC/F adapter; software for
Windows; operating instructions and protective pouch