

KeTop Safe Wireless System

Quick Start Guide



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Automation by innovation.

Welcome

To KeTop Safe Wireless System from KEBA

Automation by innovation

Thank you for your interest in our innovative automation solutions. Founded in 1968, KEBA is today an internationally active company with more than 1,750 employees and enjoys a high reputation on the world market.

The KeTop Safe Wireless System is a solution for the safe mobile wireless operation of a plant or a machine.

For more information, please visit our website:
www.keba.com/industrial-automation

Procedure for commissioning and operation

1. Introduction	3
2. System description	3
3. Installation	4
3.1. <i>Power supply of the base station</i>	4
3.2. <i>Power supply of the handheld terminal</i>	4
3.3. <i>Loading options</i>	5
3.4. <i>Switching on the handheld terminal</i>	7
4. Connecting and disconnecting the base station and the handheld terminal	7
4.1. <i>Connect</i>	7
4.2. <i>Disconnect</i>	9
5. Configuration	10
5.1. <i>Assign base station name</i>	11
5.2. <i>Set network mode</i>	12
5.3. <i>Network configuration</i>	15
5.4. <i>Fast Response Operator Controls (Fast Response Buttons)</i>	17
6. Projection	19
6.1. <i>Operator Controls Interfaces</i>	19
6.2. <i>Access to elements of the KeTop Safe Wireless System</i>	19
6.3. <i>Data connection</i>	19
7. Operation	19
7.1. <i>Ident Key</i>	20
7.2. <i>Enabling switch</i>	20

7.3. Emergency stop	21
7.4. Pairing/unpairing connections.....	22
7.5. Remote Pairing	22
7.6. Remote Unpairing	25
7.7. Error conditions during connection between base station and handheld terminal	26

Used hardware

- KeTop T155WL-W10-NN1-W10E handheld terminal
- KeTop CB410-SE2

Used software

- Already installed on the base station and the handheld terminal.

1. Introduction

This document describes in a simplified way individual topics of the use of the KeTop Wireless System. It does not replace the study of the project engineering manual, where the individual topics are described and explained in detail. Information on sources of danger, hazardous situations and the proper use must also be read there.

2. System description

The KeTop Wireless System consists of a base station and a handheld terminal.



Illustration: Base station and handheld terminal

There are two states for the handheld terminal

- It is connected to a base station (paired)
- It is not connected to a base station (unpaired)

The safety devices on the handheld terminal (emergency stop and enabling switch) are only active in the paired state. The emergency stop on the base station is always available. The network with which data is exchanged is not part of this state.



Illustration: Emergency stop not illuminated



Illustration: Emergency stop illuminated

How to switch between these two states, see chapter 4.

3. Installation

3.1. Power supply of the base station

First of all, the base station must be supplied with voltage. To do this, pin 10 of terminal strip S1 must be supplied with GND and pin 11 of terminal strip S1 with 24V.

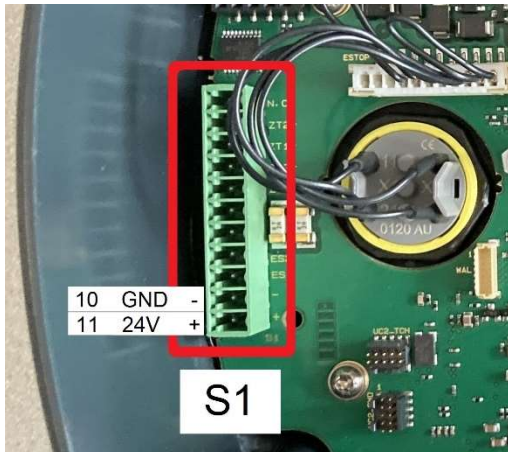


Illustration: Picture of the base station with terminal strip S1 (Pin 10 and 11)

As soon as the base station is powered, the PWR led on the base station lights up and the base station goes into bridged emergency stop status, the bar turns white.



Illustration: PWR Led indicates power supply to the base station

3.2. Power supply of the handheld terminal

Before starting the handheld terminal for the first time, the battery must be installed in the handheld terminal. To do this, open the cover of the battery compartment



Illustration: Rear side of the handheld terminal with marked cover of the battery compartment

Plug in the battery, place it in the slot and screw the cover shut with a Torx T10 screwdriver.

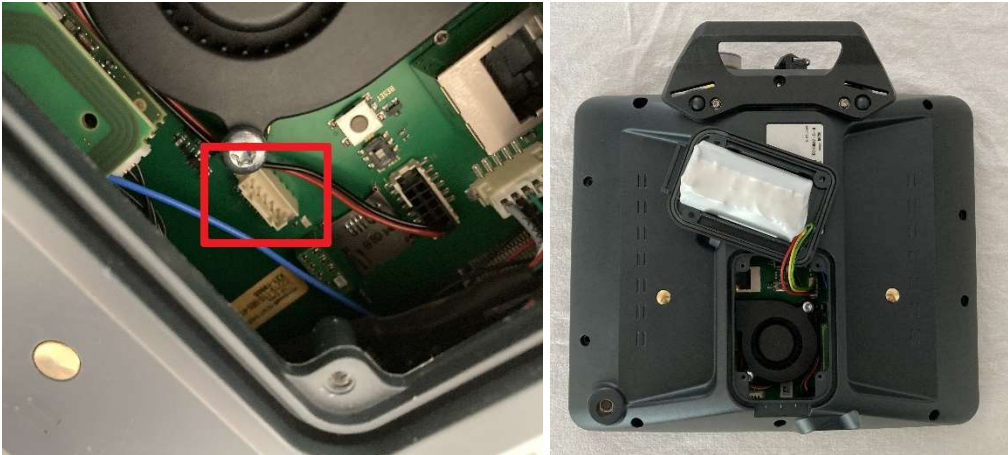


Illustration: Rear side of the handheld terminal with open cover of the battery compartment. The plug for the battery is marked

Then charge the battery (see next section) until the charge indicator light goes out.



Illustration: Battery charge indicator light

3.3. Loading options

Optional power supply unit directly on the handheld terminal

Power supply: Output 24V DC, DC plug adapter 5.5/2.1

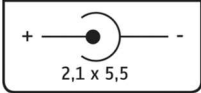


Illustration: Power supply



Illustration: Charging socket of the handheld terminal

Optional charging station KeTop CS 15x



Illustration: Charging station KeTop CS 15x

The charging station is supplied with power either via the charging socket (data as for optional power supply unit directly on the handheld terminal) or by direct wiring with a 24V power supply. For direct wiring, the charging station must be opened, the screws for this are located on the back of the charging station. A Torx T10 screwdriver is required for the screws. For charging, the handheld terminal is hooked in at the top, please check the charging indicator light.



Illustration: Connectors of the charging station



Illustration: Rear of the charging station with the marked screws

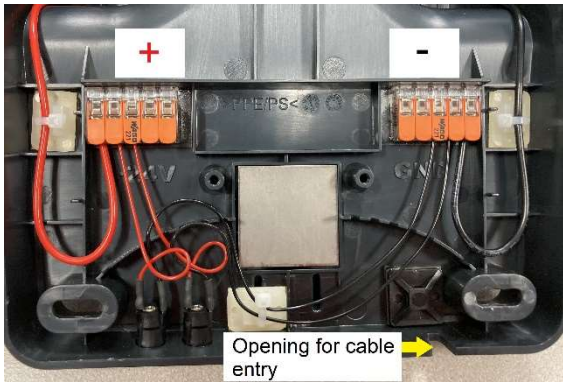


Illustration: Connectors of the charging station for direct wiring

3.4. Switching on the handheld terminal

Switch on the handheld terminal using the Power key. The device is switched on as soon as the PWR (Power) led lights up.



Illustration: Power key of the handheld terminal

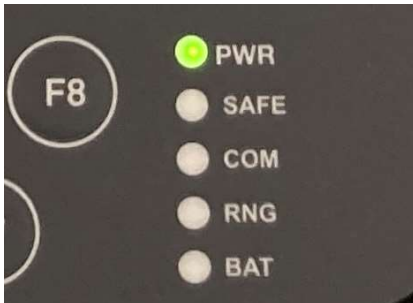


Illustration: Power led on the handheld terminal

The handheld terminal will then boot Windows and a Windows desktop will appear.

4. Connecting and disconnecting the base station and the handheld terminal

4.1. Connect

To connect, hold the handheld terminal close to the base station (<2cm). The type plate area of the handheld terminal should be close to the RFID sign of the base station. As soon as the two devices have recognized each other, a vibration feedback is given.



Illustration: Keep devices close together



Illustration: RFID sign on the base station

A waiting dialog is displayed until communication is established, then a dialog appears asking whether a connection to the base station should be established with the name of the base station.



Illustration: Waiting dialog until communication is established

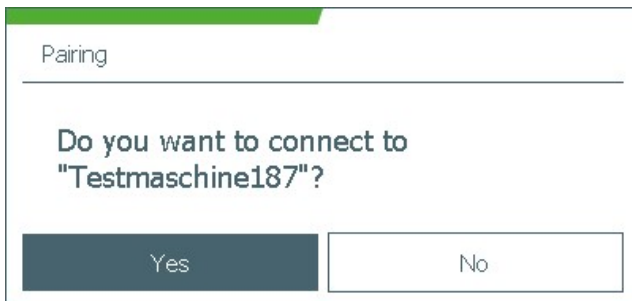


Illustration: Dialog whether a connection should be established with this base station "Testmaschine187"

If the answer is yes, the connection is established. If this connection is established, a dialog is displayed, the bar of the base station turns green and the emergency stop is illuminated.

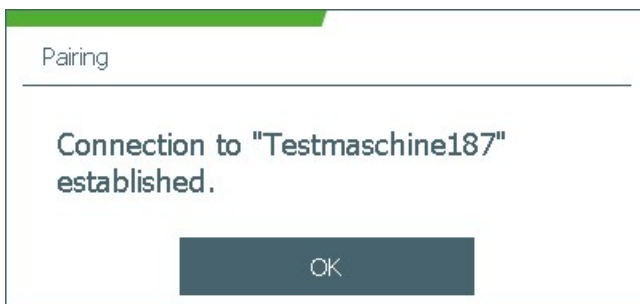


Illustration: Dialog confirming that the connection exists



Illustration: Successful establishment of the connection between base station and handheld terminal

4.2. Disconnect

To disconnect, hold the connected handheld terminal close to the base station (<2cm). The type plate area of the handheld terminal should be close to the RFID sign of the base station.



Illustration: Keep devices close together

A dialog appears asking whether the connection to the base station should be closed by specifying the name of the base station.

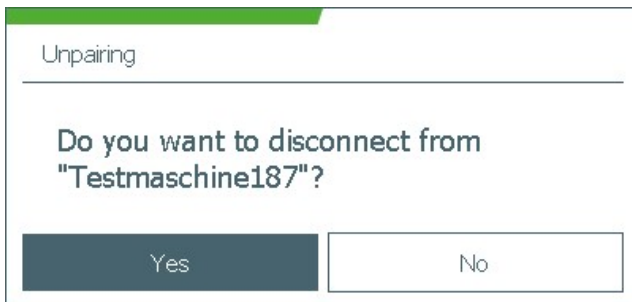


Illustration: Dialog whether the connection to the base station "Testmaschine187" is to be disconnected

If the answer is yes, the connection is closed. If this connection is closed, a dialogue is displayed, the bar of the base station turns white and the emergency stop is no longer illuminated.

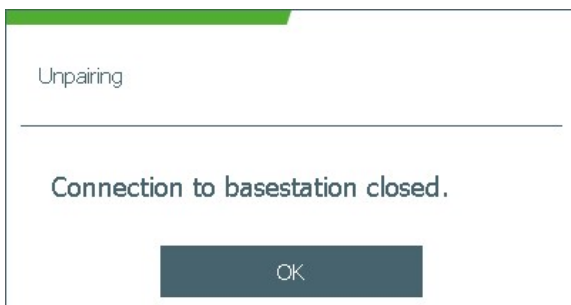


Illustration: Dialog confirming that the connection has been closed



Illustration: Successful closing of the connection between base station and handheld terminal

5. Configuration

To configure the base station and/or the handheld terminal, these two must first be connected (see chapter 4). For the configuration, the DeviceConfig tool is available on the handheld terminal, with which both the base station and the handheld terminal can be configured.

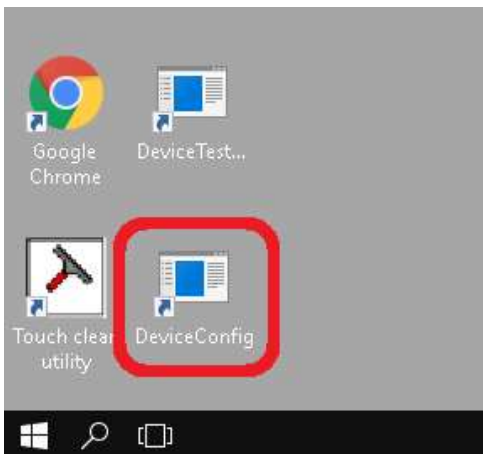


Illustration: Windows Desktop with DeviceConfig tool

After starting the DeviceConfig tool, different menus can be selected.

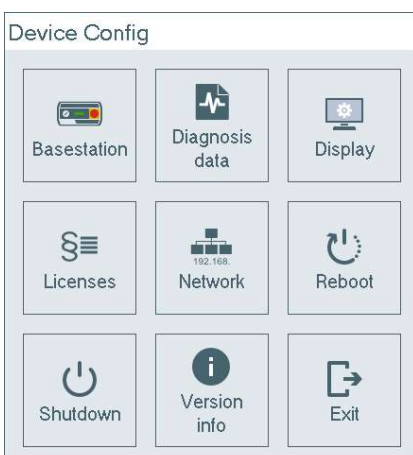


Illustration: Main menu DeviceConfig tool

5.1. Assign base station name

Each base station should be given a name. The default name is the serial number of the base station. The name always appears when connecting and disconnecting the base station with the handheld terminal.

Note: To be able to perform this configuration, the base station and the handheld terminal must be connected. The connection must be established before starting the DeviceConfig tool.

Note: For the name please use only letters and numbers and no special characters.

First select the base station in the DeviceConfig tool main menu.



Illustration: DeviceConfig tool main menu

Then select the dialog for entering the name of the base station.



Illustration: Base station submenu

To enter the name, press the keyboard icon next to the name. An on-screen keyboard opens for entering the name. The name dialog also indicates the base station to which the handheld terminal is connected (paired). Once the name has been entered, the dialog is exited via "Write to basestation". This command writes the name to the base station.

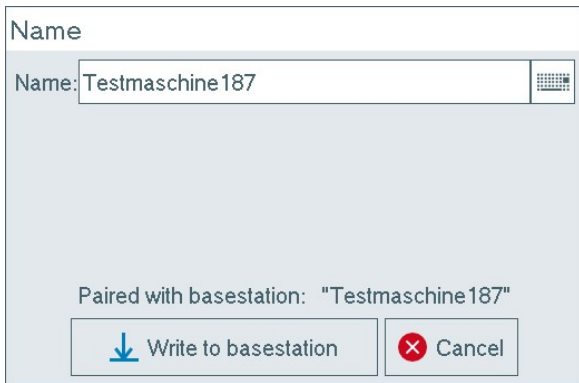


Illustration: Dialog for entering the name of the base station



Illustration: On-screen keyboard for entering text

5.2. Set network mode

Next, the Network Mode should be set, in which state of the system over which network data should be exchanged. For this purpose the network mode can be set.

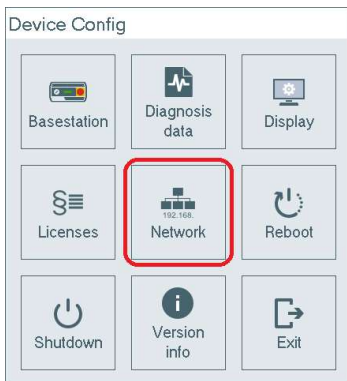


Illustration: DeviceConfig tool main menu



Illustration: Network submenu

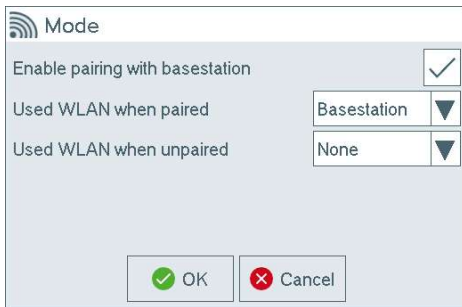


Illustration: Modedialog

But what can be set here? There are different deployment scenarios for the KeTop Wireless System, which can be configured here. In the following, the scenarios are briefly described and how they can be configured in the DeviceConfig tool.

Scenario „Industrial tablet“:

The handheld terminal is operated in the hall network and there is no connection to a base station - comparable to a tablet. There is only data traffic and no secure connection. In this case, no access to information from the base station is possible.



Illustration: Scenario description „Industrial tablet“

The corresponding configuration in network mode looks like this, a connection of the handheld terminal to the base station is not possible in this mode, the emergency stop and the enabling switch are not available, the emergency stop will never be illuminated, a base station is not necessary.

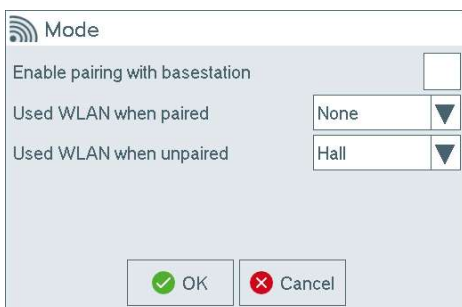


Illustration: Configuration for scenario „Industrial tablet“

Scenario „Cable replacement“:

The handheld terminal is only operated with the base station. Data traffic only takes place if the two have established a secure connection after being paired. In the paired state, the emergency stop and the enabling button are available on the handheld terminal. This is indicated by the emergency stop lighting.



Illustration: Scenario description „Cable replacement“

Mode	
Enable pairing with basestation	<input checked="" type="checkbox"/>
Used WLAN when paired	Basestation ▼
Used WLAN when unpaired	None ▼
<input checked="" type="button" value="OK"/> <input type="button" value="Cancel"/>	

Illustration: Configuration for scenario „Cable replacement“

Scenario „HMI focus“:

The handheld terminal is only operated in paired mode with the base station. In unpaired mode, data traffic is handled via the hall network. In the paired state, the emergency stop and the enabling button are available on the handheld terminal. This is indicated by the emergency stop lighting.



Illustration: Scenario description scenario „HMI focus“

Mode	
Enable pairing with basestation	<input checked="" type="checkbox"/>
Used WLAN when paired	Basestation ▼
Used WLAN when unpaired	Hall ▼
<input checked="" type="button" value="OK"/> <input type="button" value="Cancel"/>	

Illustration: Configuration for scenario „HMI focus“

Scenario „SCADA focus“:

The handheld terminal always uses the WLAN of the hall network for data traffic. The safe connection can exist in parallel. In the paired state, the emergency stop and the enabling button are available on the handheld terminal. This is indicated by the emergency stop lighting.



Illustration: Scenario description scenario „SCADA focus“

Mode	
Enable pairing with basestation	<input checked="" type="checkbox"/>
Used WLAN when paired	Hall ▼
Used WLAN when unpaired	Hall ▼
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	

Illustration: Configuration for scenario „SCADA focus“

5.3. Network configuration

Handheld terminal network through the base station

If the base station is selected in the network mode, the connection configured here is used. From the point of view of the network, the base station is transparent and is therefore not considered a network subscriber. From the point of view of the application on the handheld terminal, the handheld terminal is in the network to which the base station is connected. The SSID of the WLAN between the base station and the handheld terminal is generated from the serial number, among other things; the password is generated, is not visible and is exchanged between the base station and the handheld terminal. However, the band and the channel can be parameterized from the established WLAN connection.

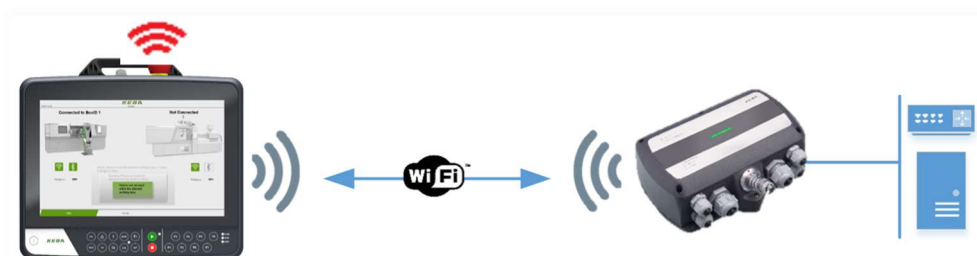


Illustration: Handheld terminal in the base station network

Note: To be able to perform this configuration, the base station and the handheld terminal must be connected. The connection must be established before starting the DeviceConfig tool.



Illustration: Selecting the submenu for configuring the network settings of the base station

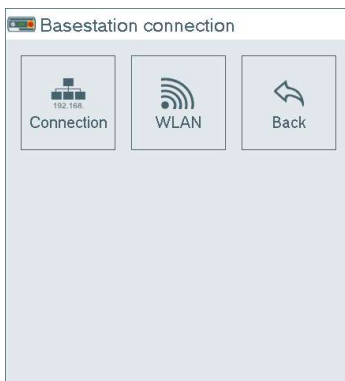


Illustration: Submenu for configuring the network settings of the base station

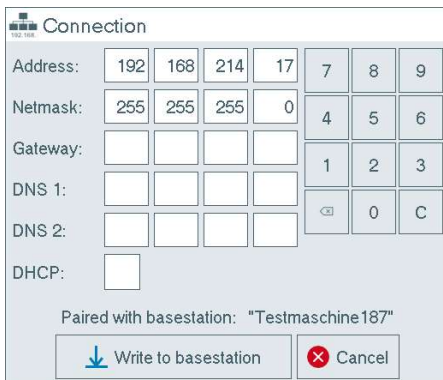


Illustration: Setting the network settings of the base station



Illustration: Parameterization of the WLAN connection between base station and handheld terminal

Network of the handheld terminal in the hall network

If the hall is selected in network mode, the connection configured here is used. The WLAN connection between the hall and the handheld terminal must be configured as follows.

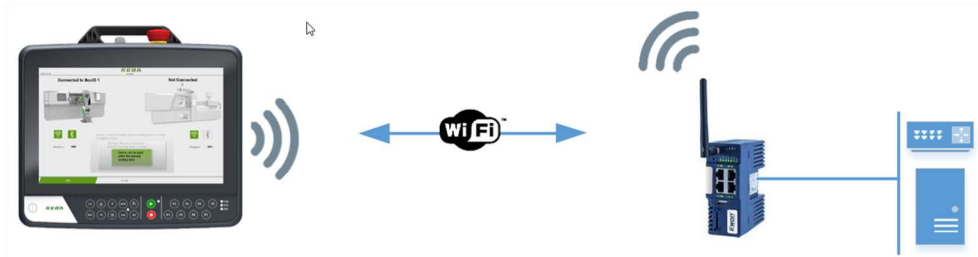


Illustration: Handheld terminal in the hall network



Illustration: Selecting the submenu for configuring the hall network settings

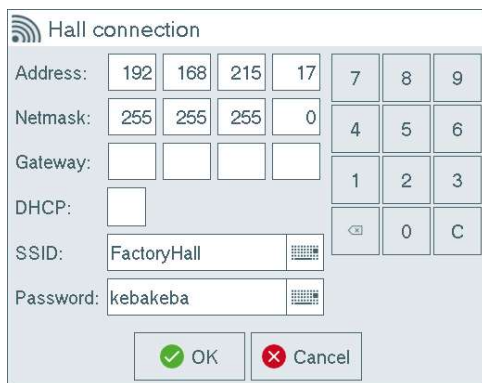


Illustration: Setting the hall network settings

5.4. Fast Response Operator Controls (Fast Response Buttons) [Option]

Fast Response Operator Controls are a function where the operator controls of the handheld terminal are directly assigned to outputs of the base station and the value of the controls can be tapped directly at the outputs during operation. Currently this is only implemented for the keys.

The outputs are in the base station at the terminal strip Fast Response Buttons Pin 6 (DO14) to Pin 20 (DO1), whereby Pin 5 and Pin 11 provide GND..

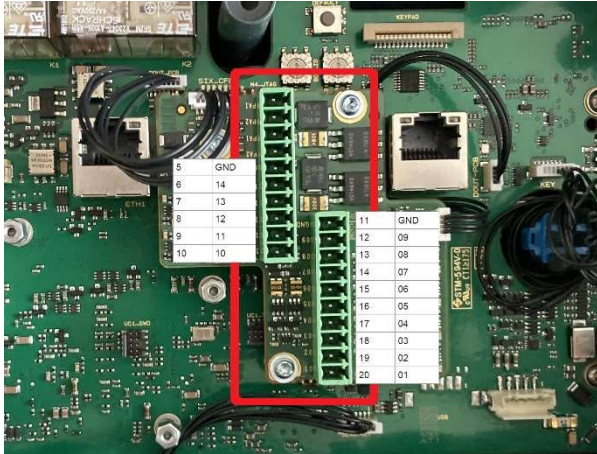


Illustration: Image of the base station with terminal strip Fast Response Buttons (Pin 5 to 20)

The configuration is then done in the DeviceConfig tool.

Note: To be able to perform this configuration, the base station and the handheld terminal must be connected. The connection must be established before starting the DeviceConfig tool.

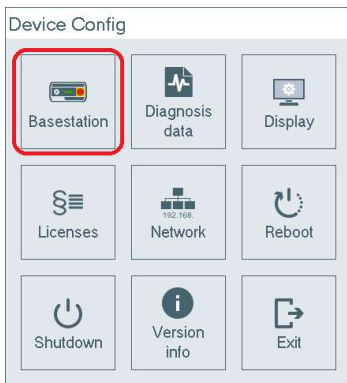


Illustration: DeviceConfig tool main menu

Then select the Fast Response Buttons configuration dialog..



Illustration: Base station submenu

The configuration is done in such a way that for each of the outputs used (DO), it is defined which key of the handheld terminal switches it. For definition, press the "KEY" button next to the key number and then press the desired key. The scancode of the key is filled.

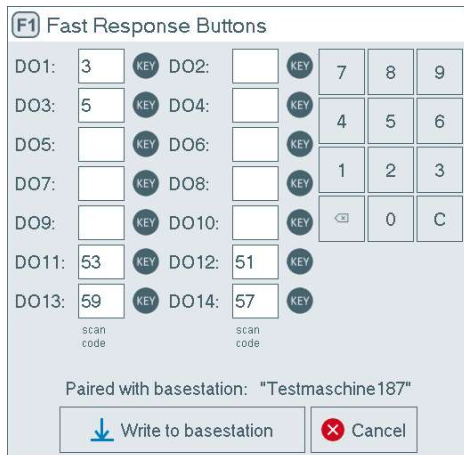


Illustration: Dialog for configuring the Fast Response buttons.

6. Projection

For the projection of the visualization application, the KeTop Safe Wireless System is the same as a wired KeTop system. Both the access via control interfaces to the operator controls and the connection with PLCs, computers or other data sources is made via the network connections. It should only be noted that when switching between the two network options, connections are interrupted and must be reestablished.

6.1. OperatorControlsInterfaces

Refer to the manual of the respective controller connection to the operator controls.

6.2. Access to elements of the KeTop Safe Wireless System

The elements of the KeTop Safe Wireless System can be accessed via the HWApi. This library is supplied as a DLL and can be used in C, C++ and C# implemented applications. Further information is available from KEBA Support.

6.3. Data connection

See the manual for the respective visualization projection or programming.

7. Operation

During operation, the base station and handheld terminal are normally connected or disconnected depending on the usage scenario. This is described in chapter 4. If it is necessary to check to which base station a handheld terminal is connected, it is possible to check this via the Ident Key.

Another application is the pressing of the emergency stop or the enabling switch during operation. This activates electrical safety mechanisms; when the emergency stop is pressed, this is also visualized by the base station.

For exceptional situations where the base station and the handheld terminal cannot be brought into close proximity, there is a function for connecting or disconnecting both devices "remotely" (remote pairing and remote unpairing). However, a line of sight must always be available between the two devices.

7.1. Ident Key



Illustration: Ident Key

The Ident Key has two functions:

- Short press: In the connected state, an identification of the connected base station takes place. The light bar of the base station flashes for 5 seconds.
- Long press (>3 seconds): An info dialog appears. Depending on the connection status, this shows different information about the handheld terminal or the base station.

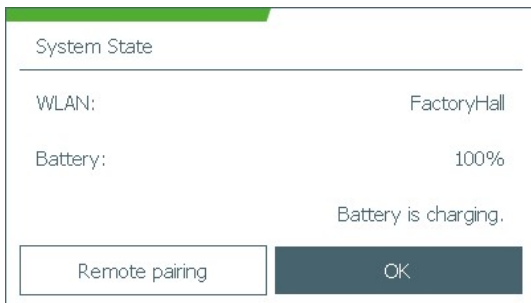


Illustration: Info display when the Ident Key is pressed for a long time and there is no connection between the base station and the handheld terminal

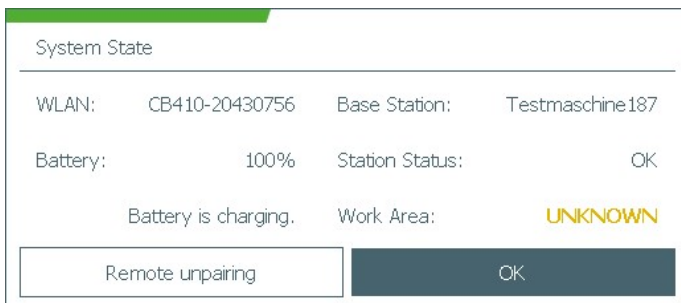


Illustration: Info display when the Ident Key is pressed for a long time and there is a connection between the base station and the handheld terminal

7.2. Enabling switch

Pressing the enabling button closes outputs in the base station. There is no possibility to read this out in the handheld terminal.



As these are safety devices, please read the manual.

The contacts for the enabling switch are available at terminal strip S1 pin 2 to pin 5. The enabling switch circuit has two circuits, please refer to the manual for details.

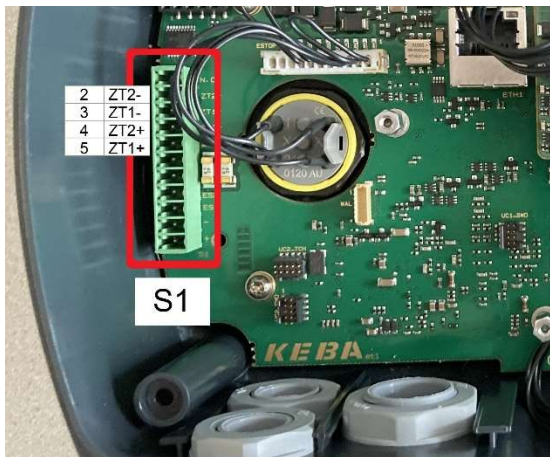


Illustration: Picture of the base station with terminal strip S1 - contacts for enabling switches (pin 2 to 5)

7.3. Emergency stop

The emergency stop is designed according to the closed loop principle. By pressing the emergency stop - either on the base station or on the handheld terminal - the circuits in the base station are interrupted - these outputs are closed in normal operation. These outputs must be read in as inputs in a PLC or safety controller, there is no possibility to read them out in the handheld terminal. If the emergency stop was triggered, the bar of the base station turns red. Releasing the emergency stop switches back to the previously valid state. The emergency stop has two circuits, please refer to the manual for details.



As these are safety devices, please read the manual.

The contacts for the emergency stop are available on terminal strip S1 pin 6 to pin 9.



Illustration: Picture of the base station with terminal strip S1 - contacts for emergency stop (Pin 6 to 9)

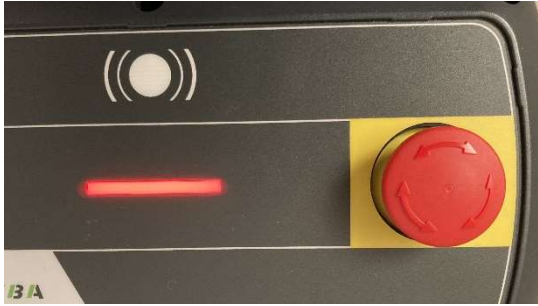


Illustration: Indication that an emergency stop has been triggered either at the base station or at the handheld terminal

7.4. Pairing/unpairing connections

There are 2 outputs available which indicate the type of pairing (no pairing, pairing or remote pairing). By logically linking the two outputs, an operating mode switchover can be implemented (e.g. safely reduced speed with remote pairing). For details please read the manual.

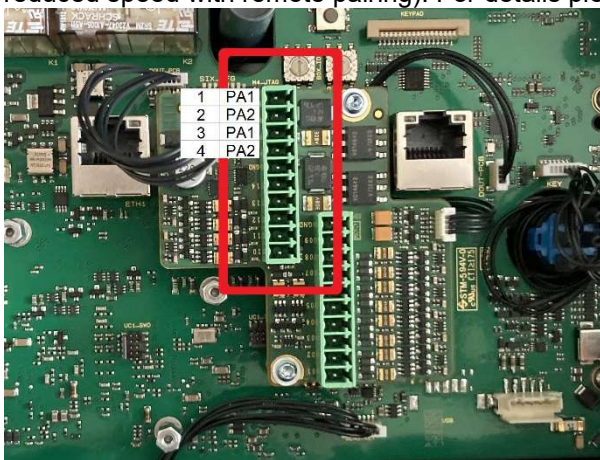


Abbildung: Bild der Basisstation mit Klemmleiste Fast Response Buttons (Pin 1 bis 4)

7.5. Remote Pairing

If it is no longer possible to bring the base station and the handheld terminal close together, it is still possible to establish the connection. The following conditions must be met for this. In order to restrict access control for this function to instructed persons, a password must be set in the configuration and the base station and the handheld terminal must have been connected to each other before. Each time a base station and a handheld terminal are connected, this connection is stored in the handheld terminal and this list can then be used for remote pairing.

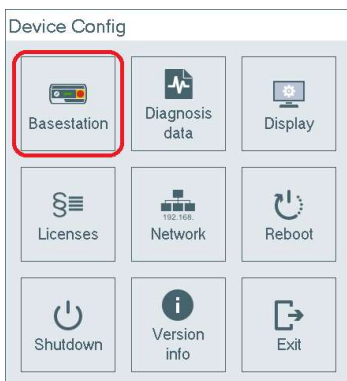


Illustration: DeviceConfig tool main menu

Then select the dialog for configuring the base station.



Illustration: Base station submenu

The password must be set in the configuration dialog. To avoid errors, the password must be entered twice in the same way.

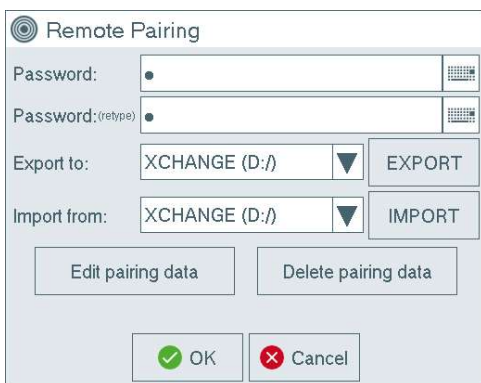


Illustration: Dialog for configuring remote pairing

Remote pairing is initiated by pressing the Ident Key long (> seconds). In the appearing info dialog there is a button to start the remote pairing process.



Illustration: Ident Key

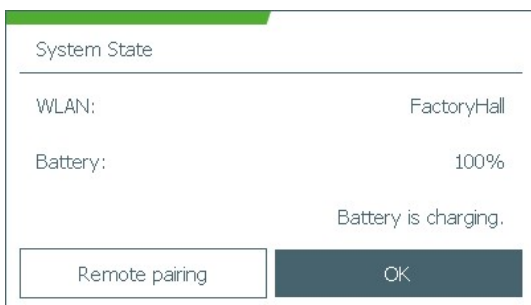


Illustration: Info display when pressing the Ident Key for a long time, button for starting remote pairing

First the password must be entered. This is necessary so that access to this function can be restricted to instructed persons only.

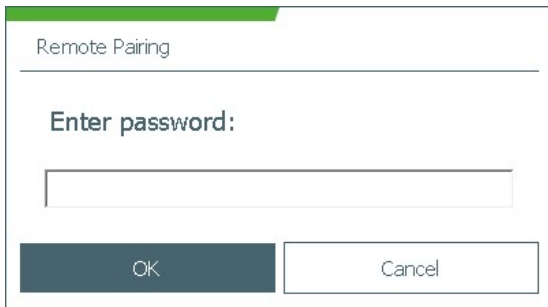


Illustration: Dialog for entering the password

After entering the password, the base station with which the connection is to be established must be selected. The selection contains the names of all base stations with which a connection has already been established.

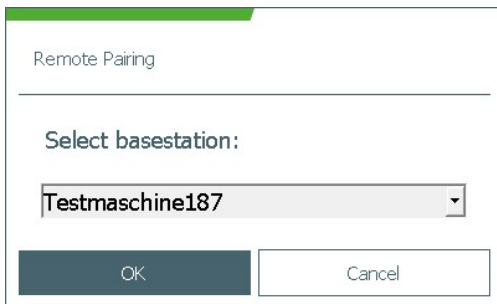


Illustration: Dialog for selecting the base station

After selecting the base station, a connection is temporarily established and on the base station the bar starts to light up in a color combination of two colors. This color combination must be confirmed on the handheld terminal - this mechanism guarantees a line-of-sight connection.



Illustration: Dialog for confirming the color combination of the base station

Then the connection is established and indicated by a dialog, the bar of the base station turns green and the emergency stop is illuminated.

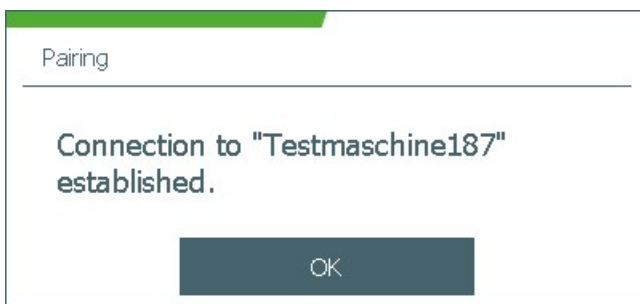


Illustration: Dialog confirming that the connection exists



Illustration: Successful establishment of the connection between base station and handheld terminal

7.6. Remote Unpairing

If it is no longer possible to bring the base station and the handheld terminal close together, it is still possible to disconnect the connection. The following conditions must be met for this. To restrict access control for this function to instructed persons, a password must be set in the configuration for this purpose. For setting the prerequisite, see Remote pairing.

Remote unpairing is initiated by pressing the Ident Key long (>3 seconds). In the info dialog that appears, there is a button for starting the remote unpairing process.



Illustration: Ident Key

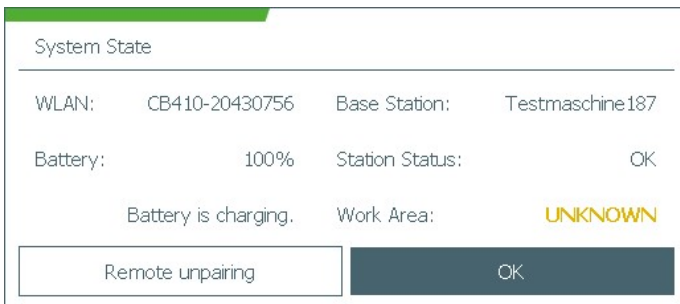


Illustration: Info display when pressing the Ident Key for a long time, button for starting Remote Unpairing

First the password must be entered. This is necessary so that access to this function can be restricted to instructed persons.

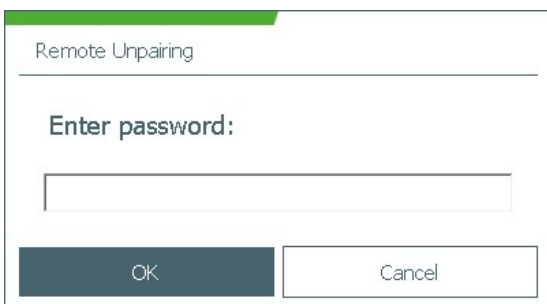


Illustration: Dialog for entering the password

After entering the password, the bar starts to light up in a color combination of two colors. This color combination must be confirmed on the handheld terminal - this mechanism guarantees a line of sight.



Illustration: Dialog for confirming the color combination of the base station

Then the connection is disconnected and indicated by a dialog, the bar of the base station turns white and the emergency stop is no longer illuminated.



Illustration: Dialog confirming that the connection has been closed



Illustration: Successful disconnection between base station and handheld terminal

7.7. Error conditions during connection between base station and handheld terminal

Due to e.g. restart of the handheld terminal or loss of voltage at the base station, an error condition may occur during the connection. In these cases, an emergency stop is triggered. However, the logical connection between the two devices remains intact. In these cases, the connection must be released manually.

The error condition is indicated on the base station by a red running light in the bar

The solution must first be carried out on the base station. The solution takes place on the base station side by pressing the Pairing Reset button for a long time (>5 seconds). The base station then goes into the emergency stop state (base station bar is red). In order to leave this state, the emergency stop must be pressed but not yet unlocked.



Illustration: Position of the pairing reset button

On the handheld terminal side, the connection is resolved by attempting to establish a connection - but only by holding it close to each other.

By unlocking the emergency stop button, this state can be left and changed to normal operation.