KeTop T40

Handheld Terminal

User's Manual V 1.6

KEBA®

Automation by innovation.

Notes on This Manual

At various points in this manual you will see notes and precautionary warnings regarding possible hazards. The meaning of the symbols used is explained below.

⚠ DANGER

- **DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.**

⚠ WARNING

- **WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**

⚠ CAUTION

- **CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.**

CAUTION

- **CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property injury.**

This symbol reminds you of the possible consequences of touching electrostatically sensitive components.

Note

Notes on use of equipment and useful practical tips are identified by the "Notice" symbol. Notices do not contain any information that draws attention to potentially dangerous or harmful functions.

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History

Modification from / to	Date	Modified pages	Description	Author
V1.0	July 02		First edition	sam
V1.0/V1.1	July 02	28ff	The chapter „Shielding“ has been added.	sam
V1.1/V1.1a	02-7-17	23	Chap. „Example of Connection with PILZ PST1 Control Relay“: The diodes and the resistors has been replaced by a motor.	sam
V1.1a/V1.2	2.8.02	11	Chap. „Hardware“: The RS-232-C has beend added to the interfaces.	sam
		13	Chap. „Power supply“: The item „Maximum interruption time of supply voltage:“ has been added.	sam
		31	Chap. „Cable Entrance Area“: The drawing has been changed..	sam
		33	Chap. „Cable outlet“: The drawing has been changed.	sam
		34	Chap. „RS-422-A“: has been changed (Dip-Switches, external device, general information)	sam
		36	Chap. „RS-232-C“ has been added.	sam
		38	Chap. „Labelling of keys“: The drawing „Inserting of a paper label“ has been added.	sam
		39	Chap. „Labelling of keys“: The drawing „Dimensions of labels“ has been changed.	sam
		42	Chap. „Selection of protocol“: Other protocols has been added..	sam
		48	Chap. „Display character set“ has been actualized..	sam
		52	Chap. „Diagnosis Menu“: The items „Display“ and „COM Test“ has been added..	sam
		55	Chap. „Setup Menu“: The item „Parameter“ has been added.	sam
		55	Chap. „Info Menu“: The item „Software“ has been added.	sam
		56	Chap. „System Errors“: The item „Time“ has been added.	sam
		60	Chap. „Connection diagram“: The drawing has been changed.	sam
		65	Chap. 11 „Transport conditions“ has been added	sam
		66	Chap. 12 „Technical data“: „Vibration resistance:“ has been changed and the item „Maximum interruption time of supply voltage:“ zugefügt. „Interfaces“: RS-232-C has been added.	sam
V1.2/V1.3	1.10.02	-	The notes have been adapted to the ANSI z535.4 standard in the entire document. The new caution notes are shown and described on page 2. All "notices" and "caution" notes have been classified as „! DANGER“, „! WARNING“; „! CAUTION“ and „CAUTION“ and are represented in the new layout. The former CAUTION symbol does not exist any more. The ESD note remains as before. The „Notice" too remains and is of informative nature only..	sam
		59,61,62	The colors of the connection cable TT xxx and the Intermediate cable IC xxx has been corrected as follows: S19, pin 6: red => pink, S19, pin 8: green-brown => brown-green, S19, pin 9: white-grey => white-green	sam
		65	Chap. "Technical Data": The storage temperature has been changed: OLD: -25 °C to +70 °C (-13 °F to 158 °F) NEW: **-20** °C to +70 °C (**-4** °F to 158 °F)	sam
V1.4 / V1.5	2002	all	small changes	sam
V1.5 / V1.6	12-2004	all	new layout	sam

Contents

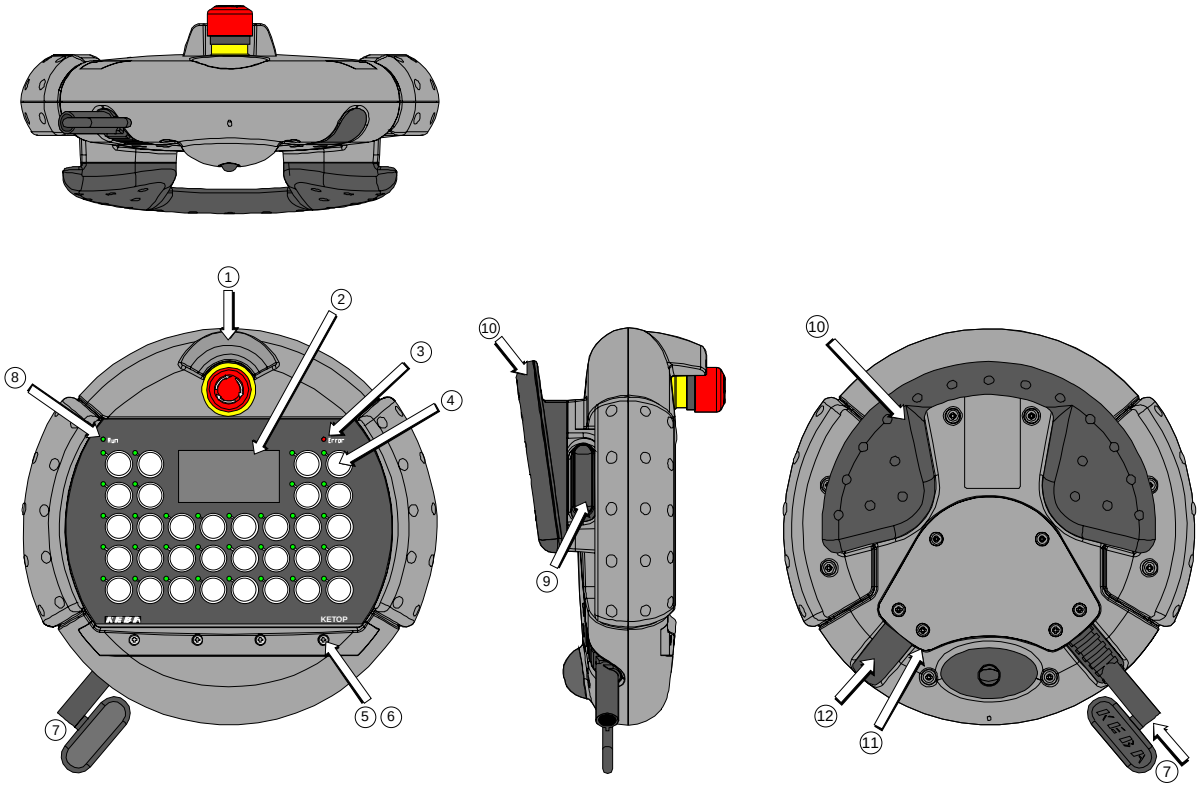
1 Brief Description

The handheld terminal KeTop T40 is a portable operating and display panel for industrial application. Thanks to its rugged design and optimized ergonomical features, it is suitable for a great variety of tasks:

- Operator panel for machines and plants
- Teach and programming panel for robots
- Start-up device for drives
- Handheld operating device for machine tools

The configuration of the KeTop T40 is performed by means of the configuration software included in the **KeTop Startkit T40** (available at KEBA).

Construction



1 ..... Emergency stop switch with mechanical protection
2 ..... STN LC display with 128x64 pixels (20 columns, 8 lines)
3 ..... Error LED (red)
4 ..... 32 keys with tactile feedback and a green LED per key
5 ..... Detachable cover for insertable labels
6 ..... 8 insertable labels for individual labeling (below label cover)
7 ..... Strain relief for connection cable (delivered with the connection cable)
8 ..... Run LED (green)
9 ..... Two 3-position enabling switches (left and right), twin circuit
10 ..... Multigrip handle
11 ..... Cable entrance area (lid)
12 ..... Blind plug for cable outlet not used (to guarantee the degree of protection IP65)

Construction of KeTop T40

Ergonomic Features

- Multigrip handle
- Round housing
- Different holding positions
- Operation by right-handed and left-handed people
- Desk top operation
- Operation in wall bracket
- The cable outlet can be on the left or right side of the housing.
- Easy-to-read display

Housing

- Vibration- and shock resistance
- Housing made of non-flammable material (UL 94-V0), impact-resistant, withstands water, cleaning agents (alcohol and tensides), oil, drilling oils, grease and lubricants
- Twin shell, extremely sturdy housing. Drop-tested on industrial flooring from a height of 1.5 m (59 in).

Operating and Display Panel

- Membrane keys with tactile feedback
- 2 status LEDs
- Buzzer in upper part of housing
- one LED per key for user guidance
- Backlit STN LC display with 128x64 pixels
  (20 columns, 8 lines)

Hardware

- CPU Hitachi H8/2144
- Memory: 1 MB flash, 128 kB SRAM
- Interfaces: RS-422-A/RS-232-C and RS-232-C (debug)

2 Safety Precautions

The device was developed, manufactured, tested and documented in accordance with the applicable safety standards. If you follow the instructions regarding safety and use as described in this manual, the product will, in the normal case, neither cause personal injury nor damage to machinery and equipment.

The instructions contained in this manual must be precisely followed in all circumstances. Failure to do so could result in the creation of potential sources of danger or the disabling of safety features integrated in the handheld terminal.

Apart from the safety instructions given in this manual, the safety precautions and accident prevention measures appropriate to the situation in question must also be observed.

⚠ WARNING

- **In all situations where faults occurring on the automation system could cause personal injury or significant damage to machinery and equipment, additional external safety measures must be taken in order to ensure the system as a whole remains in a safe operating condition even in the event of a fault.**
- **The functionality of the emergency stop switch must be tested regularly.**
- **The functionality of the emergency stop switch must also be tested after strong shocks (e.g. device falls to ground).**
- **If the plant is operated with the KeTop take care that, at this time, the operation is only possible with the KeTop and not from any other point of the plant (cf. ANSI/RIA 15.06)**
- **If the plant is operated with the KeTop in the manual mode (e.g. teaching of robot) take care that the robot moves with slower speed (cf. ANSI/RIA 15.06).**

Notice

- *Measures must be taken to ensure that in the event of power dips or power failures, an interrupted program can be properly restarted.*

Power Supply

⚠ WARNING

- **The device meets the safety class III in accordance with EN61131-2 and EN50178. The 24V power supply for the equipment must be guaranteed through safe isolation of the extra low-voltage circuits from dangerous-contact voltage circuits (e.g. by safety transformers or similar facilities).**

CAUTION

- **The power supply circuit must be protected with a fuse of a maximum of 3.15 A**

Notice

- *When planning the power supply, take into account the voltage drop on the KeTop TT xxx connection cable:*

  Specification of power supply lines in the KeTop TT xxx connection cable:

Cross section:	*AWG24 (0.24mm²)*
Material:	*zinc-coated copper strand*
Line resistance:	*≤ 90 Ohm/km (≤ 145 Ohm/mile)*

- *The nominal supply voltage directly on the handheld terminal (without KeTop TT xxx connection cable) is:*
  +24 VDC (supply voltage range: 18-32 VDC).
- *Power consumption:*
  4,32 W (240 mA at 18 V DC, 180 mA at 24 V DC)
- *Maximum interruption time of supply voltage:*
  ≤ 10 ms (lt. IEC 61131)

Emergency Stop Switch

The emergency stop switch of the KeTop meets the requirements of the EN 418. It must be designed as an emergency stop of category 0 or category 1 (see EN 60204-1 chapter 9.2.5.4.2) on the basis of the risk assessment for the machine. The connection of the positive-break contacts to an appropriate monitoring system must meet the safety category which is defined by means of the risk assessment (in accordance with EN 954-1) of the machine.

⚠ WARNING

- **As long as the handheld terminal is not plugged to the machine, store the handheld terminal on a place where the operator cannot see it.**
  Take into account that the operator would automatically activate the nearest emergency stop in case of danger. This could have fatal consequences if the emergency stop did not function!
- **Emergency stop facilities must remain operational in all operating modes. Resetting an activated emergency stop facility must not result in uncontrolled start-up of machines or installations.**
- **The emergency stop switch does not replace other safety facilities.**
- **The emergency stop switch on the handheld terminal does not replace the emergency stop switches to be mounted directly on the machine**

Enabling Switches

Each machine features a normal operating mode and a special operating mode. To guarantee the safety in the normal operating mode, guards and/or operative protection devices which prevent the access are used. The special operating modes are used to maintain the normal mode. In the special mode, the safety must be guaranteed in another way since the operator must enter dangerous areas of the machine, and targeted movements must be possible. In this case, a reduced speed of the machine must be defined by means of the risk assessment. A movement will only be possible if an enabling device is actuated. The user must be trained correspondingly, and he must know the details of the intended use according to the operating manual. The safety-related parts of the control for reducing the speed and for the enabling device must be constructed in a way that they meet the safety category according to EN 954-1, that is defined by means of the risk assessment.

To meet the safety category 3 in accordance with EN 954-1:1996, the enabling switch must be realized with 2 circuits.

The EN 60204 describes the functioning of the enabling device. Due to the latest findings of analyses of accidents and since technical solutions are

available, the 3-position enabling switch became the state of the art. The positions 1 and 3 of the enabling switch are OFF functions. Only the central position is used for enabling. The EN 60204-1:1997 is identical with the IEC 60204-1. So the 3-position enabling switch is of international relevance.

Further the EN 60204-1:1997 prescribes that the enabling switches shall be connected to a category 0 stop or a category 1 stop.

⚠ WARNING

- **The enabling switch is only suitable as safety function if the operator activating the enabling switch recognizes the dangerous situation in time so that he can immediately take the necessary measures to avoid such situations.**
  As additional measure reduced speed of the movement can be necessary. The allowed speed must be determined by means of a risk assessment.

- **The enabling switch is only used to enable commands for performing dangerous movements. The commands themselves must be activated by a separate operating element (key on handheld terminal). Only the person who operates the enabling switch is allowed to work in the dangerous area.**

Notice

- *At the KeTop, the enabling switches always feature two circuits.*

Risk Assessment of Machinery
For the risk assessment the following standards must be applied:

EN 292 „General principles for design of machinery“
EN 1050 „Principles for risk assessment of machinery“

EN 954-1 „Safety-related parts of control systems“

ANSI/RIA 15.06-1999 „For Industrial Robots and Robot Systems-Safety Requirements (Section 9)“

- The safety categories (B, 1, 2, 3, 4) which finally affect the design of the safety-related parts of a machine result from this risk assessment.
-
- The connections with two different control relays on page 20 and 22 show how the **safety category 3** can be fulfilled with the KeTop and its safety-related parts. The entire concept of the machine must be laid out according to the principles of safety category 3.
-

3 General Instructions

Intended Use of KeTop

The KeTop may only be used for the purposes mentioned in this manual (also refer to chapter "Brief Description" on page 5).

Waste disposal

Observe the national regulations when disposing of electronic components!

Handling of KeTop

You have chosen a high-quality KeTop that is equipped with highly sensitive state-of-the-art electronics.
To avoid malfunctions or damage through improper handling, follow these instructions during operation.

CAUTION

- **Turn off the power supply before opening the cable entrance area of the KeTop. Otherwise the components could be destroyed or undefined signals could occur.**
- **Make sure that nobody can fall over the cable to avoid that the device falls to ground.**
- **Take care not to squeeze and thus damage the cable with any object.**
- **Do not lay the cable over sharp edges to avoid damaging the cable sheath.**
- **If you do not use the device, hang it into the wall bracket KeTop WBxxx provided for storage.**
- **Do not lay down the device with the operating side facing down to avoid damaging the operating elements.**
- **Never lay the device onto unstable surfaces. It could fall to ground and thus be damaged.**
- **Never lay the device close to heat sources or into direct sunlight.**
- **Avoid exposing the device to mechanical vibrations, excessive dust, humidity or to strong magnetic fields.**
- **Never clean the device, operating panel and operating elements with solvents, scouring agent or scrubbing sponges. For cleaning the device, use a soft cloth and a bit of water or a mild cleaning agent.**

- **Make sure that no foreign objects or liquids can penetrate into the device. Check at regular intervals the protective covers of the device, if all housing screws are firmly tightened and if the housing or the cable entry is damaged.**
- **If the device shows any defect, please send it, including a detailed error description, to your supplier or the relevant after-sales service office.**

When the cable entrance area is open, the KeTop is sensitive to electrostatic discharge.

Foreseeable Misuse of Enabling Switch

Foreseeable misuse means the not allowed fixing of the enabling switch in the enabling position. The foreseeable misuse of the enabling switch must be restricted. The following measures causing the stop of the machine in the manual mode are recommended:

- Inquiry of the enabling switch when turning on the machine/plant and inquiry of the enabling switch when changing the operating mode from automatic to manual (The enabling switch must not be in the enabling position.).
- The enabling switch must be released within a defined period and pushed into the enabling position again. The length of the period must be defined according to the activity.

4 Safety Elements

Enabling Switch

The KeTop is equipped with two enabling switches, one at the left and one at the right side of the device. This allows a left- and right-hand operation of the enabling switch. Both enabling switches are equivalent and parallel switched. So for enabling only one of both enabling switches must be activated.

The electronic enabling switch realizes the enabling equipment as safety function for machines in special operating modes. The enabling switch is only a part of this equipment.

The enabling switch consists of a 3-position operating element and a seperated evaluation electronics. An essential feature are the continuous two-channel circuits beginning from the actuating elements up to the connecting terminals. For the evaluation circuits different technologies and circuits are used. Due to the electronic switching contacts, their lifetime does not depend on the load provided the nominal values of the load (ohmic, inductive and capacitive) are not exceeded.

Functioning

The actuating element consists of two symmetrically arranged slides. The position of these slides is detected by electrical switches and transmitted to the evaluation electronics.

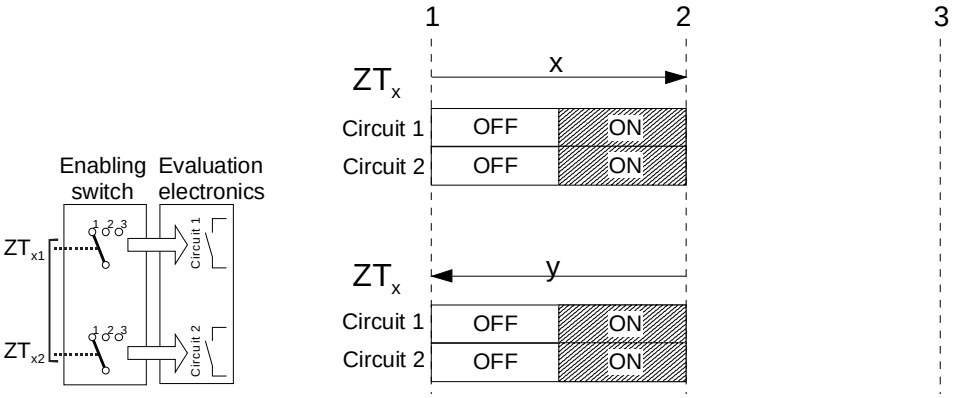
Positions of enabling switch:

Position	Function	Enabling switch	Contacts
1	home position	is not pressed	enabling outputs are open
2	enabling	is pressed	enabling outputs are closed
3	panic	is pressed strong	enabling outputs are open

For the enabling switch, the following switching sequences are possible:

Enabling

Home position x enabling y home position



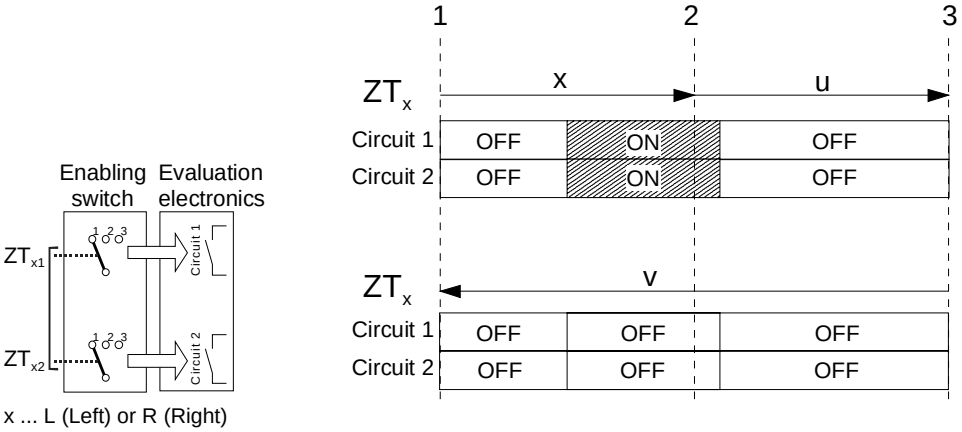
x ... L (Left) or R (Right)

Contact travel diagram for enabling

Panic

The pushing of the actuating elements into the panic position is evaluated in a way that the enabling position is skipped when the actuating elements are released.

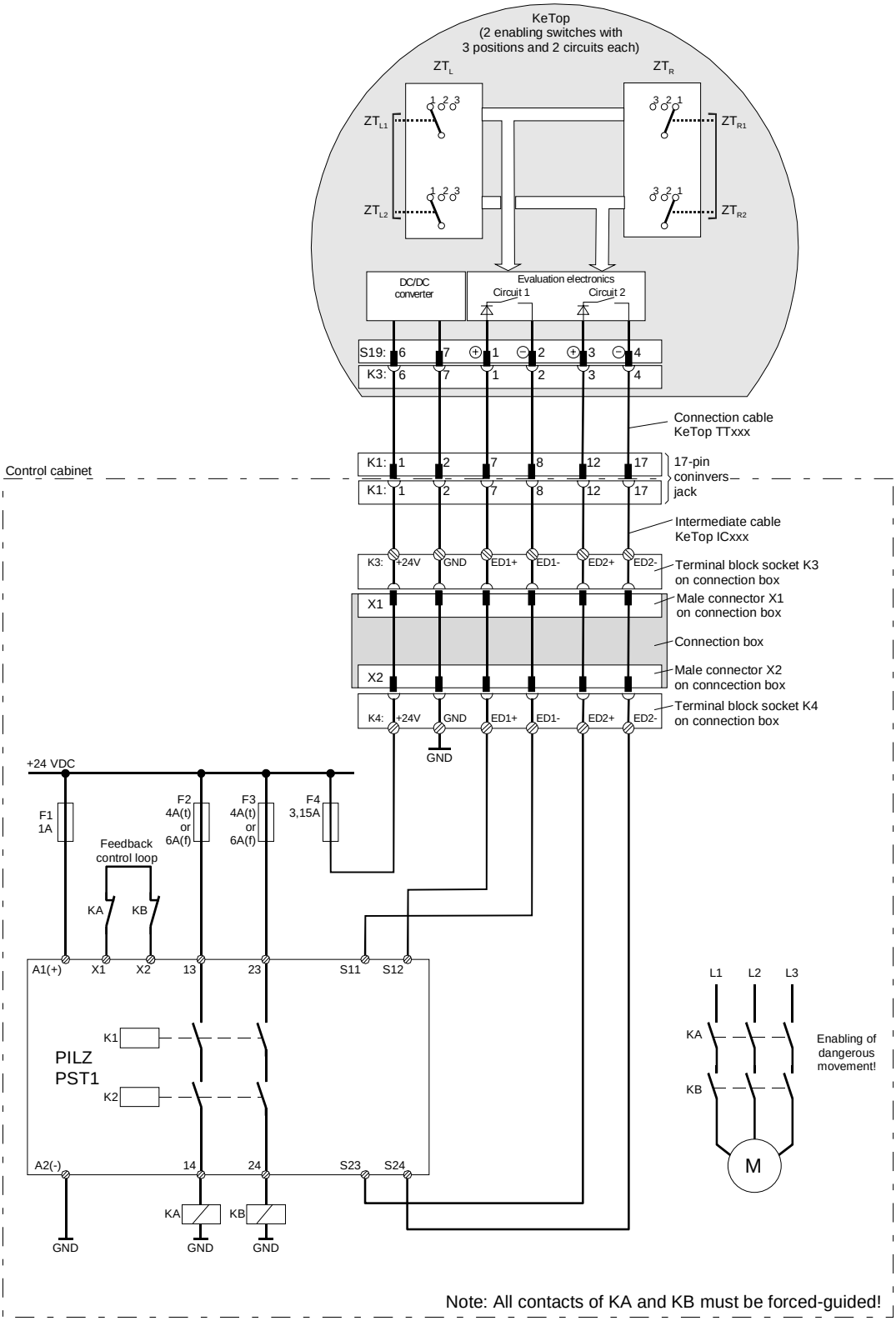
Home position x enabling u panic v home position



x ... L (Left) or R (Right)

Contact travel diagram for panic

Example of Connection with PILZ PST1 Control Relay



Suggested wiring of enabling switches to fulfill safety category 3 with PILZ control relay. Also follow the instructions described in the PILZ operating manual about the PST1 device.

Functional procedure:

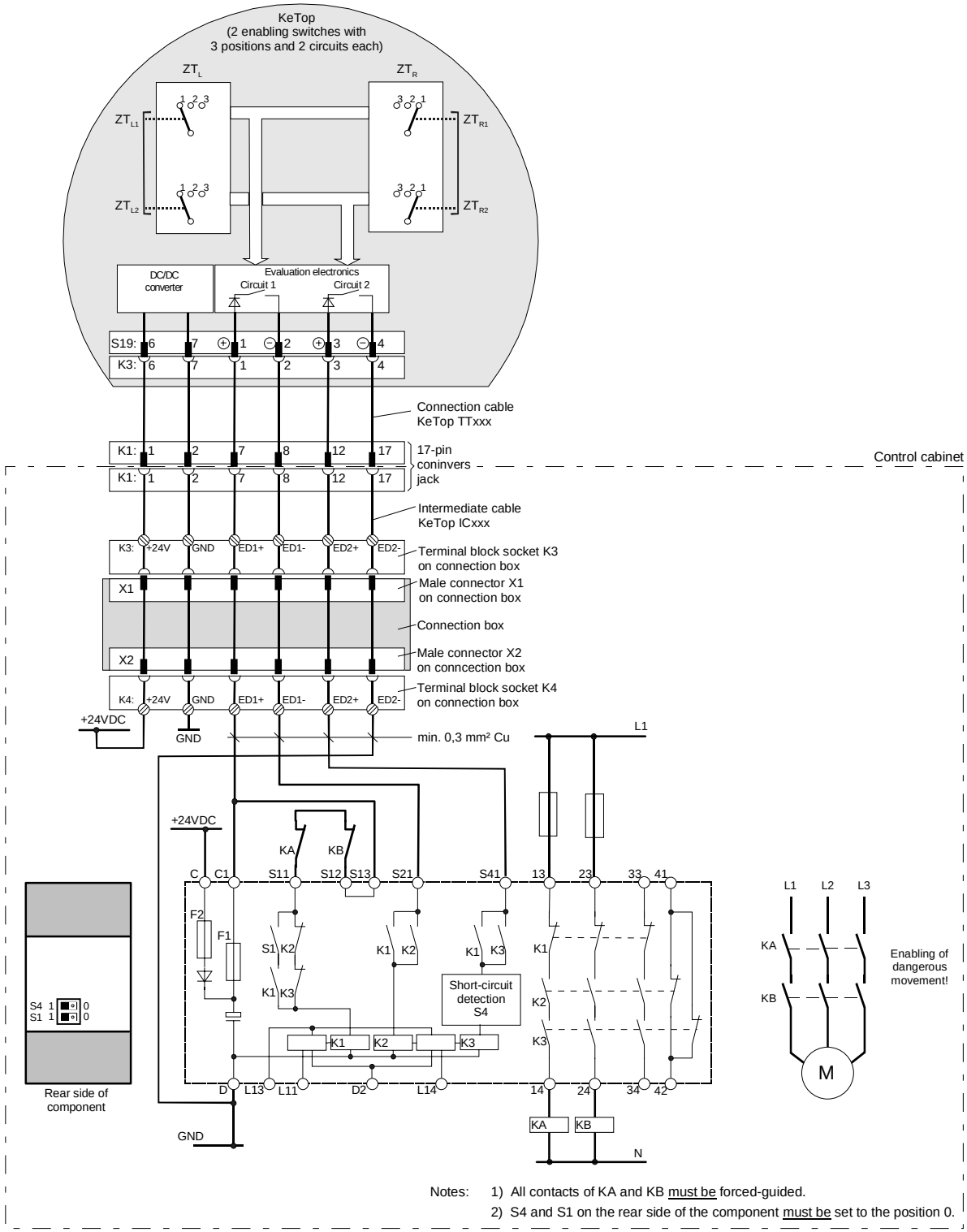
- Only if both channels are activated „simultaneously“ (by pressing one of the enabling switches) both output relays K1 and K2 will energize and the output contacts 13-14 and 23-24 will close.

- The output relays K1 and K2 will not energize if
  - only one enabling channel is activated (in case of a defect),
  - the tolerance value for the simultaneity period is exceeded,
  - the feedback control loop X1-X2 is open.

- If one enabling channel is deactivated after being simultaneously activated (by releasing the enabling switch or in case of a defect), the output relays K1 and K2 will return to their initial position again.
  The forced-guided output contacts 13-14 and 23-24 will open. The output relays will energize again only after both enabling channels have been deactivated and simultaneously activated once again.

In this way the enabling switches avoid that one single error makes the safety function inoperational. A single error will be recognized at the next cycle at the latest.

Example of Connection with ELAN SRB-NA-R-C.27/S1 Control Relay



Suggested wiring of enabling switches for safety category 3 with the ELAN SRB-NA-R-C.27/S1 control relay. In addition follow the instructions of the operating manual about the SRB-NA-R-C.27/S1.

Functional procedure:

- Only if both channels are activated „simultaneously“ (by pressing one of the enabling switches) both output relays K2 and K3 will energize and the output contacts 13-14, 23-24 and 33-34 will close.

- The output relays K2 and K3 will not energize if
  - only one enabling channel is activated (in case of a defect),
  - the tolerance value for the simultaneity period is exceeded,
  - the feedback control loop S11-S12 is open.

- If one enabling channel is deactivated after being simultaneously activated (by releasing the enabling switch or in case of a defect), the output relays K2 and K3 will return to their initial position again.
  The forced-guided output contacts 13-14 and 23-24 will open. The output relays will energize again only after both enabling channels have been deactivated and simultaneously activated once again.

In this way the enabling switches avoid that one single error makes the safety function inoperational. A single error will be recognized at the next cycle at the latest.

Technical Data of Switching Elements of Enabling Switches

Nominal voltage	24 V DC (typ.)
	32 V DC (max.)
Nominal current	500 mA (typ.)
Short-circuit current	circuit 1: max. 1,9 A
	circuit 2: max. 600 mA
Max. inductive load (at 500 mA)	circuit 1: max. 1H
	circuit 2: max. 320 mH
Max. capacitive load	circuit 1: no limit since the transistor is protected thermally
	circuit 2: max. 500 µF

The switching elements of the enabling switches are protected against reversed polarity. The outputs of both circuits are protected against short circuits and excess load.

Circuit 1: thermal protective circuit
Circuit 2: fold back line

Emergency Stop Switch

The emergency stop switch used on the KeTop features two circuits. The contacts are normally closed.

Connection values

- Connection voltage: 24 VDC
- Maximum current: 500 mA
- Minimum current: 10 mA

5 Shielding

The KeTop is conceived for industrial applications. In this environment, considerable electromagnetic and electrostatic interferences may occur. For this reason, particular importance was attached to immunity to interferences and data security when the device was constructed.

- All shielding and filtering measures (filtered supply voltage) are directly realized in the KeTop.
- Due to its special construction, the KeTop cable ensures immunity to interferences in case of larger cable lengths.
  I.e. the *data lines* (communication signals) are shielded and routed separately from the *control lines* (power supply, enabling switch, E-stop, key switch, etc.) in the KeTop cable.
- Normally the power supply lines in the control cabinet are not shielded. Therefore they are routed outside the KeTop cable shield to avoid that the sensitive data lines are disturbed by the other lines (e.g. power supply lines).

Shield Connections

The cable shield of the KeTop cable can be considered as extension of the KeTop shield housing (=PCB) to the shield housing of the communication partner (e.g.: PLC). In this way the shield connections of the cable shield to the shields of the devices essentially contribute to the immunity to interferences of the KeTop. Connections to ground are not required for shield connections.

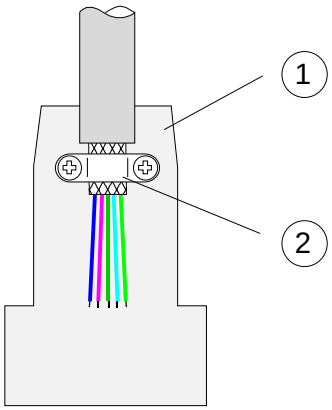
The shield connection in the KeTop is made via the RJ-45 connector in the cable entrance area.

The connection of the KeTop via the connection box (e.g. CB211) guarantees a reliable shield connection up to the communication partner.

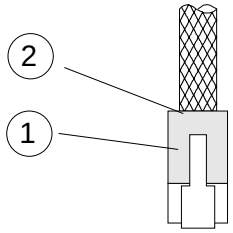
All connection cables available at KEBA (KeTop TTxxx, KeTop ICxxx, KeTop XD040, KeTop CD040) guarantee a proper shield connection.

At the cables you produced yourself, the following conditions for shielding the data lines must be fulfilled:

- Provide a large contact surface area at each connector (DSUB or RJ-45) when connecting the cable shield to the connector housing.



DSUB connector

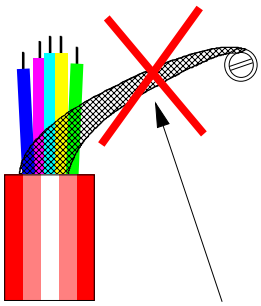


RJ-45 connector

1 .....Metallized or metallic housing
2 .....Provide large contact surface area.

Correct shield connection at DSUB and RJ-45 connector

- Pig tails to connect the shield to the pins or terminals are not suitable. The inductivity of such pig tails represents a high-ohmic resistance for high-frequency interferences. This seems to interrupt the cable shield. In this case interferences are not absorbed any more but directly affect the inner lines.

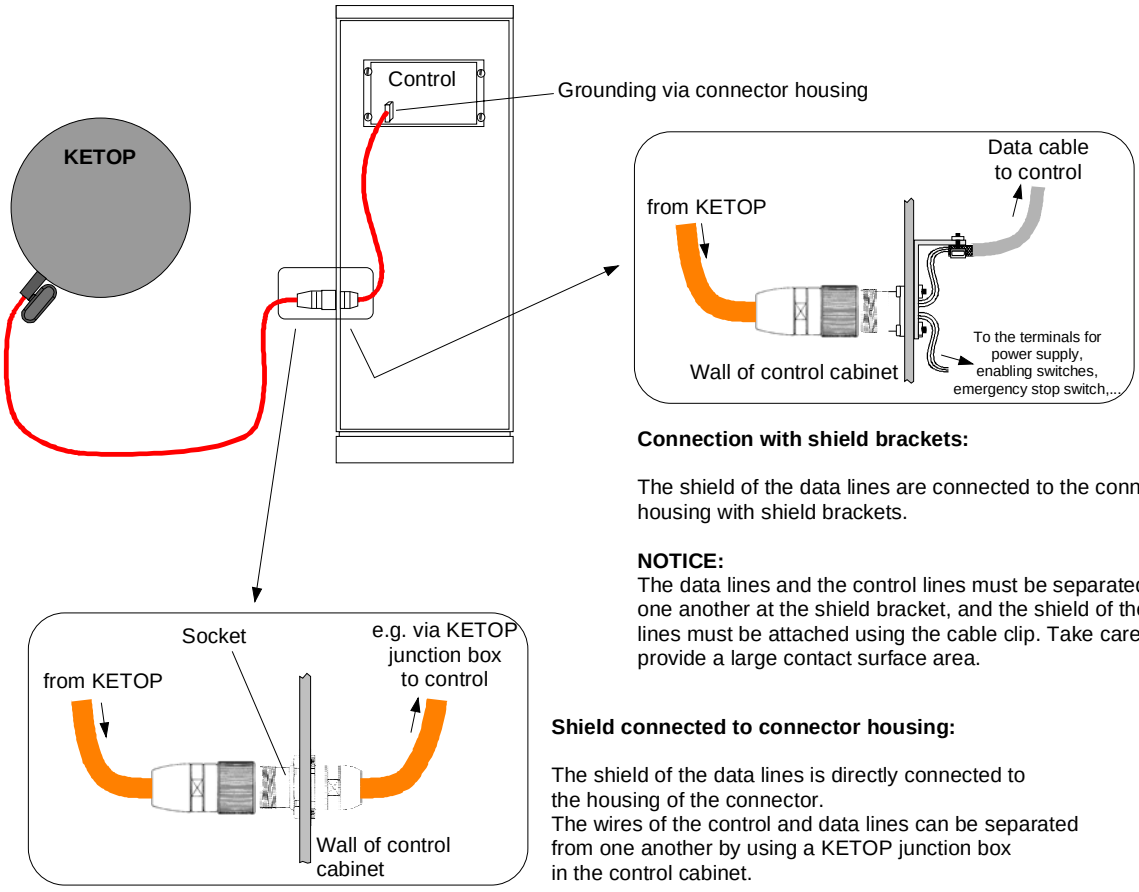


No pig tails

Insufficient connection of cable shield

Shielding inside the Control Cabinet

In many cases, several interference sources exist in the control cabinet, such as servo drive modules, transformers, contactors and relays. Therefore it is necessary to continue the cable shield from the connector shell (control cabinet) up to the PLC (continuous connection from handheld terminal up to PLC).
This continuous connection is realised through the connection of the connector shell to the flange socket of the control cabinet, and inside the control cabinet through the connection of the cable shield to the control cabinet (using cable clips). The smaller the distance between connection of connector shell on the control cabinet and the cable clip of the control cabinet is, the better the shield damping will be.



Connection with shield brackets:

The shield of the data lines are connected to the connector housing with shield brackets.

NOTICE:
The data lines and the control lines must be separated from one another at the shield bracket, and the shield of the data lines must be attached using the cable clip. Take care to provide a large contact surface area.

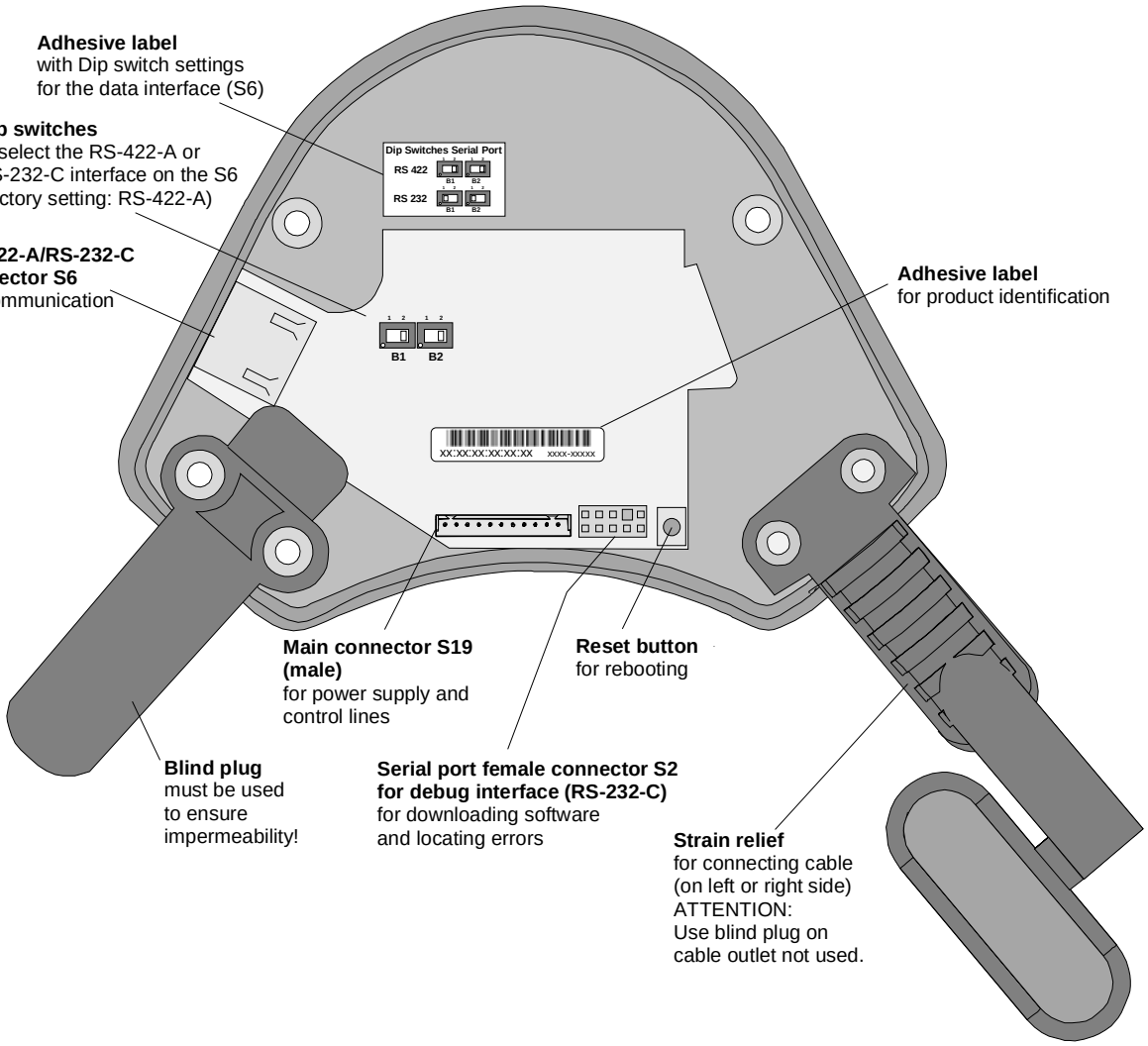
Shield connected to connector housing:

The shield of the data lines is directly connected to the housing of the connector.
The wires of the control and data lines can be separated from one another by using a KETOP junction box in the control cabinet.

Connection of cable shield in a control cabinet

6 Connection

Cable Entrance Area



Anschlussschacht des KeTop T40

Cable Routing in Cable Entrance Area

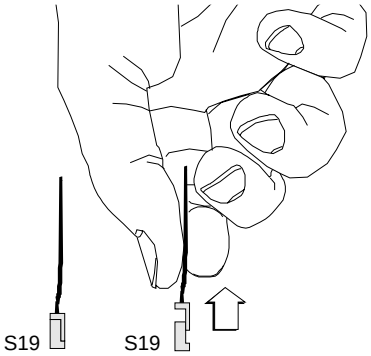
After opening the cable entrance area, the connecting lines can be routed as described in the following chapters. Before opening the KeTop please pay attention to the following safety instructions:

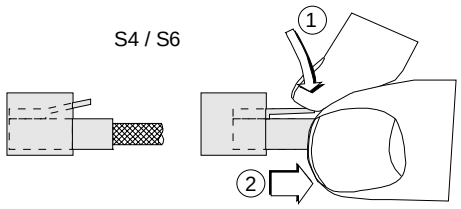
Instructions for opening the cable entrance area:

- *Lay the KeTop with the display facing down onto a plane and clean table (preferable on ESD pad) and take care not to damage the KeTop and its operating elements.*
- *For opening and closing the cable entrance area use the following type of screwdriver: „Phillips size 2“.*

Instructions for modifications in the cable entrance area:

- *Unplug the main connector (S19) by pulling on its wires with your fingers. Do not use any sharp objects.*
- *For unplugging the RJ-45 jack (S4 / S6), actuate the locking lever:*





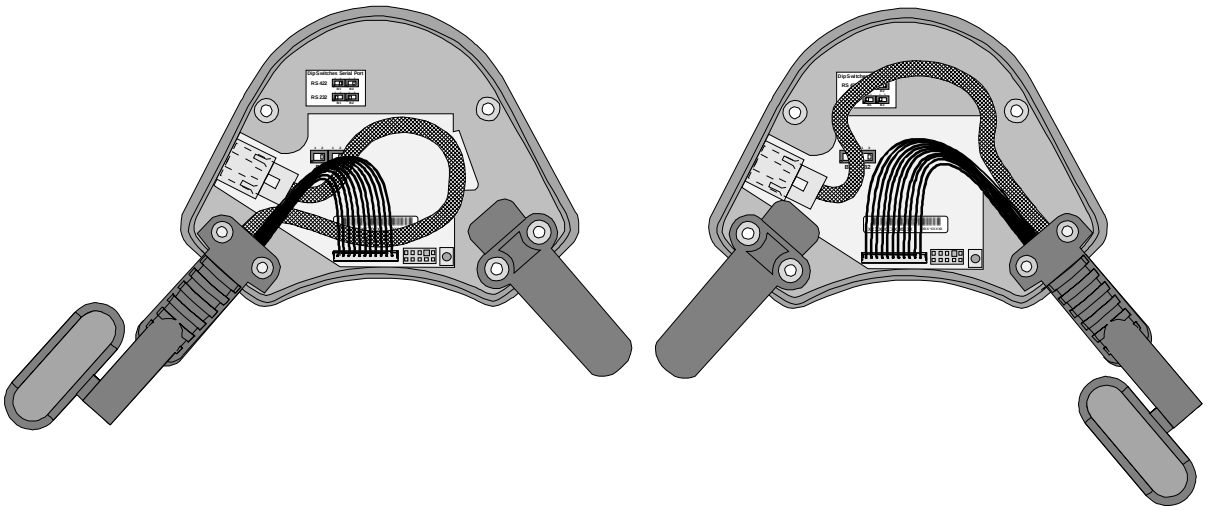
⚠ WARNING

- **Make sure that the connectors S19 and S6 correctly snap in when you plug them in. Otherwise the emergency stop functionality (S19) or the correct shielding (S4/S6) might not be given any more.**

Instructions for closing the cable entrance area: Make sure that

- *the sealing is clean, not damaged and correctly positioned in the cable entrance area,*
- *no cables are squeezed in,*
- *the cover of the cable entrance area is attached again with all 6 screws (torque: 0.4 bis 0.5 Nm). Otherwise the protection degree cannot be guaranteed.*

Cable outlet



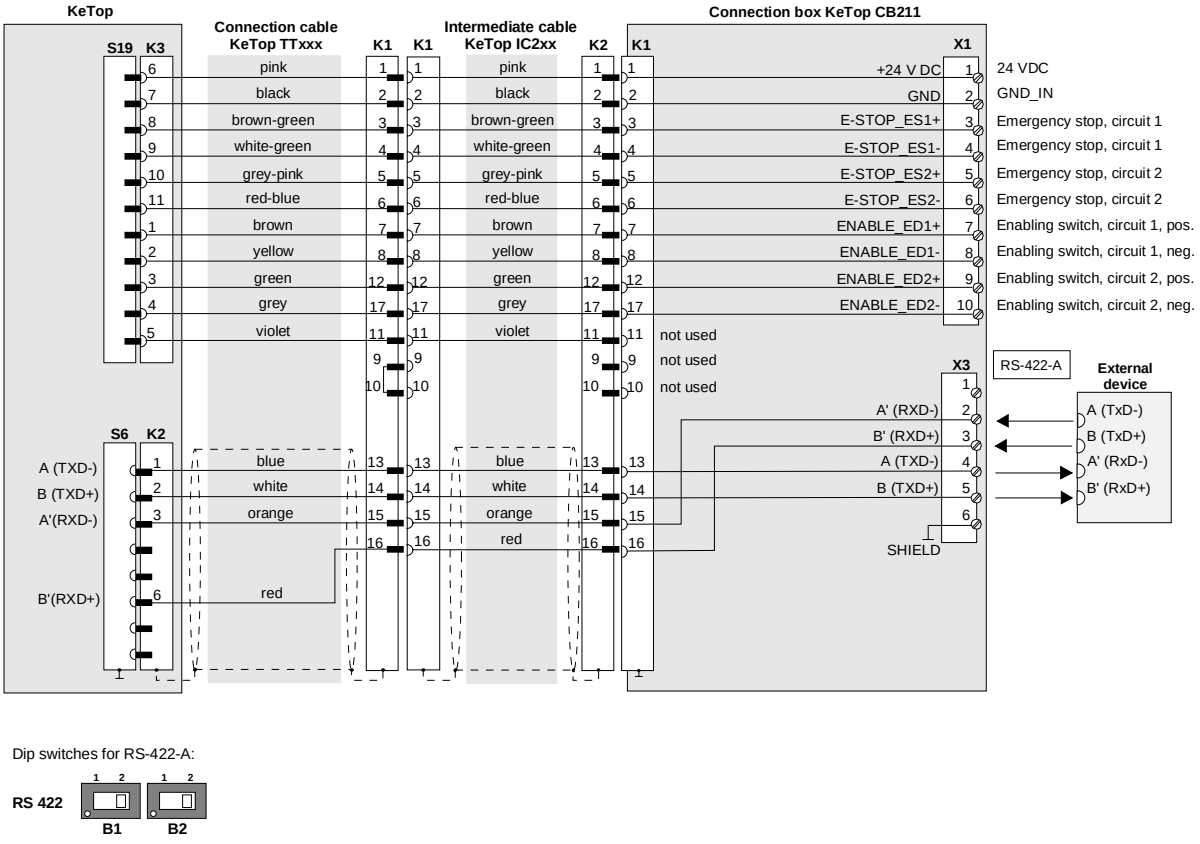
Cable outlet on left and right sight with data and control lines

RS-422-A

The communication takes place via the COM module connector S6 in the cable entrance area of the KeTop.

The RS-422-A interface assigned to the COM 5 interface port is in the software. The interface parameters are set via the WIN32API in the Windows operating system.

Connection diagram



Dip switches for RS-422-A:

Connection diagram: KeTop with RS-422-A via connection box CB211

General information about the RS-422-A interface

- The A terminal of the generator shall be negative with respect to the B terminal for a binary 1 (MARK or OFF) state.
- The A terminal of the generator shall be positive with respect to the B terminal for a binary 0 (SPACE or ON) state.

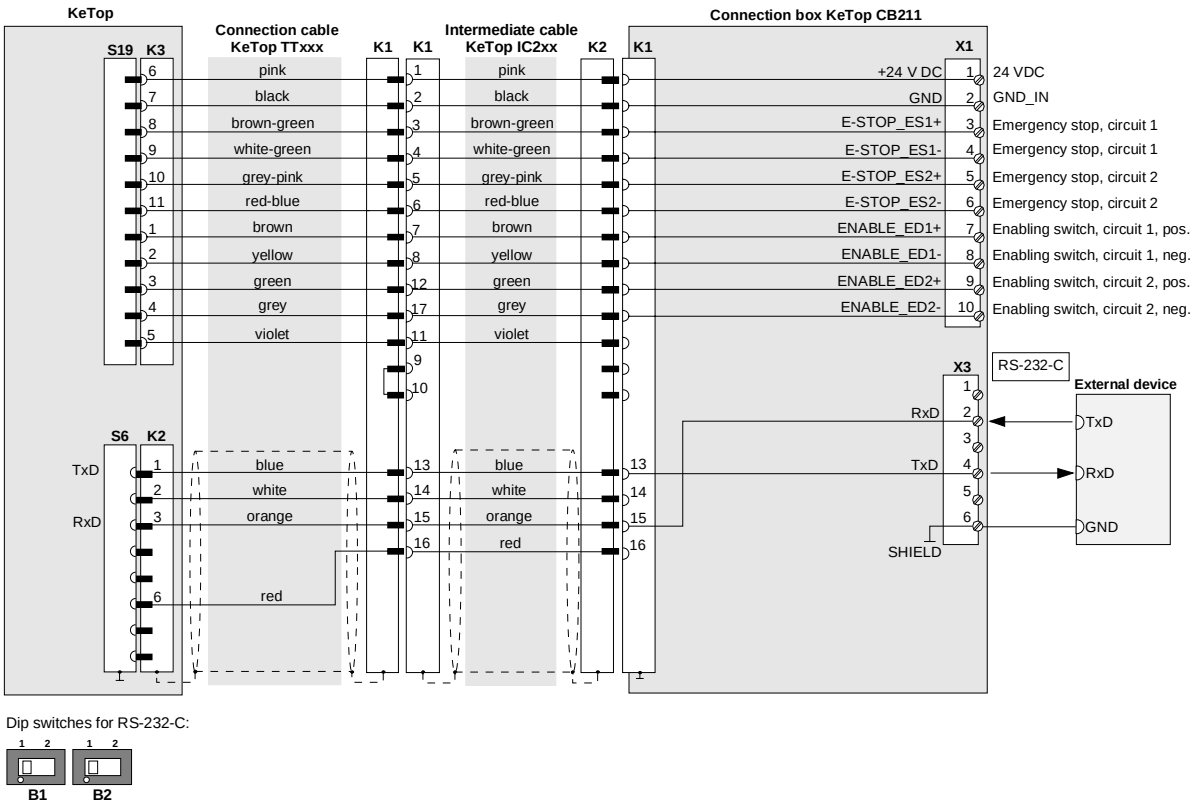
To identify the lines, the voltage between the lines A and B can be measured by means of a voltameter.

RS-232-C

The communication takes place via the COM module connector S6 in the cable entrance area of the KeTop.

The RS-422-A interface assigned to the COM 2 interface port is in the software.

Connection diagram



Connection diagram: KeTop with RS-232-C via connection box CB211

Serial port female connector S2 for Debug Interface (RS-232-C)

This interface will be used for programming the KeTop T40 by the programming software KeTop PS040.
For that purpose, the download cable KeTop XD040 is available.

The following interface parameters are defined and cannot be changed:

- 8 data bits
- 1 stop bit
- No parity
- No handshake

The debug interface is assigned to the COM 1 interface port in the software.

7 Labelling of Keys

Since different functions can be assigned to the keys of the KETOP, you have the possibility to label the operator panel according to your specific requirements. Drawing foils or paper strips are suitable for that purpose. The desired symbols are drawn onto the visible fields.

Notice

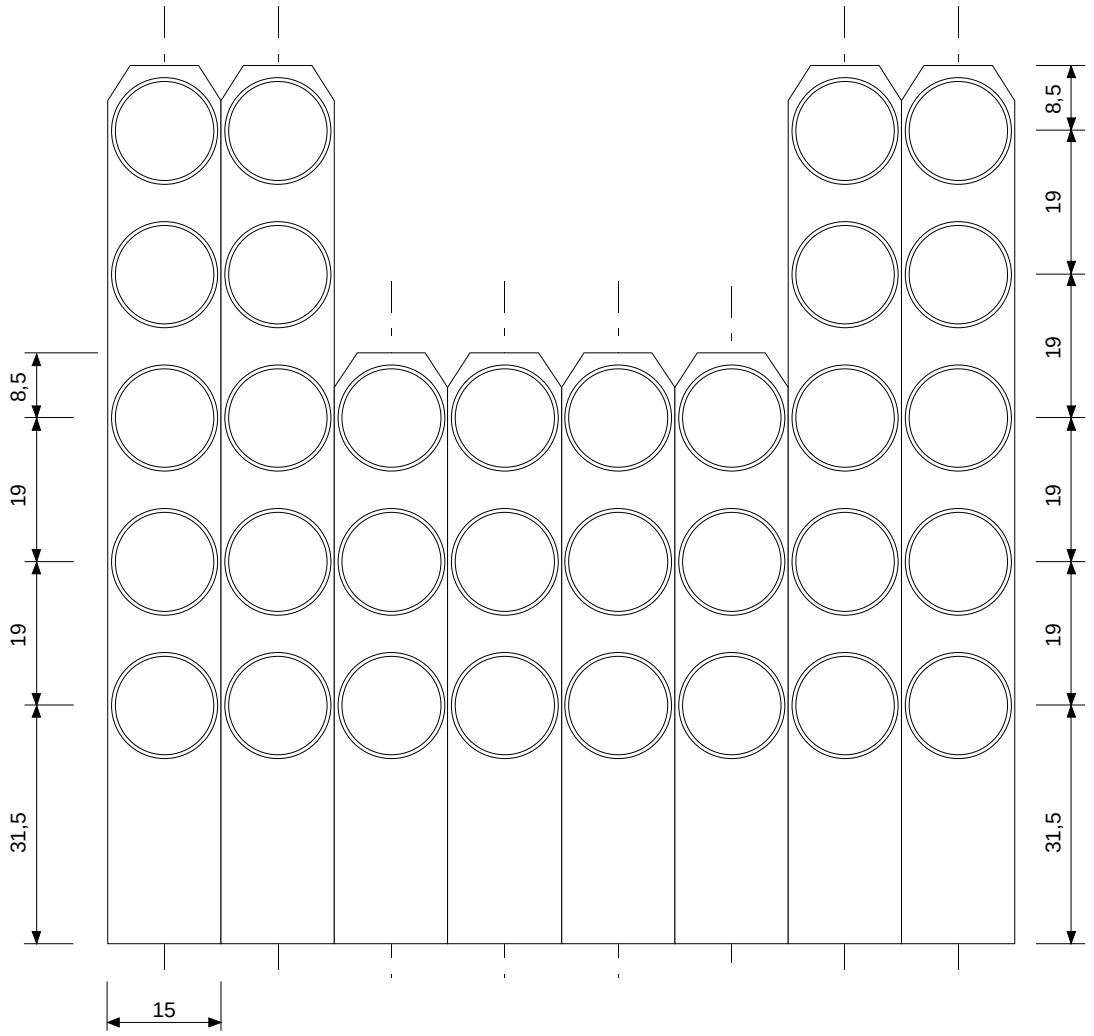
- *Paper labels:*
  We recommend using paper with a size of 115 g/m².
- *Foil labels:*
  We recommend using the following products by Folex:

  X-350 wo (white opaque) suitable for color copier 100 µm
  X-360 wo (white opaque) suitable for color copier 125 µm
  BG 32 wo (white opaque) suitable for ink jet printer 100 µm

Inserting of a paper label

TIP:

To facilitate the inserting of the label, insert also a foil (e.g. company logo) below the label step by step. Once the label is completely inserted, remove the foil.
When removing the foil, press on the membrane keyboard to avoid that the label is removed as well.



Dimensions of labels in mm (scale 1:1)

8 Configuration of KeTop

For setting the configuration of the device and for generating texts and the keypad layout, a configuration software executable under MS-Windows (95, NT, 2000, XP) is supplied.

This software provides functions for creating configuration data, editing text lines and the keyboard layout and loading the program. The operation of the software is menu-driven.

Hardware Required

For creating the device configuration, the following hardware components are required:

- KeTop T40
- Configuration PC with KeTop configuration software (KeTop PS 040)
- 24V DC power supply unit for the KeTop
- Download cable KeTop XD 040 (connection cable between the serial port connector S2 in the cable entrance area of the KeTop and a free serial interface (COM1, COM2,...) on the configuration PC)

For connecting the KeTop, the connection box KeTop CB 111 can be used alternately.

KeTop Configuration Software (KeTop PS 040)

The configuration software under Windows is supplied on a CD.

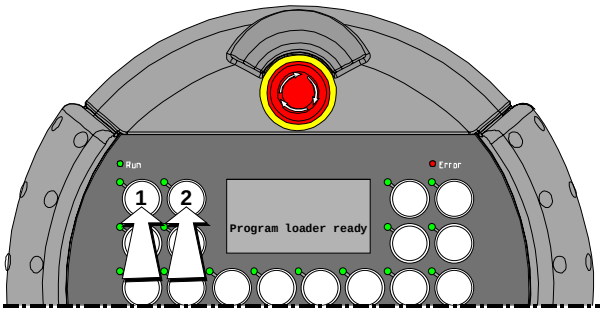
Installation:

► Insert the CD into your configuration PC and invoke the automatic installation program SETUP.EXE under Windows.

Data Transmission from and to the KeTop

The configuration software provides several functions for transmitting data from or to the KeTop.

Data transmission from or to the KeTop is only possible in the loading mode "Program loader ready". For that purpose, hold the following keys pressed **when turning on** the KeTop until „Program loader ready“ appears on the display:



Key combination (when turning on the KeTop) for the access to the loading mode „Program loader ready“

The following mask is displayed:

```
KEBA KeTop      Vt.t

Program loader ready
#u vvvvv wwwww x y z
```

s..... 1 or 2
t ..... version of boot software
u ..... number of interface port (1 or 2)
v..... interface type (RS-232-C, 20 mA CL)
w..... baudrate
x..... parity
y..... data bits
z..... stop bit

The KeTop is in the loading mode now, and the data transmission can be activated via the configuration software. Depending on the transmission direction, the following data are displayed:

```
KEBA KeTop      Vt.t

   *load........  x
```

s..... 1 or 2
t ..... version of boot software
*..... down(load): PC -> KeTop or
up(load): PC <- KeTop
x..... rotating bar during transmission or OK when
the transmission has been completed successfully.

Once the data have been transmitted successfully to the KeTop, the device performs a reset and starts the cyclic execution of the user program.

Functions of Configuration Software

Selection of Protocol

Before starting the configuration, the requested coupling must be selected. The following protocols are available:

Serial KEBA standard protocol
This protocol is used for serial communication.
See User's Manual „KeTop T40 KEBA Standard Protocol“.

Serial Gateway MMI-COM
This protocol is used for the connection to serveral bus systems via the gateway boxes KeTop CB23x.
See User's Manual „KeTop T40 Serial Gateway MMI-COM Coupling“.

Serial MMI-COM
This protocol is used for serial communication.
See User's Manual „KeTop T40 Serial MMI-COM Coupling“.

Serial S5 CP (RK512)
For the connection to Siemens S5 communication processors.
See User's Manual „KeTop T40 Siemens S5 Coupling“.

Serial S7 CP (RK512)
For the connection to Siemens S7 communication processors and for the connection via Gatewaybox KeTop CB236.
See User's Manual „KeTop T40 Siemens S5 Coupling“.

Serial S5 PG (AS511)
For the connection to Siemens S5 central processors via the programmer port. See User's Manual „KeTop T40 Siemens S5 Coupling“.

Serial NAIS FP1 PG (Matsushita)

Serial T-Flex
See User's Manual „KeTop T40 T-Flex Coupling“.

Bitmap Memory

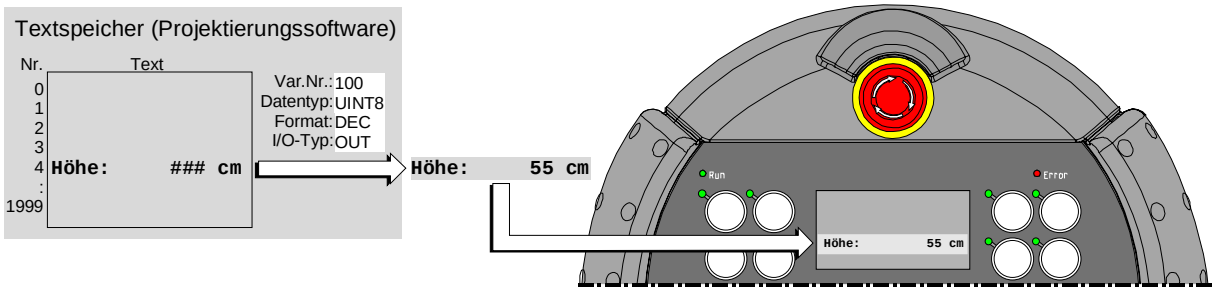
Up to 1000 bitmaps can be stored in the bitmap memory of the KeTop. These bitmaps can displayed by a simple PLC command. For displaying the bitmaps, take into account the following points:

- Maximum memory for the 1000 bitmaps: 320 kB
  Bitmaps filling the entire display (128 x 64 pixels) require a memory of approx. 1 kB. If only bitmaps of this size are used, it will not be possible to store 1000 bitmaps in the memory since the maximum storage capacity of 320 kB is exceeded.

- Only uncompressed, 2-color (b/w) Windows bitmaps may be used.

Texts

Depending on the number of configured variable fields, up to 8143 texts with a length of one line each can be defined. These texts are stored in the KeTop and can later be displayed by means of a simple PLC command.



Text call from text memory

Configuring Variables in a Text

It is possible to configure several variables in a text line. The positions of the variables must be identified by specific characters for input or output fields:

Field type	I/O type of variable	Characters for fields	Representation on KeTop display (without numerical value)
Output field	„OUT“	‘#’, ‘@’*	Blank
Input field	„IN“	‘ ’, ‘~’*	‘ ’
Input/output field	„IN/OUT“	‘_’, ‘~’*	‘_’

*) These alternative characters enable placing one variable field after the other (e.g. # # # @ @ @ # # # or _ _ ~~ # #).

During operation, the numerical values are displayed in the variable fields. If the value of the variable is too long so that it cannot be displayed in the programmed field ‘*’ characters will be displayed (e.g. 2-digit output field: ##, value to be displayed: 100, => output: ‘**’).

Variables may be configured with a maximum of 7 decimal places.

Defining Variables

For input and output fields in a text line, the corresponding variable must be defined by a variable number, a data type, the format and the I/O type.

Variable number
The value range depends on the type of coupling and is described in the corresponding user's manual. For the „KEBA Standard Protocol“ and for the „Serial MMI-COM Coupling“ the value to be entered must range between 100-65535 (exception STRING variable: 0-255).

Data word
Data words must only be specified at Siemens and NAIS couplings. The data word contains the PLC variable and corresponds to the input field „Variable number“ at other couplings.

Data type
Selection possibilities:

Data type	Length	Value range
UINT8	1 byte	0...255
SINT8	1 byte	-128...+127
UINT16	2 bytes	0...65535
SINT16	2 bytes	-32768...+32762
UINT32	4 bytes	0...4294967295
SINT32	4 bytes	-2147483648...+2147483647
FLOAT32	4 bytes	$-3{,}4*10^{-38}$...$+3{,}4*10^{38}$
STRING	n bytes	-

Format
Selection possibilities:

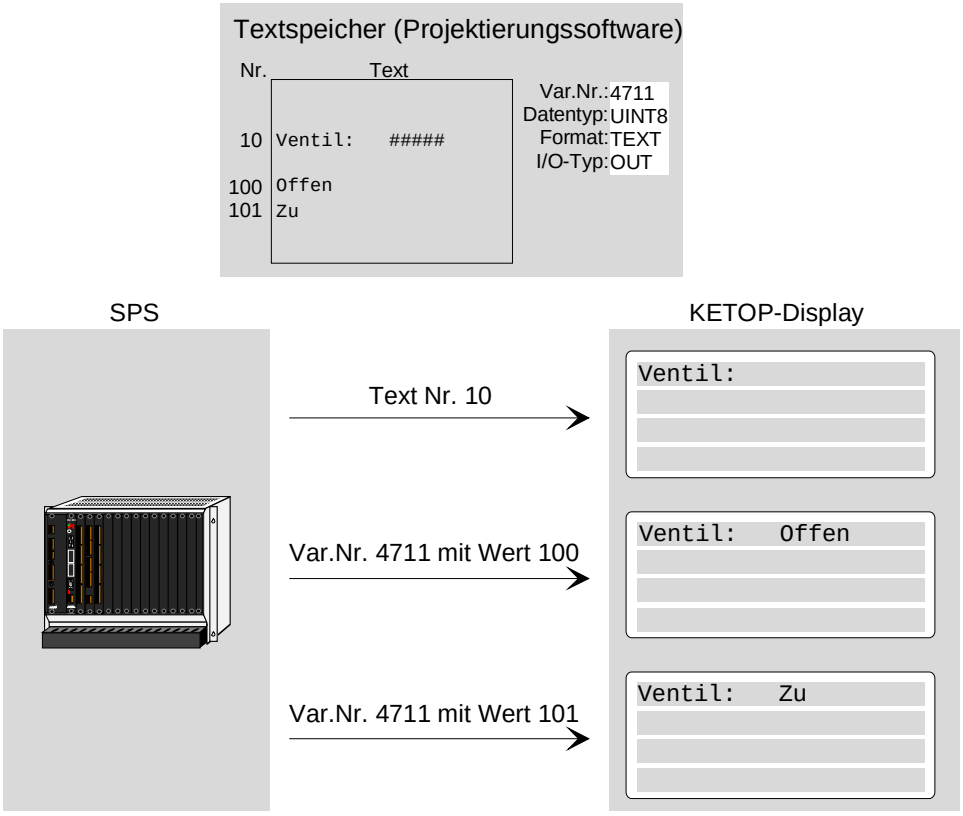
Format	Description
DEC	decimal (0...9)
HEX	hexadecimal (0...9, A...F)
BIN	binary (0, 1)
BCD	„Binary Coded Decimal“ (0...9)
INVISIBLE	Entry of passwords. Each character entered is displayed as '♦' (possible with I/O type "IN" and data type "STRING" only).
TEXT	The variable format „TEXT“ enables calling a text from the internal text memory via variables. Depending on the text number, the data type „UINT 8 / 16 or 32“ must be used (only allowed with I/O type „OUT“). If the data type „STRING“ is used the contents of the variable will be displayed/read in on the KeTop as ASCII character string and transmitted to the control after pressing the Enter key.

I/O-Typ

OUT
= output. The variable is read from the PLC or written by the PLC and displayed in the corresponding variable format. The output field must be identified by the character '#'.

IN
= input. An empty input field is displayed. Pressed keys appear on the display one after the other.
After pressing Enter, the key string entered is evaluated and transmitted to the PLC. Pressing the "Esc" key cancels the editing process, and the value in the PLC remains unchanged. The input field must be identified by the character '_'.

IN/OUT
= combination of input and output. The variable can be written by the PLC, but also entered on the KeTop and transmitted to the PLC. Pressing Enter completes the editing process, and the value entered is transmitted to the PLC. Pressing the "Esc" key cancels the editing process, and the value in the PLC remains unchanged. The field for the I/O type "IN/OUT" must be identified by the character '_'.



Display of text in an output field for variables

Examples of output fields for variables

Output field for variables	Data type	Format	I/O type	Value of variable (decimal)	Display
##	UINT8	DEC	OUT	99	'99'
##.##	UINT16	DEC	OUT	100 5	' 1.00' ' 0.05'
	SINT16	DEC	OUT	-1	'-0.01'
	FLOAT32	DEC	OUT	1.234 100.1	' 1.23' '♦♦.♦♦'
#####	FLOAT32	DEC	OUT	-1.5 43.78	' -1.5' '43.78'
########	UINT8	BIN	OUT	32 85	00100000 01010101
####	UINT16	HEX	OUT	31548 45054	'7B3C' 'AFFE'

Keypad Assignment

One, two, three or four codes may be assigned to each key. Following the functionality of a PC keyboard, one of the 32 keys must be assigned as "Shift" key in case of a double assignment. In case of a triple assignment, an additional "Ctrl" key must be defined. If 4 codes are assigned to one key, an additional "Alt" key is required.

Configurable Keys

The keys with characters specified in „Display Character Set“ and the following special keys can be configured:

Shift
Selects a character of the 2nd keypad layout level (pressing Shift and the corresponding key simultaneously).

Shift Lock
Switches over to the 2nd keypad layout level and remains activated until the Lock key is pressed once again or another Lock key (Ctrl Lock, Alt Lock) is pressed.

Ctrl
Selects a character of the 3rd keypad layout level (pressing Ctrl and the corresponding key simultaneously).

Ctrl Lock
Switches over to the 3rd keypad layout level and remains activated until the Lock key is pressed once again or another Lock key (Shift Lock, Alt Lock) is pressed.

Alt
Selects a character of the 4th keypad layout level (pressing Alt and the corresponding key simultaneously).

Alt Lock
Switches over to the 4th keypad layout level and remains activated until the Lock key is pressed once again or another Lock key (Shift Lock, Ctrl Lock.

Enter
Takes over a variable entered (following that, the cursor jumps to the next input field). The value is sent to the PLC.

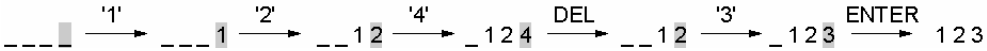
ESC
Deletes the current input. The old contents of the field (before the input) are displayed again (cursor remains in current input field).

Delete
Deletes a character.

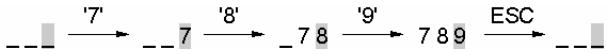
←, →, ↑, ↓
Cursor control in case several input fields are available.

Examples of Function of Variable Editor in the KeTop

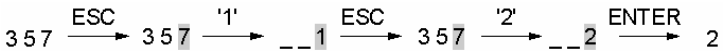
Example 1:



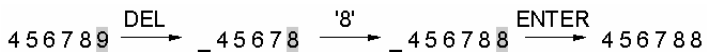
Example 2:



Example 3:



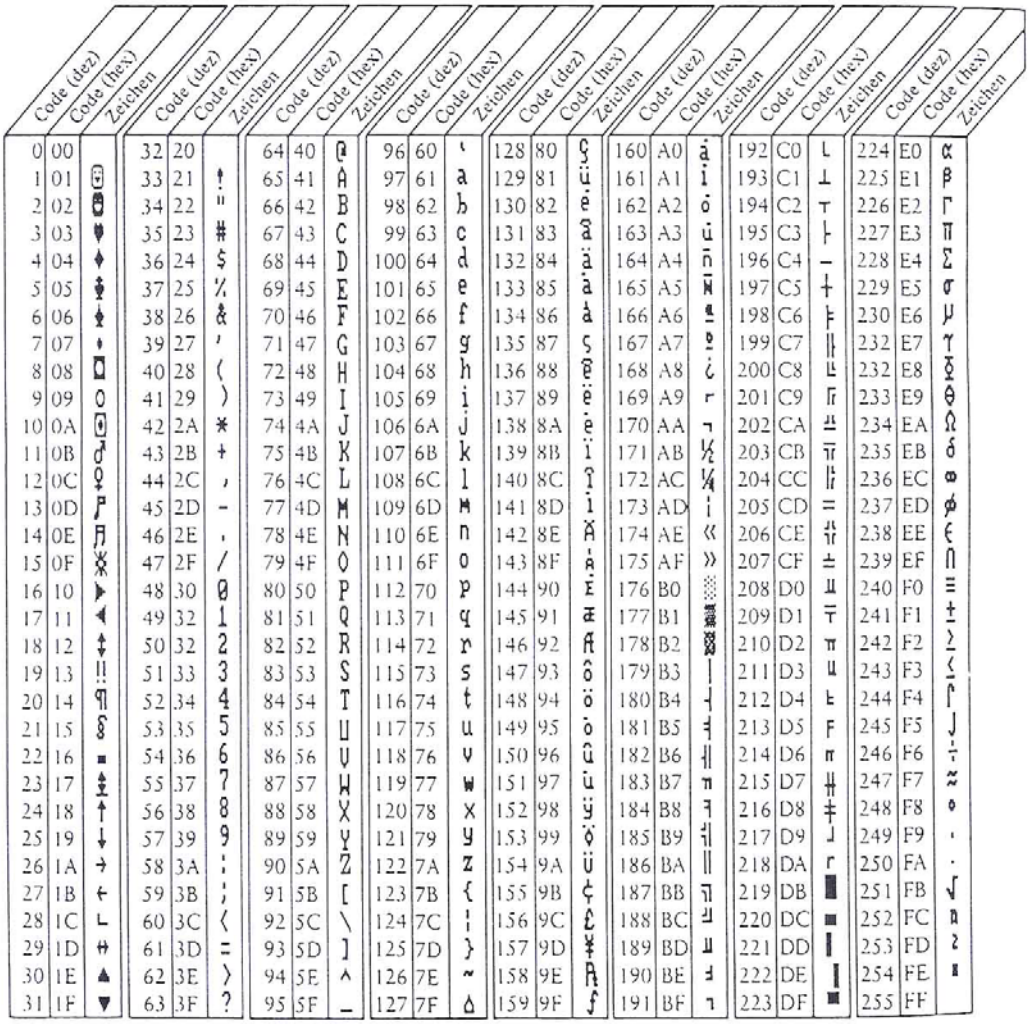
Example 4:



Example 5: Password entry (data type: STRING, format: INVISIBLE)

Display Character Set

The following list shows the ASCII characters which can be displayed on the handheld terminal.



Code (dez)	Code (hex)	Zeichen	Code (dez)	Code (hex)	Zeichen	Code (dez)	Code (hex)	Zeichen	Code (dez)	Code (hex)	Zeichen	Code (dez)	Code (hex)	Zeichen	Code (dez)	Code (hex)	Zeichen	Code (dez)	Code (hex)	Zeichen	Code (dez)	Code (hex)	Zeichen
0	00		32	20		64	40	@	96	60	`	128	80	Ç	160	A0	á	192	C0	└	224	E0	α
1	01	☺	33	21	!	65	41	A	97	61	a	129	81	ü	161	A1	í	193	C1	┴	225	E1	ß
2	02	☻	34	22	"	66	42	B	98	62	b	130	82	é	162	A2	ó	194	C2	┬	226	E2	Γ
3	03	♥	35	23	#	67	43	C	99	63	c	131	83	â	163	A3	ú	195	C3	├	227	E3	π
4	04	♦	36	24	$	68	44	D	100	64	d	132	84	ä	164	A4	ñ	196	C4	─	228	E4	Σ
5	05	♣	37	25	%	69	45	E	101	65	e	133	85	à	165	A5	Ñ	197	C5	┼	229	E5	σ
6	06	♠	38	26	&	70	46	F	102	66	f	134	86	å	166	A6	ª	198	C6	╞	230	E6	µ
7	07	•	39	27	'	71	47	G	103	67	g	135	87	ç	167	A7	º	199	C7	╟	232	E7	γ
8	08	◘	40	28	(	72	48	H	104	68	h	136	88	ê	168	A8	¿	200	C8	╚	232	E8	Θ
9	09	○	41	29	)	73	49	I	105	69	i	137	89	ë	169	A9	⌐	201	C9	╔	233	E9	Ω
10	0A	◙	42	2A	*	74	4A	J	106	6A	j	138	8A	è	170	AA	¬	202	CA	╩	234	EA	δ
11	0B	♂	43	2B	+	75	4B	K	107	6B	k	139	8B	ï	171	AB	½	203	CB	╦	235	EB	∞
12	0C	♀	44	2C	,	76	4C	L	108	6C	l	140	8C	î	172	AC	¼	204	CC	╠	236	EC	φ
13	0D	♪	45	2D	-	77	4D	M	109	6D	m	141	8D	ì	173	AD	¡	205	CD	═	237	ED	ε
14	0E	♫	46	2E	.	78	4E	N	110	6E	n	142	8E	Ä	174	AE	«	206	CE	╬	238	EE	∩
15	0F	☼	47	2F	/	79	4F	O	111	6F	o	143	8F	Å	175	AF	»	207	CF	╧	239	EF	≡
16	10	►	48	30	0	80	50	P	112	70	p	144	90	É	176	B0	▒	208	D0	╨	240	F0	±
17	11	◄	49	32	1	81	51	Q	113	71	q	145	91	æ	177	B1	▓	209	D1	╤	241	F1	≥
18	12	↕	50	32	2	82	52	R	114	72	r	146	92	Æ	178	B2	▓	210	D2	╥	242	F2	≤
19	13	!!	51	33	3	83	53	S	115	73	s	147	93	ô	179	B3	│	211	D3	╙	243	F3	⌠
20	14	¶	52	34	4	84	54	T	116	74	t	148	94	ö	180	B4	┤	212	D4	╘	244	F4	⌡
21	15	§	53	35	5	85	55	U	117	75	u	149	95	ò	181	B5	╡	213	D5	╒	245	F5	÷
22	16	▬	54	36	6	86	56	V	118	76	v	150	96	û	182	B6	╢	214	D6	╓	246	F6	≈
23	17	↨	55	37	7	87	57	W	119	77	w	151	97	ù	183	B7	╖	215	D7	╫	247	F7	°
24	18	↑	56	38	8	88	58	X	120	78	x	152	98	ÿ	184	B8	╕	216	D8	╪	248	F8	·
25	19	↓	57	39	9	89	59	Y	121	79	y	153	99	Ö	185	B9	╣	217	D9	┘	249	F9	·
26	1A	→	58	3A	:	90	5A	Z	122	7A	z	154	9A	Ü	186	BA	║	218	DA	┌	250	FA	·
27	1B	←	59	3B	;	91	5B	[	123	7B	{	155	9B	¢	187	BB	╗	219	DB	▌	251	FB	√
28	1C	└	60	3C	<	92	5C	\	124	7C	¦	156	9C	£	188	BC	╝	220	DC	▄	252	FC	n
29	1D	↔	61	3D	=	93	5D	]	125	7D	}	157	9D	¥	189	BD	╜	221	DD	▐	253	FD	²
30	1E	▲	62	3E	>	94	5E	^	126	7E	~	158	9E	₧	190	BE	╛	222	DE	▀	254	FE	■
31	1F	▼	63	3F	?	95	5F	_	127	7F	⌂	159	9F	ƒ	191	BF	┐	223	DF	■	255	FF	

9 Basic Functions

Power-On Self-Test

The KeTop performs a power-on self-test. The safety functions are not tested in this case. If no error occurs the test steps (marked by "⇨") will be carried out one after the other in brief sequences.

► The internal signal buzzer of the KeTop triggers a short audible signal.

► The program is checked.

Normally the following message is displayed:

```
KEBA KeTop T40    Vx.x

      Selftest 1
Program ......... OK
```

x version of boot software

The message

```
KEBA KeTop T40    Vx.x

      Selftest 1
Program .......error
```

will be displayed for 2 s if an error has been recognized in the program or if the program is not available in the KeTop. Then the device changes to the loading mode (the display indicates "Program Loader ready"). See also chapter "Data Transmission from and to the KeTop“.

The following messages are only displayed in case of errors:

► The ROM contents are checked.

The message

```
KEBA KeTop T40    Vx.x

      Selftest 1
ROM .......... OK
```

will be displayed if a ROM error has been recognized. The device remains in this error condition. A new start is only possible after turning off and on the device.

▶ The FLASH type is checked.

The message

```
KEBA KeTop T40    Vx.x

      Selftest y
Flashtyp ........ OK
```

y .....1 or 2

will be displayed if an unkown FLASH type is entered in the configuration data. The device remains in this error condition. A new start is only possible after turning off and on the device.

▶ The configuration data checksum is checked.

The message

```
KEBA KeTop T40    Vx.x

      Selftest y
Configuration  OK
```

y .....1 or 2

will be displayed for approx. 2 s if the checksum is not correct. The device changes to the "Configuration Loader" mode. A new start is only possible after turning off and on the device.

▶ The keypad matrix for pressed keys is checked.

The message

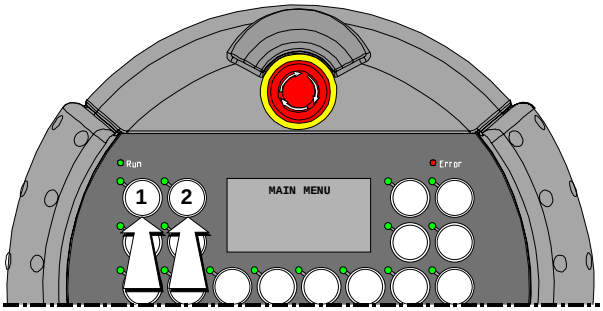
```
KEBA KeTop T40    Vx.x

      Selftest 2
Keyboard ..... error
```

will be displayed if one or more pressed keys have been found during testing. The device remains in this condition as long as the keys remain pressed. After the keys are released, the KeTop continues performing the self-test.

▶ After the flash memory test, the system program is invoked. What will be displayed further depends on the program.

Menu

To access the main menu, press the keys **1** and **2 after turning on the** KeTop **and the application**. „MAIN MENU“ appears in the first line of the display. After you release the keys, the menu itself will be displayed.

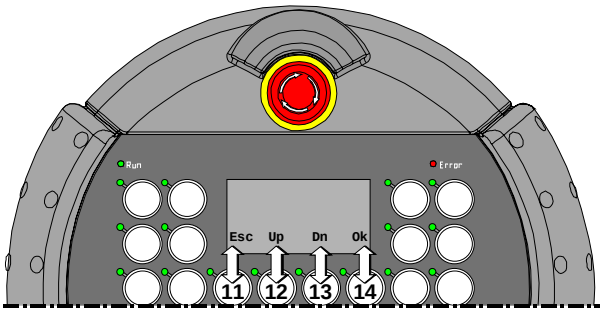


Key combination (when application is already running) for access to „Main Menu“

Notice

- *The access to the main menu can also be deactivated if required. For details about the deactivation, please refer to the manual dealing with the specific coupling.*

For the following menus, the keys of the first row are available as softkeys. The last line of the display shows what functions are assigned to the keys of the first row.



Assignment of softkeys to keys

In all menus, the key 11 is the ESC key. Apart from few exceptions, the keys 12, 13 are used to move up and down the brackets „> <“ that identify the function to be selected. The key 14 (Ok) is used to confirm the selection.

Main Menu

The main menu provides the following functions:

MAIN MENU
Diagnosis
Setup
Info
System Reset

Diagnosis Menu

The diagnosis menu is a submenu of the main menu and provides different test functions:

DIAGNOSIS MENU
Keyboard Test
Buzzer Test
Enabling Swi. Test
COM Test
LED Test
Display
Software

Keyboard Test
Tests the keypad of the KeTop. All keys pressed from 2 to 32 are displayed one after the other in the line „Pressed Key:“. The key 11 is the ESC key.

Buzzer Test
The buzzer remains turned on until you quit the menu by pressing ESC.

Enabling Switch Test
The state of the enabling switch will be displayed:

If the enabling switch is in the "home position" or "enabling position", the following message appears on the display:

```
Switch is now in
UNPRESSED or ENABLED
position
```

If the enabling switch is in the "panic position" (enabling switch completely pressed), the following message appears on the display:

```
Switch is now in
PANIC
position
```

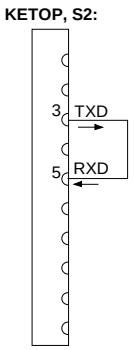
COM Test

All interfaces available in the KeTop can be selected for testing. They can be tested without being connected to the PLC:

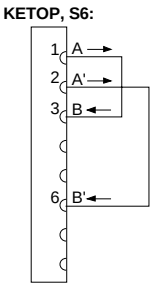
COM Test
COM1: RS232 COM2: RS232/RS422

At the interface to be tested, the transmitter and the receiver must be linked together (e.g. directly at the connectors in the cable entrance area or on-site at the end of the signal lines).

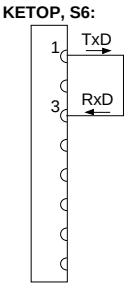
The terminal and signal designations of the following drawings refer to the connectors in the cable entrance area:



Interface test: COM 1, RS-232-C (debug interface)



Interface test: COM 2, RS-422-A



Interface test: COM 2, RS-232-C

The interface test is performed on the basis of the interface parameters set during programming. Factory-set interface parameters (the interface parameters can also be checked in the menu „Info -> COM-Parameter“):

9600 Baud, no parity, 8 data bits, 1 stop bit.

During the interface test, the selected interface appears on the display:

```
COMx: y
Transmit:  a
Receive :  b
Esc
```

x ..... interface 1 or 2
y ..... interface type (RS232 or RSxx2 for RS232 I RS422)

Transmit
The KeTop sends the ASCII characters "0" (30H) to "z" (7AH) one after the other at intervals of one second. The characters sent are displayed at the position a.

Receive
The characters just sent are received one after the other and displayed at the position b. If the send/receive line or the interface is defective, nothing will be displayed.

LED Test
The LEDs are flashing at one second intervals. The corresponding status is displayed.

Display
Display of all characters which can be displayed.

Software
Certain warnings are logged for diagnostic purposes and assist KEBA's service engineer in analysing errors. Normally the display indicates the message "No warnings!". The entries in this message storage are only for information. Most warnings refer to handling errors caused by the user.

Setup Menu

The setup menu is a submenu of the main menu and provides the following functions:

SETUP MENU
Program Loader
Parameter

Program Loader
This function is used to set the parameters of the interface via which the program is loaded from the PC into the KeTop. These parameters are only relevant during the loading process. This menu item does **not** start the loading process.
To switch the KeTop over to the loading mode, press and hold the keys **1** and **2** simultaneously when turning on the KeTop until the message "Program loader ready" appears on the display.

Parameter
No setting values at present.

Info Menu

The info menu is a submenu of the main menu and provides the following functions:

INFO MENU
Hardware
Software
COM-Parameter

Hardware
Important data of the device hardware are displayed.

Software
Version of software is displayed.

COM-Parameter
Set interface parameters.

System Reset

The menu item "System Reset" included in the main menu restarts the KeTop. This process corresponds to a turning on and off of the device. Pressing the two keys **1** and **2** switches the device to the loading mode.

System Errors

Fatal system errors can be caused by a defective hardware or an error in the system software (no handling error).
In case a fatal error occurs the following will be displayed:

```
Error:a/b
Modul:c d.d
Line :e, f
Info :g
Time:dd.hh.mm.ss,mse
```

a .....component number
b .....error number
c .....module name
d .....module revision
e .....line number in source code
f .....task name
g .....additional information
Time ....time between turning on of device and occurrence of error (in days, hours, minutes, seconds and milliseconds)

Notice

- *Since fatal errors are not stored in the device, please note the complete text displayed and contact a service engineer from KEBA.*
- *If a system error occurs in the KeTop, the KeTop will no longer respond to incoming packets.*
  To correct this error, turn the KeTop off and then on again.

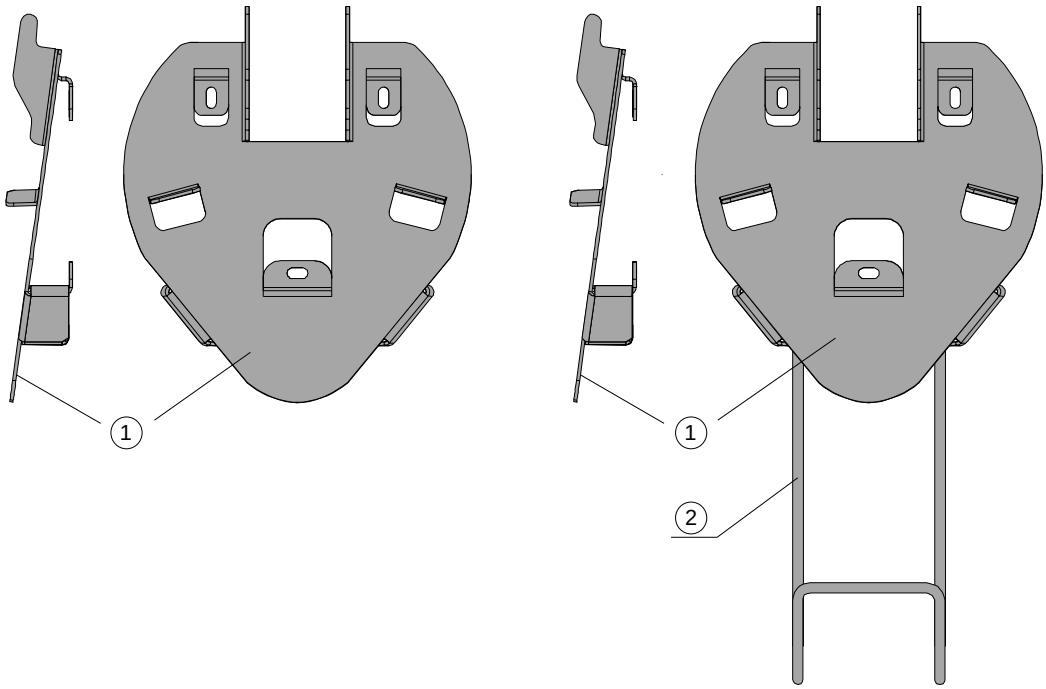
10 Accessories

Wall bracket KeTop WB090 and KeTop WB095

The powder-coated black wall bracket is used for stationary operation or storage of the KeTop.

Two types of wall brackets are available:

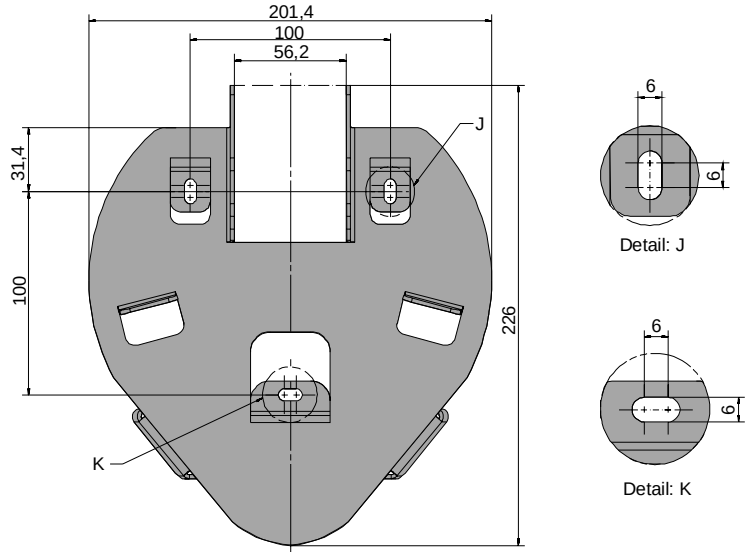
KeTop WB090 Wall bracket without cable suspension	**KeTop WB095** Wall bracket with cable suspension



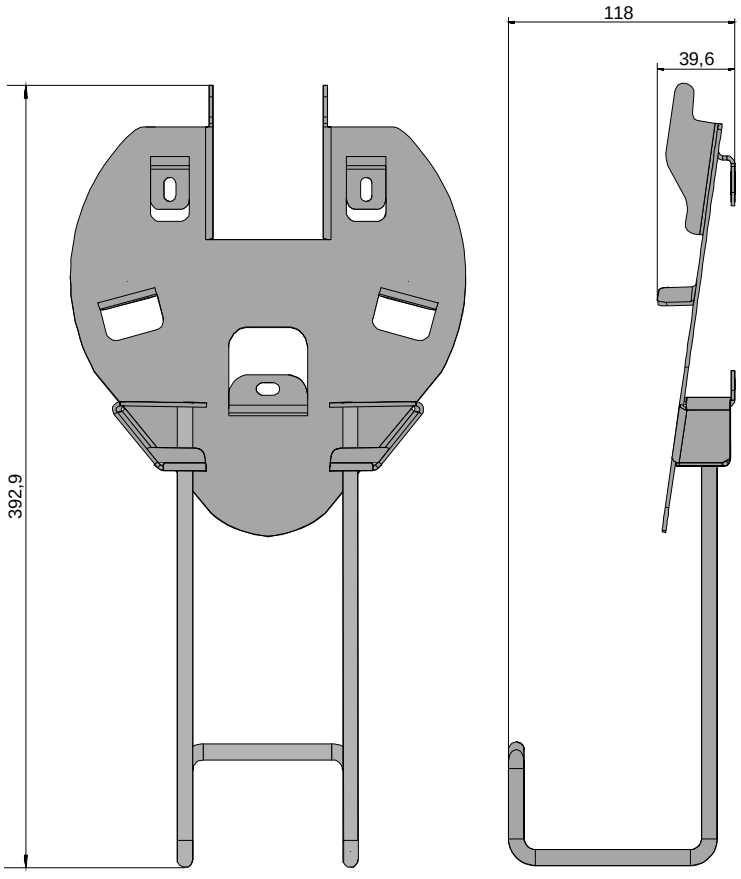
1.....Height adjustment plate
2.....Carrier

Wall bracket KeTop WB100 and KeTop WB110 with KeTop

Dimensions (mm)



Wall bracket KeTop WB090, front view



Wall bracket KeTop WB095, rear and side view

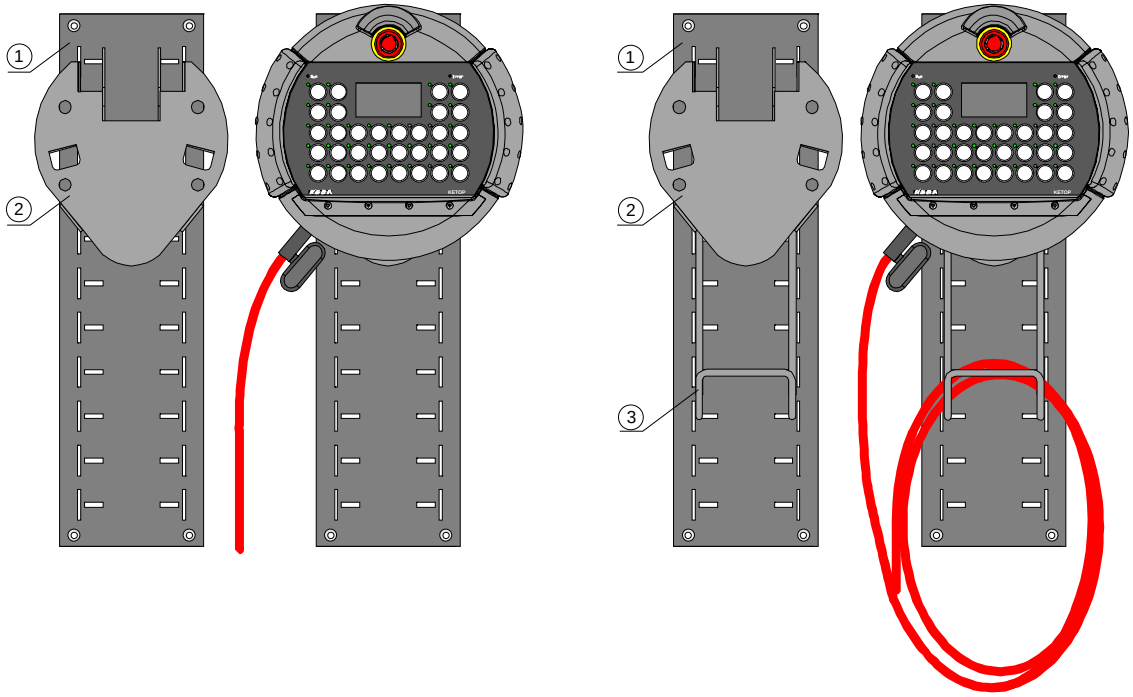
Wall Bracket KeTop WBxxx

The powder-coated black wall bracket is used for stationary operation or storage of the KeTop.

The carrier is adjustable in 8 positions over a height of 320 mm (12.6 in). Take care to hang up the carrier in all 4 points in the height adjustment plate. The cable suspension must be mounted on the carrier using the screws delivered with the device.

Two types of wall brackets are available:

KeTop WB100 Wall bracket without cable suspension	**KeTop WB110** Wall bracket with cable suspension

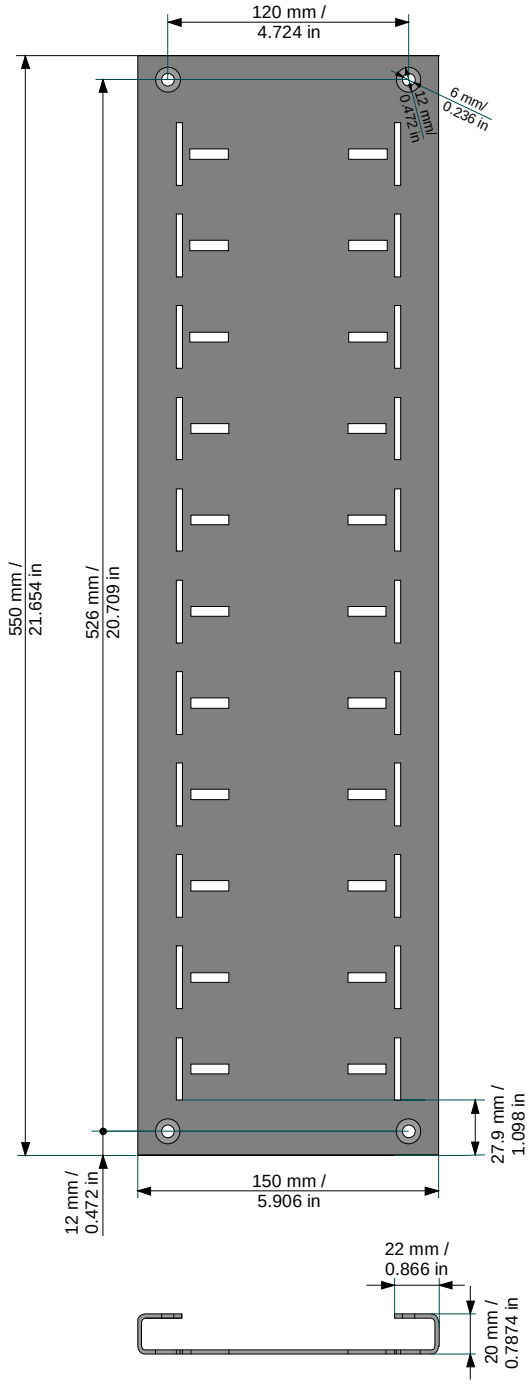


1.....Height adjustment plate
2.....Carrier
3.....Tether holder

Wall bracket WB 110 and WB 100

Height adjustment plate

For mounting the height adjustment plate, use suitable screws (not part of delivery).

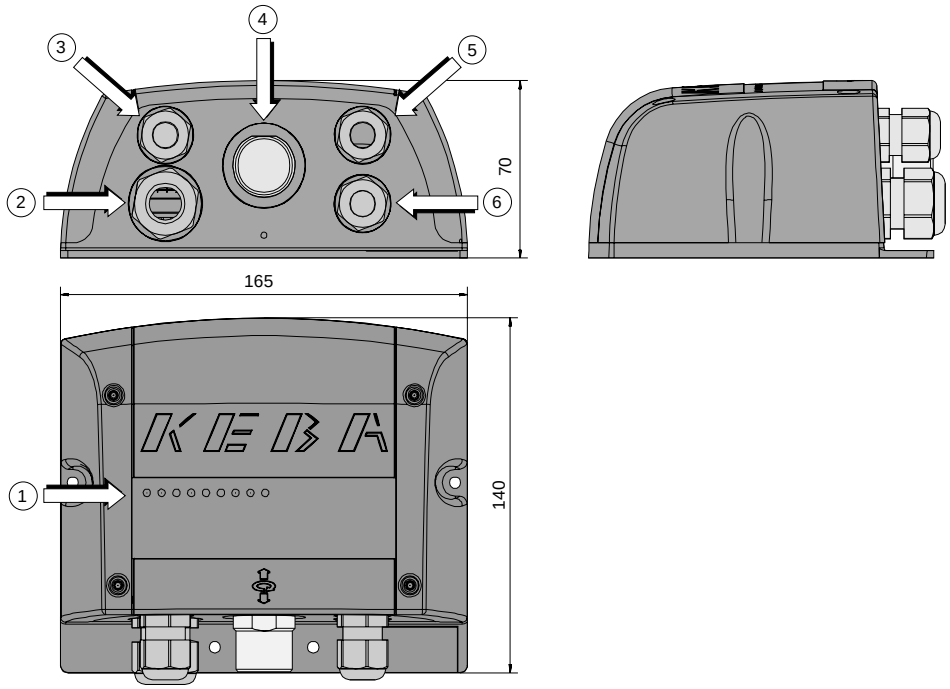


Height adjustment plate for wall bracket WB110

KeTop CB211 Connection Box

The KeTop CB211 connection box is used for integration of the KeTop in the machine/system. It is suitable for wall mounting and can also be mounted on a mounting rail through the use of the mounting rail assembly kit (KeTop DR200). The KeTop CB211 connection box has the following connections:

Construction



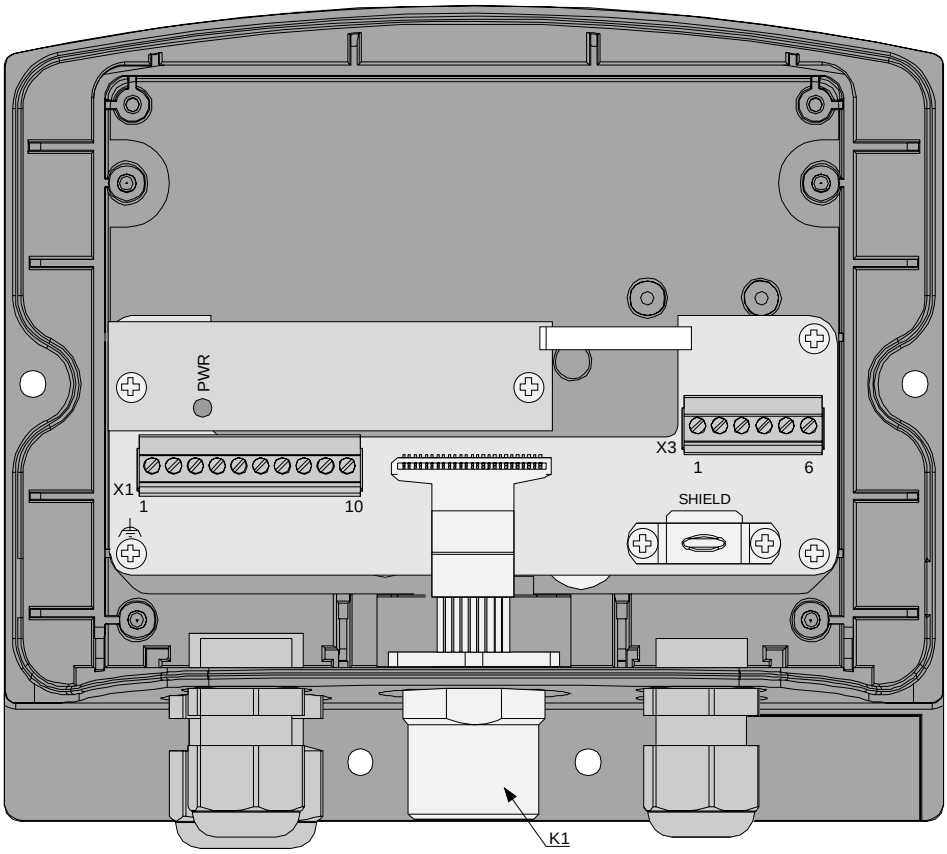
1.....Status and error LEDs
2.....PG gland (M20) for voltage supply, enabling switch and emergency stop
3.....PG gland (M16) for separate functional ground (status as supplied with dummy plugs)
4.....Coninvers female connector for KeTop T100, T50 and T40 - connection cable
5.....PG glands (M16)for data lines
6.....PG glands (M16) for data lines (status as supplied with dummy plugs)

View and device description of the Gateway box

⚠ WARNING

- **The connection box and the handheld terminal meet the safety class III in accordance with EN61131-2 and EN50178.**
  When connecting the handheld terminal, make sure that all voltages connected to the handheld terminal are safety extra low voltages and isolated from the low voltage supply system by a safety transformer or a similar facility.

Interior view



K1..... 17-pin female connector (Coninvers) for KeTop connection cable
X1..... Terminal block for power and control lines (enabling switch and emergency stop)
X3..... Terminal block for data lines
SHIELD..... Cable shield clamp with connection surface for cable shield of data lines
(not used for strain-relief of the cable!)

Interior view of connection box

Technical data of the connection terminals

The following technical data apply to the X1 and X3 connector terminal blocks already available in the Junction box:

Connection capacity:		
rigid / flexible / wire gages	[mm²]/[mm²]/AWG	0.14-1.5 / 0.14-1.5 / 28-16
flexible with wire end ferrules without / with plastic sleeve	[mm²]	0.25-1.5 / 0.25-0.5
Grid dimension:		3.81
Insulation length:	[mm²]	7
Tightening torque:	[Nm]	0.22-0.25

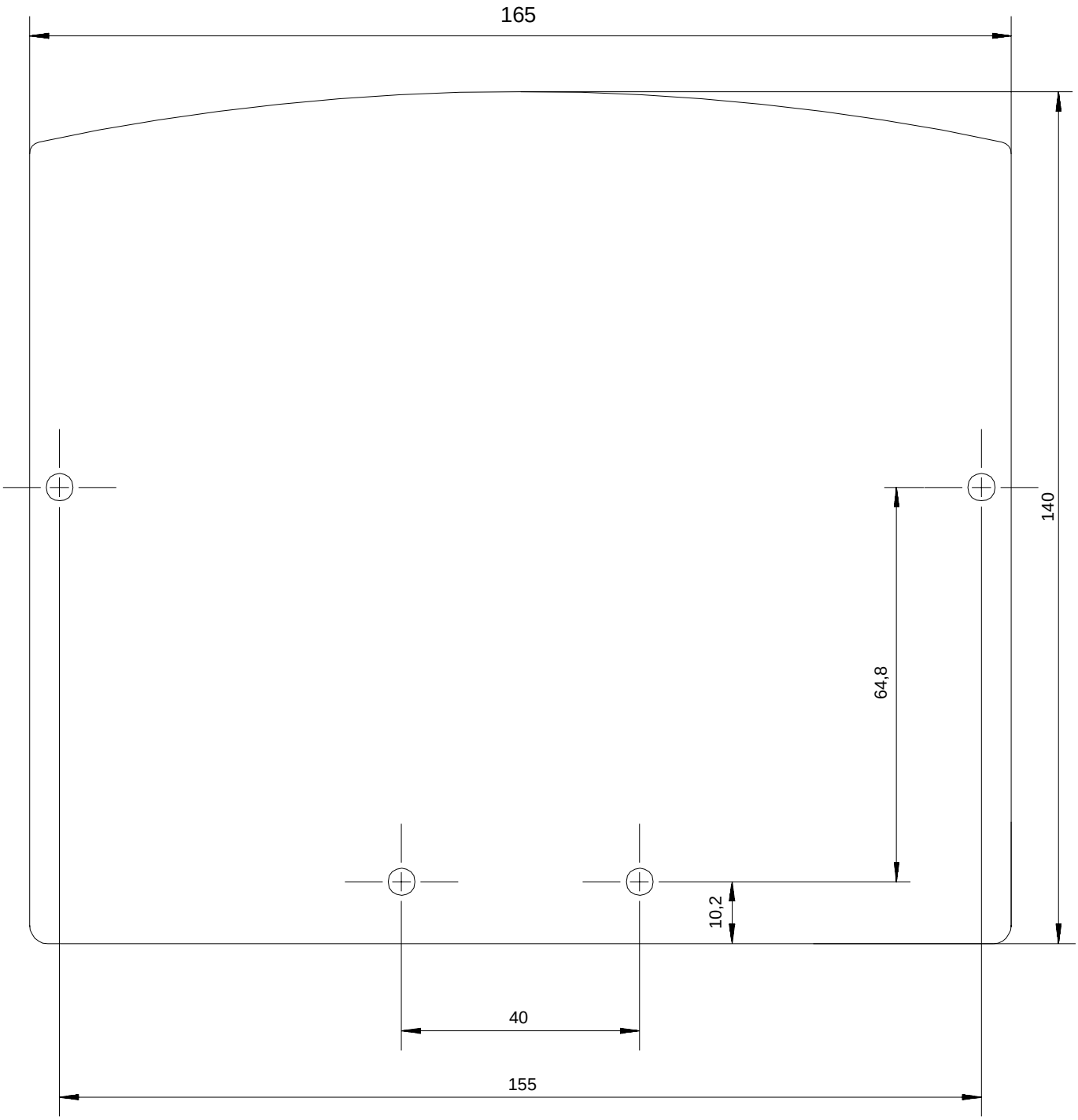
PHOENIX order data:

Gateway-terminal block	**PHOENIX Type**	**Part no.**
X1	MCVR 1.5/6-ST-3.81	1827169
X3	MCVR 1.5/7-ST-3.81	1827172
X4, X4B	MCVR 1.5/10-ST-3.81	1827208

Notice

- *Consider the connection capacity of the terminal blocks when selecting the connection cable.*
- *Use the following screwdriver to connect the wires to the terminal blocks:*
  Blade: 0.4 x 2.5 x 80 mm,
  Length: 160 mm
- *Multi-line connections (2 wires in one terminal) are not allowed. Use the X4B terminal block for continuing the field bus.*

Drilling template for wall mounting



Drilling template for the Gateway box, scale 1:1

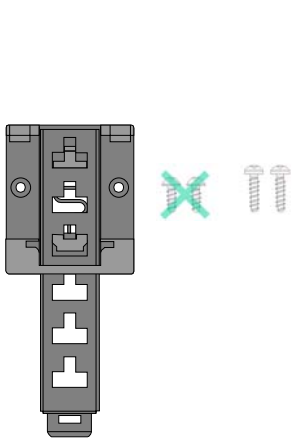
For wall mounting, we recommend the following screws and materials:

- Chipboard screw: ∅ 4 x 40mm
  Head form: flat head
  Max. head diameter: ∅ 9mm

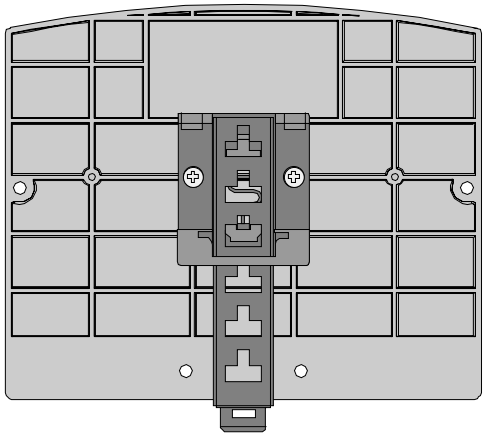
- Recommended rawlplug: ∅ 6 x 30mm

DIN Rail Holder Mounting Set KeTop DR200

The DIN rail holder KeTop DR200 is available as accessory and will be mounted on the rearside of a KeTop CB2xx gatewaybox. So the gatewaybox can be easily snapped onto a DIN rail.



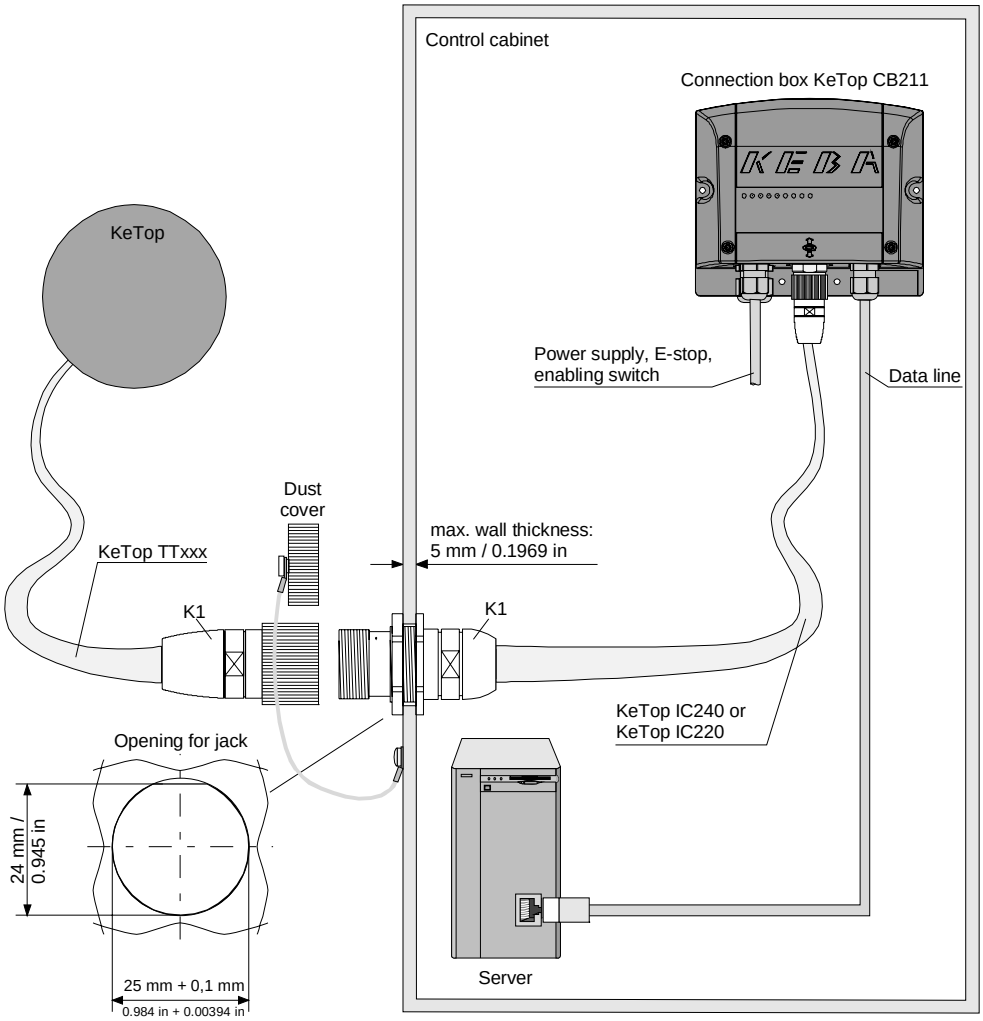
DIN Rail Holder Mounting Set



DIN Rail Holder fixed on the rear side of the gateway-box

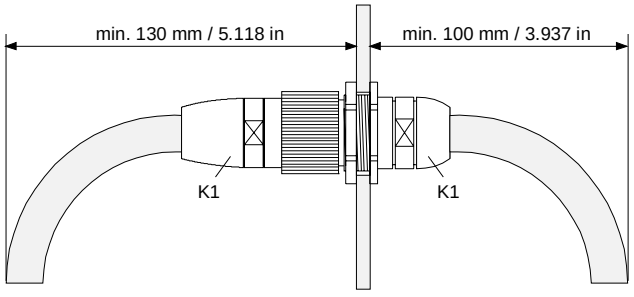
DIN Rail Holder Mounting Set for gatewaybox

Use of Connection Box



Connection box KeTop CB211 in control cabinet

Minimum Bending Radius of Cable



Required minimum distance outside and inside the control cabinet

Technical Data of Connection Box KeTop CB211

General data

Nominal supply voltage:	24 V DC (Safety extra low voltage)
Supply voltage range:	18 V DC to 32 V DC
Maximum interruption time	
of supply voltage:	≤ 10 ms (lt. IEC 31131)
Power consumption:	
with KeTop:	3.6 W (200 mA at 18 V DC, 150 mA at 24 V DC)
without KeTop:	10.8 W (600 mA at 18 V DC,450 mA at 24 VDC)
Inrush current:	max. 5.6 A (with limitation of current)
Safety class:	III in accordance with EN 61131-2 and EN 50178

Environmental conditions

Operating temperature:	0 °C to 50 °C (32 °F to 122 °F)
Storage temperature:	-20 °C to +70 °C (-4 °F to 158 °F)
Relative humidity (non-condensing):	5 % to 95 %
Vibration resistance (operation):	(IEC 60068-2-6)
	5 ≤ f < 9 Hz 7 mm
	9 ≤ f ≤ 150 Hz 2g (0.0044 pound)
Shock resistance (operation):	15 g (0.033 pound) / 11 ms (IEC 60068-2-27)

Housing

Construction	
	Double-walled ABS housing
	Withstands grease, oil, lubricants, alcohol, etc.
Flammability class:	UL94-V0
Dimensions:	
Width:	160 mm
Height:	140 mm
Depth:	70 mm
Protection degree:	IP65
Weight:	500 g (1.1 pound)
Display:	Status LEDs

Accessories

Intermediate cable	Connection box to connection cable
KeTop IC220:	2 m / 6.56 ft
KeTop IC240:	4 m / 13.12 ft
Download cable	
KeTop XD040:	4 m / 13.12 ft. For downloading software and for debugging via S2.
DIN Rail Holder Mounting Set	
KeTop DR200:	For mounting on the rearside of a KeTop CB2xx gatewaybox.

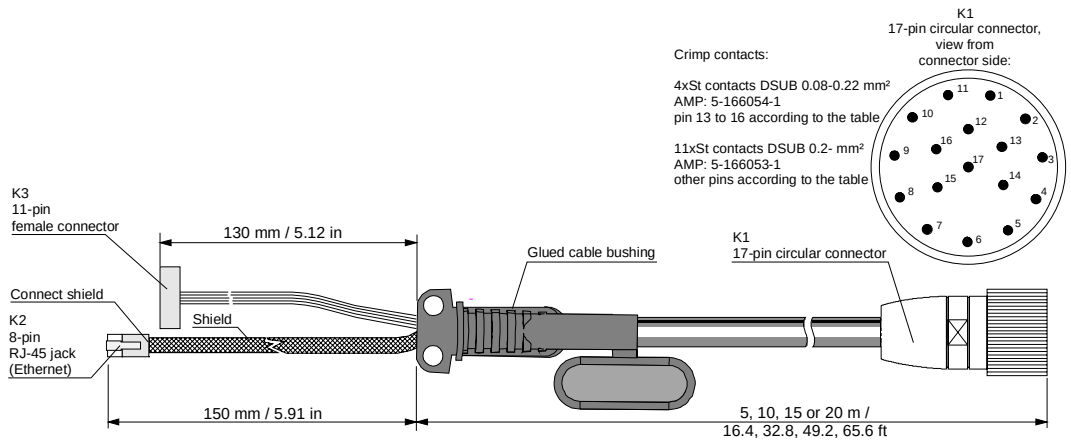
Connection Cable KeTop TTxxx

The standard KeTop handheld terminals are available with the following cables:

- KeTop TT025 (2,5 m)
- KeTop TT050 (5 m)
- KeTop TT100 (10 m)
- KeTop TT150 (15 m)
- KeTop TT200 (20 m)

The KeTop connection cable withstands water, cleaning agents (alcohol and tensides), oil, drilling oils, grease and lubricants.

Description of signal	K3, 11-pin female connector to S19 on the KeTop	K2, 8-pin RJ-45 jack (S6, RS-422-A)	Connection cable KeTop TTxxx, color of wires		K1, 17-pin male connector, pin No.:
24 VDC	6	-	pink	->	1
GND_IN	7	-	black	->	2
E-stop, circuit 1	8	-	brown-green	->	3
E-stop, circuit 1	9	-	white-green	->	4
E-stop, circuit 2	10	-	grey-pink	->	5
E-stop, circuit 2	11	-	red-blue	->	6
enabling switch, circuit 1, pos.	1	-	brown	->	7
enabling switch, circuit 1, neg.	2	-	yellow	->	8
enabling switch, circuit 2, pos.	3	-	green	->	12
enabling switch, circuit 2, neg.	4	-	grey	->	17
not used	n.c.	-	-	-	9
not used	n.c.	-	-	-	10
not used	5	-	violet	->	11
TD+ I CAN+	-	1	blue	->	13
TD- I CAN-	-	2	white	->	14
RD+ I SGND	-	3	orange	->	15
RD- I not used	-	6	red	->	16



Connection cable KeTop TTxxx

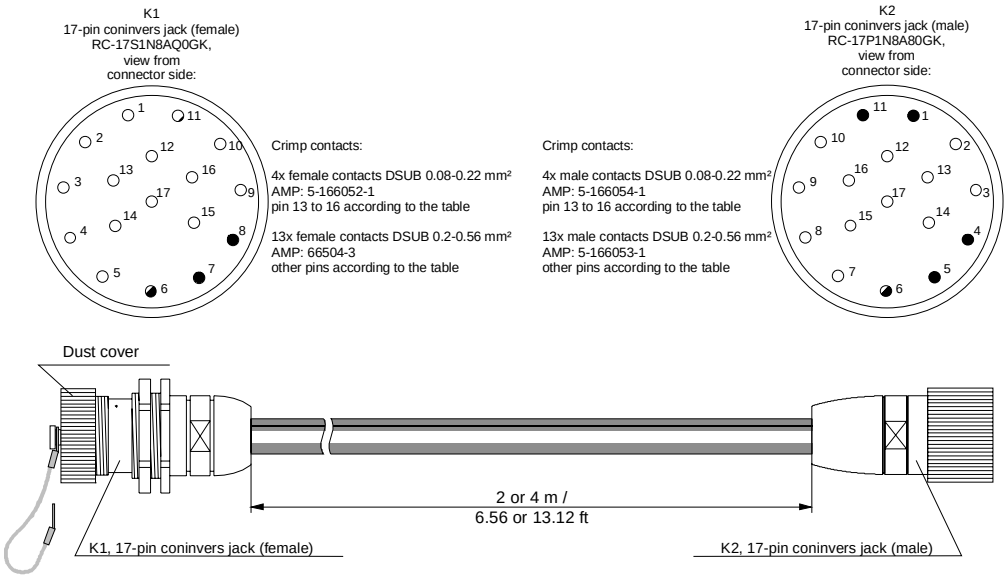
Intermediate Cable KeTop ICxxx

The KeTop intermediate cable is used to the connect the connection box and the Coninvers jack in the wall of the control cabinet. Cables with the following lengths are available:

- KeTop IC020 (2 m)
- KeTop IC040 (4 m)

Description of signal	K1, 17-pin female connector, pin No.:	Intermediate cable ICxxx, color of wires		K2, 17-pin male connector, pin No.:
Enabling switch, circuit 1, pos.	7	brown	<-	7
Enabling switch, circuit 1, neg.	8	yellow	<-	8
Enabling switch, circuit 2, pos.	12	green	<-	12
Enabling switch, circuit 2, neg.	17	grey	<-	17
Not used	10	-		10
24 V DC (+/- 10%)	1	red	<-	1
Not used	9	-		9
Emergency stop, circuit 1	3	green/brown	<-	3
Emergency stop, circuit 1 GND	4	white/grey	<-	4
Emergency stop, circuit 2	5	grey/pink	<-	5
Emergency stop, circuit 2 GND	6	red/blue	<-	6
GND_IN	2	black	<-	2
TD+ (tansmit)	13	blue	<-	13
TD- (transmit)	14	white	<-	14
RD+ (receive)	15	orange	<-	15
RD- (receive)	16	red	<-	16
Powerfail	11	violet	<-	11

Shielded signals: TD+, TD-, RD+, RD-



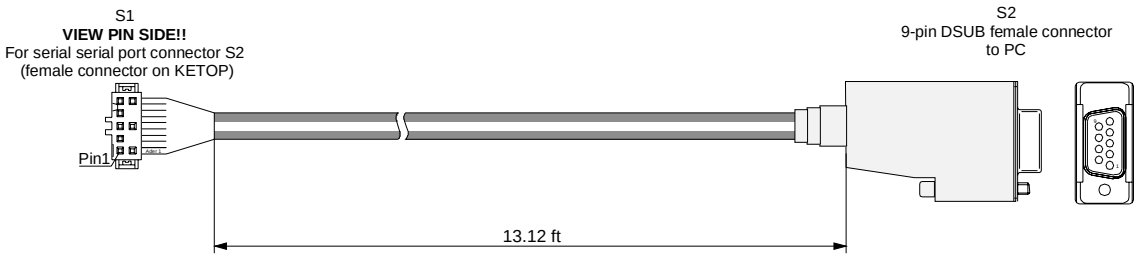
Intermediate cable KeTop ICxxx

Download Cable KeTop XD040

The download cable XD040 is available with a length of 4 m (13.12 ft) and plugged into the serial port connector S2 in the cable entrance area of the KeTop or into the X6 of the KeTop CB23x Gatewaybox.
The cable is used for downloading software and for debugging.

Handheld Terminal KeTop xxxx		Gateway box KeTop CB23x		Download cable KeTop XD040			PC
Signals	S2 Serial port connector	Signals	X6 Serial port connector	S1 male connector	Description of signals	S2, 9-pin DSUB female connector	Signals (COMx)
-	1*	n.c.	1	1	< - >	1	(ActiveSync)
-	2*	n.c.	2	2	< - >	6	(ActiveSync)
TXD	3	TXD	3	3	< - >	2	RXD
CTS	4	n.c.	4	4	< - >	-	-
RXD	5	RXD	5	5	< - >	3	TXD
RTS	6	n.c.	6	6**	< - >	-	-
-	7*	n.c.	7	7	< - >	4	(ActiveSync)
n.c.	8	n.c.	8	8**	< - >	9	-
GND	9	GND	9	9	< - >	5	GND
GND	10	n.c.	10	10	< - >	-	not used
						7	not used
						8	not used

*)..... The pins 1, 2 and 7 of the serial port connector S2 are short circuited directly on the CPU board of the KeTop.
If you produce the serial download cable yourself you will need these three wires in the cable for the ActiveSync signal.
**) ..... One pin has been removed from the male connector (prevents from incorrect plugging in).



Download cable KeTop XD040

11 Transport Conditions

To avoid damaging the device during further or return transport, the following transport conditions must be fulfilled:

- Always use the original packaging for the transport.
- The environmental conditions for the device (see chapter „Technical Data“) must also be fulfilled during transport.

12 Technical Data

General data

Nominal supply voltage:	24 V DC
Supply voltage range:	18 V DC to 32 V DC
Maximum interruption time of supply voltage:	≤ 10 ms (lt. EN 61131)
Power consumption:	4,32 W (240 mA at 18 V DC, 180 mA at 24 V DC)
	Inrush current: max. 5.6 A (with limitation of current)
Safety class:	III in accordance with EN 61131-2 and EN 50178

Environmental conditions

Operating temperature:	0 °C to 50 °C (32 °F to 122 °F)
Storage temperature:	-20 °C to +70 °C (-4 °F to 158 °F)
Relative humidity (non-condensing):	5 % to 95 %
Vibration resistance (operation):	(IEC 60068-2-6)
	5 Hz ≤ f < 9 Hz with 7 mm (0.276 in)
	9 Hz ≤ f < 150 Hz with 2 g (0.0044 pound)
Shock resistance (operation):	25 g (0.055 pound) / 11 ms (IEC 60068-2-27)

Housing

Construction	
	Twin-shell ABS housing
Flammability class	UL94-V0
Dimensions:	
Diameter:	250 mm / 9.84 in
Total height incl. handle:	125 mm / 4.92 in
Protection degree:	IP65
Weight:	approx. 1000 g
Display:	
Type:	STN LC display
Size:	2.7" (60 x 30 mm)
Resolution:	128x64 pixels (20 columns, 8 lines)
Representation:	monochrome
Background lighting:	LED
Keypad:	
	- membrane keypad (32 keys) with tactile feedback
	- Left / right-hand operation
	- Customer-specific keypad possible
	- 2 status LEDs
Operating elements:	
	Two 3-position enabling switches, twin circuit

Processor and interfaces

Processor:	Hitachi H8/2144
Memory:	Flash: 1 MB, SRAM: 128 kB
Interfaces:	RS-422-A or RS-232-C
	RS-232-C (debug interface in the device)

Accessories

Wall bracket	For stationary operation or storage of the KeTop.
KeTop WB090:	Wall bracket without cable suspension.
KeTop WB095:	Wall bracket with cable suspension.
KeTop WB100:	Wall bracket with height adjustment and without cable suspension.
KeTop WB110:	Wall bracket with height adjustment and with cable suspension.
Connection cable	Resistent to twisting, bending and foot traffic,with 17-pin circular conn.
KeTop TT025:	2.5 m / 8.2 ft
KeTop TT050:	5 m / 16.4 ft
KeTop TT100:	10 m / 32.8 ft
KeTop TT150:	15 m / 49.2 ft
KeTop TT200:	20 m / 65.6 ft
Intermediate cable	Connection box to connection cable
KeTop IC220:	2 m / 6.56 ft
KeTop IC240:	4 m / 13.12 ft
Download cable	(not for KeTop T30)
KeTop XD040:	4 m / 13.12 ft. For downloading software and for debugging via S2 (KeTop) or via X6 (KeTop CB23x).
Connection / Gatewax boxes	(KeTop CB23x not for KeTop T30)
KeTop CB211:	Connection box for separating the data and control lines.
KeTop CB230:	Gateway box for connecting to CAN via the RS-422-A interface.
KeTop CB232:	Gateway box for connecting to CANopen via the RS-422-A interface.
KeTop CB233:	Gateway box for connecting to DeviceNET via the RS-422-A interface.
KeTop CB234:	Gateway box for connecting to INTERBUS via the RS-422-A interface.
KeTop CB235:	Gateway box for connecting to PROFIBUS-DP via the RS-422-A.
KeTop CB236:	Gateway box for connecting to PROFIBUS-MPI via RS-422-A.
Visualization software	Only for KeTop T100 and KeTop T50
KeTop PT001:	zenOn 5.50
Start Kit	
KeTop SK001:	Manuals English/German on CD
	SDK for Windows CE
	Programming tool KeTop PS040
	Demoapplication zenOn 5.50
	Demoapplication PLC

Spare parts

Service lid	
KETOP E-SD050:	Service lid of cable entrance area with seal and attachment material.

13 CE conformity and standards

CE conformity

The CE marking indicates that this KEBA product complies with all applicable directives of the European Community.
For this handheld terminal, these are the EMC directive RL 89/336/EG and the machinery directive RL 98/37/EG.
As defined in the machinery directive, this device is considered to be an safety component.
The standards used for presumption of conformity are contained in the next chapter.

A "declaration of conformity“ in agreement with the above-mentioned directives has been delivered and can be viewed at KEBA in Linz, Austria.

Standards

EMC directives	
EN 61000-6-4:2001	Electromagnetic compatibility (EMC): Generic standards - Immunity for industrial environments
EN 61000-6-2:2001	Electromagnetic compatibility (EMC): Generic standards - Emission standard for industrial environments
IEC 61131-2 final draft, chapters 7,8	(Programmable Controllers Part 2: Equipment requirements and test)
Machinery directives	
EN 292-1:1991	Safety of machinery - Basic concepts, general priciples for design - Basic terminology, methodology
EN 292-2:1991 + A1:1995	Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications
EN 418:1992	Safety of machinery; emergency stop equipment, functional aspects; principles for design
EN 614-1:1995	Safety of machinery - Ergonomic design principles - Part 1: Terminology and general principles
EN 894-1:1997	Safety of machinery - Ergonomics requirements for the design of displays and control actuators-Part 1: General principles for human interactions with displays
EN 894-2:1997	Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 2: Displays
EN 894-3:2000	Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 3: Control actuators
EN 954-1: 1996 (ISO 13849-1:1999)	Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design
EN 60204-1:1997	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
General standards	
UL 508, 2001 (=CSA C22.2 No.14)	Industrial Control Equipment
EN 50178:1997	Electronic equipment for use in power installations

EN 61131-1:1994 (IEC1131-1)	Programmable controllers - Part 1: General information
EN 61131-2:1994 (IEC1131-2)	Programmable controllers - Part 2: Equipment requirements and tests
EN ISO 9241-10:1996	Ergonomic requirements for office work with visual display terminals (VDTs) - Part 10: Dialogue principles

Use of robots with the KeTop

UL 1740, 1998	Industrial Robots and Robotic Equipment
ANSI/RIA R15.06, 1999 (=CSA-Z434-94)	ANS for Industrial Robots and Robot Systems - Safety Requirements
ANSI/RIA R15.02/1, 1990	ANS for Industrial Robots and Robot Systems - Hand-Held Robot Control Pendants - Human Engineering Design Criteria
ISO 10218:1992	Manipulating industrial robots - Safety

Use of the KeTop in machining centers:

ISO 11161:1994	Industrial automation systems - Safety of integrated manufacturing systems - Basic requirements
EN 12417:2001	Machine tools - Saftey - Machining centres
EN 14070:2001	Safety of machine tools - Transfer and special-purpose machines