KAP-X
User Guide

KAP-X.UG.0002-en
2023-02-27

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CHANGELOG

Rev.	Date	Name	Pos.	Modification
0001	2023-02-24	Elst		Document created
0002	2023-07-17	Elst	Chapter 8.1	• Added figure for mechanical dimension
			Chapter 10	• Added more regulatory information

1. ABOUT THIS MANUAL

1.1 Copyright and licence expenses

The drivers and utilities for the components used as well as the Firmware are subject to copyrights of the respective manufacturers. The licence conditions of the respective manufacturer are to be adhered to.
Firmware-licence expenses are paid by TQ-Systems GmbH and are included in the price.

1.2 Registered Trademarks

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1.4 Imprint

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1.5 Service and Support

Please visit our website www.tq-group.com for latest product documentation, drivers, utilities and technical support.
You can register on our website www.tq-group.com to have access to restricted information and automatic update services.
For direct technical support you can contact our FAE team by email: support@tq-group.com.

For service/RMA, please contact our service team by email (service@tq-group.com) or your sales team at TQ-Systems GmbH.

2. IMPORTANT INFORMATION

2.1 General Information

Be sure to follow the instructions in this manual to get the most out of the product.
Otherwise there may be inconveniences, injuries or failure of the product.

2.2 Symbols and Typographic Conventions used in this Guide

Table 1: Symbols

Symbol	Meaning
	This symbol represents the handling of electrostatic-sensitive modules and / or components. These components are often damaged / destroyed by the transmission of a voltage higher than about 50 V. A human body usually only experiences electrostatic discharges above approximately 3,000 V.
	This symbol indicates the possible use of voltages higher than 24 V. Please note the relevant statutory regulations in this regard. Non-compliance with these regulations can lead to serious damage to your health and also cause damage / destruction of the component.
	This symbol indicates a possible source of danger. Acting against the procedure described can lead to possible damage to your health and / or cause damage / destruction of the material used.
	This symbol represents important details or aspects for working with the product.

2.3 Read this guide carefully

Read these guide carefully before working with the product.

2.4 Handling and ESD Tips

Hint: general handling of the KAP-X	
	Improper or incorrect handling of the KAP-X can significantly reduce its product life. TQ-Systems GmbH is not liable for changes made by the user and their consequences, which can change the conformity of the KAP-X. Improper handling of the KAP-X would render the guarantee invalid.

Proper ESD handling

	The electronic components of your product may be sensitive to electrostatic discharge (ESD). Always wear antistatic clothing, use ESD-safe tools, packing materials etc., and operate your product in an ESD-safe environment.

2.5 Safety Instructions

	Safe operation of the KAP-X is achieved if the instructions in this manual are observed. - General safety instructions must be observed; the KAP-X is installed by trained and authorized personnel only. - Since the device generates heat, sufficient air circulation must be ensured in the final application to dissipate the heat. - Safe operation of the device is no longer possible if the housing is damaged, water has gotten inside the device or smoke is coming from the inside of the device. - All applicable national and international regulations and standards must be observed.

3. INTRODUCTION

KAP-X (KION Access Permission) is used in an industrial truck as an access device, KAP-R as RFID reader module and KAP-K as a 12-Keypad module, for replacement of the key switch

Interfaces are:

- CAN Interface (not galvanic isolated)
- Keypad or RFID reader module (125 kHz and 13.56 MHz)
- Digital Output
- High Side Switch
- Two LED's for indication

4. FUNCTIONAL SPECIFICATION

4.1 Electrical Properties

4.2 Input Voltage Specification

The input voltage of the KAP-X is 12.0 VDC or 24.0 VDC.

4.3 Power consumption specification

- Current draw (at 12V) in standby, PIN: < 8 mA
- Current draw (at 12V) in standby, RFID: < 15 mA
- Current draw (at 12V) in operation: max. 800 mA / max 10W
- Enable High Side Switch output: max 24V / 7.5A (observe direction of current flow and protection e.g fuse)

	High Side Switch closes after entering a valid PIN or transponder serial number. If an inductive load is connected, a free-wheeling diode is installed. To delete an arc when using an inductive load, a suppressor must be connected.
	For further protection of the High Side Switch a fuse should be connected in the harness or industrial truck.

4.4 Climatic and operating conditions

In general, reliable operation is given when the following conditions are met:

- Operating temperature range: -40 °C … +85 °C
- Storage temperature range: -40 °C … +85 °C
- Relative humidity (operating / storage): 20 % … 85 % (not condensing)
- Air pressure: 700 … 1060 hPa
- Protection type for housing: IP67

4.5 Front view

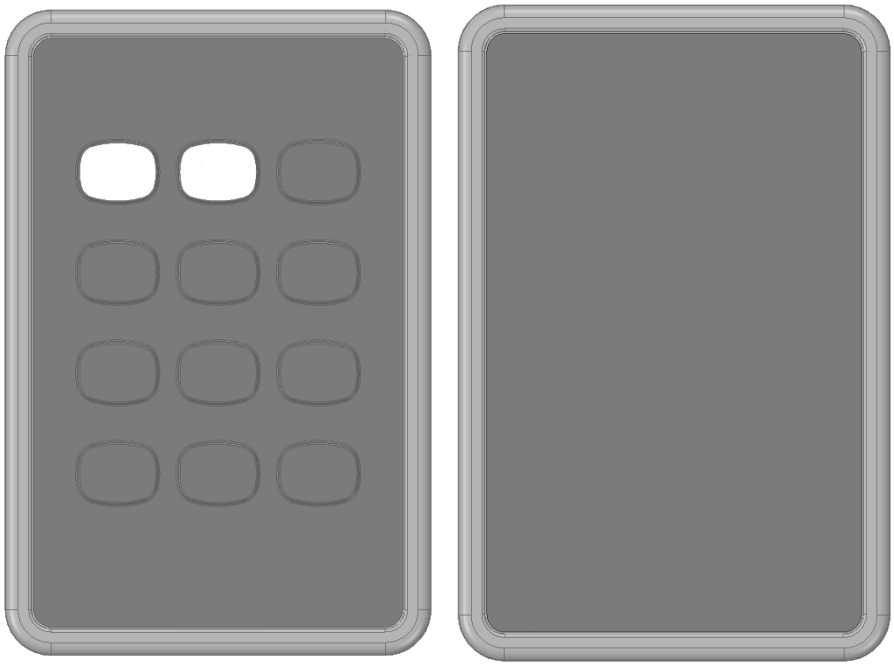

Figure 1: Front view

4.6 Keypad

Input of defined PIN-Code would be done via keypad. The user gets feedback of the status of the component via LED's (e.g. green flashing: KAP is in "Input Mode" and waits for a PIN input; red flashing: invalid PIN). Additional acoustic feedback for the user will be done via the buzzer.
KAP uses two modes within the industrial truck: HMI-Mode (in combination with KCU) and standalone (without KCU).
HMI-Mode (with fleet management): KAP is installed into the industrial truck together with the radio module KCU. Driver table and also the administration is handled by the KCU. KAP only transmits the PIN-Code input via CAN to the KCU.
Standalone (without fleet management): KAP is installed into the industrial truck without KCU. It is used as a key switch replacement and simple access device. User's/driver's ID can be programmed into KAP via different keystroke combinations (up to 150 users).

Further information about the operation can be provided by KION Group in the truck user manual.

4.7 RFID

Input of defined ID would be done via RFID transponder. The user gets feedback of the state of the component via LED's (e.g. green flashing: KAP is in "Input Mode" and waits for a PIN input; red flashing: invalid PIN). Additional acoustic feedback for the user will be done vie via the buzzer.
KAP uses two modes within the industrial truck: HMI-Mode (in combination with KCU) and standalone (without KCU).
HMI-Mode (with fleet management): KAP is installed into the industrial truck together with the radio module KCU. Driver table and also the administration is handled by the KCU. KAP only transmits the ID input (RFID) via CAN to the KCU.
Standalone (without fleet management): KAP is installed into the industrial truck without KCU. It is used as a key switch replacement and simple access device. User's/driver's can be programmed into KAP via different RFID transponder (up to 150 users).

Further information about the operation can be provided by KION Group in the truck user manual.

4.8 Backside

Figure 2: Backside

4.9 10-pin connector

The 10 pin-connector is customized for FEP-Connector Coding A / Micro Timer-II.

Pinout:

Pin	Signal	Target	Comments	Direction
1	V_CL30_IN		Micro Timer II -Kontakt	Input
2	WAKE_INPUT	KBC		Input
3	DGND			Input
4	V_DIGITAL_OUT	KCU		Output
5	V_SWITCH_IN	From industrial truck		Input
6	V_SWITCH_OUT	To industrial truck		Output
7	CAN_H			Input / Output
8	CAN_L			Input / Output
9	HARD_TERM_H			Input
10	HARD_TERM_L			Input

5. INSTALLATION

KAP-X is assembled to the industrial trucks inside of an installation housing or directly into the dash board.

With installation housing: KAP-X is mounted via metal springs into installation housing.
The assembly unit will be installed on a place in the industrial truck defined by the responsible persons of the industrial truck development.

For the warehouse industrial trucks, the KAP-X is directly mounted into the dash board without installation housing (a cutout is provided).

The person responsible for the industrial truck (development) is responsible for the electrical protection of the KAP in the form of a fuse. This can be different (depending on the loads at the fuse).

Harness of the industrial truck for connection of the KAP is always exactly the same and differs only in the length.

Further information about the installation can be provided by KION Group.

6. MAINTENANCE AND TROUBLESHOOTING

In case of a failure of the KAP-X, the Operation's Manual provided by KION Group should be used and followed the instructions.

The KAP-X should be replaced by trained and authorized personnel only.

7. VARIANTS

Table 2: KAP-X Variants

Name	Description
KAP-K-UNI-KPL-S	Partial equipment, Keypad is integrated into STILL trucks
KAP-K-UNI-KPL-L	Partial equipment, Keypad is integrated into Linde trucks
KAP-R-UNI-KPL-S	Partial equipment, RFID module reader is integrated into STILL trucks
KAP-R-UNI-KPL-L	Partial equipment, RFID module reader is integrated into Linde trucks

Other variants of the KAP-X would be available on request.

8. MECHANICS

8.1 Dimensions

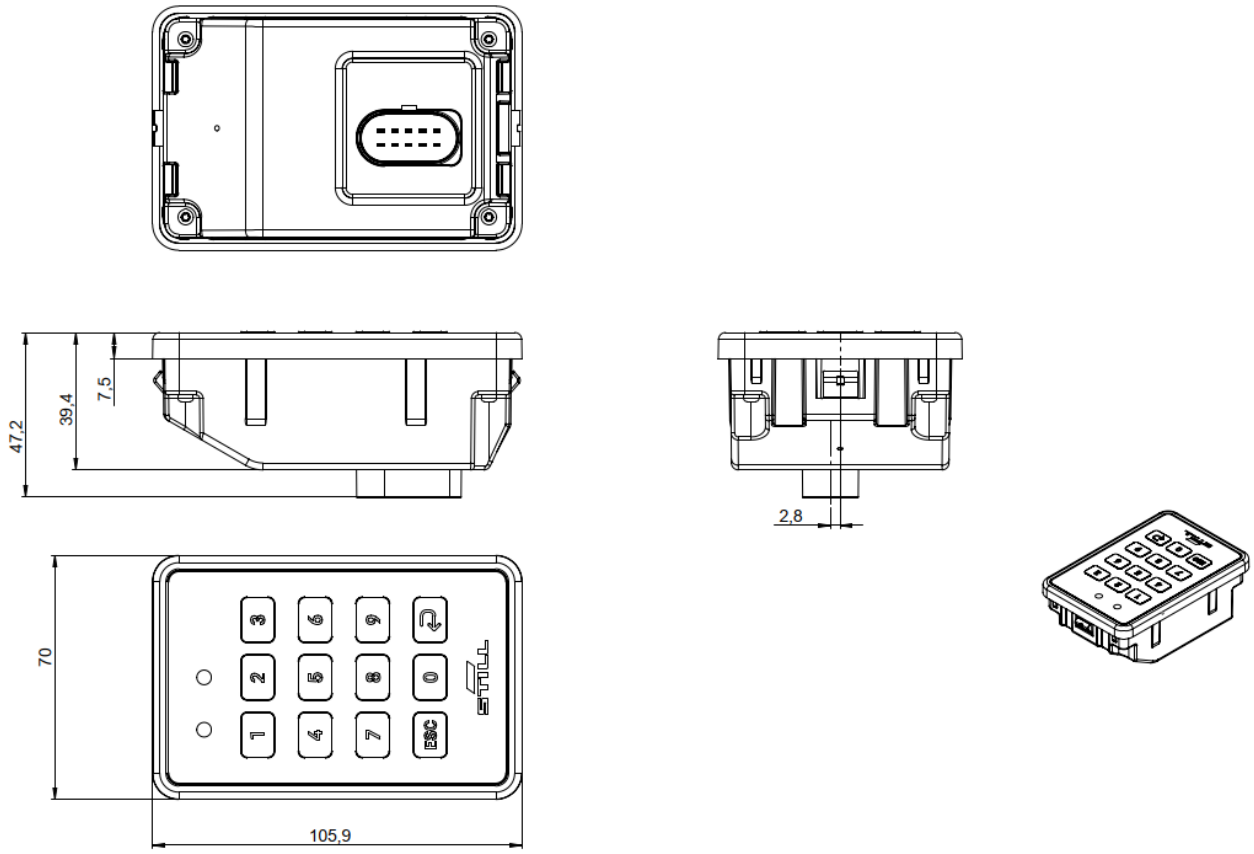

Figure 3: Mechanical Dimensions - KAP-K-UNI-KPL-S; KAP-K-UNI-KPL-L is the identical device with different imprint

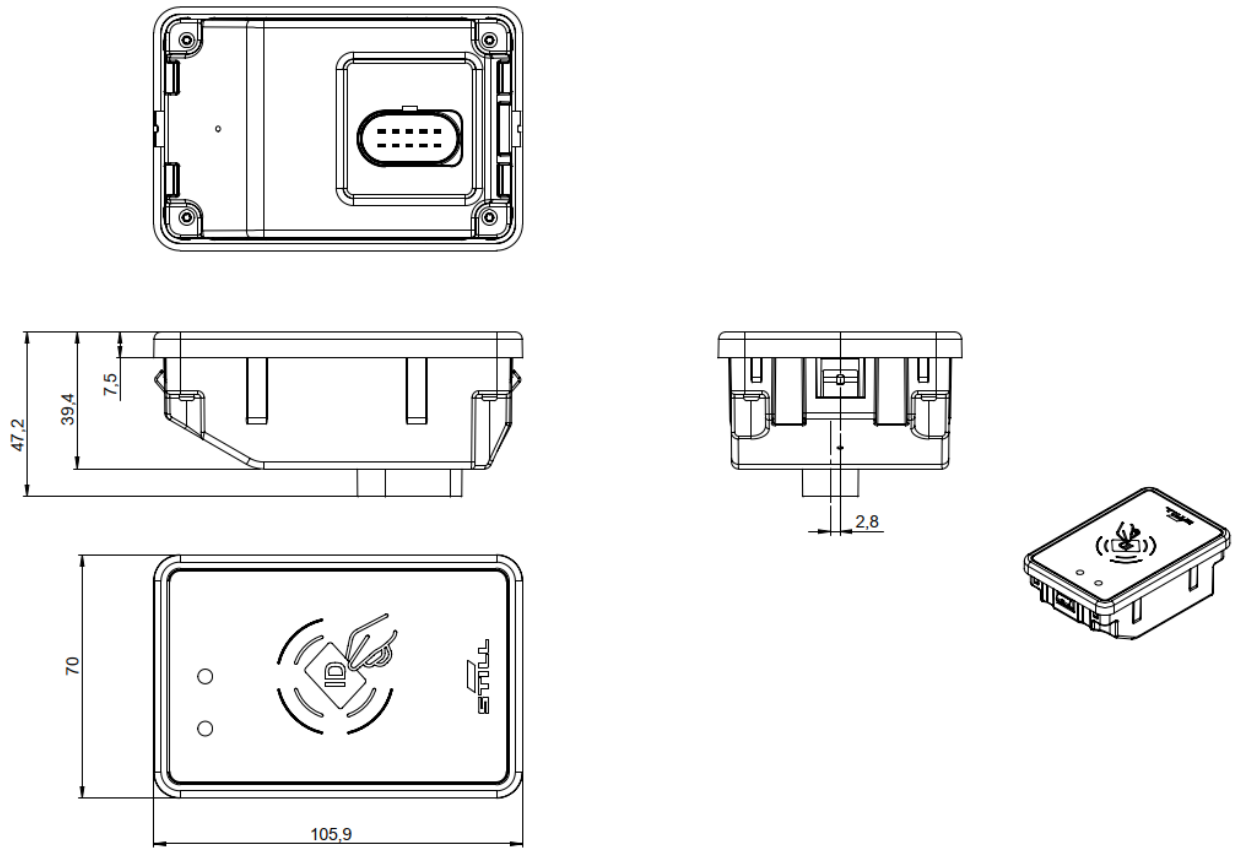

Figure 4: Mechanical Dimensions - KAP-R-UNI-KPL-S; KAP-R-UNI-KPL-L is the identical device with different imprint

9. PACKAGING AND TRANSPORT

By environmentally friendly processes, production equipment and products, we contribute to the protection of our environment. The energy consumption of this subassembly is minimized by suitable measures. The KAP-X is delivered in reusable packaging.

During installation and before operating the device, observe the instructions on environmental conditions in the device manuals.

10. REGULATORY INFORMATION

Responsibility:
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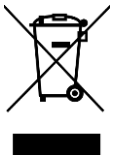
10.1 Restriction on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)

The KAP-X meets the requirements of the 2011/65/EU directive of the European Parliament and Council – in short: RoHS directive.

10.2 Waste Electrical and Electronic Equipment Policy (WEEE)

TQ-Systems GmbH encourages owners to recycle their KAP-X when it is no longer needed. Users of the KAP-X should not dispose of it as unsorted household waste. Use the collection or collection points available in your country for the recycling or reuse of WEEE to minimize possible impacts on the environment and human health due to hazardous substances.
At the end of its service life, the device can be returned to the supplier for proper disposal and recycling.



10.3 Radio license

This device contains a radio module and meets the requirements of 2014/53/EU (RED) for Europe as well as FCC ID: 2ANFF-KAPR for the USA and IC ID: 23072-KAPR for Canada.

Depending on the variant, the used frequency bands and the maximum transmission power of the radio system are listed in the following table.

Table 3: RED – Frequencies and maximum transmit power

Technologie	Standard	Frequency range	Max. transmission power / field strength
RFID	LF (bidirectional) HF (bidirectional)	125 kHz 13.56 MHz	< 97.3 dBµA/m @ 3m < 62.2 dBµA/m @ 3m

10.4 FCC 15.21

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

10.5 FCC 15.19

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation.Changes or

10.6 RSS GEN Issue 5

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:
(1) This device may not cause interference
(2) This device must accept any interference, including interference that may cause undesired operation of the device..

Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS) d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes:

(1) Cet appareil ne doit pas causer d'interférences
(2) Cet appareil doit accepter toutes les interférences, y compris celles susceptibles de provoquer un fonctionnement indésirable de l'appareil.

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