KeyPilot

(EN) **OPERATING MANUAL**

KEYPILOT
LEVEL VARIANTS

Read carefully before use.
Keep for future reference.

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1. Introduction

This manual describes the functions and characteristics of the KeyPilot variant Level. KeyPilot is used to record and control access to machines and systems. KeyPilot is easy to use and easy to integrate into control systems.

Please read this manual carefully before start-up and keep it where it is easily accessible for future reference.

1.1   Contact to the manufacturer

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Internet: www.KeyPilot.de

1.2   Further information

Further information on KeyPilot Level and other variants can be found on the Internet at:

www.KeyPilot.de

1.3   Symbols and warning notices

The following illustrations are used in this operating manual for important warning notices:

DANGER
Hazard with a high degree of risk, which may result in death or serious injury.

WARNING
Hazard with medium degree of risk, which may result in death or serious injury.

CAUTION
Hazard with a low degree of risk, which may result in minor injuries.

ATTENTION
Hazard which may result in property damage.

2. Safety Instructions

2.1   Target audience

This document is intended primarily for electricians, technicians and engineers with experience in the design, installation, start–up and maintenance of industrial control systems.

2.2   Intended use

KeyPilot can be used to control and record access to protected parts and functions on machinery and equipment. The customer is responsible for assigning authorizations to keys and assigning keys to persons.

WARNING
KeyPilot is not a safety component within the meaning of the Machinery Directive. • Do not operate where failure or malfunction could jeopardize the safety or health of a person within the working range of the unit. • Please consult the manufacturer or your supplier if you are not sure whether KeyPilot is suitable for your application.

Observe national and international safety and accident prevention regulations when using KeyPilot.

The KeyPilot components are designed for installation in industrial switch cabinets and control panels.

Conversion or other modifications of the KeyPilot is not allowed.

2.3   Transport

ATTENTION
Improper handling may damage the KeyPilot. • Use the enclosed packaging. • Handle the KeyPilot with care. • Avoid impacts, blows or falling.

2.4   Installation and Start-up

WARNING
Risk of injury, damage to the KeyPilot and damages to the environment of the KeyPilot due to improper electrical connection. • The electrical connection must be made only by qualified specialist personnel. • Electrical connections must be made only when de-energized. • Please note the technical specifications of the device. • Make sure the connections are made correctly and are tight.

ATTENTION
Reverse polarity electrical connection may damage the KeyPilot. • Disconnect the power supply if the LED on the KeyPilot does not light up 5 seconds after switching on. • Check the power supply.

ATTENTION
Exchanging components of the KeyPilot Level with those of other variants of the KeyPilot may damage the components or other connected systems. • Exchange components between different variants only after consultation with the manufacturer or your supplier. • When replacing a component, check whether the type description of the new component matches the one to be replaced.

2.5   Repair

Damaged components of the KeyPilot may be repaired only by the manufacturer. Please contact your supplier if needed.

2.6   Warranty

- The warranty period for KeyPilot is 12 months from the date of purchase. Except for damage caused by improper use.

- Never open the device without proper authorization. The opening of the housing will void the warranty claim.

- There is no warranty claim for damage to the KeyPilot caused by improper operation resulting from non–compliance with the operating instructions or by disregarding the above instructions.

- In principle, there is no liability for consequential damages.

3. System description

3.1   Scope of application

KeyPilot system is used for access control and for identifying users and those using a machine or plant.

Typical application

- User login and authorization for control panels and input systems.
- Access authorization for plants or plant components.

KeyPilot can be used everywhere where previously passwords or mechanical key switches have been used.

3.2   General function

The KeyPilot system basically consists of two parts. These are the respective reading station and the keys.

A key is placed on the reading station and held in place magnetically. The key is read out using the built-in contacts in the reading station. Each key has an individual identifier (ID). This ID is unique worldwide, is provided by the manufacturer and cannot be changed.

3.3   Reading stations

The reading stations are an essential part of the system. The key is held on the reading station by a magnet and is read out via the contacts.

Several variants are offered with different interfaces to the process. Depending on the interface to the process, the data is evaluated on the reading station or communicated to a higher-level controller via the communication interface.

The following sections provide an overview of all KeyPilot variants, including the KeyPilot Level variant described in this manual.

3.3.1 Switch variants

The switch variants are particularly suitable for all applications where no system-side data communication is possible or necessary at the place of use.

The key information is read out when the key is set up. An authorization matching is then carried out in the reading station and the switching output is switched according to the specified authorization. The original switching state is restored when the key is removed.

The following switch variants are available:

Figure 1: Design of the level, RS232 and PROFIBUS variants

- **KeyPilot Level**
  7 different authorization levels can be identified through three digital outputs.

3.3.2 Communication variants

Instead of the switching outputs, these variants have a communication interface for direct integration into a machine control. The key information can be read into a control system via the respective communication interface and reused on a customer-specific basis. No authorization matching takes place in the device.

The communication variants are available in a compact design or with a remote reading head, depending on the communication interface. The key is held on the reading head using a magnet and is read out via the contacts. In case of devices with remote reading head this reading head is connected to the so-called electronics unit via a cable connection.

Figure 2: Design of the USB variant and the reading head of the PROFIBUS AL, PROFINET and EtherCAT variants

Following communication variants are available:

- **KeyPilot USB**
  The ID can be read out via the USB interface. Keys with memory can be written and deleted. Reading stations with a USB interface are also used as set-up stations to store authorizations on other reading stations using a setup key.

- **KeyPilot RS232**
  The ID can be read out via the RS232 interface. Keys with memory can be written and deleted.

- **KeyPilot PROFIBUS**
  The ID can be read out via the PROFIBUS DP interface.

- **KeyPilot PROFIBUS AL**
  Variants with remote reading head. The ID can be read out via the PROFIBUS DP interface.

- **KeyPilot PROFINET**
  Variants with remote reading head. The ID can be read out via the PROFINET IO interface.

- **KeyPilot EtherCAT**
  Variants with remote reading head. The ID can be read out via the EtherCAT interface.

3.4 Keys

Each key has a worldwide unique identifier (ID), which is provided by the manufacturer. This ID has 2^{48} different possibilities and cannot be manipulated. Using the ID the key is clearly identifiable. Thus, the owner of the key can be clearly determined and his actions can get logged.

Currently, the keys listed in the following table are supported:

Figure 3: Keys

Key type	Family code	Memory area
ID-only authorization key	01	–
Authorization key with memory area	14	256 B EEPROM
	23	4 kB EEPROM
Setup key with memory area	37	32 kB EEPROM
Evaluation key with memory area		

Table 1: Key types, family codes and memory areas

All key types can be used in the application and all different key types can be mixed.

The key type can be distinguished using the imprinted family code.

Figure 4: Meaning of lasered labeling of the key

4. Technical data

4.1 Type plate

The type plate is located on the backside of the reading station.

Type description

Serial number

Production Week and
Production Year

CE marking
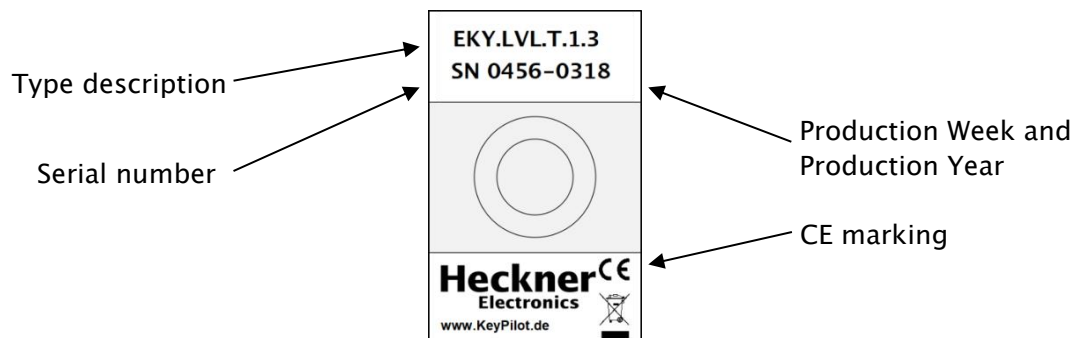
Figure 5: Type plate

4.2 Electrical specifications

Voltage power supply	9…36 V DC
Power consumption (typ.)	1 W
Operating temperature	−20…+70 °C
Short−circuit−proof reading contacts	Yes
Number of outputs (High Side Switch)	3
Minimum output current[1]	10 µA
Maximum output current	200 mA
Output voltage	Corresponds to voltage supply
Short−circuit proof outputs	Yes

4.3 Protection class

Front side when installed	IP66
Backside	IP20

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[1] The minimum output current is required for the reliable operation of the power driver.

4.4   Mechanical specifications
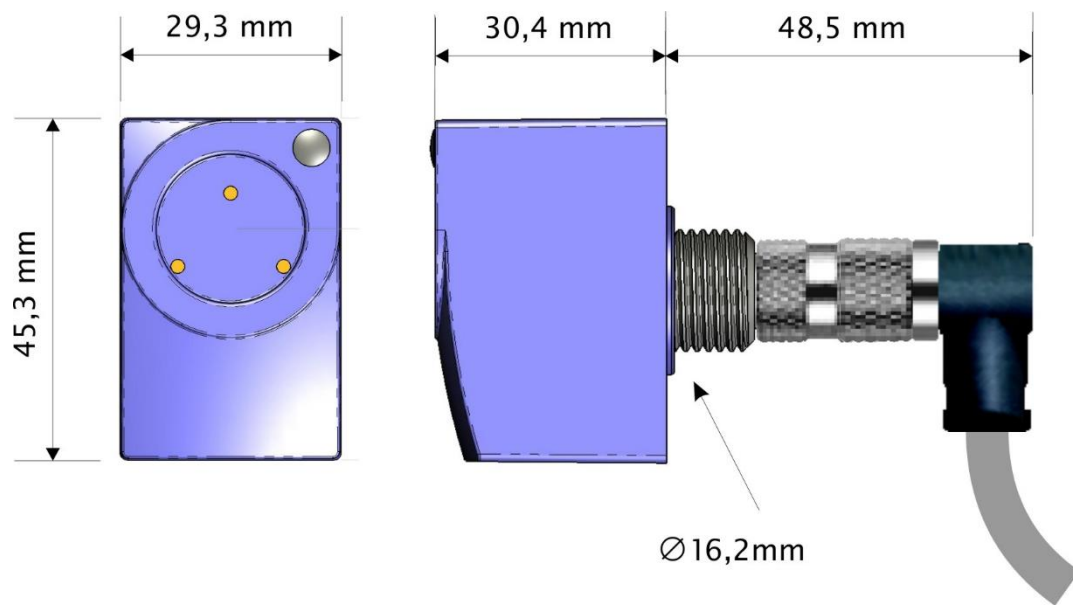
Figure 6: Dimensions

For mounting in installation openings with a diameter of 22.5 mm, a reducer ring is supplied for centering.

4.5   Pin assignment
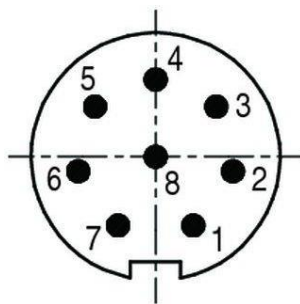
No.	Assignment	Wire color[2]
1	Level 1 (L1)	yellow
2	Supply voltage GND	grey
3	Supply voltage +9...36V	white
4		–
5		–
6	Level 2 (L2)	brown
7	Level 3 (L3)	green
8		–

Table 2: Pin assignment

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[2] Color definitions only apply to factory–made prefabrication

5. Preparation

5.1   Scope of Delivery

Description	Figure
Reading station	
Plastic nut M16x1.5	
Reducer ring 16.2 mm to 22.2 mm	
Quick Reference Guide	

Table 3: Scope of Delivery

5.2 Packaging

The packaging has been designed to protect the KeyPilot during transport by freight carrier or parcel delivery service. Nevertheless, please check all supplied components for damage after unpacking.

The packaging must be disposed of separately according to the applicable rules for cardboard and plastic.

5.3 Installation

A mounting hole with a diameter of 16.2 mm is sufficient for mounting of the KeyPilot reading station. The mounting in holes with 22.3 mm diameter is possible with the enclosed reducer ring.

Procedure:

1. Insert the reading station into the mounting hole from the front. The thread of the reading station must protrude on the back of the mounting hole.
2. If necessary, place the reducer ring between the thread and the mounting hole.
3. Tighten the reading station with the plastic nut.

5.4   Connection

	WARNING
⚡	**Risk of injury, damage to the KeyPilot and damages to the environment of the KeyPilot due to improper electrical connection.** • The electrical connection must be made only by qualified specialist personnel. • Electrical connections must be made only when de-energized. • Please note the technical specifications of the device. • Make sure the connections are made correctly and are tight.

Pre-assembled connecting cables in various lengths are available separately for connecting the KeyPilot reading station.

Procedure:

1. Trim the open end of the connecting cable. The cable may be shortened to the required length.

2. Connect the output cables to suitable control inputs or loads.

3. Insulate unused output cables.

4. Connect the supply lines to a suitable power supply.

5. Plug the connection cable to the reading station and tighten.

5.5   Configuring the authorizations

The authorizations are configured using the KeyPilot Manager software. This can be downloaded free of charge from manufacturer's website at www.KeyPilot.de. Using a KeyPilot setup station and a setup key, the configuration created with the KeyPilot Manager can be transferred to the reading station and read out.

Please contact the manufacturer or your supplier if you need help with the configuration.

You must have a key with authorization for this reading station in order to test the operation of the reading station.

6. Operation

6.1   Function description

The KeyPilot Level function can be summarized as follows:

- The key is attached on the reading head of the KeyPilot using a magnet. The key data is read out via the contacts.

- The reading station evaluates the read-out data and its own configuration and uses this data to determine the authorization level of the key.

- The outputs are controlled according to the determined authorization level.

The outputs remain active according to the determined authorization level as long as the key lies on the reading station. In absence of a key the outputs will be reset. This corresponds to authorization level 0.

The authorization level is stored either in the reading station or optionally on a key with memory.

6.2   Output signal

Authorization level	Output status		
	Level 3 (L3)	**Level 2 (L2)**	**Level 1 (L1)**
0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	1
6	1	1	0
7	1	1	1

Table 4: Output signals after authorization

6.3   Status display

The status of the KeyPilot is signaled via a two-color LED on the front of the reading station.

Display	Meaning
Permanently off	No or faulty power supply or device is defective.
Single flash GREEN	Normal operation and no key detected.
Blinking GREEN (5 Hz)	Key is read out.
Blinking GREEN (1 Hz)	Key read out successfully.
Steady GREEN light	Key is recognized as authorized.
Single flash RED	Device not in operating state: • no configuration available • incorrect configuration data • incomplete setup process
Blinking RED (1 Hz)	Error when reading a key. Absence of an issued key indicates a non-specific error, e.g. through short-circuiting of the contact surfaces.
Steady RED light	Key is recognized as unauthorized.
Blinking GREEN/RED (5 Hz)	Key is written, e.g. when reading the reading station with an evaluation key.
Blinking GREEN/RED (1 Hz)	Key written successfully.

Table 5: LED

7. Maintenance

7.1   Cleaning

For reliable operation of the KeyPilot, the contact surfaces of the reading station and the key must be kept clean. Remove any soiling if you experience problems reading the key. Reading station and key can be cleaned using common cleaning agents. Avoid using corrosive detergents.

7.2   Maintenance

The components of the KeyPilot do not require any special maintenance.

7.3   Repair

Damaged components of the KeyPilot may be repaired only by the manufacturer. Please contact your supplier if needed.

8. Decommissioning and disposal

8.1   Disassembly

WARNING
⚠ **Risk of injury and damage in the environment of the KeyPilot due to unconnected electrical wiring.** • The electrical connection may be changed only by qualified personnel. • Electrical connections must be made only when de-energized. • Make sure that disconnected connecting cables do not remain unprotected (insulate).

In case you want to remove the KeyPilot from your system, proceed as follows:

1. Switch off the power supply.
2. Disconnect the connection cable at the back of the reading station and remove.
3. Disconnect the connection cable from other control components to remove it. Simple cutting of the cable should be avoided.
4. To disassemble the reading station unscrew the plastic nut. The reading station can then be pulled out of the mounting hole.

8.2   Disposal

All components of the KeyPilot (reading station and key) must be disposed of in accordance with the statutory regulations for electronic devices.

The packaging must be disposed of separately according to the applicable rules for cardboard and plastic.

9. CE declaration of conformity

Figure 7: CE declaration of conformity

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