

EUCHNER

Operating Instructions

Transponder-Coded Electronic-Key-System
Electronic-Key-System EKS2

EN

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1. About this document

1.1. Scope

These operating instructions apply to the Electronic-Key-System EKS2. These operating instructions, the supplementary documents and any enclosed data sheets form the complete user information for your system.

They apply to:

Electronic-Key-System EKS2 component		Product version (hardware version)	Firmware version
Evaluation unit	EKS2-E-PN-...	V1.0.X	V1.2.X
Read unit with holding clip	EKS2-R-I1A-...	V1.0.X	V1.2.X
Read unit without holding clip	EKS2-R-I1B-...	V1.0.X	V1.2.X

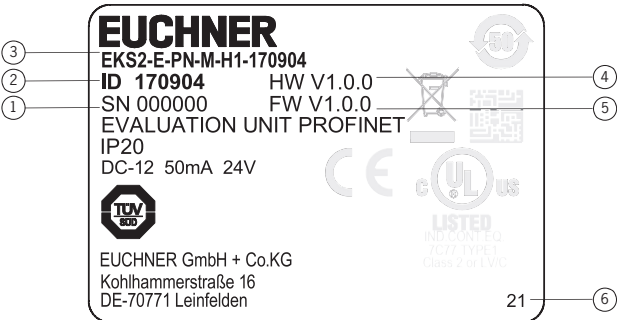


Important!

- Make sure to use the operating instructions valid for your product version. The version numbers can be found on the type label of the respective component.
- A firmware update might have been performed on your device. Make sure that the device documentation corresponding to the update is available and is observed. The current firmware version number can be accessed in the integrated web server, see chapter 13. *Integrated web server on page 28.*
- Please contact the EUCHNER support team if you have any questions.

1.1.1. Evaluation unit type label

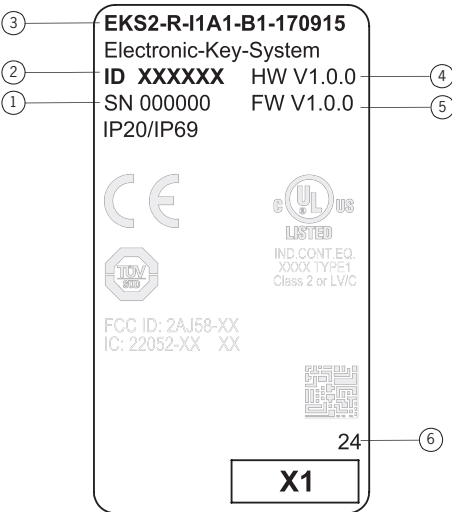
(example illustration)



Key	
1	Serial number
2	Order number
3	Item designation
4	Product version (hardware version)
5	Firmware version on delivery
6	Year of manufacture

1.1.2. Read unit type label

(example illustration)



Key	
1	Serial number
2	Order number
3	Item designation
4	Product version (hardware version)
5	Firmware version on delivery
6	Year of manufacture

1.2. Target group

Design engineers and installation planners for safety devices on machines as well as setup and servicing staff possessing the following expertise:

- specialist knowledge in handling safety components
- expertise in the installation, setup, programming and diagnostics of programmable logic controllers (PLC) and bus systems
- knowledge about the applicable EMC regulations
- knowledge about the applicable regulations on operational safety and accident prevention.

1.3. Key to symbols

Symbol/depiction	Meaning
	Printed document
	Document is available for download at www.euchner.com
 DANGER WARNING CAUTION	Safety precautions Danger of death or severe injuries Warning about possible injuries Caution slight injuries possible
 NOTICE Important!	Notice about possible device damage Important information
Tip	Useful information

1.4. Supplementary documents

The overall documentation for this product consists of the following documents:

Document title (document number)	Contents	
Safety information (2525460)	Basic safety information	
Operating Instructions (MAN20001715)	(this document)	
Operating Instructions (MAN20001744)	Operating instructions, EKS2 programming station	
Software manual	Software manual for various EKS2 software applications, see www.euchner.com	
Declaration of conformity	Declaration of conformity	
Information_EU-DA_110 (ECO20001824)	Information on data usage in accordance with the EU Data Act	
Release notes	Release notes for firmware update	
Possibly available data sheet	Item-specific information about deviations or additions	 
	Important! Always read all documents to gain a complete overview of safe installation, setup and use of the product. The documents can be downloaded from www.euchner.com . For this purpose enter the doc. no in the search box.	

2. Correct use

The Electronic-Key-System EKS2 can be used in combination with a touch panel as part of a higher-level overall system for selection of operating mode. It can also be used to read and evaluate or forward data, e.g. to check authorizations.

The Electronic-Key-System is operated as an IO device in PROFINET.

The system consists of the following components:

- Read unit
- Evaluation unit
- Electronic-Key
- Connecting cable for connecting the read unit to the evaluation unit
- Programming station for reading and writing Electronic-Keys
- Various software applications for reading and writing Electronic-Keys

Before the system is used, a risk assessment must be performed on the machine, e.g. in accordance with the following standards:

- EN ISO 13849-1
- EN ISO 12100
- IEC 62061

Correct use includes observing the relevant requirements for installation and operation, particularly based on the following standards:

- EN ISO 13849-1
- EN 60204-1

The system is only allowed to be operated using Electronic-Keys and connection components that meet the EUCHNER guidelines. If unsuitable Electronic-Keys or connection components are used, EUCHNER provides no warranty for safe function.

The user is responsible for the safe overall function, especially for safe integration into the PROFINET environment.



Important!

- The user is responsible for the proper integration of the system into a safe overall system. For this purpose, the overall system must be validated, e.g. in accordance with EN ISO 13849-1.
- Use only components that are permissible according to *Table 1: Electronic-Key-System EKS2 system components on page 6* or that meet EUCHNER guidelines.
- Use only components that have mutually compatible firmware versions in accordance with *Table 2: Compatibility of the firmware versions of Electronic-Key-System EKS2 components on page 7*. The Electronic-Key-System EKS2 firmware can be updated, see *16. Updating firmware on page 38*.

Table 1: Electronic-Key-System EKS2 system components

Component	Item	Description
Read unit	EKS2-R-I1A.-...	Read unit with holding clip
	EKS2-R-I1B.-...	Read unit without holding clip
Evaluation unit	EKS2-E-PN-M-H1-170904	Evaluation unit with PROFINET interface and 1-of-n safety outputs
Electronic-Key	EKS2-K-K-B-D2...	Available in different colors
Connecting cable	C-RJ9-4X015PU...	For the connection of the read unit to the evaluation unit
Programming station	EKS2-P-USB-NH1B0-C1-172018	Programming station for reading and writing Electronic-Keys
Various software applications for EKS2	SW ...	Various software applications for reading and writing Electronic-Keys

Table 2: Compatibility of the firmware versions of Electronic-Key-System EKS2 components

Component	Version	Evaluation unit EKS2-E-PN-...	
		Firmware version V1.0.X	Firmware version V1.2.X
Read unit EKS2-R-...	Firmware version V1.0.X	●	—
	Firmware version V1.2.X	—	●
GSDML	GSDML-V2.44-EUCHNER-EKS2-2587441-20240925-141300.xml	●	●
	GSDML-V2.44-EUCHNER-EKS2-2587441-20251029-120700.xml	—	●

2.1. Notes on cybersecurity

EUCHNER components and systems must not be integrated into public networks. EUCHNER components are approved only for use in private networks. Use a VPN for remote access.

Data processing is unencrypted. Do not use any personal data, or implement suitable protective measures (e.g. in accordance with Art. 32 GDPR).

The device does not constitute a payment system within the meaning of the Directive, and it must not be used as such.

2.2. Notes on the EU Data Act

In accordance with EU Data Act 2023/2854, we wish to point out that data are generated during operation of the product. These instructions describe the type of data generated and access to the data.

You will find further information in the document “Information on data usage in accordance with the EU Data Act”, see chapter 1.4. *Supplementary documents on page 5.*

3. Description of the safety function

The Electronic-Key-System EKS2-... has the following safety function:

Safe switching and monitoring of the selected operating mode

(subsystem of the safety function *selection of operating mode* according to EN ISO 13849-1)

- › Safety function:
 - Safe selection of an operating mode using a touch panel
 - Safe detection of a change of operating mode
- › Safety characteristics: category, Performance Level, PFH (see chapter 17. *Technical data* on page 39).

Selection of operating mode

As a subsystem, the system fulfills the subfunctions of an operating mode selector that controls the machine's safety functions required for the selected operating mode. A failure or malfunction of selection of operating mode can lead to the safety functions of the selected operating mode not being activated in the machine.

A system for selection of operating mode can be subdivided into the following subfunctions according to EN ISO 16090-1, for example:

- › Access system
- › Selection system
- › Activation system

Incorrect behavior or an error in the *selection system* subfunction can lead to the safety function of the overall *selection of operating mode* system failing.

The system fulfills the *access system* subfunction and, in combination with a touch panel, the *selection system* subfunction. The safety function is ensured by a two-stage interaction between the Electronic-Key-System EKS2 and the touch panel. This involves prompting for confirmation of the selection in a new, additional dialog. Selection of the operating mode and confirmation of the operating mode must take place at two different locations on the touch panel.

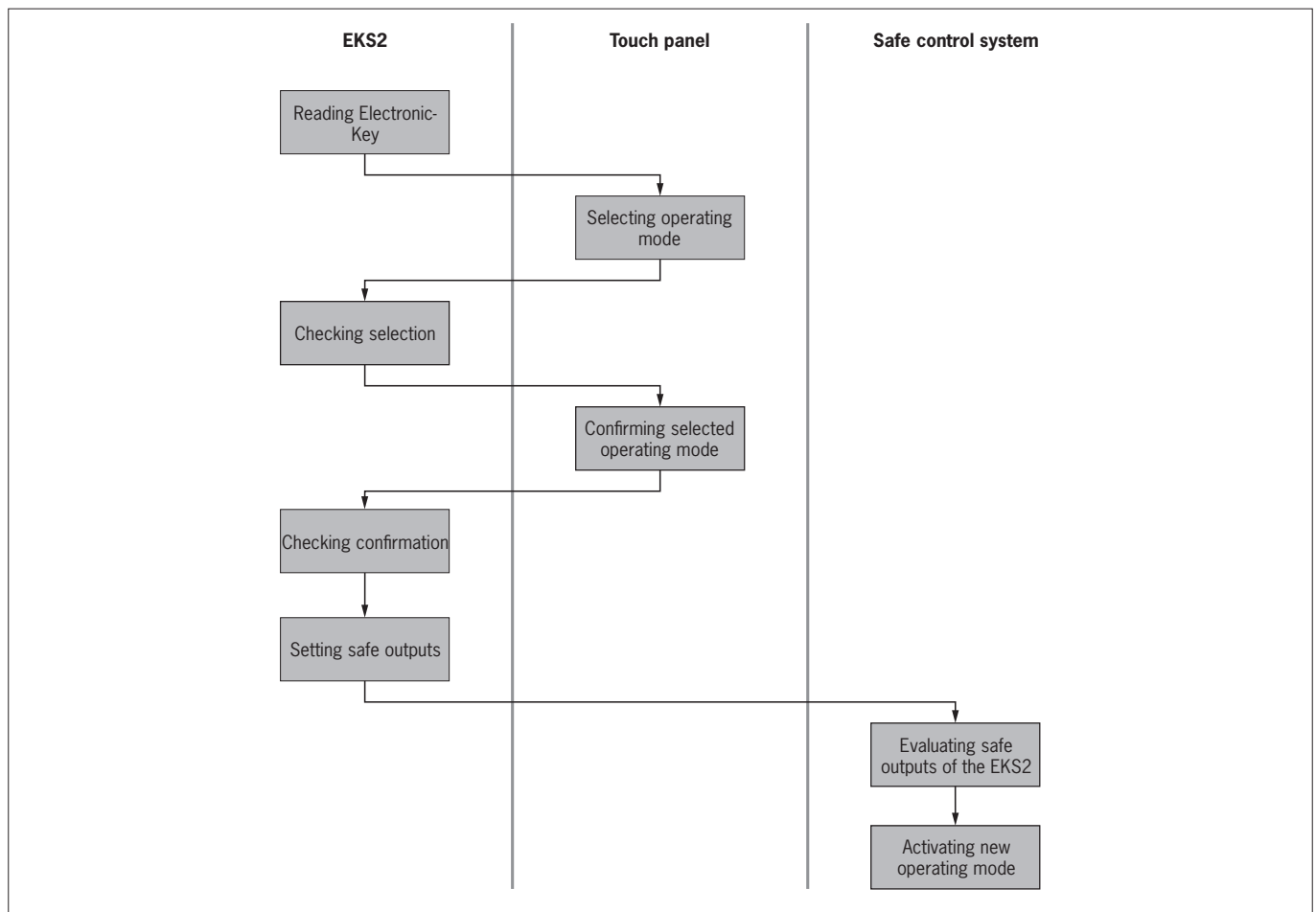


Fig. 1: Two-stage interaction between EKS2 and touch panel

The data structure of selection of operating mode is hierarchically structured for the individual access rights, and it changes values accordingly in the individual polling levels.

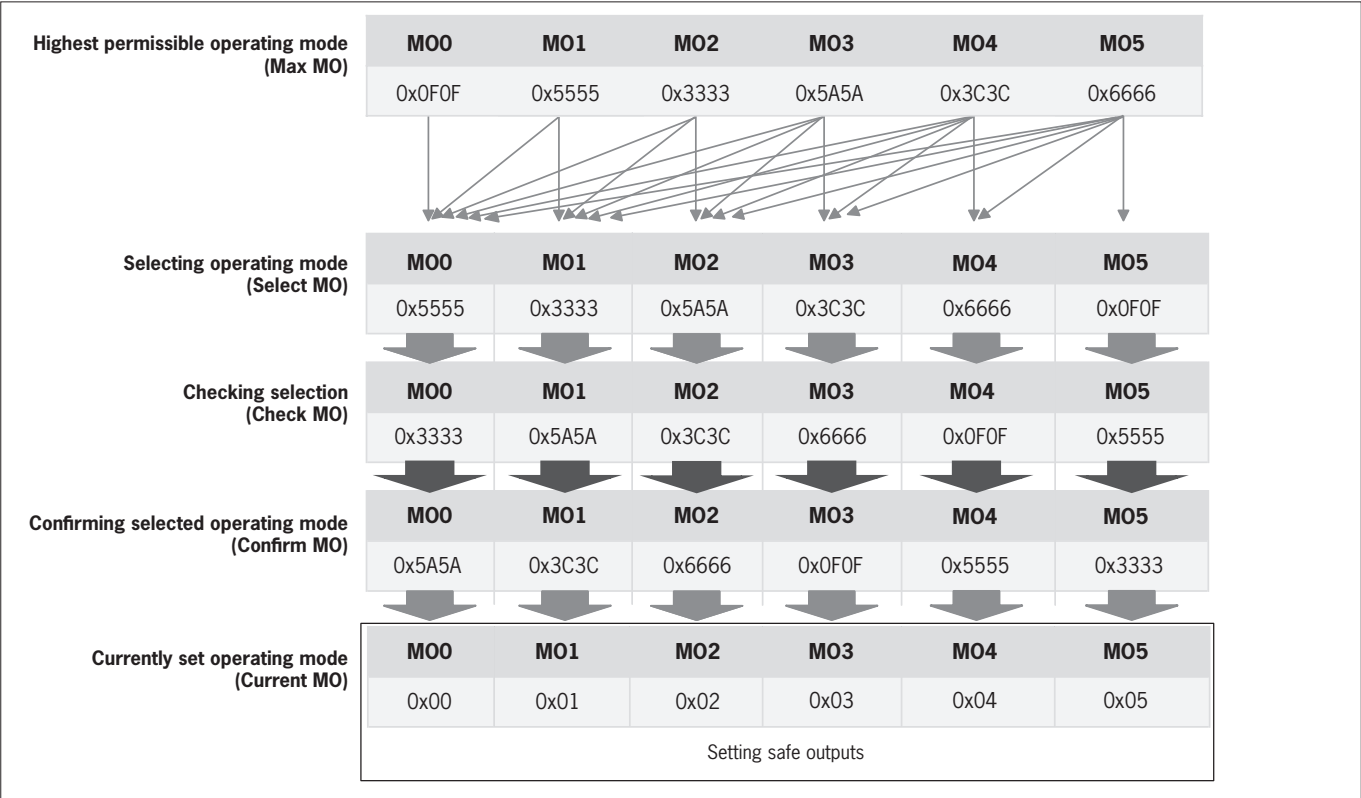
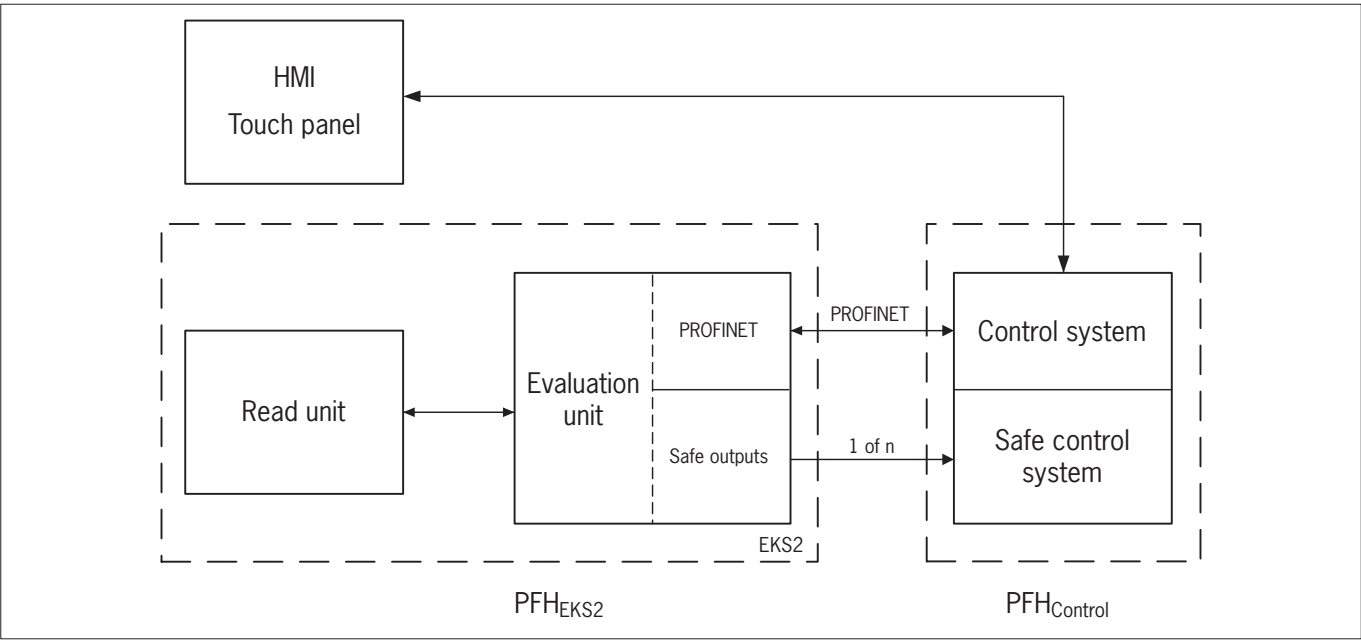


Fig. 2: Data structure of selection of operating mode

To fulfill the safety function of the overall *selection of operating mode* system, a suitable activation system must be connected to the safe outputs of the evaluation unit. A suitable activation system is a safe control system that can process 1-of-n signals, for example. Additionally, the safe function is ensured only if two adjacent safe outputs are connected and evaluated.

The failure probability of the overall system's safety function can therefore be calculated as follows:

$$PFH_{\text{overall}} = PFH_{\text{EKS2}} + PFH_{\text{Control}}$$



4. Security

It is advisable to create and implement a comprehensive industrial security plan to protect instrumentation and control systems.

Additionally note the following points:

- › Protect the standard PC for setting up the configuration software and for writing data to the Electronic-Keys using a fire-wall and an up-to-date virus scanner.
- › Always use the latest software and firmware versions.
- › Assign a specific password for each device.
- › Assign different access rights to different user groups.
- › Regularly check the assignment of rights and, if necessary, control using an expiry date.

5. Exclusion of liability and warranty

Liability or warranty is ruled out in case of:

- › Incorrect use
- › Failure to comply with the operating instructions and the safety regulations therein
- › Failure to perform the required check for correct function
- › Changes to the product.

6. General safety precautions

Operating mode selectors fulfill personnel protection functions. Incorrect installation of the subsystem or tampering can lead to fatal injuries to personnel.

Observe the following safety regulations to prevent failure of the personnel protection function:

- › Visually inspect all components for damage prior to mounting and connection. Do not use damaged components; file a complaint with the manufacturer instead.
- › Do not modify plugs or cables.
- › Check the safe function of the system as a subsystem, particularly:
 - each time after initial setup
 - each time after replacing the system or a system component
 - after extended downtimes
 - each time after correcting an error
 - after every factory reset
 - after every firmware update
 - in accordance with the machine's maintenance schedule.

7. Function

The Electronic-Key-System EKS2 can be used as part of a higher-level overall system for selection of operating mode on safe control systems. It can also be used to read and evaluate or forward data, e.g. to check authorizations.

The Electronic-Key-System EKS2 consists of the following components:

- | | |
|-----------|---|
| 1 | Read unit |
| 2 | Evaluation unit |
| 3 | EKS2 programming station |
| 4 | Connecting cable for connecting the read unit to the evaluation unit |
| 5 | EKS2 Electronic-Key |
| Not shown | Various software applications for reading and writing Electronic-Keys |

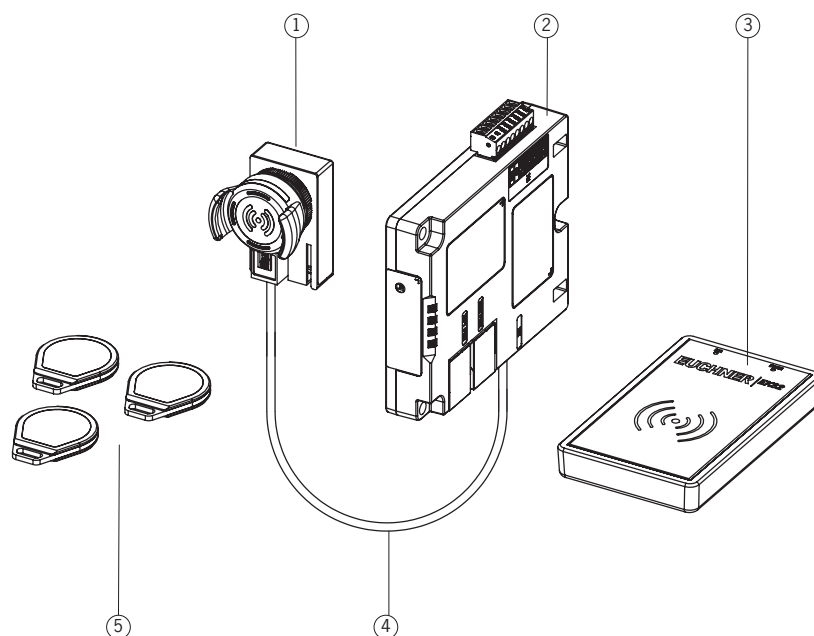


Fig. 3: Overview of Electronic-Key-System EKS2 components

Depending on the configuration in PROFINET, the system can be used in standard mode or in UID-only mode, see chapter 10.2.3. *Selecting modules and submodules on page 20.*

7.1. Standard mode

7.1.1. Evaluation of Electronic-Key data

In standard mode, the Electronic-Key data are read by the read unit and checked in the evaluation unit for validity based on specific parameters. If the Electronic-Key is recognized as valid, Electronic-Key data can be transferred to the control system to display the operating modes available for selection on the machine's touch panel, for example.

LEDs on the read unit and evaluation unit indicate the status and error messages, see chapter 14. *Status and error messages on page 32.*

The Electronic-Keys are written on the PC with the aid of the EKS2 programming station and corresponding application software. You will find further information in the corresponding instructions, see chapter 1.4. *Supplementary documents on page 5.*

Detailed application examples can be found in the Download area at www.euchner.com.

7.1.2. Selection of operating mode

The selected operating mode is transmitted via the evaluation unit's safety outputs F01A to F01F to the safe control system of the machine acting as the activation system. The safety outputs must be evaluated via 1-of-n evaluation in the safe control system.

During a change from one operating mode to another, first the output currently in use is set to LOW. Then all outputs are in the LOW state for 2 to 60 ms. This is not a fault state and must be tolerated by the control system. Then the output for the new operating mode is set.

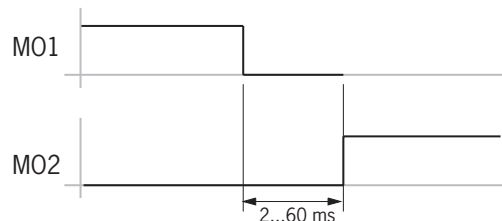


Fig. 4: Operating mode change

Each 1-of-n state maps an operating mode MO (**M**ode of **O**peration):

	F01A	F01B	F01C	F01D	F01E	F01F
MO0	1	0	0	0	0	0
MO1	0	1	0	0	0	0
MO2	0	0	1	0	0	0
MO3	0	0	0	1	0	0
MO4	0	0	0	0	1	0
MO5	0	0	0	0	0	1
Safe state ^{1) 2)}	0	0	0	0	0	0

1) Operating mode change: state duration from 2 to max. 60 ms; safe state: state duration longer than 60 ms.

2) The subsystem EKS2 is in the safe state. An error must be reported to the control system.

7.2. UID-only mode

In UID-only mode, the Electronic-Key-System EKS2 can also be used only to read a transponder's unique serial number (UID). The corresponding module must be selected in the GSDML during PROFINET configuration for this purpose, see chapter 10.2.3. *Selecting modules and submodules on page 20*.

The read unit reads the unique serial number (UID). It can be processed for other functions, such as login.

Selection of operating mode is not possible in UID-only mode.

8. Mounting

8.1. Mounting the read unit

Depending on the installation situation on the panel, the following read unit variants are available:

Read unit	Installation situation in the panel
Read unit with holding clip	
EKS2-R11A1-B1-170915	
EKS2-R11A2-B1-173727	
EKS2-R11A3-B1-173728	
EKS2-R11A4-B1-173729	
Read unit without holding clip	
EKS2-R11B1-B1-170919	Any installation position



NOTICE

- Risk of damage to equipment and malfunctions as a result of incorrect installation.
- › Install the read unit in a clean, flat front panel with a thickness of 1 to 3 mm.
 - › Provide a mounting cut-out D22 according to EN IEC 60947-5-1 with a diameter of 22.5 mm.
 - › During mounting, pay attention to the correct alignment of the individual components.
 - › Use only the threaded ring provided.
 - › Tighten the threaded ring to a tightening torque of 1.1 - 1.3 Nm using an appropriate tool.
 - › Provide strain relief for the connecting cables.
 - › Protect the read unit against rotation due to vibration or other external effects.

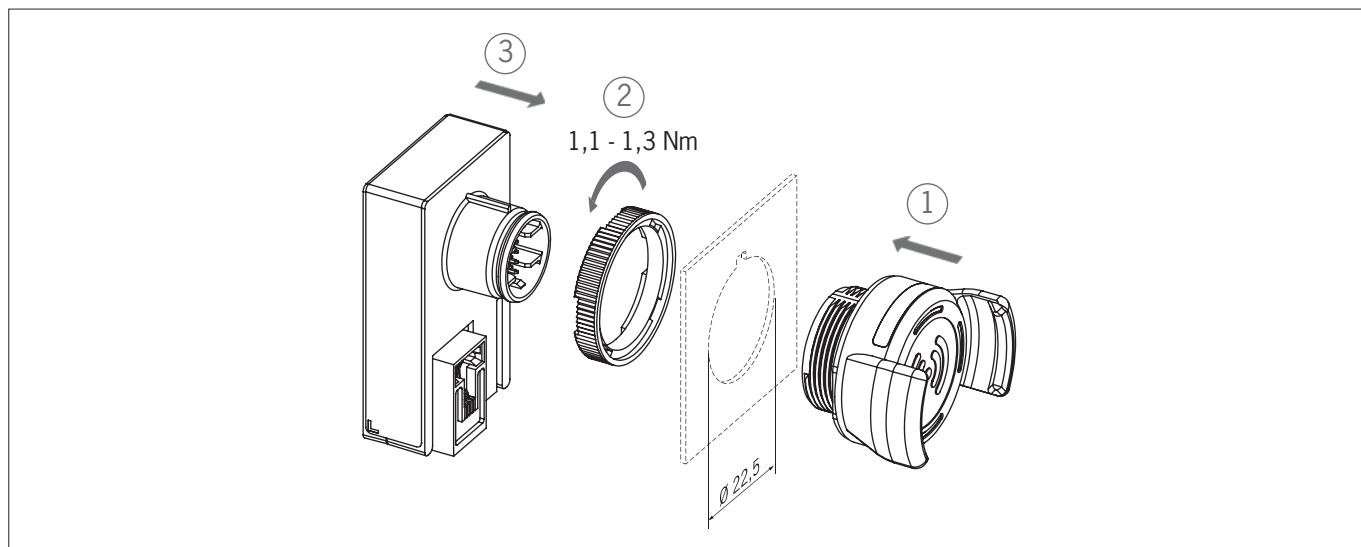


Fig. 5: Mounting the read unit

8.2. Mounting the evaluation unit



NOTICE

- Risk of damage to equipment and malfunctions as a result of incorrect installation.
- › Fasten evaluation unit using screws with a diameter of 4 mm.
- › Tighten screws to a tightening torque of 1.1 - 1.3 Nm.
- › Ensure adequate ventilation for the device to maintain the ambient temperature. Do not cover ventilation slots, see chapter 17.1.2. *Dimension drawing for EKS2 evaluation unit on page 40.*



Important!

- › The evaluation unit has a reset button above the LEDs, see chapter 17.1.2. *Dimension drawing for EKS2 evaluation unit on page 40.* While mounting, ensure that the reset button is accessible.

8.2.1. Panel mounting

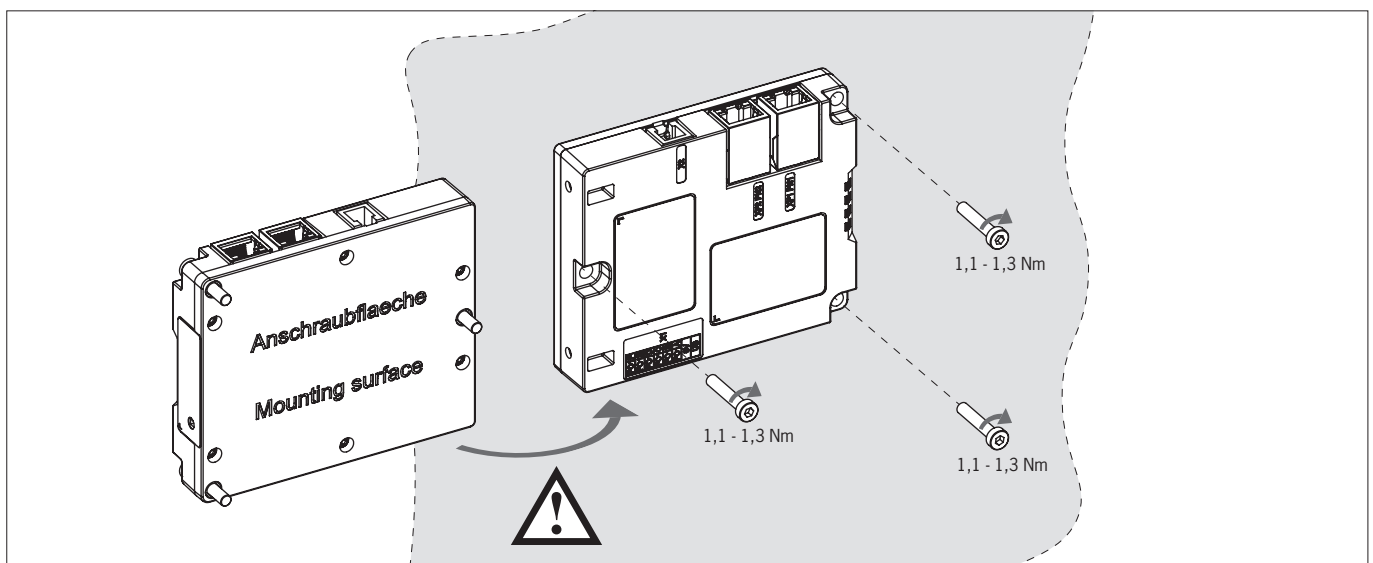


Fig. 6: Panel mounting

8.2.2. Control cabinet mounting



Important!

- › Use the mounting rail adapter AM-SET-PS-169829 (order no. 169829) for mounting on a 35 mm mounting rail.
- › Use only the screws provided during mounting.

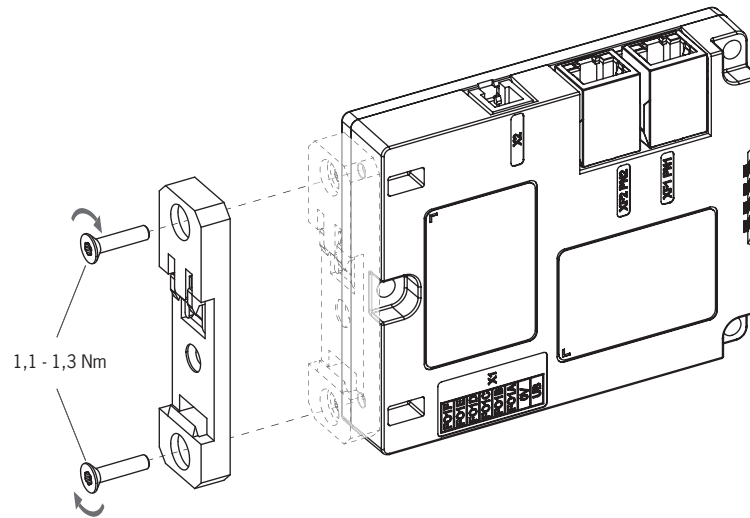


Fig. 7: Evaluation unit with mounting rail adapter for control cabinet mounting

9. Electrical connection

9.1. General notes

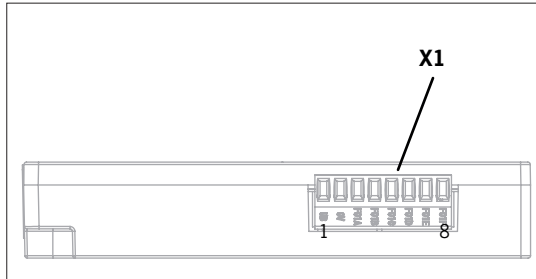
	WARNING Loss of the safety function due to incorrect electrical connection. › Ensure that the safety outputs FO1A to FO1F are evaluated via 1-of-n evaluation in the safe control system. › Ensure that at least two adjacent outputs from the safety outputs FO1A to FO1F can be evaluated by a safe control system at all times. › Lay the connecting cables with protection to prevent short circuits. › Do not lay connecting cables in the immediate vicinity of sources of interference.
	CAUTION Risk of damage to equipment or malfunctions as a result of incorrect electrical connection. › Ensure that all circuits connected to the device comply with the regulations for low voltages with safe electrical isolation (SELV/PELV). › Ensure that power devices, which are a powerful source of interference, are installed in a separate location away from the input and output circuits for signal processing. The cables of the safety circuits must be installed as far away as possible from the cables of the power circuits. › To avoid EMC interference, ensure that the physical environmental and operating conditions at the installation site of the device comply with the requirements according to the standard EN 60204-1 (EMC). › All electrical outputs must have an adequate protective circuit for inductive loads. The outputs must be protected with a free-wheeling diode for this purpose. Varistors and RC interference suppression units must not be used. › Pay attention to any interference fields from devices such as frequency converters or induction heating systems. Observe the EMC notes in the manuals from the respective manufacturer. › As the PROFINET cable, use only a screened 100 BaseTX cable, twisted pair, Cat5 or higher, with a maximum cable length of 100 m. › Use only cables with parallel conductors and straight-through wiring to connect the read unit to the evaluation unit. › Provide strain relief for the connecting cables to prevent malfunctions or damage at the device connectors. › Contact between the metal surfaces on the RJ45 sockets, the device's ground and the functional earth in the control cabinet must be prevented. The device itself does not have a functional earth.

9.2. Notes about UL

	Important! › This device is intended to be used with a Class 2 power source in accordance with UL1310. As an alternative an LV/C (Limited Voltage/Current) power source with the following properties can be used: This device shall be used with a suitable isolating source in conjunction with a fuse in accordance with UL248. The fuse shall be rated max. 0.5 A and be installed in the max. 30 V DC power supply to the device in order to limit the available current to comply with the UL requirements. Please note possibly lower connection ratings for your device (refer to the technical data). › For use and application as per the requirements of UL ¹⁾ a connecting cable listed under the UL category code CYJV/7 must be used. 1) Note on the scope of the UL approval: the devices have been tested as per the requirements of UL508 and CSA/ C22.2 no. 14 (protection against electric shock and fire).
--	--

9.3. Terminal assignment / connector assignment

9.3.1. Evaluation unit connection terminals



Pin	Designation	Description
X1.1	UB	Supply voltage 24 V DC
X1.2	0V	Supply voltage 0 V DC (GND)
X1.3	F01A	Safety output M00
X1.4	F01B	Safety output M01
X1.5	F01C	Safety output M02
X1.6	F01D	Safety output M03
X1.7	F01E	Safety output M04
X1.8	F01F	Safety output M05



Important!

- For the connection to the connection terminals on the evaluation unit, use only cables with a conductor cross-section of maximum 1.5 mm².
- For the screws in the terminal plug, pay attention to the tightening torque of 0.22 Nm.

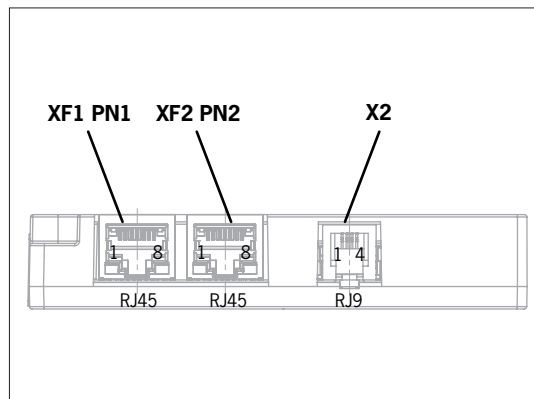
9.3.2. Evaluation unit terminal assignments

The evaluation unit has the following connections:

- Two RJ45 connections with integrated RT switch for the PROFINET interface
- One RJ9 connection for the read unit

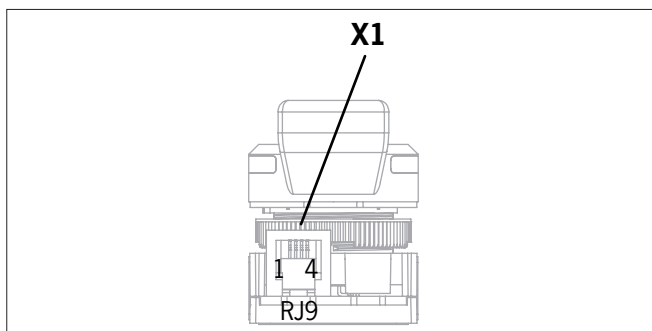
Pin	Description
XF1.1	Receive Data RD+
XF1.2	Receive Data RD-
XF1.3	Transmit Data TD+
XF1.4	n.c.
XF1.5	n.c.
XF1.6	Transmit Data TD-
XF1.7	n.c.
XF1.8	n.c.

Pin	Description
XF2.1	Receive Data RD+
XF2.2	Receive Data RD-
XF2.3	Transmit Data TD+
XF2.4	n.c.
XF2.5	n.c.
XF2.6	Transmit Data TD-
XF2.7	n.c.
XF2.8	n.c.



Pin	Description
X2.1	Supply voltage for read unit 24 V DC
X2.2	Read unit databus low (RS485-)
X2.3	Read unit databus high (RS485+)
X2.4	Supply voltage for read unit 0 V DC (GND)

9.3.3. Read unit terminal assignment



Pin	Description
X1.1	Supply voltage 24 V DC
X1.2	Databus low (RS485-)
X1.3	Databus high (RS485+)
X1.4	Supply voltage 0 V DC (GND)

10. Setup

10.1. Programming in the safe control system



Important!

While programming the evaluation in the safe control system, ensure that, when the operating mode is selected, exactly one output is set at the safety outputs FO1A to FO1F for transmission to the safe control system and the output is monitored via 1-of-n evaluation.

This means:

- If more than one output or no output is set, there is an error in the device or in the cable installation. The safe control system must be capable of reacting to such errors in accordance with the machine's risk assessment.

10.2. PROFINET configuration

The Electronic-Key-System EKS2 is integrated into the PROFINET environment via individual data blocks with the related communication data. The corresponding data blocks are combined and parameters set in the configuration software of the control system with the aid of the GSDML file for the EKS2.

10.2.1. Installing GSDML file

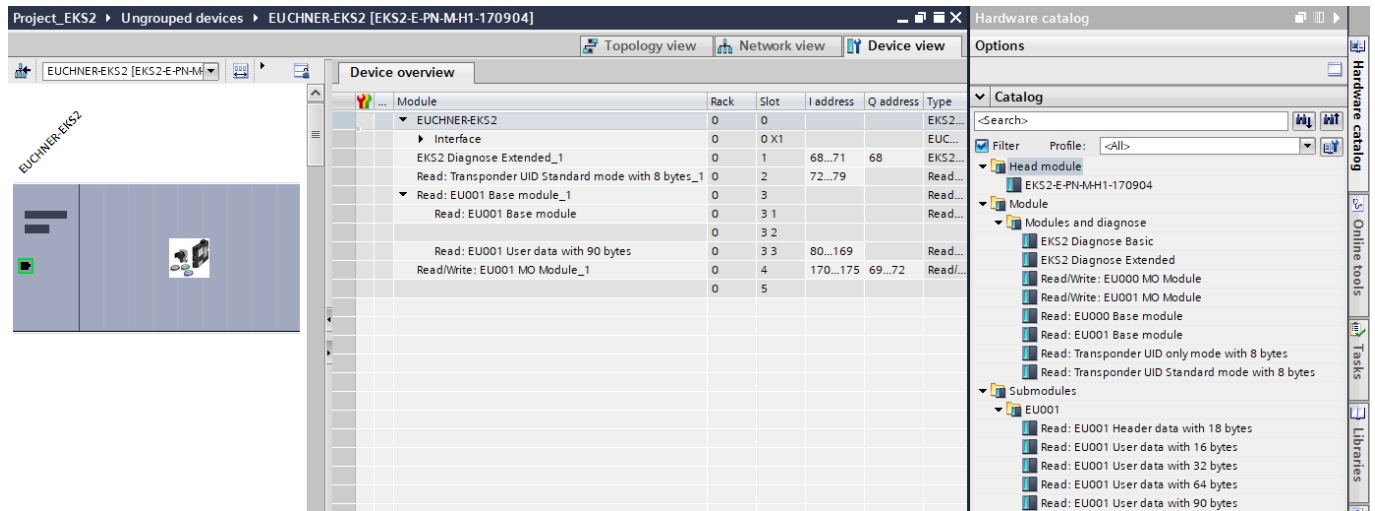
1. Download GSDML file from the Download area at www.euchner.com.
2. In *Options*, select the *Manage general station description files* function.
3. Install the latest GSDML file.

10.2.2. Integrating EKS2 evaluation unit

1. In the *Hardware catalog*, in *Other field devices*, select the EKS2 evaluation unit.
2. Using drag & drop, drag the evaluation unit to the network view and connect to the control system.
3. Select the evaluation unit by double-clicking it to configure the parameters.
 - ➡ The *Device View* opens.
4. The following parameters can be specified:
 - Name of the device in *General*
 - IP address in *PROFINET interface/Ethernet addresses*

10.2.3. Selecting modules and submodules

The standard modules and other optional modules for the evaluation unit are displayed in the *Device View* in the *Hardware catalog*.



The following modules are available and are either already included in the GSDML for the evaluation unit as a standard configuration or, optionally, can be added:

Table 3: EKS2 modules

The **standard modules** are in **bold**.

Module	Parameter [default value]	Description	Slot
EKS2 Diagnose Basic	Alarm setting: Activated/Deactivated [Deactivated] Data format setting: Little/Big Endian [Big Endian]	- Reading status messages - Parameterizing the alarms - Parameterizing the data format	1
EKS2 Diagnose Extended	Alarm setting: Activated/Deactivated [Deactivated] Data format setting: Little/Big Endian [Big Endian]	- Reading status and diagnostic messages - Parameterizing the alarms - Parameterizing the data format	1
Read: Transponder UID Standard mode with 8 bytes		- Activating standard mode, see chapter 7.1. <i>Standard mode on page 11</i> - Reading the transponder's unique serial number (UID)	2
Read: Transponder UID-only mode with 8 bytes		- Activating UID-only mode, see chapter 7.2. <i>UID-only mode on page 12</i> - Reading the transponder's unique serial number (UID) - Selection of operating mode not possible	2
Read: EU001 Base Module	Automatic data evaluation: Yes/No [Yes]	Activating automatic data evaluation	3.1
	Company: [0] Plant: [0] Department: [0]	These fields are evaluated one after the other as a hierarchy.	
	Cost center: 1 - 5 [0]	These fields are combined with an OR operator.	
	Exception value: 1, 2 [0]	The values in these fields are superordinate to the other fields in the evaluation.	
	Use expiry date: Yes/No [No]	- Internal evaluation of the transponder's expiry date - The current date additionally must be defined in the control system and sent to the evaluation unit via an acyclical command.	
	Automatic Electronic-Key management: Activated/Deactivated [Deactivated]	Activating automatic Electronic-Key management	
Read: EU001 header data with 18 bytes		Additional reading of the header data in the control system	3.2
Read: EU001 User data with 16 bytes		Reading user data with 16 bytes ¹⁾	3.3
Read: EU001 User data with 32 bytes	Start address: [26]	Reading user data with 32 bytes ¹⁾	3.3
Read: EU001 User data with 64 bytes	Number of bytes to be read: [dependent on the module]	Reading user data with 64 bytes ¹⁾	3.3
Read: EU001 User data with 90 bytes		Reading user data with 90 bytes ¹⁾	3.3

Module	Parameter [default value]	Description	Slot	
Read: EU000 Base Module	Use expiry date: Yes/No [No]	- Internal evaluation of the transponder's expiry date - The current date additionally must be defined in the control system and sent to the evaluation unit via an acyclical command.	3	3.1
	Start address of the expiry date: [0]	Start address of the expiry date		
Read: EU000 User data with 16 bytes	Start address: [0] Number of bytes to be read: [dependent on the module]	Reading user data with 16 bytes	3	3.2
Read: EU000 User data with 32 bytes		Reading user data with 32 bytes		
Read: EU000 User data with 64bytes		Reading user data with 64 bytes		
Read: EU000 User data with 116 bytes		Reading user data with 116 bytes (default)		
Read/Write: EU001 MO Module	Machine group: 1-4 [1] Operating mode after system start: MO0-MO5 [MO0] ²⁾	- Compatible only with EU001 Base Module - Setting the machine group - Configuring the parameters for selection of operating mode in the evaluation unit	4	
Read/Write: EU000 MO Module	Start address of the Max. MO value: [0] Operating mode after system start: MO0-MO5 [MO0] ²⁾	- Compatible only with EU000 Base Module - Setting the address range for the Max. MO value on the Electronic-Key - Configuring the parameters for selection of operating mode in the evaluation unit	4	

1) The first four bytes contain the personnel number.

2) The operating mode after system start (Boot MO) is a safe configuration.



Important!

The operating mode to which the system switches automatically after system start is specified during the configuration of the parameters in the GSDML file, see *Table 3: EKS2 modules on page 20*.

The operating mode MO0 (output FO1A) is the factory-set default.

10.3. Teaching-in access key (only in standard mode)

For the use of the Electronic-Key-System EKS2 in standard mode, it is necessary to teach-in an access key that encrypts the project and transponder data.

Proceed as follows:

1. Generate an access key in the EKS2 software for reading and writing Electronic-Keys. You will find further information in the corresponding instructions, see chapter 1.4. *Supplementary documents on page 5*.
2. Place a transponder encrypted with the access key in the operating distance of the read unit ready for operation.
 - ➔ The access key on the transponder is transferred to the system.
 - ➔ The system can now decrypt the data from this transponder and all other transponders with the same access key.



Important!

If the access key is changed, the system must be reset to the factory settings and taught-in again, see chapter 15. *Factory reset on page 37*.

10.4. Functional check



WARNING

Loss of the safety function due to incorrect installation and erroneous functional check.

- › Before carrying out the functional check, make sure that there are no persons in the danger area.
- › Observe the valid accident prevention regulations.

After installation and after any fault, the safety function must be fully checked.

Proceed as follows:

1. Check for correct mounting and correct electrical connection of the individual components.
2. Apply operating voltage.
3. Connect PROFINET cable and establish connection.
 - ➔ The STATE LED on the evaluation unit illuminates green. The LED on the read unit illuminates yellow.
 - ➔ The system is ready for operation.
4. Place an Electronic-Key in the operating distance of the read unit.
 - ➔ The LED on the read unit illuminates green with a valid Electronic-Key.
5. In case of use for selection of operating mode: check for the correct selection of the operating modes to check the safe outputs.

11. Communication data

11.1. Cyclical communication data

Module	Data block	Size of user data	Data type
General			
Device	EKS2 Profinet		Name, IP address
Reading input data			
Status	Status	2 bytes	Status bytes and error codes
	Status and diagnostics	4 bytes	
UID	UID (Unique Identifier)	8 bytes	Serial number
EU001	EU001 header data	18 bytes	Company, plant, department, cost center, expiry date
	EU001 user data	16 bytes	Personnel number, other user data
		32 bytes	
		64 bytes	
		90 bytes	
EU000	EU000 user data	16 bytes	User data
		32 bytes	
		64 bytes	
		116 bytes	
Writing/reading input/output data			
MO	Read MO	6 bytes	Data words for the communication between EKS2 and touch panel, see <i>Table 3: EKS2 modules on page 20</i>
	Write MO	4 bytes	

11.1.1. Input area (read process)

Table 4: Diagnose Basic module

PROFINET	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Cyclical job in progress	Ready for cyclical job	Cyclical job error	Device error	Ready for acyclical job	Acyclical job error	Electronic-Key detected	Device ready for operation
Byte 1 *	-	Electronic-Key valid	Electronic-Key invalid	-	-	-	Selection of operating mode error	No user area included

*The byte is not used in UID-only mode.

Table 5: Diagnose Extended module

PROFINET	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Cyclical job in progress	Ready for cyclical job	Cyclical job error	Device error	Ready for acyclical job	Acyclical job error	Electronic-Key detected	Device ready for operation
Byte 1 *	-	Electronic-Key valid	Electronic-Key invalid	-	-	-	Selection of operating mode error	No user area included
Byte 2	Diagnostics byte 1, see chapter 14.3. Error messages on page 34							
Byte 3	Diagnostics byte 0, see chapter 14.3. Error messages on page 34							

*The byte is not used in UID-only mode.

The following setting and resetting conditions apply to the bits of the Diagnose Basic and Diagnose Extended modules:

Bit	Description	Condition for setting	Condition for resetting
Cyclical job in progress	A cyclical job has been accepted and is in progress.	A new cyclical job is detected.	The cyclical job has been completed.
Ready for cyclical job	The last cyclical job has been completed and answered.	The device is ready for a new cyclical job.	A cyclical job is in progress.
Cyclical job error	The last cyclical job was erroneous.	The last cyclical job is invalid or contains incorrect parameters.	A new cyclical job is detected.
Device error	An error has occurred on a device.	- Connection to the read unit interrupted - Output error during selection of operating mode	After error correction, see chapter 14.3. Error messages on page 34.
Ready for acyclical job	The last acyclical job has been completed and answered.	The device is ready for a new acyclical job.	An acyclical job is in progress.
Acyclical job error	The acyclical job is erroneous.	The last acyclical job is invalid or contains incorrect parameters.	A new acyclical job is accepted.
Electronic-Key detected	An Electronic-Key is in the operating distance.	An Electronic-Key is located in the operating distance of the read unit and has been detected.	There is no Electronic-Key in the operating distance.
Device ready for operation	The device is in operation.	The device has been restarted.	The device is restarted.
Electronic-Key valid	- The Electronic-Key is readable and detected by the device as valid. - The bit is not used in UID-only mode.	The Electronic-Key and the Electronic-Key data are valid.	There is no Electronic-Key in the operating distance.
Electronic-Key invalid	- The Electronic-Key is invalid and not accepted by the device. - The bit is not used in UID-only mode.	- The access key is invalid, see chapter 10.3. Teaching-in access key (only in standard mode) on page 21. - Header data are invalid.	There is no Electronic-Key in the operating distance.
Selection of operating mode error	An error occurred during selection of operating mode.	- Wrong sequence of selection of operating mode - Output error	After error correction, see chapter 14.3. Error messages on page 34.
No user area included	No user area included on the Electronic-Key.	The Electronic-Key includes data but no user area.	There is no Electronic-Key in the operating distance.

Table 6: Data modules UID

Byte no.	Designation
0 ... 7	UID (Unique Identifier)

Table 7: Data module EU001 header data

Byte no.	Designation
0 ... 3	Company
4 ... 7	Plant
8 ... 11	Department
12 ... 15	Cost center
16 ... 17	Expiry date

Table 8: Data module EU001 user data

Byte no.	Designation
0 ... 3	Personnel number
4 ... 15	Freely programmable user data with 16 bytes
4 ... 31	Freely programmable user data with 32 bytes
4 ... 63	Freely programmable user data with 64 bytes
4 ... 89	Freely programmable user data with 90 bytes

Table 9: Data module EU000 user data

Byte no.	Designation
0 ... 15	Freely programmable user data with 16 bytes
0 ... 31	Freely programmable user data with 32 bytes
0 ... 63	Freely programmable user data with 64 bytes
0 ... 115	Freely programmable user data with 116 bytes

Table 10: MO module (reading)

Byte no.	Designation
0 ... 1	Max. MO
2 ... 3	Check MO
4	-
5	Current MO

11.1.2. Output area (write process)



Important!

The control system's output area must be cleared after every complete selection of operating mode sequence to avoid an MO error (plausibility error) during restart.

Table 11: MO module (writing)

Byte no.	Designation
0 ... 1	Select MO
2 ... 3	Confirm MO

Table 12: Diagnostic module (writing)

PROFINET	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0 (command byte)	Acknowledge error messages or warnings	-	-	-	-	-	-	-

Command bit	Designation	Function
7	Acknowledgment bit	Resets resettable error messages and warnings via the control system. The acknowledgment bit must be set for min. 100 ms.

11.2. Acyclical data

11.2.1. Read

The command must be addressed to slot 1 (diagnostic module).

Index		Information	Size/format	Value		Description
Hex	Dec			Hex	Dec	
0x1021	4129	Order number for the transponder	Word32	Example: 0x291F0	168432	EKS2-K-K-B-D2-RD-168432
0x1022	4130	Transponder color	byte	0x01 0x02 0x03 0x04 0x05 0x06 0x07	1 2 3 4 5 6 7	green blue yellow black orange white red
0x1038	4152	Date/time	byte	0x00 ... 0x63	0 ... 99	Date: year (1970 ... 2069)
				0x01 ... 0x0C	1 ... 12	Date: month
				0x01 ... 0x1F	1 ... 31	Date: day
				0x00 ... 0x17	0 ... 23	Time: hour
				0x00 ... 0x3B	0 ... 59	Time: minute
				0x00 ... 0x3B	0 ... 59	Time: second

11.2.2. Write

The command must be addressed to slot 1 (diagnostic module).

Index		Information	Byte no.	Value		Description
Hex	Dec			Hex	Dec	
0x1000	4096	Open special machine manufacturer area	0	0x02	2	Command
			1	-	-	-
			2 - 17	User-specific		Access key for the "Service" operating mode
0x1000	4096	Date/time	0	0x05	5	Command
			1	-	-	-
			2	0x00 ... 0x63	0 ... 99	Date: year (1970 ... 2069)
			3	0x01 ... 0x0C	1 ... 12	Date: month
			4	0x01 ... 0x1F	1 ... 31	Date: day
			5	0x00 ... 0x17	0 ... 23	Time: hour
			6	0x00 ... 0x3B	0 ... 59	Time: minute
			7	0x00 ... 0x3B	0 ... 59	Time: second
			8	-	-	-
			9	-	-	-

11.2.3. Special machine manufacturer area

The "Service" operating mode can be saved in the special machine manufacturer area, for example.

You will find further information in the application in the Download area at www.euchner.com

12. Electronic-Key data structure

The data are written to the Electronic-Keys with the aid of the EKS2 programming station and a corresponding software application for the EKS2. Predefined data structures are available for structuring the data in the Electronic-Key memory and for subsequent evaluation in the EKS2.

You will find further information about the data modules in chapter 10.2.3. *Selecting modules and submodules on page 20* and about data transmission from the EKS2 to the control system in chapter 11.1. *Cyclical communication data on page 23*.

12.1. EU000 data structure

Data area (116 bytes) ¹⁾	Designation	Module for transmission to PLC	Data type	Internal data evaluation
0 ... 115	Freely programmable user data	Read: EU000 User data with x bytes	Bytes	No ²⁾

¹⁾ Corresponds to the Electronic-Key memory. The data are mapped in the input area of the control system in the corresponding data modules, see 11.1. *Cyclical communication data on page 23*

²⁾ If "Maximum operating modes" and "Expiry date" are used within the customer-specific structure, these data can be evaluated internally as required, see Table 3: EKS2 modules on page 20.

12.2. EU001 data structure

Data area (116 bytes) ¹⁾	Designation	Module for transmission to PLC	Data type	Internal data evaluation
0 ... 3	Company	Read: EU001 header data with 18 bytes	UInt32	Yes
4 ... 7	Plant			
8 ... 11	Department			
12 ... 15	Cost center			
16 ... 17	Expiry date		Date	
18 ... 19	Machine group 1	Read/Write: EKS2 MO Module ²⁾	Word	
20 ... 21	Machine group 2			
22 ... 23	Machine group 3			
24 ... 25	Machine group 4			
26 ... 29	Personnel number	Read: EU001 User data with x bytes	UInt32	No
30 ... 115	Freely programmable user data		Bytes	

¹⁾ Corresponds to the Electronic-Key memory. The data are mapped in the input area of the control system in the corresponding data modules, see 11.1. *Cyclical communication data on page 23*.

²⁾ Only one machine group is transmitted as the Max. MO value. This is specified via the module's parameter assignment, see on page 24.

12.3. EU002 data structure (only for machine manufacturers)

Data area (18 bytes) ¹⁾	Designation	Module for transmission to PLC	Data type	Internal data evaluation
0 ... 1	Expiry date	Read: EU001 header data with 18 bytes	Date	Yes
2 ... 3	Operating modes	Read/Write: EKS2 MO Module	Word	
4 ... 7	Personnel number	Read: EU001 User data with x bytes	UInt32	No
8 ... 17	Freely programmable user data		Bytes	

¹⁾ Corresponds to the Electronic-Key memory. The data are mapped in the input area of the control system in the corresponding data modules, see 11.1. *Cyclical communication data on page 23*

13. Integrated web server

The Electronic-Key-System EKS2 has an integrated web server that can be used at any time during operation. The system parameters cannot be configured via the integrated web server.

The following data can be read:

- › Events in the network
- › Errors in the Electronic-Key-System EKS2
- › Device status of the individual EKS2 components

13.1. Using integrated web server

Proceed as follows to open the web server:

1. Connect the evaluation unit to a standard PC via the network cable.
2. Open browser and type the IP address of the device.
3. The web server is opened:

HOMELOGERROR LOGSTATUSSETTINGS

EUCHNER
More than safety.



DCP Name: euchner-eks2
IP Address: 192.168.0.101
MAC-ID:
EKS2: 00:1A:5C:0C:95:DB
PN1: 00:1A:5C:0C:95:DC
PN2: 00:1A:5C:0C:95:DD

ELECTRONIC-KEY-SYSTEM
EKS2 SYSTEM STATUS

Name	Order no.	Hardware version	Firmware version	Present
EKS2 Evaluation unit	170904	V1.0.0	V1.2.0	●
EKS2 Read unit	170915	V1.0.0	V1.2.0	●
EKS2 Key				●

EKS2 Media Library

EUCHNER GmbH + Co. KG
Kohlhammerstr. 16
D-70771 Leinfelden-Echterdingen

13.2. Reading event log (LOG)

Events in the network can be read in the LOG view:

[HOME](#)
[LOG](#)
[ERROR LOG](#)
[STATUS](#)
[SETTINGS](#)



More than safety.



INDUSTRY 4.0

DCP Name: euchner-eks2
 IP Address: 192.168.0.104
 MAC-ID:
 EKS2: 00:1A:5C:0C:96:14
 PN1: 00:1A:5C:0C:96:15
 PN2: 00:1A:5C:0C:96:16

**ELECTRONIC-KEY-SYSTEM
EKS2 LOG**

Nr.	Category	Status Code	Message	Time Stamp	BootCounter
100	Key	0x0900	KeyUID = 04 1F 39 2A C7 10 90 00	01:01:1970 04:02:13	48
99	Key	0x0900	KeyUID = 04 1F 39 2A C7 10 90 00	01:01:1970 00:00:00	48
98	Boot	0x0101	BootloaderInfo = 0x00000000	01:01:1970 00:00:00	48
			SoftwareVersion = 01.02.00		
97	Boot	0x0100	BootCNT = 0x00000030	01:01:1970 00:00:00	48
			SoftwareVersion = 01.02.00		
96	Key	0x0900	KeyUID = 04 1F 39 2A C7 10 90 00	01:01:1970 00:00:00	47
95	Boot	0x0101	BootloaderInfo = 0x00000000	01:01:1970 00:00:00	47
			SoftwareVersion = 01.02.00		

The following status codes are used:

Status code	Message	Description
0x0050	-	The memory for the event log is full. Older events will be deleted.
0x0100	BootCNT: number of restarts since the last firmware update SoftwareVersion: current firmware version of the evaluation unit	The system has been restarted.
0x0101	BootloaderInfo: status of the firmware update performed 0x46575553: firmware update successful 0x4E465755: firmware update not successful SoftwareVersion: current firmware version of the evaluation unit	The firmware has been updated.
0x0200	SoftwareVersion: current firmware version of the evaluation unit	A firmware update has been started.
0x0900	KeyUID: unique serial number (UID) of the transponder	A transponder has been placed.
0x0901	KeyUID: unique serial number (UID) of the transponder	A transponder has been removed.
0x0902	KeyUID: unique serial number (UID) of the transponder ExpiryDate: expiry date on the transponder	The placed transponder has expired and is not accepted.
0x0904	KeyUID: unique serial number (UID) of the transponder	The header data in the placed transponder have been changed via the control system.
0x0906	KeyUID: unique serial number (UID) of the transponder SwitchAppType: open data area	Change to a different data area.
0x1010	MSOProcessStep: status during the process to select the operating mode 0x00: selecting operating mode 0x01: checking selection 0x02: confirming selected operating mode	The selection process for selection of operating mode takes place.
0x7003	-	The system parameters have been changed.
0x7004	-	A factory reset has been performed successfully.
0x8000	CurrentDate: current time stamp	Date and time in the system have been updated.

13.3. Reading ERROR LOG

Errors in the Electronic-Key-System EKS2 can be read in the *ERROR LOG* view:

[HOME](#)
[LOG](#)
[ERROR LOG](#)
[STATUS](#)
[SETTINGS](#)

EUCHNER

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INDUSTRY 4.0

DCP Name: euchner-eks2
IP Address: 192.168.0.104
MAC-ID:
EKS2: 00:1A:5C:0C:96:14
PN1: 00:1A:5C:0C:96:15
PN2: 00:1A:5C:0C:96:16

**ELECTRONIC-KEY-SYSTEM
EKS2 ERROR LOG**

Nr.	Name	Error Code	Message	Time Stamp	BootCounter
50	EKS2 Evaluation unit	0x007B	Error Removed. No Profinet Connection	01:01:1970 04:02:13	48
49	EKS2 Evaluation unit	0x007B	Error Added. No Profinet Connection	01:01:1970 00:00:00	48
48	EKS2 Evaluation unit	0x007B	Error Added. No Profinet Connection	01:01:1970 00:00:00	47
47	EKS2 Evaluation unit	0x007B	Error Added. No Profinet Connection	01:01:1970 00:00:00	46
46	EKS2 Evaluation unit	0x007B	Error Added. No Profinet Connection	01:01:1970 00:29:58	45
45	EKS2 Evaluation unit	0x007B	Error Removed. No Profinet Connection	01:01:1970 00:00:39	45

You will find the error codes and their description in chapter 14.3. *Error messages on page 34.*

13.4. Reading device status (STATUS)

The device status of the individual EKS2 components can be read in the *STATUS* view:

[HOME](#)
[LOG](#)
[ERROR LOG](#)
[STATUS](#)
[SETTINGS](#)

EUCHNER

More than safety.



INDUSTRY 4.0

DCP Name: euchner-eks2
IP Address: 192.168.0.104
MAC-ID:
EKS2: 00:1A:5C:0C:96:14
PN1: 00:1A:5C:0C:96:15
PN2: 00:1A:5C:0C:96:16

**ELECTRONIC-KEY-SYSTEM
EKS2**

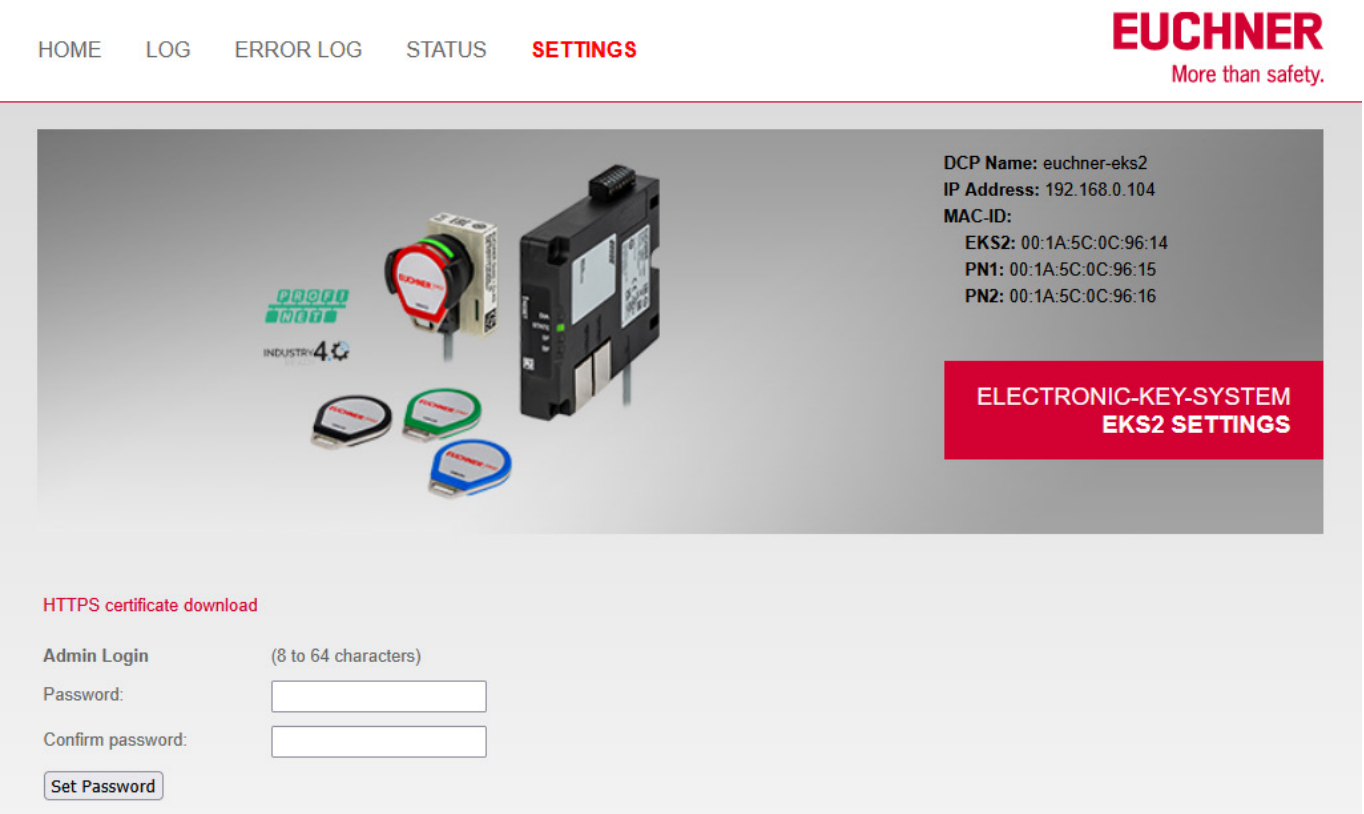
Name	Voltage [V]	CPU Temperature [°C]	Time Stamp	BootCounter
EKS2 Evaluation unit	25,1	50,6	01:01:1970 04:52:27	48
EKS2 Read unit	25,4	52,2	01:01:1970 04:53:00	63

Status Bytes [0][1]							
Command active	Command ready	Command error	Device error	Acyclic ready	Acyclic error	Key inserted	EKS2 active
0	1	0	0	1	0	1	1
-	Key ok	Key error	-	-	-	MO error	No End-User APP
-	1	0	-	-	-	0	0

You will find further information about the status bytes in chapter 11.1.1. *Input area (read process) on page 23.*

13.5. Managing settings (SETTINGS)

You can download the HTTPS certificate and manage the administrator area in the *SETTINGS* view:



The administrator area is protected by a specific password that is assigned the first time the web server is used. In the administrator area, it is possible to assign a further password for the firmware update process, see chapter 16. *Updating firmware on page 38.*



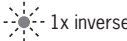
Important!

- › EUCHNER recommends assigning an individual password for each device.
- › If a default password is used for different devices instead of individual passwords, it is essential to observe the following points:
 - The use of default passwords might facilitate unauthorized access to the network and the devices.
 - If a network error occurs during the firmware update process, devices not intended for a firmware update might be updated.

14. Status and error messages

14.1. LED displays

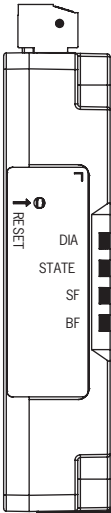
The LED displays on the read unit and the evaluation unit indicate the individual status and error messages. More detailed error messages can be read via the control system or the integrated web server.

Key to symbols							

14.1.1. Read unit LED indicator

The LED in the read unit indicates using the colors red, green and yellow.

14.1.2. Evaluation unit LED indicator



LED	Color
DIA	red, yellow
STATE	red, green, yellow
SF (System fault)	red, yellow
BF (Bus fault)	red, yellow

14.2. Status messages

Operating mode	Evaluation unit LED indicator red/green/yellow				LED indicator Read unit	Status
	DIA	STATE	SF	BF	RGB	
Normal operation		 green			 yellow	Ready for operation
		 green			 green	Valid Electronic-Key
	 red 1 Hz	 green 1 Hz			 red/green 1 Hz	Device detection after pressing the "Flash LED" option in the control system
Factory reset	 red 2 Hz	 green 2 Hz			 red/green 2 Hz	Factory reset, see chapter 15. <i>Factory reset on page 37</i>

14.3. Error messages

Error code	Evaluation unit LED indicator red/green/yellow				Read unit LED indicator red/green/yellow	Error	Troubleshooting	Acknowledging errors	
	DIA	STATE	SF	BF				Reseta-ble	Non-re-settable
Internal fault									
0x01					 red on/green 1x briefly	 Internal device fault Internal device fault Error during factory reset	Restart system. On repeated occurrence, contact the EUCHNER support team.		
-					 red	Error on the read unit	Restart system. On repeated occurrence, contact the EUCHNER support team.		
-					 2x yellow	Error on the evaluation unit	Restart system. On repeated occurrence, contact the EUCHNER support team.		
Configuration error									
0x03					 red on/green 1x briefly	Invalid safe configuration of the parameters	Check the parameters for the MO settings in the GSDML file and correct if necessary. Then load the corrected parameters into the assembly and restart the system.		
0x04					 red / green 2 Hz	The safe configuration has been changed.	Restart system.		
					 yellow on / green 1x	The non-safe configuration has been changed.			
0x06					 yellow on / green 1x	Invalid non-safe configuration of the parameters	Check the parameters that can be set in the GSDML and correct them if necessary. Then load the corrected parameters into the assembly and restart the system.		
Compatibility error									
0x05					 yellow 3 x	System components are incompatible.	 Check device versions for compatibility. Update firmware.		
Output error									
0x54					 red on/green 1x briefly	Invalid state of the safety outputs	Check wiring.		

Error code	Evaluation unit LED indicator red/green/yellow				Error	Troubleshooting	Acknowledging errors		
	DIA	STATE	SF	BF			Reseta-ble	Non-re-settable	
Evaluation unit environment errors									
0x60						Supply voltage at the evaluation unit too high			
									Observe the specified supply voltage, see chapter 17.1.1. Technical data for EKS2 evaluation unit on page 39
									
0x61						Supply voltage at the evaluation unit too low			
									
0x62					Device temperature at the evaluation unit too high	Observe the specified temperature range, see chapter 17.1.1. Technical data for EKS2 evaluation unit on page 39.			
0x63					Device temperature at the evaluation unit too low				
Read unit environment errors									
0x6C						Supply voltage at the read unit too high			
									Supply voltage at the read unit too low
									
0x6D						Device temperature at the read unit too high			
									
0x6E					Device temperature at the read unit too high	Observe the specified device temperature, see chapter 17.2.1. Technical data for EKS2 read unit on page 41			
0x6F					Device temperature at the read unit too low				
Communication error									
0x7B					No PROFINET connection	Check cables and plug connectors for the PROFINET connection for correct seating and damage.			
					Communication error between system components				
0x7C					Communication error between system components	Check cables and plug connectors between evaluation unit and read unit for correct seating and damage.			

Error code	Evaluation unit LED indicator red/green/yellow				Read unit LED indicator red/green/yellow	Error	Troubleshooting	Acknowledging errors	
	DIA	STATE	SF	BF				Reseta-ble	Non-re-settable
Transponder/Electronic-Key error									
0xC0						Erroneous Electronic-Key data	▶ Check transponder, only EUCHNER transponders intended for the EKS2 system are permitted to be used. ▶ Check whether the access key is erroneous.		
0xC1						Invalid Electronic-Key	Check header data for validity.		
0xC2						Disabled Electronic-Key			
0xC3						Expired Electronic-Key	Check transponder for validity.		
Application error									
0xC4						Application error	Check data sent. The access key or the command may be incorrect.		
0xC5							Check contents of transponder. The transponder must contain the special machine manufacturer area if necessary.		
0xC6							Check the installation situation. External influences, such as a second read unit, could interfere with or impair the read process.		
0x70					  yellow on/green 2x briefly	Interference in the read unit	Correct PROFINET command.		
0x7D						Error during selection of operating mode	▶ Check data sent. ▶ Check data channel. ▶ Check configuration of the touch panel.		
0x11									
Update error									
0xAF						Error during firmware update.	▶ Run firmware update again. ▶ Check product and firmware versions and their compatibility. ▶ Wait until the update has finished and the device is restarted.		
									

1) This error message will not result in system shutdown.

14.4. Acknowledging error messages

Resettable errors can be acknowledged as follows:

- Send the acknowledgment bit, see chapter 11.1.2. *Output area (write process) on page 25*
- Selection of a valid operating mode
- For application errors: place a valid Electronic-Key

If the error is still indicated, disconnect the power supply for min. 3 s.

Non-resettable errors are also acknowledged by disconnecting the power supply (min. 3 s).

The system configuration is not deleted when the power supply is disconnected to acknowledge errors.



Important!

If the fault display is not cleared after a reset, contact the EUCHNER support team.

14.5. PROFINET alarms

The PROFINET alarms can be activated during PROFINET configuration, see *Table 3: EKS2 modules on page 20*.

The following alarms can be sent to the control system:

- Diagnostics alarms
- Process alarms: Process alarms are written to a data area in the control system.

The following errors are assigned to the standard PROFINET alarms:

Alarm number	Alarm information	Troubleshooting
0x0002	Supply voltage at the evaluation unit too low	Observe the specified supply voltage, see chapter 17.1.1. <i>Technical data for EKS2 evaluation unit on page 39</i>
0x0003	Supply voltage at the evaluation unit too high	
0x0005	Device temperature at the evaluation unit too high	Observe the specified temperature range, see chapter 17.1.1. <i>Technical data for EKS2 evaluation unit on page 39</i> .

The device's error messages are assigned to corresponding PROFINET alarms, which are written in the data area with offset 0x0100, see 14.3. *Error messages on page 34*.

The alarms are structured as follows: [byte word with alarm number];[byte with alarm information].

15. Factory reset

A factory reset deletes the system configuration and restores the factory settings.

1. Apply voltage to the system.
 - ➔ The system is started.
2. Wait 30 s.
 - ➔ The system has booted.
3. Within 70 s, actuate the reset button on the evaluation unit for longer than 5 s.
 - ➔ The DIA LED flashes red, and the STATE LED flashes green. The LED on the read unit alternately flashes red and green, see chapter 14.2. *Status messages on page 33*.
 - ➔ The system restarts automatically after completion of the factory reset.



Important!

The *factory reset* via the TIA-Portal does not reset the complete Electronic-Key-System EKS2. The access key is retained in the system and can be deleted only by means of a factory reset using the reset button.

16. Updating firmware

The firmware of the Electronic-Key-System EKS2 can be updated using EUCHNER Device Update. You will find further information in the software manual for EUCHNER Device Update.



WARNING

Loss of the safety function

A firmware update can change or expand functions.

Observe the following points to ensure the safety function:

- › Carefully observe the release notes for the respective firmware version prior to the update process. Ensure that the changes triggered by the firmware update continue to comply with the requirements of the overall system.
- › Perform a risk assessment on the overall system before the update if necessary, because the update could change functions or processes in the EUCHNER device.
- › Observe and follow the instructions in the software manual for EUCHNER Device Update when updating the firmware.

16.1. Running EUCHNER Device Update



NOTICE

Damage to the device

The device can be damaged when the firmware is updated.

- › Make sure to use only one instance of the EUCHNER Device Update tool. Sending several broadcasts simultaneously from different instances to search for devices can damage the device.
- › Ensure that a possible network connection loss does not result in the loss of data and damage to the device. While the network is being scanned, an overload might occur.
- › Ensure a stable power supply for the device.
- › Ensure that the automatic restart of the device after a successful update is not interrupted.



Important!

- › Before updating, ensure that the read unit is connected to the evaluation unit such that the entire system can be updated.
- › After the update, check the update report to determine whether and on which devices the update process was successful.
- › Ensure that the firmware update is recorded in the machine documentation using the automatically generated update report.
- › Ensure that the device documentation corresponding to the update is available and is observed after the device update.

17. Technical data



NOTICE

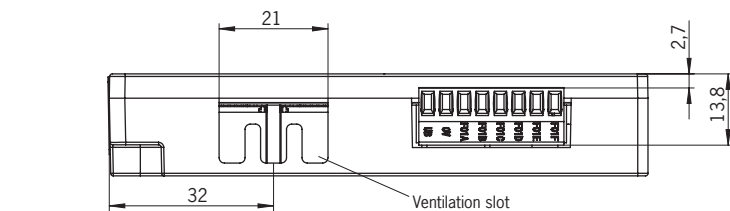
If a data sheet is available for the product, the information on the data sheet applies.

17.1. EKS2 evaluation unit

17.1.1. Technical data for EKS2 evaluation unit

Parameter	Value			Unit
	min.	typ.	max.	
General				
Material	Plastic (PA66 GF40, black)			
Degree of protection in the installed state	IP20			
Ambient temperature at UB = 24 V	-20	-	+55	°C
Storage temperature	-35	-	+85	°C
Power supply connection	Plug-in connection terminal, 8-pin, with screw terminal (tightening torque 0.2 ... 0.25 Nm), conductor cross-section 0.05 ... 1.5 mm²			
Interface, data transfer				
Interface to the control system	Industrial Ethernet (IEEE 802.3)			
Transfer protocol	PROFINET			
Data transfer rate (full duplex)	10/100			MB/s
Connection for Ethernet interface	2 x RJ45			
Data line	2 x 2 twisted-pair copper cables, screened; min. category 5			
Cable length			100	m
Read unit connection	1 x RJ9			
Operating voltage UB (reverse polarity protected, regulated, residual ripple <5%)	24 -15 ... +20% (PELV)			V DC
Current consumption			150	mA
Switching current	1 ... 50			mA
The following applies to the approval acc. to UL	Operation only with UL class 2 power supply or equivalent measures			
Switching load acc. to UL	DC 24 V, class 2			
External fuse (operating voltage UB)		0.5		A
EMC protection requirements	As per IEC 61000-6-2			
Safety outputs F01A ... F01F Semiconductor outputs, p-switching, short circuit-proof				
- Output voltage U _{F01A...U_{F01X}} HIGH U _{F01A...U_{F01X}} LOW U _{F01A...U_{F01X}}	UB - 1.5 0		UB 1	V DC
Switching current per safety output	1		50	mA
Utilization category acc. to EN 60947-5-2	DC-13 24 V 50 mA (Caution: outputs must be protected by a free-wheeling diode in the case of inductive loads.)			
Off-state current I _r ¹⁾			0.25	mA
Characteristics acc. to EN ISO 13849-1 and EN IEC 62061				
Mission time	20			years
Category	3			
Performance Level (PL)	e			
PFH	6.44 x 10 ⁻⁹			
Max. SIL	3			

1) Maximum current at an output in switched-off state.

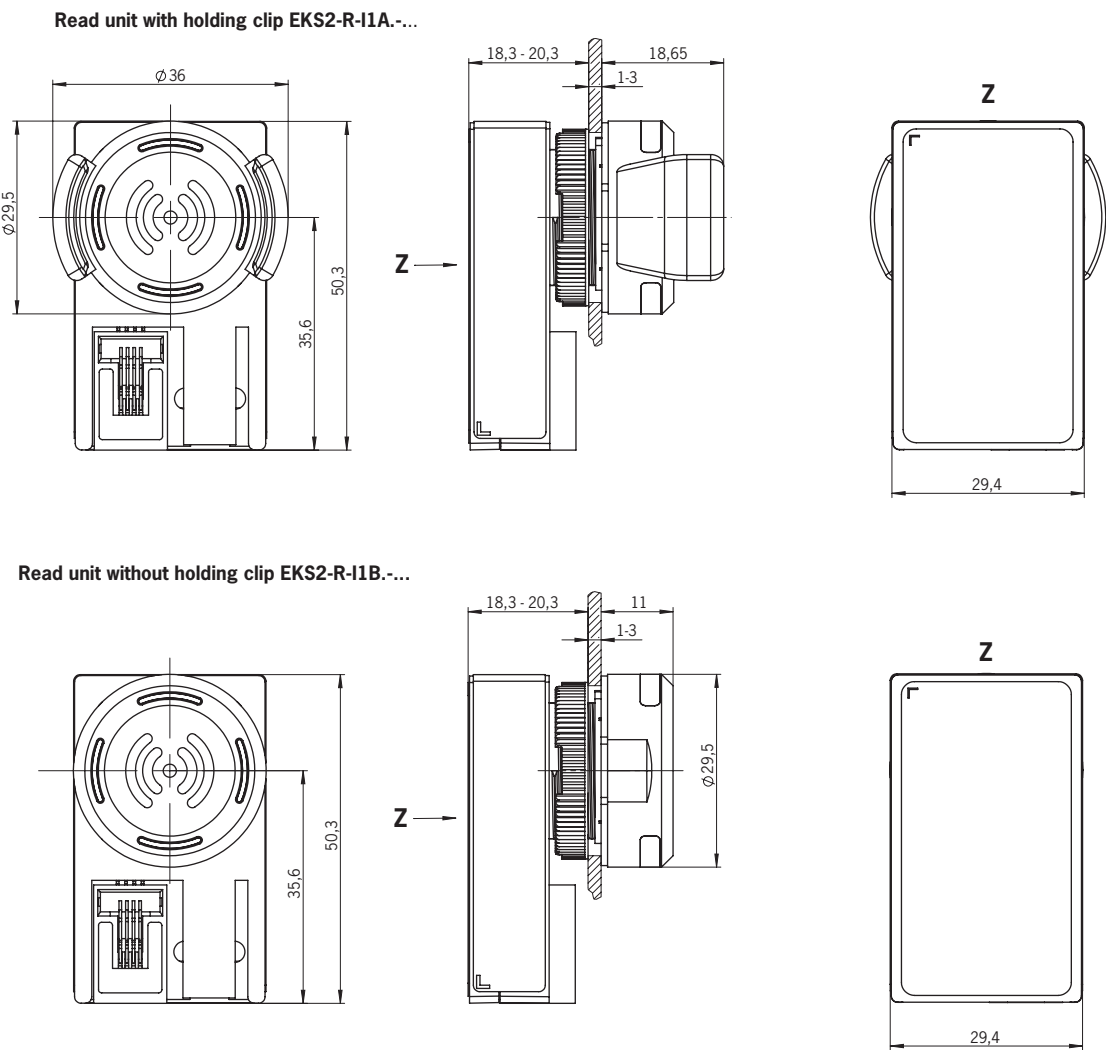


17.2. EKS2 read unit

17.2.1. Technical data for EKS2 read unit

Parameter	Value			Unit
	min.	typ.	max.	
Material	Plastic (TPU, PBT)			
Mounting cut-out D22 acc. to EN IEC 60947-5-1	Ø 22.5			mm
Degree of protection in the installed state	IP65/IP67/IP69/IP69K at front, IP20 in panel			
Ambient temperature at UB = 24 V	-20	-	+55	°C
Storage temperature	-35	-	+85	°C
Connection	RJ9, 4-pin			
Cable length			50	m
Operating voltage UB (reverse polarity protected, regulated, residual ripple <5%)	24 -15 ... +20% (PELV) Power supply via the evaluation unit			V DC
Supported transponder technology	EKS2 Electronic-Key See chapter 17.3. <i>EKS2 Electronic-Key on page 42</i> (MIFARE DESFire EV2)			
Standard mode				
UID-only mode	ISO/IEC 14443 type A (only the UID is read)			

17.2.2. Dimension drawing for EKS2 read unit

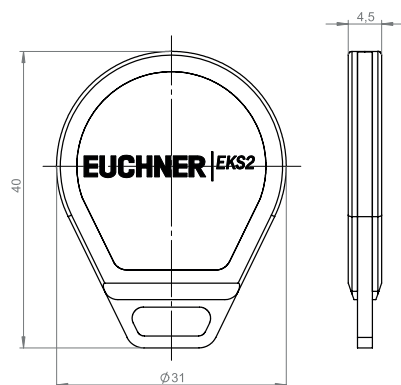


17.3. EKS2 Electronic-Key

17.3.1. Technical data for EKS2 Electronic-Key

Parameter	Value			Unit
	min.	typ.	max.	
Material	Stainless steel, plastic (ABS)			
Degree of protection	IP65/IP67			
Ambient temperature	-25	-	+60	°C
Storage temperature	-35	-	+85	°C
Power supply	inductive via read unit			
Storage capacity	4,096			Bytes
Data retention time			10 y at +22 °C	
Length of serial number (UID)	7 (read only)			Bytes
Number of write cycles			500,000	
Transponder technology	ISO/IEC 14443 type A (MIFARE DESFire EV2)			

17.3.2. Dimension drawing for EKS2 Electronic-Key



17.4. Radio frequency approvals

FCC ID: 2AJ58-21

IC: 22052-21



FCC/IC-Requirements

This device complies with part 15 of the FCC Rules and with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

- 1) This device may not cause harmful interference, and
- 2) this device must accept any interference received, including interference that may cause undesired operation.

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

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Supplier's Declaration of Conformity

47 CFR § 2.1077 Compliance Information

Unique Identifier:

EKS2-R-I series

Responsible Party – U.S. Contact Information

EUCHNER USA Inc.

1665 N. Penny Lane
Schaumburg, Illinois 60173

+1 315 701-0315
info(at)euchner-usa.com
<http://www.euchner-usa.com>

18. Inspection and service

Regular inspection of the following is necessary to ensure trouble-free long-term operation:

- › Check the secure mounting of the devices and the connections
- › Check for contamination.

No servicing is required. Repairs to the device are only allowed to be made by the manufacturer.

19. Disposal



Observe the country-specific regulations when disposing of the device.

For further information, please refer to the *Company/Sustainability* area at www.euchner.com.

20. Service

If servicing is required, please contact:

EUCHNER GmbH + Co. KG
Kohlhammerstraße 16
70771 Leinfelden-Echterdingen
Germany

Service telephone:
+49 711 7597-500

E-mail:
support@euchner.de

Internet:
www.euchner.com

21. Declaration of conformity

The product complies with the following requirements:

- › Machinery Directive 2006/42/EC (until January 19, 2027)
- › Machinery Regulation (EU) 2023/1230 (from January 20, 2027)

The EU declaration of conformity can be found at www.euchner.com. Enter the order number of your device in the search box. The document is available under *Downloads*.

Note on Directive 2014/53/EU RED (Radio Equipment Directive) and Delegated Regulation (EU) 2022/30

If this RED-compliant device is integrated into a machine or control system in accordance with the requirements in these instructions, this does not expand or change the device's radio characteristics and therefore does not influence its RED compliance.

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