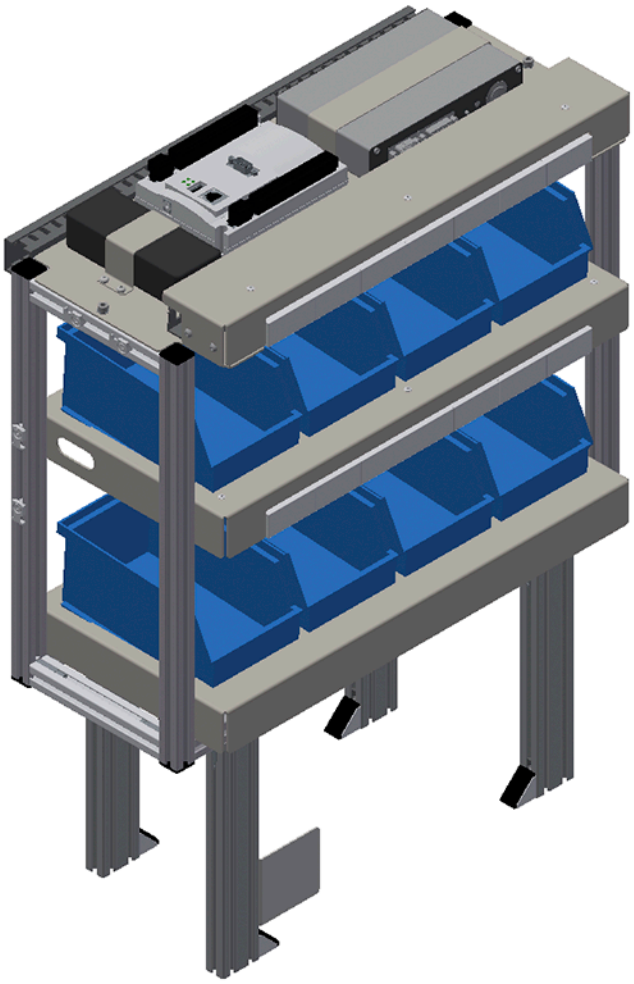
8068413

Application module Pick-by-Light

FESTO

CP Systems

Operating instruction



Festo Didactic SE
8068413
[8068413, 3, en_US]
10/2025

Original operating instructions

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1 About this document

1.1 General information

This documentation must be available to the user at all times. This documentation must be read before commissioning. The safety instructions must be observed. Non-observance may result in severe personal injury or damage to property.

For information, documentation, and software updates, visit:➦ *https://ip.festo-didactic.com*

1.2 Software updates for third-party components

For products from Festo Didactic SE components from third-party manufacturers (e.g. controllers, motor controllers, HMI, etc.) can be installed with the firmware of the delivery status of the third-party manufacturer. The operator is responsible for ensuring that the latest firmware is always installed. This can be obtained from the respective manufacturer.

2 Security

2.1 Safety instructions and pictograms

2.1.1 Safety instructions

	**DANGER** ... indicates an imminently dangerous situation which will result in fatal or severe personal injury if not avoided.
	**WARNING** ... indicates a potentially dangerous situation which may result in fatal or severe personal injury if not avoided.
	**CAUTION** ... indicates a potentially dangerous situation which may result in moderate or slight personal injury or severe property damage if not avoided.
	**NOTICE** ... indicates a potentially dangerous situation which may result in property damage or loss of function if not avoided.

2.1.2 Pictograms

This document and the hardware described herein include warnings about possible hazards which may arise if the product is used incorrectly. The following pictograms are used:

Warning signs	Type of danger
	Warning – danger zone.
	Warning – hand injuries.
	Warning – dangerous electrical voltage.
	Warning – danger zone.

Warning signs	Type of danger
	Warning – hot surface.

2.2 Intended use

The components and sysytems may be used only:

- For its intended use in teaching and training applications
- In perfect condition from a safety engineering perspective
- Under observation (no unattended continuous operation!)

The components and systems are designed in accordance with the latest technology and recognized safety rules. However, the life and limb of the user or third parties can be endangered and the components impaired if they are used incorrectly.

The learning system from Festo Didactic SE has been developed and produced exclusively for basic and further training in the field of automation technology. The training company and/or trainers must ensure that all trainees observe the safety precautions described in this document.

Festo Didactic SE hereby excludes any and all liability for damages suffered by trainees, the training company and/or any third parties, which occur during use of the device in situations which serve any purpose other than training and/or vocational education, unless such damages have been caused by Festo Didactic SE due to malicious intent or gross negligence.

2.3 For your safety

2.3.1 Important Notes

Knowledge of the basic safety instructions and safety regulations is a fundamental prerequisite for safe handling and trouble-free operation of Festo Didactic SE components and systems.

This documentation includes the most important information for safe use of the components and systems. In particular, the safety instructions must be adhered to by all persons who work with these components and systems. Furthermore, all pertinent accident prevention regulations and instructions that are applicable at the respective place of use must be adhered to.

WARNING

Malfunctions which may impair safety must be eliminated immediately!

CAUTION

Improper repairs or modifications may result in unforeseeable operating statuses. Do not carry out any repairs or modifications to the components and systems that are not described in these operating instructions.

2.3.2 Obligations of the operating company

The operating company undertakes to allow only those persons to work with the components and systems of Festo Didactic SE who:

- Are familiar with the basic instructions regarding occupational safety and accident prevention and have been instructed in the handling of the components and systems of Festo Didactic SE,
- Have read and understood the chapter concerning safety and the warnings in this document.

Personnel should be tested at regular intervals for safety-conscious work habits.

2.3.3 Obligations of trainees

All persons who have been entrusted to work with the components and systems of Festo Didactic SE undertake to complete the following steps before beginning work:

- Read the chapter concerning safety and the warnings in this document.
- Familiarizing themselves with the basic regulations regarding occupational safety and accident prevention.

2.4 Cyber Security

Festo Didactic SE offers products and solutions with security functions that assist in the safe operation of plants, systems, machines and networks. In order to protect plants, systems, machines and networks from cyber threats, a comprehensive security concept must be implemented and continuously updated. Festo's products and services only constitute one part of such a concept.

The customer is responsible for preventing unauthorized access to their plants, systems, machines and networks. Systems, machines and components should only be connected to a company's network or the Internet if and as necessary, and only when the suitable security measures (e.g. firewalls and network segmentation, Defense in Depth) are in place. Connecting a product to the company network or internet without suitable security measures can lead to vulnerabilities that can allow unwanted, remote access into the network – even beyond the system boundaries of the Festo Didactic SE solution – with the intention of causing data loss or for manipulating or sabotaging installations and systems. Typical forms of attack include: denial of service (putting a product out of operation), remote execution of a malicious code, privilege escalation (executing program code with higher access rights than expected), ransomware (encrypting data and requesting payment for its decryption).

In the context of industrial systems and machines, this can also lead to unsafe machine conditions with hazards for people and equipment. Furthermore, Festo's guidelines on suitable security measures should be observed. Festo Didactic SE Festo products and solutions are constantly being developed further in order to make them more secure. Festo Didactic SE strongly recommends that customers install product updates as soon as they become available and always use the latest versions of its products. Any use of product versions that are no longer supported or any failure to install the latest updates may render the customer vulnerable to cyber attacks.

Support Festo Didactic SE in ensuring your safety at all times. Should you find any security vulnerabilities in our products, please inform the Festo Product Security Incidence Response Team (PSIRT) in German or English by sending an email to psirt@festo.com or by using the online contact form at➦ *https://www.festo.com/psirt*.

WARNING

Unsecure Operating Statuses Due to Software Tampering

Unsafe operating states of the system.

- Keep software up to date.
- Include installed products in the overarching safety concept.
- Protect storage media from malicious software using suitable protection measures.

2.5 Work Instructions and Safety Precautions

2.5.1 General

CAUTION

- Trainees should work with the components and systems only under the supervision of an instructor.
- Observe the specifications included in the datasheet for the individual components, and in particular all safety instructions!
- Wear your personal protective equipment (safety goggles, safety shoes).
- Never leave objects lying on the top of protective enclosures. Vibrations could cause such objects to fall off.
- In the event of
  - visible damage
  - defective function
  - inappropriate storage or
  - inappropriate transport

  safe operation of the device is no longer possible.
- Switch off the power supply immediately.
- Protect the device against being accidentally switched on again.

2.5.2 Electrical safety instructions

WARNING

Product is not de-energized

Electric shock

- Switch off the power supply before working on the circuit.
- Protect the product against being accidentally switched on again.
- Please note that electrical energy may be stored in individual components. Further information on this issue is available in the datasheets and operating instructions included with the components.
- Capacitors inside the product may still be charged even after the device has been disconnected from all sources of voltage.

WARNING

Malfunctioning

Electric shock

- Never place or leave liquids (e.g. drinks) on the station in open containers.
- The machine must not be switched on if there is condensation (moisture) on its surface.
- Never lay pipes/hoses designed to carry liquid media near the machine.

WARNING

Electric Shock Due to Unsuitable Power Supply

Electrical components can be destroyed.

When devices are connected to an unsuitable power supply, exposed components can cause dangerous electrical voltage that can lead to severe or fatal injury.

- Always use power supplies that provide SELV (safety extra-low voltage) or PELV (protective extra-low voltage) output voltages for all the connections and terminals on the electronics modules.

WARNING

No protective conductor connection

electric shock

- If there is no protective earth connection in place for a Protection Class I device, or if the protective earth connection has not been installed correctly, exposed, conductive parts may carry high voltages, thereby causing severe or fatal injury if touched.
- Ground the device in accordance with the applicable regulations.

WARNING

Fire Hazard Due to Unsuitable Power Supply

If a device is connected to an unsuitable power supply, this can cause components to overheat, leading to a breakout of fire.

- Always use limited power supplies (LPSs) for all the connections and terminals on the electronics modules.

CAUTION

Electrical Cables

Electric shock.

- Always ensure that your connecting cables are designed for use with the electrical connections in question.
- When laying connecting cables, make sure they are not kinked, sheared or pinched. Cables laid on the floor must be covered with a cable bridge to protect them
- Do not lay cables over hot surfaces. – Hot surfaces are indicated by a corresponding warning symbol.
- Make sure that connection cables and leads are not subjected to continuous tensile loads.
- Devices with a ground connection must always be grounded.
- If a ground connection (green-yellow laboratory socket) is present, it must always be connected to the protective grounding. The protective ground must always be connected first (before voltage), and must always be disconnected last (after disconnecting the voltage). – Some devices have a high leakage current. These devices must be fitted with a PE conductor for additional grounding.

3 Design and Function

3.1 Transport

WARNING

Moving heavy machines/machine parts can cause damage to the musculoskeletal system

- When the stations are shipped out, extra care must be taken to ensure that heavy machines/machine sections are always transported using a suitable fork-lift truck. A single station can weigh up to 50 kg.
- Always use suitable transport equipment.
- Always use the lifting points provided to move the machine/machine sections.
- Always use the designated load take-up point.

WARNING

Securing transit routes

- The supply routes must be cleared prior to transport, and must be suitable for the forklift truck to pass through. If necessary, warning signs or barrier tape must be set up to keep the routes clear.
- When opening transport boxes, care must be taken to ensure that any additional components delivered in the same box, such as computers, do not fall out.

WARNING

Danger of crushing for hands/feet

- It is not permitted to grip onto or under the feet of the station, as there is an increase risk of hands or feet getting crushed or trapped.
- When setting down the station, make sure no persons have their feet under the machine's feet.

NOTICE

- When opening the transport box, any additional components must be secured to prevent them from falling out, and removed first.
- Once this is done, the transport box can be removed/opened up fully, and the station can be taken out and moved to its intended location.
- Care must be taken with all components projecting from the machine, as sensors and similar small parts can easily be damaged if the machine is not transported correctly.
- Check that all the profile connectors are seated correctly using a size 4 – 6 Allen key. Unavoidable vibrations can loosen the connectors during transport.

3.2 Protective devices

In order to reduce risks, this machine contains guards to prevent access to dangerous areas. These guards must not be removed or tampered with.

Emergency Stop (E-Stop)

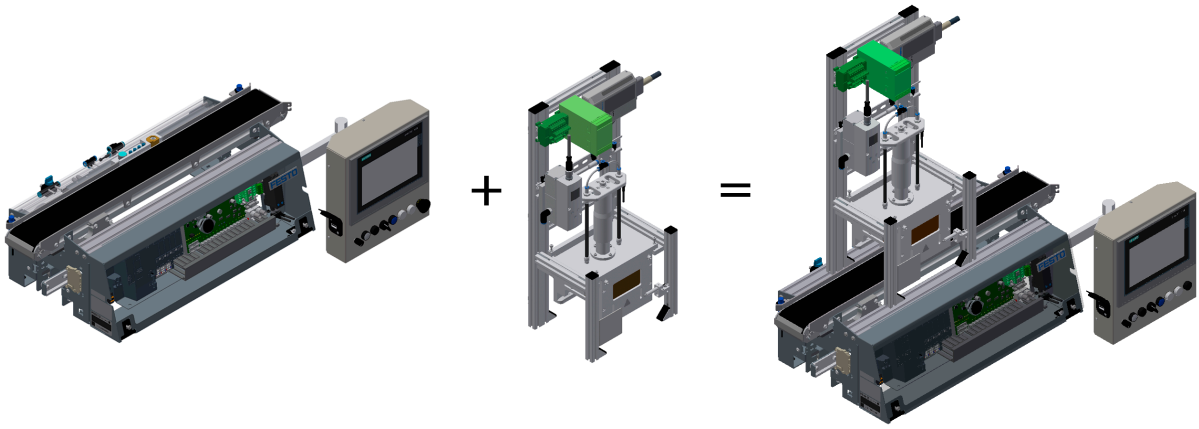
If a station has an emergency stop mushroom actuator, the emergency stop signal switches off all actuators. Operator confirmation is required to restart the system; there is no automatic restart.

Additional protective devices

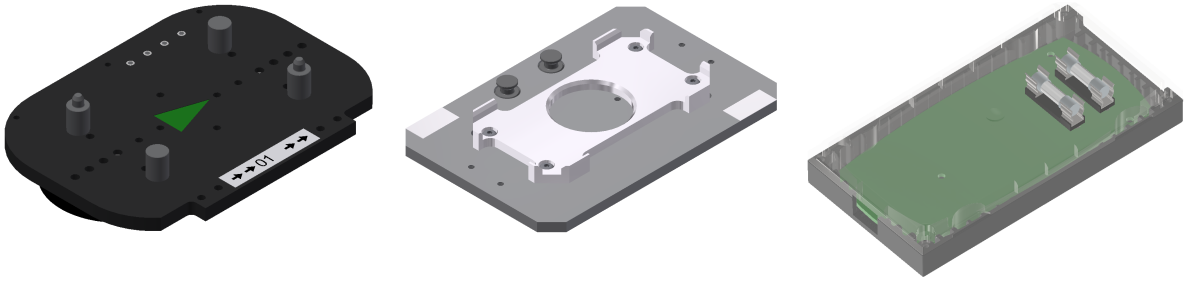
The individual components, such as the power supplies and the controllers, possess built-in safety functions such as short-circuit protection, overcurrent protection, overvoltage protection and thermal monitoring. If necessary, consult the instruction manual for the device in question for more information.

3.3 System overview

CP Lab conveyor, CP Factory linear, CP Factory branch and CP Factory bypass are called basic modules. When an application module, e.g. the CP muscle press application module, is mounted on a base module, a station is created.



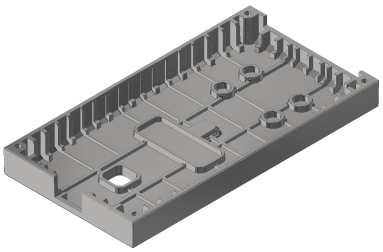
A system is created by setting up several stations one after the other.



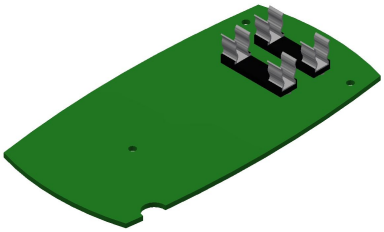
Workpiece carrier | Pallet | Workpiece

Workpiece carriers are transported on the base module conveyors. Pallets with fixed workpiece holders are placed on the workpiece carriers. The workpieces are placed on the workpiece holder or removed from there. In some stations, pallets can also be placed on a workpiece carrier or picked up from there.

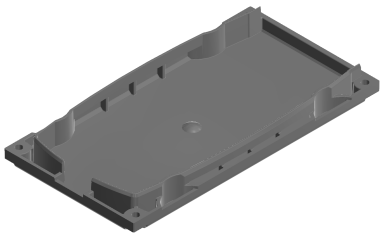
The typical workpiece of a CP system consists of a front cover, a PCB with a maximum of two fuses and a back cover:



Front cover



PCB with fuses



Back cover

3.4 Design CP PickByLight application module

Task of this application module:

- Specify the sequence for the assembly of a workpiece to a user.

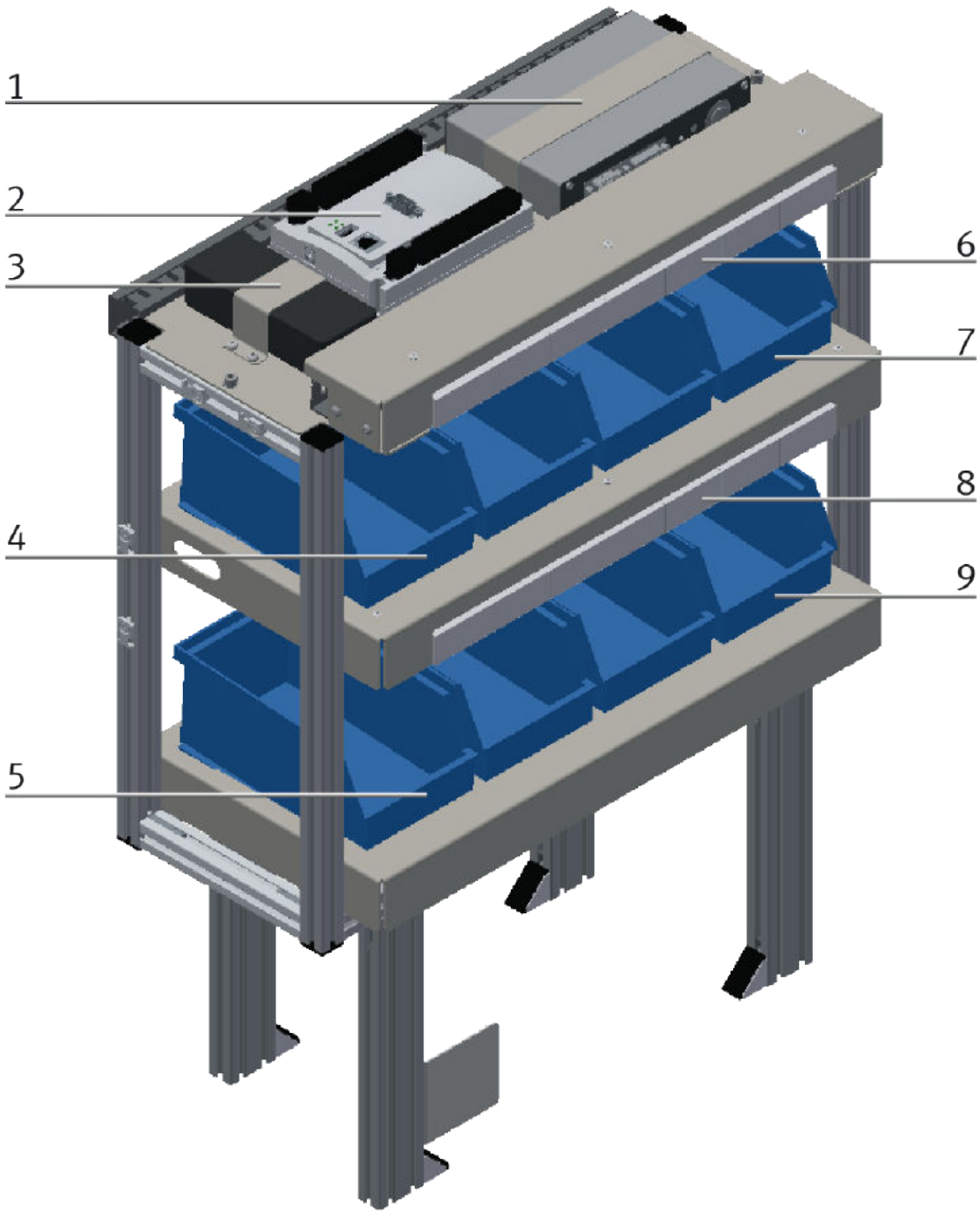


Fig. 1: Similar to illustration

1 Basic module for PickByLight, R-iZO by light
2 Festo CECC controller
3 Fixed power supply, R-IZO by light xpert - Power supply unit
4 Storage compartment 1
5 Storage compartment 5
6 Control strip 1-4, R-iZO by light - xpert light module
7 Storage compartment 4
8 Control strip 5-8, R-iZO by light - xpert light module
9 Storage compartment 8

3.5 Electrical connections

3.5.1 Ethernet connection

The controller (1) is connected to the switch (2) on the basic structure of the CP Lab conveyor via an Ethernet cable.

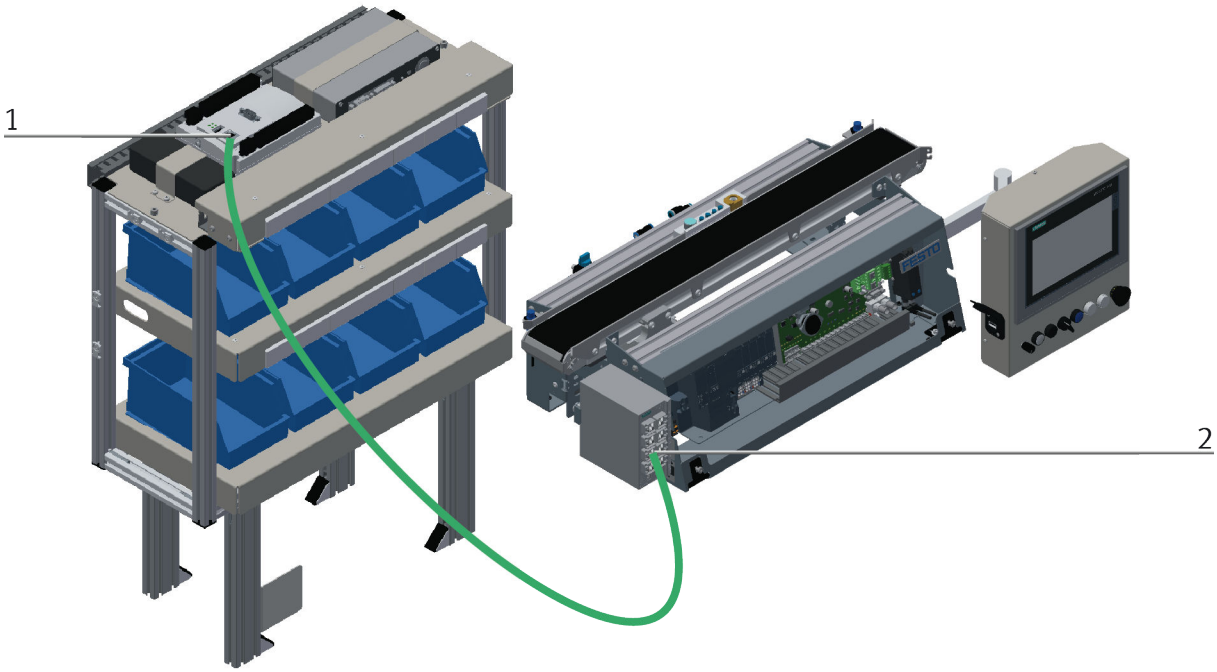


Fig. 2: Ethernet connection to CP Lab / Similar to illustration

The controller (1) is connected to the switch (2) on the electrical board of the basic module via an Ethernet cable.

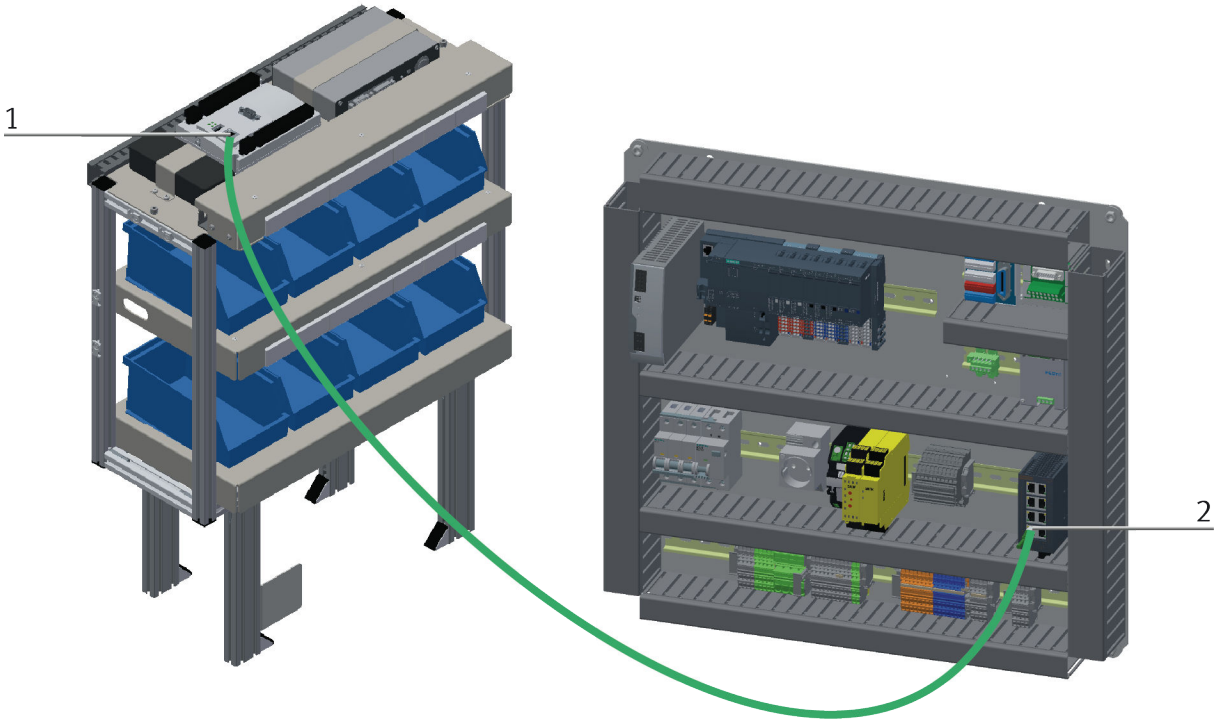


Fig. 3: Ethernet connection to CP Factory basic module

3.6 Function

The CP application module provides workpieces in various boxes. Each box is equipped with a light module. Depending on the order, the light modules often flashes differently; the user has to remove this number (1 flash = 1 workpiece from the corresponding box), thereby specifying the quantity and sequence.

The product carrier is detected and stopped by a light barrier when it enters the CP application module.

The indicator lights flash according to the task (as previously taught) and the user assembles the workpiece accordingly.

Once assembly is complete, the product carrier is released from the CP application module.

3.7 Sequence description

Starting requirements

- All connections are done correctly

Initial position

- The boxes are sufficiently stocked with workpieces

Sequence

1. If a workpiece carrier with a workpiece is conveyed to the stopper when the CP application module is activated, the workpiece carrier is stopped and an automatic sequence is started.
2. The sensors check the condition of the workpiece carrier.
3. If the status of the workpiece carrier matches the requirements, the light modules of the various boxes flash in the specified sequence.
4. The user removes the displayed parts and assembles the desired workpiece.
5. The application program is finished, the stopper moves down and the workpiece carrier leaves the station.

4 Commissioning

4.1 Introduction

NOTICE

What applies below to commissioning also applies to recommissioning.

- The CP application module is supplied pre-assembled.
- All attachments are individually packaged.
- All components, tubing connections and wiring are clearly identified, so that all of the connections can be readily restored.
- For operation within a CP Factory/Lab system, the CP application module must be placed and mounted on a basic module.

NOTICE

The general assembly instructions can be found in the operating instructions for your basic module. Only specific information on the CP application module is provided here.

4.2 Workspace

To commission the CP application module, you need:

- A CP application module.
- A CP Factory basic module or a CP Lab conveyor basic module for mounting the CP application module.
- A SysLink cable for the connection between the I/O terminals of the CP application module and the CP Factory basic module.
- A workpiece carrier with pallet and workpiece for aligning the CP application module (optional).
- An on-site electrical connection in the room, see basic module datasheet.
- An on-site pneumatic connection in the room, see basic module datasheet.

4.3 Visual inspection

WARNING

Damage must always be repaired immediately.

The visual inspection must be carried out before each commissioning!

Before each start of the CP application module, check the following for visible damage and function:

- Electrical connections
- Pneumatic connections
- Mechanical components and connections
- Emergency stop devices

4.4 Safety instructions

Safety instructions

WARNING

Damage must always be repaired immediately.

The CP application module may only be put into operation under the following conditions:

- The technical condition (mechanical, pneumatic and electrical) is flawless.
- The CP application module is used as intended.
- The operating instructions have been read and understood.
- All safety devices are present and active.

4.5 Fitting the CP application module to the CP Lab conveyor

Mounting an application module

The procedure for mounting a CP application module on a basic module is identical for all basic modules. The following example applies to all basic modules and applications.

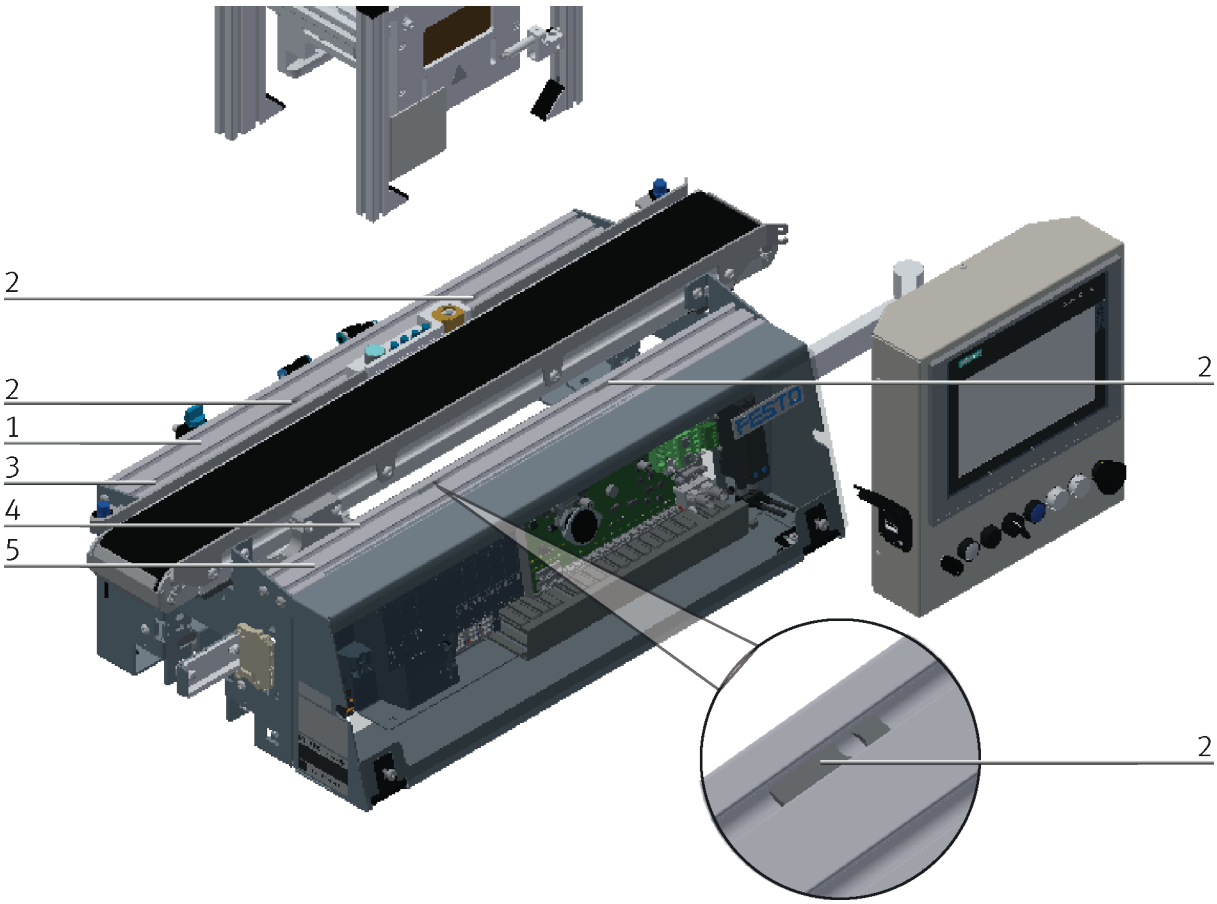


Fig. 4: Positioning slot nuts / Similar to illustration

1 Cross profile, rear
2 Slot nut
3 Inner slot (rear cross profile)
4 Inner slot (front cross profile)
5 Cross profile, front

Position the slot nuts in the cross profiles of the CP Lab conveyor basic module

1. Place two M5 slot nuts (2) in the inner, front slot of the cross profile (4) of the CP Lab conveyor.

2. Then place two more M5 slot nuts (2) in the inner, rear slot of the cross profile (3) of the CP Lab conveyor.

3. The slot nuts (2) must then be positioned approximately at the distance of the vertical cross profiles of the CP application module.

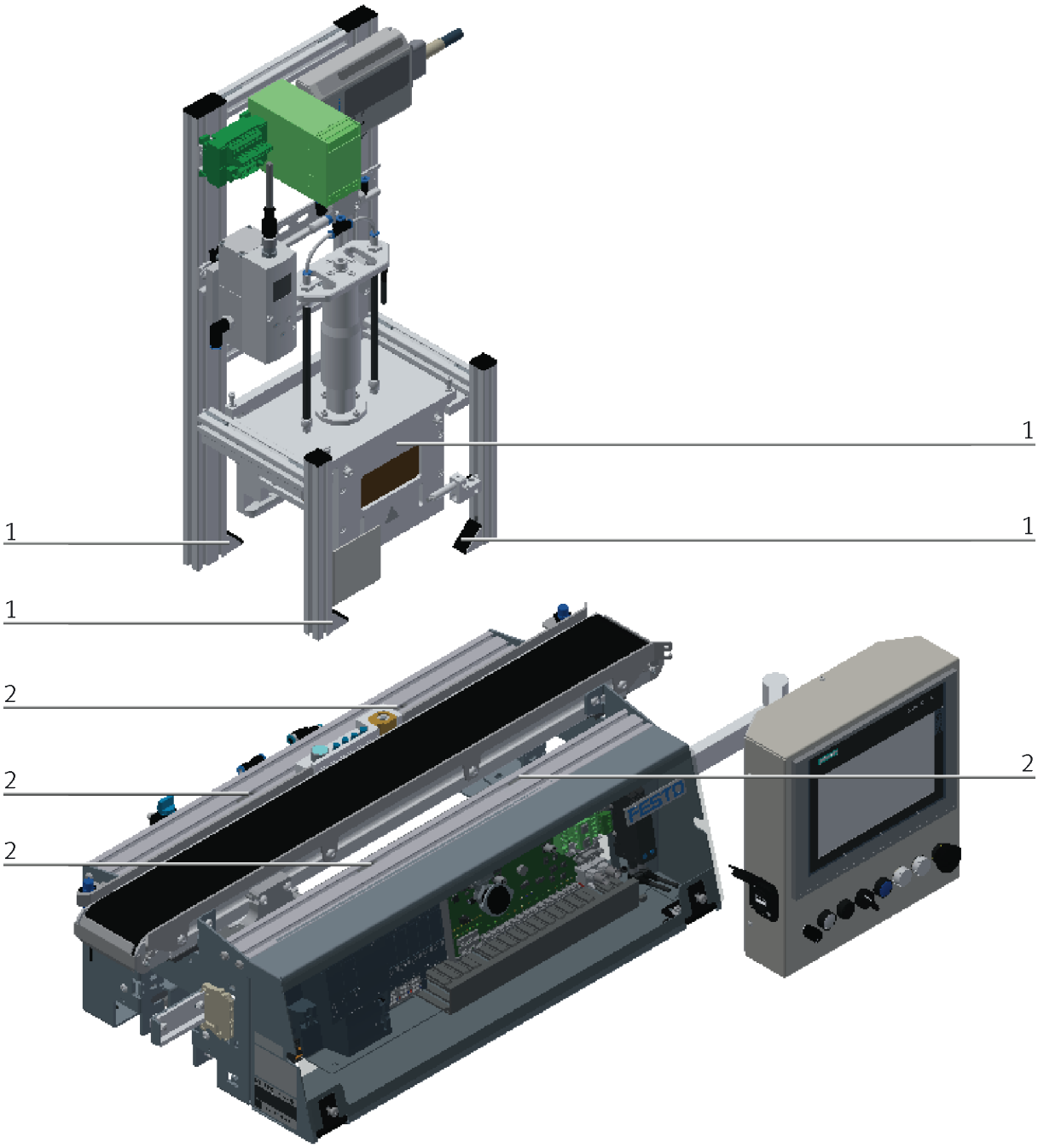


Fig. 5: Attach CP application module / Similar to illustration

1 CP application module: Mounting bracket

2 Slot nut

Attach the CP application module to the CP Lab conveyor basic module

1. Place the CP application module on the CP Lab conveyor basic module.

2. Position the slot nuts (2) under the mounting brackets (1) of the CP application module so that the internal threads of the slot nuts are visible under the slotted holes of the mounting brackets.

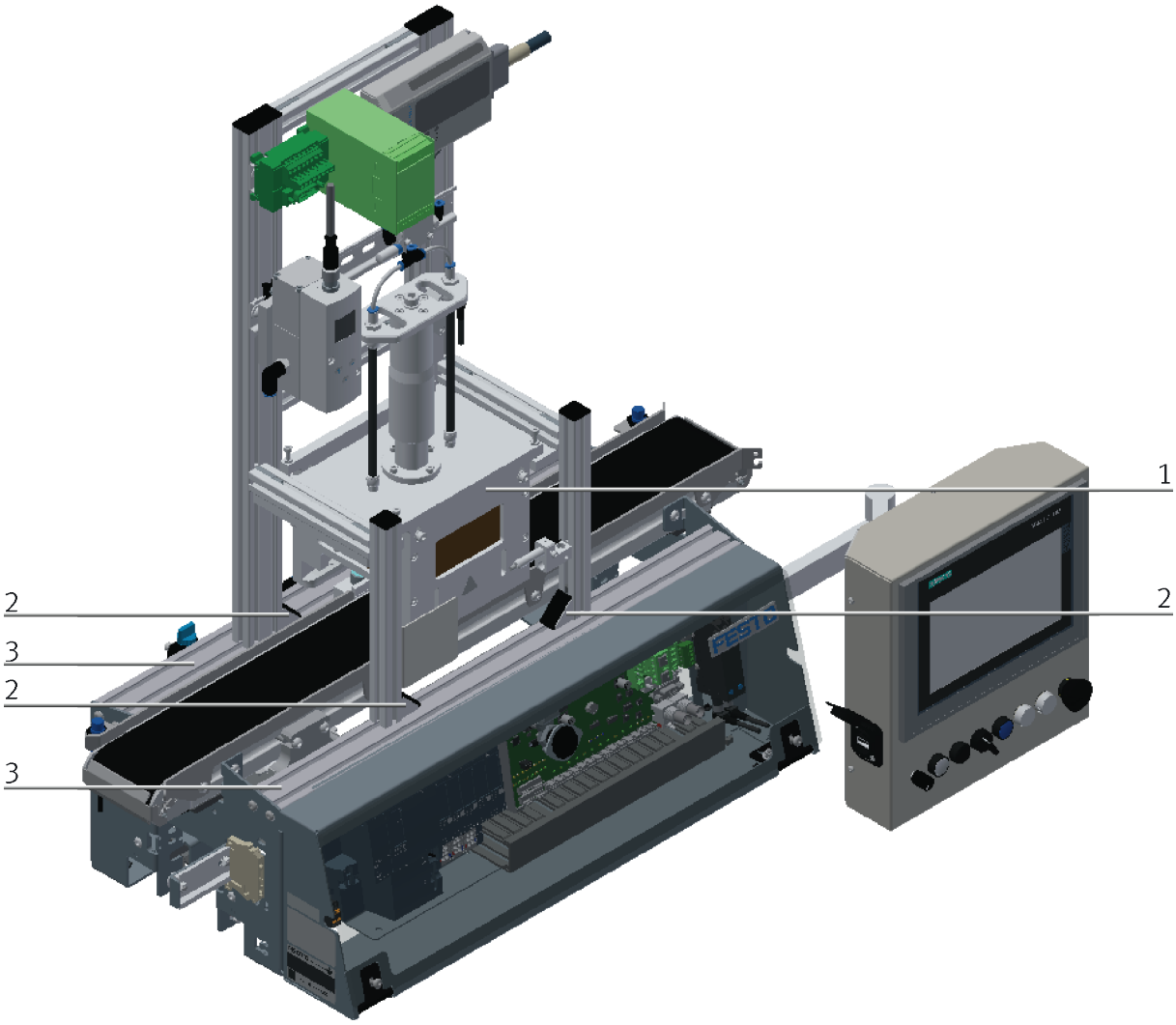


Fig. 6: Screw down CP application module / Similar to illustration

1 CP application module
2 Mounting bracket with covering
3 Basic module CP Lab conveyor: Cross profile

Align the CP application module and attach it to the CP Lab conveyor basic module

1. Use pan head screws M5x8 to initially connect the mounting brackets (1) of the CP application module loosely to the cross profiles (2) of the CP Lab conveyor basic module.
2. If necessary, move the CP application module to the desired position after you have tightened all the pan head screws.
3. Slide a workpiece carrier with pallet and front cover to the stopper position. The front cover is facing upward on the inside. The drilled hole for the front cover is on the left.
4. Visually check that the position is correct.
5. Then tighten the pan head screws.
6. Then place the black coverings on the mounting brackets.

4.6 Connect CP application module electrically to CP Lab conveyor

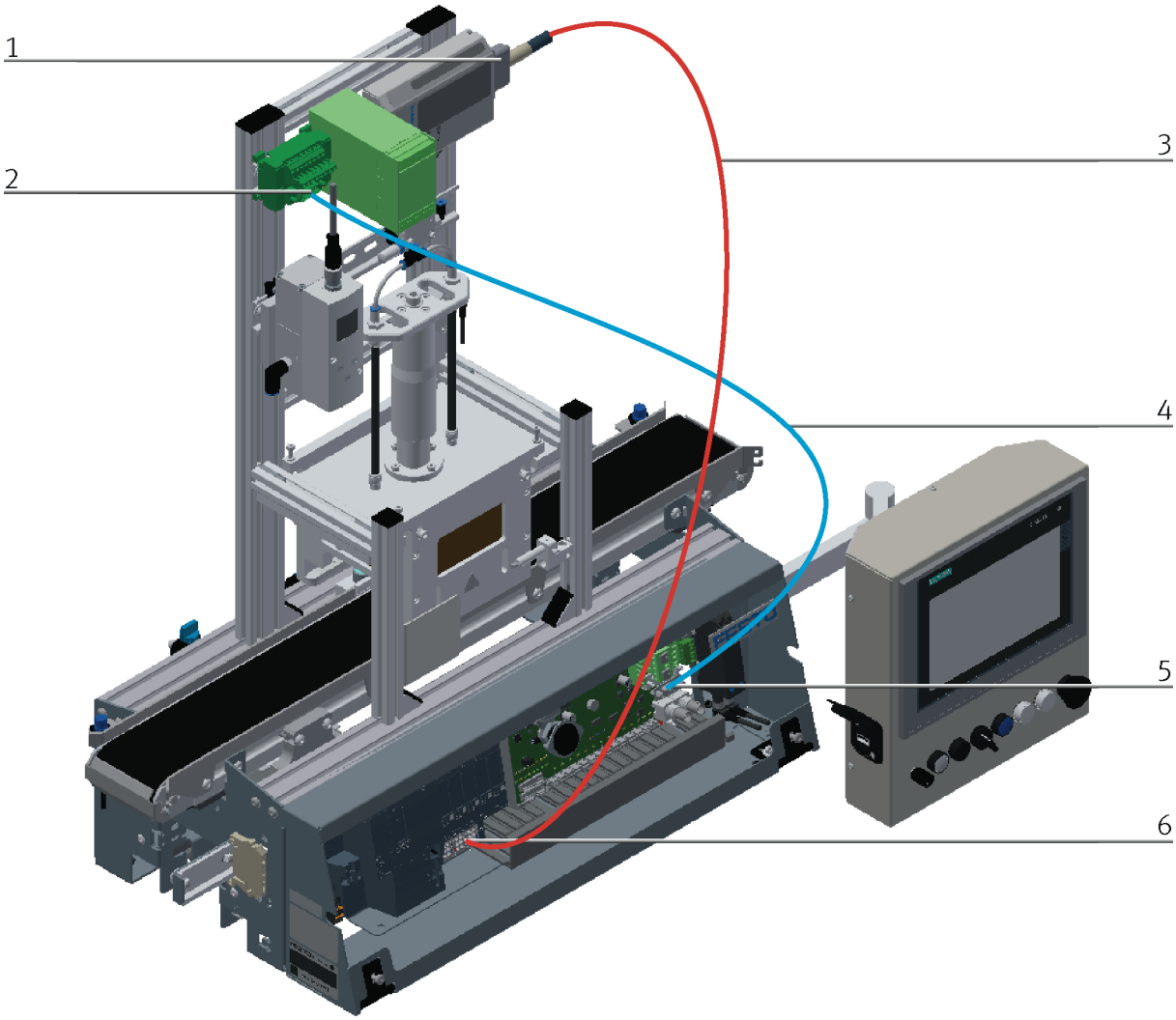


Fig. 7: Example electrical connections / Similar to illustration

1 CP application module: I/O terminal (+BG-XD1)
2 CP application module: analog terminal (+BG-XD2A)
3 Connection cable with a SysLink plug (SysLink cable)
4 Connecting cable with 15-pin standard Sub-D plugs
5 Basic module CP Lab conveyor: PCB (-XZ1 / X5)
6 Basic module CP Lab conveyor: PLC (inputs / KF2; outputs / KF4)

SysLink interface for digital signals

1. The CP application module exchanges digital input and output signals with the CP Lab conveyor via the SysLink interface:

To do this, connect the I/O terminal (1) of the CP application module to the controller (6) of the CP Lab conveyor basic module. Use the connecting cable with SysLink plug (3) already fitted to the control unit and led out at the rear of the CP Lab conveyor basic module.

Sub-D interface for analog signals (optional - not available on all CP application modules)

2. The CP application module supplies an analog output signal. This is placed on the analog terminal (2) and connected to the analog inputs of the basic module.

Connect the analog terminal (2) of the CP application module to the Sub-D interface for analog signals (5) on the XZ1 PCB of the CP Lab conveyor basic module. Use the supplied connecting cable (4) with standard Sub-D plugs: 15-pin, double row.

4.7 Fitting the CP application module to the CP Factory basic module

Mounting an application module

The procedure for mounting a CP application module on a basic module is identical for all basic modules. The following example applies to all basic modules and applications.

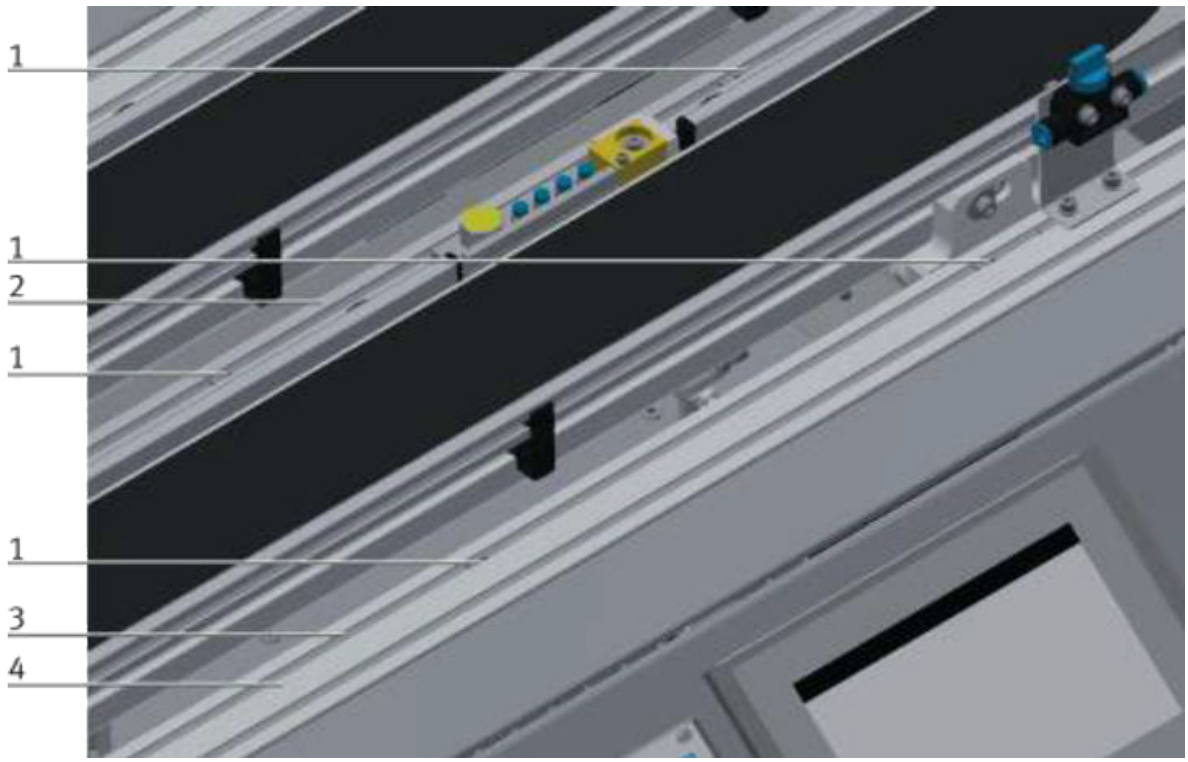


Fig. 8: Positioning slot nuts / Similar to illustration

1 Slot nut
2 Cross profile, rear
3 Inner slot (front cross profile)
4 Cross profile, front

Position the slot nuts in the cross profiles of the CP Factory basic module

1. Place two M5 slot nuts (1) in the inner slot of the front cross profile (4) of the CP Factory basic module.

2. Then place two more M5 slot nuts (1) in the slot of the rear cross profile (2) of the CP Factory basic module.

3. The slot nuts (1) must then be positioned approximately at the distance of the vertical cross profiles of the CP application module.

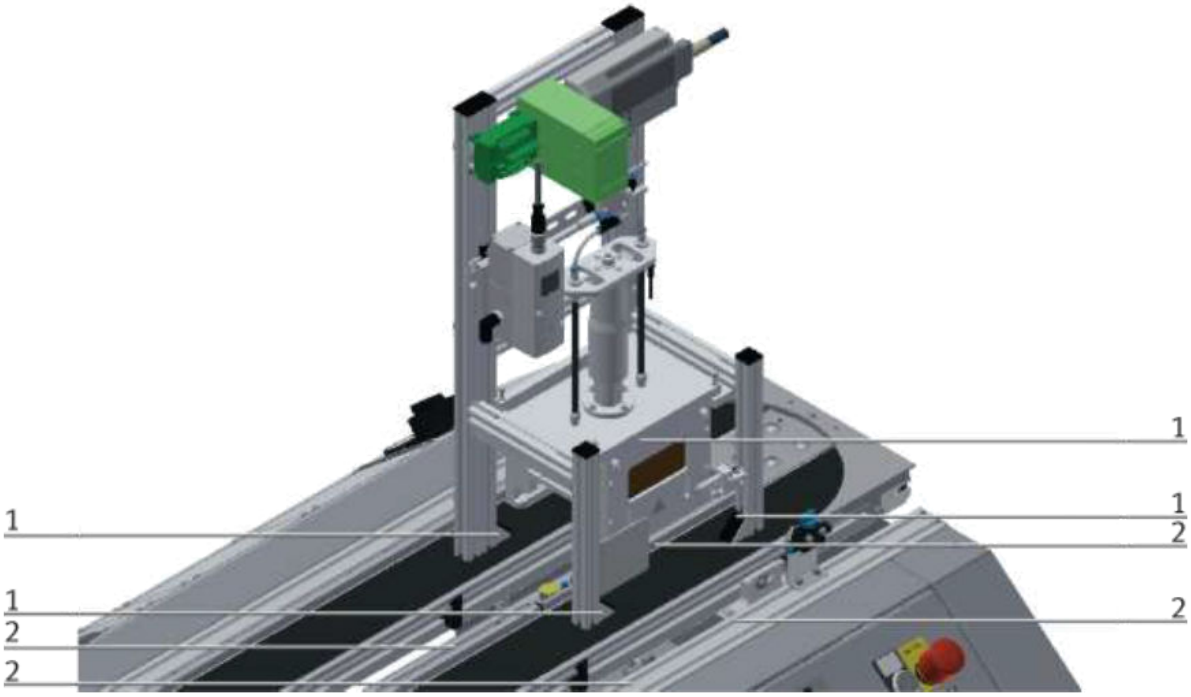


Fig. 9: Attach CP application module / Similar to illustration

1 CP application module: Mounting bracket
2 Slot nut

Attach the CP application module to the CP Factory basic module

1. Place the CP application module on the CP Factory basic module.

2. Position the slot nuts (2) under the mounting brackets (1) of the CP application module so that the internal threads of the slot nuts are visible under the slotted holes of the mounting brackets.

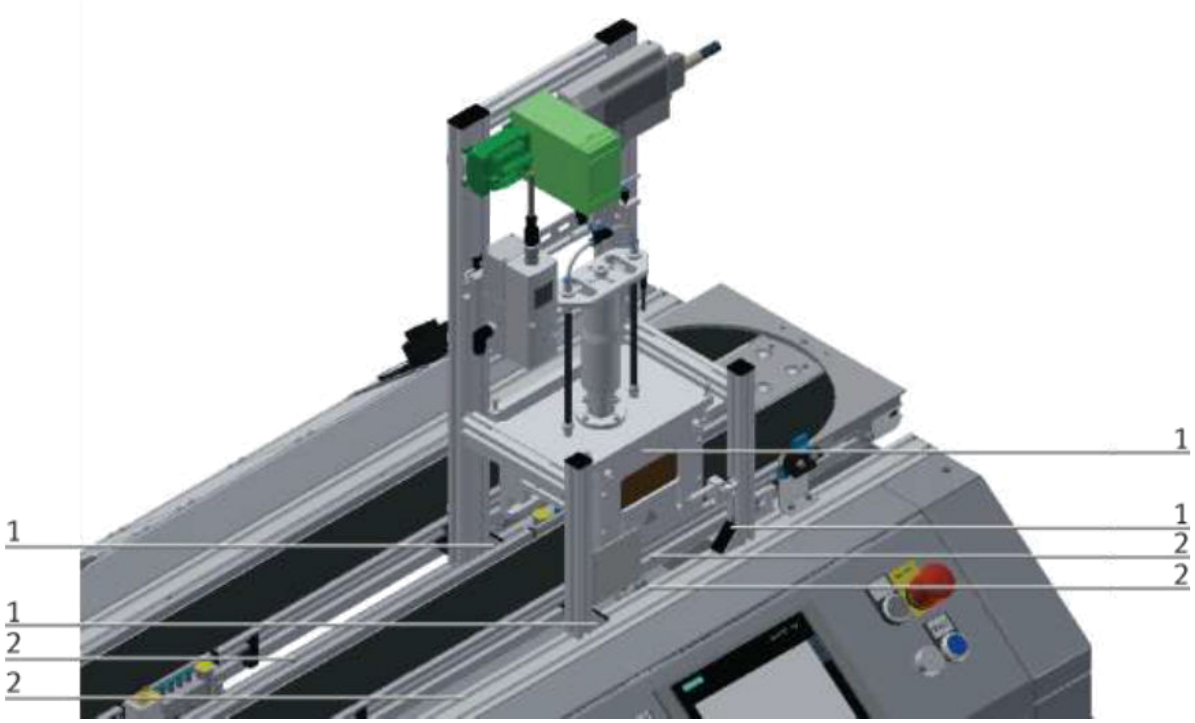


Fig. 10: Screw down CP application module / Similar to illustration

1 CP application module: Mounting bracket with covering
2 CP Factory basic module: Cross profile

Align the CP application module and fix it to the CP Factory basic module

1. Use pan head screws M5x8 to initially connect the mounting brackets (1) of the CP application module loosely to the cross profiles (2) of the CP Factory basic module.
2. If necessary, move the CP application module to the desired position after you have tightened all the pan head screws.
3. Slide a workpiece carrier with pallet and front cover to the stopper position. The front cover is facing upward on the inside. The drilled hole for the front cover is on the left.
4. Visually check that the position is correct.
5. Then tighten the pan head screws.
6. Then place the black coverings on the mounting brackets.

4.8 Connect CP application module electrically to CP Factory basic module

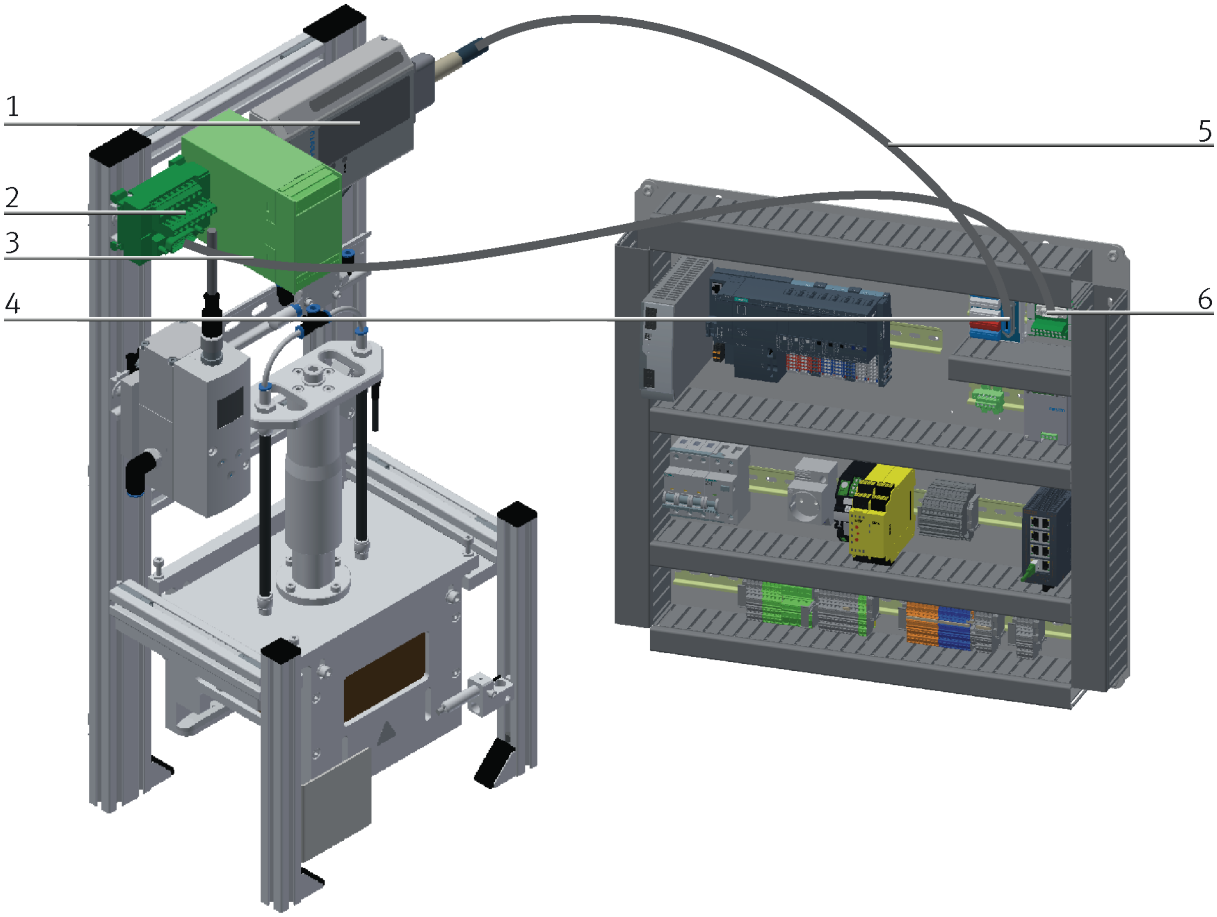


Fig. 11: Example electrical connections / Similar to illustration

1 CP application module: I/O terminal (+BG-XD1)
2 CP application module: analog terminal (+BG-XD2A)
3 Connecting cable with 15-pin Sub-D plugs
4 Electric board basic module CP Factory: I/O terminal (+K1-XD15)
5 Connecting cable with SysLink plugs (SysLink cable)
6 Electroboard basic module CP Factory: Analog terminal (+K1-XD16A)

SysLink interface for digital signals

1. The CP application module exchanges digital input and output signals with the basic module via the SysLink interface:

Connect the I/O terminal (1) of the CP application module to the I/O terminal (4) on the electrical board of the CP Factory basic module. Use the supplied connecting cable with SysLink plugs (5).

Sub-D interface for analog signals (optional - not available on all CP application modules)

2. The CP application module supplies two analog output signals via the distance sensors. These are placed on the analog terminal and connected to the analog inputs of the basic module.

Connect the analog terminal (2) of the CP application module to the analog terminal (6) on the electrical board of the CP Factory basic module. Use the supplied connecting cable (3) with standard Sub-D plugs: 15-pin, double row.

5 Operation

5.1 General

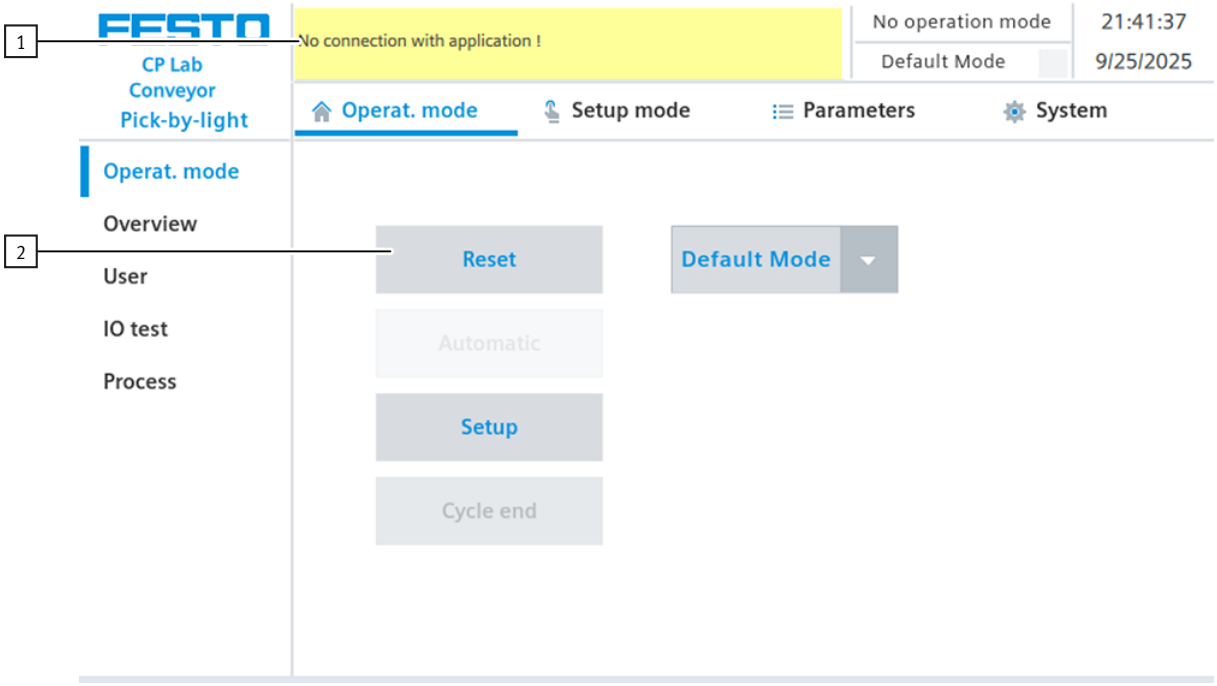
A CP application module has no control elements. The CP application module can only be operated once it has been mounted and connected to a basic module of the CP Lab or CP Factory system.

The operation of the CP application module can be achieved by each customer according to their wishes, the supplied programs are only an suggestion for operation that can be used to operate the CP application module on the CP Lab or CP Factory system. Customized operating concepts or external controls are also possible.

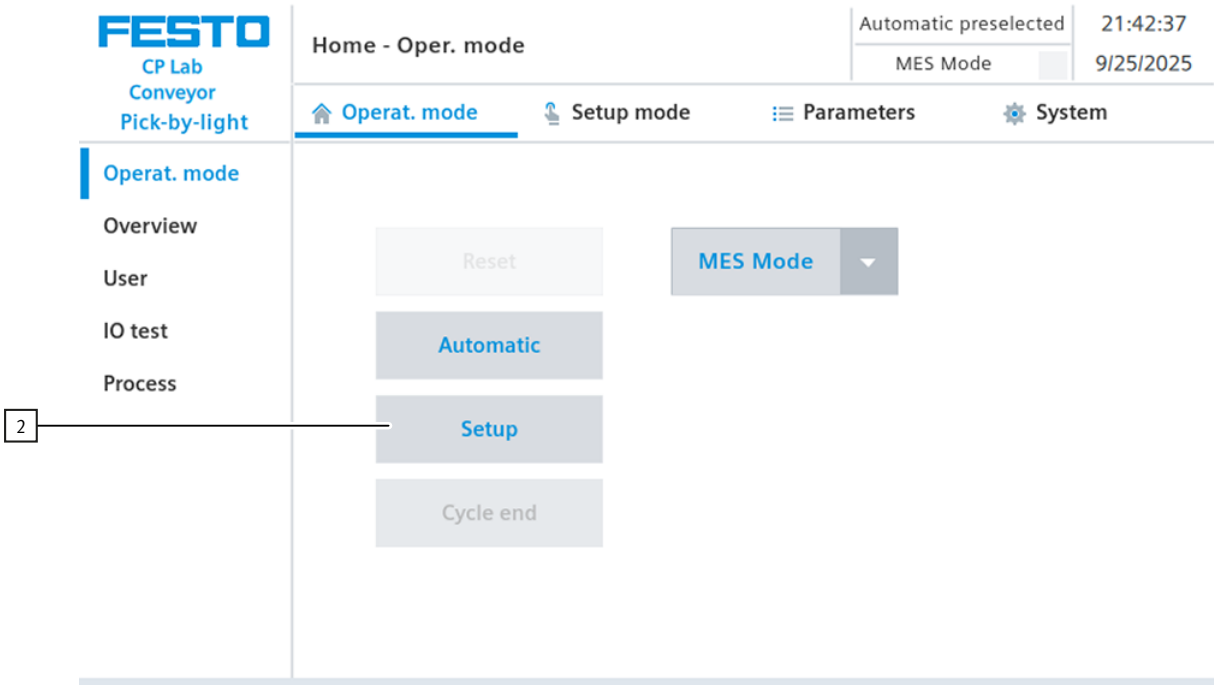
If a CP application module is operated on a CP Lab or a CP Factory basic module, the general operation is described in the operating instructions for the CP Lab or CP Factory system. All application-specific information can be found in the operating instructions for the CP application module.

5.2 Set up the CP PickByLight application module on the HMI

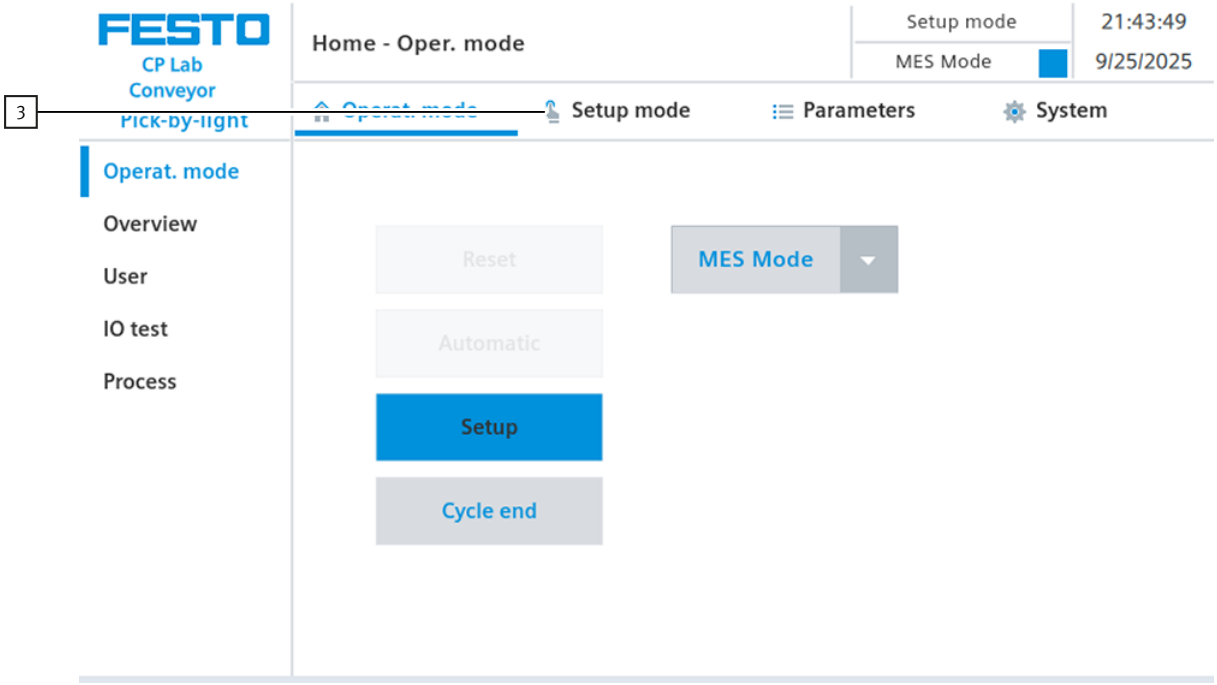
To set up the CP application module, the CP application module must be put into Setup mode.



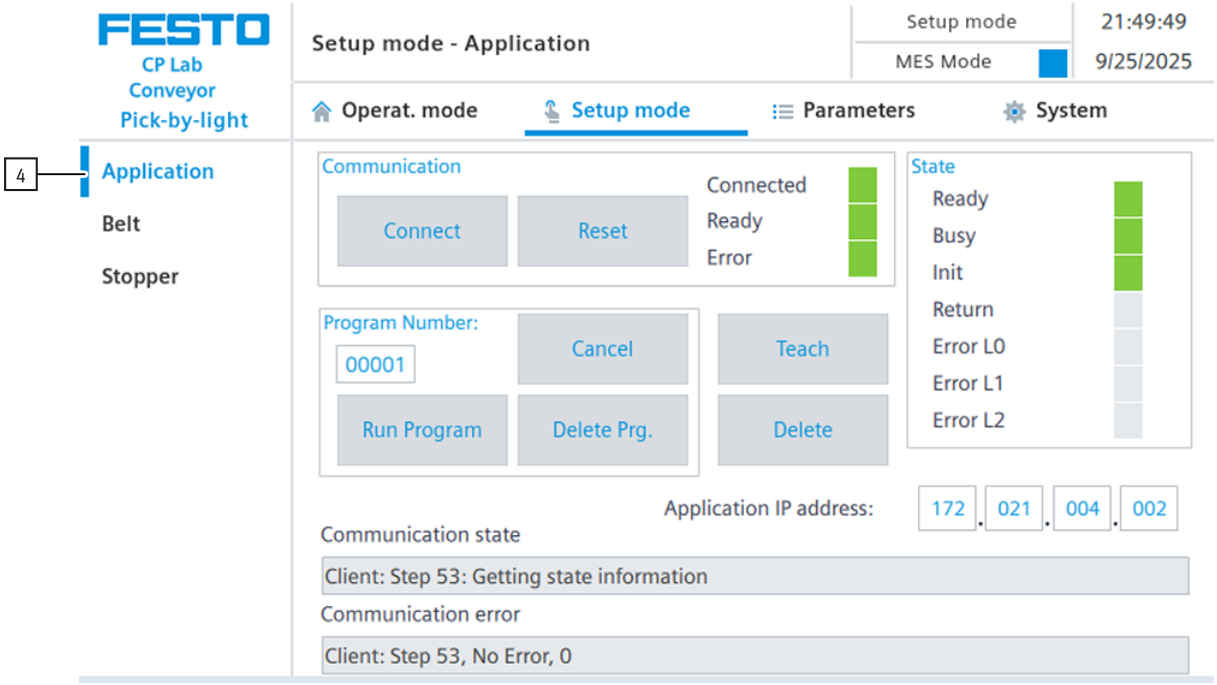
1. If the CP application module has not yet been started, there is no connection between the application module and the basic module. This is indicated by the error message (1) in the info line. On the home screen under Operat. mode click on the button *"Reset"* (2) The basic module establishes the connection to the CP application module.



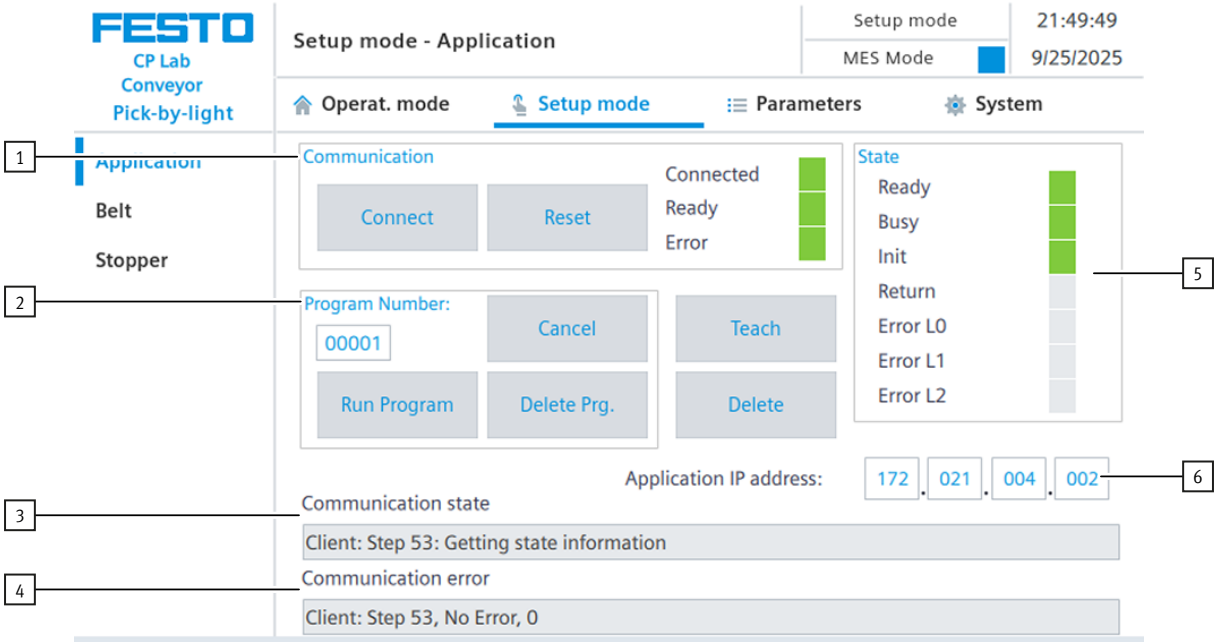
2. On the Home screen, under Operat. mode, select *"Setup"*.



3. Switch to the *"Setup mode"* function via the menu bar.



4. Select *"Application"*.

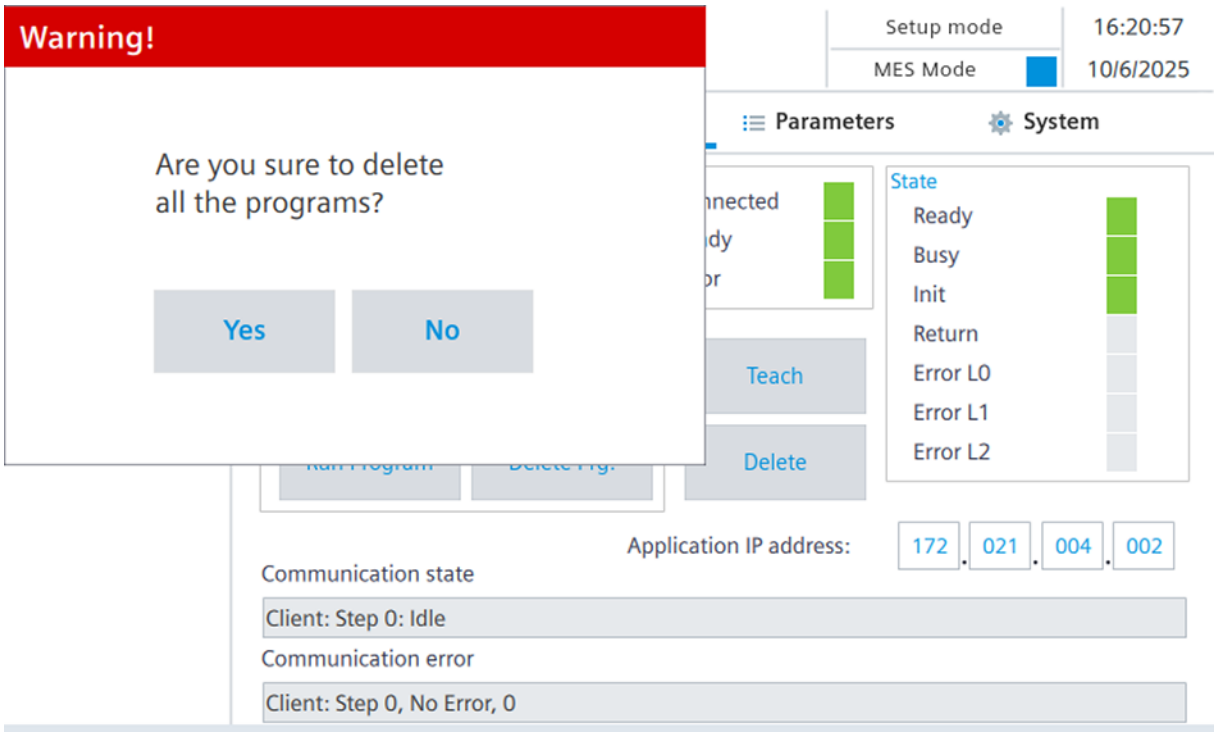


5. The corresponding actuators can be controlled by pressing the buttons.

Active sensors are displayed.

Pos.	Description
1	Communication field ● Connect button: Establish connection with Pick By Light controller (only possible in manual mode) ● Reset button: Reset connection (only possible in manual mode) ● Connection lamp: green = communication program is ready ● Ready lamp: green = Pick By Light is ready ● Error lamp: red = communication error present
2	Program number field ● Input field: The program number can be entered here ● Cancel button: Cancels the current process ● Execute Prog. button: start selected program (blue if active) ● Delete Prog. button: Deletes the input field of the program number (pop-up window opens)* ● Teach-in button: Create program with new settings (pop-up window opens, see following description) ● Delete all button: all programs are deleted (pop-up window opens)*
3	Communication status ● reads out the current status and the step number of the communication status and displays this as text
4	Communication error ● reads out the current status and the communication errors and displays them as text
5	Status field ● Auto lamp: lights up green when automatic is active ** ● Manual lamp: lights up green when manual mode is active ● Reset lamp: lights up yellow when reset mode is active ● Lamp Ready: PickByLight is ready for the next job, lights up green ● Busy lamp: PickByLight is processing an order, lights up yellow ● Lamp Error L0: Error on PickByLight module, lights up red *** ● Lamp Error L1: Error on PickByLight module, lights up red ***Lamp Error L2: Error on PickByLight module, lights up red ***
6	Display of the IP address

Pos.	Description
*delete selected program – pop-up window must be confirmed. ** Even if the conveyor is in manual mode, the Pick By Light module is always in auto mode in order to execute the programs. *** Error L0 has the highest priority of the error codes.	



5.2.1 Programs in Pick by Light

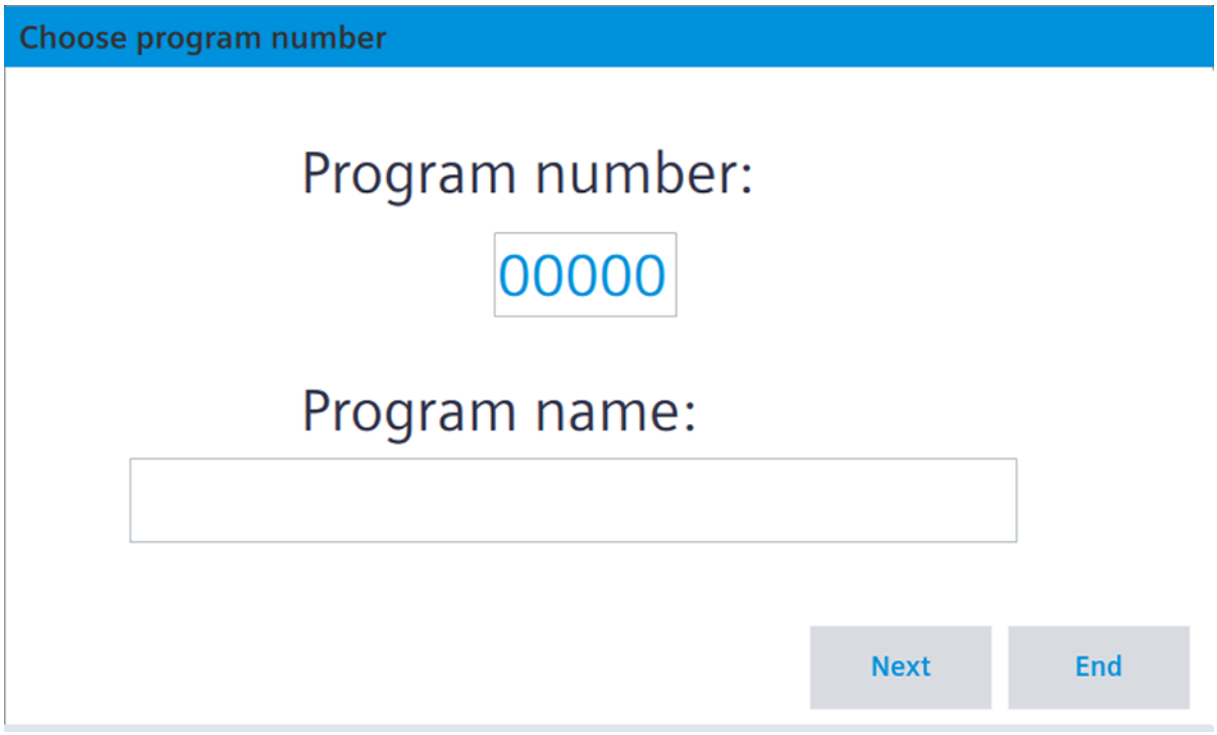
Company numbers

1. Execute program
2. Teach program
3. Continue
4. Submit
5. Storage
6. Cancel
7. Delete program
8. Delete all

5.2.2 Teach-in program

if the *"Einlernen"* button is pressed, the following pop-up window appears.

1. Select the program number and continue by pressing the *"Nächste"* Button



2. In this mode, the pick-by-light modules can be taught by touching them. Select the desired box and press the touch button on the box. The number of touches corresponds to the number of workpieces to be removed from the box. The green light shows the active box, the blue lights show the number of workpieces to be removed from the box.

3. The PickByLight module must be ready for the next step or for saving; this is indicated by a gray background on the buttons. If the button is highlighted in blue, the module is in a process.

4. If workpieces are to be removed from another box, press the *"Next"* button and continue as above.

5. The teaching process can be completed and saved using the *"Save"* button. If you want to cancel the process, press the *"Cycle end"* button.

5.2.3 Pop-up in automatic operating mode

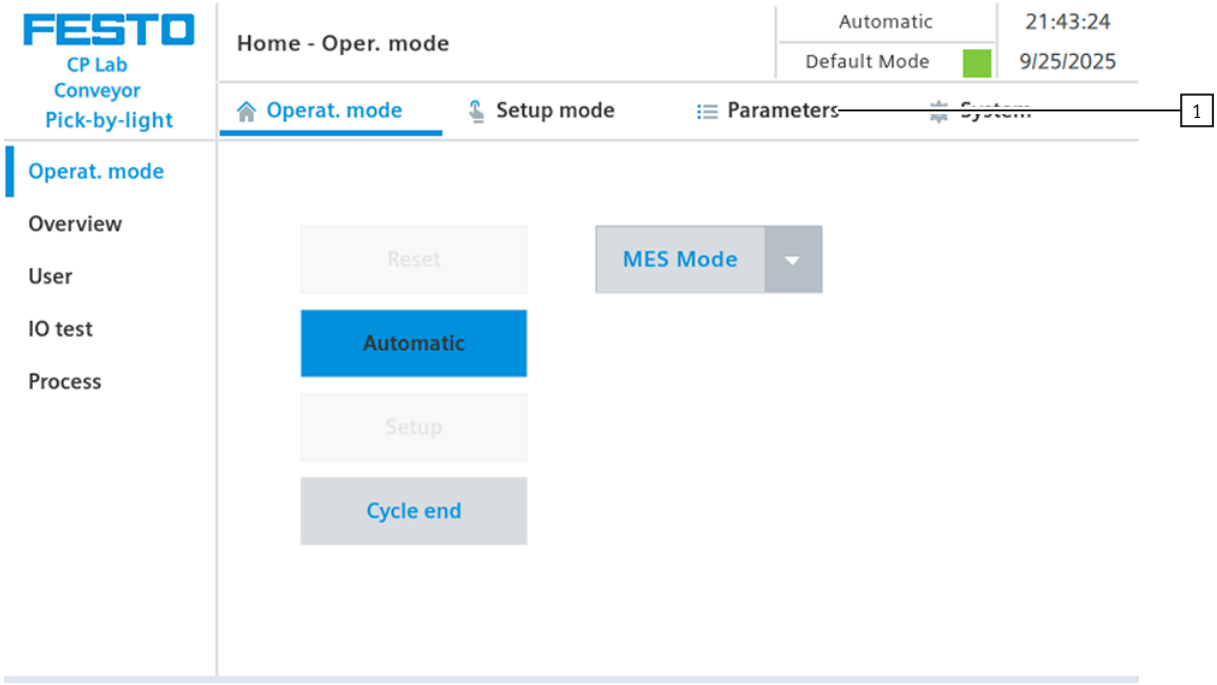
In standard mode, the following pop-up window appears if an order appears:

It displays parameter 1 as the program number and parameter 2 as the operating number. The user can accept or cancel the order.

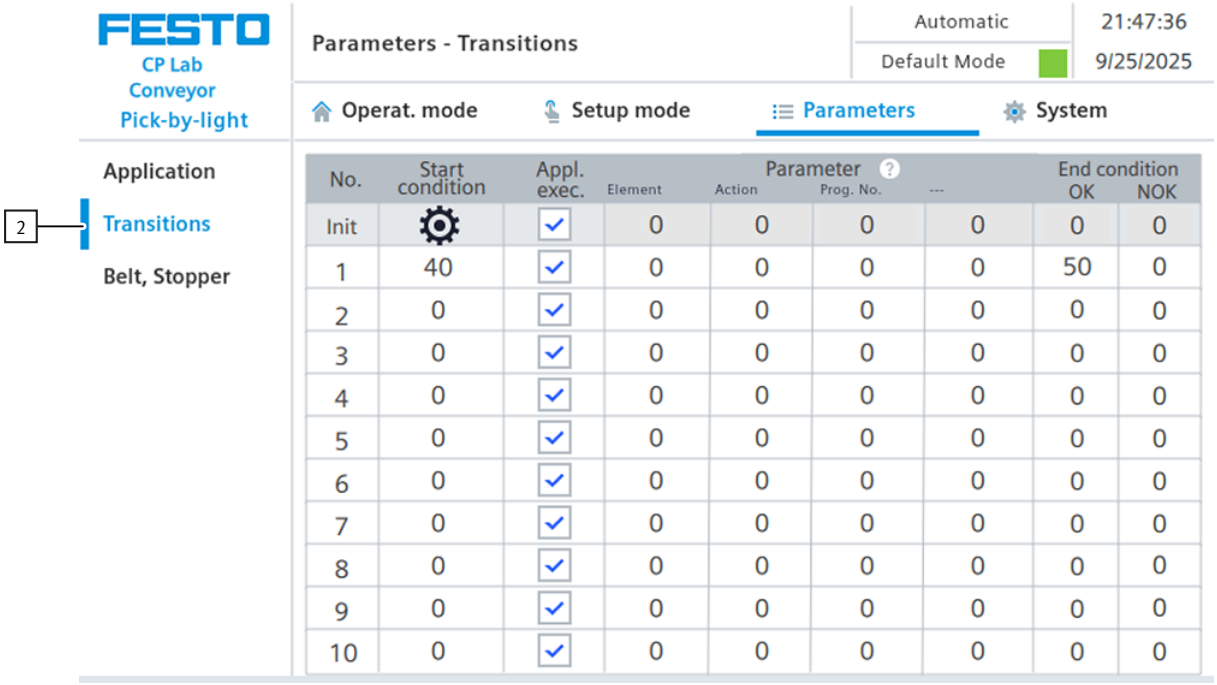
In MES mode, a web page is opened by the MES.

5.3 Transitions of the CP application module iPickByLight

With CP Factory/Lab stations in default mode, the transition table is used to define whether an operation takes place at this station and if so, using which parameters.



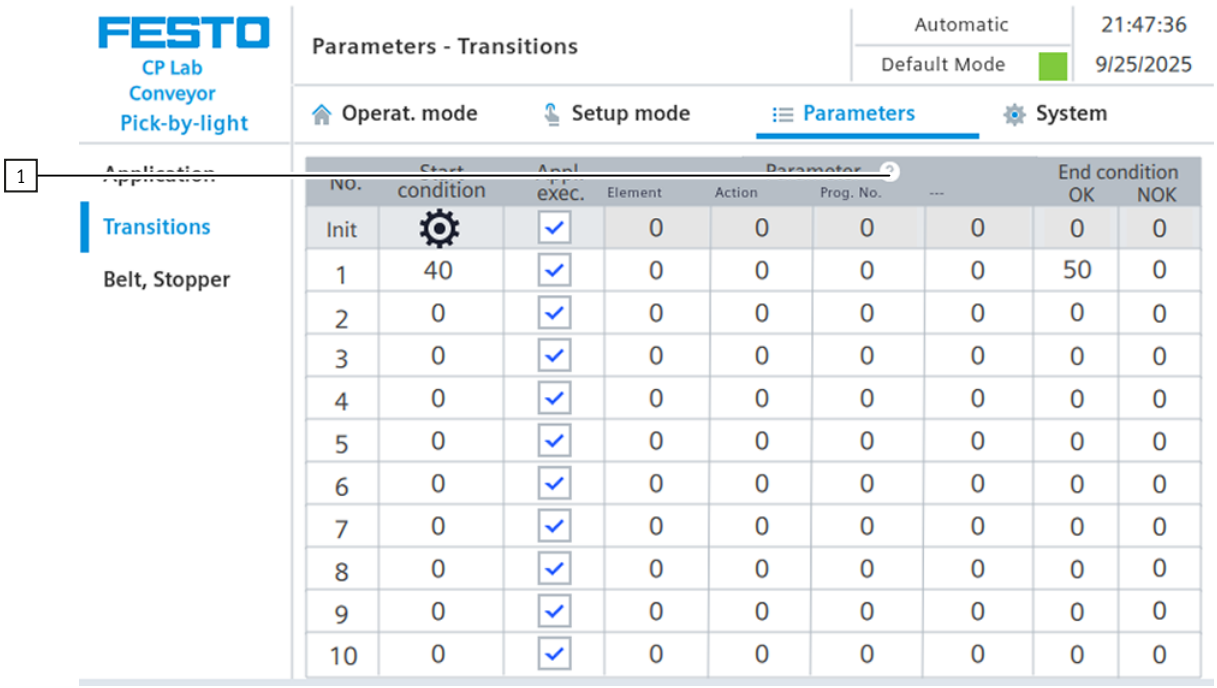
1. Press the *"Parameter"* button.



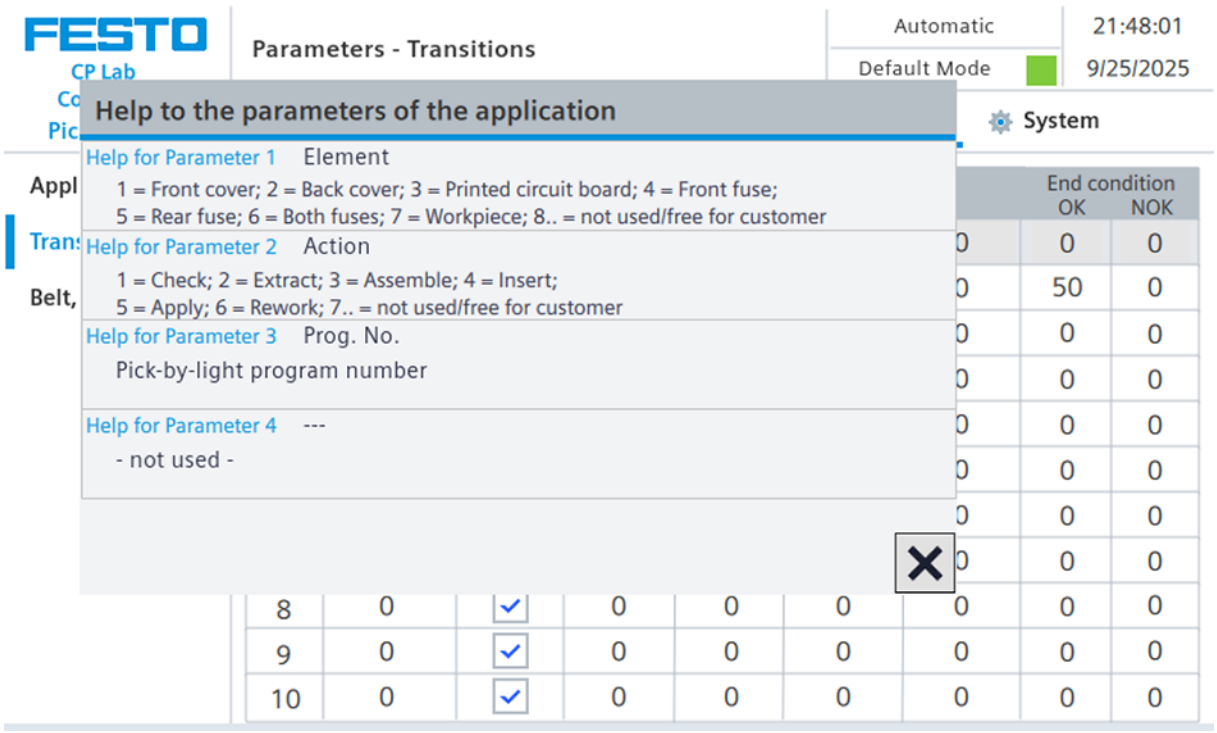
2. Now press the *"Transitions"* button.

If the Transitions submenu is selected, the transitions of the installed CP application module are displayed.

Help for the parameters



1. Press the question mark to open a help window.



2. All parameters are listed in detail in the help window.

5.3.1 Setting transitions

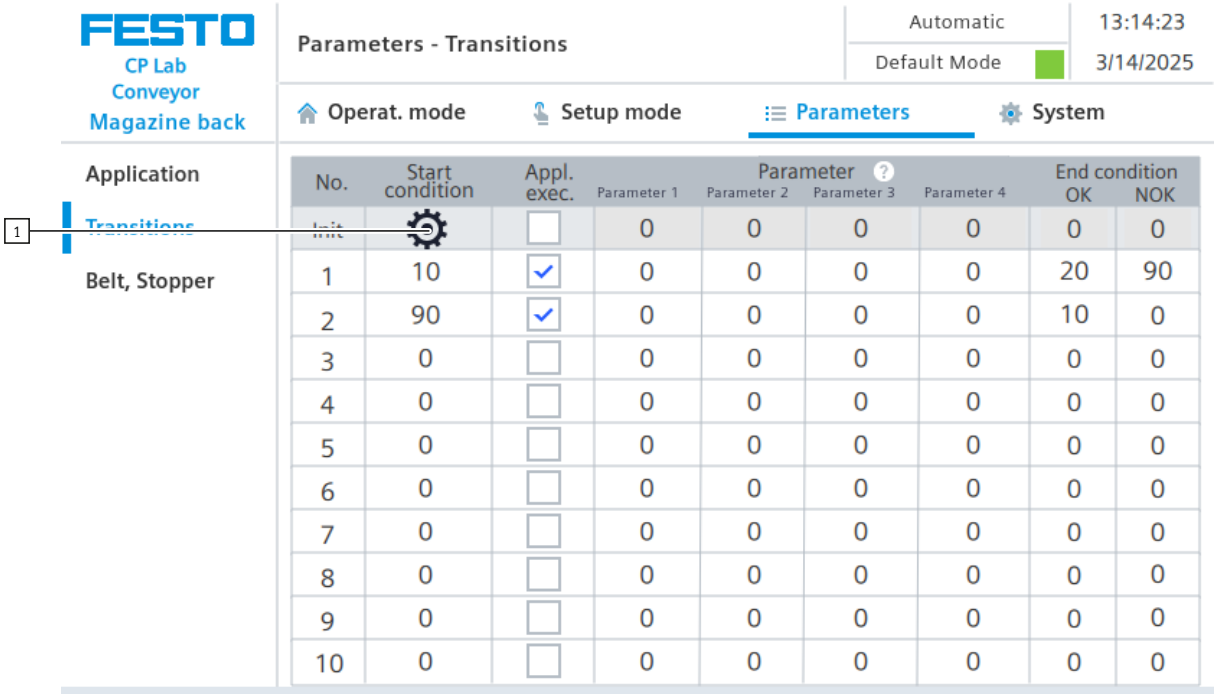
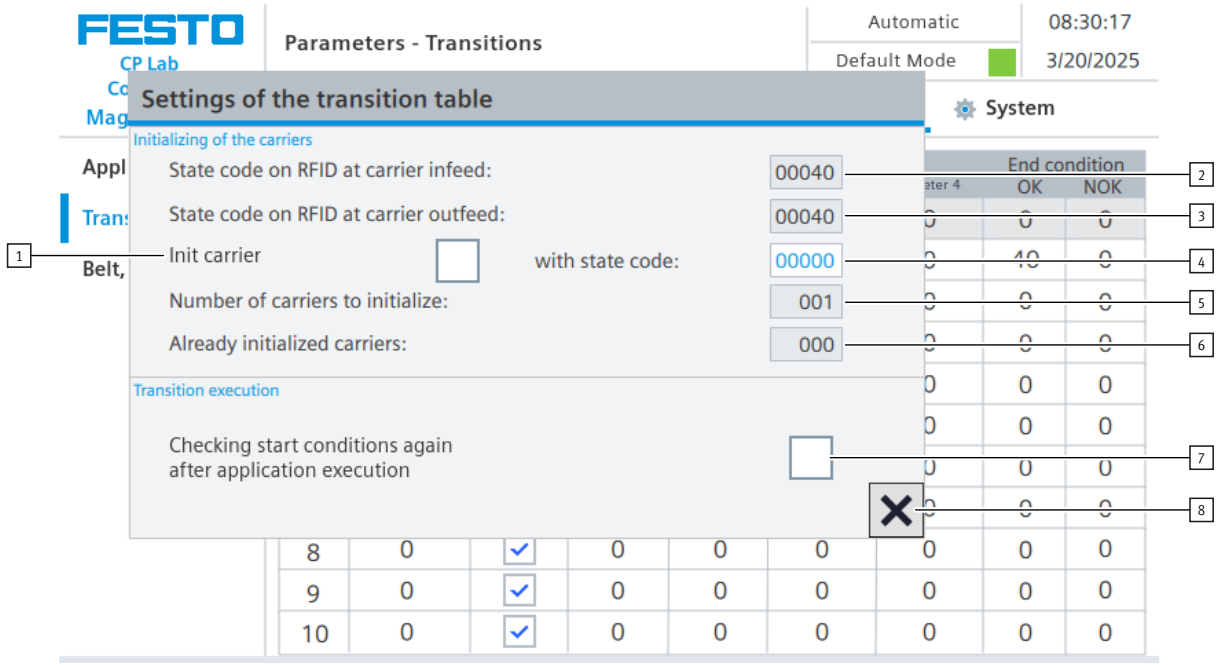


Fig. 12: Example on the AM MAG

Click on the gear to open a pop-up. The settings for the transitions can be adjusted here.



1 Initialize workpiece carrier: The next workpiece carrier that arrives at the stopper position is initialized with the finished state (status code can be entered under item 4) of the first line of the transition table

2 Status code on the RFID at the workpiece carrier infeed: Display of the start condition for application processing

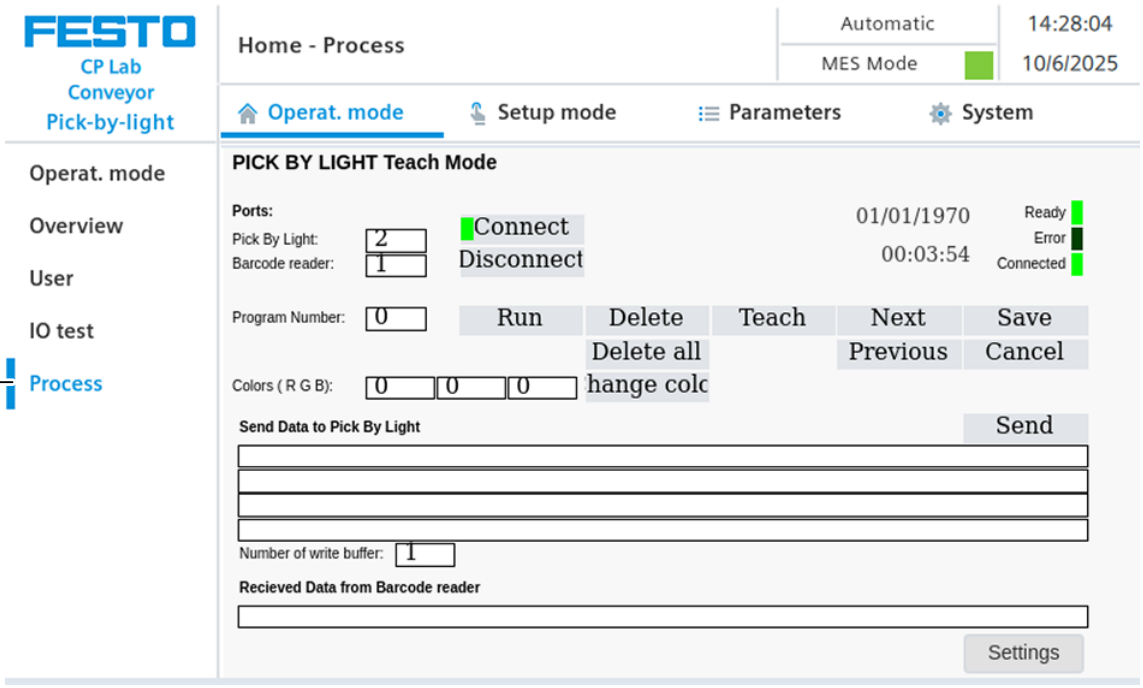
3 Status code on the RFID at workpiece carrier outfeed: Display of the final status after application processing

4 With status code: During initialization (item 1 / Initialize workpiece carrier), the workpiece carrier is initialized with the status code entered here

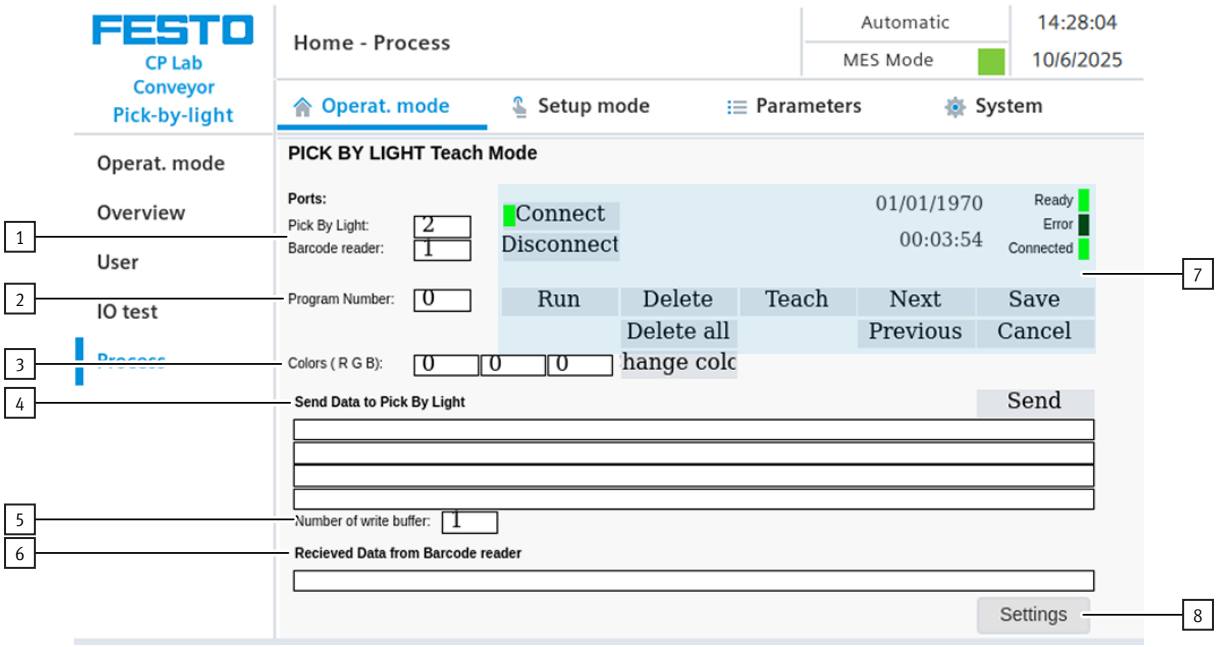
5 Number of workpiece carriers to be initialized: Editable, the number of workpiece carriers to be initialized can be entered here.
6 Already initialized workpiece carriers: Display of the already initialized workpiece carriers
7 Re-check start conditions after application execution: If this function is activated, the start conditions are checked again after a transition condition has been processed. This makes it possible to run an application several times without the workpiece carrier leaving the working position.
8 Exit settings

5.4 Process of the CP application module

→ the following page is opened via the *"Process"* Button.



The connection information is displayed on this page.



1 Ports: Display of the ports of PickByLight and Barcode Reader.

2 Program Number: Display and input of the program number.

3 Colors (R,G,B): Display and input of the color / enter value and accept with button change color.

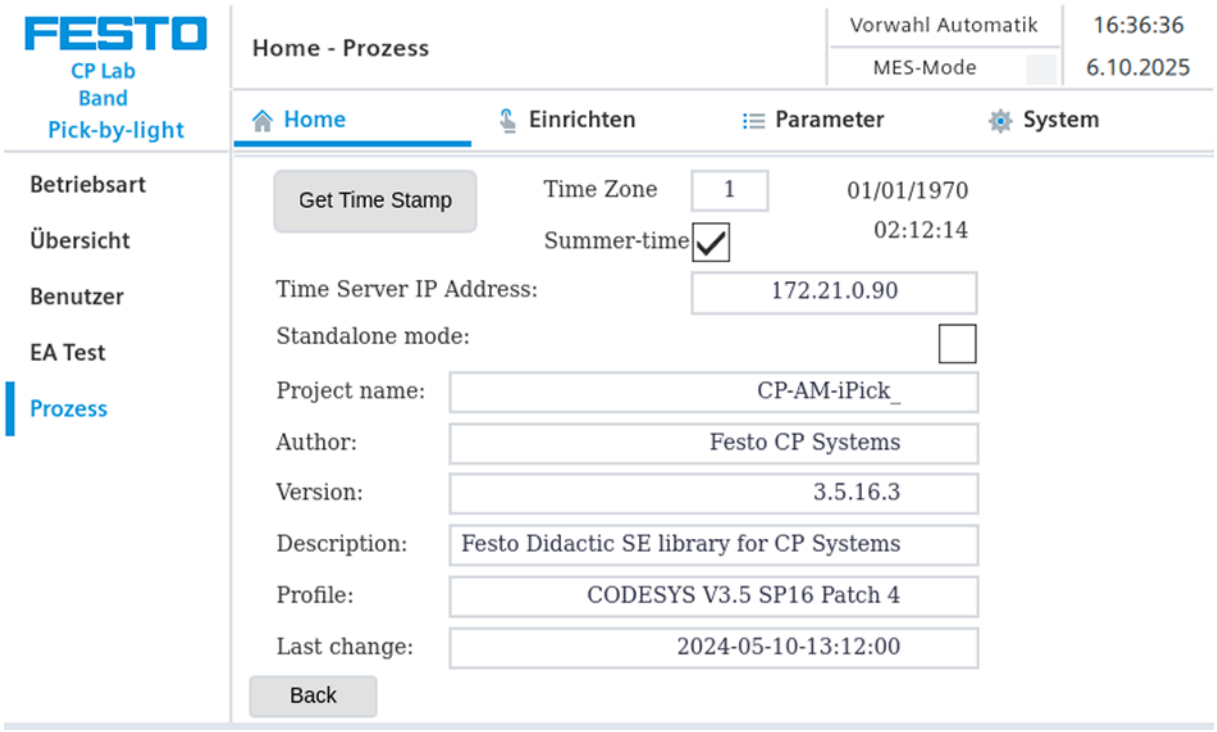
4 Send Data to Pick by light: Display/enter data to the R-iZO base module and transfer it with the Send button.

5 Number of write buffer Button:

6 Recieved Data from Barcode Reader: Display of barcode reader data.

7 Connect Button: Connect PLC to PickByLight module.
Disconnect Button: Disconnect the PLC from the PickBy-Light module.
Run Button: start selected program
Delete Button: delete selected program
Delete all Button: delete all programs
Teach Button: Teach a step in the selected program.
Next Button: Teach next module step in selected program.
Previous Button: Teach previous module step in selected program.
Save Button: Save changes in the selected program.
Cancel Button: Do not apply changes to the selected program.

8 Settings Button: see the following screen.



Settings of the PickByLight module.

5.5 Default parameter (PICK)

Parameter [ ]	Description
[1] Element	0 No element 1 Front cover 2 Back cover 3 Printed circuit board 4 Front fuse (in direction of transport) 5 Rear fuse (in direction of transport) 6 Both fuses 7 Workpiece

Parameter [ ]	Description
[2] Action	0 No action 1 Check 2 Extract 3 Assemble 4 Insert 5 Apply 6 Rework
[3] Prog. No.	Pick by Light program number

6 Message Texts and Interactive Error Messages on the HMI

There are generally three different message classes. These are laid out as follows

- Message class 0 (displayed with a red background in the message line)
  - the program is stopped immediately and automatic mode is ended
  - the cause of the error must be rectified
  - Then acknowledge the error and restart the station
- Message class 1 (displayed with a red background in the message line)
  - the program and automatic mode are stopped at the end of the cycle
  - the cause of the error must be rectified
  - Then acknowledge the error and restart the station
- Message class 2 (displayed with a yellow background in the message line)
  - the program and automatic mode continue to run
  - if the cause of the error is rectified, the error is automatically acknowledged
- Information
  - Displayed on the HMI but not processed in MES

6.1 Message texts

6.1.1 Message texts CP application module PickByLight

There are currently no message texts available for the application module PickByLight.

6.2 Interactive Error Messages on the HMI

There are generally three different notification classes. These are laid out as follows

- Notification class 0 (displayed with a red background in the message line)
  - the program is stopped immediately and automatic mode is ended
  - the cause of the error must be rectified
  - Then acknowledge the error and restart the station
- Notification class 1 (displayed with a red background in the message line)
  - the program and automatic mode are stopped at the end of the cycle
  - the cause of the error must be rectified
  - Then acknowledge the error and restart the station
- Notification class 2 (displayed with a yellow background in the message line)
  - the program and automatic mode continue to run
  - if the cause of the error is rectified, the error is automatically acknowledged
- Notes
  - Displayed on the HMI but not processed in MES

6.2.1 Default operation

Interactive messages are displayed via a pop-up window on the HMI.

The pop-up window has 3 buttons.

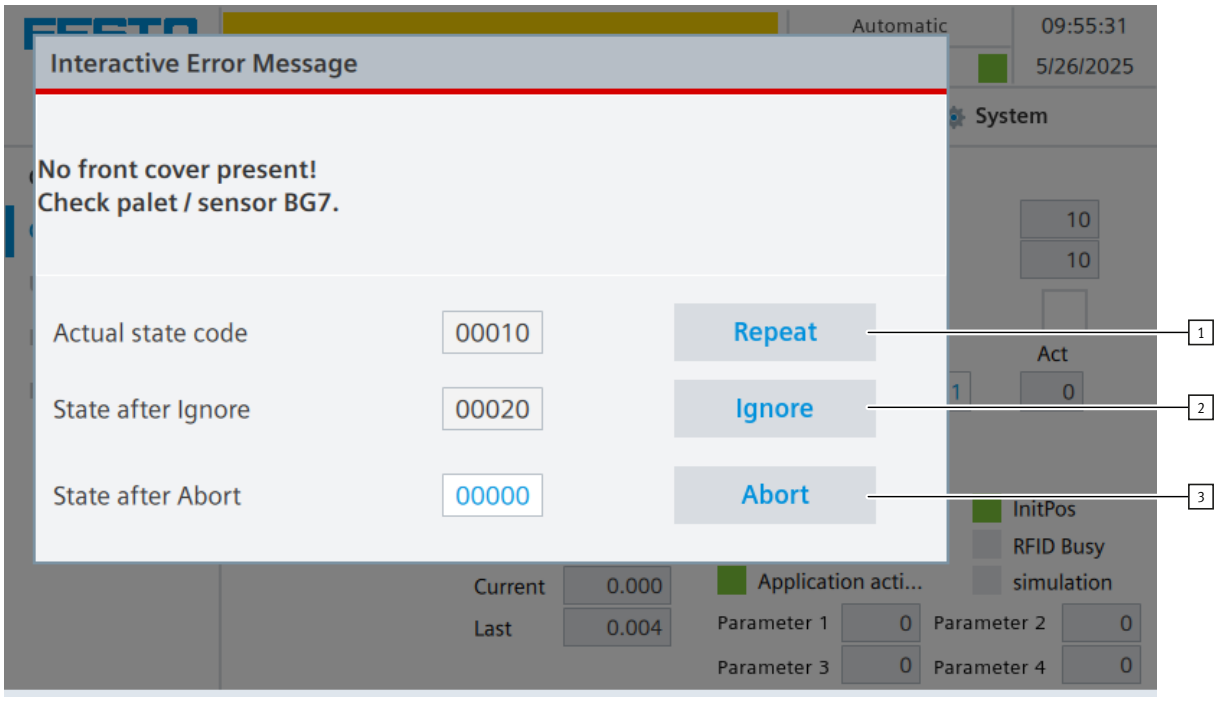


Fig. 13: Example – interactive messages in default mode

1 *"Repeat"* Button - An attempt is made to run the application again.

2 *"Ignore"* Button – The error status is ignored, the workpiece carrier receives the status code as specified in the "Initial status" column in the transition table. The application is no longer executed.

3 *"Abort"* Button – The error status is ignored, the workpiece carrier receives the status code as shown in the input/output field next to the button. This can be changed in this interactive error message window.

6.2.2 MES operation

Interactive messages are displayed via a pop-up window on the HMI.

The pop-up window has 4 buttons.

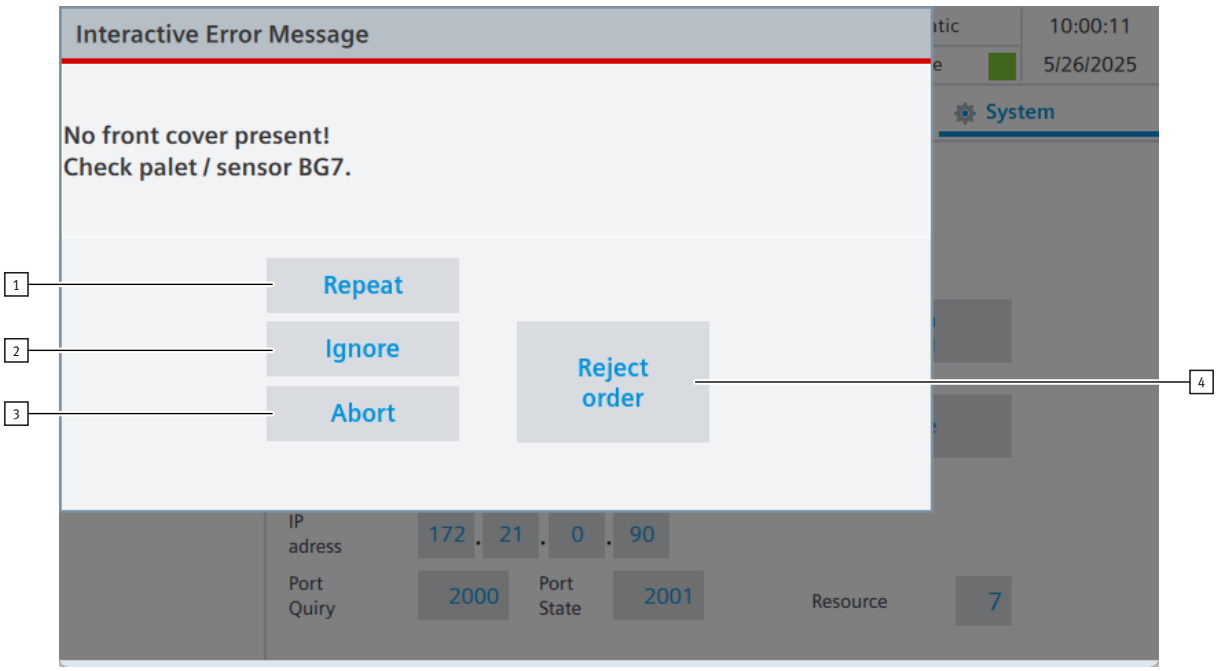


Fig. 14: Example – interactive messages in MES mode

1 *"Repeat"* Button - An attempt is made to run the application again with the same parameters.

2 *"Ignore"* Button – The application is not executed but is treated in the MES as if the order step has been completed without errors.

3 *"Abort"* Button – The application is no longer executed. In the MES, this order item is terminated with an error and canceled, depending on whether an error step is defined or not. Reject order – The application is not executed. The step for this order item is reset in the MES and restarted the next time the workpiece carrier arrives.

4 *"Reject order"* Button – The application will not be executed. In the MES, the step of this order position is reset and restarted the next time the workpiece carrier arrives.

6.2.3 General

Value	Error	Eliminating the Fault
100	Order canceled incorrectly	Restart order

6.2.4 PickByLight application module

There are currently no interactive error messages available for the PickByLight application module.

7 Maintenance

7.1 Maintenance in the CP System

General information

The CP Factory and CP Lab systems from Festo Didactic have been developed using high-quality components to ensure a long service life. Nevertheless, any improper use can lead to failures. The purpose of this maintenance manual is to provide you with an overview of the service-related activities that need to be carried out on CP systems.

Before carrying out maintenance work, the entire system must be switched off and the power supply disconnected. Industrial robots and CP Factory bearings must be secured against being switched on again during maintenance work. Assembly work inside the CP Factory bearings is only permitted in the lower end position of the Z-axis or with the Z-axis mechanically locked. If the activities are to be carried out with the control system switched on, the operator must establish additional protective measures to ensure safe personal protection (e.g. marking with a sign on the system).

Below you will find a checklist of the inspections that Festo Didactic recommends at the end of the specified time interval. If the inspection reveals that the specified components are not in an acceptable condition, this must be rectified immediately. Maintenance work may only be carried out by qualified personnel.

Visual inspection

The visual inspection is carried out to detect external defects and must be performed every working day. Special attention should be paid to the following (if available):

- Any damage
- Contamination/dust deposits (e.g. on conveyor, workpiece carrier, camera, etc.)
- Loosening of door locks and hinges
- All cables and plugs are connected as intended
- Condition of the mains plug and the mains connectors and conductors
- Defective strain relief of the mains cable
- Defective mains cable
- Condition of the anchoring, cable clamp, accessible fuse insert
- Damage to the housing and protective cover that could allow access to live or dangerous moving parts
- Signs of overloading, overheating or improper use
- Signs of improper modifications
- Signs of contamination, corrosion and inappropriate ageing
- Contamination, blockage of the cooling openings, e.g. the air filter
- Tightness of the container for water, air or other medium
- Usability of switches, control and set-up devices
- Legibility and completeness of all safety-relevant markings or symbols, characteristic data and position indicators
- All fuses accessible from the outside correspond to the data specified by the manufacturer (rated current, characteristics)

- Evaluate the relevant accessories together with the device (e.g. detachable or fixed connection cables and protection) - Defective due to overbending the cables, lines, pipes and hoses
- Obstacles and tripping hazards in the vicinity of the system and on the Robotino's travel paths
- Safety areas free of workpieces and other material
- Signs of smoke, heat, odor, noise or deformation of (rechargeable) batteries

The above information has been compiled to the best of our knowledge and belief and has been taken in part from DIN EN 50699. Above all, the attention of those responsible for the system on a daily basis is required.

General safety maintenance table

The safety functions of the entire system should be checked monthly to ensure correct operation. The applicability of the test steps listed below depends on the respective system configuration:

Equipment	Activity	Intervals	Criterion
Emergency stop device	Carry out a cyclical function test for each individual emergency stop button. To do so, press the button and then check whether the emergency stop chain is triggered. Then use the reset button to confirm, and check that all components are unlocked.	1 month	Functional test
Operator protection	Carry out a cyclical function test for each safe door monitoring switch and for each safe inductive proximity sensor. To do so, open the safety door during operation or remove a box of material from the box conveyor so that the safety switch triggers operator protection. Check whether the components enclosed by the safety guard come to a standstill. Then close the safety door or push the material box back into position and check the automatic restart or the acknowledgement function.	1 month	Functional test

Equipment	Activity	Intervals	Criterion
Safety sensors	Cyclical function test of all safety sensors (laser scanner, light curtain, safety mat), if present, according to manufacturer's specifications	1 month	Functional test

Components maintenance table

Equipment	Activity	Intervals	Criterion
Residual current devices	Testing using suitable measuring and testing devices by a qualified electrician or an electrically trained person in non-stationary* operation	1 month	Effectiveness
	Actuation of the test device in stationary* operation	6 months	Functional test
	Actuation of the test device in non-stationary* operation	1 day	Functional test
Conveyors	Visual inspection of the condition of the conveyors for wear (fraying/small tears). Replace them if necessary.	3 weeks	Visual inspection
	Visually check that the conveyors are centered between the guard rails. If necessary, adjust using the adjusting screws on the deflection heads.	3 weeks	Visual inspection
Stopper	Check whether the stopper reaches the end positions in approx. 200 ms (see HMI), adjust pressure or throttling if necessary	3 weeks	Visual inspection
	Check that the cylinder surface and seal are clean. If necessary, clean with a dry cloth	3 weeks	Visual inspection
Fan	Cleaning the ventilation grilles of all fans (robot controller, MES PC, etc.).	6 months	Visual inspection
Linear axes	Check linear axes (e.g. CP-AM-DRILL) for contamination and clean with a dry cloth if necessary.	3 weeks	Visual inspection

Equipment	Activity	Intervals	Criterion
	Maintenance in accordance with the manufacturer's operating manual	according to the manufacturer's specifications	according to the manufacturer's specifications
Compressors	Drain condensation water	every week	Time
	Maintenance in accordance with the manufacturer's operating manual	according to the manufacturer's specifications	according to the manufacturer's specifications
Label printer	Empty label compartment	As required	Visual inspection
	Change label roll	As required	Visual inspection
MES PC	Operating system upgrade only after prior consultation with Festo Didactic technical support	According to availability	According to availability
	Operating system updates as available from the manufacturer	According to availability	According to availability
Sinema RC server	Operating system updates as available from the manufacturer	According to availability	According to availability

* After commissioning, the entire system can be treated as a stationary system. If a conversion takes place during use (e.g. CP Lab), the system must be treated once as a non-stationary system.

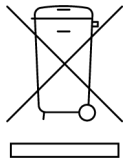
8 Cleaning

The following components in particular should be cleaned at regular intervals with a soft, lint-free cloth or brush:

- Lenses of the optical sensors, fiber optics and reflectors.
- The active surfaces of the proximity switches.

!	**NOTICE** – Do not use any aggressive or abrasive cleaning agents. – Moisture must be prevented from entering the device. – The appliance may only be cleaned when it is switched off. – Protective covers made of plastic must not be cleaned with alcohol-based cleaning agents. There is a risk of embrittlement.

9 Disposal



According to European regulations, used electrical and electronic equipment may no longer be disposed of as unsorted waste. This symbol indicates that separate collection is required. Dispose of electronic waste at designated collection points.

10 Technical data

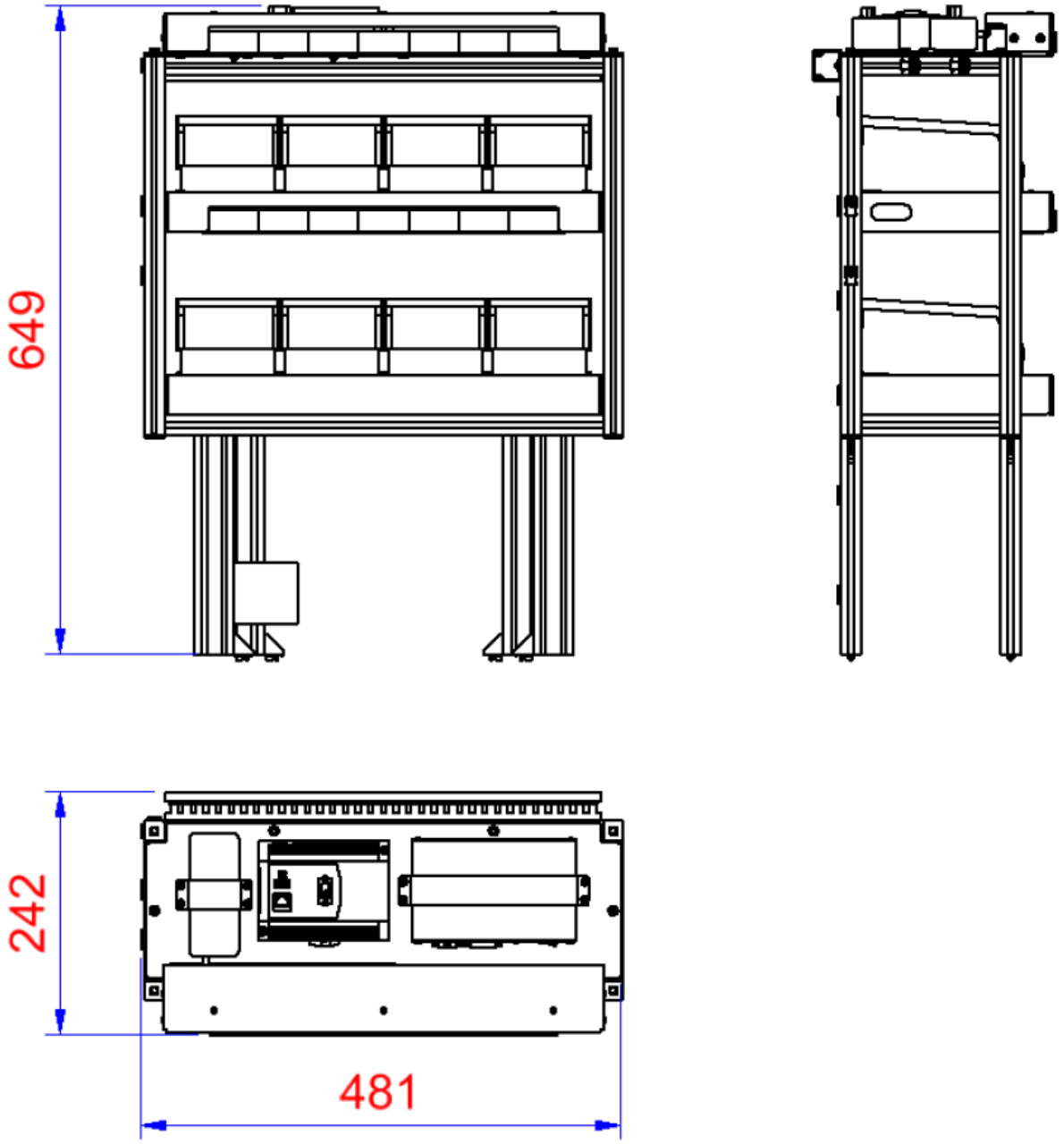


Fig. 15: Similar to illustration

10.1 Technical Data – General

Parameters	Value
Dimensions (L x W x H)	481 mm x 242 mm x 649 mm
Weight	11.2 kg

Parameters	Value
CE Marking	EMC Directive RoHS Directive The Low Voltage Directive
UKCA marking	Electromagnetic Compatibility Regulations 2016 The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 Electrical Equipment (Safety) Regulations 2016
Equipment use	Indoors only, up to 2,000 m above sea level, dry environment only
Ambient temperature range	+5 … +40 °C
Max. rel. air humidity	80 %
Contamination level	2, laboratory environment

10.2 Technical data - electrical

Parameters	Value
Operating voltage	24 V DC ±10% 100-240 V AC ±10%
Output	2.4 W 140-170 W
Current consumption	0.2 A 1 A
Source of current	24 V DC, max. 4 A, ≤ 100 W output power, SELV/PELV limited power supply (LPS) 1AC 100-240 V / 1 A / 50/60 Hz
Electrical connection	via 5-pin Sub-D plug to CECC-S Network cable CECC via fixed power supply 100-240 V, 9V output power

Parameters	Value
Overvoltage category	II, operation in building installations
Protection class	I, operation with protective grounding III. Operation with safety extra-low voltage

11 CE declaration of conformity

Hereby, Festo Didactic SE declares that this machinery is in compliance with Directive 2006/42/EG.

The machinery is subject to the conformity assessment procedure based on internal production control (Module A).

The full text of the EU declaration of conformity is available at the following internet address:

➦ *https://www.festo.com* →Supportportal

Manufacturer:
Festo Didactic SE
Rechbergstraße 3
73770 Denkendorf
Germany
+49 711 3467-0
www.festo.com
did@festo.com

UK Importer:
Festo Ltd
Applied Automation Centre
Brackmills
Northampton
NN4 7PY
United Kingdom
+44 1604 66700
www.festo.co.uk