8210728

Application module Labeling

FESTO

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 Mechanical safety instructions

	WARNING
⚠️	**Danger due to moving parts**
	Crushing and pinching injuries
	− Switch off both the operating power and the control power before working on the circuit.
	− Reach into the setup only when it is at a standstill.
	− Be aware of potential overtravel times of the actuators.

	WARNING
⚠️	**Risk of injury during troubleshooting**
	Crushing
	− Use a tool such as a screwdriver for actuating sensors.
	− Protect the device against being accidentally switched on again.

2.5.3 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.

2.5.4 Pneumatic safety instructions

⚠ **WARNING**
Uncontrolled Movement of Mechanical Components
Crushing
– Switch off the compressed air supply before working on the circuit.
– Check the system with pressure gauges to make sure that the entire circuit is fully depressurized.
– Please note that energy may be stored in reservoirs. Further information on this issue is available in the datasheets and operating instructions included with the components.

⚠ **WARNING**
Cylinder movement with compressed air activation
Crushing
– Slowly increase the compressed air.
– Keep work areas clear of cylinders.

⚠ **WARNING**
Extending cylinders
Crushing
– Always position pneumatic cylinders so that the piston rod's working space is unobstructed over the entire stroke range.
– Make sure that the piston rod cannot collide with any rigid components of the setup.

WARNING
Tubing slipping off
Risk of injury / eye injury
– Use the shortest possible connections.
– If tubing slips off, switch off the compressed air supply immediately.
– Tighten and check barbed tubing connectors during assembly according to specifications.

	WARNING
⚠️	**Additional safety instructions**
	Injuries
	− Do not exceed the maximum permissible pressure of 6 bar (600 kPa).
	− Do not switch on the compressed air until all the barbed tubing connectors have been joined and secured.
	− Do not disconnect tubing while under pressure. − Do not attempt to connect tubing or push-in connectors with your hands or fingers.
	− Check the condition of the condensate in the service unit regularly. If necessary, drain the condensate and dispose of it properly.

	CAUTION
⚠️	**Improper circuit construction**
	Injuries
	− Switch off the compressed air supply before dismantling the circuit.
	− Press the blue release ring down so that the tubing can be pulled out.
	− Connect the devices with plastic tubing with an outside diameter of 4 or 6 mm.
	− Push the pneumatic tubing into the push-in connector as far as it will go.

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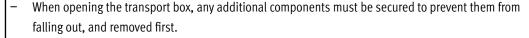
	⚠️ **WARNING**
⚠️	**Danger of crushing for hands/feet** – It is not permitted to grip onto or under the feet of the station, as there is an increase risk of hands or feet getting crushed or trapped. – When setting down the station, make sure no persons have their feet under the machine's feet.

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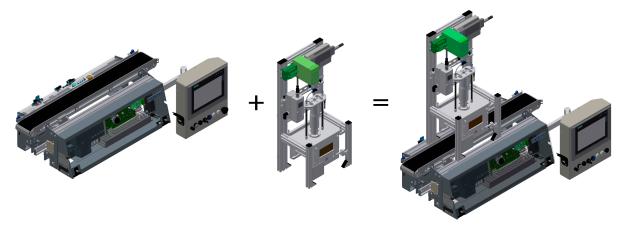
If a station has an emergency stop mushroom actuator, the emergency stop signal switches off all actuators. Operator confirmation is required to restart the system; there is no automatic restart.

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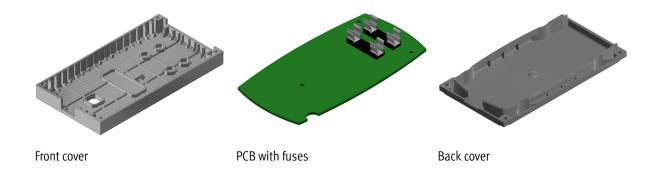
A system is created by setting up several stations one after the other.

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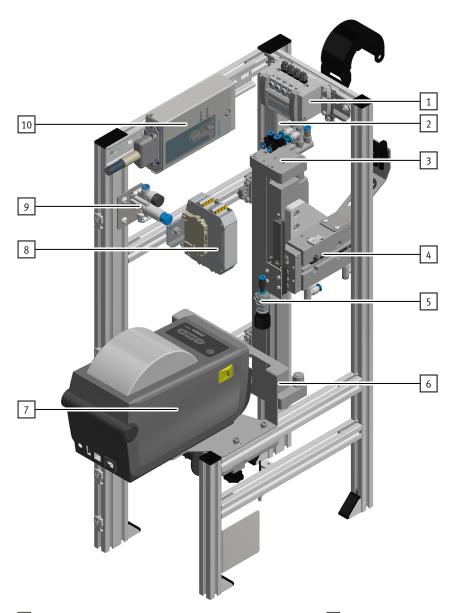
The typical workpiece of a CP system consists of a front cover, a PCB with a maximum of two fuses and a back cover:

Front cover   PCB with fuses   Back cover

3.4 Design CP Labeling Application Module

Task of this application module:

- Apply a label to a workpiece.

1	Valve manifold	6	Pick-up label behavior
2	Vacuum switch	7	Label printer
3	Cylinder Z-axis	8	Starting current limiter winding motor
4	Mini slide X-axis	9	Pressure regulator
5	Suction cup	10	I/O module

3.5 Electric
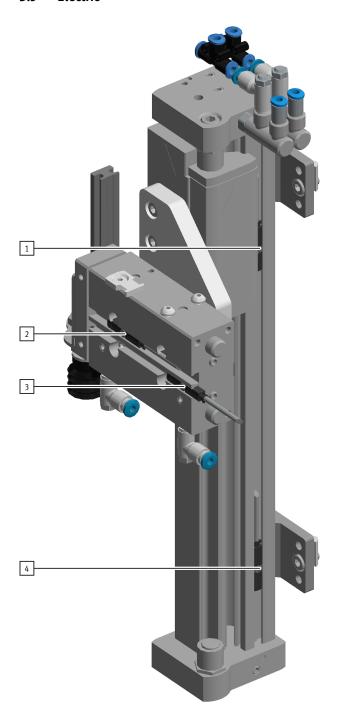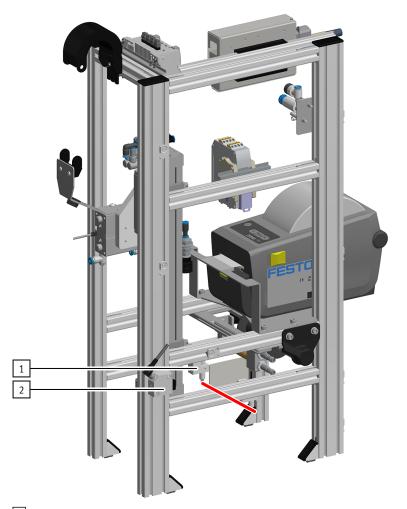
Fig. 1: Similar to illustration

1 Proximity switch, BG3, top Z-axis
2 Proximity switch, BG1, X-axis Label pick-up position
3 Proximity switch, BG2, rear Y-axis
4 Proximity switch, BG4, bottom Z-axis

1. Fiber-optic cable, BG5, workpiece available
2. Fiber-optic unit, BG5, workpiece available

Fig. 2: I/O module XD1 - Similar to illustration

Fig. 3: Zebra Label Printer, PH1 - Similar to illustration

1 Power supply connection
3 USB connection
2 LAN connection
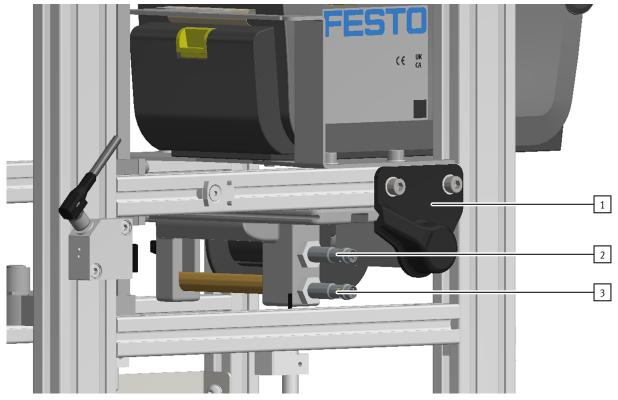
Fig. 4: Similar to illustration

1	Winding motor, MA8
2	Proximity switch, BG8, track in operating position
3	Proximity switch, BG7, track too low

3.6 Electrical Connections

3.6.1 I/O Connectors

Connection with Syslink plugs

The I/O module XD1 (1) of the CP application module is connected to the controller (2) of the CP Lab belt using an I/O cable (with Syslink plugs).

Fig. 5: Electrical connection CP Lab / Similar to illustration

The I/O module XD1 (1) of the CP application module is connected to the I/O terminal (2) on the electrical board of the CP Factory basic module using an I/O cable (with Syslink plugs).
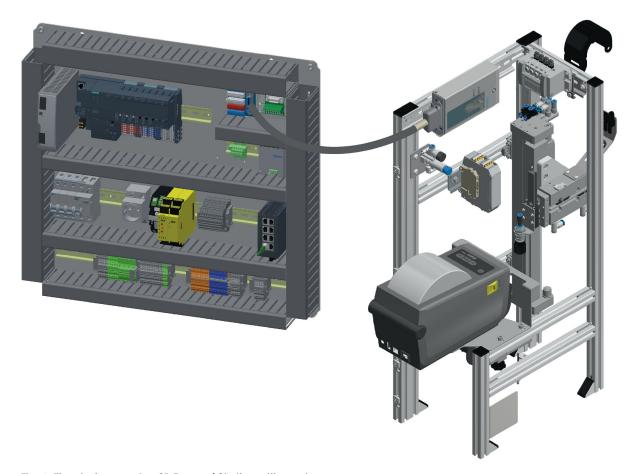
Fig. 6: Electrical connection CP Factory / Similar to illustration

3.6.2 I/O module XD1

Fig. 7: Similar to illustration

The signal status of the sensors and actuators can be read via the I/O module: IN0 to IN7 or OUT0 to OUT7 indicates the value range of a byte from bit 0 to 7. The sensors and actuators of the CP application module are connected to the internal terminals. IN0 to IN7 visualize the sensor status using a green LED. If one of the LEDs lights up green, the sensor connected to the input is carrying a logical 1 signal (TRUE).

OUT0 to OUT7 visualize the actuator status using an orange LED. If one of the LEDs lights up orange, the actuator connected to the output is energized.

3.6.3 Digital Inputs and Outputs on the I/O Module XD1

Identifier	BMK	Application	SysLink application
X-axis label pick-up position (front)	BG1	XD1 / XK:I0	XD1:XS13
Rear X-axis	BG2	XD1 / XK:I1	XD1:XS14
Z-axis top	BG3	XD1 / XK:I2	XD1:XS15
Z-axis bottom	BG4	XD1 / XK:I3	XD1:XS16
1= Workpiece present	BG5	XD1 / XK:I4	XD1:XS17
Vacuum has been generated	BP6	XD1 / XK:I5	XD1:XS18
Track too low	BG7	XD1 / XK:I6	XD1:XS19

Identifier	BMK	Application	SysLink application
Track in operating position	BG8	XD1 / XK:I7	XD1:XS20

Table 1: PLC inputs / station outputs

Identifier	BMK	Application	SysLink application
Extend X-axis	MB1	XD1 / XK:O0	XD1:XS1
		XD1 / XK:O1	XD1:XS2
Z-axis upward	MB2	XD1 / XK:O2	XD1:XS3
Z-axis downward	MB3	XD1 / XK:O3	XD1:XS4
Winding motor on counterclockwise	MA8	XD1 / XK:O4	XD1:XS5
(*Activate vacuum*)	MB6	XD1 / XK:O5	XD1:XS6
		XD1 / XK:O6	XD1:XS7
Winding motor on clockwise	MA8	XD1 / XK:O7	XD1:XS8

Table 2: PLC outputs / station inputs

3.6.4 LAN Connection

The printer (2) is connected to the switch (1) on the basic structure of the CP Lab conveyor via a LAN cable.
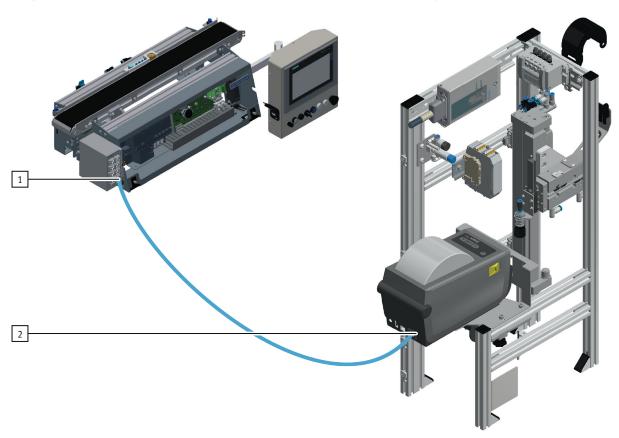
Fig. 8: LAN connection to CP Lab / Similar to illustration

The printer (2) is connected to the switch (2) on the electrical board of the basic module via a LAN cable.
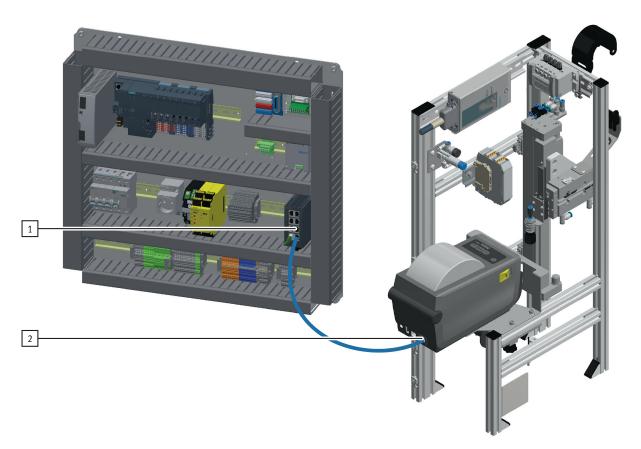
Fig. 9: LAN connection to CP Factory basic module

3.7 Pneumatic

Valve description from left to right
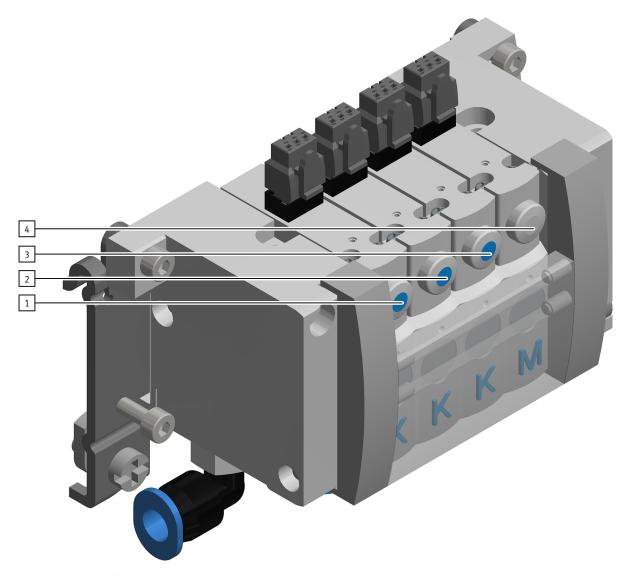
Fig. 10: Similar to illustration

1 Valve, MB 3, Z-axis upward
2 Valve ,MB 4, Z-axis downward
3 Valve, MB 6, activate vacuum
4 Valve, MB 1, extend X-axis
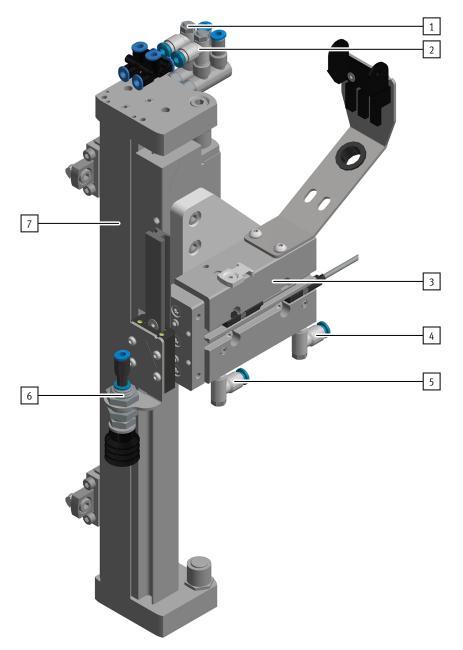
Fig. 11: Similar to illustration

1	One-way flow control valve		5	One-way flow control valve
2	One-way flow control valve		6	Suction cup
3	Guided drive X-axis		7	Cylinder Z-axis
4	One-way flow control valve			
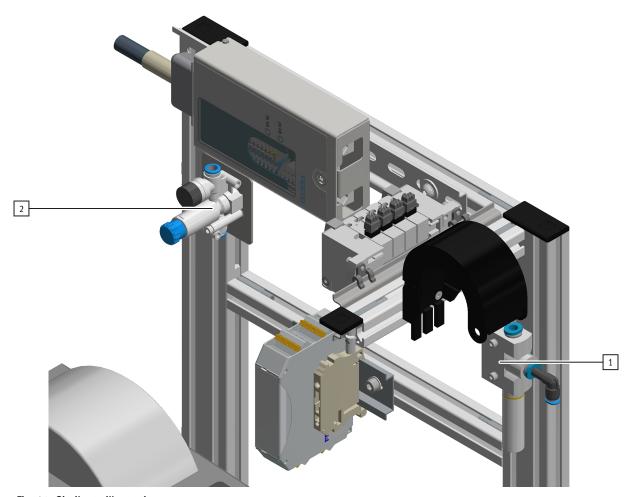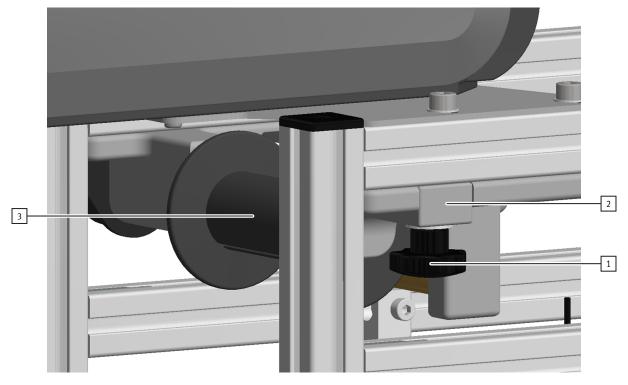
Fig. 12: Similar to illustration
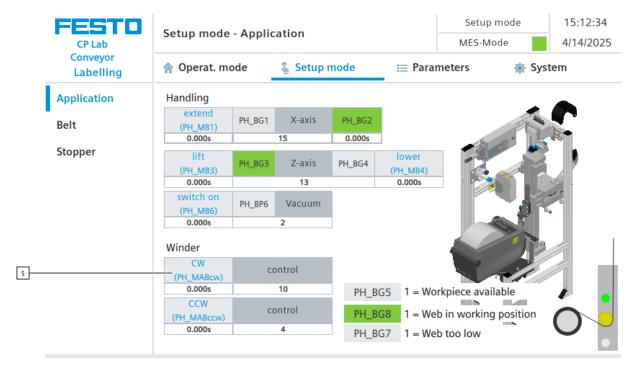
[1] Pressure regulator for complete application module (set to approx. 2 bar)

[2] Vacuum nozzle for suction cups

3.8 Label Winder

Removing label winder paper
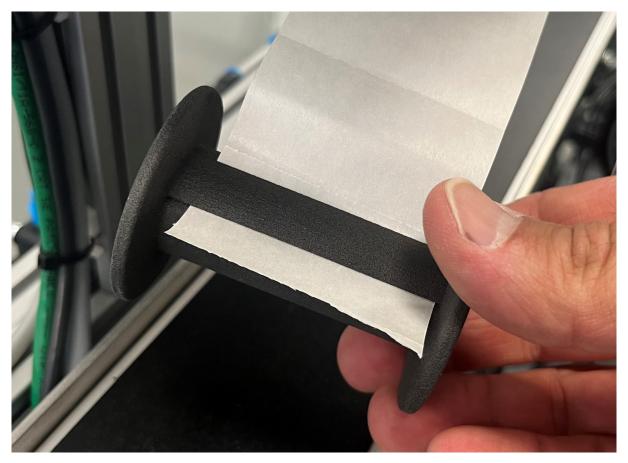
1. ▸ Loosen knurled nut.

2. ▸ Pull out the counterholder.

3. ▸ Remove the roller with the paper from the motor shaft and pull out/unroll the paper.

4. ▸ Cut the paper - a certain excess length is required here so that the paper can be threaded and rolled up again.
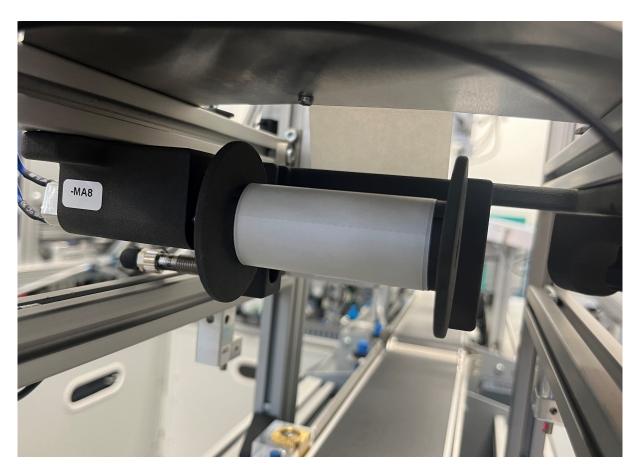
5. ▸ Alternatively, the CW button can be pressed (clockwise) to unroll the paper. Press the button until the paper is completely unrolled. Then continue with point 4.
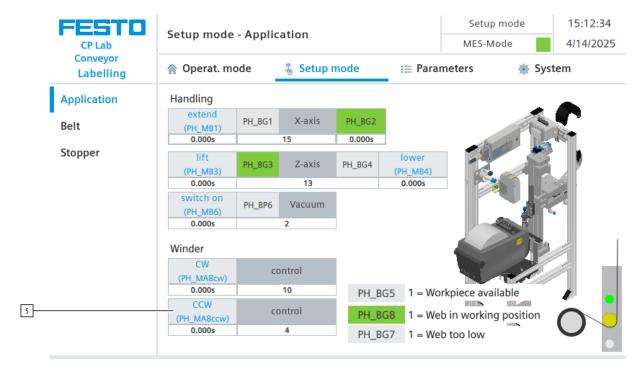
Getting the label roller ready for use

1. → Thread the paper into the roller and roll up the remaining piece.

2. ⬦ Slide the roller onto the motor.

3. ⬦ Slide on the counterholder.

4. ⬦ Tighten the knurled screw.

5. Press the CCW button until the PH_BG8 sensor is active and the correct paper tension is reached (this happens automatically during a reset run).

3.9 Function

The CP application module applies a label to a workpiece.

The workpieces are detected by a light barrier as they enter the CP application module and the goods carrier is stopped. Once the goods carrier has stopped, the X-axis extends to the pick-up position.

A label is printed by the printer; the printer contains 3 files for the print data. The files contain 2 parameters that can be customized by the customer. The selection of the file is taken over by the PLC, the PLC receives its information from the MES system (MES mode selected) or from the transition table (default mode selected).

After printing, the label is ejected from the printer and the Z-axis moves downwards. The suction cup with connector is pressed onto the ejected label. The vacuum is switched on and the label is sucked onto the sub-base. Once the label has been sucked in, the pressure switch signals this and the Z-axis moves upwards again. (A timeout period is started at the same time as the Z-axis is shut down. If the time has elapsed before the pressure switch sends a signal, a timeout error is output)

The Z-axis is then moved upwards. If the Z-axis is in its upper end position, the X-axis is retracted.

The Z-axis moves downwards again and applies the label to the workpiece. Once the label has been applied, the Z-axis moves up and the clamp is clamped. The goods carrier is then released again from the CP application module.

3.10 Sequence Description

Starting requirements

- All connections are done correctly.

Initial position
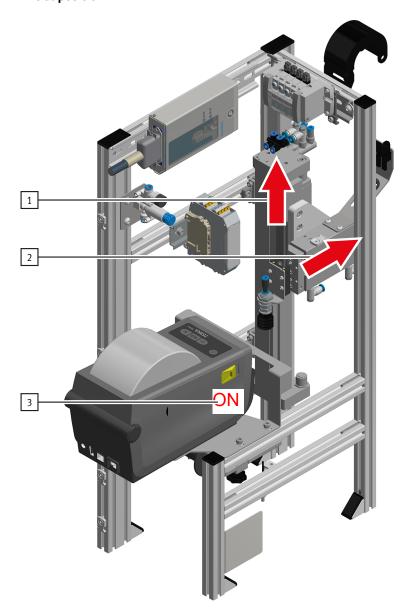
Fig. 13: Similar to illustration

1. ▸ The cylinder Z-axis must be in its upper end position.

2. ▸ The X-axis cylinder must be in its rear end position.

3. ▸ The label printer must be switched on.

Sequence

1. ▸ If a product carrier with a workpiece is conveyed through the light barrier of the CP application module, the product carrier is stopped and an automatic sequence is started.

2. ▸ The X-axis extends and the vacuum is switched on.

3. ▸ A label is printed.

4. ▸ The label is pushed out by the printer.

5. The label is sucked onto the sub-base.

6. The X-axis moves back.

7. The Z-axis moves downward.

8. The label is applied to the workpiece.

9. The Z-axis moves up again and is clamped.

10. The goods carrier is released again and leaves the CP application module.

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 Mounting

The CP application module is mounted on the basic module with the following distance (see illustration); the distance between the stopper edge and the profile edge is the same for a CP Lab conveyor as for a CP Factory basic module.

The installation procedure is explained as an example in the following chapter. The displayed dimension is an approximate value, it is possible that precision adjustment will be necessary for error-free machining.
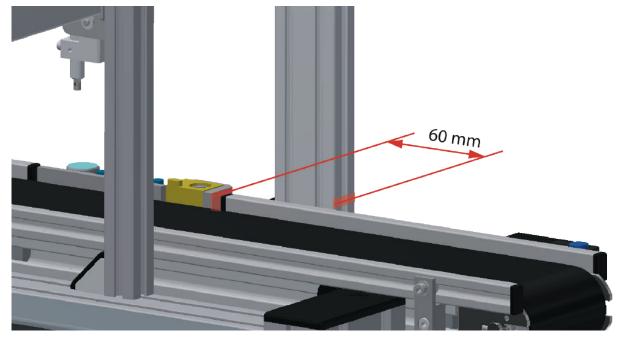
Fig. 14: Example distance of CP application module to stopper CP Lab conveyor / Similar to illustration

4.6 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. 15: 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. 16: 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. 17: 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.

4.7 Connect CP application module electrically to CP Lab conveyor

Fig. 18: 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.

4.8   Connect CP application module pneumatically to CP Lab conveyor

Fig. 19: Connect CP application module pneumatically / Similar to illustration

Connect the valve/valve terminal (1) on the CP application module to the shut-off valve (2) on the CP Lab conveyor using a hose (nominal width 4).

4.9   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.*
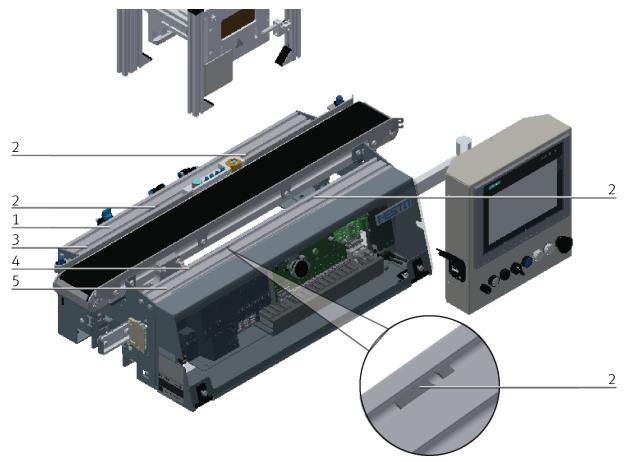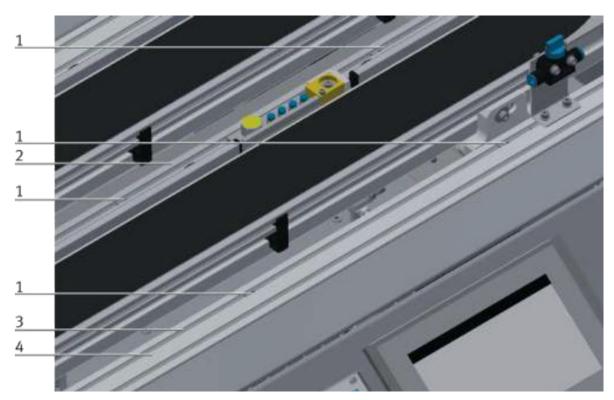

Fig. 20: Positioning slot nuts / Similar to illustration

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.
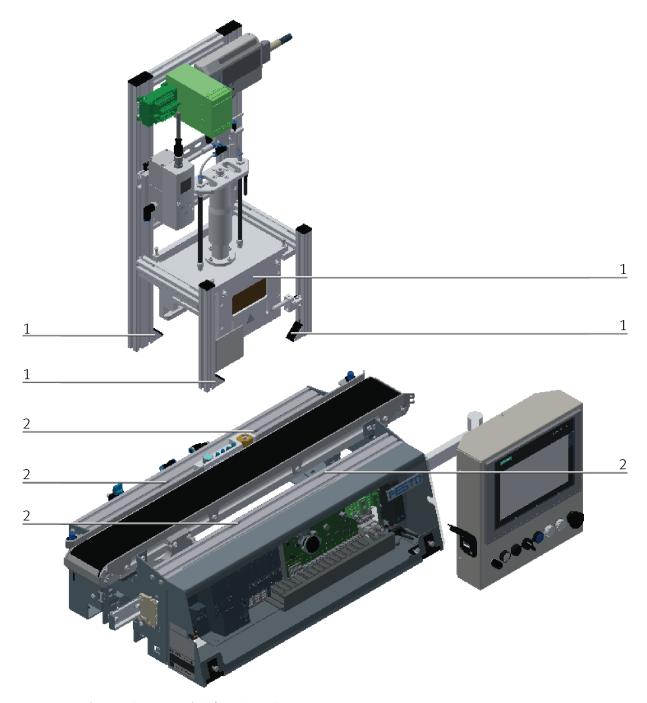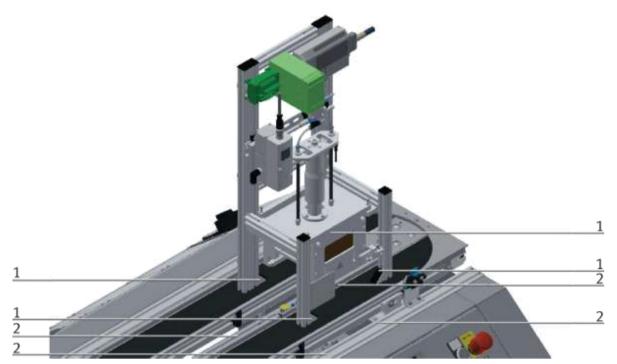
Fig. 21: Attach CP application module / Similar to illustration

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.
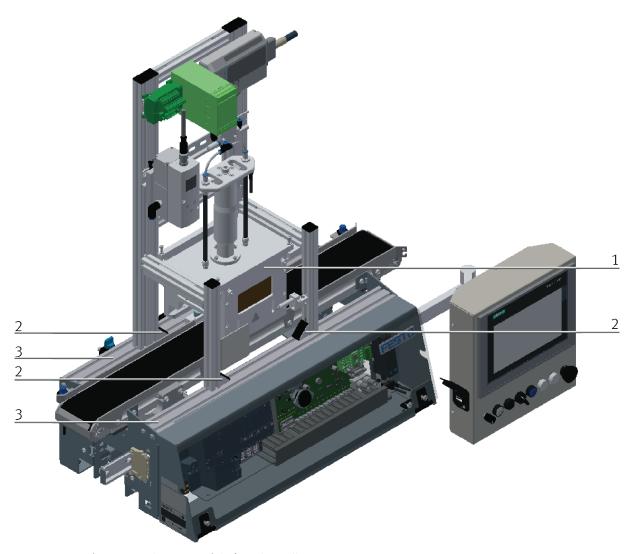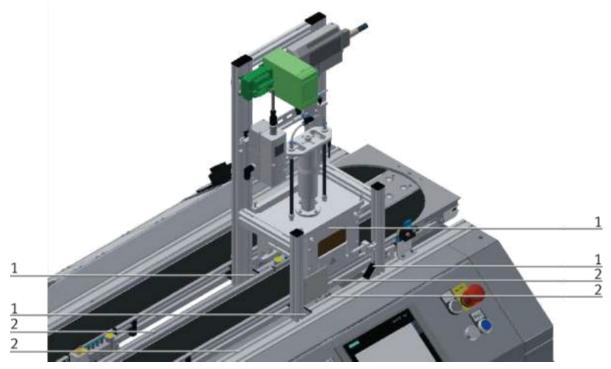
Fig. 22: Screw down CP application module / Similar to illustration

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.

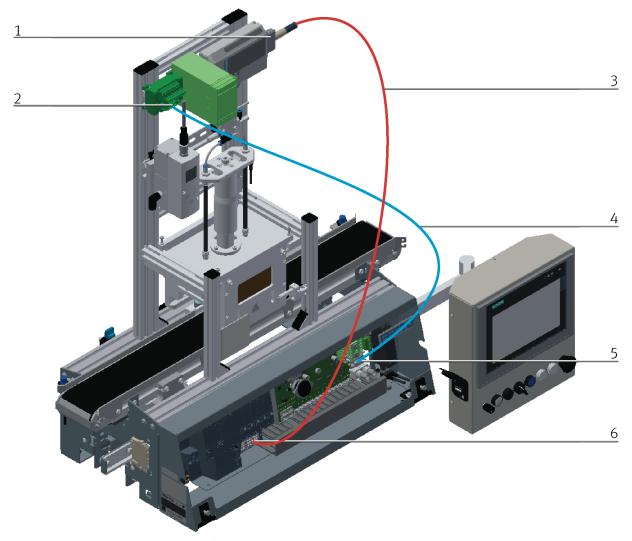## 4.10   Connect CP application module electrically to CP Factory basic module
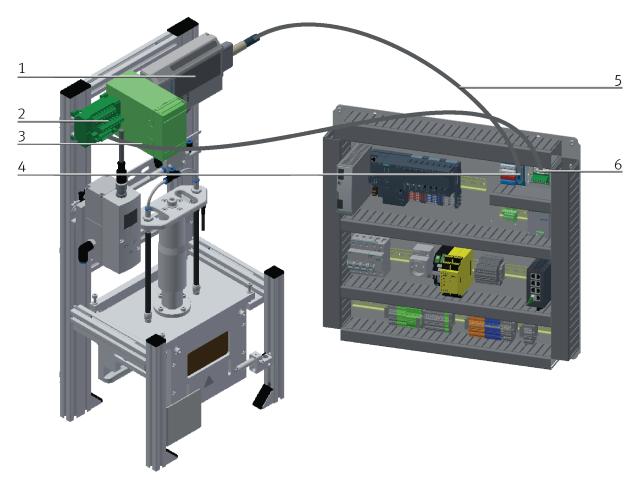
Fig. 23: Example electrical connections / Similar to illustration

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.

4.11 Connect CP application module pneumatically to CP Factory basic module
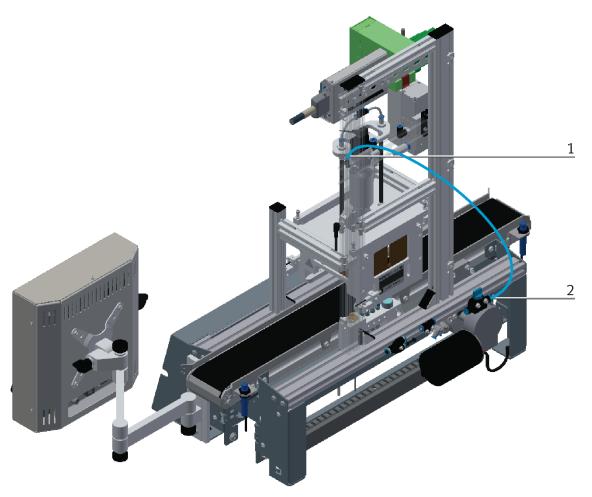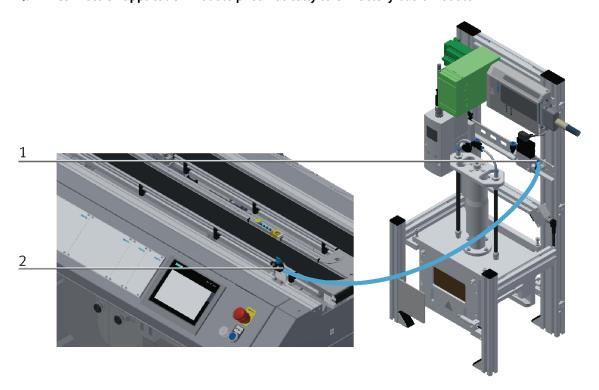

Fig. 24: Connect CP application module pneumatically / Similar to illustration

Connect the valve/valve terminal (1) on the CP application module to the shut-off valve (2) on the CP Factory basic module using a hose (nominal width 4).

4.12 Adjusting Sensors

4.12.1 Through-beam Sensor (Workpiece Detection)
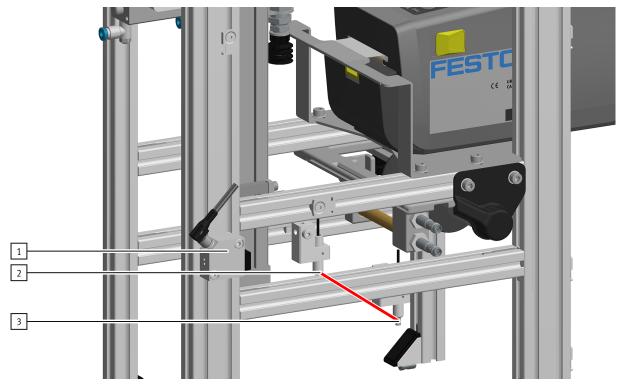
Fig. 25: Similar to illustration

1 Fiber-optic unit, SOEG-L-Q30-P-A-S-2L, 8127556 , BG5, workpiece available

2 Sensor sleeve with sensor, SOOC-TB-M4-2-R25, 552812 , BG 5, workpiece available and adapter lens, SASF-L1-LA-M2 552830

3 Sensor sleeve with sensor, SOOC-TB-M4-2-R25, 552812 , BG 5, workpiece available and adapter lens, SASF-L1-LA-M2 552830

The through-beam sensor is used to verify the presence of a workpiece. Flexible fiber-optic cables are connected to a fiber-optic unit. The fiber-optic unit operates using visible red light. The workpiece interrupts the light barrier.

Requirements

- Fiber-optic unit installed.

- The fiber-optic unit is electrically connected.

- Power supply is present.

Procedure

1. ▸ Mount the fiber-optic cable heads opposite each other on the application module

2. ▸ Align the transmitter and receiver fiber-optic cables.

3. ▸ Attach the fiber-optic cables to the fiber-optic unit.

4. ▸ Turn the alignment screw with a small screwdriver as needed until the switching status indication (LED) lights up.

5. ▸ Place the workpiece in the sensing range of the light barrier. The switching status indication goes out.

Do not turn the adjusting screw more than 12 revolutions.

4.12.2 Proximity switch (cylinder Z and X-axis)
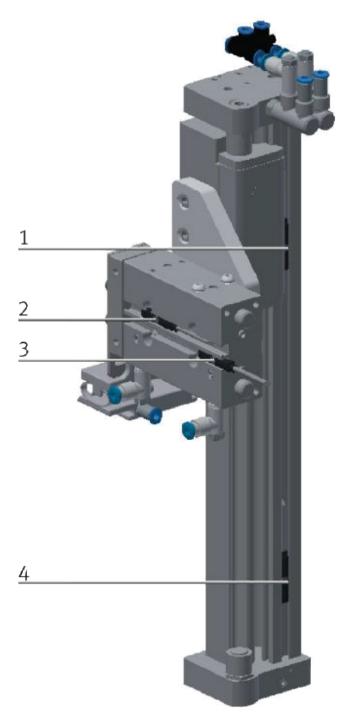
Fig. 26: Similar to illustration

1   Proximity switch, SMT-8M-A-PS-24V-E-2.5-OE, 574335, BG3, Z-axis top
2   Proximity sensor, SMT-8M-A-PS-24V-E-2.5-OE, 574335, BG1, X-axis in pick-up position
3   Proximity switch, SMT-8M-A-PS-24V-E-2,5-OE, 574335, BG2, X-axis rear
4   Proximity switch, SMT-8M-A-PS-24V-E-2.5-OE, 574335, BG4, Z-axis bottom

The proximity switches are used to check the end position of the cylinder for the Z and X-axis. The proximity switches react to a permanent magnet on the piston of the cylinder.

Requirements

- Cylinder Z and X-axis mounted.

- Pneumatic connection of the cylinder established.

- Compressed air supply switched on.

- Electrical connection of the proximity switch established.

- Power supply is present

Procedure

1. The cylinder is in the end position that is to be queried.

2. Move the proximity switch until the switching status indicator (LED) comes on.

3. Move the proximity switch a few millimeters in the same direction until the switching status indication goes out.

4. Move the proximity switch at the halfway point between the switch-on and switch-off points.

5. Tighten the clamping screw of the proximity switch with a 1.3 AF hexagon screwdriver.

6. Check the positioning of the proximity switch through repeated test runs of the cylinder.

4.12.3 Vacuum Generator
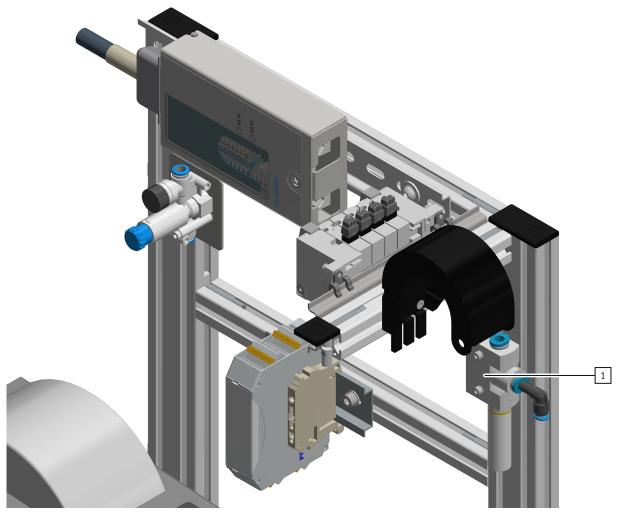
Fig. 27: Similar to illustration

1   Vacuum generator, VN-05-H-T4-PQ2-VQ2-O1-P, 536796, BP6, vacuum is built up

The vacuum generator sucks the label onto the adapter plate – this ensures that the label is transported safely.

Requirements

- Vacuum generator mounted
- Pneumatic connection of the vacuum generator established.
- Compressed air supply switched on.
- Electrical connection of the vacuum generator established.
- Variable power supply switched on.

Procedure

Observe the transport area of the workpiece and make sure that:

1. ▸ nobody is positioned underneath the workpiece

2. ▸ no objects are located there (e.g. via a protective screen)

3. Avoid long tubing lines and large volumes between the suction grippers and the vacuum generator. A large volume leads to long evacuation times and possibly incorrect settings on the vacuum switch.

4. Take into account accelerations, external influences, etc. on the workpiece when setting the required holding force.

Building up the vacuum:

● Pressurize the VN-...-P with an operating pressure at the compressed air connection. This creates a corresponding vacuum at the vacuum connection. The vacuum is set by changing the operating pressure. The workpiece must be held securely on the suction gripper by the vacuum generated.

Setting the vacuum switch:

● Setting the vacuum switch for monitoring the vacuum varies depending on the respective application.
● Switch the operating voltage on. The VN-...-P is in the basic state.
● Definition
● Switching pressure SP
● Vacuum at which the VN-...-P switches.
● Teach pressure TP
● Vacuum at the time of programming

Set the switching pressure in EDIT mode as follows:

1. Apply a teach pressure to the VN-...-P (e.g.: TP1). The order of the teach-in pressures is irrelevant.

2. Press the Edit button until the LED starts to flash. When released, the VN-...-P saves the first teach-in pressure. The LED then continues to flash.

3. Pressurize the VN-...-P with the other teach pressure (e.g. TP2).

4. Press the Edit button until the LED stops flashing. When released, the VN-...-P saves the second teach-in pressure and exits EDIT mode. The relationship between teach pressure, switching pressure and hysteresis is shown in the following table. With the VN-...-O1-P, the switching pressure is calculated from the average value at the teach pressure (SP = ½ (TP1 + TP2)). With the VN-...-O2-P, the higher teach pressure becomes the switching pressure.

Perform a test run with alternating pressure to check whether the VN-...-P switches as desired. The LED lights up in parallel with the programmed switching behavior.

4.13 Setting the Pressure Regulator
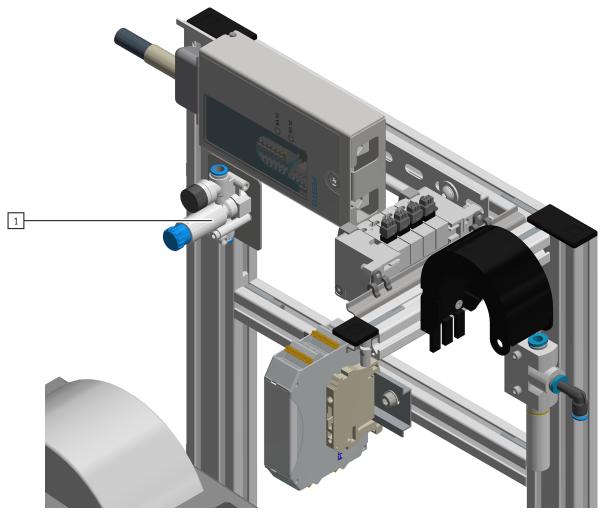
Fig. 28: Similar to illustration

1   Pressure regulator, VRPA-CM-Q6-E, 8086004

Pressure regulators are used to regulate the air pressure of the application module.

Requirement

- The pneumatic connection at the cylinder must be established.

- The compressed air supply must be switched on.

Axis procedure

1. ▸ First set the pressure regulator to fully closed. Then turn the screw and set it to approx. 2 bar. Tighten the knurled screw to secure the screw.

2. ▸ Start a test run, the axes should be easy to stop by hand.

4.14 Setting the One-Way Flow Control Valves
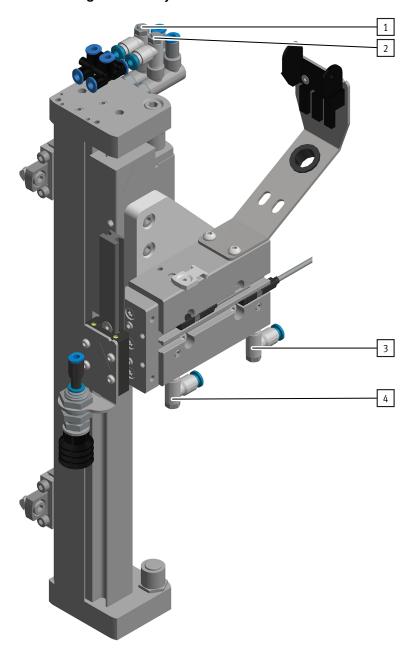
Fig. 29: One-way flow control valves / Similar to illustration

1   One-way flow control valve, GRLA-M5-QS-4-D, 193138, cylinder Z-axis
2   One-way flow control valve, GRLA-M5-QS-4-D, 193138, cylinder Z-axis
3   One-way flow control valve, GRLA-M5-QS-4-D, 193138, cylinder X-axis
4   One-way flow control valve, GRLA-M5-QS-4-D, 193138, cylinder X-axis

One-way flow control valves are used to regulate the exhaust air volume in double-acting drives. The air flows in the opposite direction via the check valve and has a full passage cross-section.

Free flowing supply air and throttled exhaust air ensure that the piston is clamped between the air pockets (improves motion, even with load changes)

Requirements

● Pneumatic connection of the cylinder established.

● Compressed air supply switched on.

Procedure

1. First completely close both one-way flow control valves and then open them back up about one rotation.

2. Start a test run again.

3. Open the one-way flow control valves slowly until the desired piston speed is reached.

5 Operation

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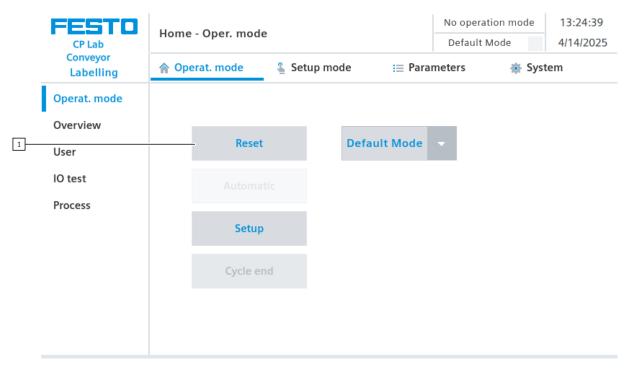
A CP application module has no control elements. The CP application module can only be operated once it has been mounted and connected to a basic module of the CP Lab or CP Factory system.

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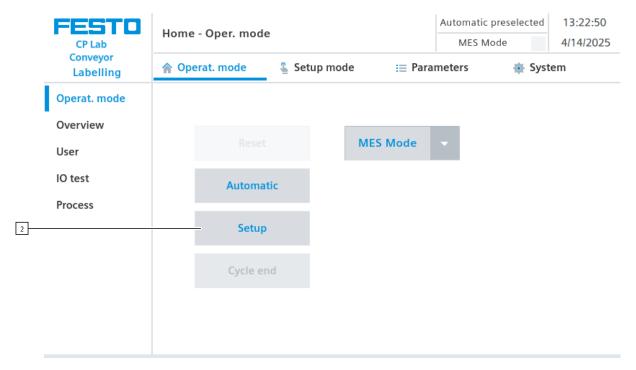
If a CP application module is operated on a CP Lab or a CP Factory basic module, the general operation is described in the operating instructions for the CP Lab or CP Factory system. All application-specific information can be found in the operating instructions for the CP application module.

5.2 Setting up the CP Labeling Application Module on the HMI
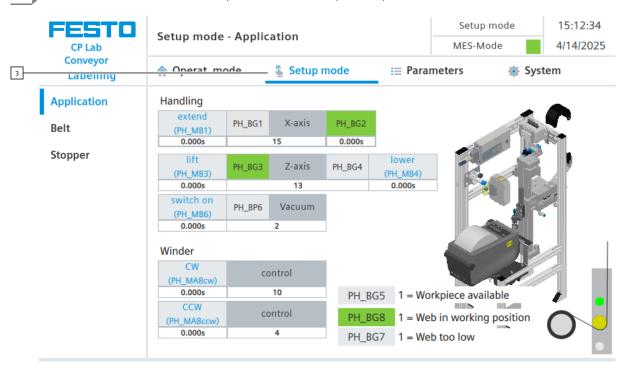
To set up the CP application module, the CP application module must be put into set-up mode.
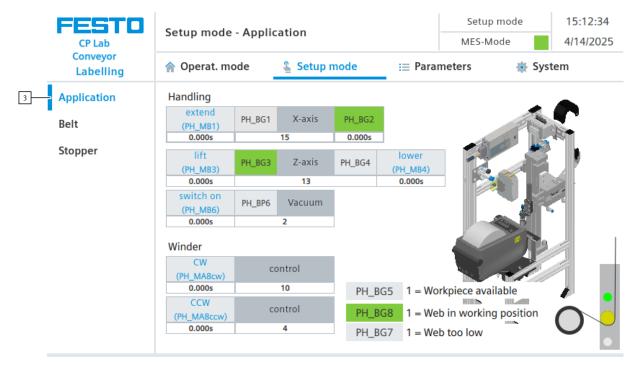
1. If the CP application module has not yet been started, click on the "*Reset*" button on the Home screen under Mode of operation. The CP application module moves to its initial position.
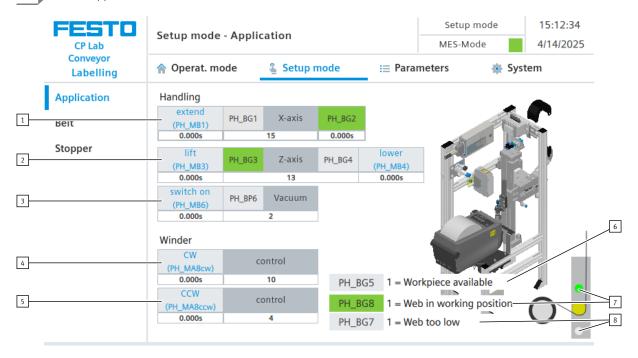
2. On the Home screen under Mode of operation, select "*Setup* "; set-up mode is active.

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

4. ▸ Select "*Application*".
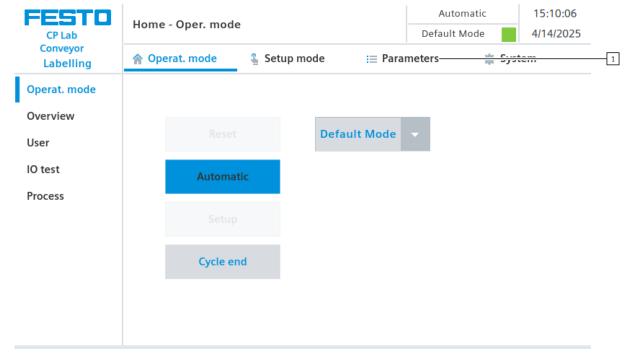
5. ▸ The corresponding actuators can be controlled by pressing the buttons.

Active sensors are displayed.
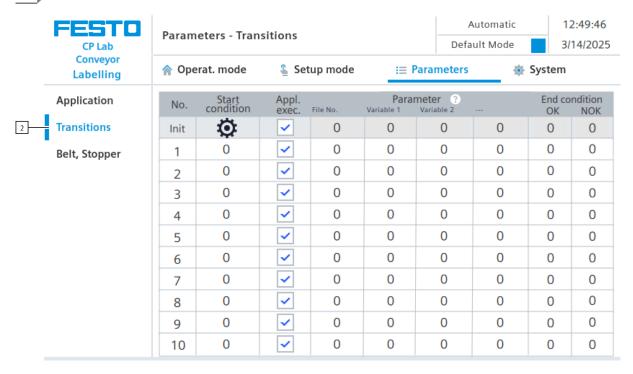
Position	Description
1	Move X-axis • "*extend*"button: Move X-axis to pick-up position (actuator PH_MB1 is activated, lights up blue when active) • PH_BG1: Sensor PH_BG1 display (green when X-axis is in pick-up position) • PH_BG2: Sensor PH_BG2 display (green when X-axis is at the rear)
2	Move Z-axis • "*Lift*"button: Move Z-axis upwards (actuator PH_MB3 is activated, lights up blue when active) • PH_BG3: Sensor PH_BG3 display (green when Z-axis is up) • PH_BG4: Sensor PH_BG4 display (green when Z-axis is down) • "*Lower*"button: Move Z-axis downwards (actuator PH_MB is activated, lights up blue when active)
3	Activate vacuum • "*switch on*"button: Vacuum is switched on (actuator PH_MB6 is activated, lights up blue when active) • PH_BP6: Switch PH_PB6 display (green when vacuum is built up and label is sucked in)
4	Winder • "*CW*"button: Switch on label winder, clockwise direction of rotation (actuator PH_MA8cw is activated, lights up blue when active)
5	Winder • "*CCW*"button: Switch on label winder, counterclockwise direction of rotation (actuator PH_MA8ccw) is activated, lights up blue when active)
6	Sensor PH_BG5 = workpiece present (lights up green when active)
7	Sensor PH_BG8 = track in operating position (lights up green when active)
8	Sensor PH_BG7 = track too low (lights up green when active)

5.3 Transitions of the CP Labeling Application Module

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.
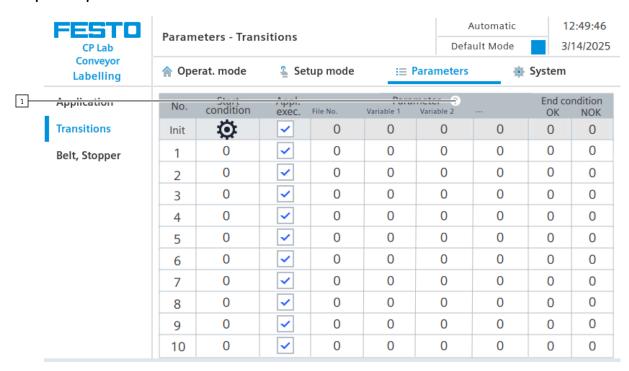
1. ➤ Press the *"Parameter"* button.
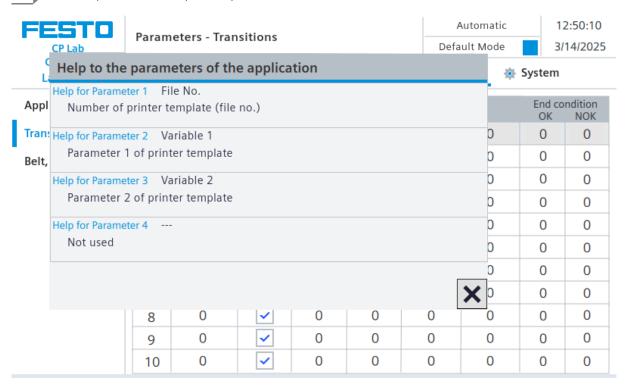
2. ➤ Now press the *"Transitions"* button.

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

Help for the parameters

No.	Start condition	Appl. exec.	Parameter				End condition	
			File No.	Variable 1	Variable 2	---	OK	NOK
Init	⚙	✓	0	0	0	0	0	0
1	0	✓	0	0	0	0	0	0
2	0	✓	0	0	0	0	0	0
3	0	✓	0	0	0	0	0	0
4	0	✓	0	0	0	0	0	0
5	0	✓	0	0	0	0	0	0
6	0	✓	0	0	0	0	0	0
7	0	✓	0	0	0	0	0	0
8	0	✓	0	0	0	0	0	0
9	0	✓	0	0	0	0	0	0
10	0	✓	0	0	0	0	0	0

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

Help to the parameters of the application

Help for Parameter 1　File No.
　Number of printer template (file no.)

Help for Parameter 2　Variable 1
　Parameter 1 of printer template

Help for Parameter 3　Variable 2
　Parameter 2 of printer template

Help for Parameter 4　---
　Not used

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

5.3.1 Setting transitions
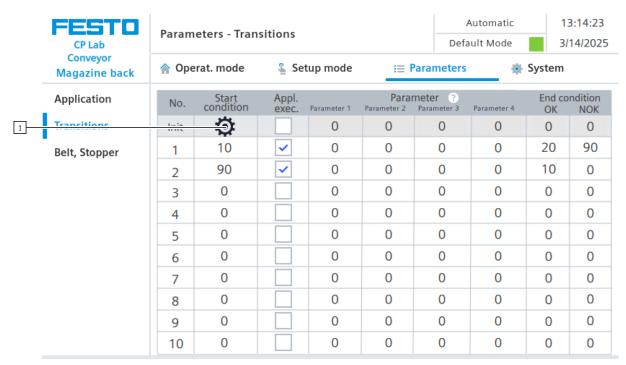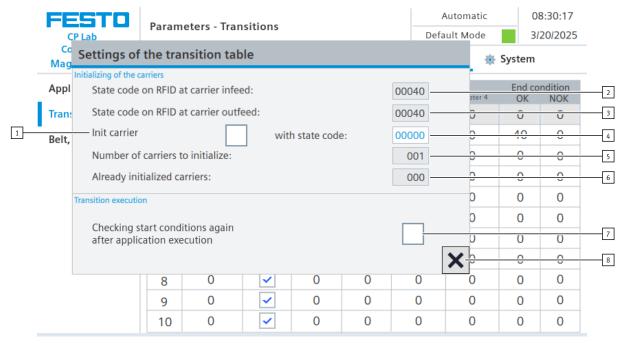
Fig. 30: Example on the AM MAG

Click on the gear to open a pop-up. The settings for the transitions can be adjusted here.
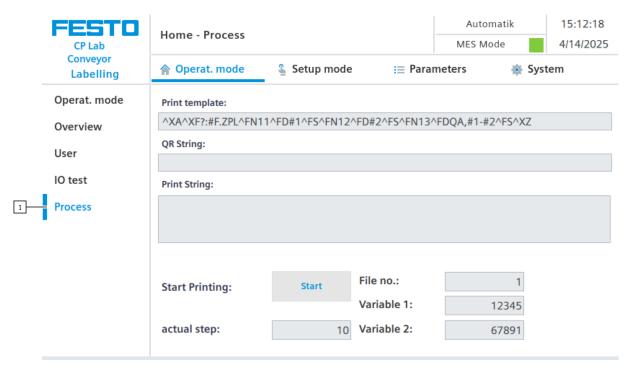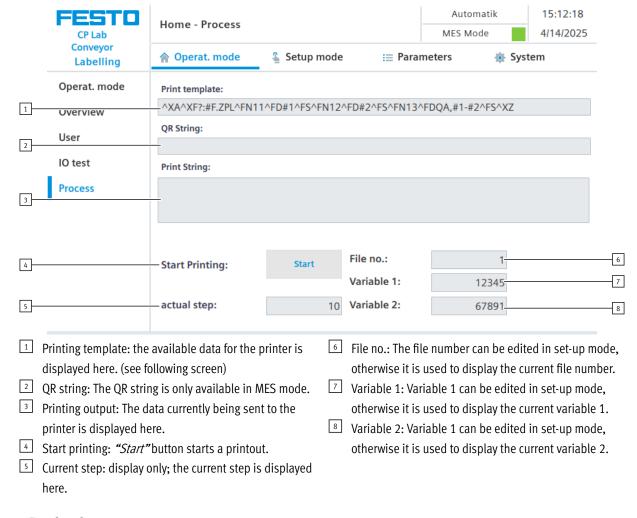
1   Initialize workpiece carrier: The next workpiece carrier that arrives at the stopper position is initialized with the finished state (status code can be entered under item 4) of the first line of the transition table

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.

	Home - Process	Automatik	15:12:18
FESTO CP Lab Conveyor Labelling		MES Mode ▉	4/14/2025

🏠 **Operat. mode**   ⚒ Setup mode   ☰ Parameters   ⚙ System

Operat. mode

[1] Overview

Print template:

`^XA^XF?:#F.ZPL^FN11^FD#1^FS^FN12^FD#2^FS^FN13^FDQA,#1-#2^FS^XZ`

[2] User

QR String:

IO test

Print String:

[3] Process

[4]	**Start Printing:**	**Start**	**File no.:**	1 [6]
			Variable 1:	12345 [7]
[5]	**actual step:**	10	**Variable 2:**	67891 [8]

[1] Printing template: the available data for the printer is displayed here. (see following screen)

[2] QR string: The QR string is only available in MES mode.

[3] Printing output: The data currently being sent to the printer is displayed here.

[4] Start printing: *"Start"* button starts a printout.

[5] Current step: display only; the current step is displayed here.

[6] File no.: The file number can be edited in set-up mode, otherwise it is used to display the current file number.

[7] Variable 1: Variable 1 can be edited in set-up mode, otherwise it is used to display the current variable 1.

[8] Variable 2: Variable 1 can be edited in set-up mode, otherwise it is used to display the current variable 2.

Druckvorlage:

`^XA^XF?:#F.ZPL^FN11^FD#1^FS^FN12^FD#2^FS^FN13^FDQA,#1-#2^FS^XZ`

    [1]   [2]   [3]   [4] [5]

[1] #F - the value for the file name

[2] #1 - the value for variable 1

[3] #2 - the value for variable 2

[4] #1 - the value for parameter 1 in the QR string – only available in MES mode

[5] #2 - the value for parameter 2 in the QR string – only available in MES mode

5.5   Flow Diagram

S1-S_Init

Initialisation start conditions

T1-T_InitDone

Wait for initalisation done

S2-S_StpIndx

Prepare start conditions,reset all application outputs

AUTO

T2-T_Auto

Wait for application start

Wait for auto mode trigger and start condition valid (auto mode active and initial position)

S3-S_SetBusy

Set module to busy state, reset ready signal

T3-T_SetBusyDn

Wait for return message from the interactive message

S4-S_SensChk

Check start condition via sensor and activate fault pattern in case of error
Call FC301 "SensorCheckPressPneumatic"
Jump back to step 2

Sensor check ok

T4-T_SensCheckOk

Wait sensor check ok, wait for response "ok"

S5-S_SuctFree

Switch on vacuum, check whether suction plate is free, set MB6

Sensor check not ok

T24-T_SensChkNok

Wait sensor check failed, wait for response "not ok"

S22-S_SensFail

Create return value for failed sensor check

Suction plate is free

T5-T_SuctFree

Wait for suction plate is free and Vacuum sensor BP6 is not active

S7-S_MovUpPos

Lift Z-Axis, set MB3, reset MB4

T7-T_Up

Wait for Z-Axis in upper position, wait for BG3

S8

Jump to step 8

Suction plate is occupied

T22-T_SuctOccpd

Wait for suction plate is occupied, wait for BG6

S21-S_SuctOccpd2

Suction plate occupied, create return value

T23-T_SuctOccpd2

Wait for Retun Code o0

S2

Jump back to step 2

T25-T_SensFailDn

Wait for Retun Code o0

S2

Jump back to step 2

```
   ( T7 )
      │
      ▼
┌──────────────────┐      S8-S_MovPickPos
│  S8-S_MovPickPos │      Extend X-Axis to label pick position, set MB1
└──────────────────┘
      │
      ▼
  ╭──────────────╮        T8-T_MovPickPos
 ( T8-T_MovPickPos )      Wait for X-Axis in label pick posititon, wait for BG1
  ╰──────────────╯
      │
      ▼
┌──────────────────┐      S9-S_PrintLabel
│  S9-S_PrintLabel │      Load print parameters, set start bit for print
└──────────────────┘
      │
      ▼
  ╭──────────────╮        T9-T_PrintLabel
 ( T9-T_PrintLabel )      Wait for label printed, wait for not busy and not started
  ╰──────────────╯
      │
      ▼
┌──────────────────┐      S10-S_VacSwitchOn
│ S10-S_VacSwitchOn│      Activate blowing air and vacuum, set MB6, reset MB7
└──────────────────┘
      │
      ▼
  ╭──────────────╮        T10-T_VacSwitchOn
 ( T10-T_VacSwitchOn )    Wait for vacuum built up conditions
  ╰──────────────╯
      │
      ▼
┌──────────────────┐      S11-S_MovBackPos
│ S11-S_MovBackPos │      Switch off blowing, retract X-axis, reset MB7, reset MB1
└──────────────────┘
      │
      ▼
  ╭──────────────╮        T11-T_MovBackPos
 ( T11-T_MovBackPos )     Wait for X-Axis retracted and Z-Axis in upper position
  ╰──────────────╯
      │
      ▼
┌──────────────────┐      S12-S_MovDwnPos
│ S12-S_MovDwnPos  │      Lower Z-axis, set MB4, reset MB3
└──────────────────┘
      │
      ▼
  ╭──────────────╮        T12-T_MovDwnPos
 ( T12-T_MovDwnPos )      Wait for Z-Axis in lower position, wati for BG4
  ╰──────────────╯
      │
      ▼
┌──────────────────┐      S13-S_WaitPos
│  S13-S_WaitPos   │      Wait step for placing label on part
└──────────────────┘
      │
      ▼
  ╭──────────────╮        T13-T_WaitPos
 ( T13-T_WaitPos )        Wait for 500ms
  ╰──────────────╯
      │
      ▼
   ( S14 )
```

S14-S_VacSwitchOff
Switch off vacuum, reset MB6

T14-T_VacSwitchOff
Wait for vacuum switched off, wait for not BP6

S15-S_MovUpPos2
Lift Z-Axis, set MB3, reset MB4

T15-T_ovUpPos2
Wait for Z-Axis in upper position, wait for BG3

S16-S_CutOn
Cut backing material, switch on cutting motor, set MA8

T16-T_CutOn
Wait for label cutted, wait 500ms

S17-S_CutOff
Switch off cutting motor, reset MA8

T17-T_CutOff
Wait for label cutted, wait 200ms

S18-S_LablPlacd
Check if label has been placed
(switch on vacuum, feedback from vacuum switch must be missing)
set MB6

Label was placed
T18-T_LablPlacd
Wait 500ms for label placed and suction plate is free, wait for not BP6

Label was not placed
T20-T_LablNotPlacd
Wait 500ms for label placed and suction plate is not free, wait for BP6

S19-S_LablPlacd2
Label has been placed, switch off vacuum, reset MB6

S20-S_LablNotPlad2
Label has not been placed, switch off vacuum, create return value

T19_T_LablPlacd2
Wait for label placed, wait for 100ms

T21_T_LablNotPlacd2
Wait for 100ms

S2
Jump back to step 2

S2
Jump back to step 2

5.6   Default Parameter (LABEL)

Parameter [ ]	Description
[1] File-.No.	Number of printer template (file no.)
[2] Variable 1	Parameter 1 of printer template
[3] Variable 2	Parameter 2 of printer template

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 Labeling

Mes-sage class	Location	Alarm name	
0	ActuatorCntrApp	X-axis	Timeout: End position sensor PH_BG1 not reached/left! Check end position/sensor. Instance: X-axis.
0	ActuatorCntrApp	X-axis	Timeout: End position sensor PH_BG2 not reached/left! Check end position/sensor. Instance: X-axis.
0	ActuatorCntrApp	X-axis	Timeout: Both end position sensors PH_BG1/PH_BG2 carry the same signal! Check sensors/end positions. Instance: X-axis;

Mes-sage class	Location	Alarm name	
0	ActuatorCntrApp	Z-axis_up	Timeout: End position sensor PH_BG3 not reached/left! Check end position/sensor. Instance: Z-axis_up.
0	ActuatorCntrApp	Z-axis_down	Timeout: End position sensor PH_BG4 not reached/left! Check end position/sensor. Instance: Z-axis_down.
0	ActuatorCntrApp	Vacuum	Timeout: Feedback from sensor (PH_BP6) without activation of actuator PH_MB6! Instance: Vacuum. Check control/sensor!
0	ActuatorCntrApp	Vacuum	Timeout: No sensor feedback (PH_BP6) when actuator PH_MB6 is activated! Instance: Vacuum. Check control/sensor.
0	ActuatorCntrApp	BlowAir	Timeout (5000 ms) Activation of actuator PH_MB7! Instance: BlowAir.
0	ActuatorCntrApp	CutPulse	Timeout (3000 ms) Activation actuator @1%s@! Instance: CutPulse.
0	ErrorApp	ErrPrinterJob	Timeout: No print job response; Parameter ONo: 1021 OPos: 1; PLC: plcLabel; Instance: ErrPrinterJob.
0	ErrorApp	ErrLabelNotPlaced	Label was not placed / suction plate not free ! (Sensor: PH_BP6); remove label! PLC: plcLabel; Instance: ErrLabel-NotPlaced.
0	LabelPrintSrv	WarnPrinterOFF	Printer is not switched on! Please check printer!

Mes-sage class	Location	Alarm name	
0	LabelPrintSrv	WarnPrinterPaused	The printer is in PAUSE mode: Please check the printer!

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.
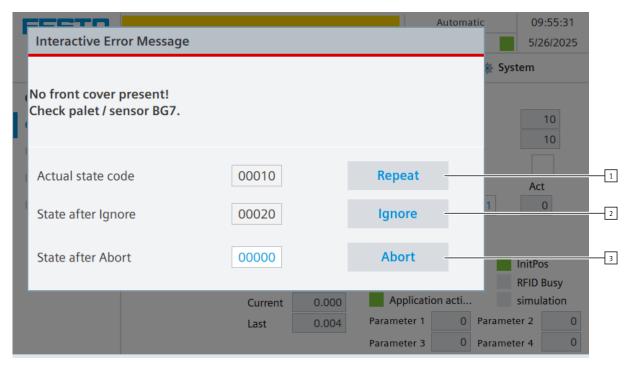
The pop-up window has 3 buttons.

Fig. 31: 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.
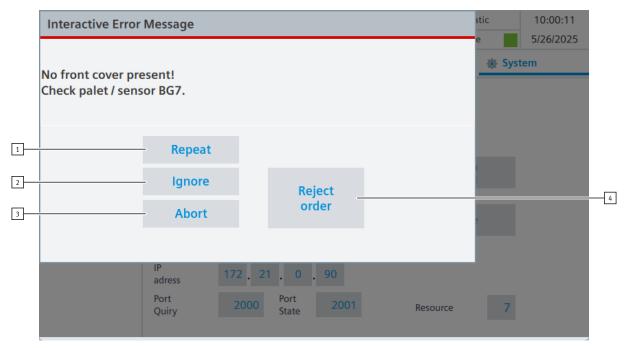
The pop-up window has 4 buttons.

Fig. 32: 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 Labeling application module

Value	Text	Eliminating the Fault
1060	Suction plate is occupied	Remove label and check sensor BG6
1061	Label was not placed	Check suction plate and sensor BG6
1062	Printer not ready	Switch on and check the printer
1063	Label printing failed	Check printer
1064	Vacuum build-up failed	Check vacuum unit

Value	Text	Eliminating the Fault
5067	No workpiece detected on pallet	Check pallet / sensor BG1

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.
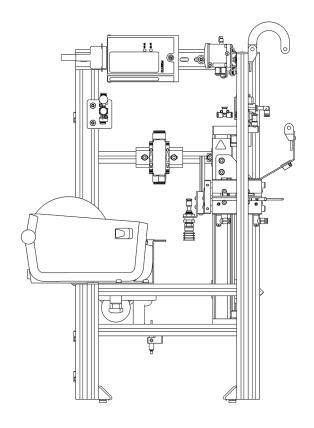- The active surfaces of the proximity switches.

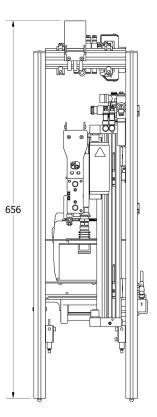| !	**NOTICE**
	− Do not use any aggressive or abrasive cleaning agents.
	− Moisture must be prevented from entering the device.
	− The appliance may only be cleaned when it is switched off.
	− Protective covers made of plastic must not be cleaned with alcohol-based cleaning agents. There is a risk of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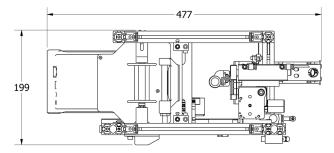
10   Technical Data

Fig. 33: Similar to illustration

10.1   Technical Data – General

Parameter	Value
Dimensions (L x W x H)	477 mm x 199 mm x 656 mm
Weight	11.0 kg
CE Marking	EMC Directive
	RoHS Directive
	Machinery Directive

Parameter	Value
UKCA Marking	Electromagnetic Compatibility Regulations 2016
	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
	Supply of Machinery (Safety) Regulations 2008
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%, controller
	1AC 230 V 50/60Hz ± 10%, printer
Output	4.8 W
	460 W
Current consumption	0.2A
	2.0 A
Electrical connection	I/O terminal via SysLink
Protection class	III, operation with safety extra-low voltage

10.3   Technical Data - Pneumatic

Parameters	Value
Pneumatic connection	Pneumatic tubing with an outside diameter of 4 mm
Operating pressure	0.25 … 0.6 MPa [2.5 … 6 bar; 36 … 87 psi]
Operating medium	Compressed air as per ISO 8573-1:2010 [7:-:-]
	Filtered, unlubricated compressed air, grade of filtration: 40 µm

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