

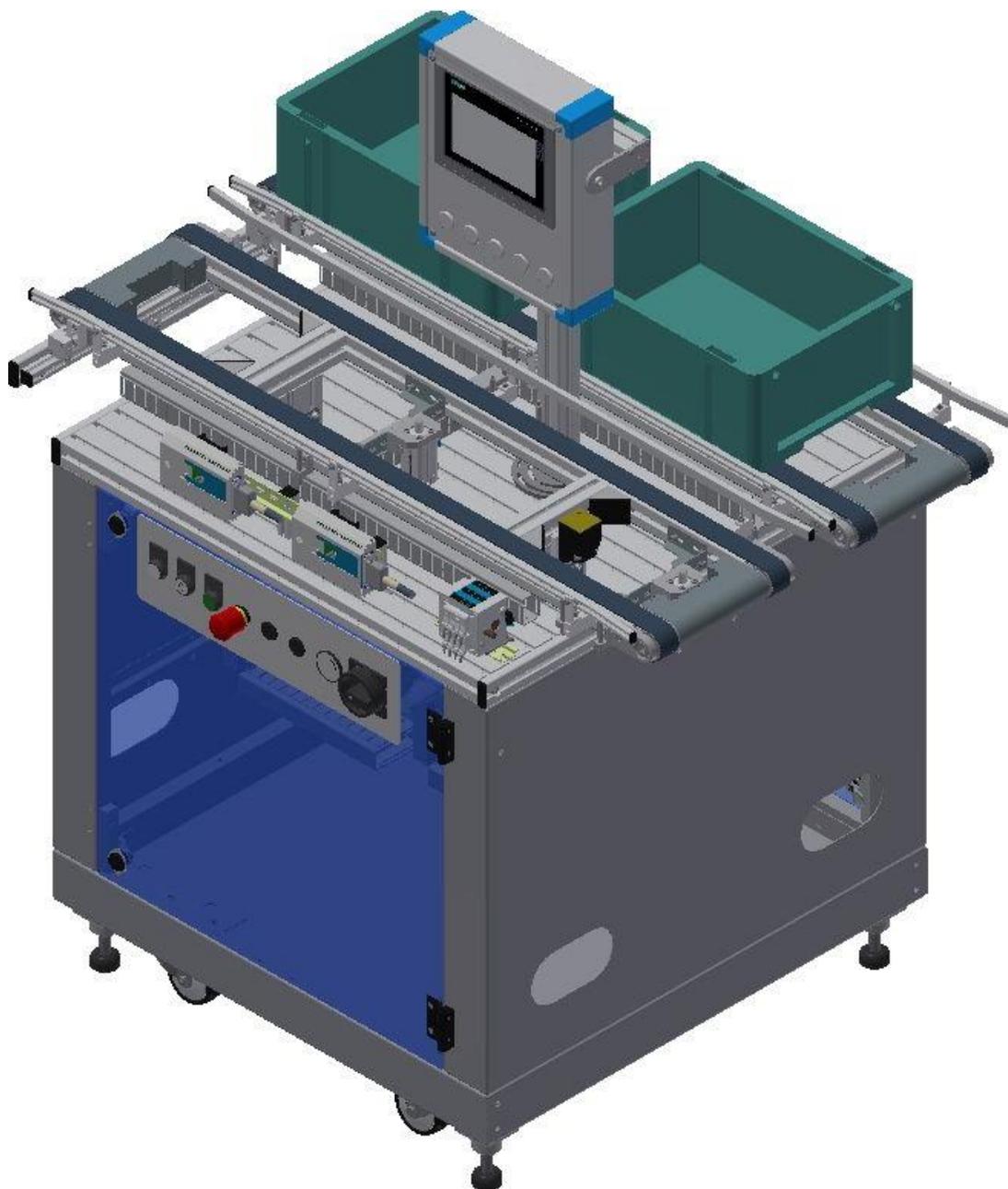
8059512

Module box buffer

FESTO

CP Factory

Translation of the
original operating
instructions



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Authors: Schober, Weiss
Layout: Frank Ebel
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© Festo Didactic SE, Rechbergstr. 3, 73770 Denkendorf, Germany, 2021

 +49 711 3467-0  www.festo-didactic.com
 +49 711 34754-88500  did@festo.com

Translation of the original instructions

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Where only pronouns such as he and him are used in these operating instructions, these pronouns are of course intended to refer to both male and female persons. The use of a single gender (e.g. he, him) should not be construed as gender discrimination; it is intended solely to make the manual easier to read and the formulations easier to understand.

	 CAUTION
	<p>These operating instructions must be available to the user at all times. The operating instructions must be read before commissioning. The safety instructions must be observed. Non-observance may result in severe personal injury or damage to property.</p>

Main document

Associated documents attached:

Safety instructions concerning transport (print/electronic)

Component datasheets (print/electronic)

Circuit diagram (print/electronic)

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1 Safety instructions

1.1 Warning notice system

These operating instructions contain notes that must be observed for your personal safety and in order to prevent property damage. The notes concerning your personal safety are indicated by a safety symbol.

Notes that only concern property damage are not indicated by a safety symbol.

The notes below are listed in order of hazard level.

	 DANGER
	<p>... indicates an imminently hazardous situation that will result in fatal or severe personal injury if not avoided.</p>

	 WARNING
	<p>... indicates a potentially hazardous situation which may result in fatal or severe personal injury if not avoided.</p>

	 CAUTION
	<p>... indicates a potentially hazardous situation that may result in moderate or slight personal injury or severe property damage if not avoided.</p>

	NOTE
	<p>... indicates a potentially hazardous situation that may result in property damage or loss of function if not avoided.</p>

In cases where more than one hazard level applies, the safety note with the highest hazard level will be shown. A safety note may concern both personal injury and property damage.

Hazards that will only result in property damage are indicated with the word "Note".

1.2 Pictograms

This document and the hardware described in it include warnings concerning possible hazards which may arise if the system is used incorrectly.

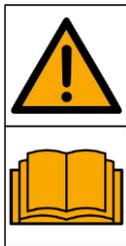
The following pictograms are used:



Hazard warning



Warning - dangerous electric voltage



Read and observe the operating and safety instructions prior to commissioning.



Switch off the device and unplug the connection for power supply from the plug socket before commencing installation, repair, maintenance or cleaning work.



Warning – hot surface



Warning – hand injuries



Warning – risk of entanglement



Warning – lifting heavy loads



Electrostatically sensitive devices



Information and/or references to other documentation

1.3 General prerequisites for installing the product

- Festo Didactic products must only be used for the applications specified in their respective operating instructions. Products or components supplied by other manufacturers must only be used if recommended or approved by Festo.
- The products must be transported, stored, installed, assembled, commissioned, operated and maintained properly in order to ensure their safe operation.
- The approved ambient conditions must be observed. The specifications in the relevant operating instructions must be observed.
- The safety equipment must be tested every working day.
- Connecting cables must be checked for damage before each use. In case of damage, they must be replaced.

Connecting cables must correspond to the minimum specifications.

1.4 General prerequisites for operating the devices

General requirements for safe operation of the system:

- In industrial facilities, the national accident prevention regulations must be observed.
- The laboratory or classroom must be overseen by a supervisor.
 - A supervisor is a qualified electrician or a person who has been trained in electrical engineering, knows the respective safety requirements and safety regulations, and whose training has been documented accordingly.

The laboratory or the classroom must be equipped with the following devices:

- An emergency-off device must be provided.
 - At least one emergency-off device must be located inside the laboratory or the classroom, and at least one outside it.
- The laboratory or classroom must be secured so that the operating voltage and compressed air supply cannot be activated by any unauthorized persons, for example by means of:
 - e.g. a keyswitch
 - e.g. lockable shut off valves
- The laboratory or classroom must be protected by residual current devices (RCDs).
 - RCDs with a differential current of ≤ 30 mA, Type B. When operating machinery with unavoidable leakage current, suitable measures must be implemented and documented in the corresponding workplace risk assessment.
- The laboratory or classroom must be protected by overcurrent protection devices.
 - Fuses or circuit breakers
- Devices must not be used if they are damaged or defective.
 - Damaged devices must be barred from further use and removed from the laboratory or classroom.
 - Damaged connecting cables, pneumatic tubing and hydraulic hoses represent a safety risk and must be removed from the laboratory or classroom.
- Safety devices must be checked every working day to ensure that they are fully functional.
- Connecting cables and accessories must be checked for damage before each use.

2 Intended use

Festo Didactic systems and components must only be used:

- For their intended use in teaching and training applications
- When their safety functions are in perfect condition

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

The Festo Didactic learning system has been developed and produced exclusively for education and training in the field of automation technology. The training company and/or trainers must ensure that all trainees observe the safety precautions described in these operating instructions.

Training with complex machinery is a highly hazardous activity. The operating company must draw up and document a workplace risk assessment. The trainees must be briefed on all the relevant safety aspects before work commences.

Festo Didactic hereby excludes any and all liability for damages suffered by apprentices, 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 due to malicious intent or gross negligence.

All extensions and accessories must be approved by Festo Didactic, and are only permitted for use for their intended purpose.

The machine fulfils the requirements of the European directives that applied when it was commissioned. Any modification to the machine shall render the manufacturer's CE Declaration of Conformity null and void. The CE Declaration of Conformity must be renewed following each major modification.

3 For your safety

3.1 Important information

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

These operating instructions include the most important instructions 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 rules and regulations that are applicable at the respective place of use must be adhered to.

	 WARNING
	<ul style="list-style-type: none">• Malfunctions which could impair safety must be eliminated immediately!

	 CAUTION
	<ul style="list-style-type: none">• Improper repairs or modifications may result in unforeseeable operating statuses. Do not carry out any repair or alternation work on components or systems that is not described in these operating instructions.

3.2 Qualified persons

- The product described in these operating instructions is only permitted for operation by persons who are qualified for the task in question in accordance with the operating instructions, especially the safety instructions.
- Qualified persons are defined as persons whose training and experience enables them to recognize risks and avoid potential dangers when working with this product.

3.3 Obligations of the operating company

It is the responsibility of the operating company to ensure that the station is operated safely.

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

- Are familiar with the basic regulations regarding occupational safety, with the safety instructions, and with the accident prevention regulations, and who have been instructed in the use of the components and systems
- Have read and understood the safety chapter and warnings in these operating instructions
- Are qualified to operate the components and systems in question
- Are governed by and trained in suitable organizational measures to ensure safe training

Personnel should be tested at regular intervals to ensure that they are safety-conscious in their work habits.

3.4 Obligations of the trainees

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

- Read the chapter concerning safety and the warnings in these operating instructions
- Familiarize themselves with the basic regulations regarding occupational safety and accident prevention

4 Basic safety instructions

4.1 General information

	 CAUTION
	<ul style="list-style-type: none"> • Trainees must be supervised by an instructor at all times when working with the components and systems. • Observe the specifications included in the technical data for the individual components and in particular all the 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.

4.2 Mechanical components

	 WARNING
	<ul style="list-style-type: none"> • Switch off the power supply! <ul style="list-style-type: none"> – Switch off both the operating power and the control power before commencing work on the circuit. – Never reach into the setup unless it is at a complete standstill. – Be aware of potential overtravel times for the actuators. • Risk of injury during troubleshooting! <ul style="list-style-type: none"> – Use a tool such as a screwdriver for actuating sensors.

	 CAUTION
	<ul style="list-style-type: none"> • Risk of burns due to hot surfaces <ul style="list-style-type: none"> – Devices can reach high temperatures during operation, as a result of which they can cause burns if touched. • Measures to take when maintenance is required. <ul style="list-style-type: none"> – Allow the device to cool off before commencing work. – Use suitable personal protective clothing, e.g. safety gloves.

4.3 Electrical components

	 DANGER
	<ul style="list-style-type: none">• Risk of fatal injury in case of interrupted protective grounding conductor!<ul style="list-style-type: none">– The protective grounding conductor (yellow-green) must not be interrupted, either inside or outside of the device.– The insulation of the protective grounding conductor must never be damaged or removed.• Risk of death from connecting power supply units in series!<p>Contact voltages of greater than 25 V AC or 60 V DC are not permissible. Contact with voltages of greater than 50 V AC or 120 V DC may be fatal.</p><ul style="list-style-type: none">– Do not connect power supplies in series.• Risk of death due to electric shock!<p>Protect the outputs of the power supplies (output sockets/terminals) and cables connected to them from direct contact.</p><ul style="list-style-type: none">– Always use connector cables with adequate insulation and electric strength.– Use safety sockets with fully shrouded contact points.

	 WARNING
	<ul style="list-style-type: none"> • Disconnect from all sources of electrical power! <ul style="list-style-type: none"> – Switch off the power supply before working on the circuit. – 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. – Warning! Capacitors inside the device may still be charged even after being disconnected from all sources of voltage. • Danger due to malfunction <ul style="list-style-type: none"> – 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. • Electric shock due to connection to unsuitable power supply! <ul style="list-style-type: none"> – 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. • Electric shock when there is no protective grounding in place <ul style="list-style-type: none"> – If there is no protective grounding terminal in place for a Protection Class I device, or if the protective grounding terminal has not been installed correctly, exposed, conductive parts may carry high voltages, thus causing severe or fatal injury if touched. – Ground the device in accordance with the applicable regulations.

	 WARNING
	<ul style="list-style-type: none"> • Risk of fire due to use of unsuitable power supply <ul style="list-style-type: none"> – 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**

- **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 identified with a corresponding warning symbol.
- **Make sure that connecting cables are not subjected to continuous tensile loads.**
- **Devices with a grounding terminal must always be grounded.**
 - If a ground connection (green-yellow laboratory socket) is available, it must always be connected to the protective grounding. The protective grounding must always be connected first (before voltage) and disconnected last (after disconnecting the voltage).
 - Some devices have high leakage current. These devices must be fitted with a grounding conductor for additional grounding.
- **When replacing fuses, always use specified fuses with the correct current rating and tripping characteristics.**
- **The device is not equipped with a built-in fuse unless otherwise specified in the technical data.**
- **Safe operation of the device is not possible in the event of any of the following circumstances:**
 - Visible damage
 - Malfunction
 - Inappropriate storage
 - Incorrect transport
- **Switch off the power supply immediately.**
- **Protect the device to prevent it from being restarted accidentally.**

4.4 Pneumatic components

	 WARNING
	<ul style="list-style-type: none"> • Depressurize the system! <ul style="list-style-type: none"> – Switch off the compressed air supply before working on the circuit. – Check the system using 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. • Risk of injury when switching on compressed air! <ul style="list-style-type: none"> – Cylinders may advance and retract automatically. • Risk of accident due to advancing cylinders! <ul style="list-style-type: none"> – Always position pneumatic cylinders so that the piston rod's working space is unobstructed along its entire stroke range. – Make sure that the piston rod cannot collide with any of the rigid components in the setup. • Risk of accident due to pneumatic tubing slipping off! <ul style="list-style-type: none"> – Use shortest barbed tubing connectors possible. – If pneumatic tubing slips off, switch off the compressed air supply immediately. • Do not exceed the maximum permissible pressure of 600 kPa (6 bar). • Do not switch on the compressed air until all the barbed tubing connectors have been connected and secured. • Do not disconnect pneumatic tubing while it is under pressure. <ul style="list-style-type: none"> – Do not attempt to seal or plug pneumatic tubing or plug 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	
	<ul style="list-style-type: none">• Setting up pneumatic circuits<ul style="list-style-type: none">– 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.• Dismantling pneumatic circuits<ul style="list-style-type: none">– Switch off the compressed air supply before dismantling the circuit.– Press the blue release ring down so that the tubing can be pulled out.• Noise due to escaping compressed air<ul style="list-style-type: none">– Noise caused by escaping compressed air may damage your hearing. Reduce noise by using mufflers, or wear hearing protection if the noise cannot be avoided.– All of the exhaust ports on the components included in the equipment set are equipped with mufflers. Do not remove these mufflers.

4.5 Guarantee and liability for application examples

The application examples are not legally binding, and we cannot guarantee their completeness in terms of their configuration, their equipment or any events that may occur. The application examples are not representations of any specific customer solution; they are merely intended to illustrate typical tasks for which the product in question could be used. You bear the responsibility for ensuring that the products described here are operated properly. These application examples do not in any way relieve you of your responsibility to ensure that the system is handled safely when it is being used, installed, operated or maintained.

4.6 Cyber security

Note

Festo Didactic offers products with industrial security functions that aid the safe operation of plants, systems, machines and networks. In order to protect plants, systems, machines and networks from cyber threats, a comprehensive industrial 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) are in place. Furthermore, Festo's guidelines on suitable security measures should be observed. Festo products and solutions are constantly being developed further in order to make them more secure. Festo 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.

	 WARNING
	<ul style="list-style-type: none"> • Unsecure operating conditions due to software tampering <ul style="list-style-type: none"> – Forms of software tampering (e.g. viruses, Trojans, malware and worms) can lead to unsecure operating conditions in your system, which may in turn lead to severe or fatal injury or property damage. – Keep your software up to date. – Integrate the automation and actuator components into an overarching and comprehensive industrial security concept for the installation or machine in question that is in line with the latest technological developments. – Make sure that all the products you have installed are incorporated into your overarching industrial security concept. – Use suitable measures, such as a virus scanner, to protect files save on exchangeable storage media from malware.

4.7 Additional safety instructions

General requirements for safe operation of the devices:

- Do not lay cables over hot surfaces.
 - Hot surfaces are identified with a corresponding warning symbol.
- Maximum permissible current loads for connector cables and devices must not be exceeded.
 - Always compare the current ratings of the device, the cable and the fuse to ensure that they match.
 - If they do not match, use a separate upstream fuse in order to provide appropriate overcurrent protection.
- Devices with a grounding terminal must always be grounded.
 - If a ground terminal (green-yellow laboratory socket) is available, it must always be connected to protective ground. The protective grounding must always be connected first (before voltage) and disconnected last (after disconnecting the voltage).
- The device is not equipped with a built-in circuit unless otherwise specified in the technical data.

	<p data-bbox="756 792 1027 855" style="text-align: center;"> WARNING</p> <ul style="list-style-type: none">• This product is designed for use in industrial environments, and may cause malfunctions if used in domestic or small commercial environments.
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4.8 Guarantee and liability

Our General Terms and Conditions of Sale and Delivery shall apply at all times. These shall be made available to the operating company no later than upon conclusion of the sales contract. Guarantee and liability claims resulting from personal injury and/or property damage are excluded if they can be traced back to one or more of the following causes:

- Use of the equipment for purposes other than its intended use
- Improper installation, commissioning, operation or maintenance of the system
- Operation of the system with defective safety equipment, or with improperly attached or non-functional safety equipment and protective guards
- Non-compliance with directions included in the operating instructions with regard to transport, storage, installation, commissioning, operation, maintenance and setup of the system
- Unauthorized modifications to the system
- Improperly executed repairs
- Disasters resulting from the influence of foreign bodies and acts of God
- Dust generated during construction work must be kept away from the system (use coverings).
See the Environmental Requirements section (contamination level) for more details.

4.9 Transport

	<div style="background-color: #c85130; color: white; padding: 5px; text-align: center;">  WARNING </div> <ul style="list-style-type: none"> • Danger due to tipping over <ul style="list-style-type: none"> – Suitable packaging and transport equipment must be used when transporting the station. The station can be lifted from underneath using a forklift truck. Please note that eccentric centers of gravity can cause the station to tip over. – Stations with attachments at height will have a high center of gravity. – Take care to avoid tipping over during transportation.
	<div style="background-color: #f1c40f; color: black; padding: 5px; text-align: center;">  CAUTION </div> <ul style="list-style-type: none"> • Danger due to broken castors! The castors on the device are not designed to be used for transportation. The castors are designed merely for positioning the station. The screw feet must relieve the castors of all the station's weight before commissioning begins. The screw feet must be set so that the station is horizontal and aligned at the same height as its neighboring station. <ul style="list-style-type: none"> – Safety shoes must be worn when transporting the station!
	<div style="background-color: #2980b9; color: white; padding: 5px; text-align: center;"> NOTE </div> <ul style="list-style-type: none"> • Station contains delicate components! <ul style="list-style-type: none"> – Take care not to shake during transportation – The station is only permitted for installation on solid, non-vibrating surfaces. – Make sure that the ground underneath the station has sufficient load-bearing capacity.

4.10 Name plates stations

1	FESTO	
2	CP-F-LINEAR-C42	
3	Mat.-Nr.: xxxxxxx	
4	Auftrag: aaaaaaaaa M306 2020	
5	3AC 400V 50/60 Hz	
6	I=1A SCCR=10kA p=6 bar 90 psi	
7	3S7PNLMDTQG	
8	Festo Didactic SE Rechbergstrasse 3 DE-73770 Denkendorf	
		9
		8

Name plate example

Position	Description
1	Description / Configuration
2	Intern material number
3	Order number, charge code, year of construction
4	Data electrical connection
5	Current consumption, short-circuits strength, input pressure compressed air (bar / psi)
6	Unique-ID, unique machine identification
7	Manufacturer's address
8	Data matrix code of a link to the website of the product
9	CE Identification

4.11 General machine safety

	 WARNING
	<ul style="list-style-type: none">• General machine safety, CE conformity<ul style="list-style-type: none">– The individual modules of this system contain control programs for which the safety of the machine has been evaluated.– The safety-related parameters and checksums of the safety function are listed in the operating instructions for the respective stations.– Changes to programs may impair the safety of the machine. A modified control program may constitute a major change to the machine.– In such cases, the manufacturer's CE Declaration of Conformity shall be rendered null and void. The operating company will need to re-evaluate the safety of the machine and confirm its CE conformity.

4.12 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.

 WARNING	
	<ul style="list-style-type: none">• Damage to the safety window<ul style="list-style-type: none">– Windows must not be cleaned using aggressive or alcoholic cleaning agents. Risk of brittleness and breakage!– This protective device must be replaced if it shows any signs of damage. Please contact our Service department to arrange this.

4.12.1 Panel doors on underground control cabinet

Transparent, impact-resistant, polycarbonate plate with lock.

Can only be accessed with tool (control cabinet key); tool must be kept in a secure place!

Access reserved for qualified electricians.

The safety door is not monitored! Make sure the safety door is always closed.

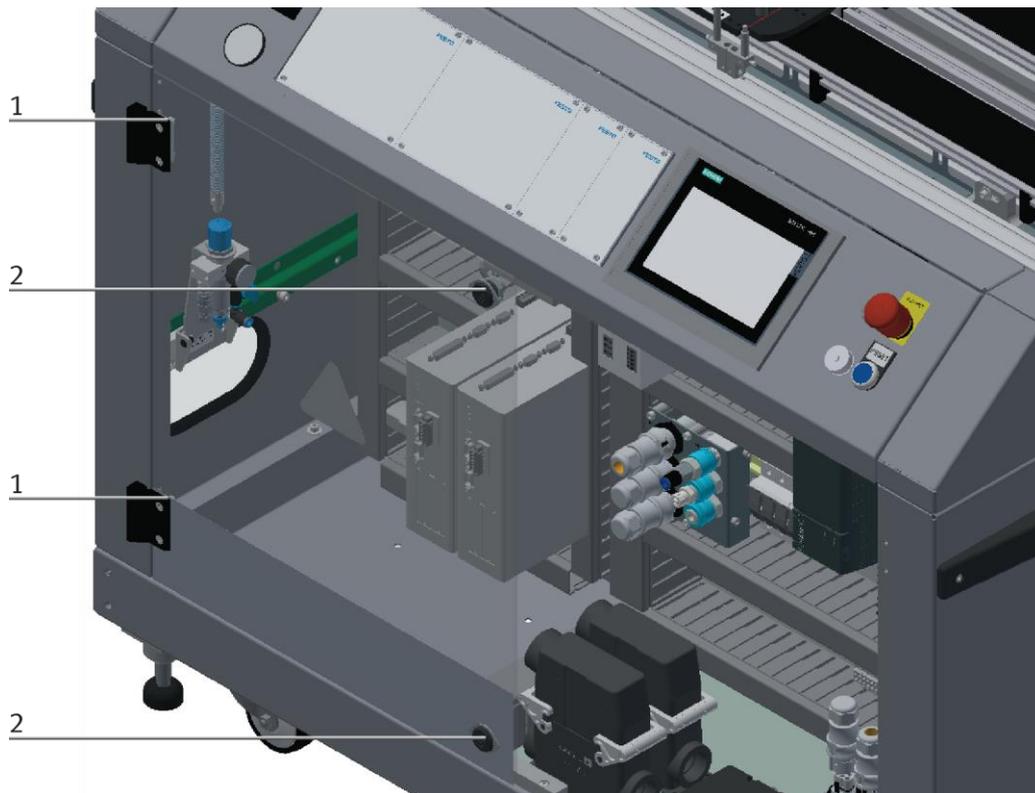


Illustration similar

The hinges of the control cabinet doors are provided with spring steel sheets (1). If the switch cabinet locks (2) are not locked, the door is automatically opened a crack and reminds the user to firmly lock the door with the switch cabinet locks.

4.12.2 Emergency stop

Every station contains an emergency stop mushroom actuator. All the emergency stop actuators in the system are interconnected. The emergency stop signal shuts off all the actuators. Operator confirmation is required to restart the system; there is no automatic restart.

4.12.3 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.

5 Technical datas

Parameter	Value
Electrics	
Operating voltage	1-phase 230 V AC±10%, 50 Hz
Power supply system	TNC-S, mains conductor L1, neutral conductor N, protective grounding PE
Full load power	1 A
Control voltage, Voltage for small actuators	24 V DC Protective extra-low voltage (PELV)
Power supply connection	IEC 60309, CEE 16 A
Max. backup fuse for installation	16 A
Leakage current	≤ 18 mA
Connecting cable between stations	System plug
Protection class	I, Operation with protective grounding only. Second protective grounding conductor required due to high leakage current
Overvoltage category	CAT II, Operation in building installation only
Short circuit current rating (SCCR)	10 kA
Compressed air	
Supply pressure	6 bar, 90 psi
Supply rate	≥ 40 l/min
Compressed air quality	EN ISO 8573-1
Pressure dew point (Class 4)	≤ +3°C
Ambient conditions	
Operating environment	Use inside building only
Ambient temperature	5°C ... 40°C
Rel. air humidity	80% up to 31°C
Pollution degree	2, Dry, non-conductive contamination
Operating height	Up to 2000 m above NN (sea level)
Noise emission level	L _{pA} < 70 dB
Certification	
CE marking in accordance with:	Machinery Directive EMC Directive RoHS Directive
EMC environment	Industrial environment, Class A (in acc. with EN 55011)
Subject to change	

5.1 Setup

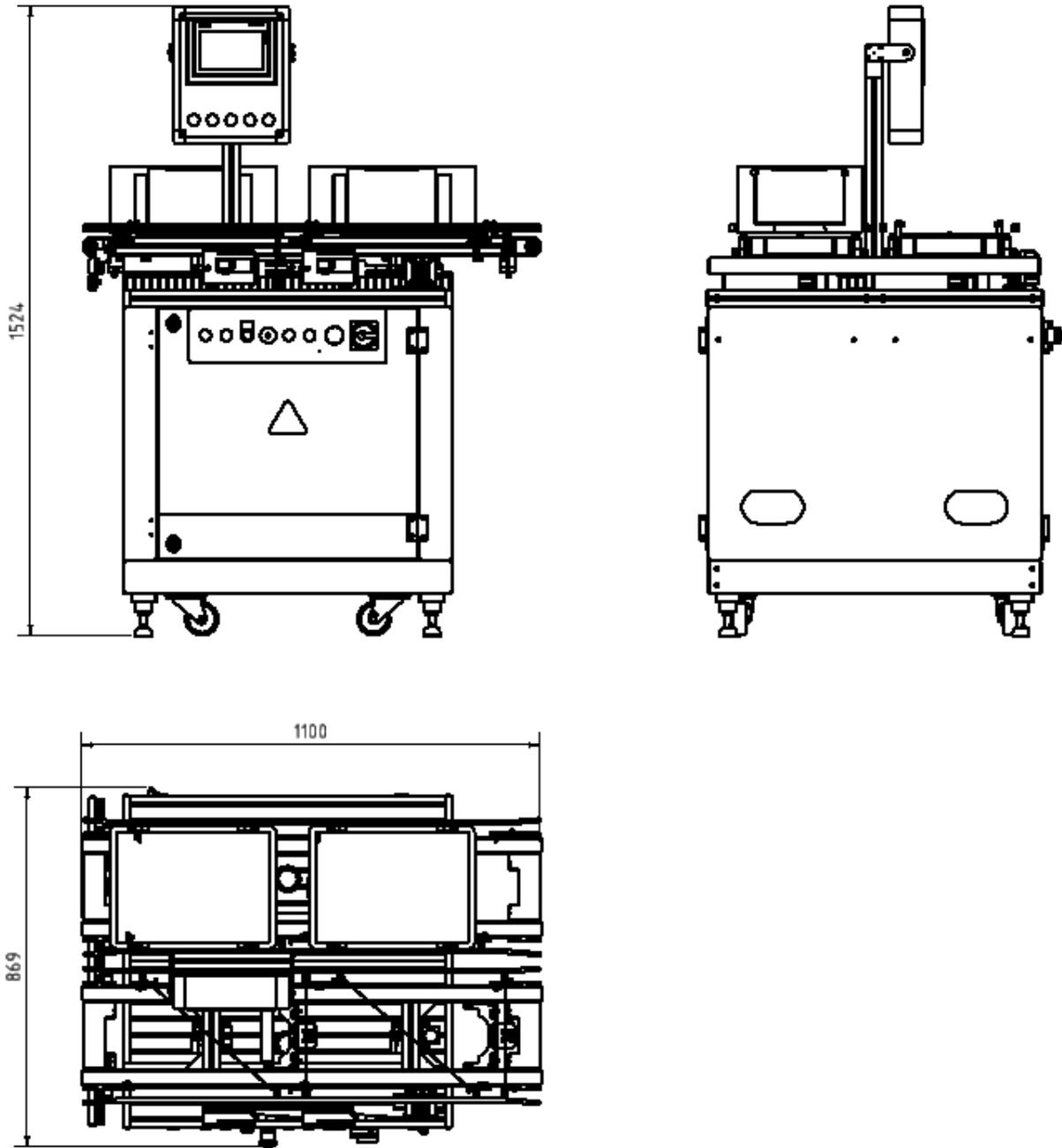


illustration similar

Recommended minimum distance from the spatial boundary is 1.2 m

6 Introduction

6.1 General information about CP Factory

The CP Factory has been developed in close co-operation with teachers and instructors. The result is a training system meeting all demands on modularity, mobility, flexibility and openness due to its completely new characteristics.

The station provides an appropriate system for practice-orientated tuition of the following key qualifications

- Social competence,
- Professional competence and
- Methodological competence,

Which are required in today's complex world of employment. This is much easier now with use of the CP Factory.

The two-sided symmetrical basic modules with accompanying control board and control unit are identical. With their technical system „transfer line with drive unit and stopper unit“, they are ideal for the training in SPS programming and drive technology from basics to medium level.

Due to the patented passive pallet return systems, the continuous working process „pallet circulation“ is already possible when using one single basic module.

The industrial-relevant basic process „pallet circulation“ already contains a large number of important course contents such as:

- drive technology with DC geared motor
- drive technology with asynchronous motor and converter (optional)
- drive technology with servo motor and servo converter (optional)
- pallet-stop setting
- pallet-stroke setting and pallet-indexing (optional)
- pallet identification by binary coding
- pallet identification by RFID
- speed and position recording by pulse generating disc (optional)
- basics on electro pneumatics (stop-cylinder model)
- basics on SPS programming
- SPS programming in steps
- SPS programming operating modes
- SPS programming binary coding
- SPS programming communication by frequency converter (optional)
- SPS programming communication by RFID (optional)
- SPS programming/visualization by touch panel (optional)

The basic module becomes a station by adding technology-specific application modules like magazines, handling or machining units. The standardized mechanical and electrical interface of application and basic module allows an unproblematic starting-up.

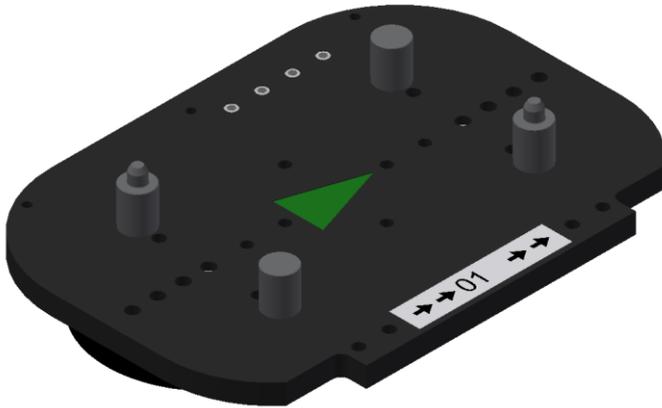
The CP Factory is a perfect platform for nearly all course contents. It helps to improve the co-operation of different teams and to extend the ability of understanding processes.

On this system, especially the topics about networking, communication and data acquisition can be shown in an easily comprehensible way and can be further trained.

6.2 Resources

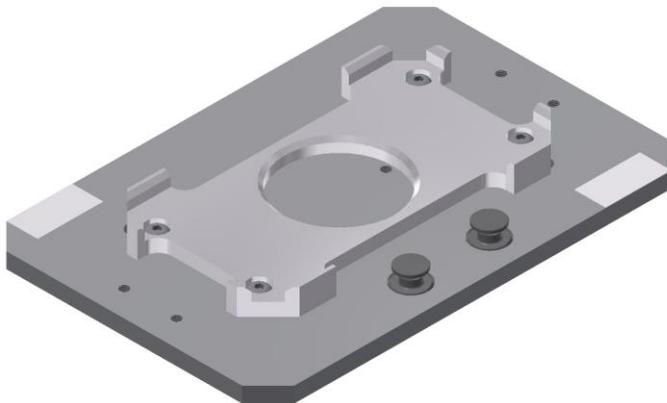
The training equipment of the system consists of several resources. They are used depending on the process selection.

The following resources are available:



Pallet carrier / illustration similar

These pallet carriers are available for transporting the pallets.
Partnumber in MES - 31



Pallet / illustration similar

These pallets are available for receiving always one workpiece.
Partnumber in MES - 25

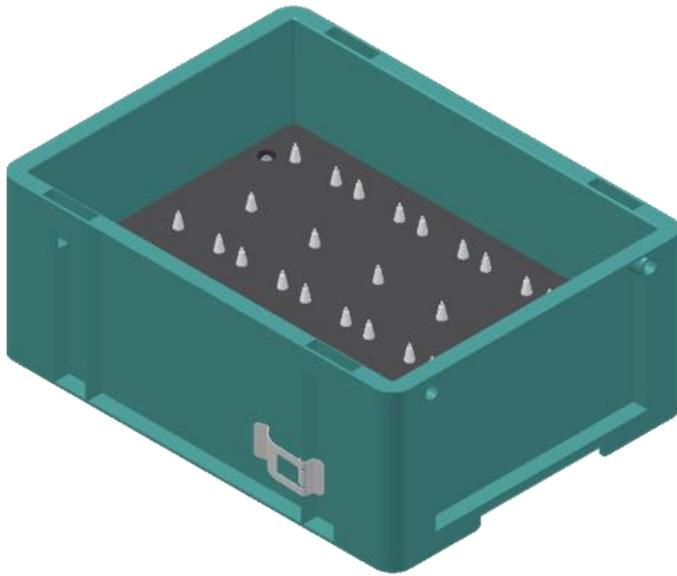


Illustration similar

Box with retainer for 10 PCB's
Partnumber in MES – 27

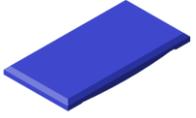
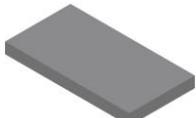
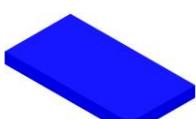
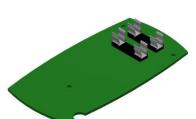
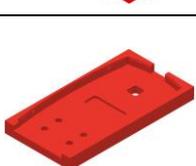
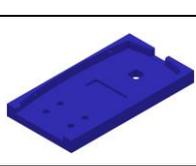
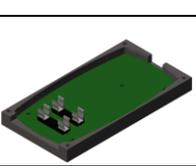
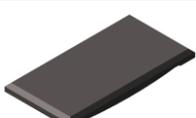
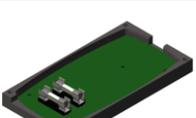
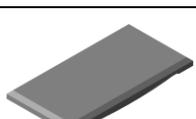


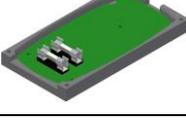
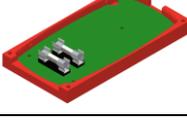
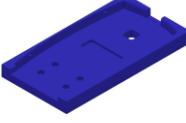
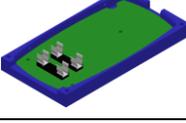
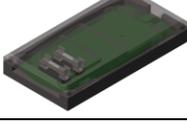
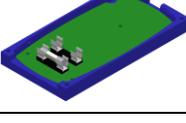
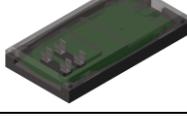
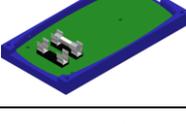
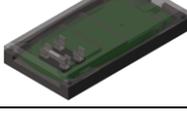
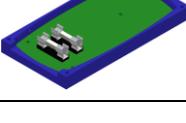
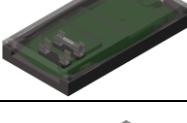
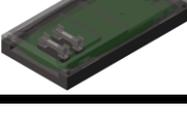
Illustration similar

Box with retainer for 8 front/backcovers or assembled workpieces
Partnumber in MES – 28

Workpieces

The workpieces are differentiated according to the project into production parts and external production parts.

Workpieces	Description	Workpieces	Description
	CP raw material black No. 101		CP back cover blue No. 113
	CP raw material grey No. 102		CP back cover red No. 114
	CP raw material blue No. 103		CP – board No. 120
	CP raw material red No. 103		CP fuse No. 130
	CP front cover red No. 107		CP front cover black No. 210 – if there is a CNC milling machine integrated in the system, the front cover can also be produced there, thus becoming a production part.
	CP front cover blue No. 108		CP front cover black without fuses No. 211
	CP front cover grey No. 109		CP front cover black with fuse left No. 212
	CP front cover black No. 110		CP front cover black with fuse right No. 213
	CP back cover black No. 111		CP front cover black with both fuses No. 214
	CP back cover grey No. 112		

Workpieces	Description	Workpieces	Description
	CP front cover grey No. 310 – if there is a CNC milling machine integrated in the system, the front cover can also be produced there , thus becoming a production part.		CP front cover red No. 510 – if there is a CNC milling machine integrated in the system, the front cover can also be produced there , thus becoming a production part.
	CP front cover grey without fuses No. 311		CP front cover red without fuses No. 511
	CP front cover grey with fuse left No. 312		CP front cover red with fuse left No. 512
	CP front cover grey with fuse right No. 313		CP front cover red with fuse right No. 513
	CP front cover grey with both fuses No. 314		CP front cover red with both fuses No. 514
	CP front cover blue No. 410 – if there is a CNC milling machine integrated in the system, the front cover can also be produced there , thus becoming a production part.		CP black complete without board No. 1200
	CP front cover blue without fuses No. 411		CP part customer No. 1210 freely selectable
	CP front cover blue with fuse left No. 412		CP part black with no fuse No. 1211
	CP front cover blue with fuse right No. 413		CP part black with fuse on the left No. 1212
	CP front cover blue with both fuses No. 414		CP part black with fuse on the right No. 1213
			CP part black with both fuses No. 1214

7 Design and Function

7.1 Transport

	 WARNING
	<ul style="list-style-type: none"> • Damage to transport equipment when moving heavy machines/machine sections <ul style="list-style-type: none"> – When the stations are shipped out, extra care must be taken to ensure that heavy machines/machine sections are always transported using a suitable forklift truck. A single station can weigh up to 500 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
	<ul style="list-style-type: none"> • Securing transit routes <ul style="list-style-type: none"> – 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. • Caution <ul style="list-style-type: none"> – 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
	<ul style="list-style-type: none"> • Danger of crushing for hands/feet <ul style="list-style-type: none"> – It is not permitted to grip onto or under the feet when handling the machine, as there is an increased risk of hands or feet getting crushed or trapped in these areas. – When setting down the station, make sure no persons have their feet under the machine's feet.



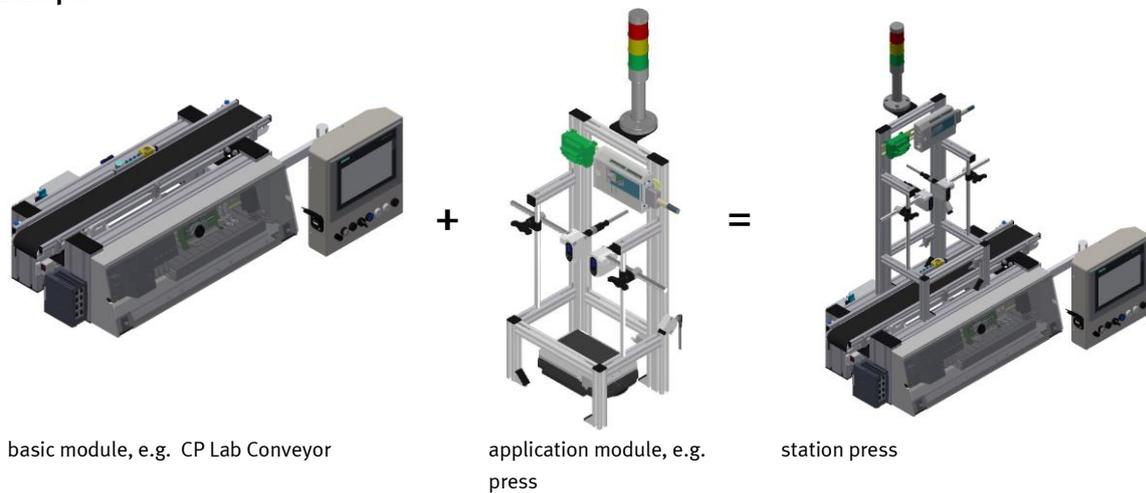
NOTE

- 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.

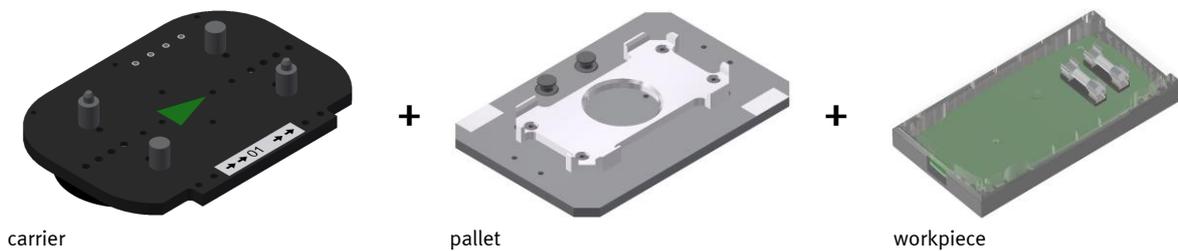
7.2 Overview of the System

CP Lab Conveyor, CP Factory Linear, CP Factory Shunt and CP Factory Bypass are called basic modules. If an application module, e.g. the CP Application Module measuring is attached to a basic module, it becomes a station.

Example

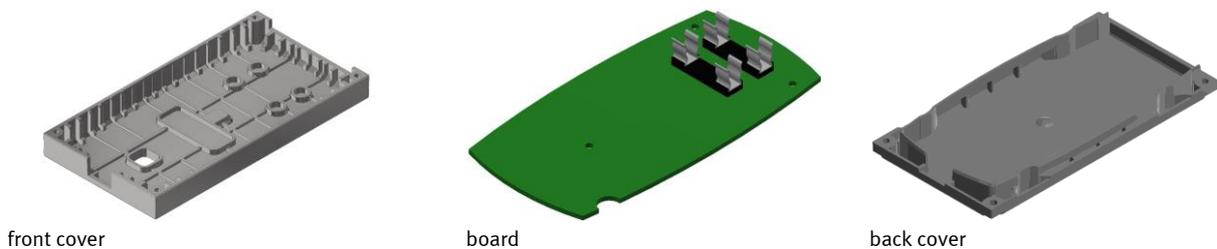


If several stations are put in a row one behind the other, this will form a production line.



Carriers are transported on the conveyors of the basic modules. And on the carriers, there are pallets with a fixed workpiece reception placed. The workpieces are placed on the workpiece reception or taken from it. Pallets can also be placed on a carrier in some stations or gripped from there.

The typical workpiece of a CP Factory/Lab System is the roughly simplified version of a mobile phone. The workpiece consists of a front cover, of a back cover, of a board and of a maximum of two fuses.



7.3 Module box buffer

7.3.1 General information

The module box buffer is designed for issuing and distributing boxes. The module has been mounted onto an aluminum slotted profile plate with a fixed profile basic frame. It serves as supply module for boxes by means of two conveyors (ON/OFF). With the help of the RFID technology, any information about the content of the boxes can be read, modified and forwarded.

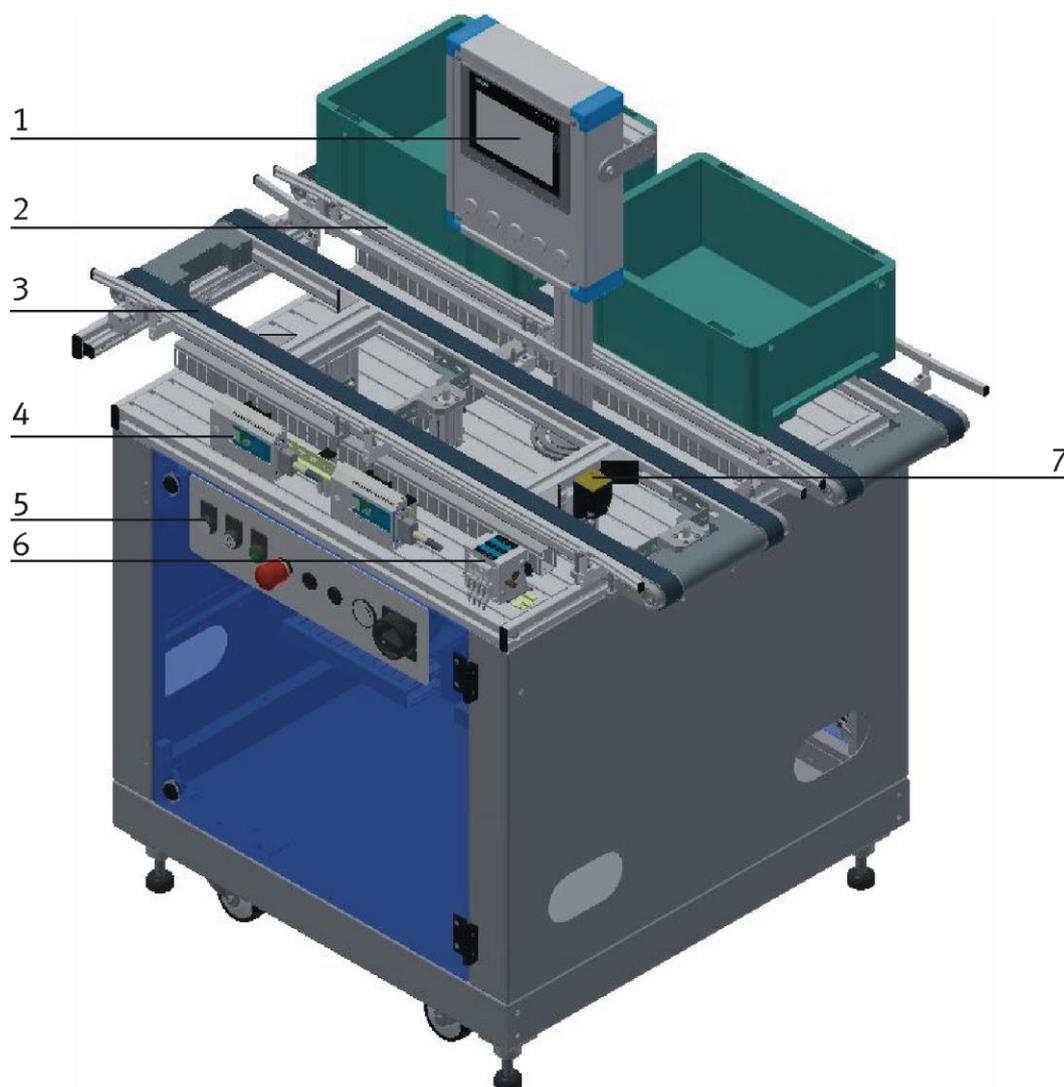
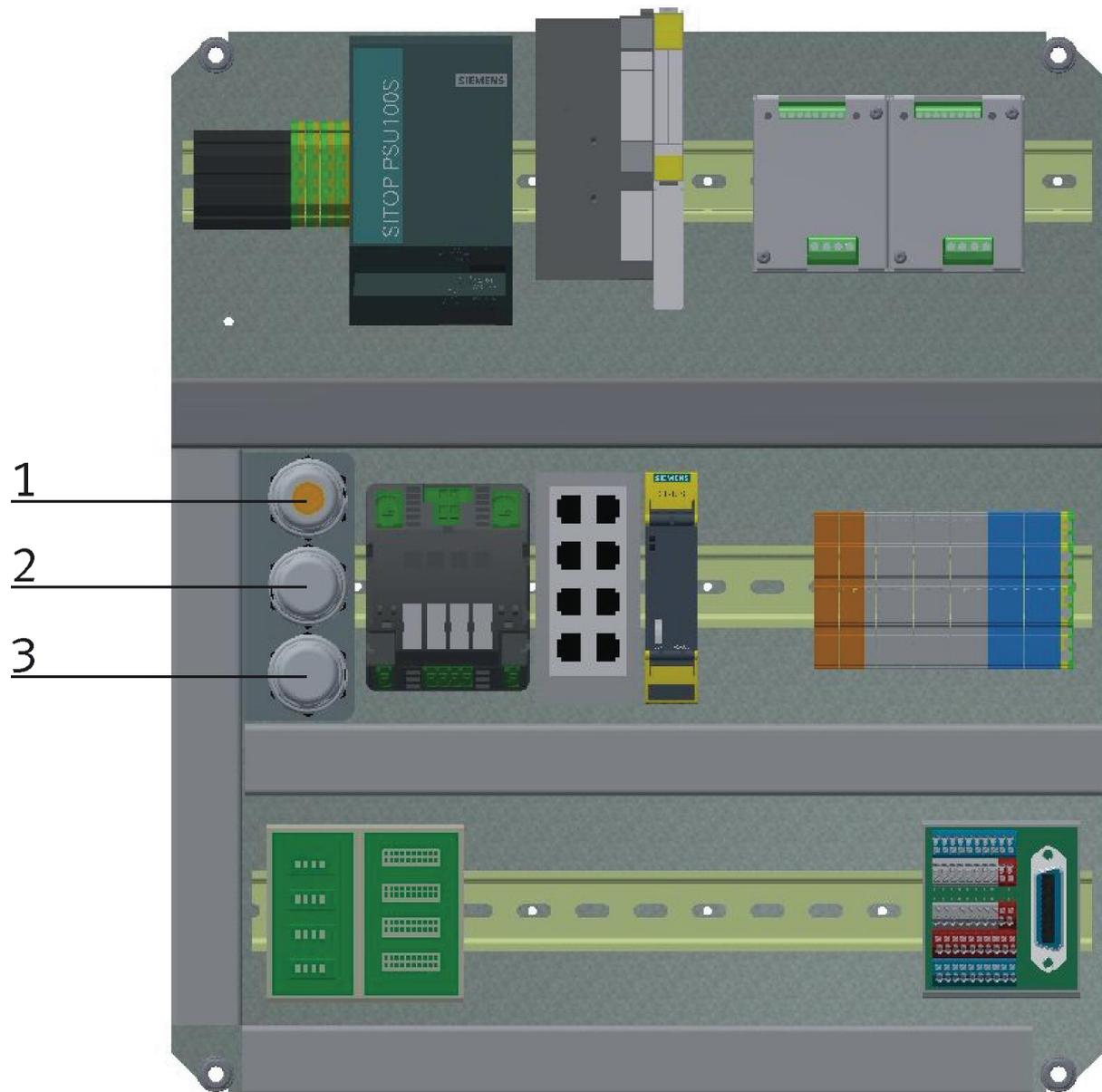


Illustration similar

Pos.	Description
1	Touch panel
2	conveyor output
3	conveyor input
4	I/O module
5	operation panel
6	valve terminal
7	RFID sensor

7.3.2 Supply of the module box buffer

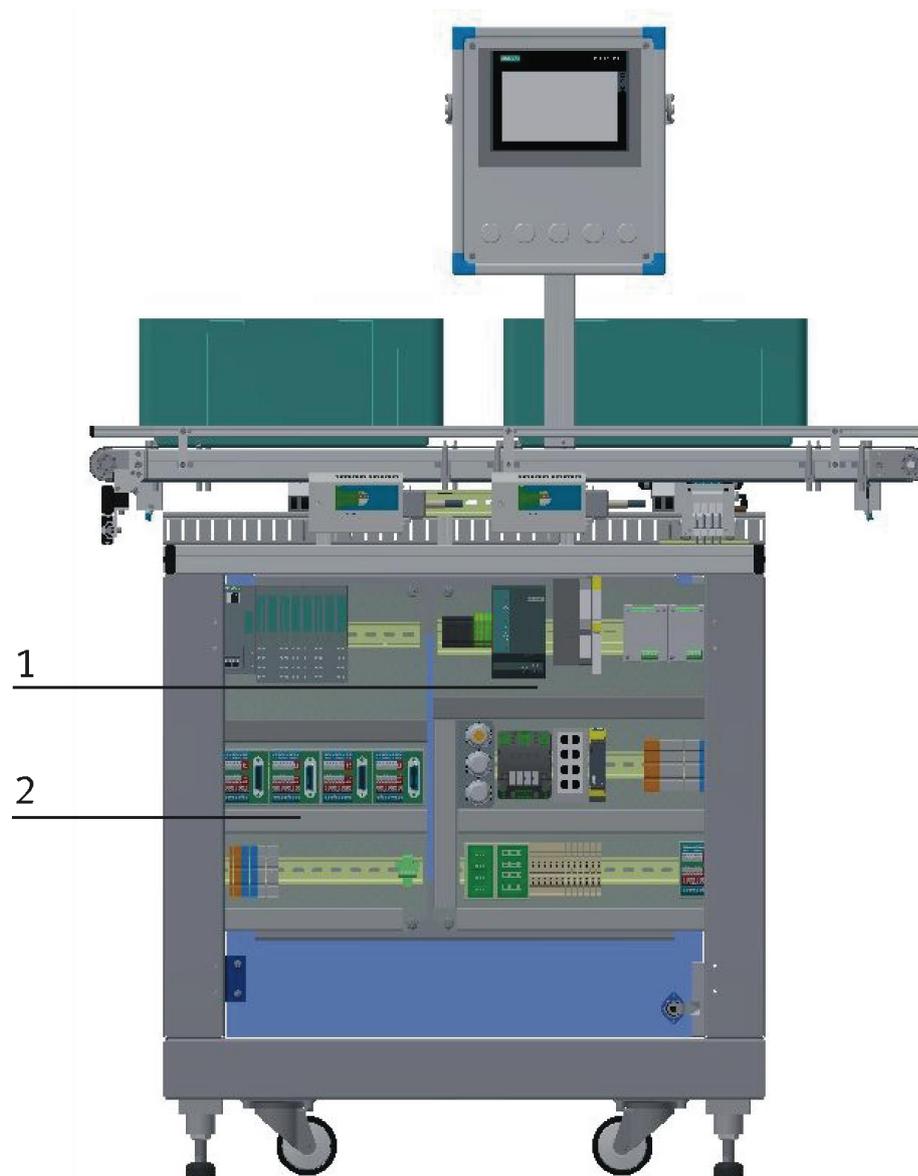


power supply / illustration similar

Position	Station
1	power supply 110V / 230V / 400V
2	power supply to another station (optional)
3	power supply to another station (optional)

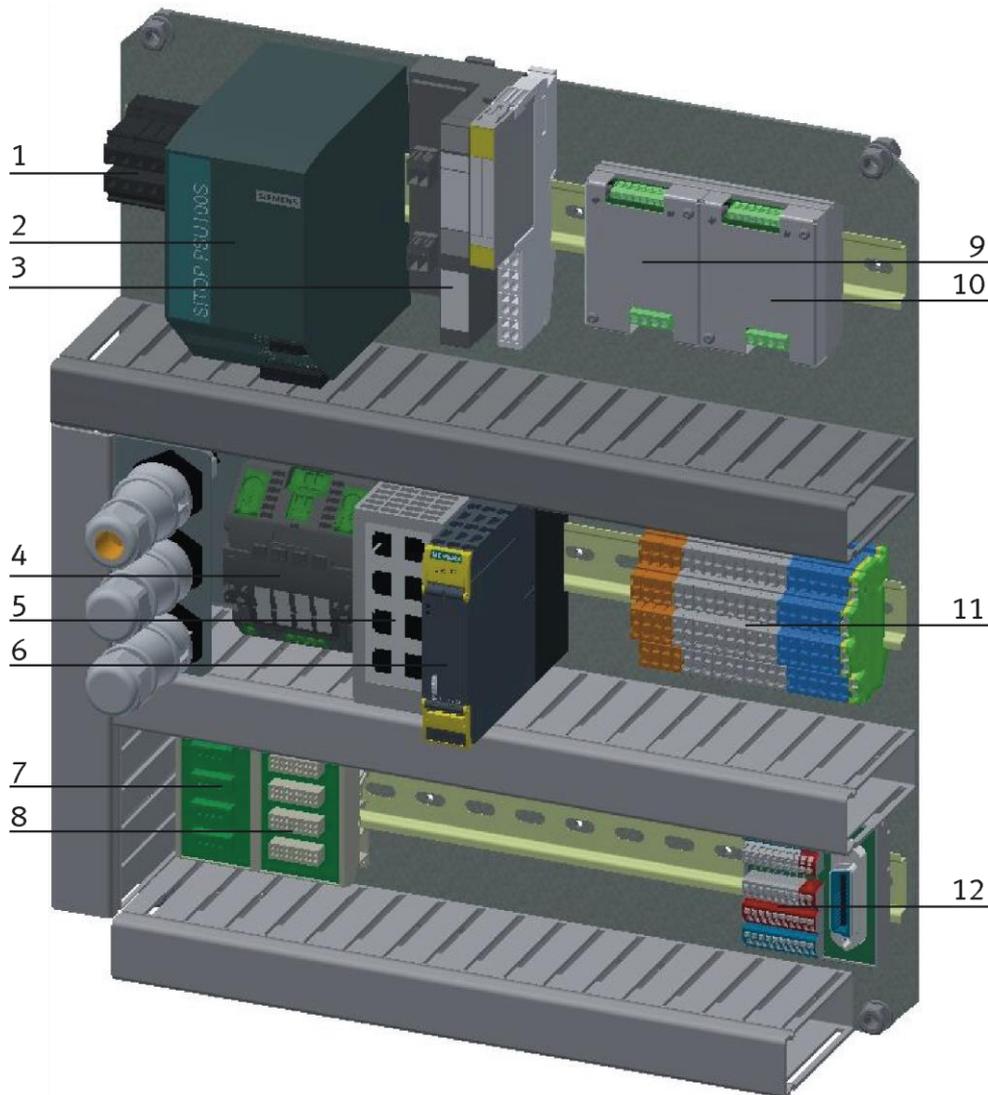
7.4 Electrical installation

The station has got two electric boards.



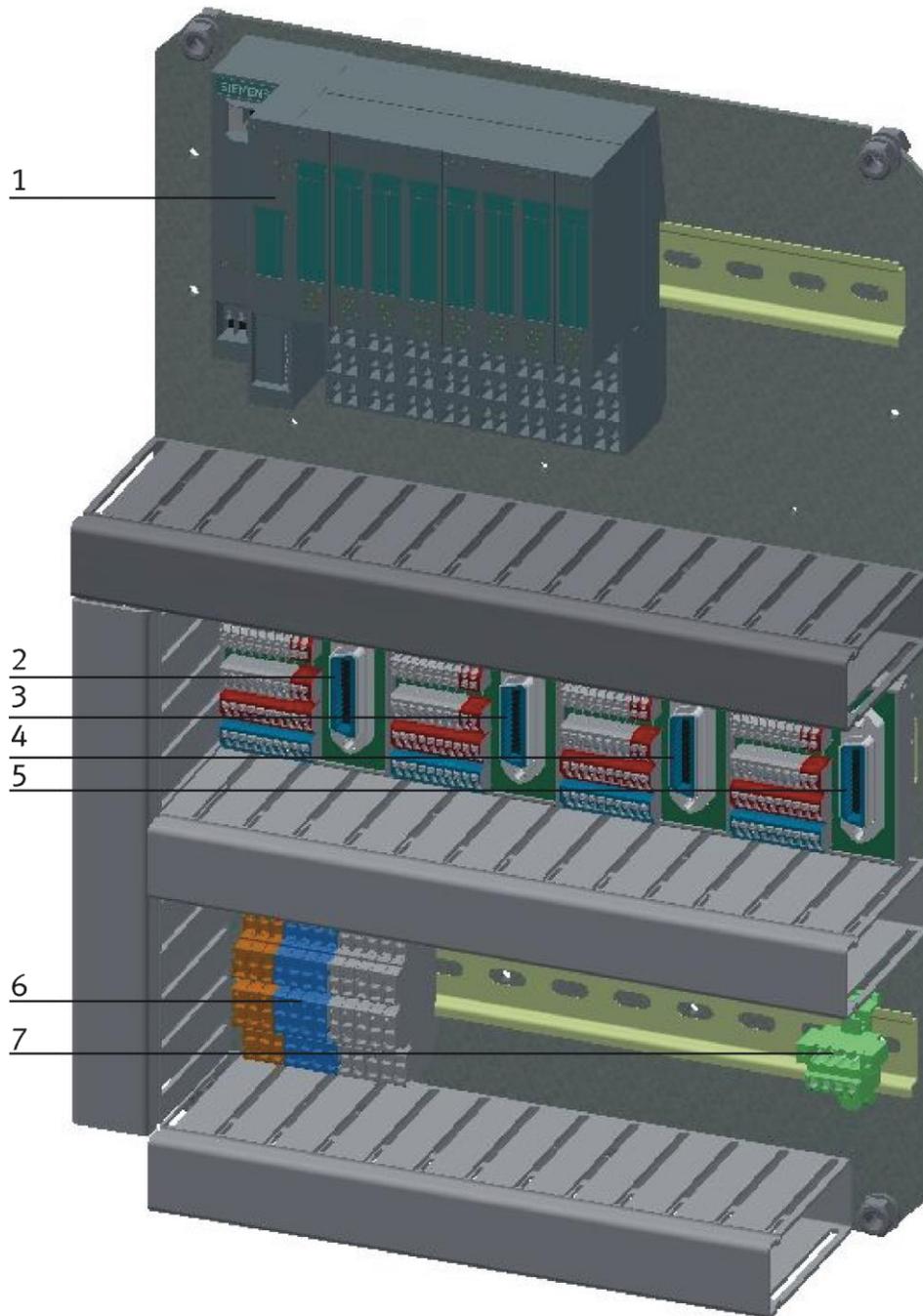
Electric boards / illustration similar

Position	Station
1	Board for power supply / +T1
2	I/O board ET200SP 32ON/32OFF/ +K1



Board for power supply / T1 / illustration similar

Position	Description	Equipment identifier	Name/Order number
1	Clamps	XD1	
2	Sitop power supply	TB1	Sitop 85-550V – 24V / 10 A
3	Profinet interface for RFID	KF1 + KF2	Turk BL20-GW-EN-PN / BL20-S4T-SBBS
4	24 V allocation	FC1	MICO 4.6/24VDC/4*1/2/4/6A Murr.9000-41034-0100600
5	Ethernet Switch	XF1	Siemens Scalance XB008 / 6GK5008-OBA00-1AB2
6	Emergency Stop unit	FZ1	Siemens Sirius / 3SK1111-2AB30
7	Switchboard 24V	XZ1	
8	Emergency stop board	XZ2	
9	Start-up current limiters	QA1	Kaleja M-MZS-4-30 / 06.05.020
10	Start-up current limiters	QA1	Kaleja M-MZS-4-30 / 06.05.020
11	Clamps	XD2	
12	I/O terminal	XD11	



PLC board / illustration similar

Position	Description	Equipment identifier	Name/ Order number
1	PLC	KF1	Siemens ET200SP / CPU 1512SP F-1PN
2	I/O terminal	XD11	
3	I/O terminal	XD12	
4	I/O terminal	XD13	
5	I/O terminal	XD14	
6	clamps	XD1	
7	connecting plug 24V distributor	XJ1	UMSTBVK 2,5 / 5 GF-5, 08

7.4.1 RFID connections

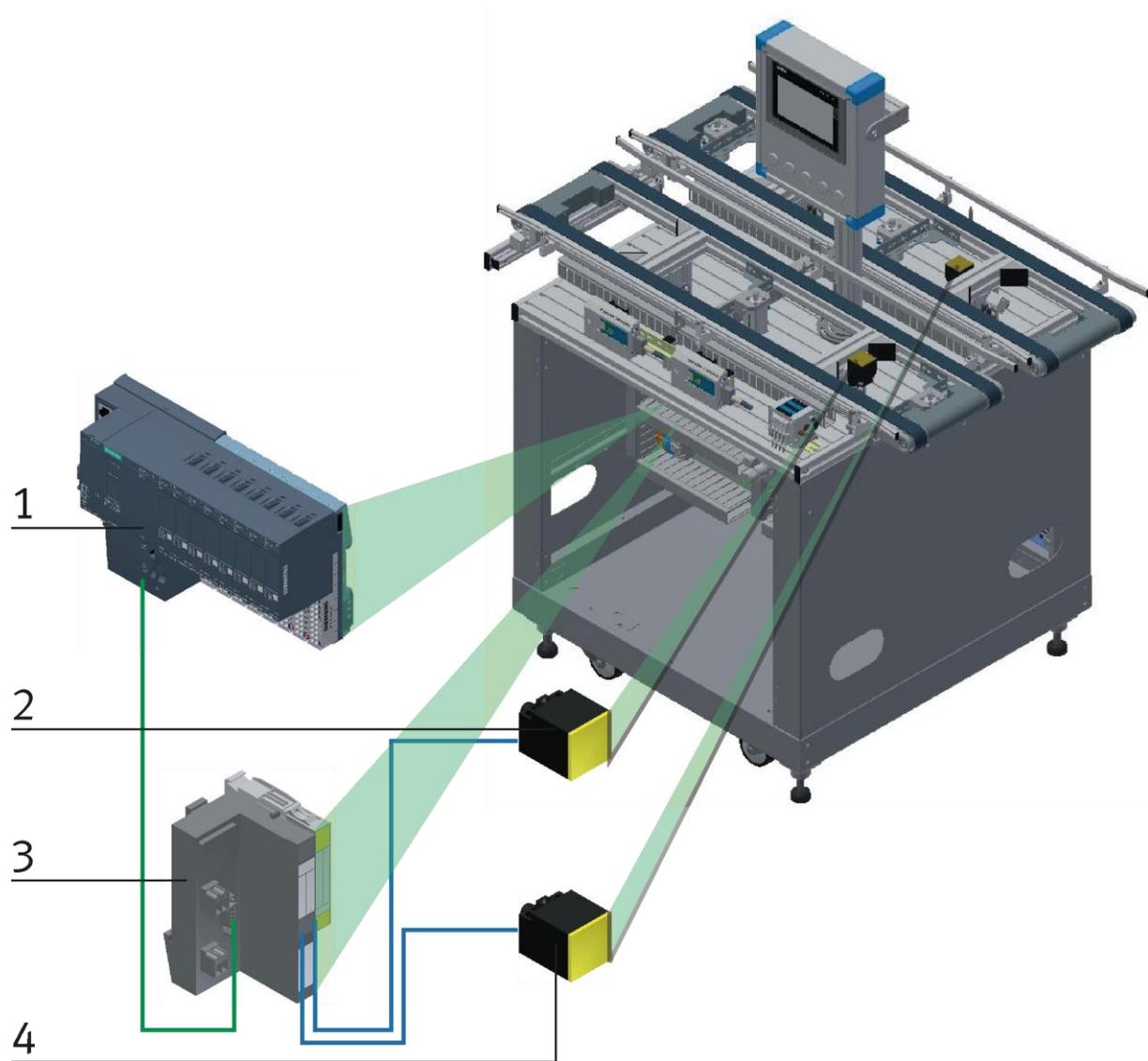
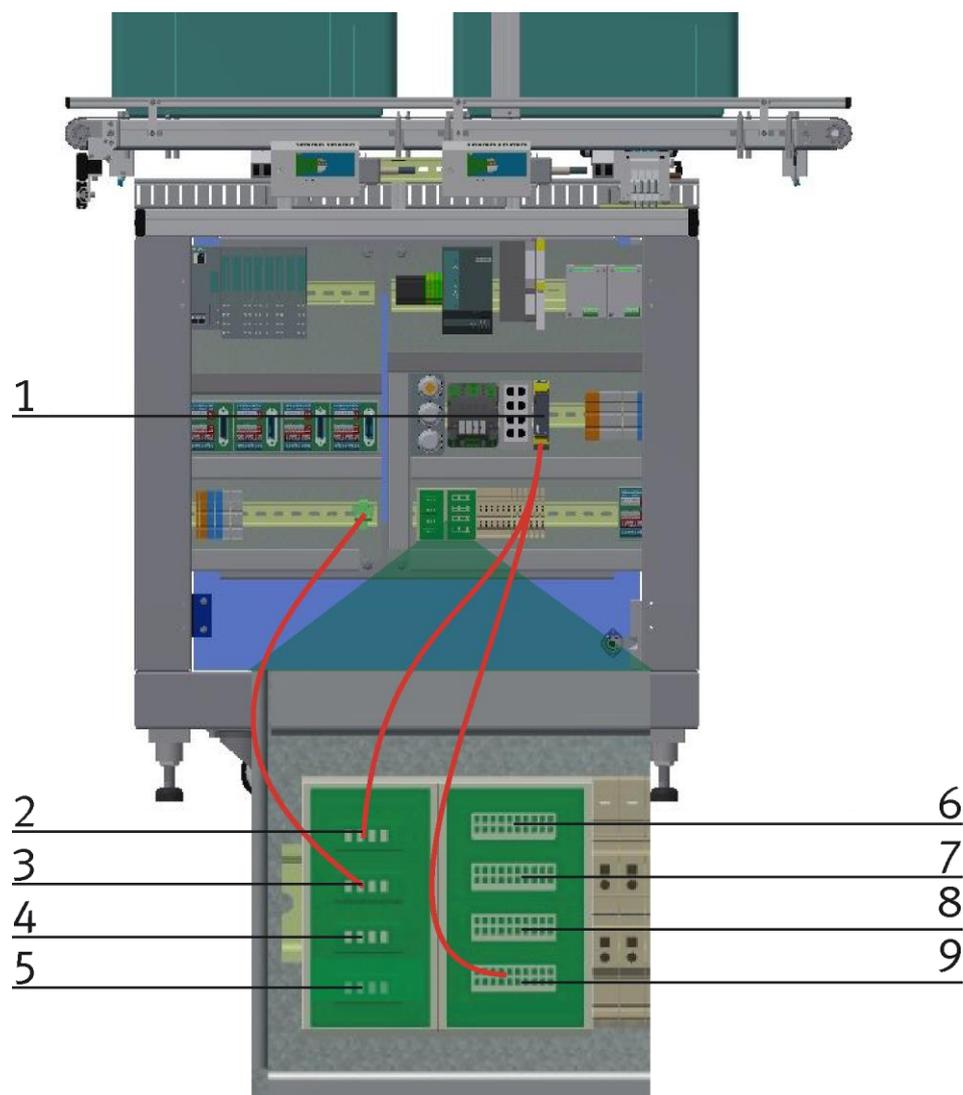


Illustration similar

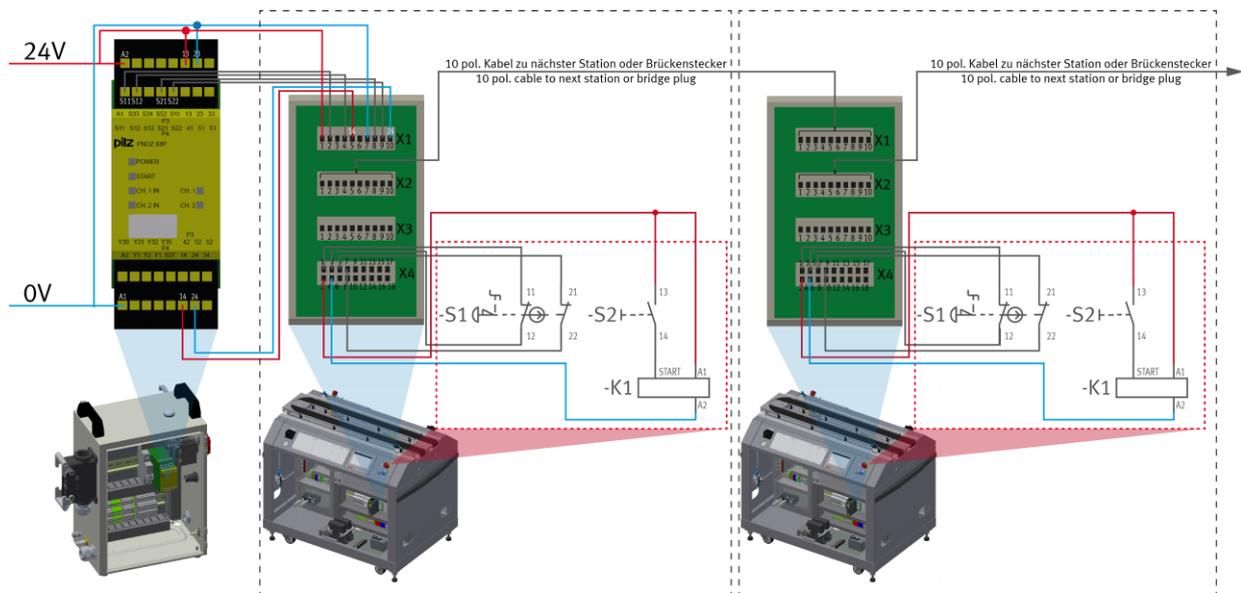
Position	Station
1	Siemens PLC
2	RFID sensor (G1 –TF1) / TN-CK40-H11147
3	Turk Gateway Profinet IO / BL20-GW-EN-PN
4	RFID sensor (G1 –TF2) / TN-CK40-H11147

7.4.2 Emergency-Stop structure



Example for Emergency-Stop connections with Emergency-Stop distributor / illustration similar

Position	Description
1	Emergency-Stop unit
2	clamp 1 / 24V Emergency-Stop distributor to station
3	clamp 2 / 24V Emergency-Stop distributor to station
4	clamp 3 / 24V Emergency-Stop distributor to station
5	clamp 4 / 24V Emergency-Stop distributor to station
6	IN1 clamp Emergency-Stop switch switch-distributor from another station
7	OUT1 clamp Emergency-Stop switch switch-distributor from another station
8	OUT2 clamp Emergency-Stop switch switch-distributor from another station
9	24 V clamp Emergency-Stop switch



Setup emergency stop system / illustration similar

The emergency stop system affects the whole line, so if an emergency stop is pressed, all stations in the line stop.

The emergency stop boards which are used in each station are used to connect one station to the next. These are connected with 10-pin cables and route all emergency stop information from one station to the next.

Starting at the power cabinet, a 10-pin cable is plugged into the X1 interface of the emergency stop board at the first station, from there it goes from the X2 of the emergency stop board to the X1 interface of the Emergency stop board from the next station. If no other station is connected, a jumper plug must be plugged into X2 of the emergency stop board at the last station.

The information is processed internally by X4 on the emergency stop board.

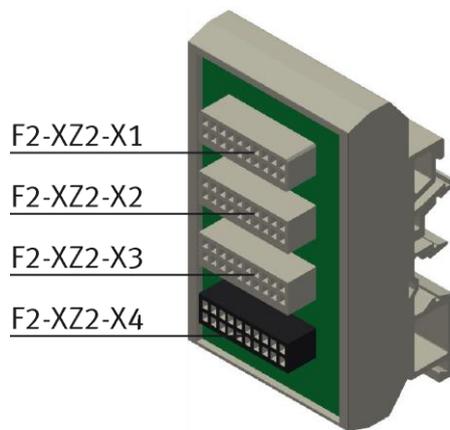


Illustration similar

Circuit board emergency stop circuit

- F2 XZ2-X1
Emergency stop coupling input / If no predecessor station is present, a bridge plug is to be installed here or at the system plug.
- F2 XZ2-X2
Emergency stop coupling Output 1 / If there is no following module, a bridge plug is to be installed here or at the system plug.
- F2 XZ2-X3
Emergency stop coupling output 2 / for the connection of a further module or an external machine (for example for basic module branch - here a further module can be installed at the branch or a CNC processing machine can be provided at a bypass) otherwise a bridge plug is to be provided.
- F2 XZ2-X4
Connection terminals for control panel, power supply, emergency stop relay

7.5 Commissioning

7.5.1 Pneumatic commissioning

The mechanic assembly must be finished. First you have to connect the module to the pneumatic system of the room. The service unit required has to be provided by the customer and should be within close proximity. The quick coupling plug has got a nominal size of 5 mm. If the respective system is equipped with 7.9 mm nominal size it will be possible to exchange the coupling plug of the service unit by a bigger one (adapter 1/8 to 1/4 required). Then the station can be supplied with 6 bar and the pneumatic commissioning is finished.

7.5.2 Electrical commissioning

Now the module must be supplied with electric voltage (230 V). The voltage has to be provided by the customer. Furthermore, an expert installation must be guaranteed.

7.6 Visual inspection

The visual inspection must be carried out before each start-up!

Before starting the station, check:

- the electrical connections
- the correct fit and the condition of the compressed air connections
- the mechanical components for visible defects
(Cracks, loose connections, etc.)
- the emergency stop devices are working

Eliminate any damage found before starting the station!

7.7 Adjusting the sensors

7.7.1 Fibre-optic (workpiece detection)

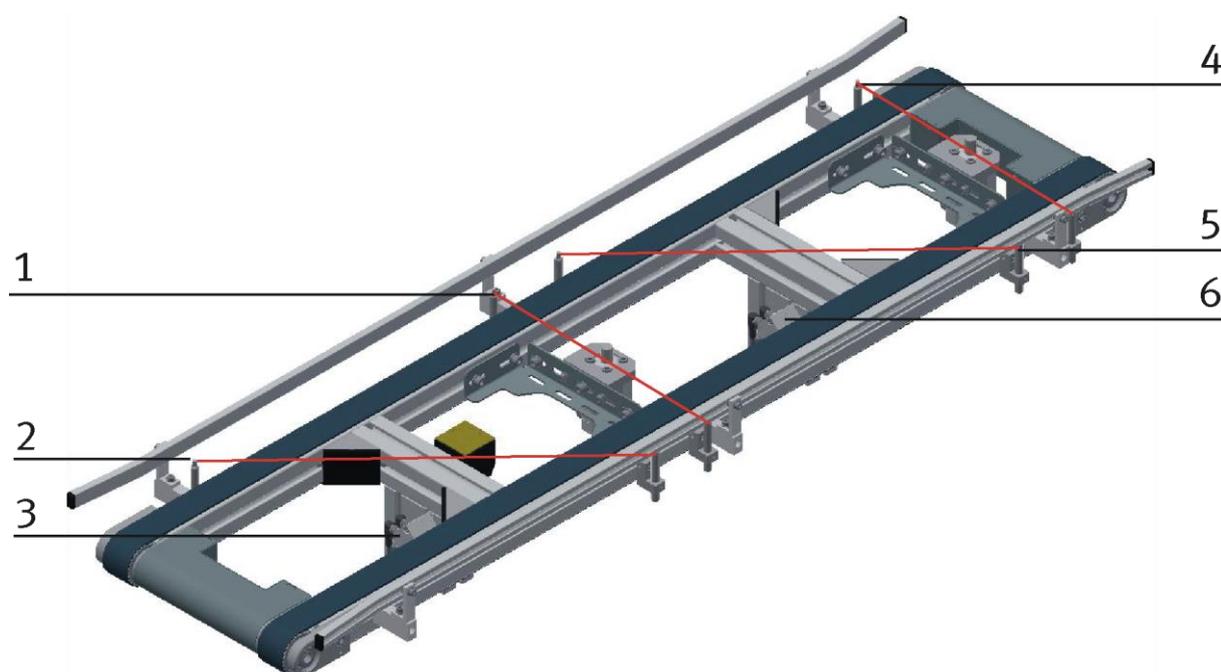


Illustration similar

Position	Description
1	Light barrier – 2 stoppers in the middle occupied (BG2 conveyor 1/ BG12 conveyor 2)
2	Light barrier – 1 feed line occupied (BG1 conveyor 1/ BG11 conveyor 2)
3	Fibre optic unit (BG1+2 / BG 11+12)
4	Light barrier – 4 stoppers outlet occupied (BG3 conveyor 1/ BG13 conveyor 2)
5	Light barrier – box on front position (BG7 conveyor 1/ BG17 conveyor 2)
6	Fibre optic unit (BG3+7 / BG 13+17)

The light barrier for detecting the boxes on the conveyor consists of the fibre optic unit and the fibre optics. The fibre optic unit works with visible infrared. You can move the fibre optics by the fibre optics reception in order to adjust the position on the conveyor. If the box is placed on the start position of the conveyor or if it is transported to the end of the conveyor, it will interrupt the light barrier, and the fibre optic unit will send a message to the control system.

Requirements

- the fibre optic unit has been attached
- the electrical connection of the fibre optic unit has been effected
- the power supply unit has been switched on

Procedure

1. Screw the two light guide heads into the sensor holders.
2. Adjust the fibre optics towards each other.
3. Attach the fibre optics to the fibre optic unit.
4. Setting the fibre optics: standard 1-signal if there is no box „at the start/the end of the conveyor“; if there is no 1-signal, the light guide heads have to be adjusted towards each other and the fibre optics potentiometer has to be adjusted until a 1-signal appears. If there is a box available at the start/end of the conveyor, the signal must be interrupted (0-signal).

Remark

The maximum permissible number of turns of the adjusting screw is 12.

5. Please check the setting by inserting a box.

Remark

The recognition of all boxes must be guaranteed.

Documents

- Data sheets / operating instructions
fibre optic unit SOEG_L and fibre optics SOEZ-SE

7.7.2 Proximity switch (Indexing units)

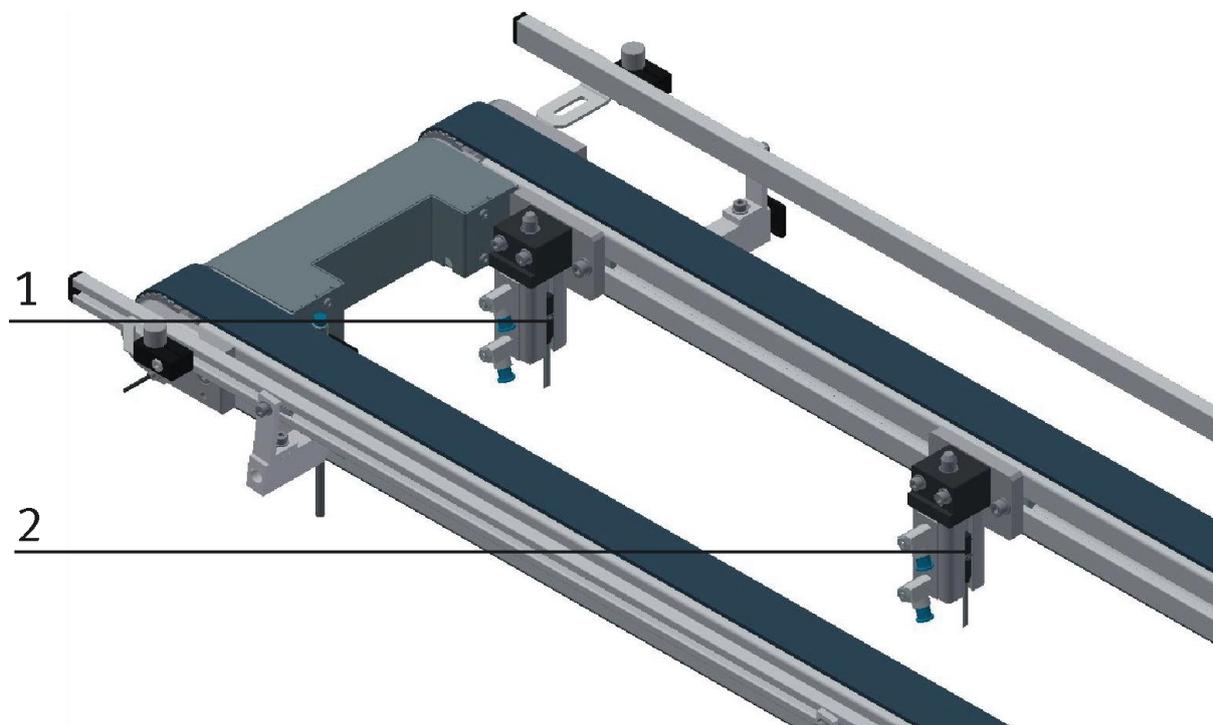


Illustration similar

Position	Description
1	Sensor Indexing Unit 1 bolt extended (BG4) / 574334 (SMT-8M-A-PS-24V-E-0,3-M8D)
2	Sensor Indexing Unit 2 bolts extended (BG5) / 574334 (SMT-8M-A-PS-24V-E-0,3-M8D)

The proximity switches are used for checking the end position of the cylinder for the indexing unit. The proximity switches react to a permanent magnet on the piston of the cylinder.

Requirements

- the indexing unit has been attached
- the pneumatic connection of the cylinder has been established
- the compressed air supply has been switched on
- the electrical connection of the proximity switches has been established
- power supply is available

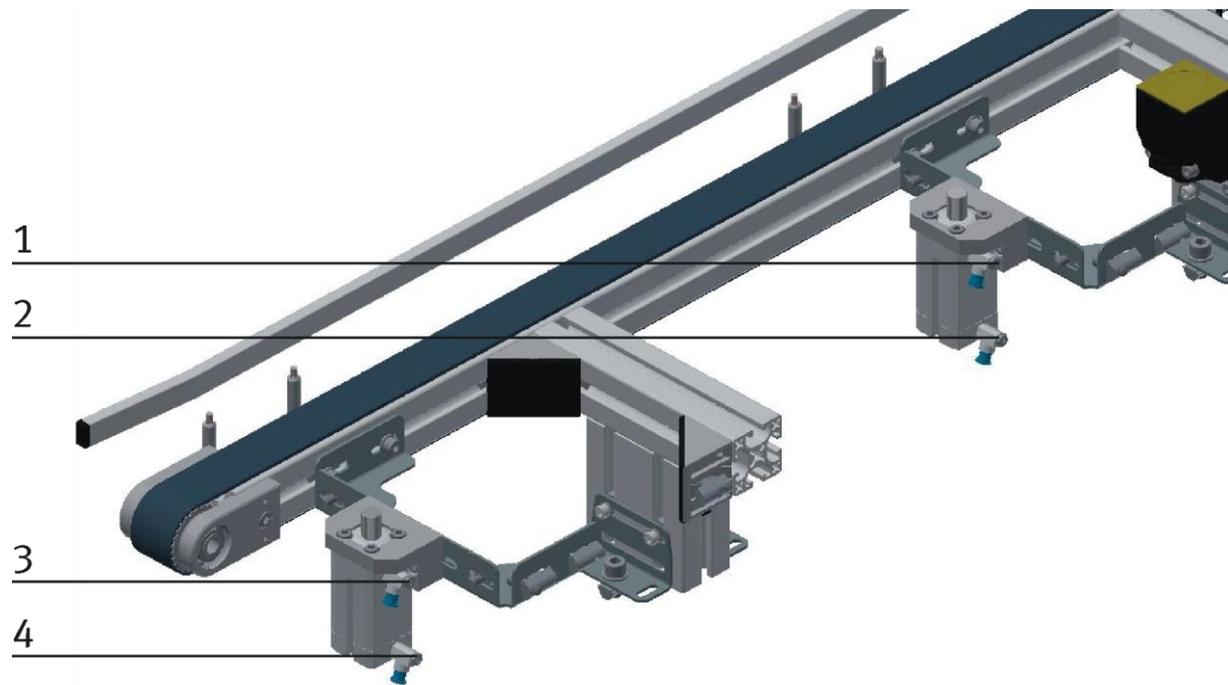
Procedure

1. The cylinder is in the end position to be queried.
2. Move the proximity switch until the switching status display (LED) appears.
3. Move the proximity switch into the same direction by a few millimeters until the switching status display disappears.
4. Move the proximity switch halfway between the switch-on and the switch-off position.
5. Tighten the locking screw of the proximity switch with an Allen key WAF 1.3.
6. Check the positioning of the proximity switch by repeated test runs of the cylinder.

Documents

- Data sheets / operating instructions
proximity switch 574334 (SMT-8M-A-PS-24V-E-0,3-M8D)

7.8 Adjusting the one-way flow control valves



One-way flow control valves / illustration similar

Position	Description
1+2	one-way flow control valves GRLA for indexing unit 1
3+4	one-way flow control valves GRLA for indexing unit 2

One-way flow control valves are used for regulating the exhaust air volume with double-acting drive units. In the opposite direction, the air flows through the flow control valve having a full cross-sectional flow. The piston is clamped between air cushions by free supply air and throttled exhaust air (improvement of the operating behavior even if the load changes).

Requirements

- the pneumatic connection of the cylinders has been set up
- the compressed air supply has been switched on

Procedure

1. At first turn off both one-way control valves, then turn them on again by about one rotation.
2. Start a test run.
3. Turn on the one-way flow control valves slowly until you reach the desired speed of the piston.

Documents

- Data sheets
One-way flow control valve (193138)

8 Operation

8.1 Starting the station

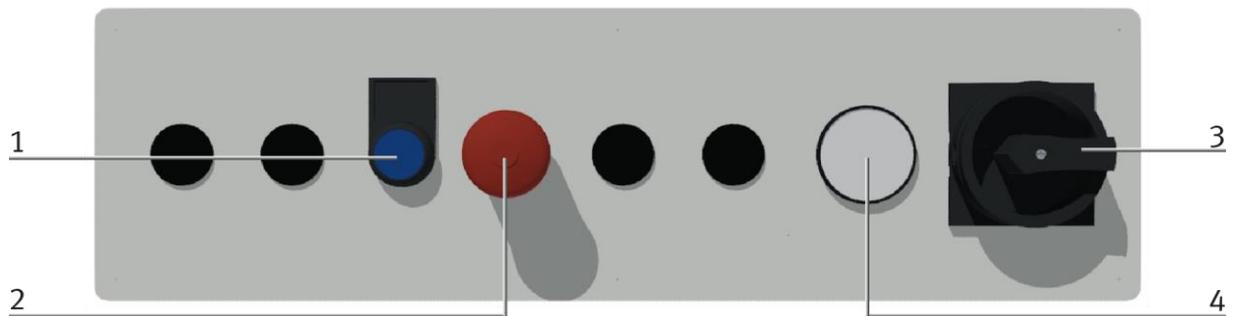
An initial commissioning has already been carried out ex works for the station.

Follow these steps to work with the station:

1. Establish mains supply 230 V AC.
2. The station is supplied with approx. 6 bar compressed air. When commissioning for the first time, make sure to increase the pressure slowly. (Prevents unpredictable events).
3. Now you can work with the station.

8.2 The operation panel of the station

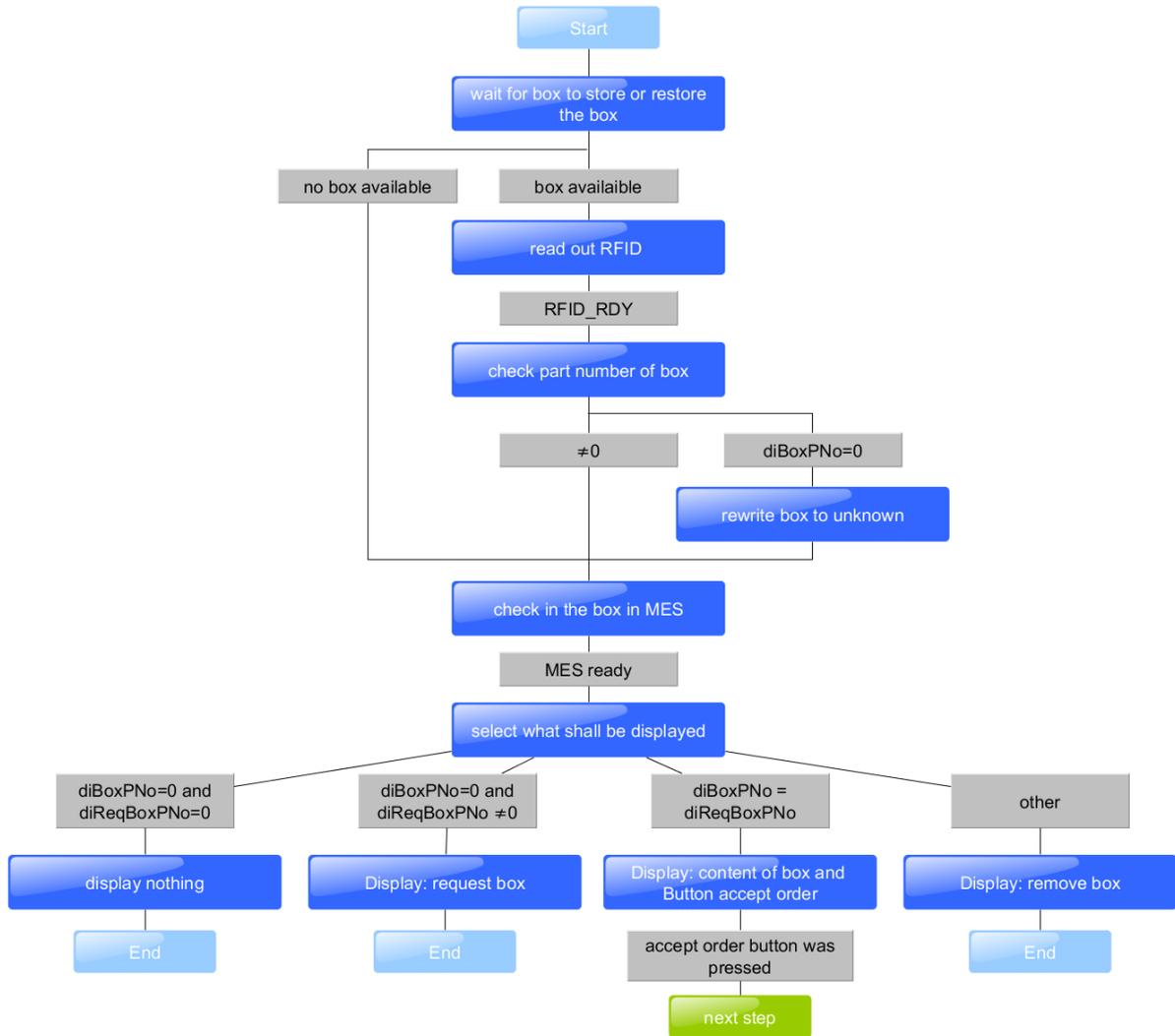
For supplying the station and starting it, the power supply must be activated. After starting the control system, the station can be operated with the operation panel. The functions on the operation panel are identical to the touch panel.

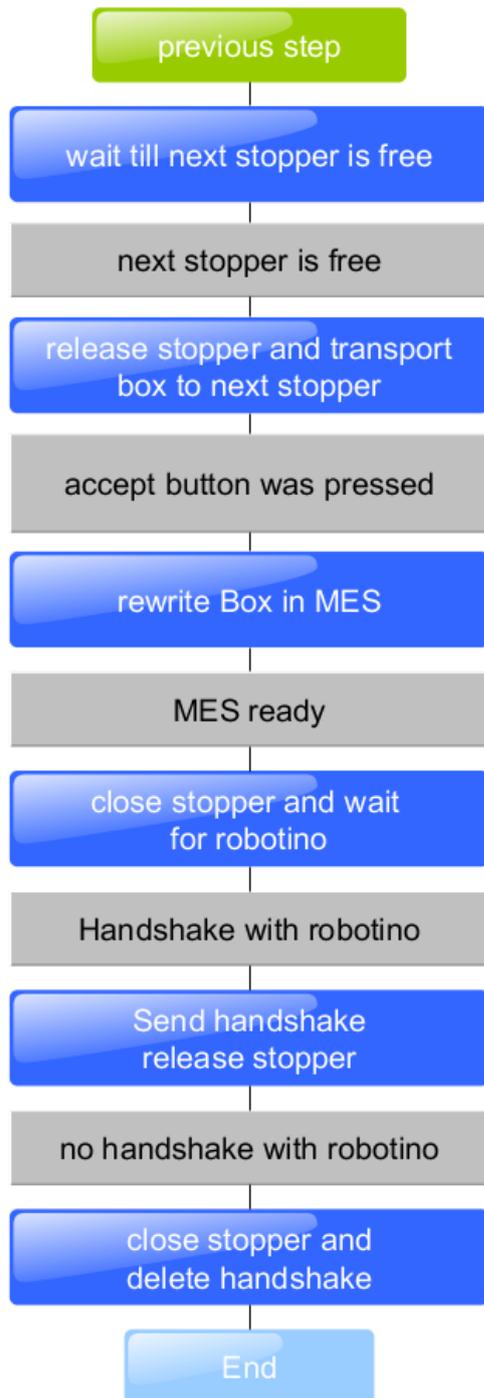


CP Factory operation panel / illustration similar

No.	Name	Element	Function	
1	Controller on	SF1	Light on	Reset ready
			Light off	Waiting for reset
2	Emergency stop	FQ1	Emergency stop function	
3	Main Switch	QB1	Main switch power supply	
4	Manometer	Announce air pressure		

8.3 Process description storing a box

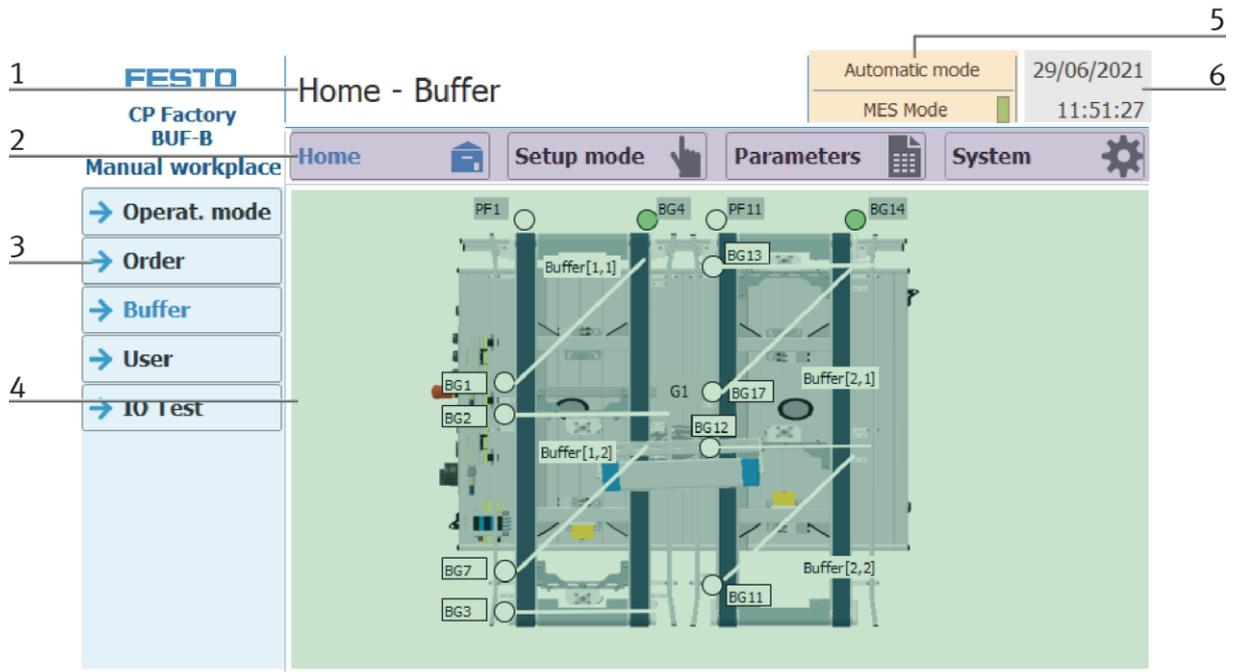




8.4 Process description outsourcing a box



8.4.1 Menu structure of the operating panel



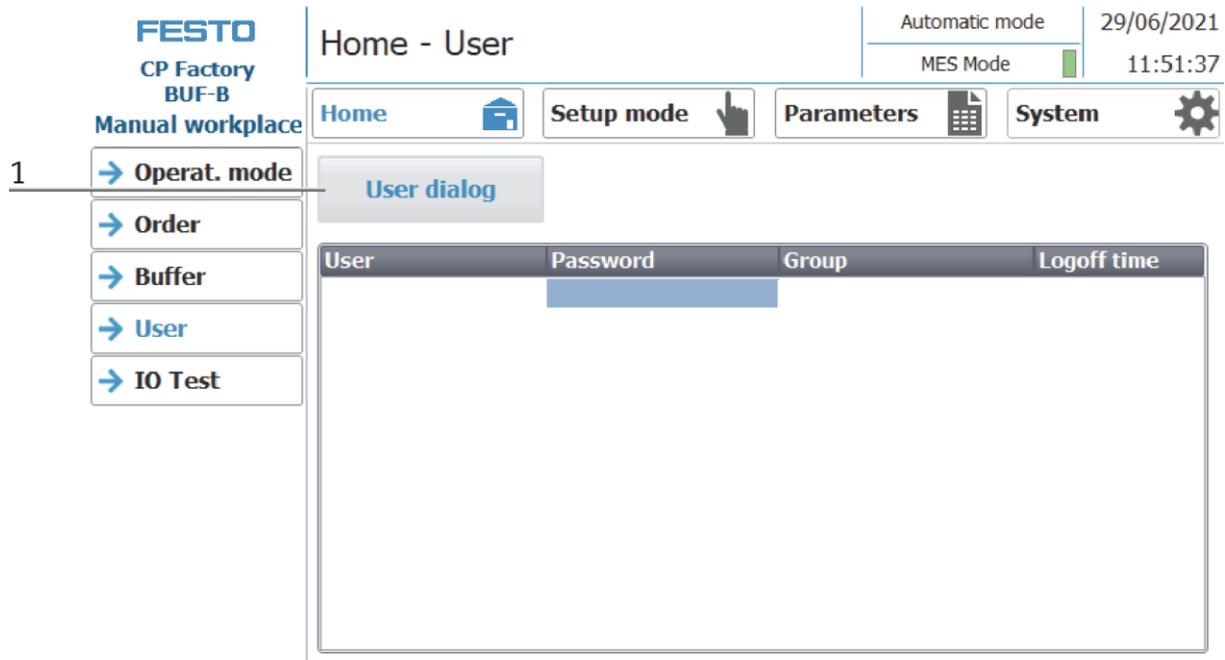
Position	Description
1	Description of menu (main or submenu) OR in case of an active Error or an error message, this field is also for announcement
2	Main menu (always shown the same) Home: Here the module can be controlled, the mode (default / MES) can be selected, the automatic or the set-up mode can also be operated. Setup: Here, the application can be operated manually in setup mode Parameter: The parameters of the application are set here, a simulation can be started, the transitions can be defined, or the tape can be set System: Here the system parameters such as language, time, etc. are set
3	Submenu Changing content, depending on the main menu
4	Changing content, depending on the main or submenu
5	Announcement of operation mode or mode (MES or default)
6	Announcement of actual date and time

Log in as an administrator

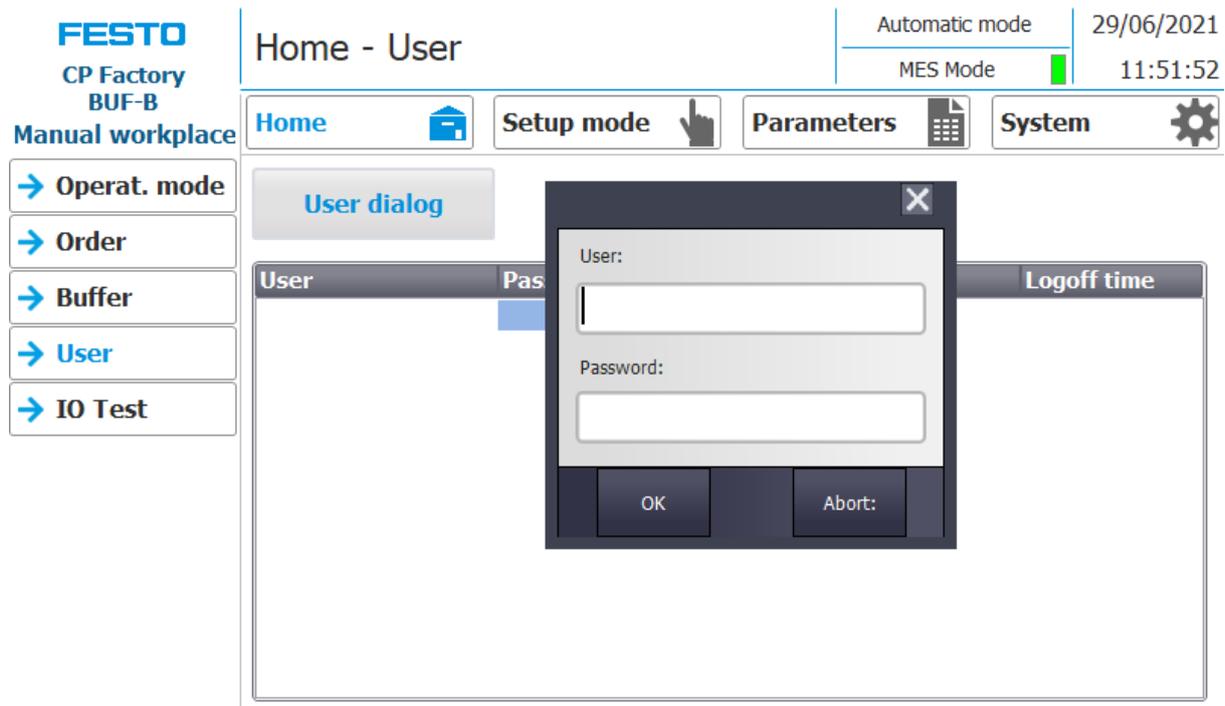
There are 2 functions in the operation of the HMI that are only available when the operator logs on to the HMI. These functions are the I/O test in the setup mode and the user area.

If one of the functions has been logged in, the other function is also available without the user having to log in again.

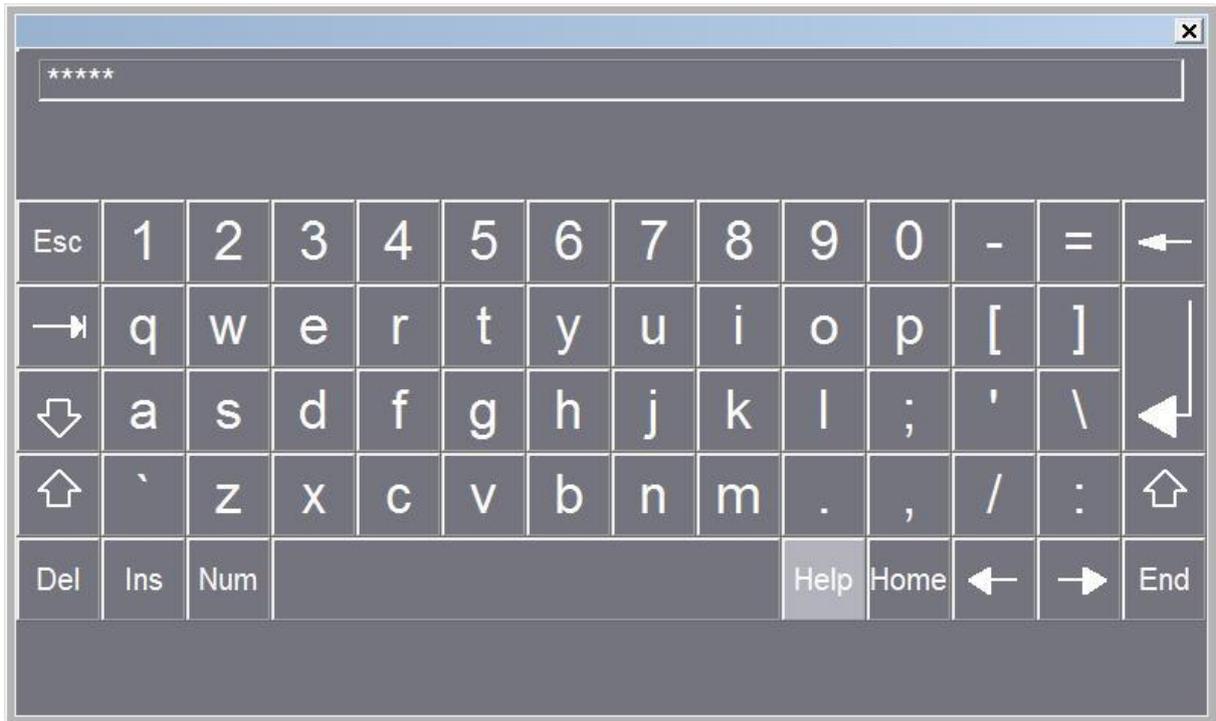
The process is explained using the user function as an example.



1. With a click on the User Dialog button the following window is opened.



2. If you click in the User or Password fields, the input window opens and the user data can be entered.



- The user data can be entered here. The entry is confirmed with the Return key.

User: festo

Password: festo

FESTO
CP Factory
BUF-B
Manual workplace

- Operat. mode
- Order
- Buffer
- **User**
- IO Test

Home - User

Automatic mode 29/06/2021
MES Mode █ 11:53:25

Home
Setup mode
Parameters
System

User dialog

User	Password	Group	Logoff time
Administrator	*****	Bedienen	5
festo	*****	Bedienen	5
PLC User	*****		5

- The user is now logged in as "Administrator" and the functions User and I / O test are available.

8.5 Operation modes

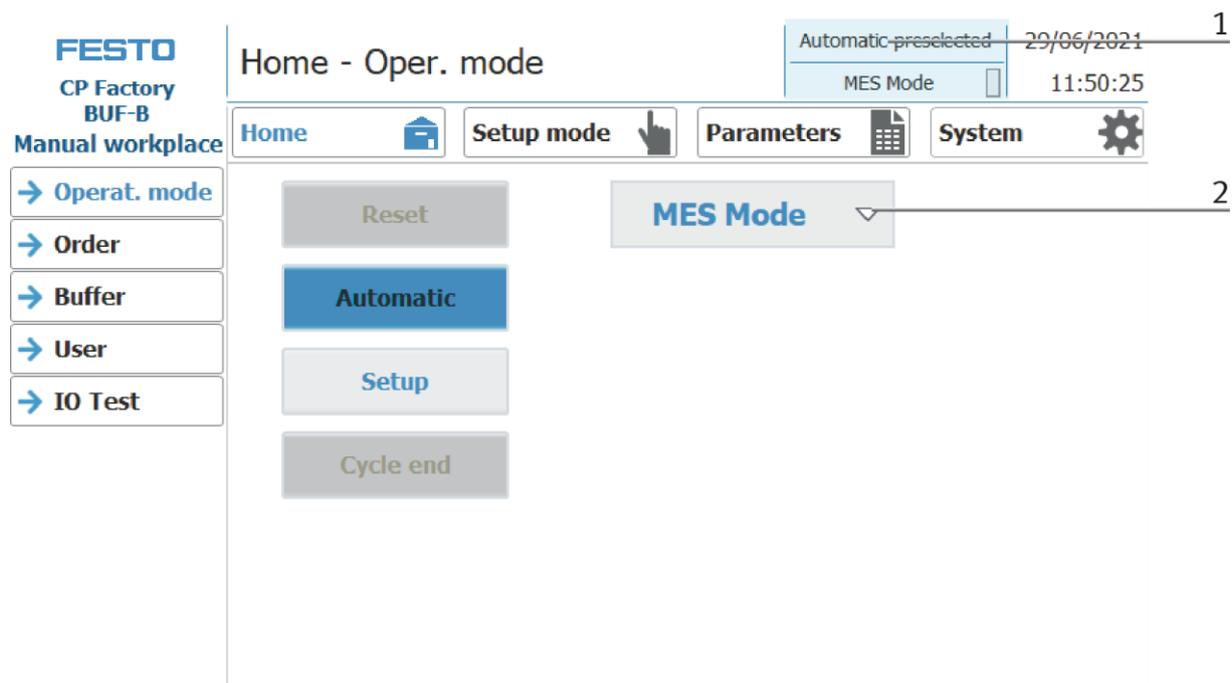
The following operation modes are available

- Reset
The station is moved to its home position
- Setup
The station runs in set-up mode, actuators can be controlled and monitored
- Automatic
The station runs in automatic mode, all processes run automatically, no actuators can be controlled.
There are two modes in the automatic mode: the default mode and the MES mode.

8.5.1 Mode

There is no default mode at this station, the following description is just an example, but it is not possible to change the mode.

1. Clicking on the blue marked area opens a pop-up window in which the operating mode can be selected. Other functions are also integrated in the pop-up.
2. The mode can also be set on the Home / Operating mode page.

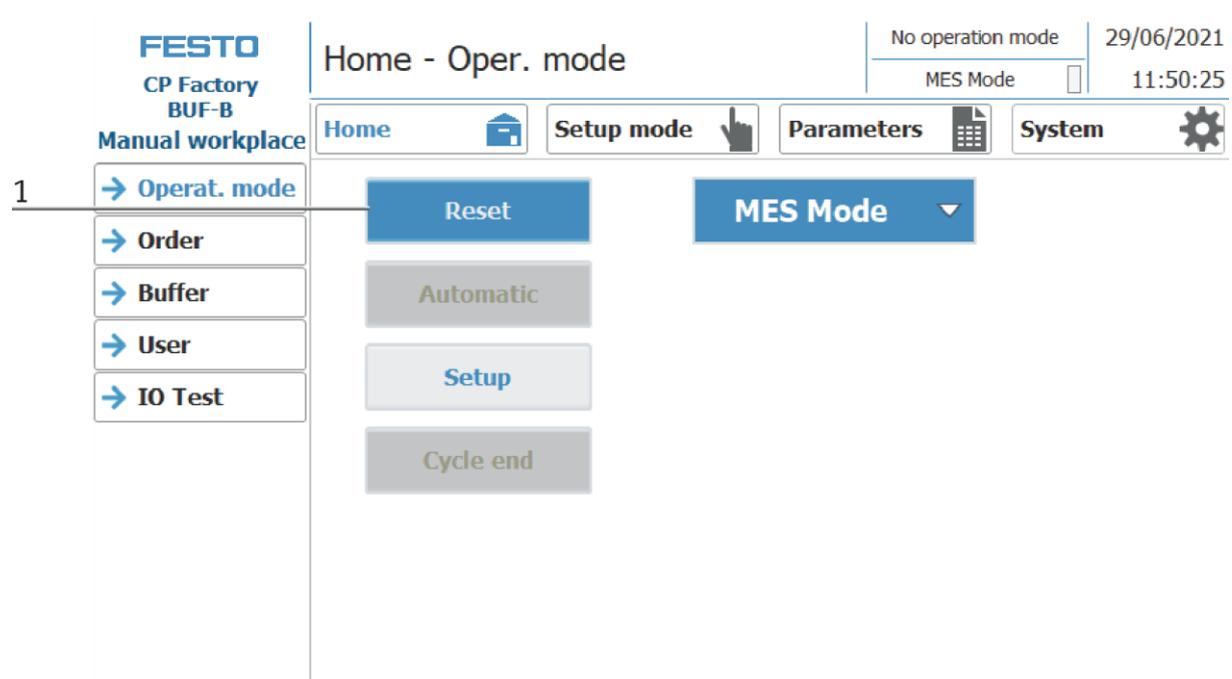


Possibilities of mode

- MES mode
In the MES mode, all processes are centrally started, executed and monitored by the MES software. All stations must be set to MES mode and automatic start.
- Default Mode
The automatic sequence is not centrally controlled in the default mode, all information from the transition tables (see chapter "Schematic process flow") is read and processed separately at each station.

8.5.2 Operation mode Reset

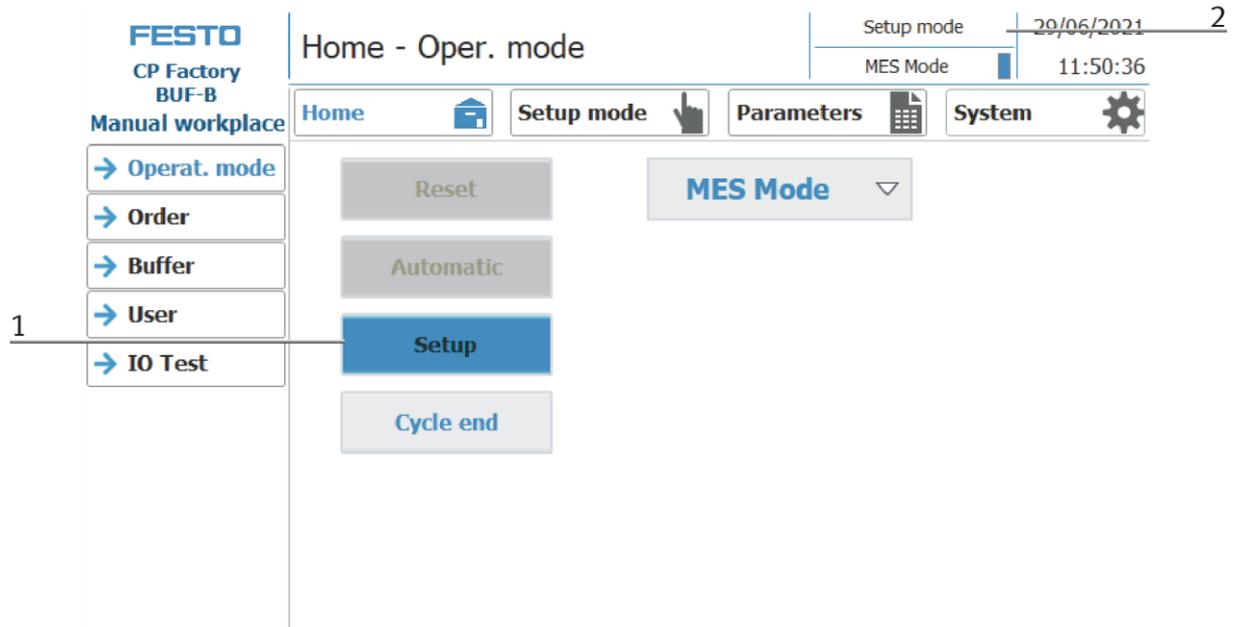
In the operation mode Reset, the station is moved to its home position.



1. After switching on the station, the Reset button flashes, press this to move the station into its home position.
2. The operating mode Reset is displayed here during the process.

8.5.3 Operation mode Setup

In operation mode Setup, all sensors can be displayed and actuators can be controlled from the HMI. This is used for troubleshooting or during commissioning.



1. Automatic mode is not active and the Setup button is not greyed out - press the Setup button to activate the Setup mode.
2. The current operation mode is displayed here

Set up Box Input

1. Click the Setup mode button
2. Select Box Input.

FESTO
CP Factory
BUF-B

Setup - Box Input

Setup mode 29/06/2021
MES Mode 12:15:51

Manual workplace
Home
Setup mode
Parameters
System

- 1
- 2

- Box Input
- Box Output
- RFID 1
- RFID 2

	Left	T1QA1	Right
Conveyor 1 Box infeed	box out (T1_QA1)	Presel. slow	creep feed (True)
Stopper 1 (ST1) boxinfeed	to bottom (G1_MB1) 00000ms	notBG5	Stopper G1_BG5 33 00000ms
Stopper 2 (ST2) box infeed	to bottom (G1_MB3) 00000ms	notBG6	Stopper G1_BG6 15 00000ms

FESTO
CP Factory
BUF-B
Manual workplace

- Box Input
- Box Output
- RFID 1
- RFID 2

Setup - Box Input

Setup mode | 29/06/2021
MES Mode | 12:16:02

Home | Setup mode | Parameters | System

1

2

3

	Left	T1QA1	Right
Conveyor 1 Box infeed	box out (T1_QA1)	Presel. slow	creep feed (True)
Stopper 1 (ST1) boxinfeed	to bottom (G1_MB1) 0000ms	notBG5	Stopper 33
Stopper 2 (ST2) box infeed	to bottom (G1_MB3) 0000ms	notBG6	Stopper 15
			to top (G1_MB2) 0000ms
			to top (G1_MB4) 0000ms

Position	Description
1	<p>Left: conveyor moves to the left counter clockwise Box Out: move conveyor to the left (activator T1_QA1 is activated, flashing blue when active)</p> <p>T1QA1: display conveyor Presel. slow: setting the conveyor speed to slow Creep feed: move the conveyor slowly (flashing blue when active)</p> <p>Right: conveyor moves to the right clockwise Box In: move the conveyor to the right (activator T1_QA1_ is activated, flashing blue when active)</p>
2	<p>To bottom: move down stopper ST1 (G1_MB1 is activated – flashing blue when active) not GB5: stopper down - sensor BG5 must not be active (flashing green when not active) Stopper: Display stopper ST1 G1_BG5: sensor BG5 indicates when stopper is up (flashing green when active) To top: move up stopper ST1 (G1_MB2 is activated – flashing blue when active)</p>
3	<p>To bottom: move down stopper ST2 (G1_MB3 is activated – flashing blue when active) not GB6: stopper down - sensor BG6 must not be active (flashing green when not active) Stopper: display stopper ST2 G1_BG6: sensor BG6 indicates when stopper is up (flashing green when active) To top: move up stopper ST2 (G1_MB4 is activated – flashing blue when active)</p>

Setup Box Output

1. Click the Setup mode button
2. Select Box Output

FESTO
CP Factory
BUF-B

Setup - Box Output

Setup mode 29/06/2021
MES Mode 12:16:12

1 Manual workplace

2

- Box Input
- Box Output
- RFID 1
- RFID 2

	Left	T1QA2	Right
Conveyor 2	box in (T1_QA2)	Presel. slow	creep feed (True)
Box output			box out (T1_QA2_)
Stopper 3 (ST3) output track	to bottom (G1_MB11) 00000ms	notBG15	Stopper G1_BG15 43
Stopper 4 (ST4) output track	to bottom (G1_MB13) 00000ms	notBG16	Stopper G1_BG16 15
			to top (G1_MB12) 00000ms

3D Model Labels: BG11, RFID 2, ST3, BG12, BG13, BG14, BG15, BG16, ST4, BG17, PF11

FESTO
CP Factory
BUF-B
Manual workplace

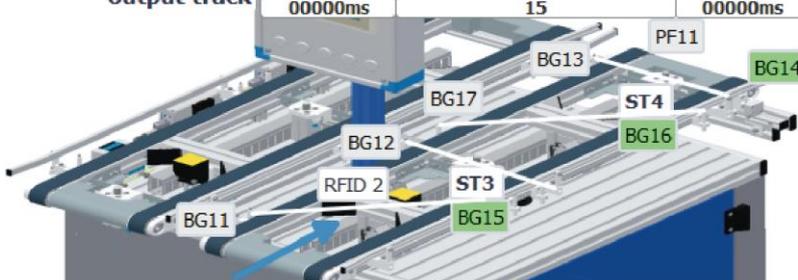
- Box Input
- Box Output
- RFID 1
- RFID 2

Setup - Box Output

Home Setup mode Parameters System

Setup mode 29/06/2021
MES Mode 12:16:26

	Left	T1QA2	Right	
Conveyor 2 Box output	box in (T1_QA2)	Presel. slow	creep feed (True)	1
Stopper 3 (ST3) output track	to bottom (G1_MB11) 00000ms	notBG15 43	Stopper G1_BG15 to top (G1_MB12) 00000ms	2
Stopper 4 (ST4) output track	to bottom (G1_MB13) 00000ms	notBG16 15	Stopper G1_BG16 to top (G1_MB14) 00000ms	3



Position	Description
1	Left: conveyor moves to the left counter clockwise Box Out: move conveyor to the left (activator T1_QA2 is activated, flashing blue when active) T1QA2: display conveyor Presel. slow: setting the conveyor speed to slow Creep feed: move the conveyor slowly (flashing blue when active) Right: conveyor moves to the right clockwise Box In: move the conveyor to the right (activator T1_QA2_ is activated, flashing blue when active)
2	To bottom: move down stopper ST3 (G1_MB11 is activated – flashing blue when active) not GB5: stopper down - sensor BG15 must not be active (flashing green when not active) Stopper: Display stopper ST3 G1_BG15: sensor BG15 indicates when stopper is up (flashing green when active) To top: move up stopper ST3 (G1_MB12 is activated – flashing blue when active)
3	To bottom: move down stopper ST4 (G1_MB13 is activated – flashing blue when active) not GB16: stopper down - sensor BG16 must not be active (flashing green when not active) Stopper: display stopper ST4 G1_BG16: sensor BG16 indicates when stopper is up (flashing green when active) To top: move up stopper ST4 (G1_MB14 is activated – flashing blue when active)

Setup RFID 1 Box Input

1. Click the Setup mode button
2. Select RFID 1 Box Input

FESTO
CP Factory
BUF-B
Manual workplace

Setup - RFID Box Input

Setup mode 29/06/2021
MES Mode 12:16:36

1 → **Setup mode**

2 → **RFID 1**

	RFID Box Input (TF1)			tag present
init				
read	ONo:	<input type="text" value="+0"/>		ready
write	OPos:	<input type="text" value="+0"/>		busy
	Box ID:	<input type="text" value="+0"/>		error
Delete data	BoxPNo:	<input type="text" value="+0"/>		timeout

FESTO
CP Factory
BUF-B
Manual workplace

Setup - RFID Box Input

Setup mode 29/06/2021
MES Mode 12:16:36

Home Setup mode Parameters System

1 → Box Input
2 → Box Output
3 → RFID 1
4 → RFID 2
5 → Delete data

RFID Box Input (TF1)

init
read
write
Delete data

Box

ONo: +0
OPos: +0
Box ID: +0
BoxPNo: +0

tag present
ready
busy
error
timeout

6
7
8
9
10

Position	Description
1	Init: initialize the RFID Module / only required once after starting the control unit
2	Read: read data from the RFID tag
3	Write: write current data on the RFID tag
4	Display of the data of the RFID tag
5	Delete data: delete all data of the RFID
6	Display tag present: green if an RFID tag has been recognized
7	Display ready: green if an RFID tag is ready
8	Display busy: green if the RFID tag is being processed
9	Display error: green if there is an error on the RFID tag
10	Display timeout: green if there is a timeout error

Setup RFID 2 Box Output

1. Click the Setup mode button
2. Select RFID 2 Box Output

The screenshot shows the 'Setup - RFID Box Output' interface. At the top, it displays 'Setup mode' and the date '29/06/2021', along with 'MES Mode' and the time '12:16:45'. The navigation bar includes 'Home', 'Setup mode', 'Parameters', and 'System'. The left sidebar, labeled 'Manual workplace', has buttons for 'Box Input', 'Box Output', 'RFID 1', and 'RFID 2'. The main content area is titled 'RFID Box Output (TF2)' and contains a table with the following data:

Function	Parameter	Value	Status
init	ONo:	+0	ready
read	OPos:	+0	busy
write	Box ID:	+0	error
Delete data	BoxPNo:	+0	timeout

Position	Description
1	Init: initialize the RFID Module / only required once after starting the control unit
2	Read: read data from the RFID tag
3	Write: write current data on the RFID tag
4	Display of the data of the RFID tag
5	Delete data: delete all data of the RFID
6	Display tag present: green if an RFID tag has been recognized
7	Display ready: green if an RFID tag is ready
8	Display busy: green if the RFID tag is being processed
9	Display error: green if there is an error on the RFID tag
10	Display timeout: green if there is a timeout error

I/O Test

The screenshot shows the FESTO CP Factory BUF-B control interface. At the top, it displays 'Home - IO test' and 'Setup mode' with the date '29/06/2021' and 'MES Mode' with the time '12:14:17'. Below this is a navigation bar with 'Home', 'Setup mode', 'Parameters', and 'System' buttons. On the left, a 'Manual workplace' menu lists 'Operat. mode', 'Order', 'Buffer', 'User', and 'IO Test'. The main area is divided into 'Inputs' and 'Outputs' sections, each with a table of 8 rows and 4 columns labeled 'Byte'. The 'IO Test' menu item is highlighted with a blue arrow and the number '3'. The 'Setup mode' button is highlighted with a hand icon and the number '2'. The 'System' button is highlighted with a gear icon and the number '1'. A red warning box on the right contains the text 'Enable Outputs CAUTION Program return of OB1 No cyclic program call' and is highlighted with the number '4'.

Position number	Description
1	Setup mode must be active
2	Choose Home
3	Choose I/O Test
4	By clicking in this area, the outputs are enabled and can be activated. A login as "Administrator" is required.

FESTO
CP Factory
BUF-B
Manual workplace

Home - IO test

Setup mode 29/06/2021
MES Mode 12:14:38

Home Setup mode Parameters System

→ Operat. mode
→ Order
→ Buffer
→ User
→ IO Test

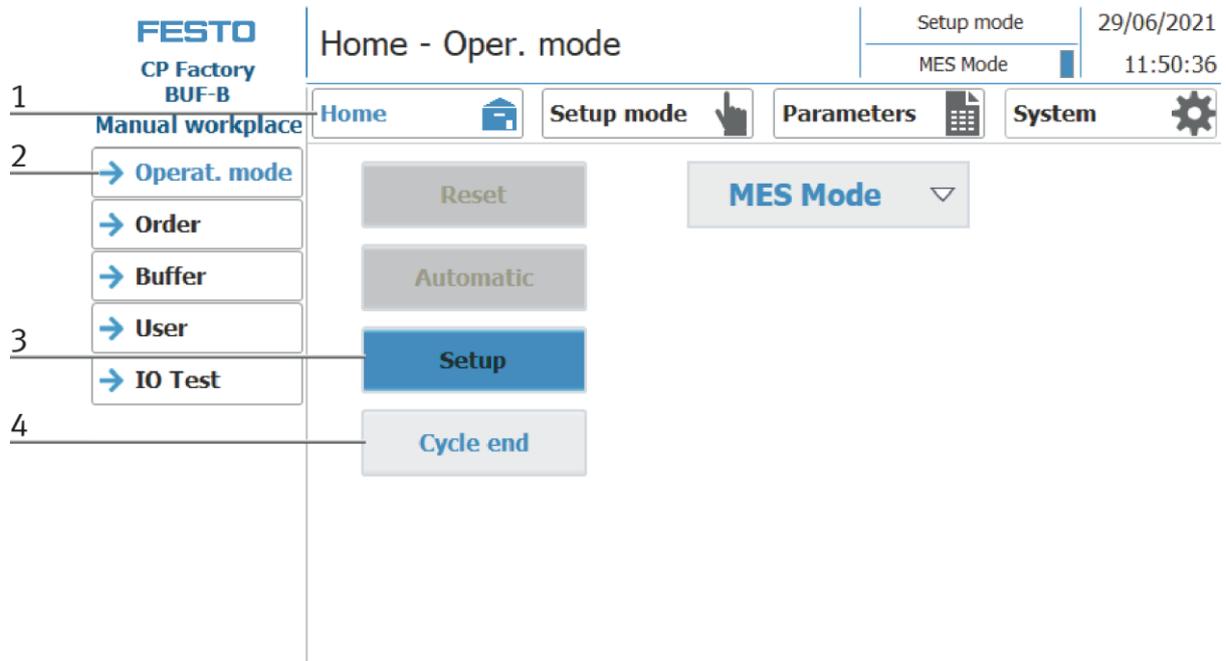
Inputs				Outputs			
0	1	2	3	0	1	2	3
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7

**Enable Outputs
CAUTION
Program return
of OB1
No cyclic program call**

1
2

Position number	Description
1	By clicking in a field, this digital output is activated (orange if active)
2	By clicking again in this field, the outputs are blocked again

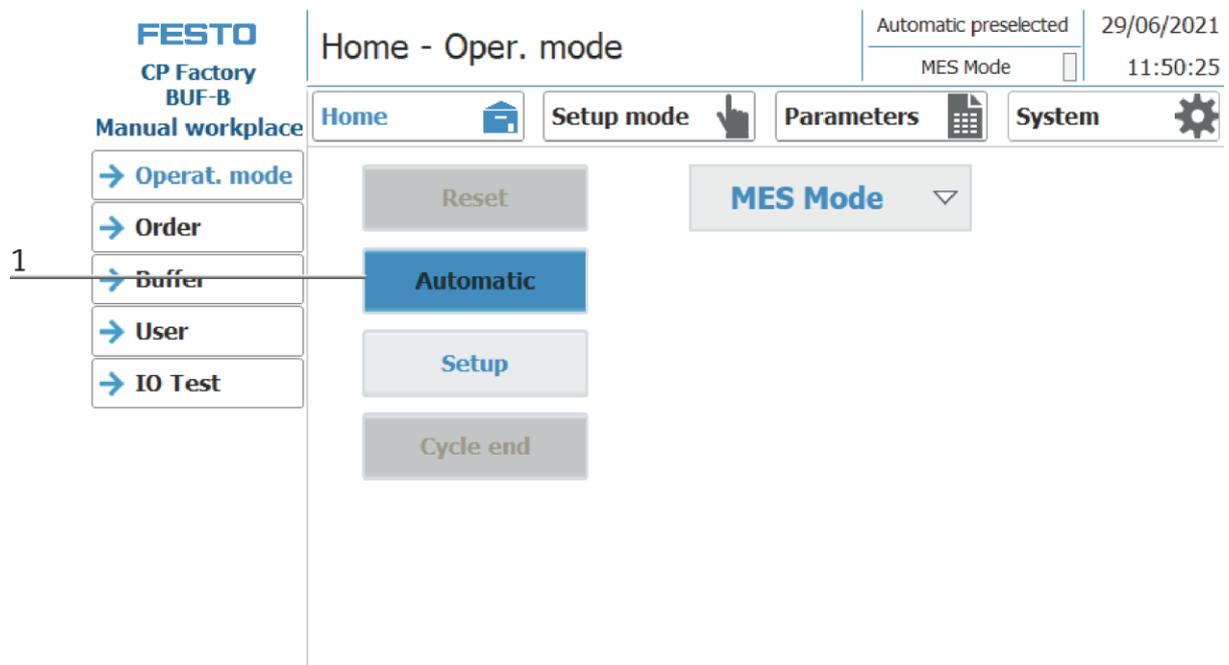
Exit operation mode setup



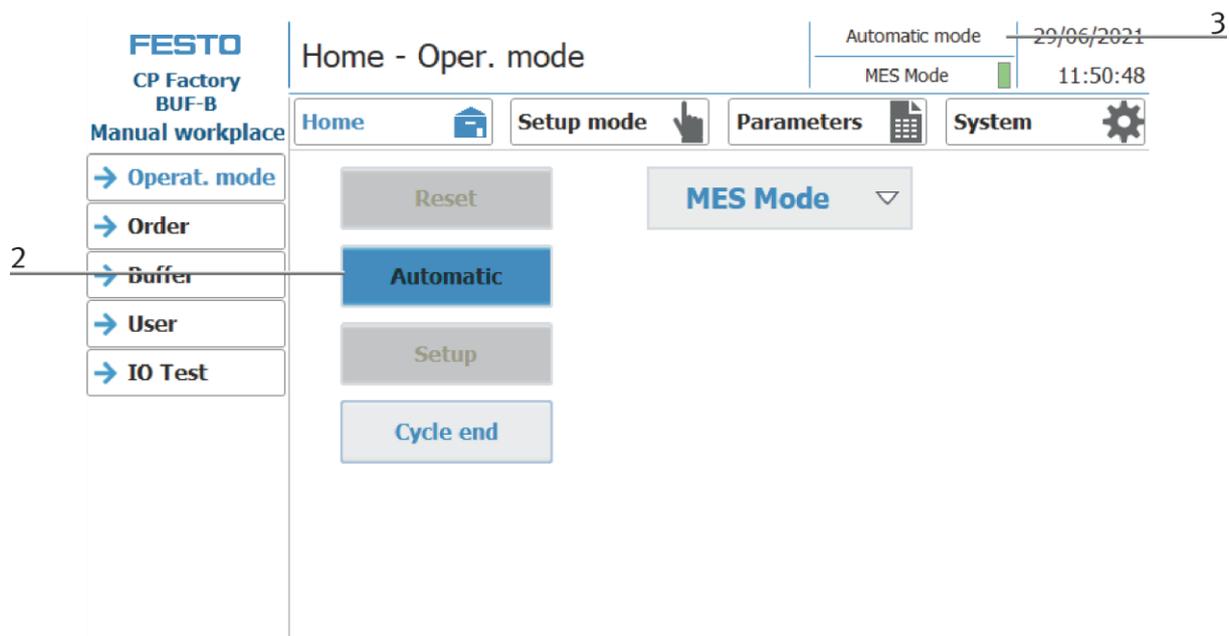
1. Press Home button
2. Press Operat. mode
3. Setup mode is active, button lights up blue
4. Press the cycle end button to end the operation mode setup.

8.5.4 Operation mode automatic

In automatic mode, the chosen automatic processes can be processed at the station. Depending on the selection of the mode, the processes are controlled via the transition tables (default – if available) or via MES.



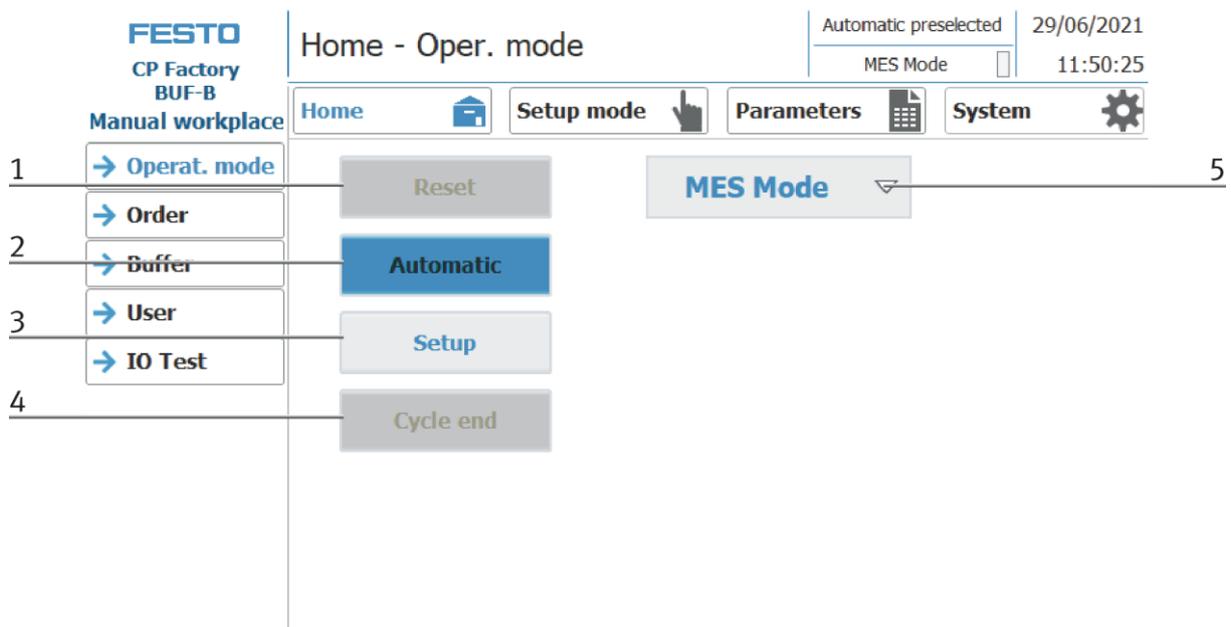
1. Automatic button flashing blue – Press Button to activate operation mode automatic



2. Operation mode automatic is active, button lights up blue

3. Announcement of active operation mode automatic

8.5.5 Main menu - Home
Sub menu operation mode

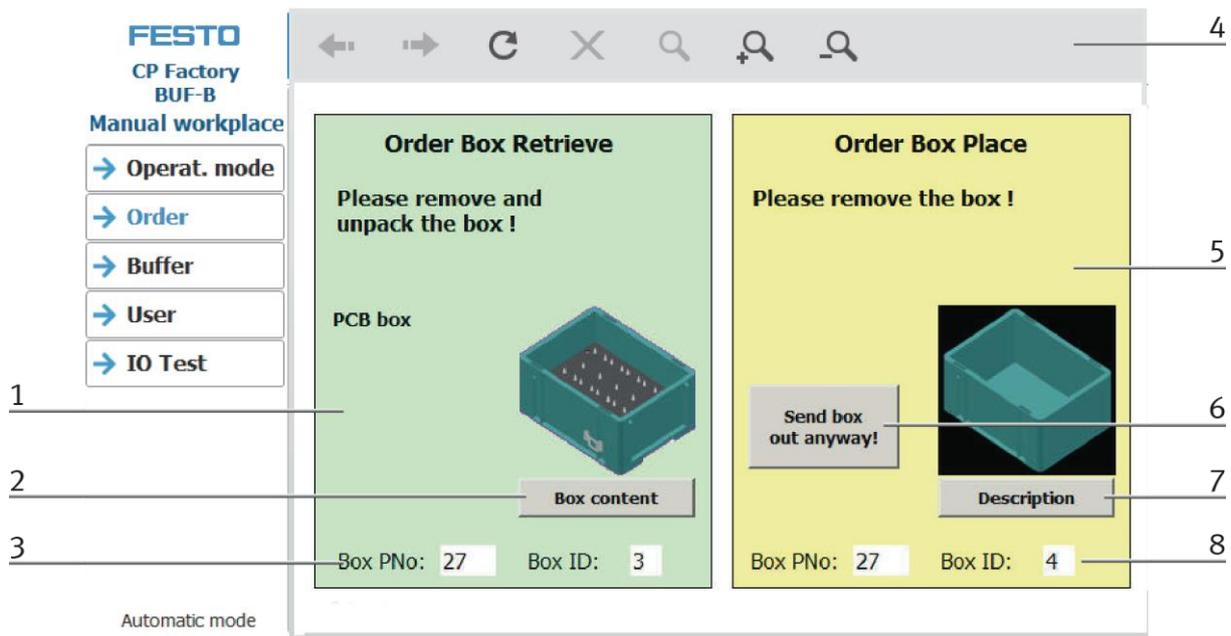


In the operating mode Home, the operating mode and the wished mode (MES or Default) can be selected and started.

Position	Description
1	Reset button: Start reset sequence
2	Automatic button: the automatic sequence in dependent from the mode (Default/MES) is started here
3	Setup button: Here the application module can be controlled manually and sensors can be displayed. Suitable for commissioning an application module or for troubleshooting. There is no difference in mode - setup mode is independent of default or MES mode.
4	Cycle end button: The currently active operating mode is stopped here.
5	Selection of the mode: Default - automatic sequence is processed with the stored transitions (not available) MES - automatic process is completely controlled by MES software

Sub menu order

The submenu order is a web page and the content is independent from the order.



Example to retrieve or place box

Position	Description
1	Display of the box to be removed by the module
2	Here the contents of the box can be displayed – HTML page is opened and the „actual content“ is read and displayed by MES
3	The Box PNo: the part number of the box is displayed here Box ID: the ID of the box is displayed here
4	Arrow to the left / go one side backwards Arrow to the right / go one side forwards circle / load page new cross / abort loading page Loupe / zoom to area Loupe + / scale up window Loupe - / scale down window
5	Display of the box to be supplied to the system
6	Send out the box anyway! If you put a box on the conveyor, the module will look for an order for the box, will book it on the box and will send it out. If there is no existing order for this box, but the box is still on the conveyor, the module will demand to remove the box manually (as long as there is no order). If you want the box to be passed out from the station by the conveyor nevertheless, you can press the button „Send out box anyway“, and the box will be passed out by the conveyor.
7	Description Here the content of the box is specified. The HTML page is opened and the „nominal content“ is read and displayed by the MES.
8	The Box PNo: the part number of the box is displayed here Box ID: the ID of the box is displayed here

Submenu Buffer

Position	Description
1	The inputs/outputs of the station are displayed here.

Sub menu user

Different users can be created here. The function is independent of the selected mode (MES - or default)

User	Password	Group	Logoff time
Administrator	*****	Bedienen	5
festo	*****	Bedienen	5
PLC User	*****		5

Display / editing of all users, a login as "Administrator" is required.

Sub menu I/O Test

The inputs / outputs are displayed here. The outputs can also be activated in setup mode.

FESTO
CP Factory
BUF-B
Manual workplace

- Operat. mode
- Order
- Buffer
- User
- **IO Test**

Home - IO test

Automatic mode 29/06/2021
MES Mode █ 11:53:36

Home

Setup mode

Parameters

System

Eingänge

	Byte			
	0	1	2	3
0.0	0.0	0.0	0.0	0.0
0.1	0.1	0.1	0.1	0.1
0.2	0.2	0.2	0.2	0.2
0.3	0.3	0.3	0.3	
0.4	0.4	0.4	0.4	
0.5	0.5	0.5	0.5	
0.6	0.6	0.6	0.6	0.6
0.7	0.7	0.7	0.7	0.7

Ausgänge

	Byte			
	0	1	2	3
0.0	0.0	0.0	0.0	0.0
0.1	0.1	0.1	0.1	0.1
0.2	0.2	0.2	0.2	0.2
0.3	0.3	0.3	0.3	0.3
0.4	0.4	0.4	0.4	0.4
0.5	0.5	0.5	0.5	0.5
0.6	0.6	0.6	0.6	0.6
0.7	0.7	0.7	0.7	0.7

Enable Outputs
CAUTION
Program return of OB1
No cyclic program call

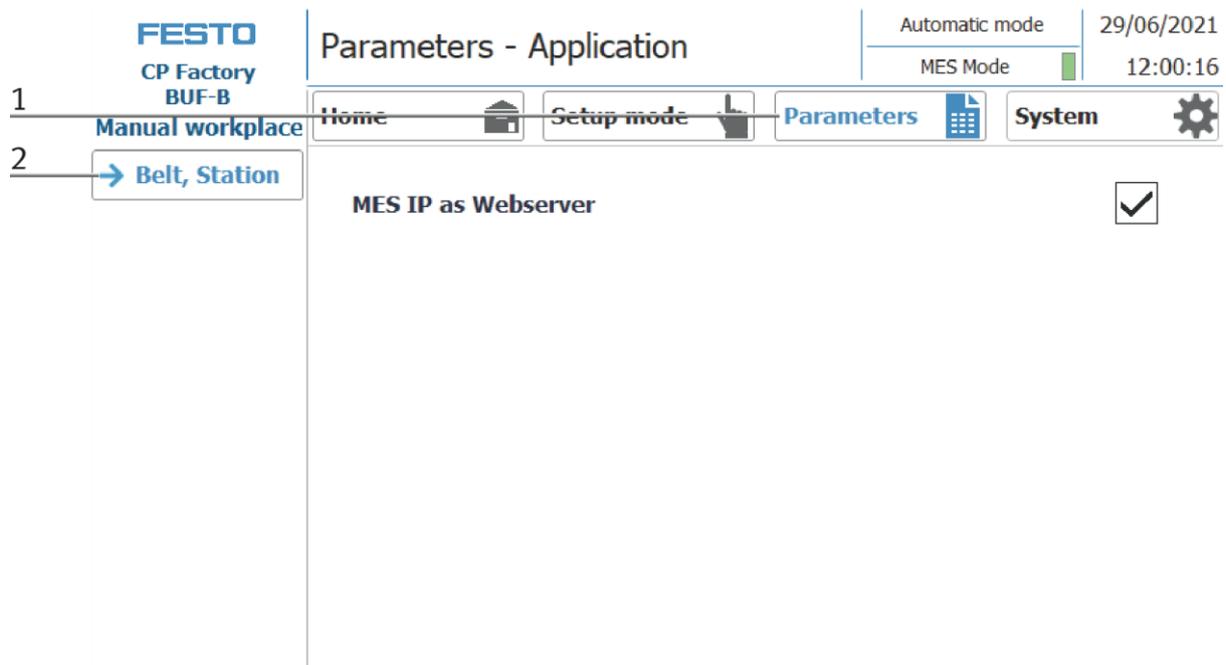
8.5.6 Main menu - Setup

See chapter operation mode setup.

8.5.7 Main menu – Parameter

Set up application parameters

1. Click on the Parameter button
2. Select application - the parameters of the application can now be set up here.



FESTO
CP Factory
BUF-B
Manual workplace

Parameters - Application

Automatic mode 29/06/2021
MES Mode 12:00:16

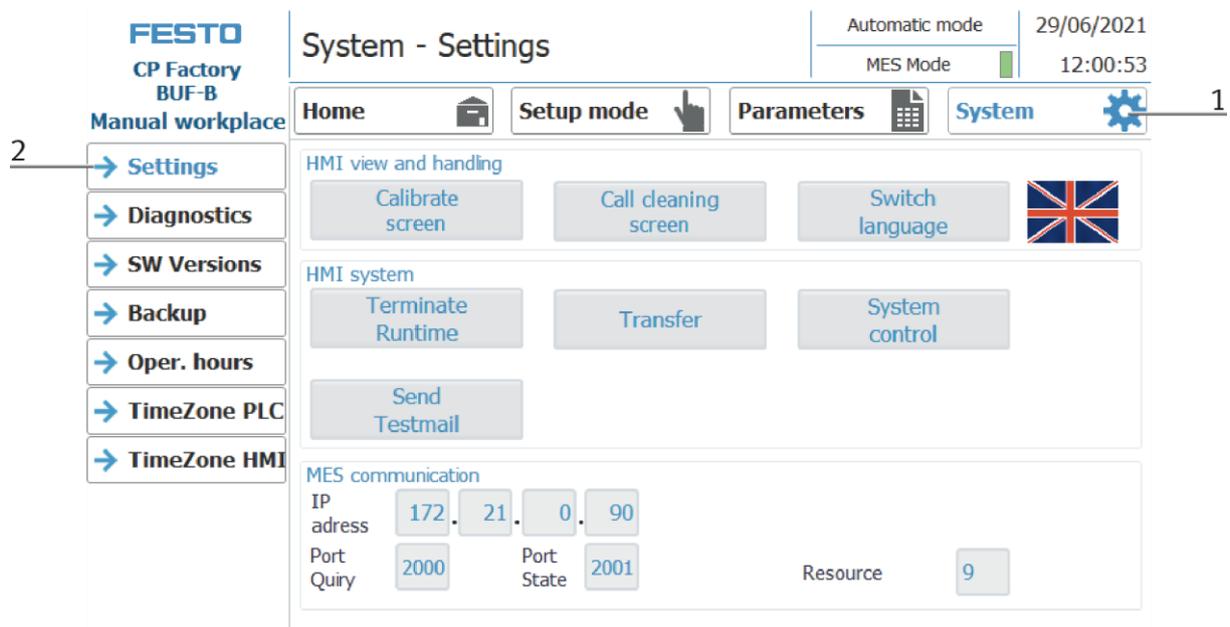
Home Setup mode Parameters System

→ Belt, Station

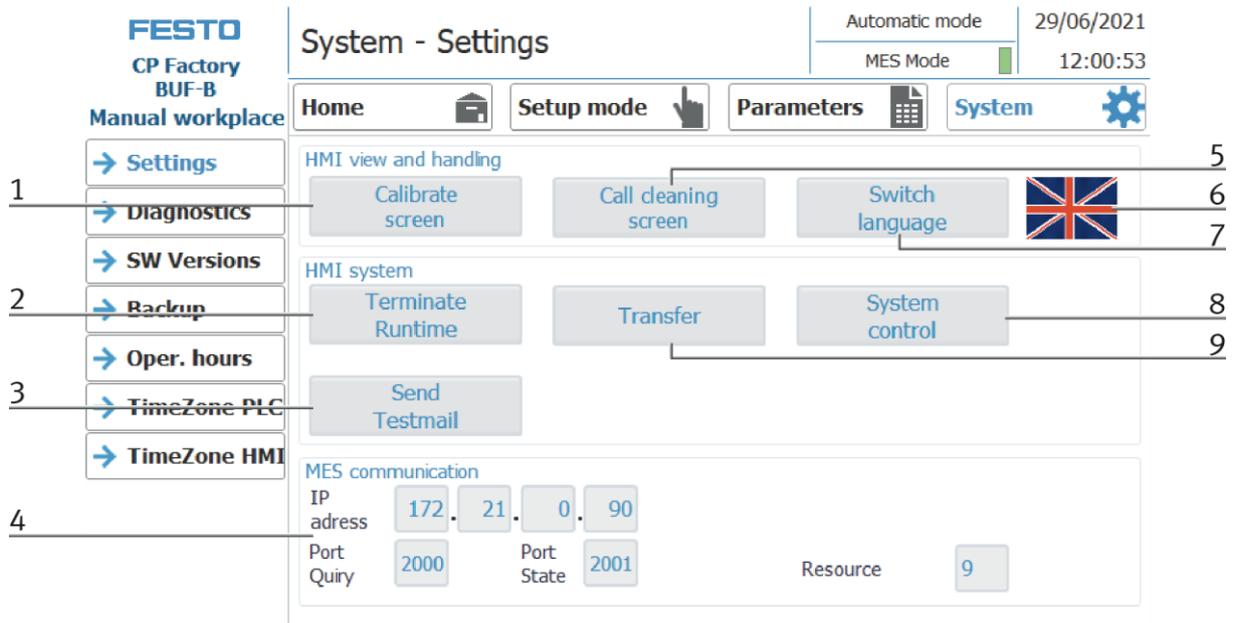
MES IP as Webserver 1

Position number	Description
1	MES IP as Webserver

8.5.8 Main menu – System
Sub menu - Settings



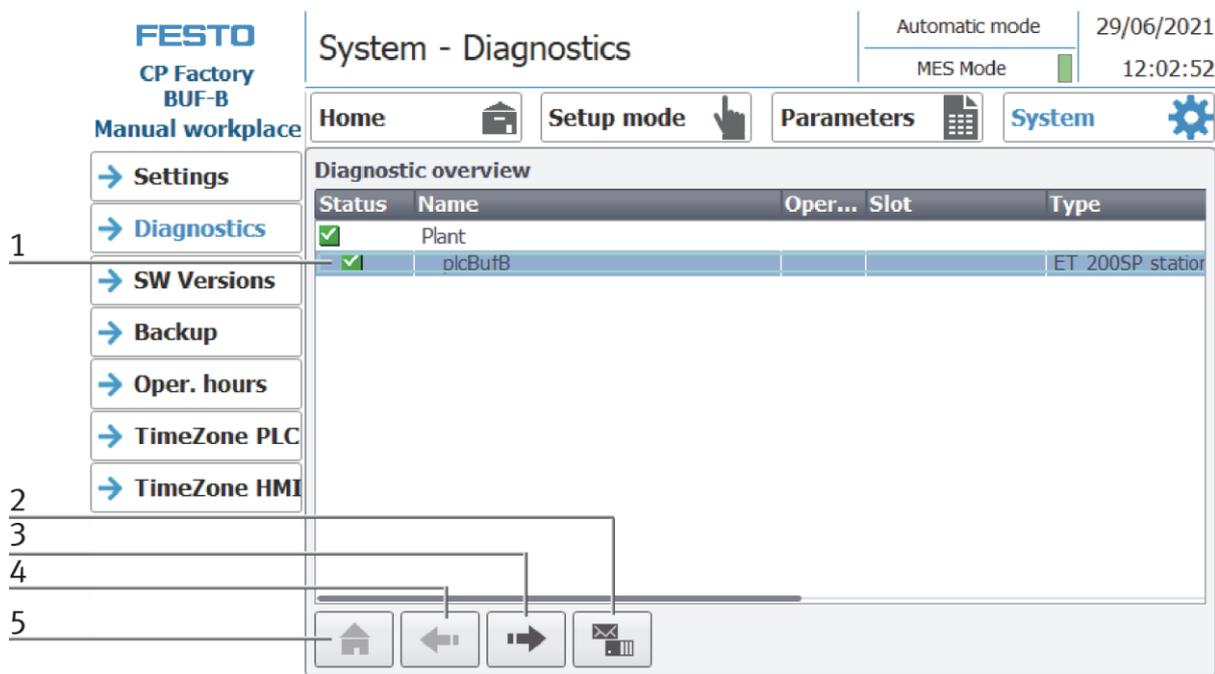
1. To get to the system settings, the System button must be selected
2. Click on Settings



The system can be set in this operating mode.

Position number	Description
1	Button Calibrate Screen - If buttons react inaccurately, calibration of the touch screen can be restored
2	Button Terminate Runtime: The runtime is terminated and returned to Windows.
3	Button send test mail – send test mail to eMailserver (all error messages are sent from the hmi to a eMailserver on the MES4 PC – this function is to test if the configuration is ok.)
4	Display of the MES IP address additionally the IP of the MES can be set here. (Password protected) User: festo, PW: festo) Input fields for your own resource number, query port and status port of the MES connection
5	Button call cleaning screen - the screen can be cleaned here. The touch function is interrupted and unintentional operation is excluded
6	Flag displays only current language. By clicking on button next to the flag language can be switched
7	Button switch language: here the language can be changed
8	Button system control: Windows system control is opened
9	Button Transfer: Runtime is closed and the transfer mode of the HMI is called

Sub menu diagnostics



Position number	Description
1	Announcement overview plant
2	Send diagnostic message via mail
3	Next diagnostic message
4	Previous diagnostic message
5	Home Button

Sub menu software versions

FESTO
CP Factory
BUF-B
Manual workplace

System - Version

Automatic mode 29/06/2021
MES Mode 12:03:04

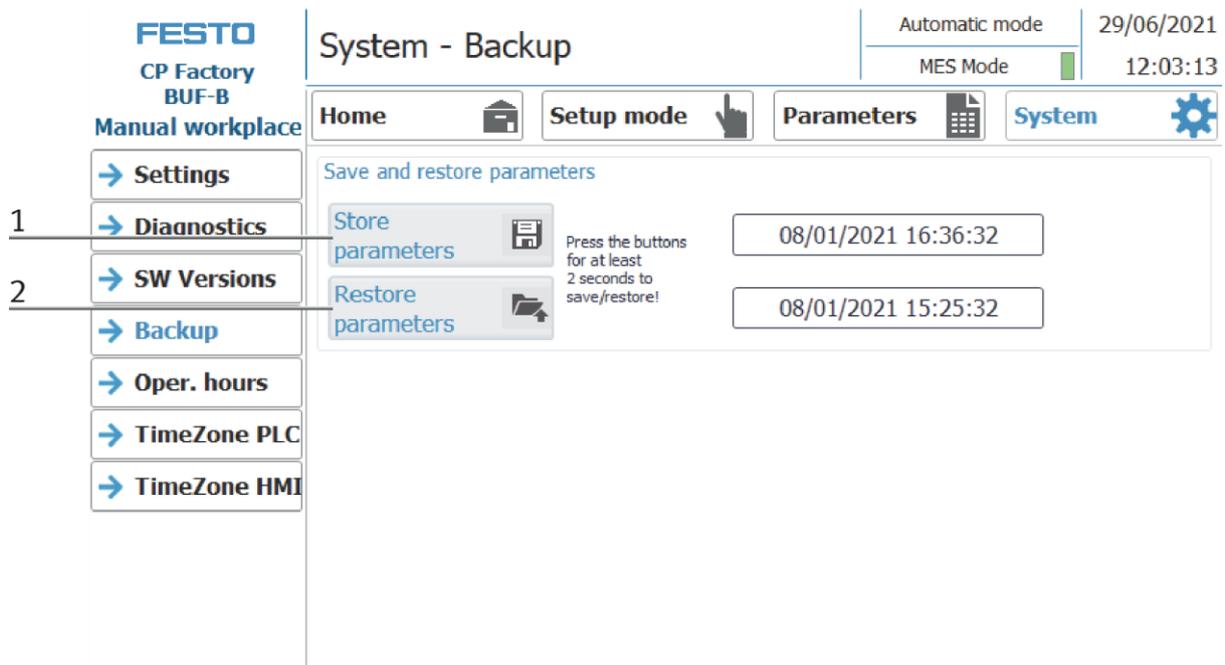
Home Setup mode Parameters System

→ Settings
→ Diagnostics
→ SW Versions
→ Backup
→ Oper. hours
→ TimeZone PLC
→ TimeZone HMI

actual library version:
V4.03

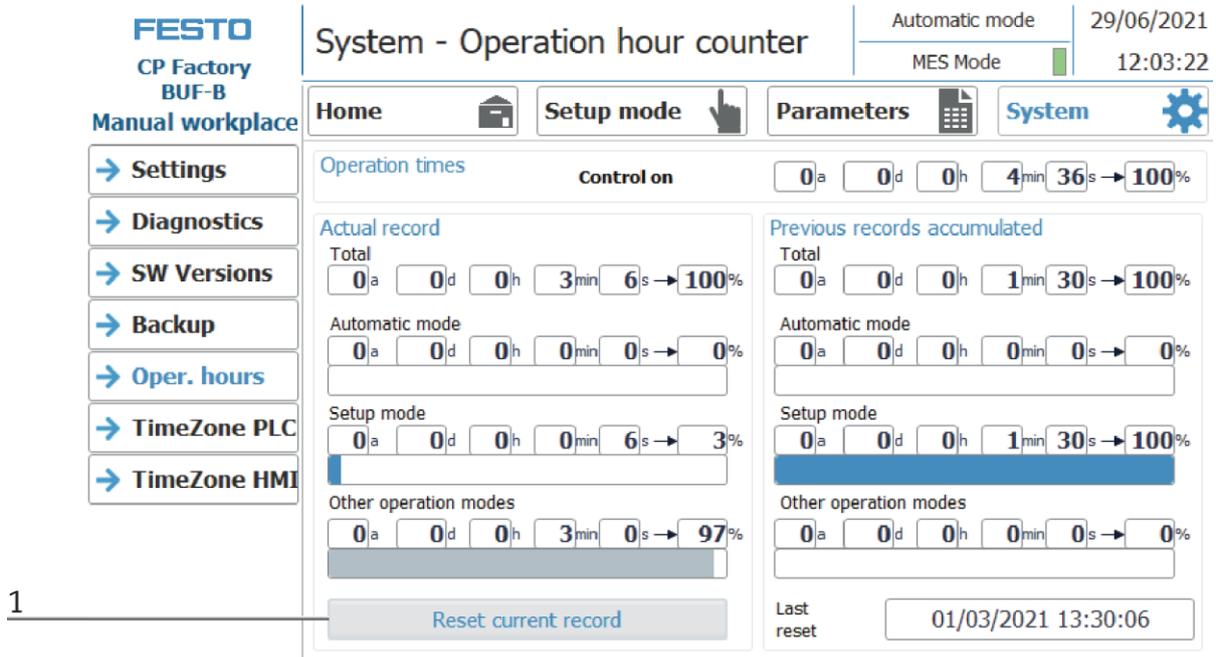
Display of the current library version.

Sub menu Backup



Position number	Description
1	Save parameters button: all parameters are saved, for this it is necessary to press the button for at least 2 seconds. The display shows the date of the last storage.
2	Restore parameters button: all parameters are loaded, for this it is necessary to press the button for at least 2 seconds The display shows the date on which the parameters were last loaded.

Submenu operating hours counter



Display of the operating times with allocation to the respective operating mode.

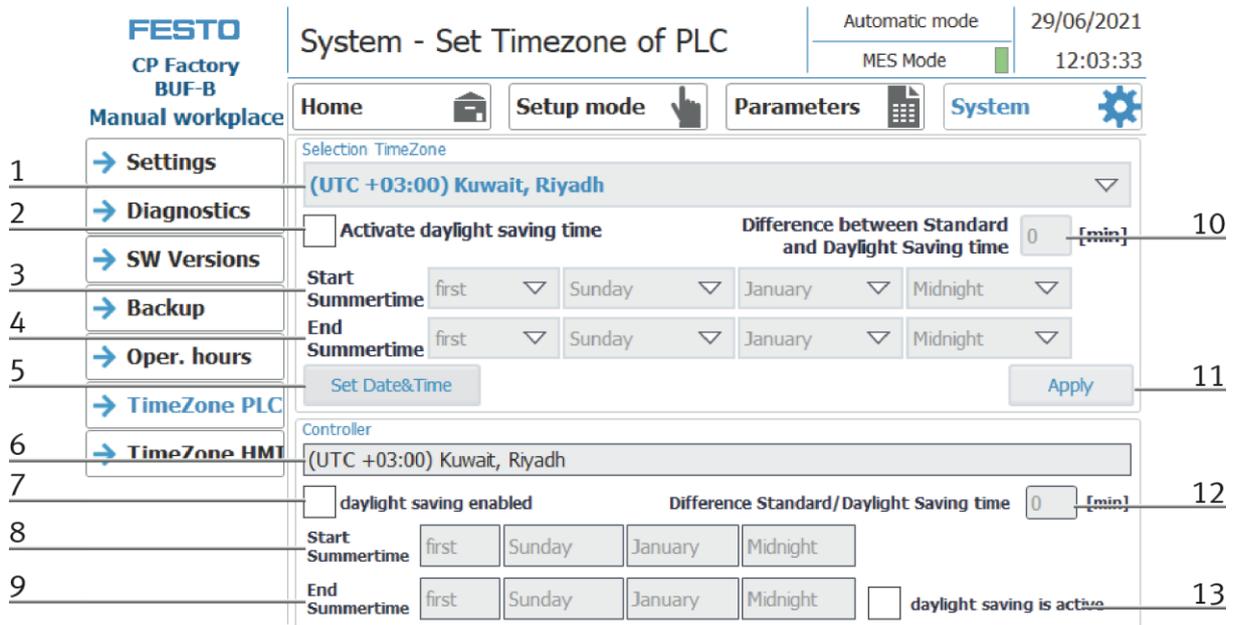
In the "Operation times" area, the time since the control was switched on is counted.

In the "Actual record" area, the time until the next time the "Reset current record" button is pressed is counted. The times are divided into the categories "Total", "Automatic mode", Setup mode and "Other operating modes". The times are counted under the heading "Other operating modes" while the station is in the operating mode "Automatic preselection", "Setup" and "No operating mode". The value in the "Total" line represents the total of the operating times differentiated according to the operating mode. The percentage refers to the proportion of the operating mode in the total time.

With the button (1) "Reset current record", the current recording is set to 0 and the operating times contained therein are added to the "Previous recordings accumulated" area. The current recording can thus be used, for example, for daily recordings.

All counter values are saved in a retentive data block. These are lost when the controller is booted. If they are to be retained, the values must be saved beforehand.

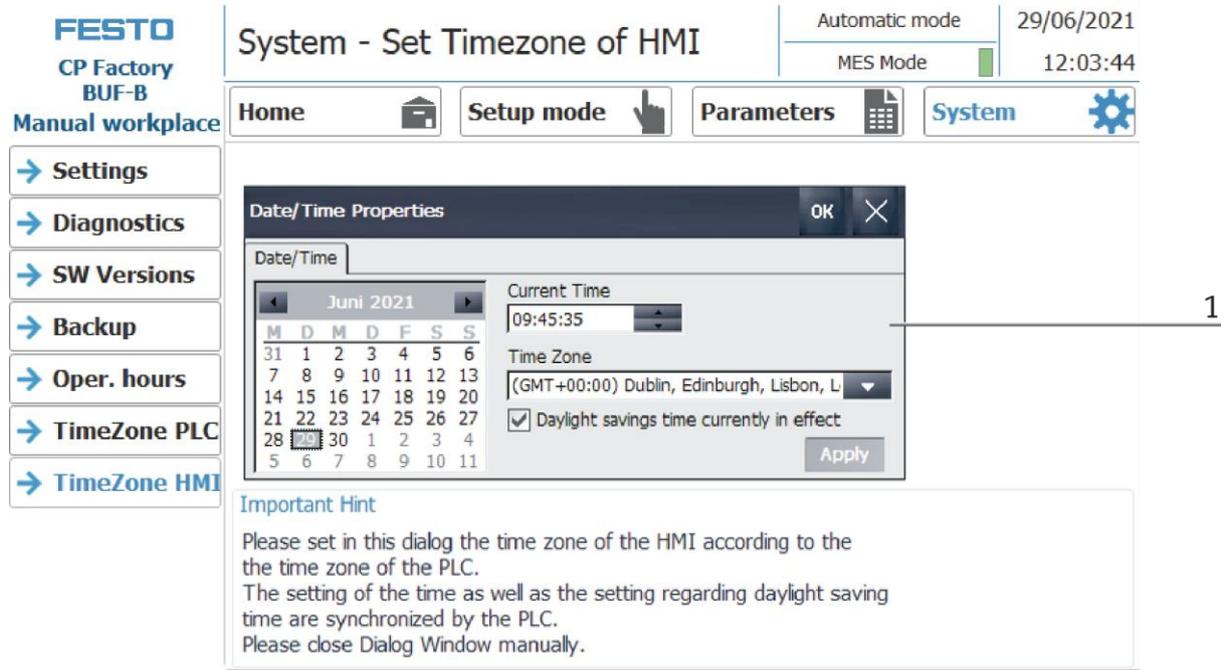
Time zone submenu in the PLC



The time and time zone of the PLC can be set in this menu. The default settings of the PLC are overwritten when you click the "Apply" button.

Position number	Description
1	Select TimeZone
2	Checkmark set - the daylight saving time changeover is automatically changed at the times "Beginning of daylight saving time" and "End of daylight saving time" Checkmark not set - there is no daylight saving time changeover
3	Setting the start of daylight saving time
4	Setting the end of summer time
5	Set time & date: When this button is pressed, a pop-up window opens for setting the time of the PLC
6	Display of the current time zone of the controller <i>(Only valid if the time zone of the PLC has been set once using the "Apply" button)</i>
7	Display of whether daylight saving time changeover is active in the PLC. <i>(Only valid if the time zone of the PLC has been set once using the "Apply" button)</i>
8	Display of the current start of daylight saving time in the control <i>(Only valid if the time zone of the PLC has been set once using the "Apply" button)</i>
9	Display of the current end of daylight saving time in the control <i>(Only valid if the time zone of the PLC has been set once using the "Apply" button)</i>
10	Enter the time difference between summer and winter time in minutes.
11	Accept the selected settings for the time zone and time change by pressing the button.
12	Display of the time difference between summer and winter time in minutes. <i>(Only valid if the time zone of the PLC has been set once using the "Apply" button)</i>
13	Display of whether daylight saving time is currently active. <i>(Only valid if the time zone of the PLC has been set once using the "Apply" button)</i>

Time zone submenu in the HMI

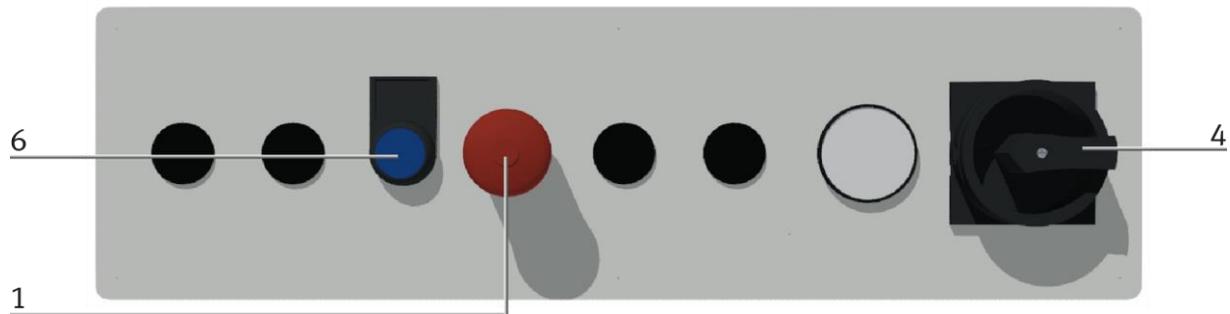


The time and time zone of the HMI can be set in this menu. The default settings of the HMI are overwritten. It is important to set the time zone in the HMI the same as it is set in the PLC, otherwise certain functions will get a different time stamp. (e.g. sending emails)

Position number	Description
1	System pop-up window of the HMI for selecting the time zone. The selected time zone in the Time Zone drop-down field is transferred to the HMI by pressing the "Apply" button. Before exiting the menu item, close the system pop-up window by pressing the X at the top right.

8.6 Switching on the station

1. All EMERGENCY STOP signal transmitters (push buttons, door contact, light barriers, etc.) are not activated and unlocked.
2. Check any installed application for visual damage and repair if necessary.
3. Switch on compressor
4. Switch on the main switch



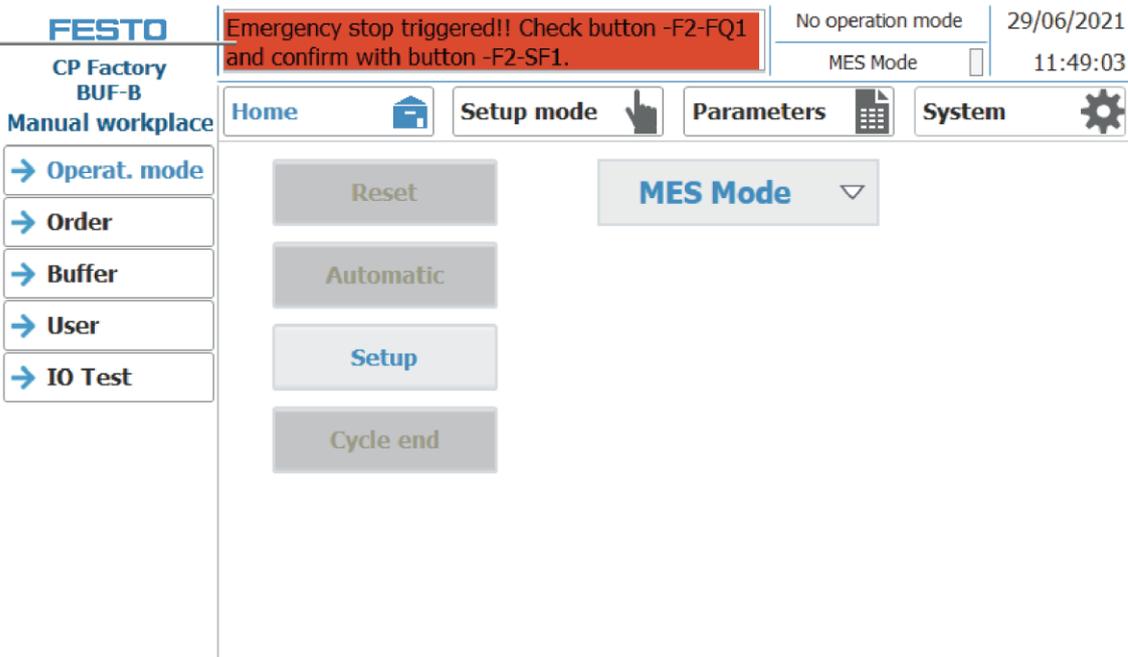
5. HMI starts and boots up.
6. Blue RESET illuminated pushbutton is not lit. Press RESET button, RESET illuminated button lights up blue.
7. Acknowledge the error message on the HMI.

8.6.1 Start automatic

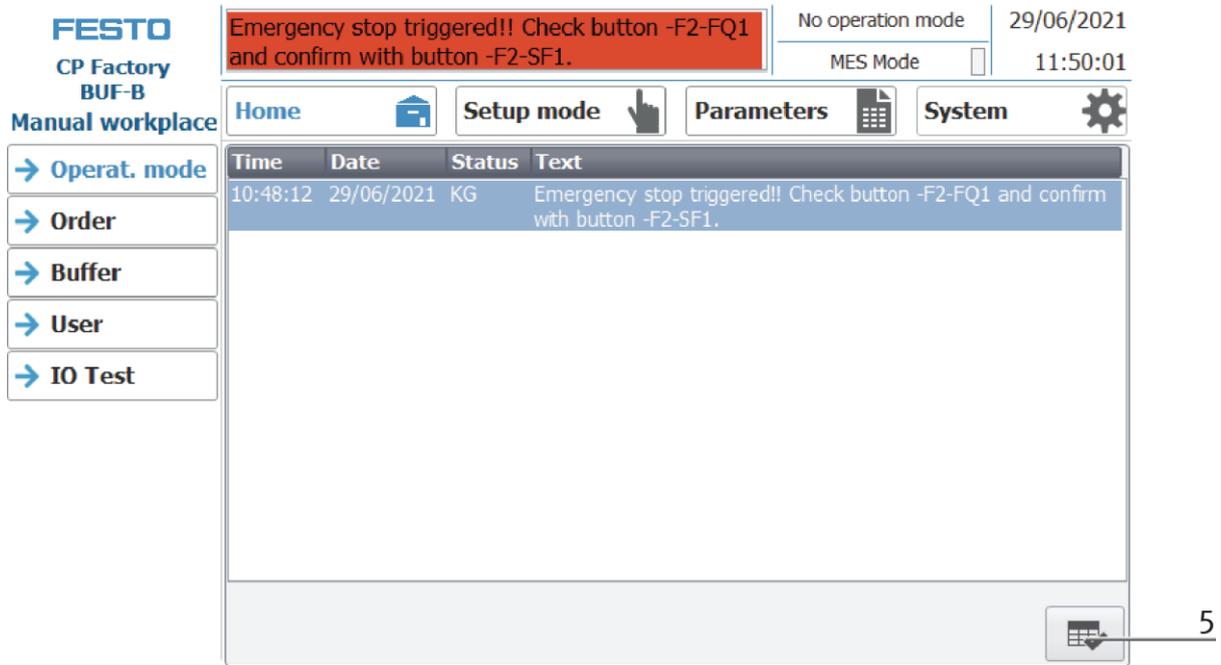
	 WARNING
	<ul style="list-style-type: none">• Danger of being pulled in at the conveyors<ul style="list-style-type: none">– When the automatic mode starts, the belts of the conveyor belts start to move, creating a risk of being pulled in.– When starting, do not stand directly at the ends of the belt or hold on to them, keep enough distance.– Failure to heed the information given can lead to injuries.

1. Pull out the emergency stop button
2. Press the blue reset button
3. Remove any existing workpieces
4. Acknowledge errors on the HMI by clicking on the error message.

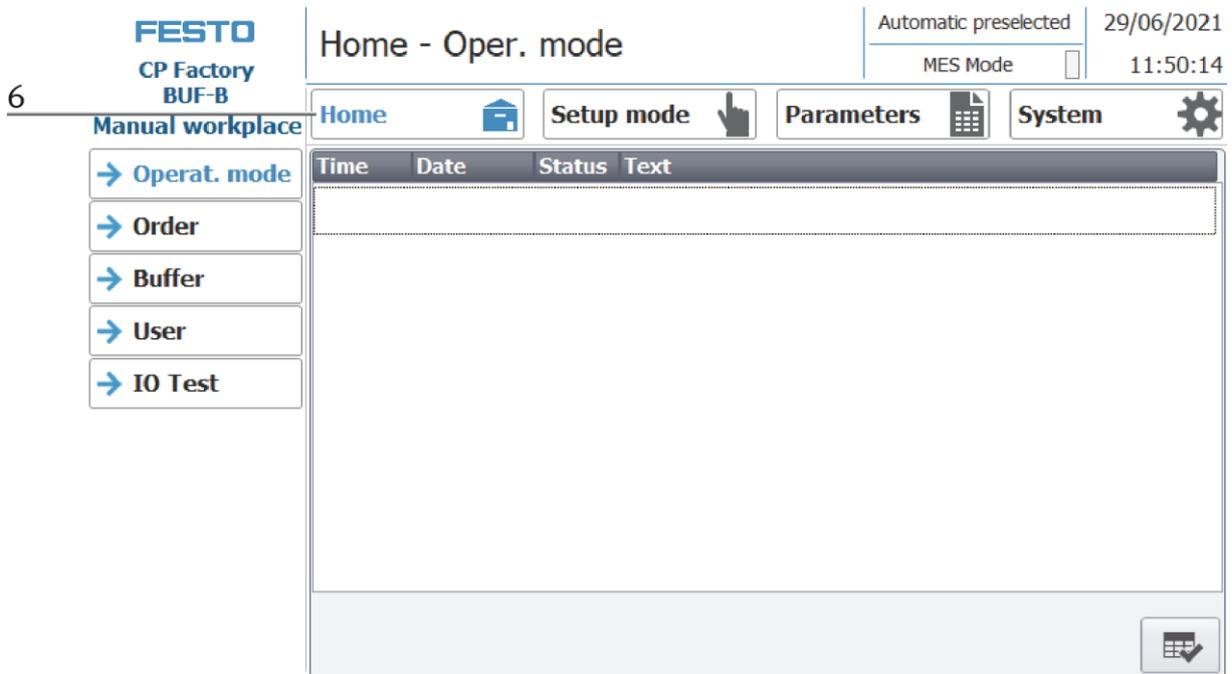
4



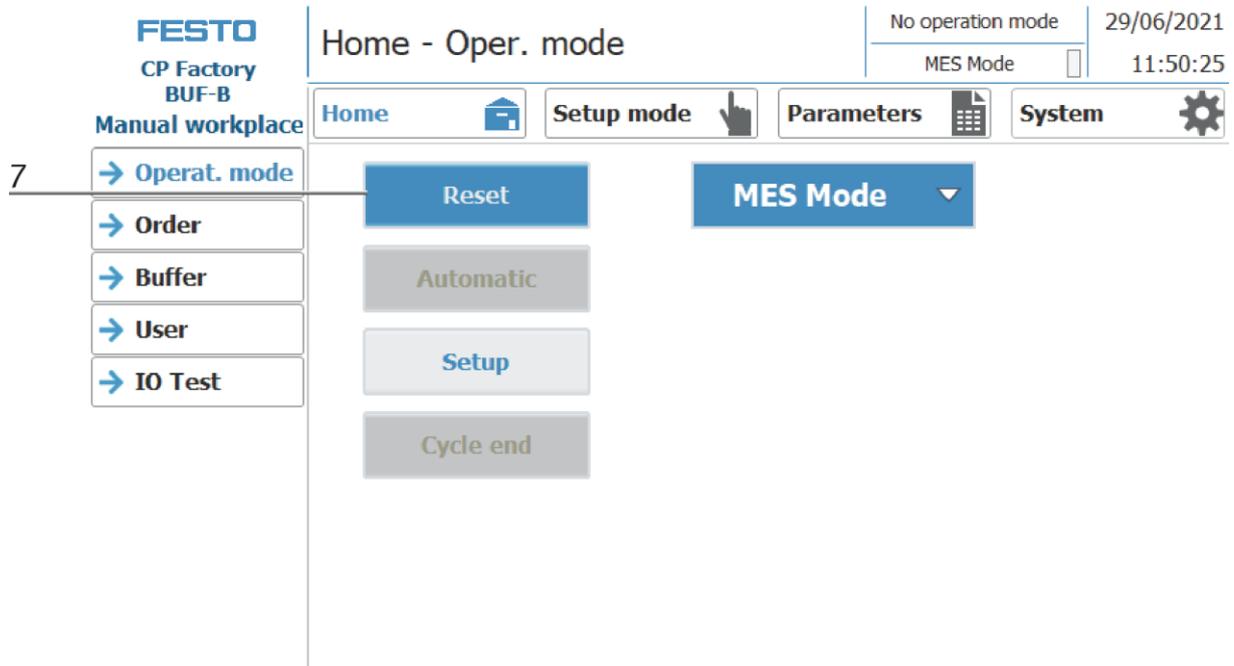
- The error message is displayed in the main window. After the error situation has been remedied, it can be acknowledged by pressing the RESET button.



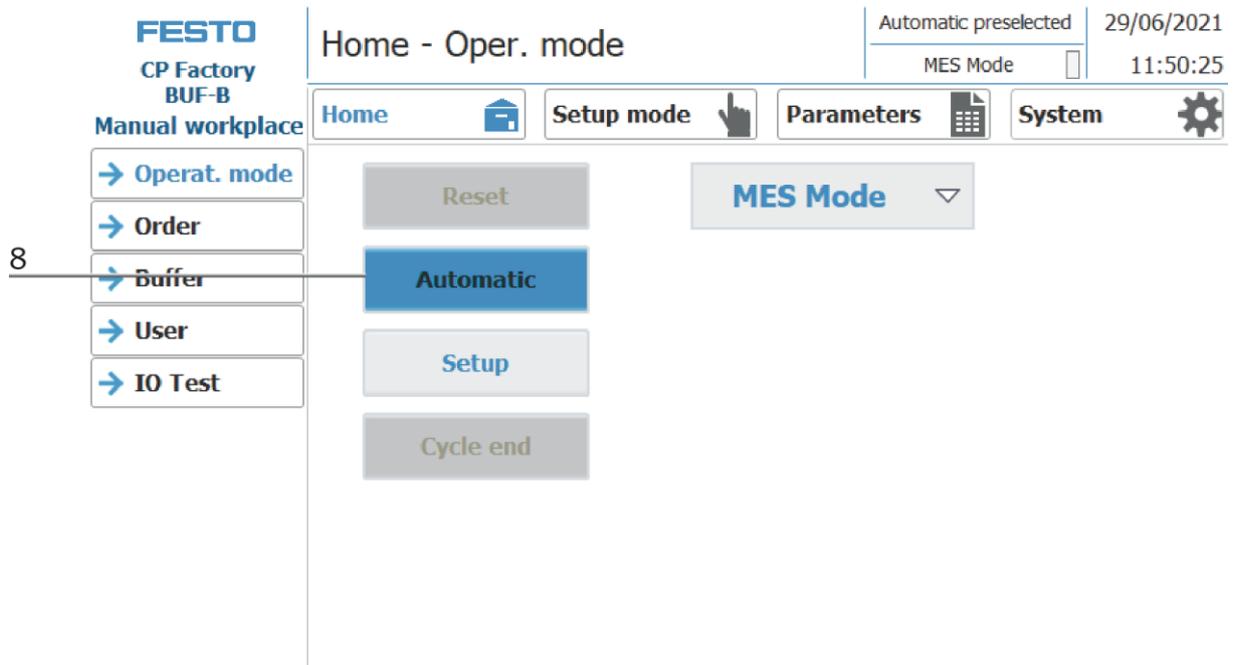
- Press Home Button



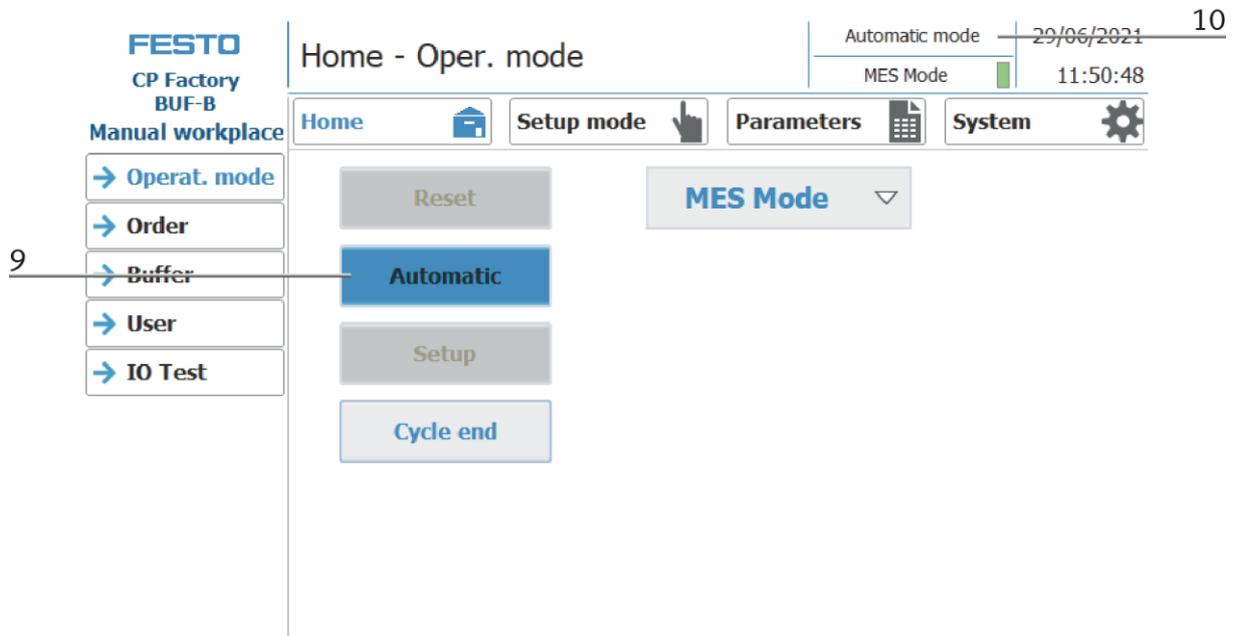
7. Press the flashing RESET Button. Station/application moves in home position. (optional)



8. Press the flashing AUTOMATIC Button

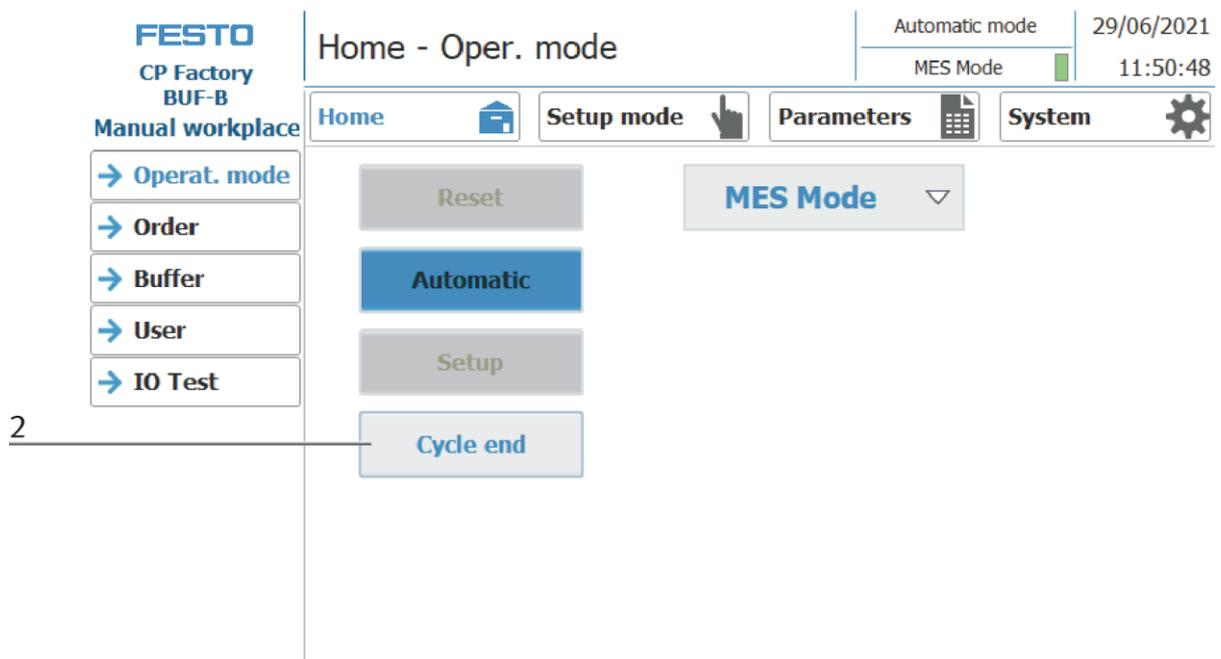


9. AUTOMATIC Button lights up
10. Automatic mode is active



8.6.2 Process description Cycle End

1. An automatic cycle is active.
2. Press the button Cycle End.



3. The module will execute the run until cycle end. During this time, the button Cycle End has got a red background.
4. The stoppers are extended.
5. The conveyors are stopped.

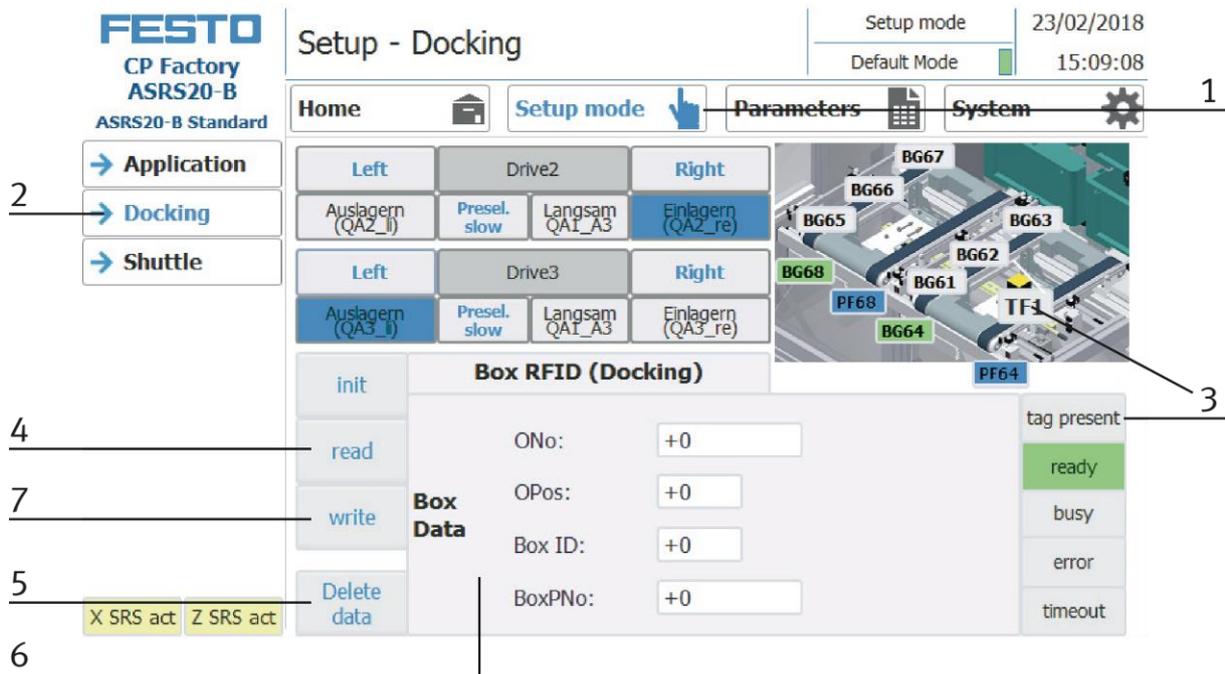
8.7 Writing on the RFID tag manually

8.7.1 Boxes

In order to describe a box with a certain ID, or to get information about what data is on the box, it is possible to read this data or to describe the tag.

For this it is necessary that a box with a working tag is located at one of the readout positions and the station is switched on.

The following example applies to all readout positions that can read an ID of boxes.



1. Select the Setup mode
2. Select the module with the read out position from the menu on the left
3. If an RFID is detected, this is indicated by "tag present". (TFxx and button "tag present" are green)
4. The data of the RFID tag can be read out and displayed by pressing the "read" button.
5. Press the Delete Data button
For easier input, all data is only deleted in the input mask, the data remains on the tag itself.
6. Entry of the desired data in the field (all fields with a white background can be edited)
MES Mode and default mode are identically
ONo – without function
OPos – without function
BoxID – here the IB number of the box is displayed or entered
BoxPNo – Here, the part number of the box and the retainer for the workpieces to be picked up are displayed or entered.
7. Press the „write“ button in order to write the performed modifications on the tag.

8.7.2 Parameter (MOBI-WORK)

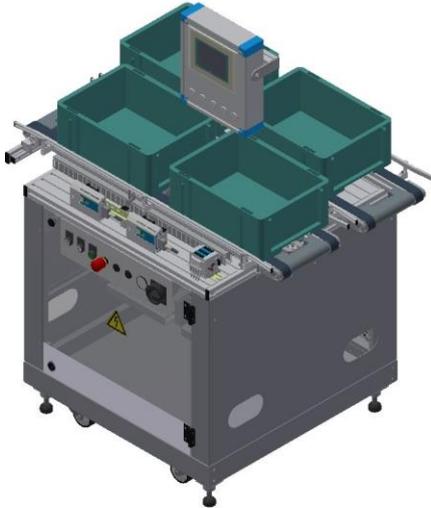


Illustration similar

Default: not available

MES:

Operation		Parameter	Description
502	Manual boxing	1	BoxPNo Value: 28 Type: changeable
		2	Part Value: 101 Type: changeable
503	Manual unboxing	-	-
510	Manual HTML	1	Workpiece
		2	Action
		3	Part number

9 Components

9.1 Electrical components

9.1.1 2 Quadrant Controller



Illustration similar

Description

Electronics for DC motors excited by magnet up to about 200 W

The module M-MZ-4-30 is a two-quadrant motor control for DC motors with anti-clockwise and clockwise rotation. It guarantees a safe starting and stopping as well as the control of the rotational direction of motors. In off-state, the load is short-circuited which results in a dynamic braking. By the inlet SLOW, you can switch over from slow speed (adjustment at Tr1) to high speed. At the inlet STOP a limit switch can be installed.

Use:

Motor controls for brushed motors

Electronic load relay for solenoid valves and various loads

Characteristics

- Anti-clockwise and clockwise rotation
- Switch-over from high speed to the speed adjusted at the TR.1
- Port for limit switch for stop
- Short-circuit proof and temperature protected
- Limitation for starting circuit

Technical Data

Type: M-MZS-4-30

Item No. 06.05.020

Technical Data					
Control circuit	Input A1/A2 A1=Start clockwise A2=Start anticlockwise	Start wave	8	(V)	
		Stop wave	5	(V)	
		Allowed range	0-35	(V)	
	Input A3/A4 A3=slow drive A4=Stop	Shift wave	8	(V)	
		Allowed range	0-35	(V)	
	Adjustment range for turning speed with trimmer at front plate (typical)		0 to max. turning speed		
	Start delay at A1 and A2 to 24V		< 2	(ms)	
Load circle	Nominal voltage (power supply) Ub/range		24 (19-30)	(VDC)	
	Load current/constant load		3/5 depends on switching frequency	(A)	
	Input current at Un /without load circle		T 10 mA	(mA)	
	Loading current I _{max} . T=1 sec.		20	(A)	
	Current detection at short		95 Typ. (45-140)	A	
	De-energize time at short		80-400	µs	
Other data	Current entry at stop		<20	(mA)	
	Allowed surrounding temperature		-20 to +40	(C°)	
	DIN VDE-regulations		0110, 0160 in parts		
	Any assembly position / DIN-rail assembly		No / Yes		
	Housing		Plastic housing light grey		
	Dimensions		59x77x50	mm	
	Weight		Approx. 100	G	
	Temperature / short guard		Yes / Yes		
	Connection type screw connection		4mm ² , 2,5mm ² Yes		

Connection diagram

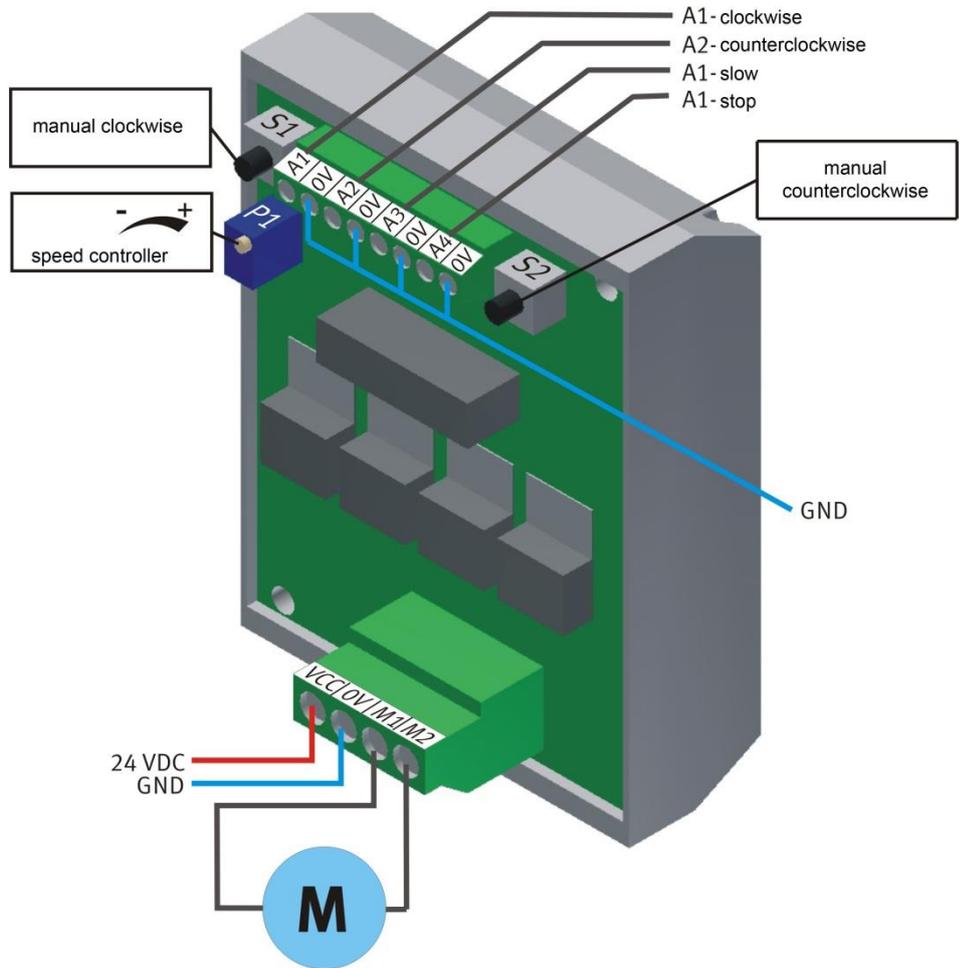
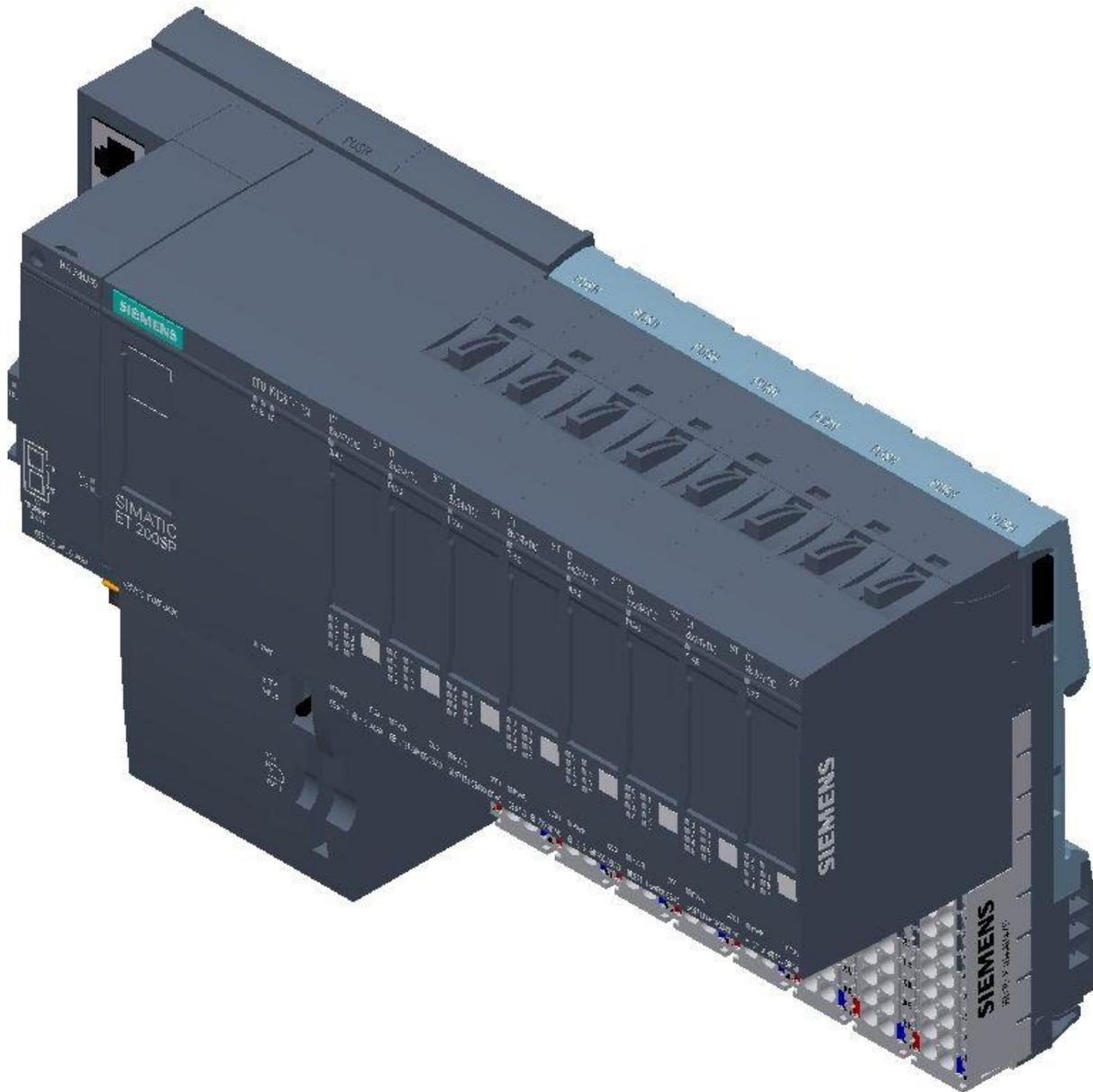


Illustration similar

Input / Output	Starting Current Limiter	Description
Control -5K2 / Q0.4:26	X1:re	Conveyor drive unit clockwise rotation
Control -5K2 / Q0.5:27	X1:li	Conveyor drive unit anti-clockwise rotation
Control -5K2 / Q0.5:28	X1:sl	Conveyor drive unit creep speed
Control -5K2 / Q0.6:29	X1:st	Conveyor drive unit Stop
Conveyor motor DC / -X3M1:4	X2:M1	Conveyor motor connection
Conveyor motor DC / -X3M2:3	X2:M2	Conveyor motor connection

9.1.2 Controller Siemens



Siemens ET200 SP / CPU 1512SP F-1PN / Illustration similar

For detailed information see electrical circuit diagram.

9.1.3 Touch Panel



Siemens TP 700 Comfort / illustration similar

Supply voltage

Type of supply voltage	DC
Rated value (DC)	24 V
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V

Input current

Current consumption (rated value)	0.5 A
Starting current inrush I^2t	0.5 A ² ·s

Power

Power consumption, typ.	12 W
-------------------------	------

Processor

Processor type	X86
----------------	-----

Memory

Flash	Yes
RAM	Yes
Memory available for user data	12 Mbyte

9.1.4 Scalance Ethernet Switch



Siemens Scalance Ethernet switch / illustration similar

The SCALANCE X208 has eight RJ-45 jacks for the connection of end devices or other network segments.

Product properties

SCALANCE X-208

Operating Instructions, 12/2011, A5E00349864-19

TP ports / Connector pinout

On the SCALANCE X208, the TP ports are implemented as RJ-45 jacks with MDI-X assignment (Medium Dependent Interface–Autocrossover) of a network component.

RJ-45 jack

Pin number

Assignment

Pin 8 n. c.

Pin 7 n. c.

Pin 6 TD-

Pin 5 n. c.

Pin 4 n. c.

Pin 3 TD+

Pin 2 RD-

Pin 1 RD+

NOTICE

TP cords or TP-XP cords with a maximum length of 10 m can be connected to the RJ-45

TP port. With the IE FC cables and IE FC RJ-45 plug 180, an overall cable length of up to 100 m is permitted between two devices depending on the cable type.

Autonegotiation

Autonegotiation means the automatic detection of the functionality of the port at the opposite end. Using autonegotiation, repeaters or end devices can detect the functionality available at the port of a partner device allowing automatic configuration of different types of device. With autonegotiation, two components connected to a link segment can exchange parameters and set themselves to match the supported communication functionality.

Note

If an IE switch port operating in autonegotiation mode is connected to a partner device that is not operating in autonegotiation mode, the partner device must be set permanently to half duplex mode. If an IE switch port is set permanently to full duplex, the connected partner device must also be set to full duplex. If the autonegotiation function is disabled, the MDI/MDI-X auto crossover function is also inactive. This means it may be necessary to use a crossover cable.

Note

The SCALANCE X208 is a plug-and-play device that does not require settings to be made for commissioning.

MDI / MDIX autocrossover function

The advantage of the MDI /MDIX autocrossover function is that straight-through cables can be used throughout and crossover Ethernet cables are unnecessary. This prevents malfunctions resulting from mismatching send and receive wires. This makes installation much easier for the user. IE Switches X-200 support the MDI / MDIX autocrossover function.

NOTICE

Please note that the direct connection of two ports on the switch or accidental connection over several switches causes an illegal loop. Such a loop can lead to network overload and network failures.

Auto polarity exchange

If the pair of receiving cables are incorrectly connected (RD+ and RD- swapped over), the polarity is reversed automatically.

9.2 RFID with Ethernet



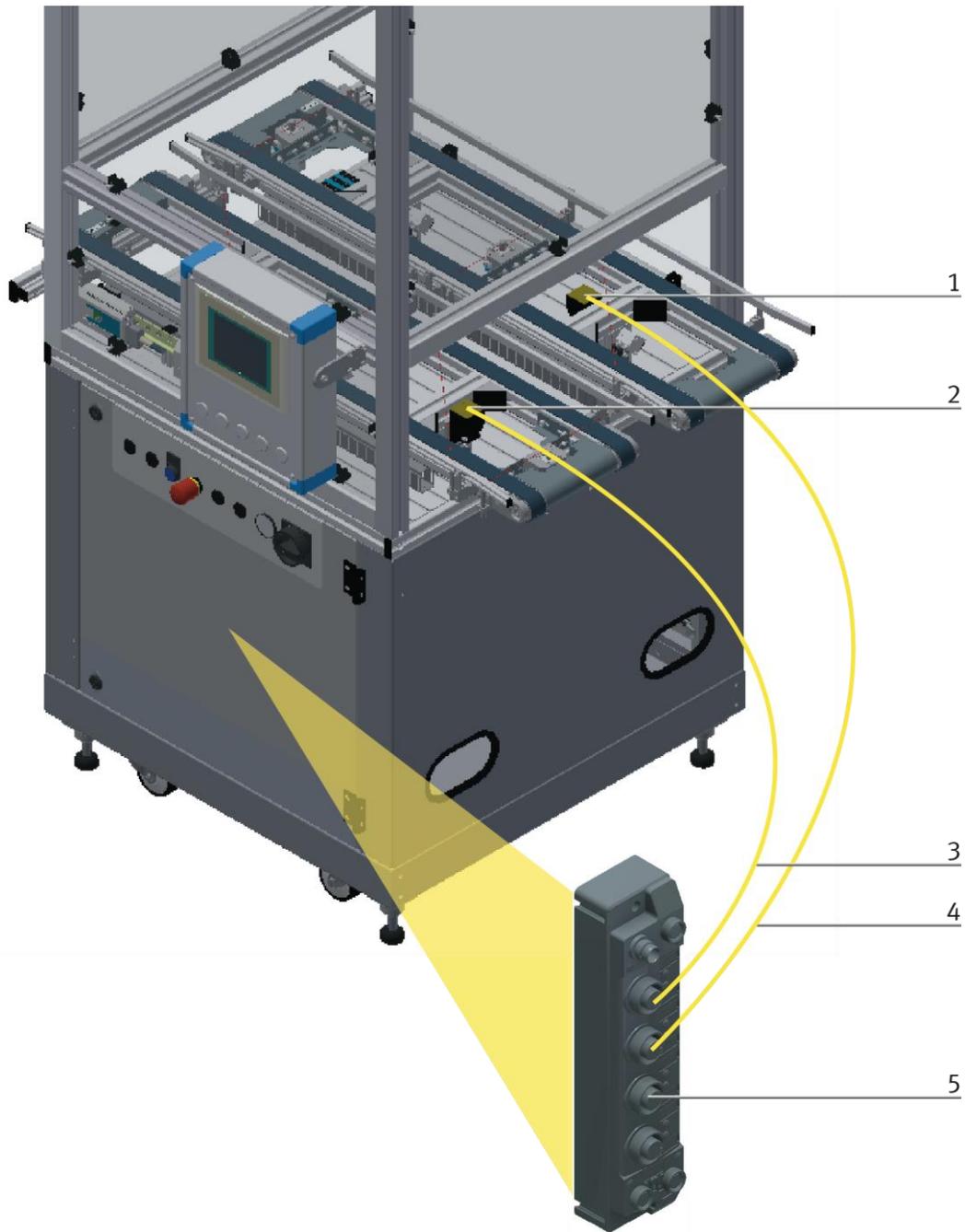
Turck – TBEN-S2-2RFID-4DXP / 6814029 / illustration similar

I/O data mapping

The BLident RFID-a interface modules cannot be controlled by the process data only. In any case, there is a software functional module required in the control. The functional module has been standardized for the RFID systems and is called Proxy Ident Block (PIB).

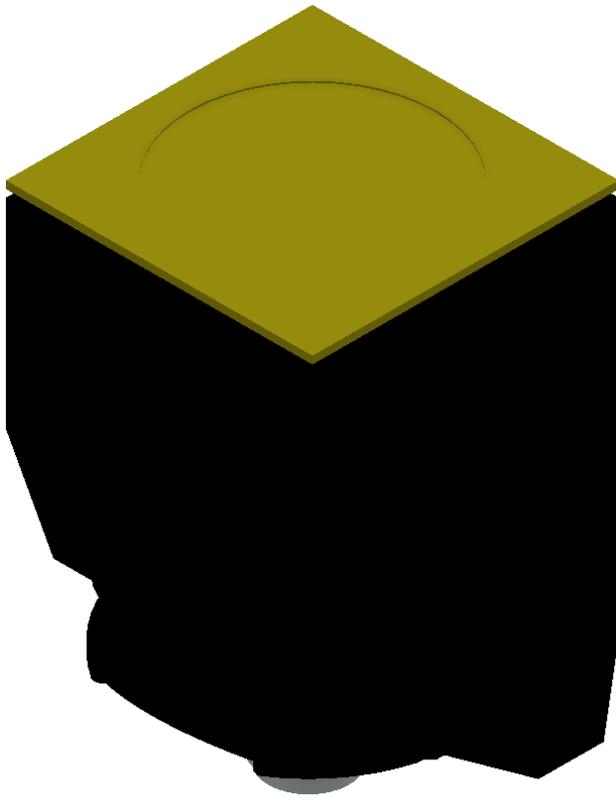
Input	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Chanel 0	0	Status word channel 0- low byte							
	1	Status word channel 0- high byte							
Chanel 1	2	Status word channel 1- low byte							
	3	Status word channel 1- high byte							

Output	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Chanel 0	0	Control word channel 0- low byte							
	1	Control word channel 0- high byte							
Chanel 1	2	Control word channel 1- low byte							
	3	Control word channel 1- high byte							



Wiring of the Ethernet module to the RFID interface / illustration similar

Pos	Name
1	Turck read-write head TN-CK40-H1147 (equipment identifier G-TF80)
2	Turck read-write head TN-CK40-H1147 (equipment identifier G-TF81)
3	Cable from Turck read-write head to turck module
4	Cable from Turck read-write head to turck module
5	Turck Ethernet module with RFID interface (equipment identifier K2-KF80)



RFID read-write head / illustration similar

The Turck RFID read-write head is mounted on the shift unit.
Its designation is TN-CK40-H1147.

Name	
Operating voltage	10...30 VDC
DC rated operating current	0-80 mA
Operating voltage	DC
Data transfer	Inductive coupling
Working frequency	13,56 MHz
Read-write distance	max. 115 mm

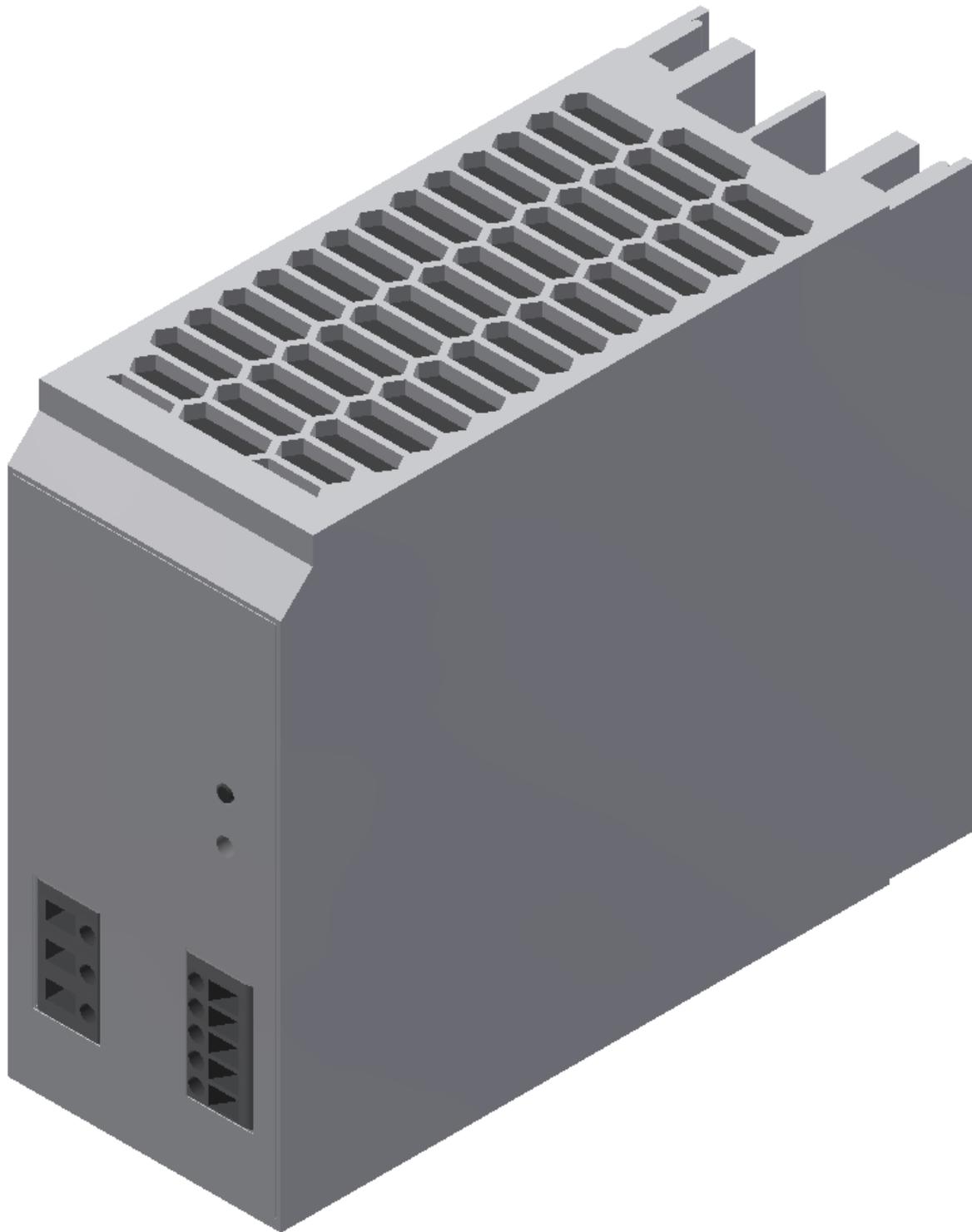
9.2.1 Electronic circuit protection



Murr Mico electronic circuit protection 2-channels / illustration similar

Description	
Input	
Operating voltage	24 V DC (18...30 V DC)
Control inputs	
Input voltage (ON)	10...30 V DC
Impulse length (ON)	min. 20 ms
Control outputs	
Group alarm output	Potential free 30 V AC/DC, 100 mA
General data	
Connection	Spring clamp terminals
Input terminals	1 × 16 mm ²
Output terminals	Per output 1 × 4 mm ²
Alarm terminals	2.5 mm ²
Bridging concept	Two sides, with spring clamp terminals or bridge set (max. 40 A)
Mounting method	DIN-rail mountable TH35 (EN 60715)
Dimensions H×B×T	90×36×80 mm
Temperature range	0...+55 °C (storage temperature -40...+80 °C)
Output	
Current adjustment	1 A, 2 A, 4 A, 6 A, by counters inked rotary switch, sealed
Inrush capacity	max. 20 mF (per channel)

9.2.2 Power supply unit



Power supply unit Festo CACN-3A-1-10 / illustration similar

Description	Value
Width	60 mm
Height	130 mm
Length	152,5 mm
Assembly position	Free convection
Primary supply	Single-phase
Input current	1,5 - 3,0 A
Nominal output voltage DC	24 V
Nominal output current	10 A
Input voltage range AC	100 ... 240 V
Power failure buffering	24 ms
Line frequency	45 ... 65 Hz
Authorisation	C-Tick /c UL us - Listed (OL)
CE mark (see declaration of conformity)	to EU directive for EMC to EU directive low-voltage devices
Storage temperature	-40 ... 85 °C
Relative air humidity	95 %
Protection class	IP20
Ambient temperature	-25 ... 70 °C
Product weight	1.554 g
Mounting type	with top-hat rail
Materials note	PWIS substances/Conforms to RoHS

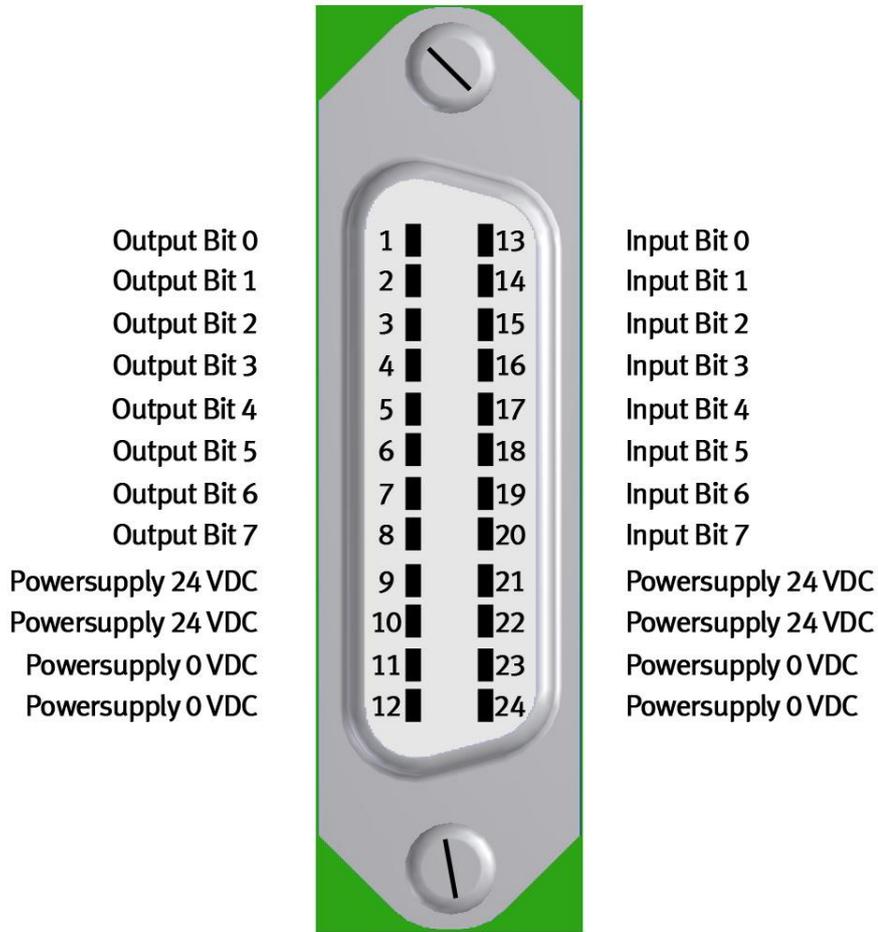
9.2.3 SAFETY RELAY



Siemens Sirius safety relay / illustration similar

Description	24 V DC/AC
Mounting type	Span on mounting
Part number	3SK1111-2AB30
Type	SIRIUS 3SK11
Depth	121.6 mm
Height	100 mm
Width	22.5 mm
Current	5 A
Power supply	24 V/DC; 24 V/AC
Max. temperature	60 °C
Min. temperature	-25 °C
Product-type	Safety relay

9.2.4 SYS link interface

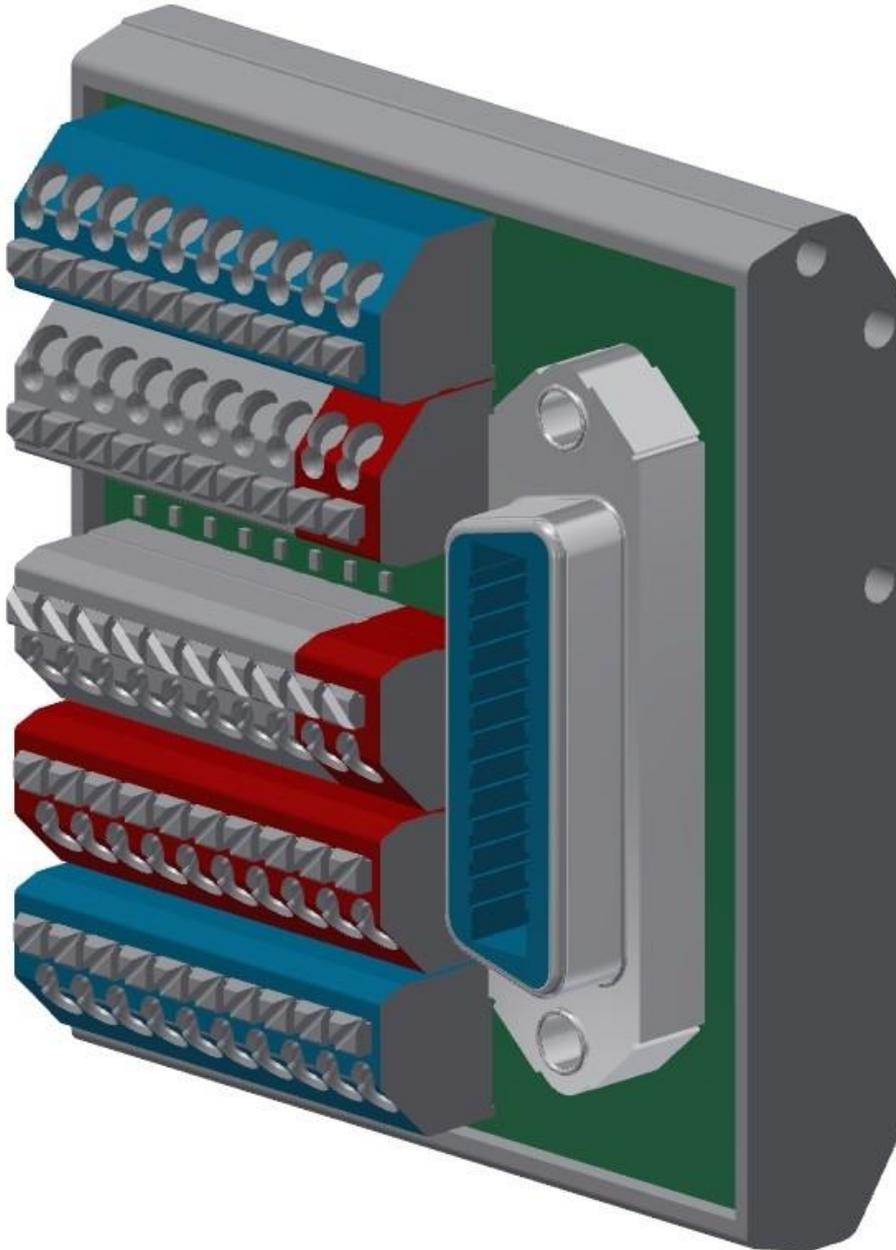


Syslink allocation

SYSlink PIN	Bit	Description	Syslink PIN	Bit	Function
01	0	Output AX.0	13	0	Input EX.0
02	1	Output AX.1	14	1	Input EX.1
03	2	Output AX.2	15	2	Input EX.2
04	3	Output AX.3	16	3	Input EX.3
05	4	Output AX.4	17	4	InputEX.4
06	5	Output AX.5	18	5	Input EX.5
07	6	Output AX.6	19	6	InputEX.6
08	7	Output AX.7	20	7	Input EX.7
09	24V	Power Supply	21	24V	Power Supply
10	24V	Power Supply	22	24V	Power Supply
11	0V	Power Supply	23	0V	Power Supply
12	0V	Power Supply	24	0V	Power Supply

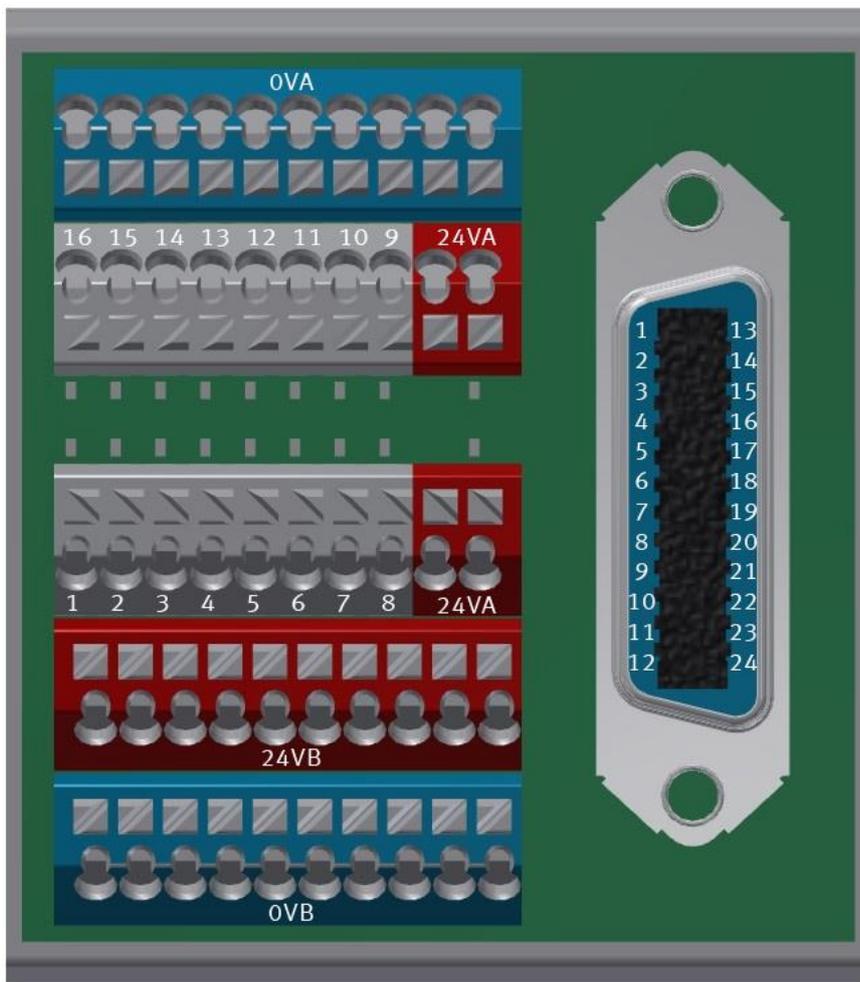
9.3 I/O terminal

The I/O interface has been standardized in order to guarantee a flawless communication. The I/O terminal is available at every working position.



Data I/O terminal

Technical data	
plug type	IEEE 488 24-pin
inputs	8 (4 of them are connected)
outputs	8 (4 of them are connected)
current consumption	maximum 1A per PIN
supply voltage	24 VDC

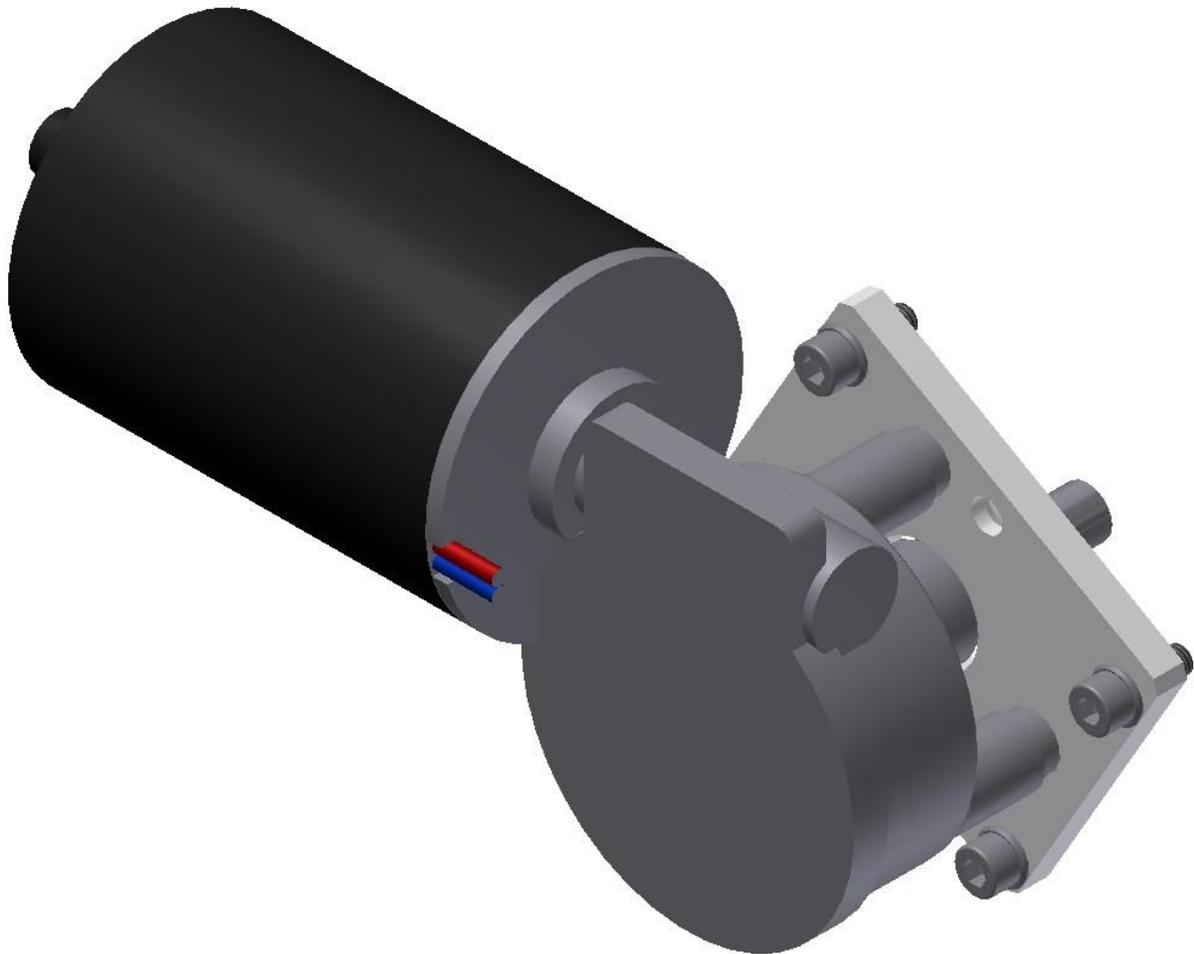


Allocation I/O terminal

terminal	Bit	function	colour	terminal	Bit	function	colour
01	0	output	white	13	0	input	grey-pink
02	1	output	brown	14	1	input	red-blue
03	2	output	green	15	2	input	white-green
04	3	output	yellow	16	3	input	brown-green
05	4	output	grey	17	4	input	white-yellow
06	5	output	pink	18	5	input	yellow-brown
07	6	output	blue	19	6	input	white-grey
08	7	output	red	20	7	input	grey-brown
09	24V	power supply	black	21	24V	power supply	white-pink
10				22			
11	0V	power supply	pink-brown	23	0V	power supply	white-blue
12	0V	power supply	purple	24			

9.4 Mechanic components

9.4.1 Motor of Conveyor

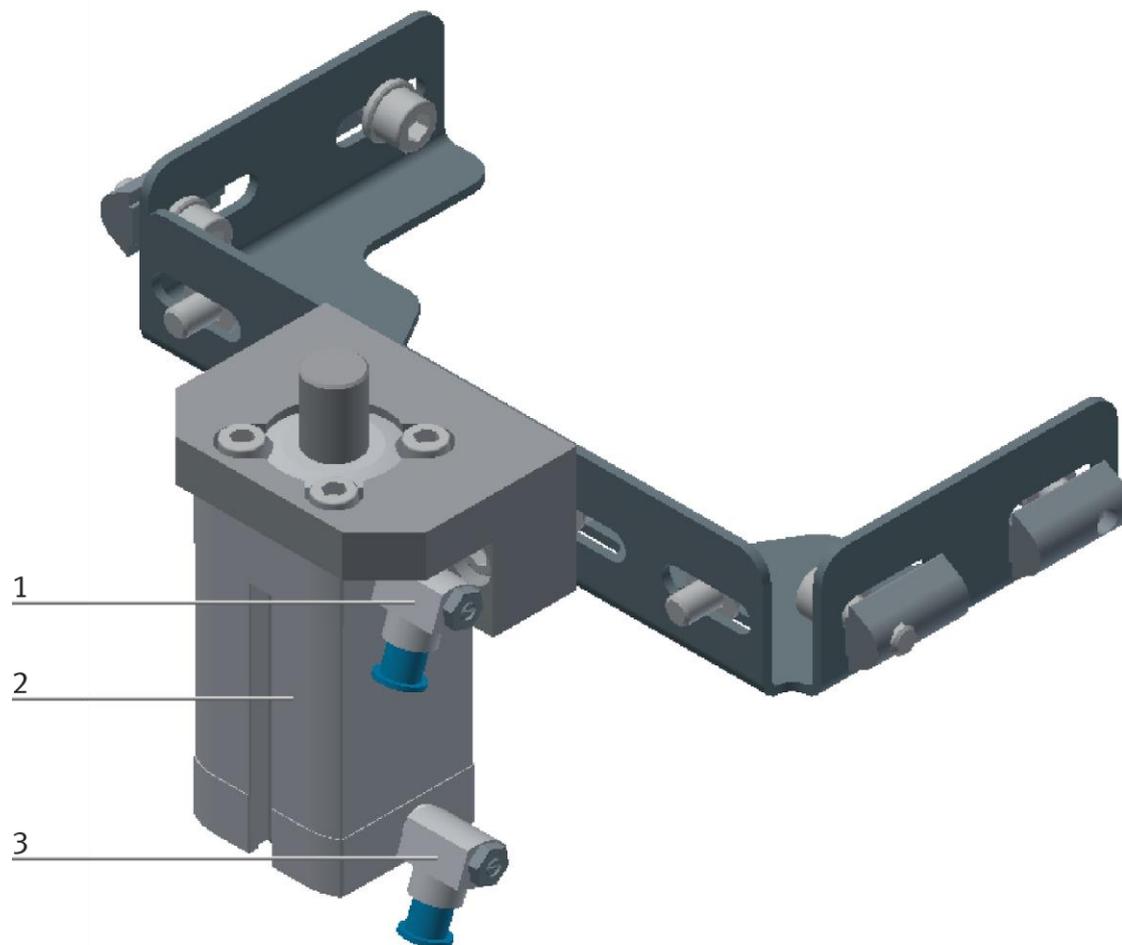


Motor type 403438 / illustration similar

The motor has got the equipment identifier / 3M1

Name	
Nominal voltage UN /Volt	36
Idling speed n0 [min-1]	120
Rated torque MN [Nm]	2
Starting torque MA [Nm]	16
Gear ratio i	53/2
Connection resistance 2 vanes R [m]	3400
Connection resistance 4 vanes R [m]	3000
Protection class IP 30	30
Weight [kg]	1

9.4.2 The stopper unit



CP Factory Stopper Unit / illustration similar

Position	Description
1	one-way flow control valve / Order number. 175056 / GRLA-M5-QS-4-LF-C
2	Stopper cylinder / Order number 576079 / DFSP-20-15-PS-PA
3	one-way flow control valve / Order number. 175056 / GRLA-M5-QS-4-LF-C

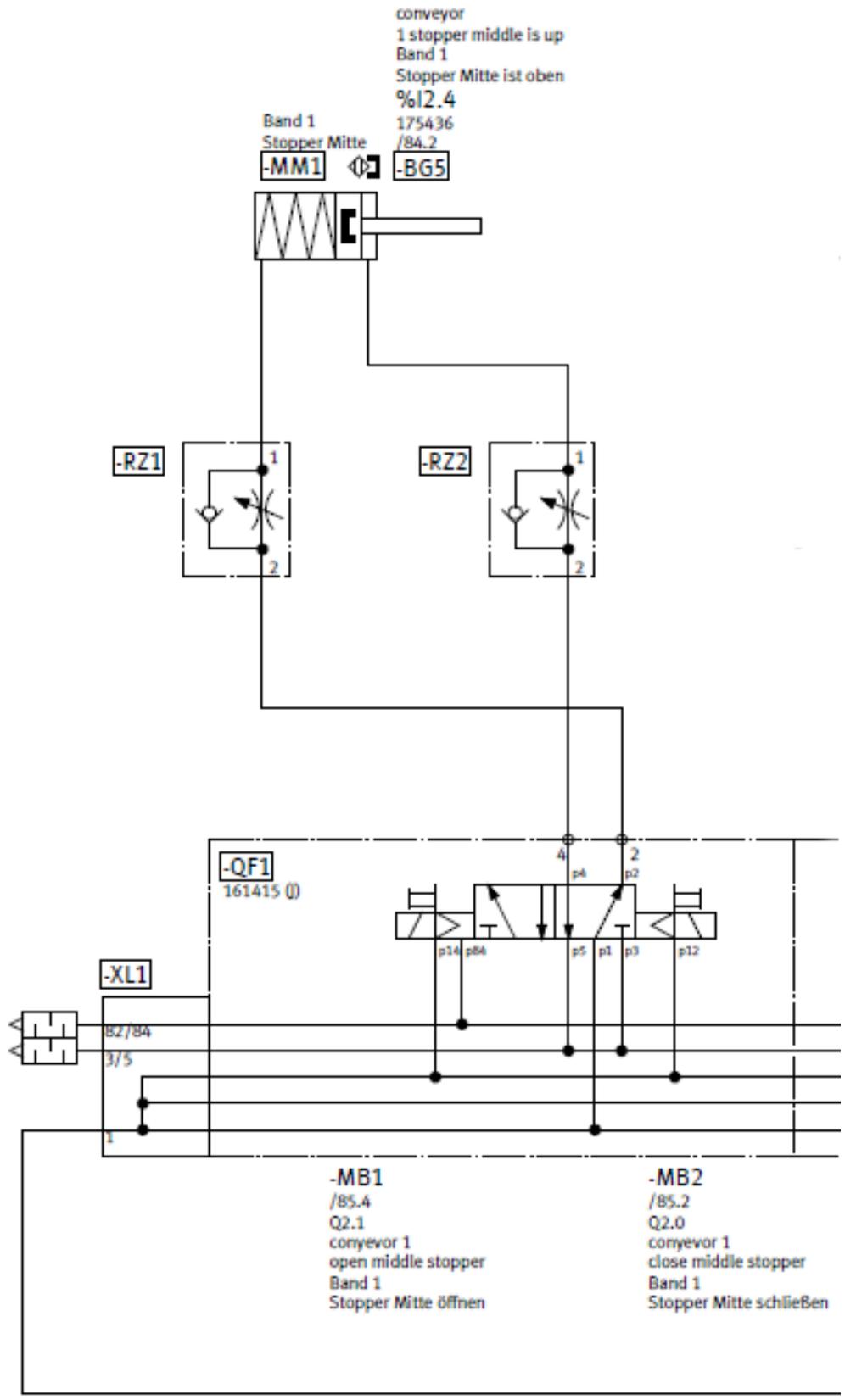
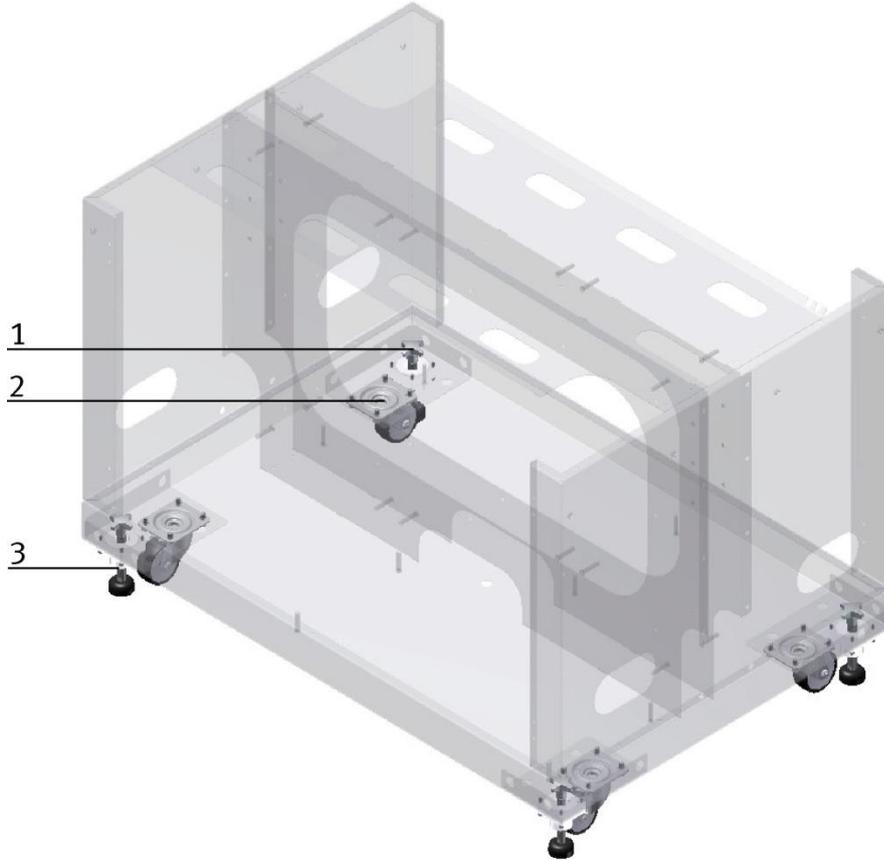


Diagram of pneumatics, Stopper Unit / illustration similar

9.4.3 Transportation of the station



CP Factory Transportation method / illustration similar

With the help of mechanically adjustable feet, you can lower the basic module and then put it on the rollers. In this way, an easy transport is possible. If you wind up the machine mounts, you can move the basic module easily to another place.

Position	Description
1	Star knob for adjusting the height of the machine mount
2	Roller
3	Lock nut for locking the machine mount in the position required

	 WARNING
	<ul style="list-style-type: none"> • Danger of crushing for hands/feet <ul style="list-style-type: none"> – It is not permitted to grip onto or under the feet when handling the machine, as there is an increased risk of hands or feet getting crushed or trapped in these areas. – When setting down the station, make sure no persons have their feet under the machine's feet.

10 Message texts and interactive error messages at the HMI

In general, there are three different reporting classes. These are designed as follows

- Message class 0 (displayed red in the message line)
 - the program is immediately stopped and the automatic mode is terminated
 - the cause of the error has to be fixed
 - Then acknowledge the fault and restart the station
- Message class 1 (displayed red in the message line)
 - the program and the automatic mode are stopped at the end of the cycle
 - the cause of the error has to be fixed
 - Then acknowledge the fault and restart the station
- Message class 2 (displayed yellow in the message line)
 - the program and the automatic mode are executed further
 - If the cause of the fault is fixed, the error is automatically acknowledged
- Note
 - Displayed on the HMI but not processed in MES

10.1 Message texts

Actual there are no message texts available.

11 Message texts and interactive error messages at the HMI

In general, there are three different reporting classes. These are designed as follows

- Message class 0 (displayed red in the message line)
 - the program is immediately stopped and the automatic mode is terminated
 - the cause of the error has to be fixed
 - Then acknowledge the fault and restart the station
- Message class 1 (displayed red in the message line)
 - the program and the automatic mode are stopped at the end of the cycle
 - the cause of the error has to be fixed
 - Then acknowledge the fault and restart the station
- Message class 2 (displayed yellow in the message line)
 - the program and the automatic mode are executed further
 - If the cause of the fault is fixed, the error is automatically acknowledged
- Note
 - Displayed on the HMI but not processed in MES

11.1 Message texts

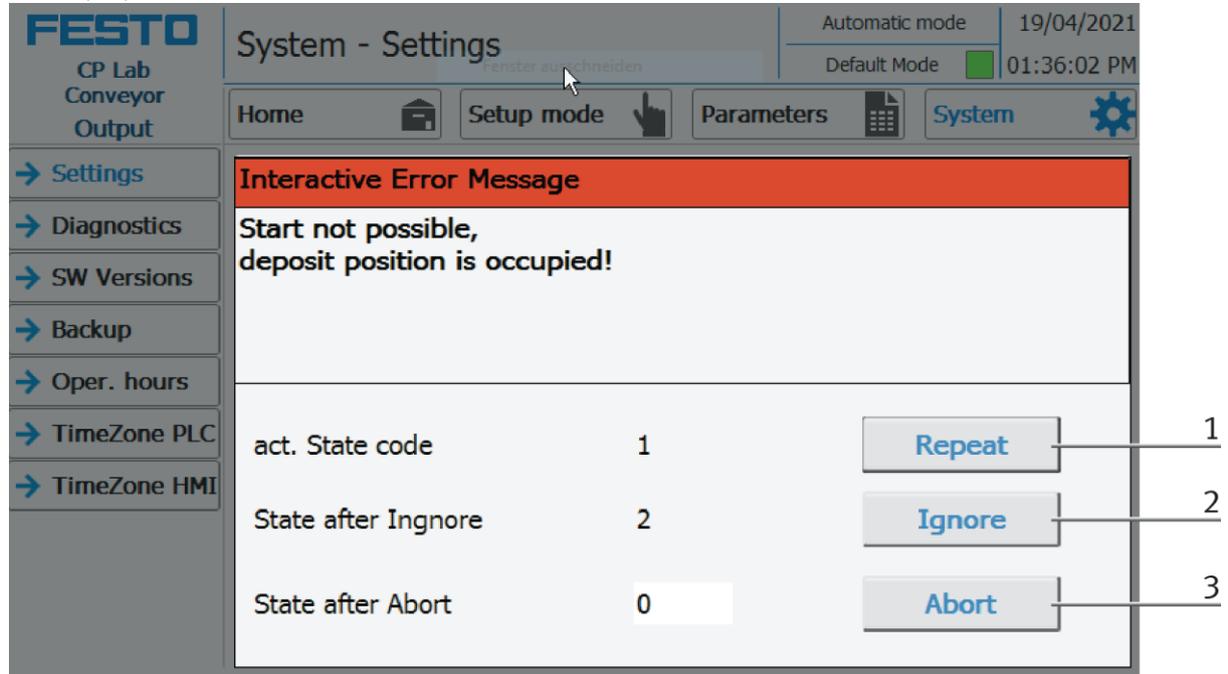
Actual there are no message texts available.

11.2 Interactive error messages

11.2.1 Default operation

Interactive messages are displayed via a pop-up window at HMI

The Pop Up has three buttons.



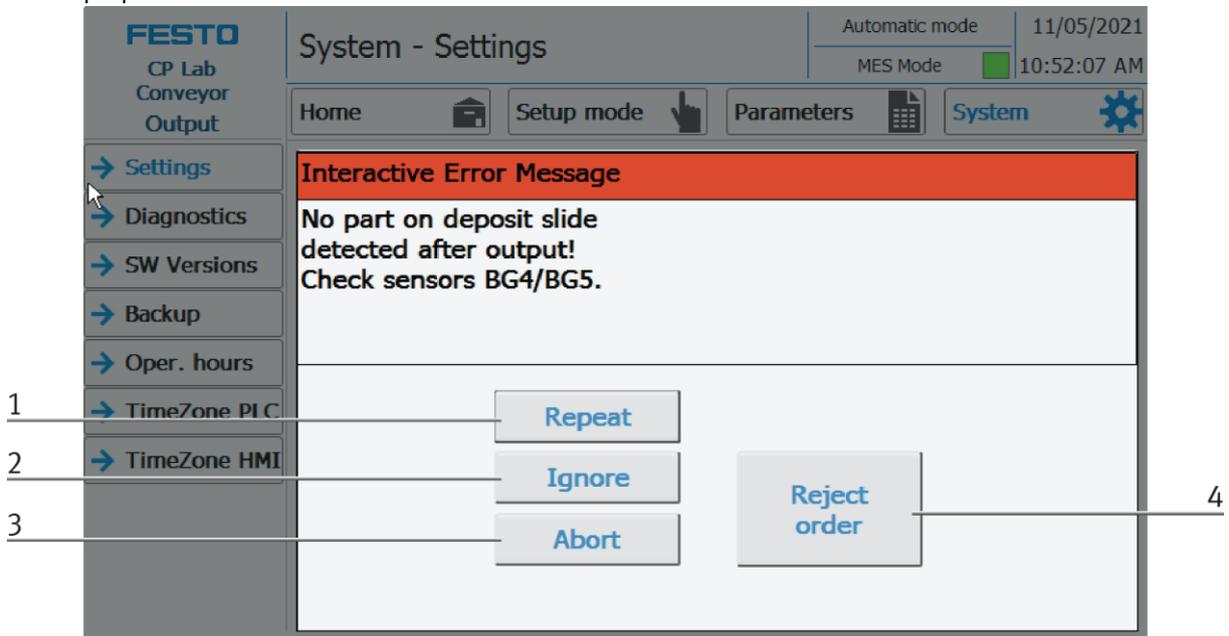
Example application module output - interactive error message in default mode

Position	Note
1	Repeat - An attempt is made to run the application again.
2	Ignore – The error status is ignored; the workpiece carrier receives the status code as indicated in the transition table in the "Initial status" column. The application is no longer executed.
3	Abort – The error status is ignored; the workpiece carrier receives the status code as shown in the input / output field next to the value displayed. This can be changed in this interactive error message window.

11.2.2 MES Operation

Interactive messages are displayed via a pop-up window at HMI

The Pop Up has four buttons.



Example application module output - interactive error message in default mode

Position	Note
1	Repeat - An attempt is made to run the application again with the same parameters.
2	Ignore – The application is not executed, but is treated in the MES as if the order step had been executed without errors.
3	Abort – The application is no longer executed. In the MES, this order position is terminated with an error and canceled, depending on whether an error step has been defined or not.
4	Reject order - 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.

11.2.3 General

Value	Text	Fix error
100	Order aborted with errors!	Start order again

12 Service and cleaning

The components and systems from Festo Didactic are maintenance-free.

At regular intervals you should have checked:

- the lenses of the optical sensors, fibre optics and reflectors
- the active surface of the proximity switch
- the entire station

can be cleaned with a soft, lint-free cloth or brush.



NOTE

Do not use aggressive or abrasive cleaners.

Protective covers must not be cleaned with alcoholic cleaning agents, there is a risk of embrittlement.

13 Further information and updating

Further information and updates on the technical documentation of Festo Didactic components and systems can be found on the Internet at:

www.ip.festo-didactic.com



14 Disposal

	<p style="text-align: center;"><i>NOTE</i></p> <p>Electronic waste contains recyclable materials and must not be disposed of with the domestic waste. Bring electronic waste to a designated municipal collection point.</p>
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Festo Didactic SE

Rechbergstraße 3
73770 Denkendorf
Germany



+49 711 3467-0



+49 711 34754-88500



www.festo-didactic.com



did@festo.com