8071937

ASRS for Workpieces

FESTO

CP Factory / CP Lab
Application Modules

Original operating instructions

Festo Didactic
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Original operating instructions

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

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.

Main document
Associated documents attached:

Safety instructions concerning transport (print/electronic)
Component datasheets (print/electronic)
Circuit diagram (print/electronic)

Contents

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

... indicates an **imminently** hazardous situation that will result in fatal or severe personal injury if not avoided.

WARNING

... indicates a **potentially** hazardous situation which may result in fatal or severe personal injury if not avoided.

CAUTION

... indicates a **potentially** hazardous situation that may result in moderate or slight personal injury or severe property damage if not avoided.

NOTE

... indicates a **potentially** hazardous situation that may result in property damage or loss of function if not avoided.

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 – hand injuries

Warning – lifting heavy loads

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

- **Malfunctions which could impair safety must be eliminated immediately!**

CAUTION

- **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

- **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

- **Switch off the power supply!**
  - 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!**
  - Use a tool such as a screwdriver for actuating sensors.

CAUTION

- **Risk of burns due to hot surfaces**
  - 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.**
  - Allow the device to cool off before commencing work.
  - Use suitable personal protective clothing, e.g. safety safety gloves.

4.3 Electrical components

WARNING

- **Disconnect from all sources of electrical power!**
  - 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**
  - 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!**
  - 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**
  - 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

- **Risk of fire due to use of unsuitable power supply**
  - If a device i 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

- **Depressurize the system!**
  - 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!**
  Cylinders may advance and retract automatically.
- **Risk of accident due to advancing cylinders!**
  - 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!**
  - 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.**
  - 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

- **Setting up pneumatic circuits**
  - 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**
  - 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**
  - 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

- **Unsecure operating conditions due to software tampering**
  - 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.

WARNING

- **This product is designed for use in industrial environments, and may cause malfunctions if used in domestic or small commercial environments.**

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

WARNING

- **Danger due to tipping over**
  - 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.

NOTE

- **Station contains delicate components!**
  - 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

Name plate example

Position	Description
1	Type code
2	Material number
3	Production code
4	Technical data
5	Technical data
6	Technical data
7	Safety note
8	Manufacturer address
9	UK importer address
10	Country of origin
11	Internet address service portal
12	CE Mark
13	UKCA mark
14	Warning mark
15	Symbol read manual
16	WEEE Marking
17	QR Code (Type-and serial number)

4.11 CE Declaration of Conformity

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(DE) Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller. Der beschriebene Gegenstand der Erklärung erfüllt die einschlägigen Harmonisierungsrechtsvorschriften der Union.

(EN) This declaration of conformity is issued under the sole responsibility of the manufacturer. The object of the declaration described is in conformity with the relevant Union harmonisation legislation.

(BG) Настоящата декларация за съответствие е издадена на отговорността на производителя. Предметът на описаната декларация отговаря на съответното законодателство на Съюза за хармонизация.

(CS) Toto prohlášení o shodě se vydává na výhradní odpovědnost výrobce. Popsaný předmět prohlášení je ve shodě s příslušnými harmonizačními právními před-pisy Unie.

(DA) Denne overensstemmelseserklæring udstedes på fabrikantens ansvar. Genstanden for erklæringen, som beskrevet, er i overensstemmelse med den relevante EU-harmoniseringslovgivning.

(EL) Η παρούσα δήλωση συμμόρφωσης εκδίδεται με αποκλειστική ευθύνη του κατασκευαστή. Ο περιγραφόμενος στόχος της δήλωσης είναι σύμφωνος με τη σχετική ενωσιακή νομοθεσία εναρμόνισης.

(ES) La presente declaración de conformidad se expide bajo la exclusiva responsabilidad del fabricante. El objeto de la declaración descrita es conforme con la legislación de armonización pertinente de la Unión.

(ET) Käesolev vastavusdeklaratsioon on välja antud tootja ainuvastutusel. Kirjeldatud deklareeritav toode on kooskõlas asjaomaste liidu ühtlustamisaktidega.

(FI) Tämä vaatimustenmukaisuusvakuutus on annettu valmistajan yksinomaisella vastuulla. Kuvattu vakuutuksen kohde on asiaa koskevan unionin yhdenmukaistamislainsäädännön vaatimusten mukainen.

(FR) La présente déclaration de conformité est établie sous la seule responsabilité du fabricant. L'objet décrit de la déclaration est conforme à la législation d'harmonisation de l'Union applicable.

(HU) Ezt a megfelelőségi nyilatkozatot a gyártó kizárólagos felelősségre mellett adják ki. Az ismertetett nyilatko-zat tárgya megfelel a vonatkozó uniós har-monizációs jogszabályoknak.

(IT) La presente dichiarazione di conformità è rilasciata sotto la responsabilità esclusiva del fabbricante. L'oggetto della dichiarazione descritto è conforme alla pertinente normativa di armonizzazione dell'Unione.

(LT) Ši atitikties deklaracija išduota tik gamintojo atsakomybe. Aprašytas deklaracijos objektas atitinka susijusius derinamuosius Sąjungos teisės aktus.

(LV) Šī atbilstības deklarācija ir izdota vienīgi uz ražotāja atbildību. Aprakstītais deklarācijas objekts atbilst attiecīgajam Savienības saskaņošanas tiesību aktam.

(NL) Deze conformiteitsverklaring wordt verstrekt onder volledige verantwoordelijkheid van de fabrikant. Het beschreven voorwerp is in overeenstemming de desbetreffende harmonisatiewetgeving van de Unie.

(PL) Niniejsza deklaracja zgodności wydana zostaje na wyłączną odpowiedzialność producenta. Wymieniony przedmiot niniejszej deklaracji jest zgodny z odnośnymi wymaganiami unijnego prawodawstwa harmonizacyjnego.

(PT) A presente declaração de conformidade é emitida sob a exclusiva responsabilidade do fabricante. O objeto da declaração descrito está em conformidade com a legislação aplicável de harmonização da União.

(RO) Prezenta declarație de conformitate este emisă pe răspunderea exclusivă a producătorului. Obiectul descris al declarației este în conformitate cu legislația relevantă de armonizare a Uniunii.

(SK) Toto vyhlásenie o zhode sa vydáva na vlastnú zodpovednosť výrobcu. Uvedený predmet vyhlásenia je v zhode s príslušnými harmonizačnými právnymi predpismi Únie.

(SL) Za izdajo te izjave o skladnosti je odgovoren izključno proizvajalec. Opisani predmet izjave je v skladu z ustrezno zakonodajo Unije o harmonizaciji.

(SV) Denna försäkran om överensstämmelse utfärdas på tillverkarens eget ansvar. Föremålet för försäkran överensstämmer med den relevanta harmoniserade unionslagstiftningen.

(TR) Bu Uygunluk Belgesi tamamen üreticinin sorumluluğu altındadır. Belgede açıklanan obje, Birliğin ilgili uyum mevzuatına uygundur.

EG-Konformitätserklärung
EU Declaration of Conformity
Декларация за съответствие на ЕС
Prohlášení o shodě ES
EF-overensstemmelseserklæring
Δήλωση συμμόρφωσης ΕΚ
Declaración de conformidad CE
EÜ vastavusdeklaratsioon
EY-vaatimustenmukaisuusvakuutus
Déclaration CE de conformité
EK megfelelőségi nyilatkozat
Dichiarazione di conformità EU
EB atitikties deklaracija
EK atbilstības deklarācija
EG-verklaring van overeenstemming
Deklaracja zgodności WE
Declaração de conformidade CE
Declarație de conformitate CE
Vyhlásenie o zhode ES
Izjava ES o skladnosti
EG-försäkran om Överensstämmelse

The installation instructions according to the manual have to be followed. The person authorized to compile the technical documents is Philippe Drolet, Product conformity, Festo Didactic Ltée/Ltd. Canada.

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2022-03-02

8032510	CP-AM-DRILL
8032507	CP-AM-PRESS
8032508	CP-AM-MAG
8032509	CP-AM-TURNOVER
8032511	CP-AM-CAM
8038567	CP-AM-MPRESS
8043598	CP-AM-iDRILL-C21
8050101*	CP-L-LINEAR-C11-M0
8050102*	CP-L-LINEAR-C13-M0
8058667*	CP-L-BRANCH-C21
8061184	CP-AM-OUT
8068413	CP-AM-iPICK-C21
8088783	CP-AM-OVEN-230V
8091107	CP Lab HMI Panel
8092833*	SC CP LAB STD CFG 4
8092834*	SC CP LAB STD CFG 6
8092835*	SC CP LAB STD CFG 8
8092836*	SC CP LAB STD CFG 10
8108237*	CP-L-LINEAR-C11-M6
8129428	CP-Lab/MPS HMI Panel
8132970*	CP-L-LINEAR-C11-M0-V2
8146023*	CP-L-LINEAR-C13-M0-V2
8146024*	CP-L-LINEAR-C11-M6-V2
8152450	CP-AM-LABEL-V2
8154245	CP-AM-MEASURE-V2
8155207	CP-AM-CAM-V2
8167762*	CP-L-LINEAR-C11-M0 V2
8167762*	CP-L-LINEAR-C11-M0 V2
8167764*	CP-L-LINEAR-C11-M6 V2
8172797*	CP-L-LINEAR-NO-PLC-M0

2006/42/EC	EN 60204-1:2018
2014/30/EU	EN 61326-1:2013-01
2011/65/EU	EN 63000:2016-10
2014/53/EU*	See Appendix A for details

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Francis Larrivée, ing.
Engineering

Philippe Drolet, ing.
Product Compliance

Appendix A:
Extracted from: Siemens EU-Declaration of Conformity No. A5E50679864A; REV.: 001 /
CE-DoC_A5E50679864A_RF200R_RF300R_RED_RoHS_2020-12-11.pdf (siemens.com)

SIEMENS

Anhang RED & RoHS / *Annex RED & RoHS*
zur EU–Konformitätserklärung / *to EU-Declaration of Conformity*
Nr./No. A5E50679864A; REV.: 001

Produktgruppenbezeichnung/-modell SIMATIC RF200R / RF300R HF RFID READERS
Product group identification/-model (13.56 MHz)

Die Übereinstimmung der bezeichneten Produkte (unter Verwendung des Zubehörs) des oben genannten Gegenstandes mit den Vorschriften der angewandten Richtlinie(n) wird nachgewiesen durch die vollständige Einhaltung folgender Normen / Vorschriften (variantenabhängig, siehe Anhang Produkte - Tabelle 1. Angewandt Normen werden durch ein „x" gekennzeichnet, wohingegen nicht angewandte Normen durch ein „-" gekennzeichnet werden.):

The conformity of the designated products (using the accessory) of the object described above with the provisions of the applied Directive(s) is proved by full compliance with the following standards / regulations (depending on versions, see annex Products - Table 1. Applicable Standards are marked by a "x" whereas not applicable Standards are marked by a "-"):

Art. 3 (1) a) Schutz der Gesundheit und Sicherheit - Normen / *Health and Safety - standards:*

Referenznummer / *Reference number*	Ausgabedatum / *Date of issue*	Referenznummer / *Reference number*	Ausgabedatum / *Date of issue*
EN 62368-1 + A11	2014/2017	EN 50364	2018

Art. 3 (1) b) EMV Normen / *EMC standards:*

Referenznummer / *Reference number*	Ausgabedatum / *Date of issue*	Referenznummer / *Reference number*	Ausgabedatum / *Date of issue*
ETSI EN 301 489-1	V2.2.3	EN IEC 61000-6-1	2019
ETSI EN 301 489-3	V2.1.1	EN IEC 61000-6-2	2019
EN 55011 + A1 + A11	2016/2017/2020	EN 61000-6-3 + A1	2007/2011
EN 55032 + A11 Class A/B	2015/2020	EN IEC 61000-6-4	2019
EN 55035 + A11	2017/2020	EN IEC 61000-6-8	2020

Art. 3 (2) Effiziente Nutzung des Funkspektrums Harmonisierte Normen / *Efficient usage of spectrum Harmonized standards:*

Referenznummer / *Reference number*	Ausgabedatum / *Date of issue*	Referenznummer / *Reference number*	Ausgabedatum / *Date of issue*
ETSI EN 300 330	V2.1.1		

Art. 3 (3) a)-i) Delegierte Rechtsakte für Funkanlagen / *Delegated acts for Radio equipment*

Referenznummer / *Reference number*	Ausgabedatum / *Date of issue*	Referenznummer / *Reference number*	Ausgabedatum / *Date of issue*

Festo Didactic Ltée/Ltd. · 675 rue du Carbone · Québec, QC G2N 2K7 · CANADA · www.festo-didactic.com 8101137 – DoC0039

4.12 General product safety

WARNING

- **General product safety, CE conformity**
  - The product fulfills the requirements of all applicable EU directives. We confirm this with the CE mark.
  - As a consequence of
    Changes (hardware / software)
    Additions
    or improper use
  - Product safety can no longer be guaranteed by the operator.
  - In this case, the manufacturer's CE declaration of conformity expires. The operator must re-evaluate the safety and determine the CE conformity.

4.13 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

- **Damage to the safety window**
  - 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.

4.13.1 Emergency stop

If a station has an emergency stop button, the emergency stop signal switches off all actuators. An acknowledgment by the operator is required for a restart, there is no automatic restart.

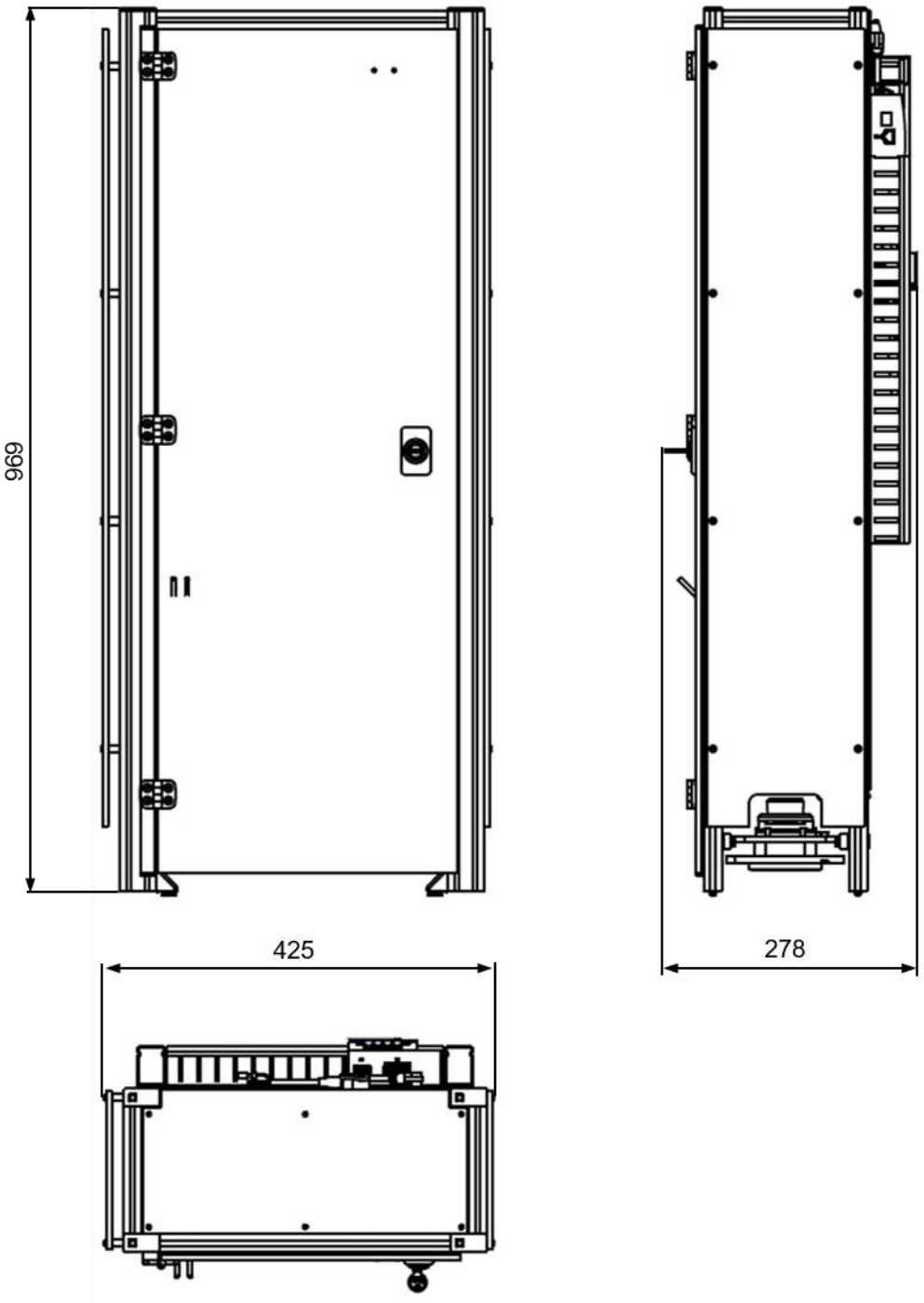
4.13.2 Additional protective devices

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 Data

Parameter	Value
Electrics	
Power supply	24 V DC, 0,35 A protective extra low voltage (PELV)
Digital inputs	7
Digital outputs	7
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)
Measurements	
Length	278 mm
Width	425 mm
Height	969 mm
Weight	Approx 24 kg
Subject to change	

Axes	
Z axis	toothed belt drive with recirculating ball bearing guide
Z axis stroke	700 mm
Z axis feed constant	58 mm/r
X axis	pneumatic linear drive with ball bearing cage guide
X axis stroke	140 mm
Handling/Gripper	
Gripper	pneumatic parallel gripper
Gripping stroke	5 mm per gripper jaw
Positioning accuracy	+/- 0.1 mm (repeat accuracy)
Maximum handling weight	0.3 kg
Workpiece size (W x H x D)	114 mm x 20 mm x 60 mm
Control	
Positioning control	CMMO-ST-C5-1-LKP
Interface to control	Modbus TCP
Interfaces	
Interfaces	TCP/IP, IO-Link
Subject to change	



Measurements / illustration similar

6 Design and Function

6.1 Transport

WARNING

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

WARNING

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

WARNING

- **Danger of crushing for hands/feet**
  - It is not permitted to grip onto or under the feet 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.

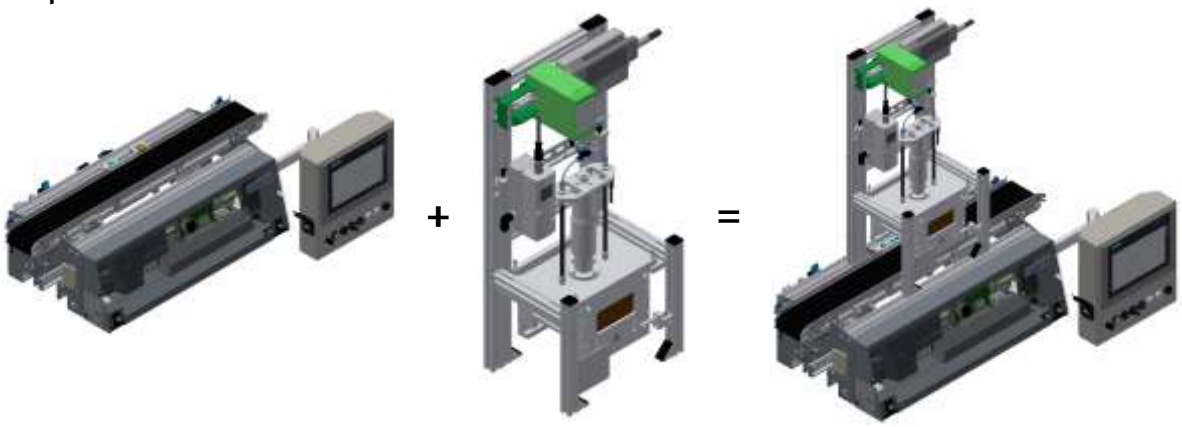
NOTE

- 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.

6.2 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 muscle press is attached to a basic module, it becomes a station.

Example



basic module, e.g. CP Lab Conveyor | application module, e.g. muscle press | station muscle press

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

carrier | pallet | workpiece

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.

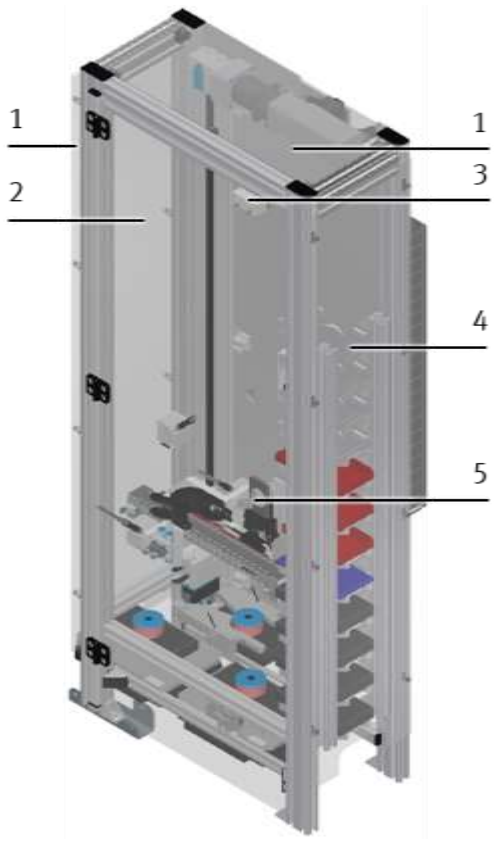
front cover | board | back cover

6.3 Transparent Panes and Front Service Door of the ASRS

NOTE

– The transparent pane (4) on the right side behind the shelfs is covered with a reflective foil on the inside.

For safety reasons, the ASRS has been enclosed with transparent panes (1+4). At the front, a front service door (2) with a key switch (5) and a safety switch (3) has been installed. The front service door is designed for safety protection, for adjustment measurements and for loading and unloading the ASRS.



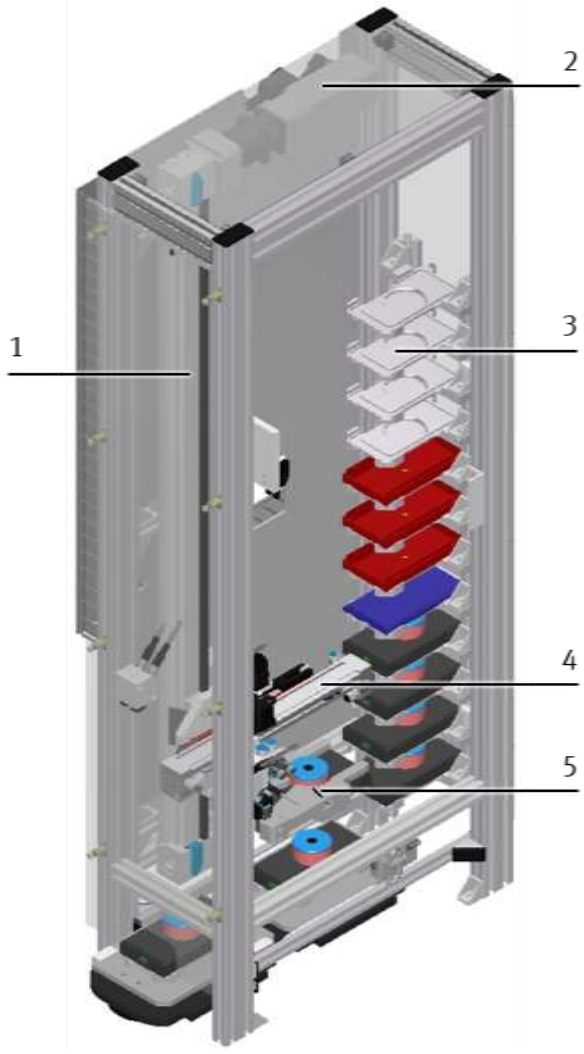
safety protection

Position	Description	Name	Order Number
1	transparent panes	-----	-----
2	front service door	-----	-----
3	safety switch PILZ front service door closed	PSEN ma1.4p-52	506309
4	transparent pane covered with reflecting foil on the inside	-----	-----
5	key switch	-----	-----

6.4 Components Front Side of the CP Application Module ASRS for Workpieces

CAUTION

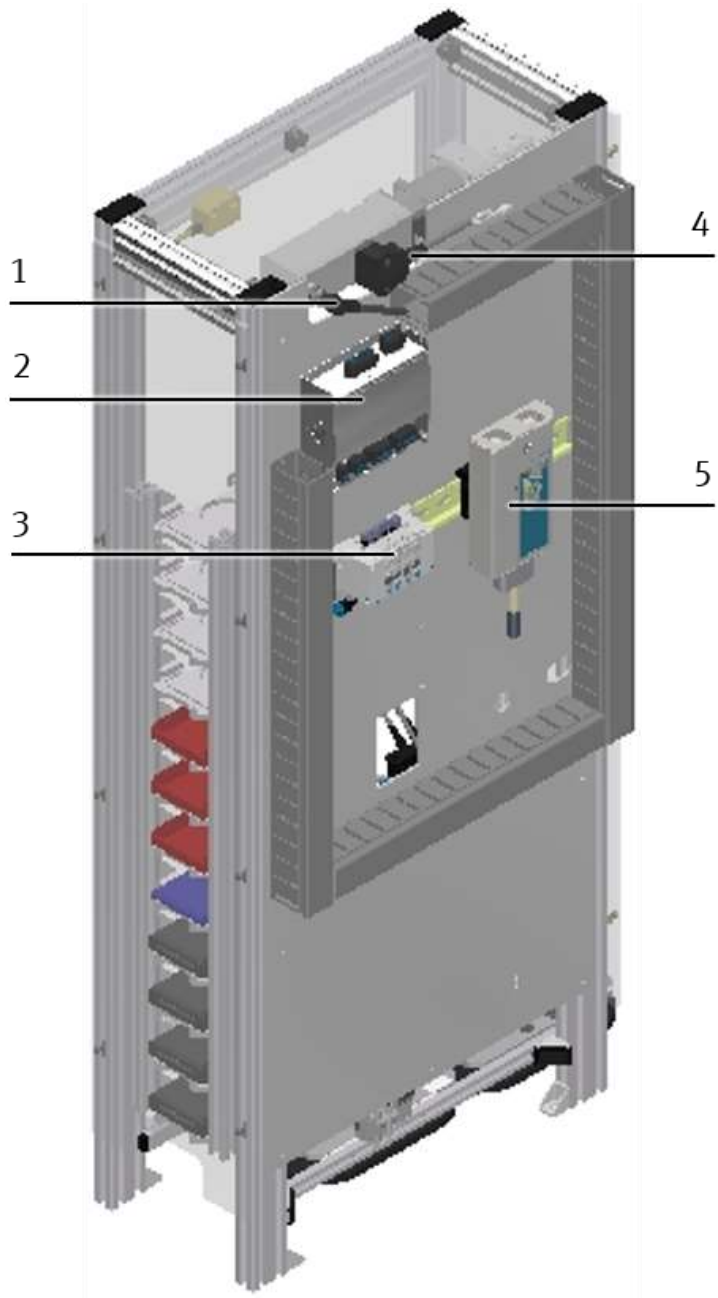
Do not touch the stepper motor, since the surface might be hot!



Front Side Components

Position	Description	Name	Order Number
1	Z axis	EGC-50-700-TB-KF-0H-GK	556812
2	stepper motor Z axis	EMMS-ST-42-S-SEB-G2	1370473
3	magazine for a maximum of 12 workpieces	-----	-----
4	X axis	DGC-12-140-KF-P-A	530907
5	gripper	DHPS-16-A-NC	1254045

6.5 Components Rear Side of the CP Application Module ASRS for Workpieces



Components Rear Side

Position	Description	Name	Order Number
1	encoder cable Z axis	NEBM-M12W8-E-1,5-LE8	1451674
2	motor controller	CMMO-ST-C5-1-LKP	1512320
3	valve terminal	80P-10-1LIT-PB-N-SLC-3KM+T	525675
4	motor cable Z axis	NEBM-S1W9-E-1,5-Q5-LE6	1450736
5	I/O module station (XD1)	-----	-----

6.6 Terminal Allocation of the Digital and Analogue Interfaces
I/O Module Station (XD1)

I/O Module Station (XD1)

With the help of the I/O Module Station, the status of the sensors can be read.
IN0 to IN7 resp. OUT0 to OUT7 here indicates the value range of a byte from Bit 0 to 7. The sensors and actuators of the CP Application Module ASRS for Workpieces are put on the interior terminals.

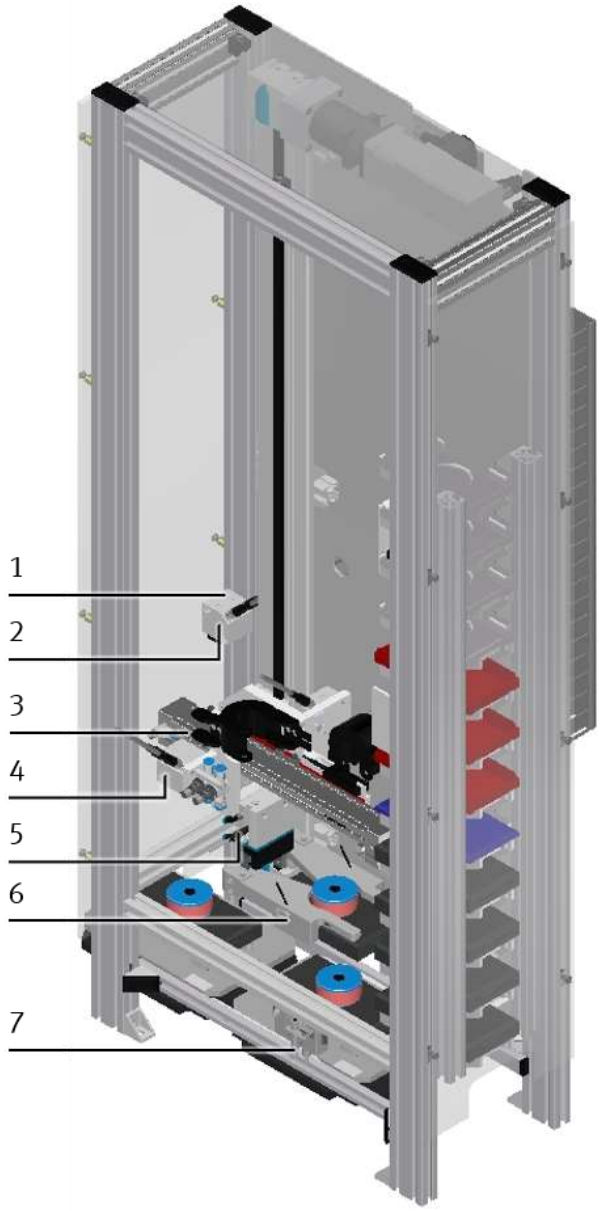
Digital Inputs (PLC)

Digital Inputs	Reference Identifier	Description
IN0	-BG1	X axis is retracted
IN1	-BG2	X axis in shelf
IN2	-BG3	gripper is open
IN3	-BG4	workpiece available in gripper
IN4	-BG5	pallet available
IN5	-BG6	workpiece available
IN6	-BG7	workpiece in storing place
IN7	-BG8	collision detection

Digital Outputs (PLC)

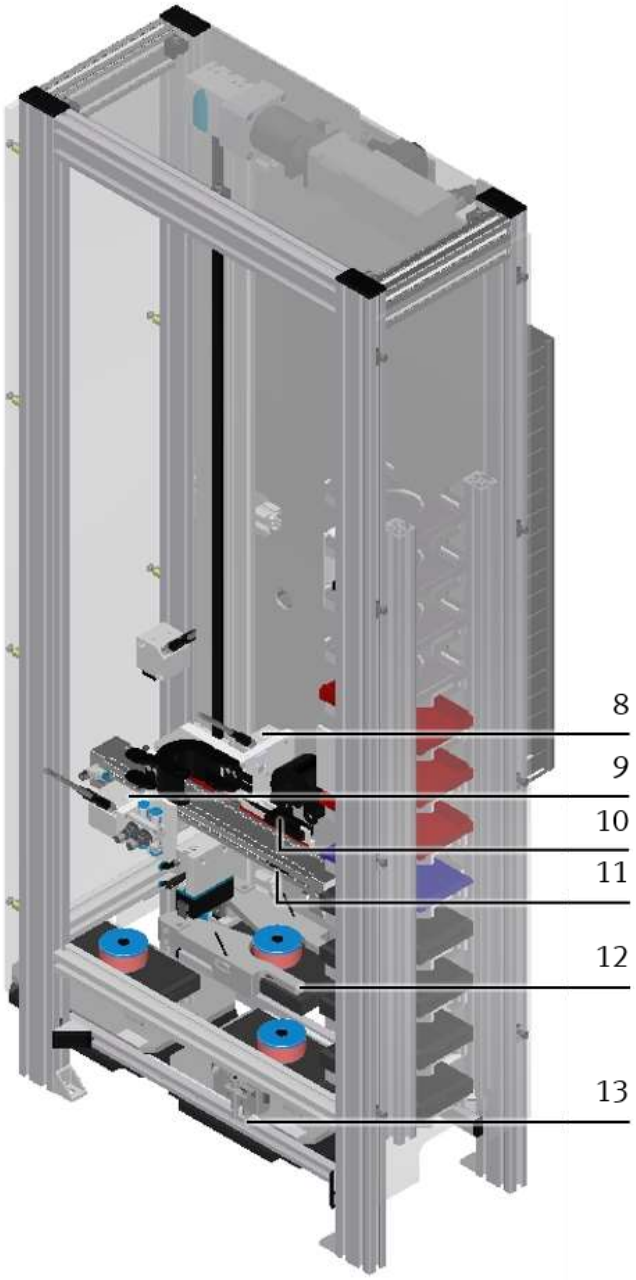
Digital Outputs	Reference Identifier	Description
OUT0	MB1	move X axis back
OUT1	MB2	move X axis to shelf
OUT2	MB3	open gripper
OUT3	MB4	close gripper
OUT4		reserve
OUT5		reserve
OUT6		reserve
OUT7		reserve

6.7 Sensors and Switches of the CP Application Module ASRS for Workpieces



sensors and switches

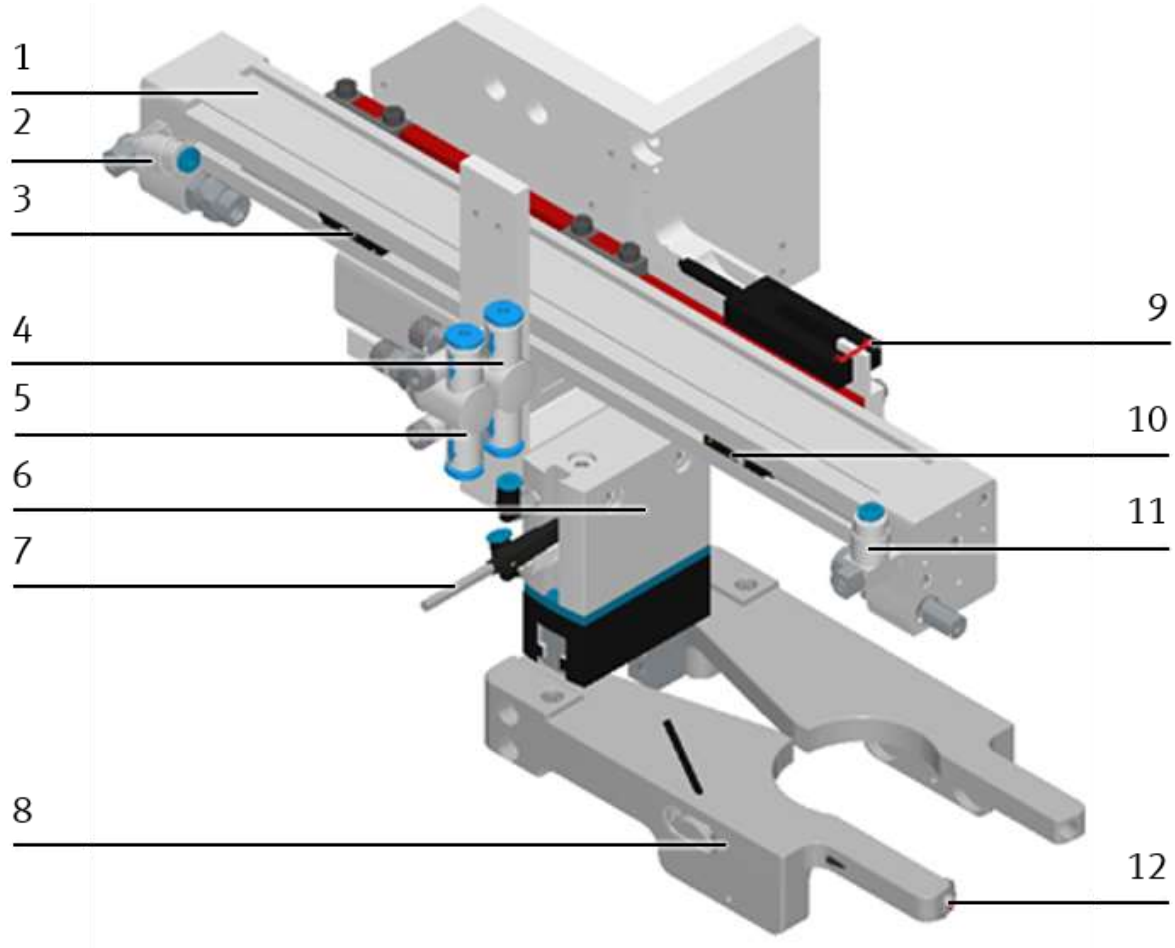
Position	Description	Name	Order Number
1	fibre-optic unit BG6	SOEG-L-Q30-P-A-S-2L	165327
2	fibre-optic unit BG5	SOEG-L-Q30-P-A-S-2L	165327
3	proximity switch BG1	SMT-10M-PS-24V-E-0,3-L-M8D	551375
4	fibre-optic unit BG4	SOEG-L-Q30-NA-S-2L	165325
5	fibre-optic BG3	SMT-8G-PS-24V-E-0,3Q-M8D	547860
6	fibre-optic BG4	SOEZ-LLK-SE-2,0-M4	165360
7	fibre-optic BG5	SOEZ-LLK-SE-2,0-M4	165360



sensors and switches

Position	Description	Name	Order Number
8	fibre-optic unit BG8	SOEG-L-Q30-NA-S-2L	165325
9	fibre-optic unit BG7	SOEG-L-Q30-NA-S-2L	165325
10	fibre-optic BG8	SOOC-TB-P-C5-2-R10	552828
11	proximity switch BG2	SMT-10M-PS-24V-E-0,3-L-M8D	551375
12	fibre-optic BG7	SOEZ-LL-K-RT-M6	165358
13	fibre-optic BG6	SOEZ-LLK-SE-2,0-M4	165360

6.8 X Axis with Gripper



X axis with gripper

Position	Description	Name	Order Number
1	X axis	DGC-12-140-KF-P-A	530907
2	one-way flow control valve	GRLA-M5-QS-3-LF-C	175053
3	sensor end position X axis is retracted	SMT-10M-PS-24V-E-0,3-L-M8D	551375
4	one-way flow control valve	GR-QS-3	193965
5	one-way flow control valve	GR-QS-3	193965
6	gripper	DHPS-16-A-NC	1254045
7	sensor gripper is open	SMT-8G-PS-24V-E-0,3Q-M8D	547860
8	fibre-optic gripper available in workpiece	SOEZ-LLK-SE-2,0-M4	165360
9	fibre-optic (light barrier sensor) collision detection	SOOC-TB-P-C5-2-R10	552828
10	sensor end position X axis in shelf	SMT-10M-PS-24V-E-0,3-L-M8D	551375
11	one-way flow control valve	GRLA-M5-QS-3-LF-C	175053
12	fibre-optic workpiece in storing place	SOEZ-LL-K-RT-M6	165358

6.9 Task and Function

6.9.1 Task

The CP Application Module ASRS for Workpieces has the following tasks:

- Store workpieces in the ASRS
- retrieve workpieces from the ASRS
- retrieve workpieces from the ASRS and placing them onto a workpiece which has already been put on a carrier.

6.9.2 Function

The CP Application Module ASRS for Workpiece has been constructed for storing and retrieving workpieces. It has a handling device with a gripper and an ASRS with 12 shelfs where up to 12 workpieces can be stored. You can move the handling upwards with the Z axis, and to the right and the left with the X axis. Different sizes of workpieces can be stored and retrieved.

Due to the different sizes of the workpieces, you have to teach the gripper to the corresponding sizes so that the gripper is able to pick and place the workpieces correctly.

The handling transfers the workpiece with the Z and X axis from the conveyor to the shelf in the ASRS. It can also transfer the workpiece from the shelf of the ASRS to the conveyor via the X and Z axis. With adequate sensors, the handling detects if there is a workpiece in the shelf or not. This is essential in order to avoid collisions.

The CP Application Module ASRS for Workpieces returns a message to the MES system concerning the storing or retrieving.

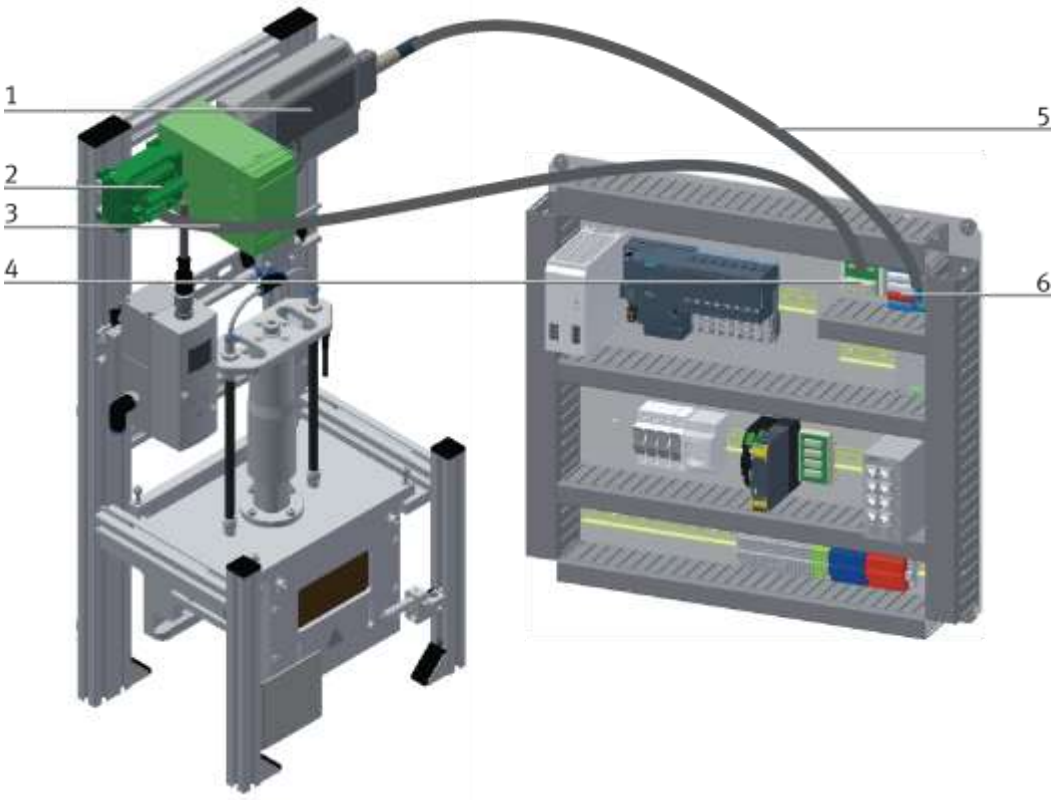
SysLink interface:

- Connect the I/O terminal (1) of the CP application module with the I/O terminal (6) on the electric board of the CP Factory basic module. Therefore use the provided connecting cable with SysLink plugs (5).

D-Sub-interface for analogue signals (option – not available at all CP application modules)

The CP application module produces two analogue output signals with the distance sensors. These are set on the analogue terminal and have to be connected with the analogue inputs of the CP Factory basic module:

- Connect the analogue terminal (2) of the CP application module with the analogue terminal (4) on the electric board of the CP Factory basic module. Therefore use the provided connecting cable (3) with standard D-Sub plugs: 15-pin, two-rowed.

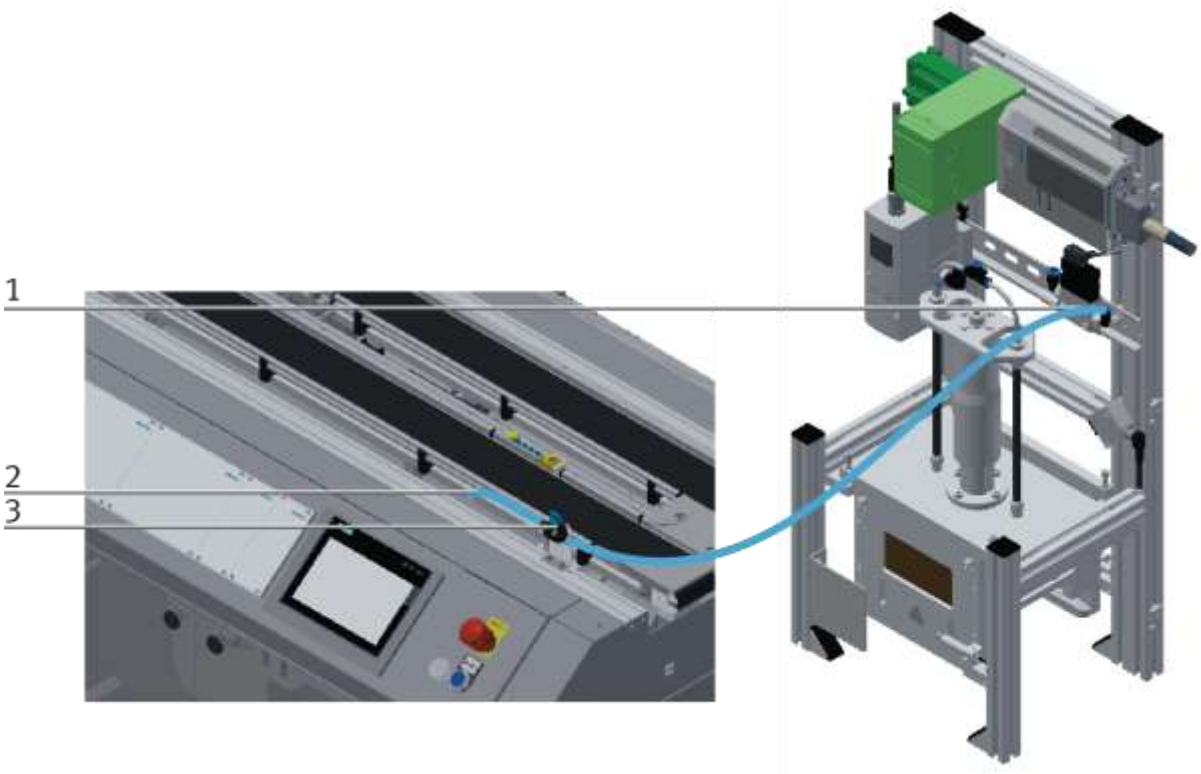


Electrical connections / illustration similar

Position	Description
1	CP application module: I/O terminal (+BG-XD1)
2	CP application module: analogue terminal (+BG-XD2A)
3	connecting cable with 15-pin D-Sub-plugs
4	electric board CP Factory basic module: analogue terminal (+K1-XD16A)
5	connecting cable with SysLink-plugs (SysLink-cable)
6	electric board CP Factory basic module: I/O terminal (+K1-XD15)

6.9.3 Pneumatic connection from application modules to CP Factory basic module

The pneumatic connection is based on the principle of the following sketch. The application module is connected from the valve (terminal) to the shut-off valve (3) on the conveyor belt.
The hose (nominal width 4) is simply inserted into the QS connector.
The supply line (2) is plugged into the shut off-valve (3).

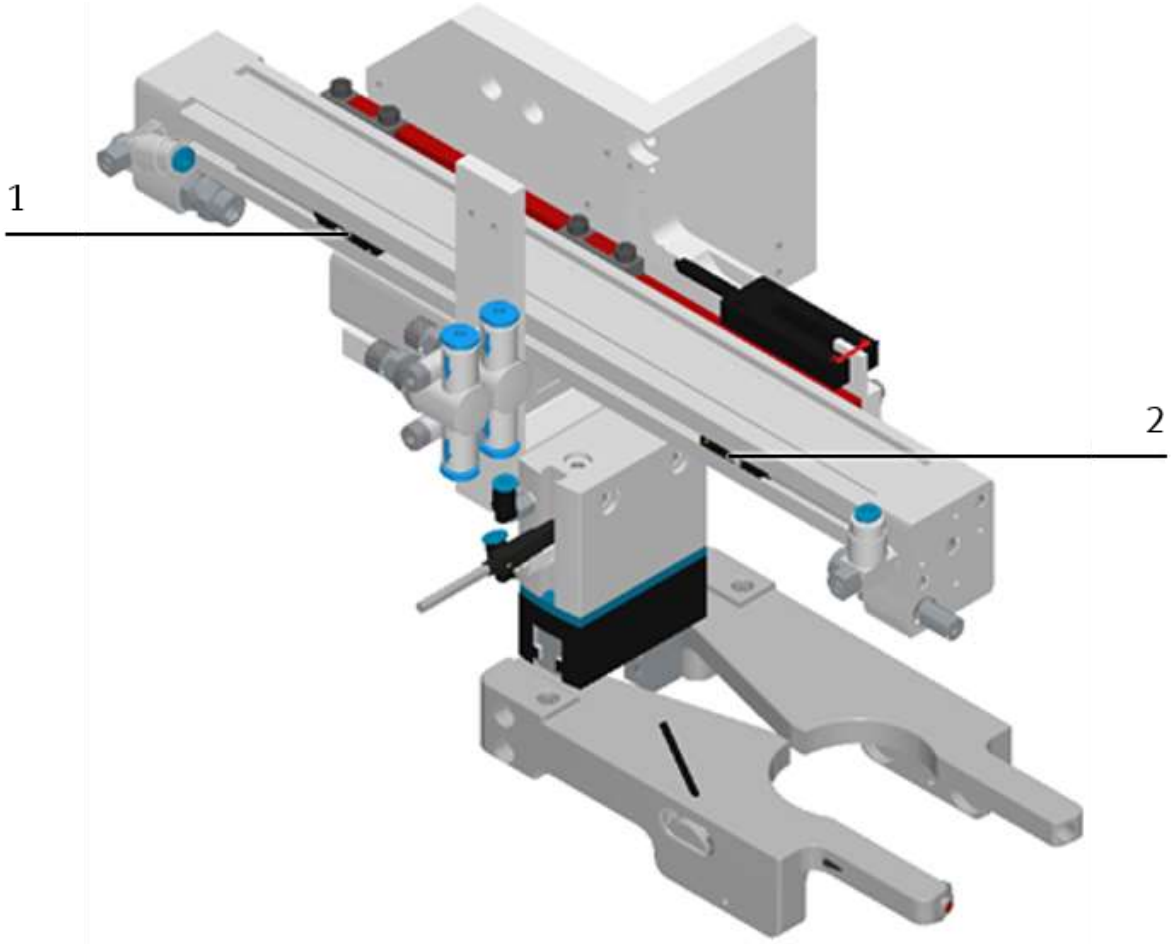


Pneumatically connect application module / illustration similar

6.10 Adjusting Sensors, Fibre-Optics and One-way Flow Control Valves

6.10.1 Proximity Switch

Proximity Switch (end position control of X axis)



end position control X axis

Position	Description
1	sensor X axis is retracted (BG1) / 551375 / SMT-10M-PS-24V-E-0,3-L-M8D
2	sensor X axis is extended (BG2) / 551375 / SMT-10M-PS-24V-E-0,3-L-M8D

Requirements

– cylinder with driver attached to housing
– pneumatical connection of the cylinder provided
– compressed air supply switched on
– electrical connection of the proximity switches provided
– power supply switched on

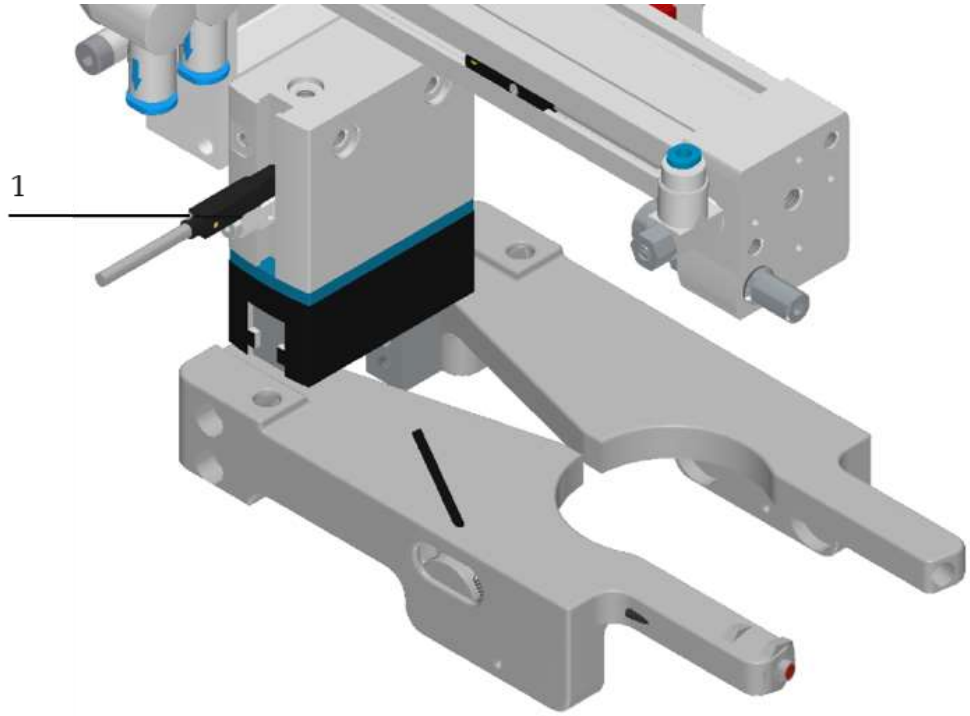
Procedure

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 a few millimetres further until the switching status display disappears again.
4. Move the proximity switch halfway between the switch-on and the switch-off point.
5. Tighten the locking screw of the proximity switch with an Allen key (width across flats 1.5)
6. Now check the positioning of the proximity switch by repeated test runs of the cylinder.

Documents

- data sheets/operating instructions
  Proximity Switch SMT-10M

Proximity Switch (gripper open)



gripper open

Position	Description
1	sensor gripper is open (BG3) / 547860 / SMT-8G-PS-24V-E-0,3Q-M8D

Requirements

– gripper is mounted
– pneumatical connection of the gripper is provided
– compressed air supply is switched on
– electrical connection of the proximity switches is established
– power supply is switched on.

Procedure

1. The gripper is open and no workpiece is clamped.
2. Move the proximity switch until the switching status display (LED) appears.
3. Move the proximity switch into the same direction a few millimetres further until the switching status display disappears again.
4. Move the proximity switch halfway between the switch-on and the switch-off point.
5. Tighten the locking screw of the proximity switch with an Allen key (width across flats 1.5)
6. Now check the positioning of the proximity switch by repeated test runs of the cylinder.

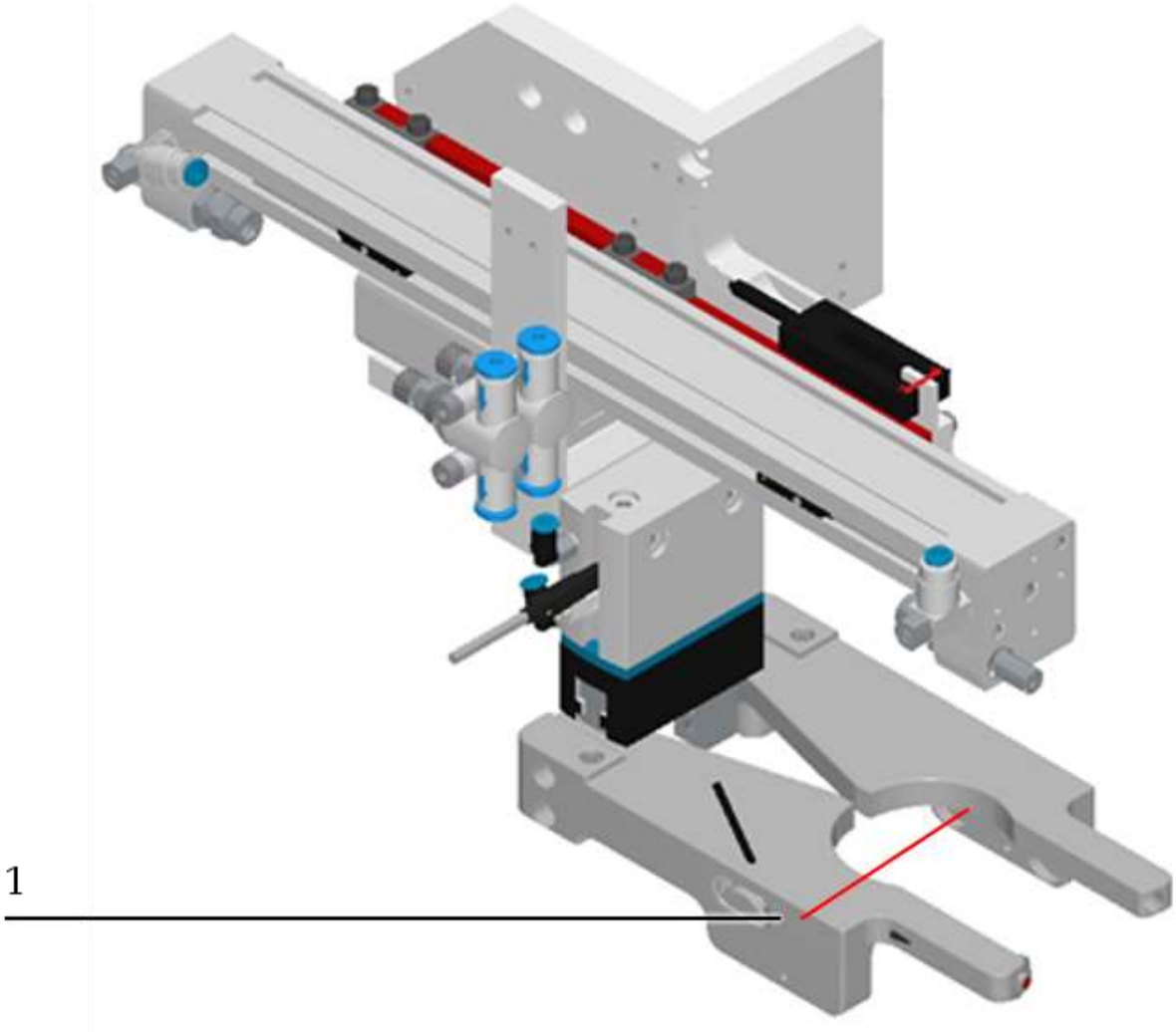
Documents

- data sheets/operating instructions
  Proximity Switch SMT-8G

6.10.2 Fibre-Optics and Fibre-Optic Units

Fibre-optic BG4 (workpiece in gripper)

The fibre-optic BG4 is connected with the fibre-optic unit BG4 and checks if there is a workpiece available in the gripper.



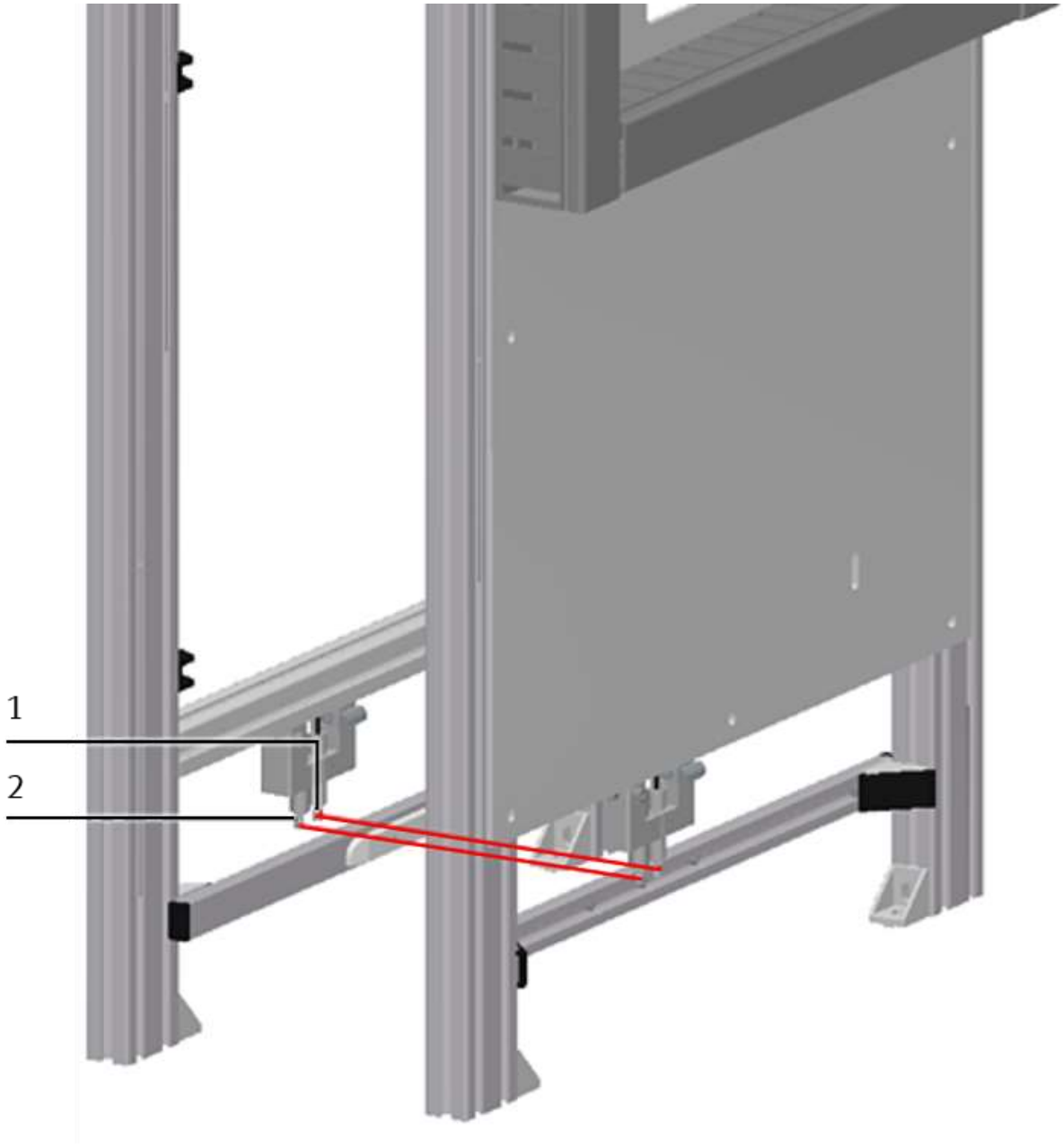
workpiece in gripper

Position	Description
1	fibre-optic BG4 / 165325 / SOEG-L-Q30-NA-S-2L

Fibre-optic BG5 (pallet available) fibre-optic BG6 (workpiece available)

The fibre-optic BG5 is connected with the fibre-optic unit BG5 and checks if there is a pallet available on the conveyor.

The fibre-optic BG6 is connected with the fibre-optic unit BG6 and checks if there is a workpiece available in the pallet on the conveyor.



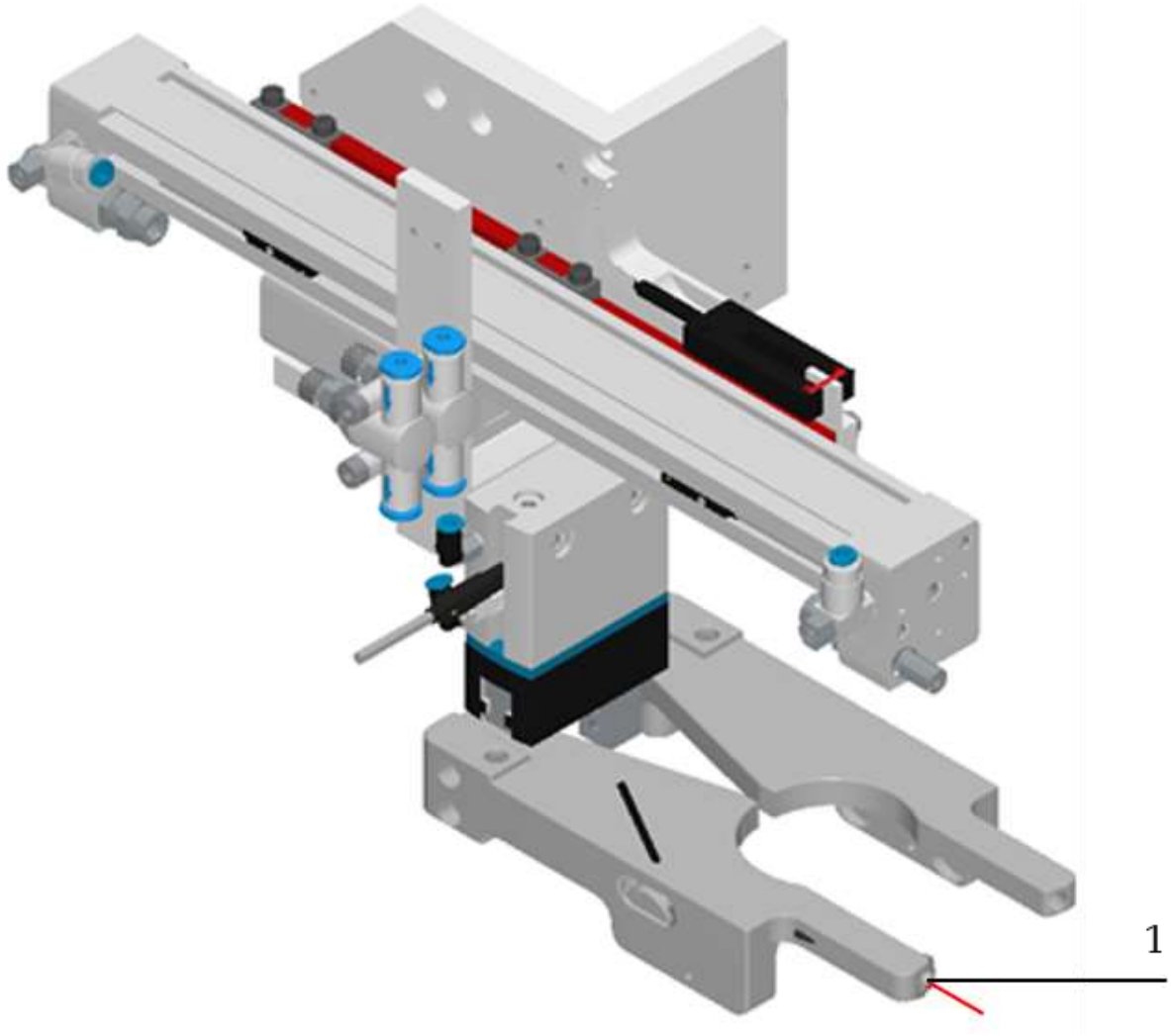
pallet and workpiece available

Position	Description
1	fibre-optic BG5 pallet available
2	fibre-optic BG6 workpiece available

Fibre-optic BG7 (workpiece in shelf)

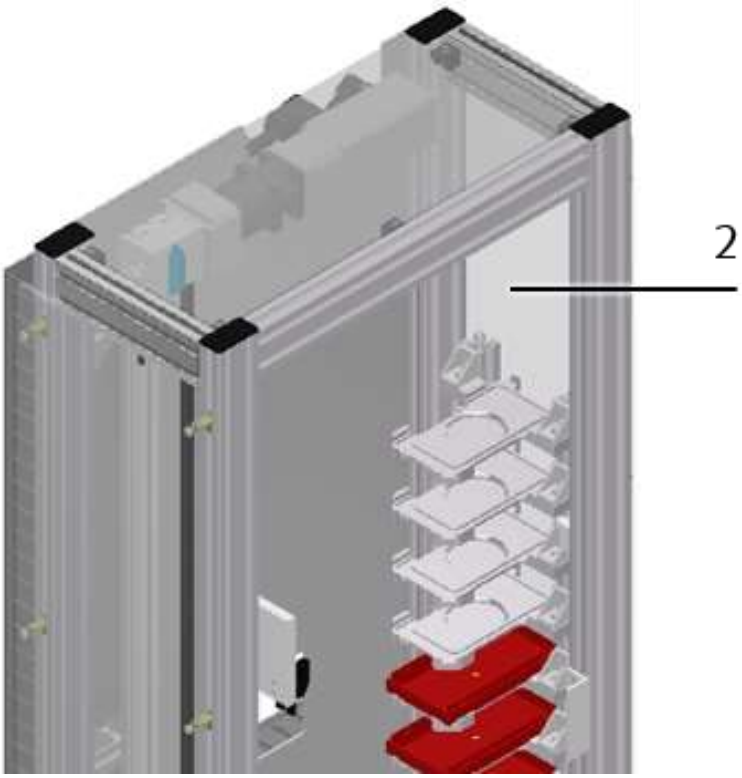
The fibre-optic BG7 is connected with the fibre-optic unit BG7 and checks if there is already a workpiece in the approached shelf.

If there is no workpiece in the approached shelf, the light beam of the fibre-optic BG7 is reflected by the reflecting foil on the inside of the transparent pane (2).



workpiece in shelf

Position	Description
1	fibre-optic BG7 / 165358 / SOEZ-LL-K-RT-M6

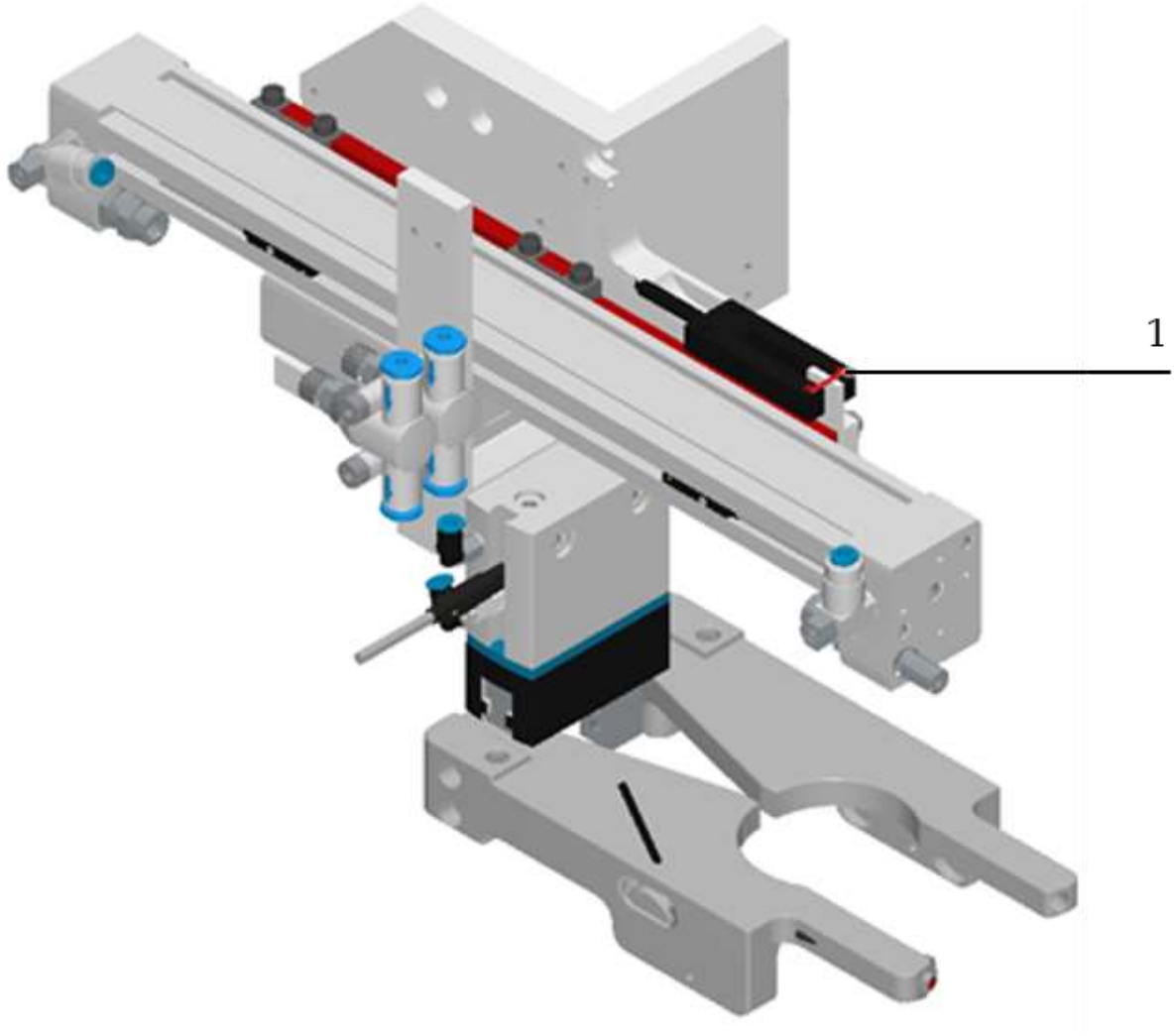


transparent pane with reflecting foil (inside)

Position	Description
2	transparent pane covered with reflecting foil on the inside

Fibre-optic BG8 (collision detection)

The fibre-optic BG8 is a light barrier sensor and is connected with the fibre-optic unit BG8.
If there are too strong torques working on the extended gripper (e.g. moving on limit stop), the gripper is moved from this snap-in point, which is detected by the light barrier sensor (BG8) and is used for the collision monitoring in the control.



collision detection

Position	Description
1	fibre-optic BG8 / 552828 / SOOC-TB-P-C5-2-R10

Requirements

– housing and fibre-optic unit mounted
– electrical connection of fibre-optic unit established
– power-supply switched on

Procedure

1. Screw the fibre-optic head into the housing. The fibre-optic head is flush with the mounting surface.
2. Attach the two fibre-optics to the fibre-optic unit.
3. Grip a workpiece.
   Drive with the handling in front of a shelf.
   Loosen the tilting mechanism.
4. You may have to turn the adjusting screw with a small screwdriver until the switching status display (LED) appears.
5. Check the adjustment by inserting black, red and silver workpieces.
   Remark
   The maximum permissible number of turns of the adjusting screw is 12.
   All workpieces must be recognized reliably.

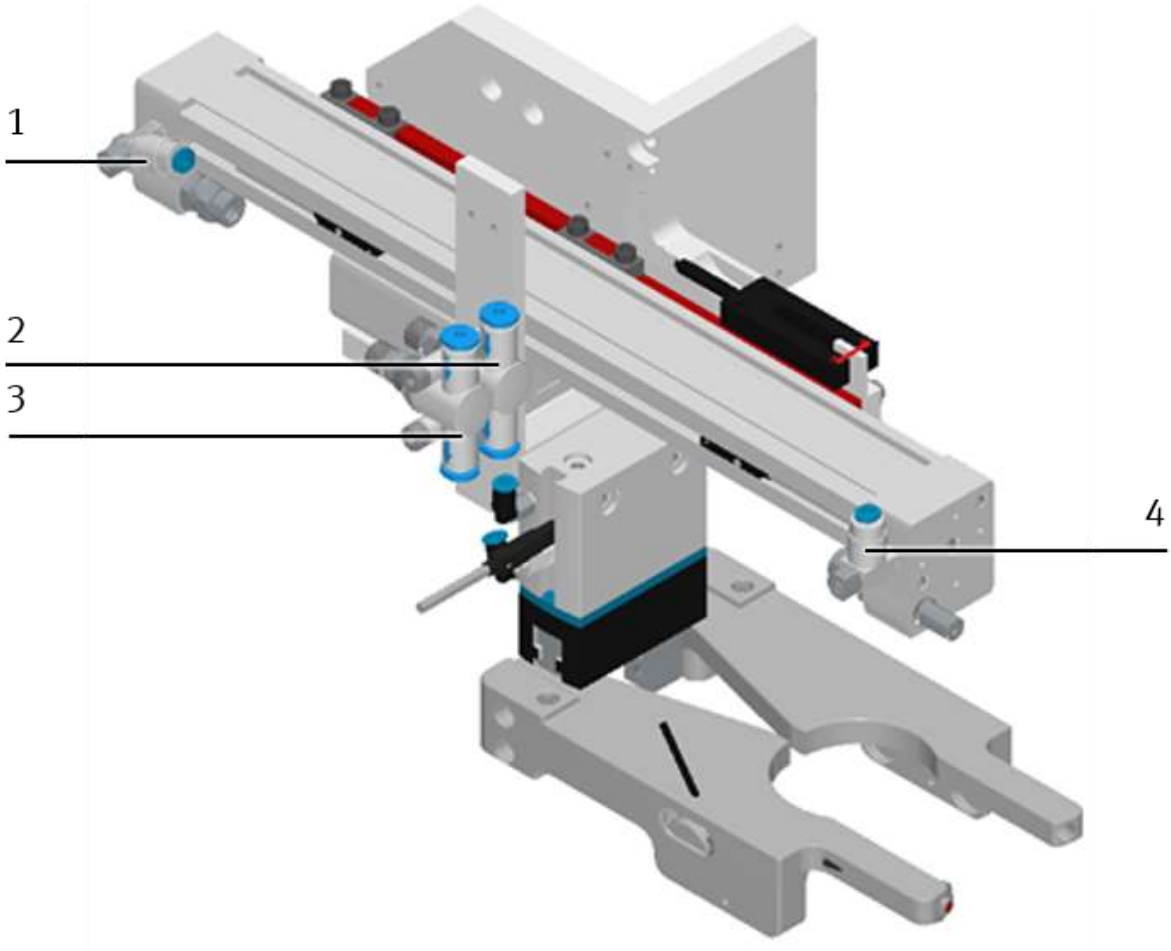
Documents

- data sheets
  Fibre-Optic Unit SOEG-L (165327)

6.10.3 Adjusting the One-way Flow Control Valves

NOTE

– 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 air behaviour even if the load changes).



One-way flow control valves

Position	Description
1	one-way flow control valve X axis
2	one-way flow control valve gripper
3	one-way flow control valve gripper
4	one-way flow control valve X axis

Requirements

– pneumatical connection of the cylinder established
– compressed air supply switched on

Procedure

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

Documents

- Data sheets
  One-way flow control valve (193138)
- Operating instructions
  Pneumatic cylinder (170905)

6.11 Visual Inspection

Visual inspection has to be carried out prior to every commissioning!
Before you start the application module, you must always check the following:

- the electrical connections
- the proper fit and condition of the supply ports
- the mechanical components for visual damages (cracks, loose connections etc.)
- the function of the Emergency-Stop devices

Any discovered damages must be repaired before you start the application module!

6.12 Settings of Offset Sectors

6.12.1 General Information

NOTE

- The setting of the offset sectors is performed at the HMI (see chapter „Setting the Storing or Retrieving Offset at the HMI“)
- In practice, half the height of the workpiece is indicated as offset sector.

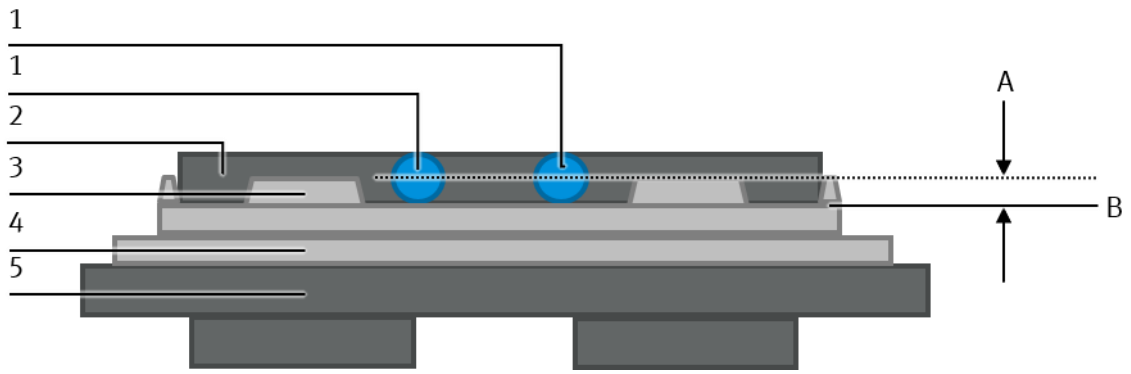
The storing and retrieving offset consists in each case of:

- conveyor offset (can be modified by the user/operator)
- teach offset (can be modified by the user/operator)
- shelf offset (cannot actually be modified by the user/operator)

NOTE

- All 3 offsets can be modified. However, the teach offset is not relevant to the automatic mode operation, but only for teaching the positions. After all, in a storing and retrieving process, you can/ have to indicate an offset for the conveyor and the shelf.

The grip points of the gripper on the workpiece (1) refer to the zero point of the conveyor (conveyor offset) (B) of the workpiece holder (3) on the pallet (4) resp. to the zero point of the shelf (shelf offset) (B) of the shelf.



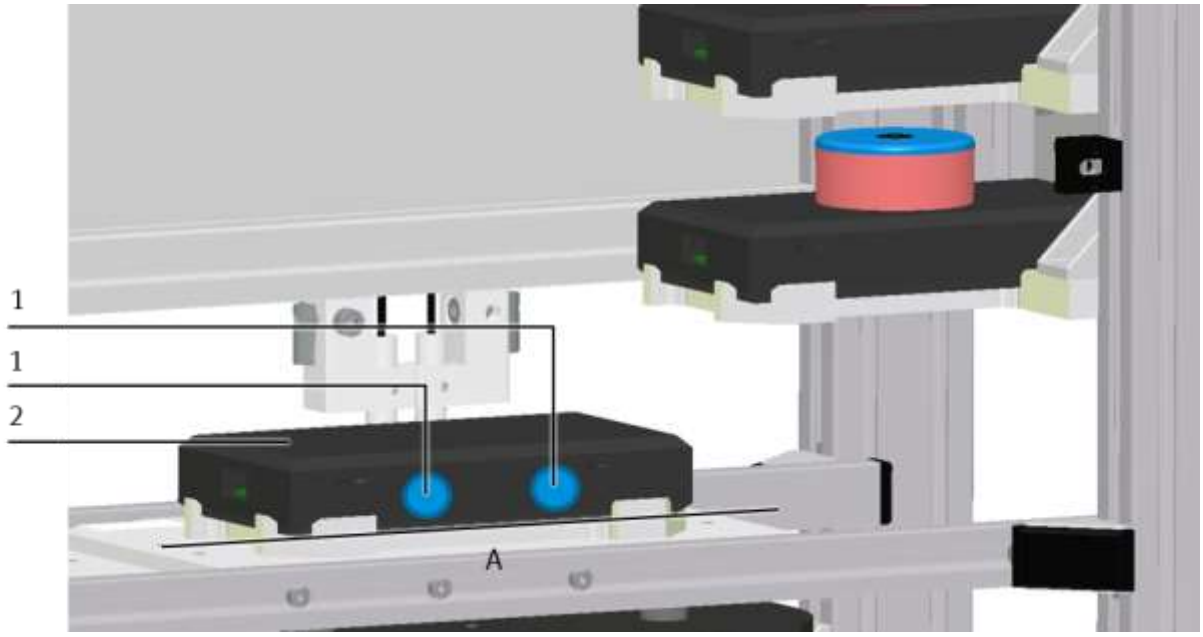
workpiece on the pallet

Position	Description
1	grip points of the gripper on the workpiece
2	workpiece
3	workpiece holder/shelf
4	pallet
5	carrier
A	conveyor offset/shelf offset
B	zero point of conveyor/zero point of shelf (0 mm)

6.12.2 Conveyor Offset

NOTE

- The setting values of the grip points of the workpiece on the conveyor (conveyor offset) may only be 2 ... 40 mm.
- If the centre point of the gripper was directly on the zero point of the conveyor, the conveyor offset would be = 0. Since this is not easy to teach resp. the gripper is not able to reach it at all, it is essential that already in the teaching process, the gripper's centre point has to be positioned above the zero point of the conveyor.
  5 mm are given here (see chapter „Setting the Storing or Retrieving Offset at the HMI“).



conveyor offset

Position	Description
1	grip points of the gripper on the workpiece
2	workpiece
A	zero point of the conveyor (0 mm)

Storing

NOTE

– If the calculated value of the height of the workpiece is ‹ 10 mm, the value for the conveyor offset is always 5 mm (see chapter „Setting the Storing or Retrieving Offset at the HMI“)

How to calculate an example value for a conveyor offset (storing)

- height of workpiece 15 mm (offset sector half the workpiece’s height)

Calculation example
15 mm: 2 = 7.5 mm

In our example, the calculated value of the conveyor offset would be 7.5 mm.

Retrieving

NOTE

– If the calculated value of the height of the workpiece is ‹ 10 mm, the value for the conveyor offset is always 5 mm (see chapter „Setting the Storing or Retrieving Offset at the HMI“)

How to calculate an example value for a conveyor offset (retrieving)

- height of workpiece 15 mm (offset sector half the workpiece’s height)

Calculation example
15 mm: 2 = 7.5 mm

In our example, the calculated value of the conveyor offset would be 7.5 mm.

Retrieving on workpiece available on conveyor

	***NOTE*** – If the calculated value of the height of the workpiece is ‹ 10 mm, the value for the conveyor offset is always 5 mm (see chapter „Setting the Storing or Retrieving Offset at the HMI“)

How to calculate an example value for a conveyor offset (retrieving on a workpiece available on the conveyor)

- height of workpiece 15 mm (offset sector half the workpiece's height)
- height of workpiece 10 mm (workpiece available on conveyor/pallet)

Calculation example
(15 mm: 2) + 10 mm = 17.5 mm

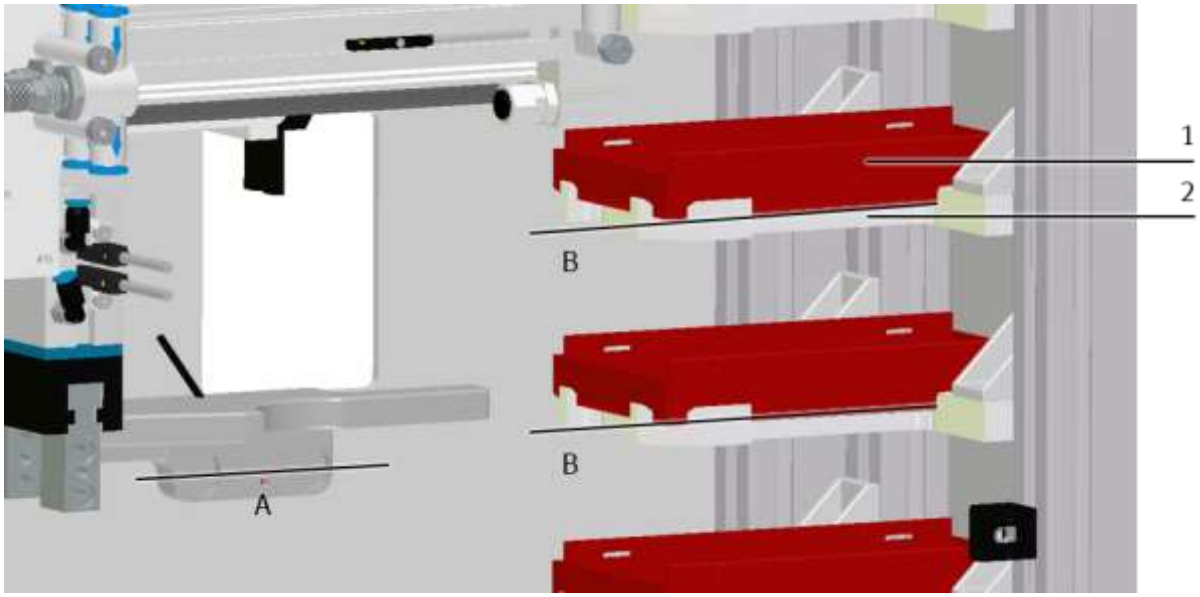
In our example, the calculated value of the conveyor offset would be 17.5 mm.

6.12.3 Shelf Offset

	***NOTE*** – The setting values of the grip points of the workpiece in the shelf (shelf offset) may only be 1 ... 25 mm.

	**⚠ CAUTION** With values of the shelf offset higher than 25 mm, there will be a collision in the shelf with the shelf above, when extending the gripper.

	***NOTE*** – If the value = 0 was given for the shelf offset, the workpiece would be taken with the gripper's centre point at the level of the zero point of the shelf. Since this does not make any sense for the workpiece, you also have to pre-set an offset value for the shelf (shelf offset). On this level, the workpiece will then be taken.



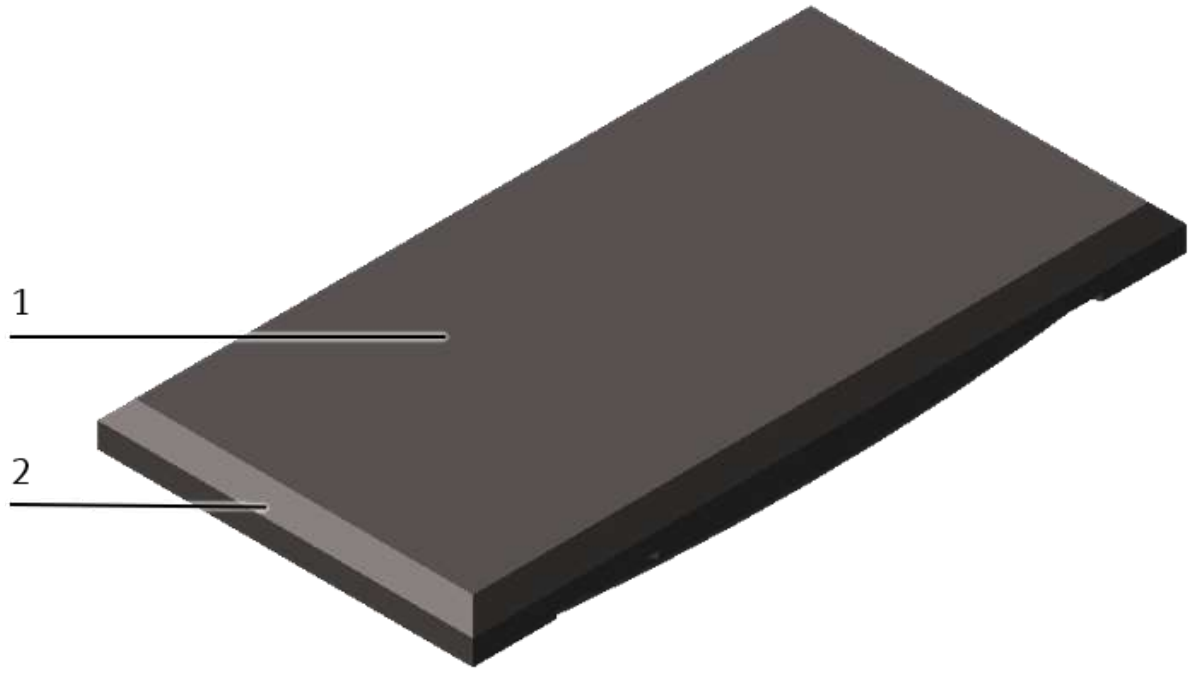
shelf offset

Position	Description
1	workpiece
2	shelf
A	centre point of gripper
B	zero point of shelf (0 mm)

Shelfs milled

The workpieces as well as the shelfs have a milled edge. The milled edge of the shelfs amounts to a value of 2 mm. Therefore, workpieces with a milled edge (milled edge must point downwards) can lie neatly-guided in the shelf. The workpieces, however, are therefore located by 2 mm below the zero point of the shelf. You strictly have to observe the 2 mm when calculating the shelf offset.

	NOTE
	– If the shelfs do not have a milled edge inside, you can neglect the 2 mm.



workpiece with milled edge

Position	Description
1	workpiece
2	milled edge

Storing or retrieving

NOTE

– If the calculated value of the height of the workpiece is ‹ 10 mm, the value for the shelf offset is always 5 mm (see chapter „Setting the Storing or Retrieving Offset at the HMI“).

How to calculate an example for a shelf offset (storing or retrieving)

- height of workpiece 15 mm (offset sector half the workpiece’s height)

Calculation example
15 mm: 2 = 7.5 mm

In our example, the calculated value of the shelf offset would be 7.5 mm.

Storing or retrieving (workpiece with milled edge)

NOTE

– If the calculated value of the height of the workpiece is ‹ 10 mm, the value for the shelf offset is always 5 mm (see chapter „Setting the Storing or Retrieving Offset at the HMI“).
– Consider subtracting the 2 mm (workpiece and shelf with milled edge) from the height of the workpiece!

How to calculate an example value for a shelf offset (workpiece and shelf with milled edge)

- height of workpiece 15 mm (offset sector half the workpiece’s height)
- 2 mm below the zero point of the shelf (workpiece with milled edge)

Calculation example
(15 mm – 2 mm):2 = 6.5 mm

In our example, the calculated value of the shelf offset would be 6.5 mm.

6.12.4 Approach Position of the Shelf for Extending the X Axis

NOTE

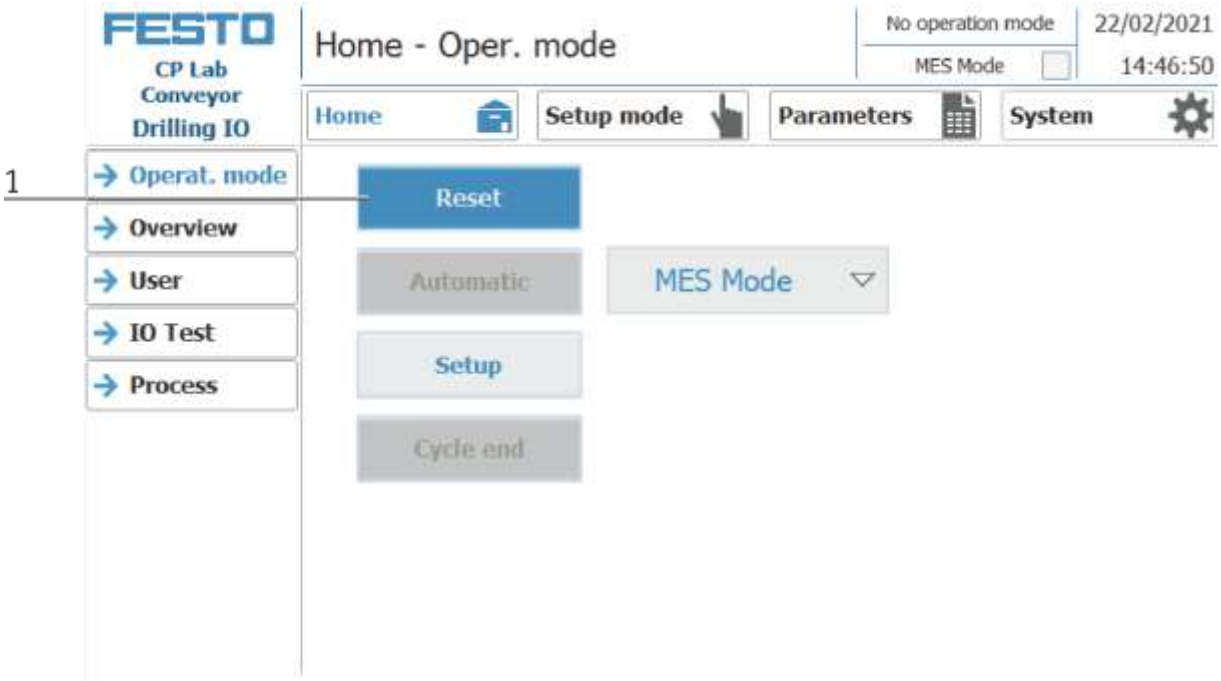
– Actually, the operator/user does not have any influence on the approach position opposite the shelf. The handling has to move over the shelf in order to be able to extend the X axis. This is opposite the zero point of the shelf the maximum height (25 mm) in order to be able to extend the X axis with the gripper without collision. The workpiece is now placed, respectively gripped, opposite the zero point of the shelf with the shelf offset.

7 Operation

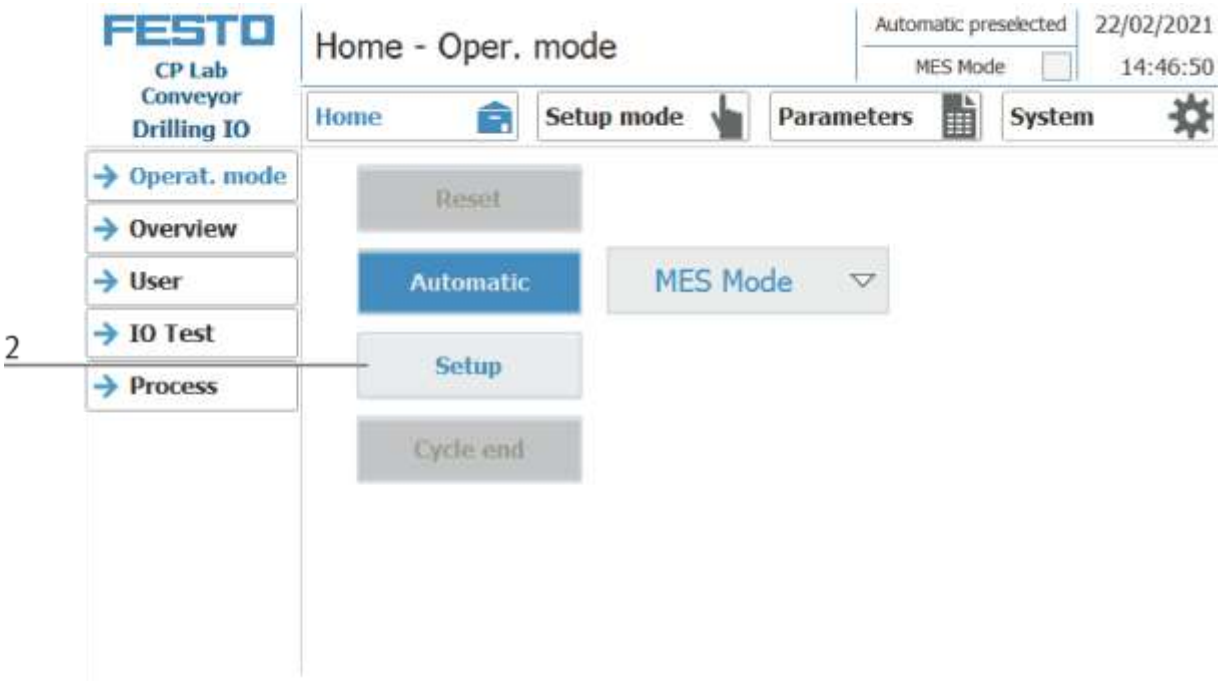
An application module has no control elements. Operation of the application module is only possible when it is mounted on a basic module of the CP-Lab or CP-Factory system.
The operation of the application module can be realized by every customer according to his wishes, the supplied programs are only an operating suggestion with which the application module is on CP-Lab or CP-Factory System can be operated. Own operating concepts or external controls are also possible.
If the application module is mounted on a CP Lab or a CP Factory basic module, the general operation for this is described in the manuals of the CP Lab or CP Factory system. All application-specific information is described in this manual for the application module.

7.1 Setting the application module at HMI

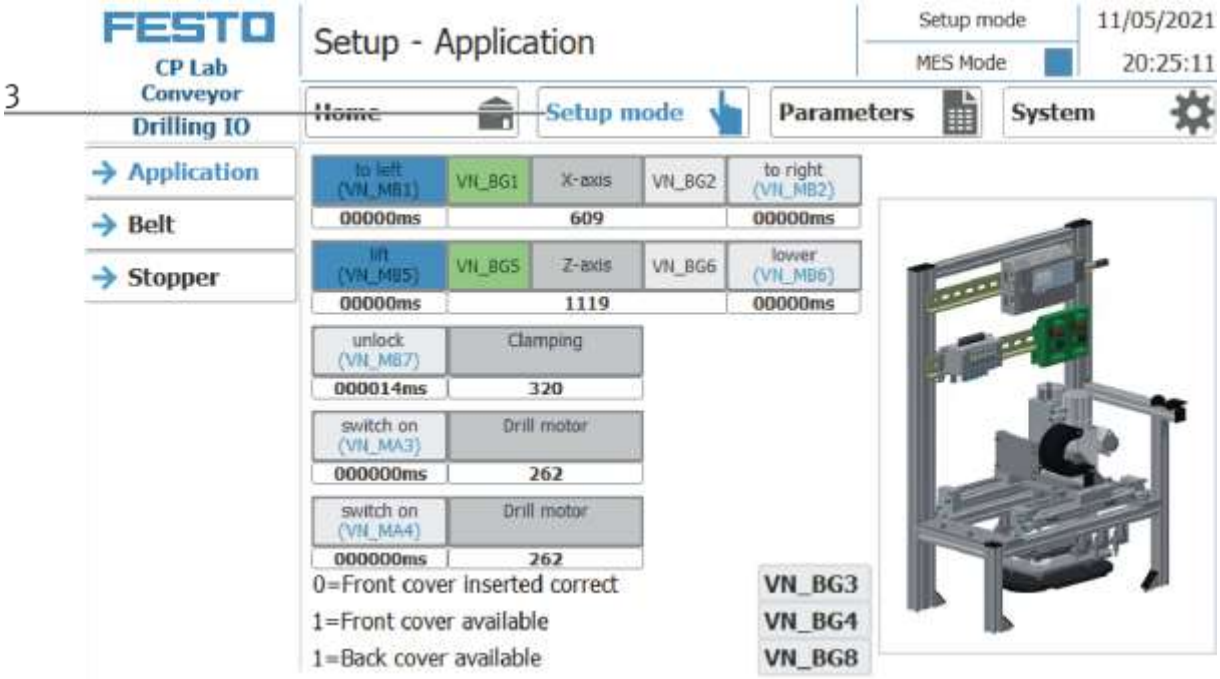
1. If the application module has not yet started, click on the Setup button under Operating mode on the home screen. The application module moves into its basic position



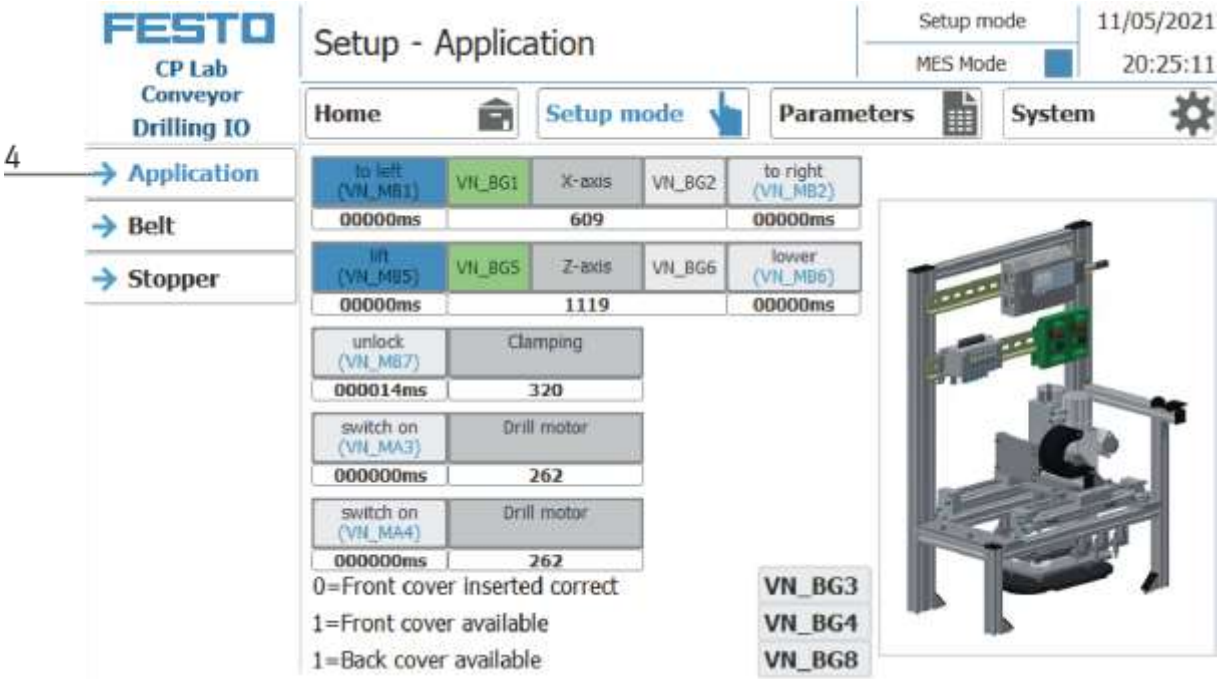
2. Then click on Setup, setup mode is active.



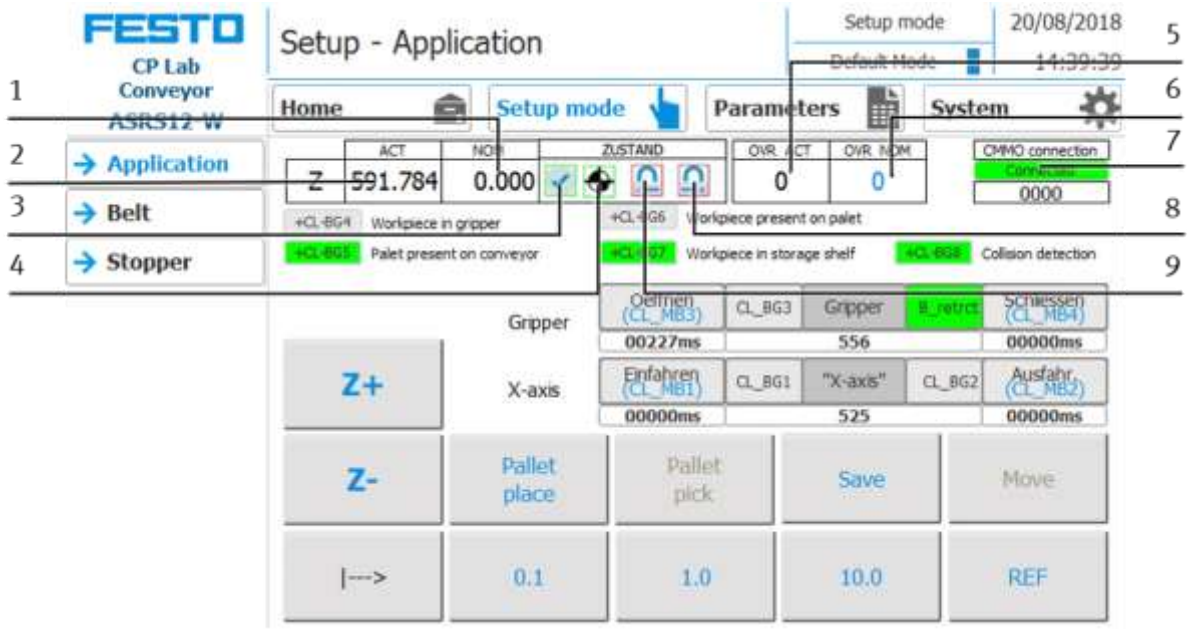
3. Change to Setup mode page.



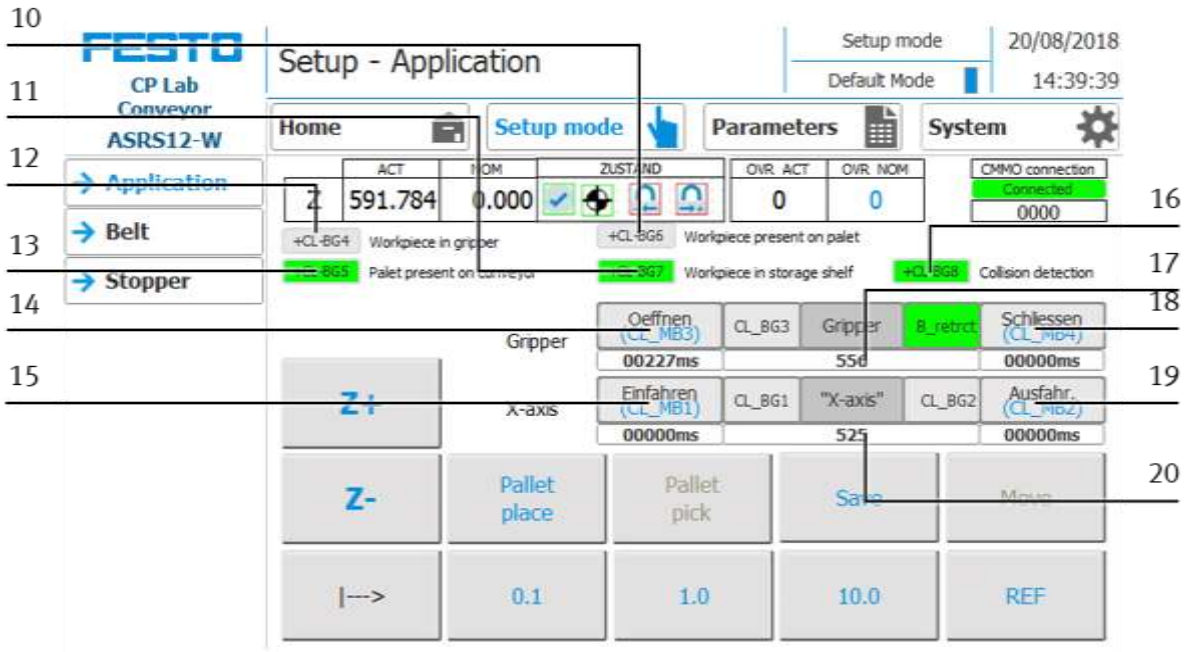
4. Choose application



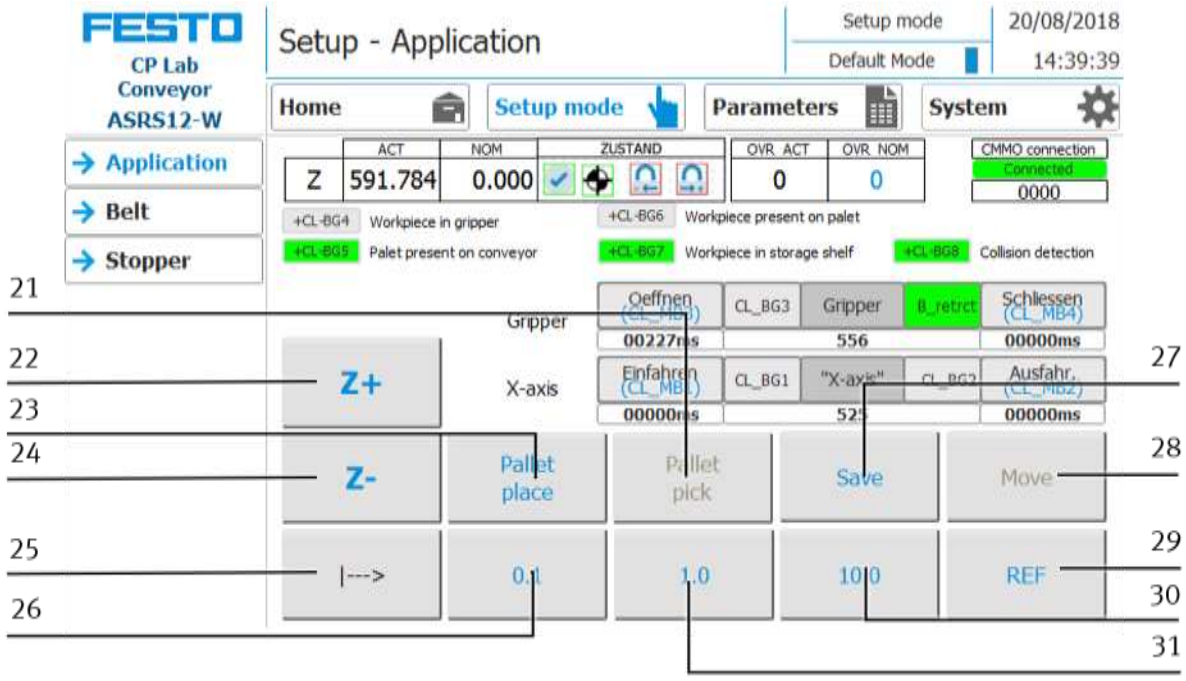
5. Application is selected to set up the application module. The corresponding actuators can be started by pressing the buttons. All other areas are for display purposes and cannot be influenced.



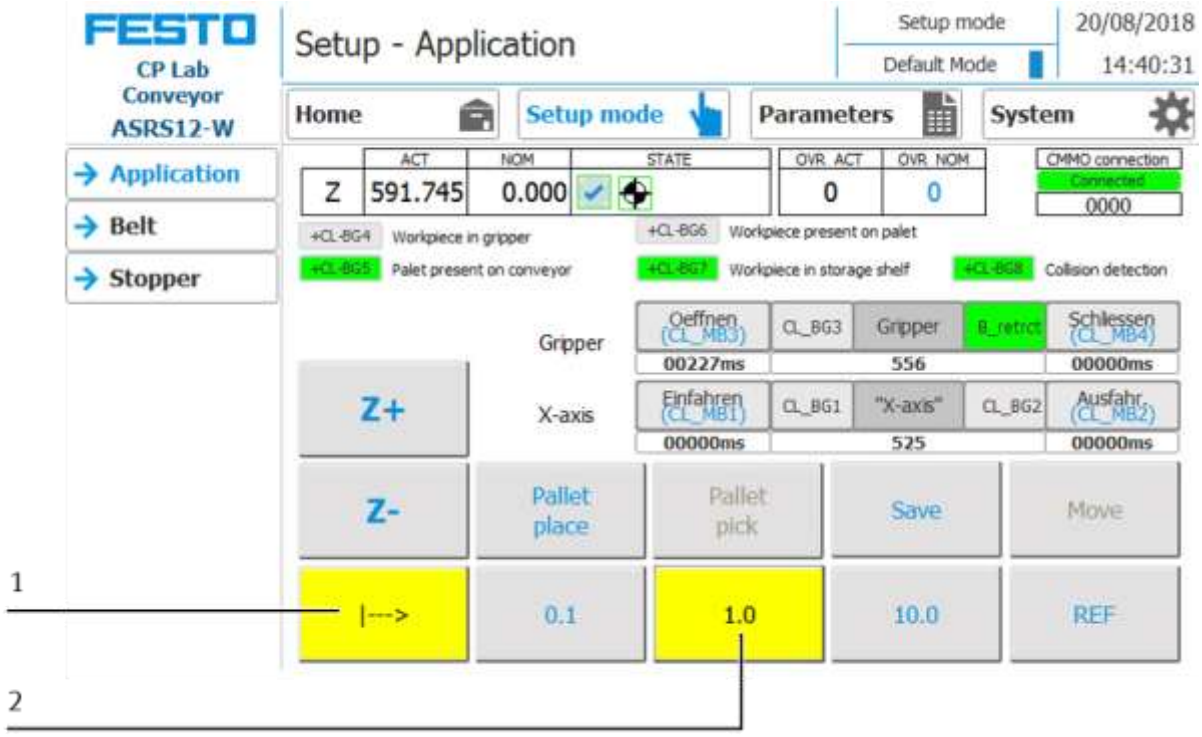
Position	Description
1	Z (SETPOINT) setpoint position of Z axis (e.g. when positioning)
2	Z (ACTUAL) actual position of Z axis is displayed
3	Z (STATUS)  controller release
4	Z (STATUS)  drive unit is referenced
5	Z (OVR ACTUAL) actual override of Z axis in % (100 = maximum value)
6	Z (OVR SETPOINT) setpoint override of Z axis in % (100 = maximum value)
7	CMMO connection connection to motor controller (display area red = no, display area green = yes)
8	Z (STATUS)  software end position positive
9	Z (STATUS)  software end position negative



Position	Description
10	+CL-BG6 workpiece available on pallet (display area grey= no, display area green= yes)
11	+CL-BG7 workpiece in storing place (display area grey= no, display area green= yes)
12	+CL-BG4 workpiece available in gripper/detected (display area grey= no, display area green= yes)
13	+CL-BG5 pallet available on conveyor (display area grey= no, display area green= yes)
14	gripper (opening) opens the gripper
15	X axis (retracting) drive X axis to the left
16	+CL-BG8 collision detection (display area red = collision detected, display area green = no collision)
17	gripper number of actuations (total)
18	gripper (closing) closes the gripper
19	X axis (extending) drive X axis to the right
20	X axis number of actuations (total)



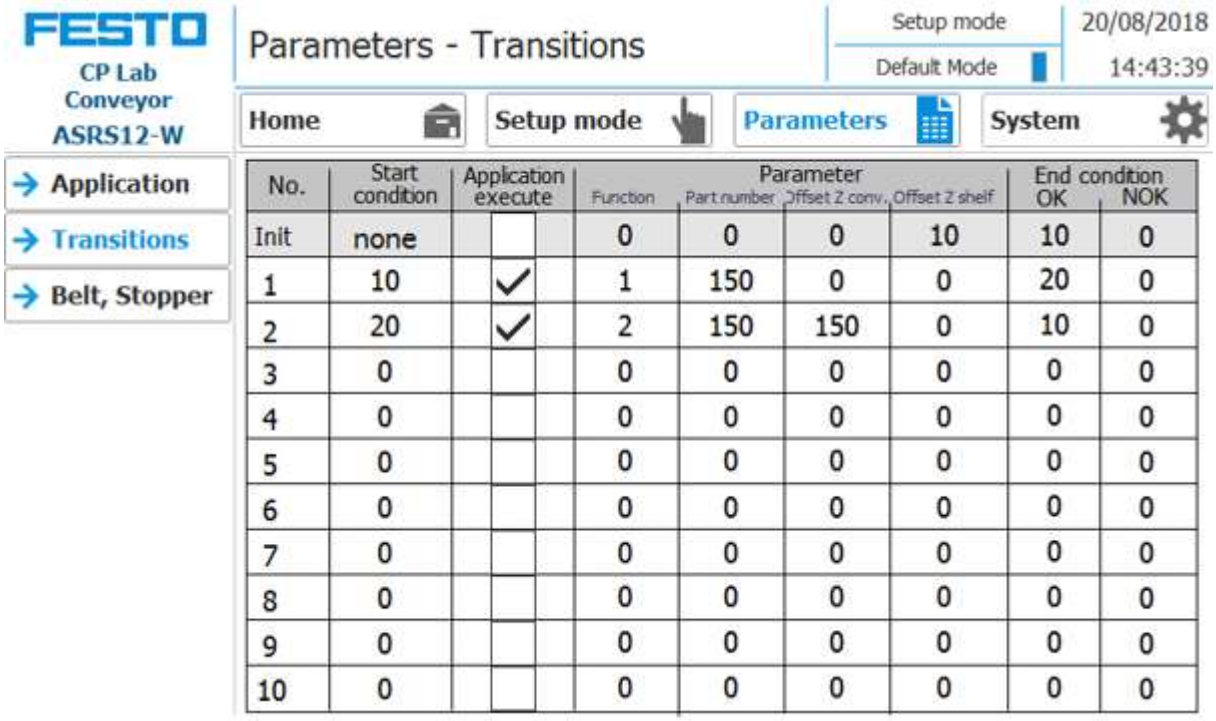
Position	Description
21	lift pallet pallet is lifted
22	Z+ Z axis is driven downwards
23	place pallet pallet is placed
24	Z- Z axis is driven upwards
25	I--->› preselection incremental positioning (in connection with position 23, 27, 28)
26	0.1 preselection incremental positioning by 0.1 mm
27	Save If you press this button you will get to the menu for the setup of the conveyor offset and shelf offset
28	Approach A new window opens up – here you can select the shelf desired, and the handling drives to that position.
29	REF The handling performs a reference run.
30	10.0 Preselection incremental positioning by 10 mm
31	1.0 Preselection incremental positioning by 1 mm



preselection incremental positioning (1) by 1 mm (2).

7.2 Transitions of the application module

The transitions are located in the Parameters submenu



No.	Start condition	Application execute	Parameter				End condition	
			Function	Part number	Offset Z conv.	Offset Z shelf	OK	NOK
Init	none		0	0	0	10	10	0
1	10	✓	1	150	0	0	20	0
2	20	✓	2	150	150	0	10	0
3	0		0	0	0	0	0	0
4	0		0	0	0	0	0	0
5	0		0	0	0	0	0	0
6	0		0	0	0	0	0	0
7	0		0	0	0	0	0	0
8	0		0	0	0	0	0	0
9	0		0	0	0	0	0	0
10	0		0	0	0	0	0	0

7.3 Process of application module

In the menu item „home-process“, you can see the inventory on stock of the CP Application Module ASRS for Workpieces. The display is dependent on the selected mode (MES or Default).

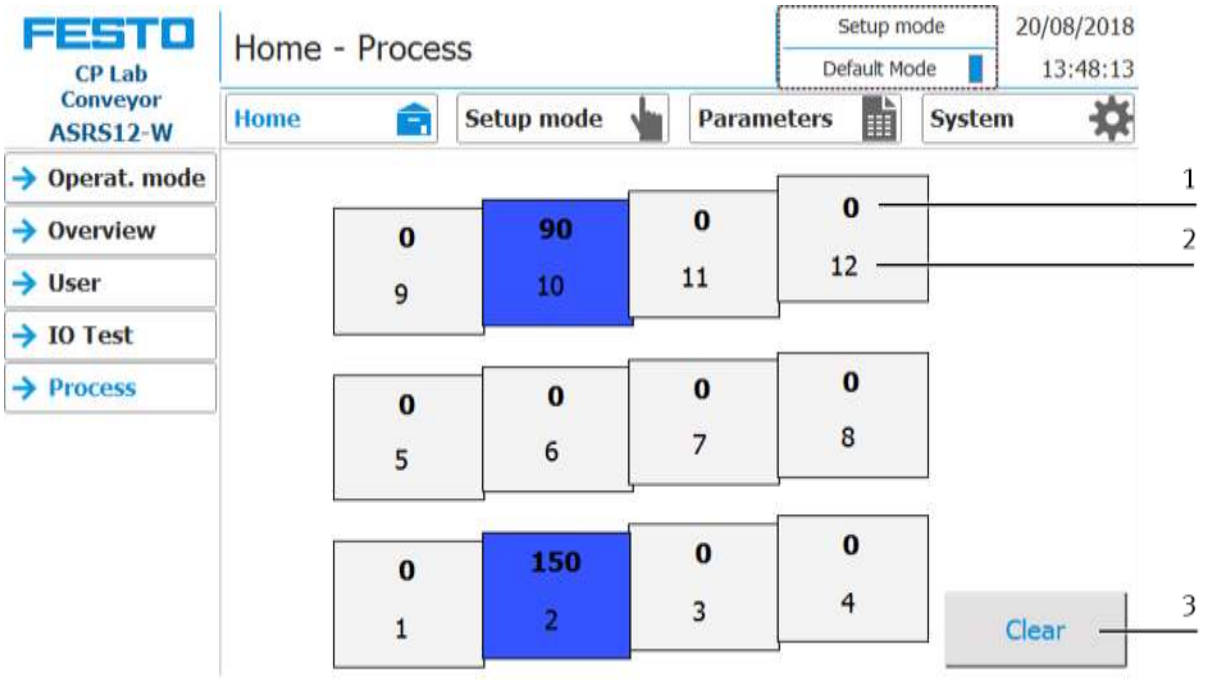
There are two states:

- Field (rectangle) with blue background:
  There is a workpiece in the shelf.
- Field (rectangle) with white/grey background:
  There is no workpiece in the shelf.

MES Mode

Position	Description
1	the number of the shelf is displayed here
2	PNo: the part number is displayed here
3	ONo: the order number is displayed here
4	Pos: the order position is displayed here

Home - Process



Default Mode

Position	Description
1	the part number is displayed here
2	the number of the shelf is displayed here
3	button „Clear“

By pressing the „Clear“ button (3), you can set all shelfs to 0.

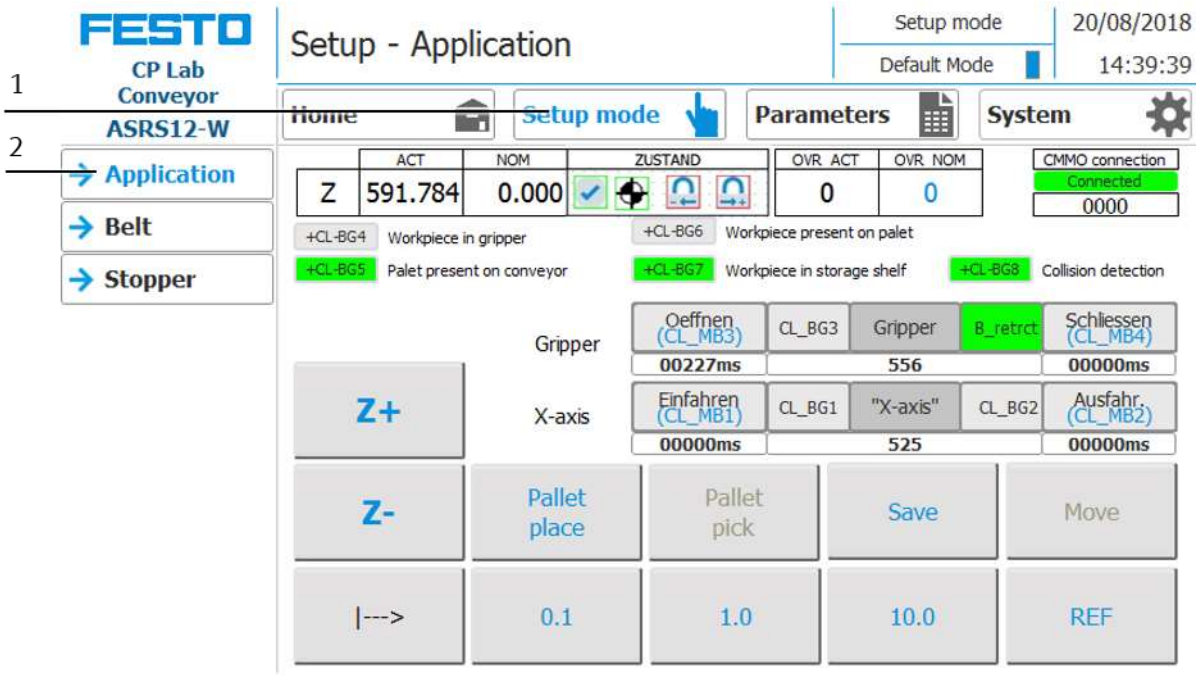
	***NOTE***
	– Please see to it that all ASRS shelfs are emptied.

7.4 Setting a Storing or Retrieving Offset at the HMI

For setting the storing or retrieving offset, you have to set the CP Application Module ASRS for Workpieces into the Setup Mode.

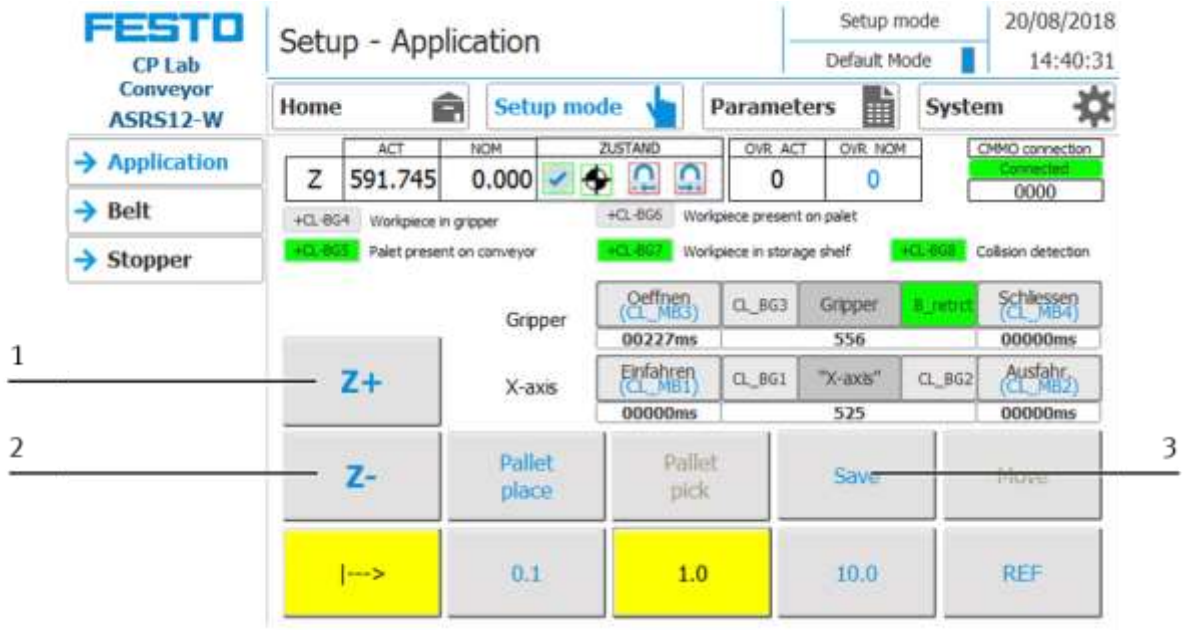
Press the button „Setup“ (1) on the start screen.

Switch to the menu page „Setup“ (1) and select the submenu „Application“ (2).



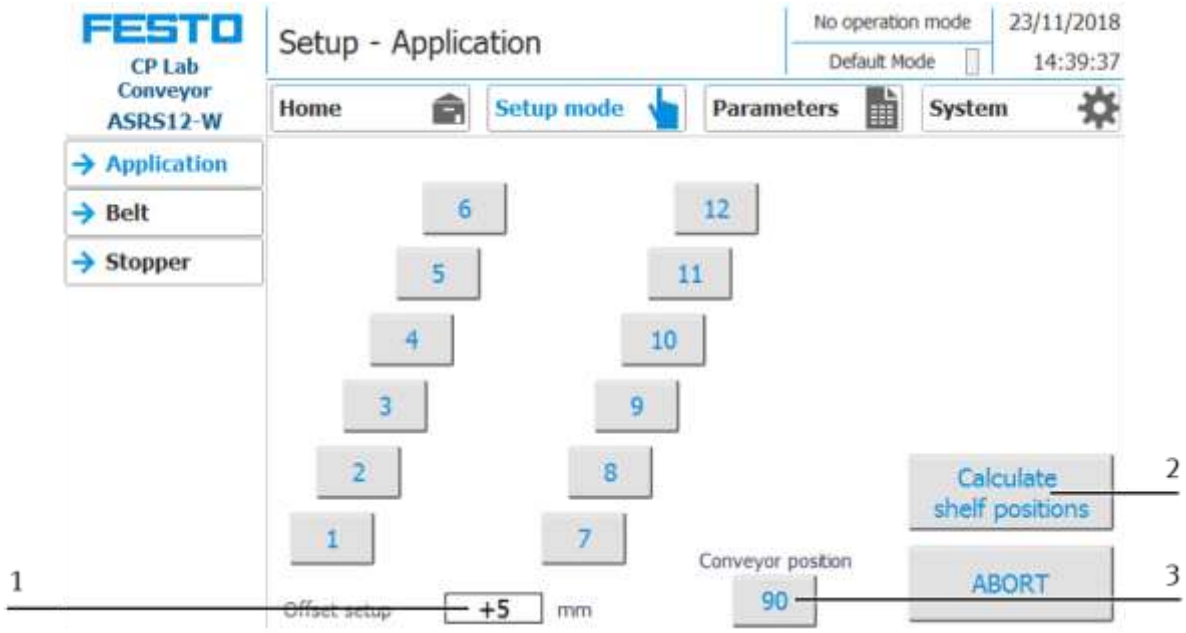
7.4.1 Teaching the Conveyor Position
Storing or Retrieving

	NOTE
	– In practice, half the workpiece's height is specified as offset sector.



Here it is described how you teach the conveyor position. When storing the position, however, the offset of the approached position opposite the zero point of the conveyor is considered.

1. For teaching, move the handling manually with the buttons „Z+“ (1) and „Z-“ (2) to the stopper position of the conveyor, since usually the zero point of the pallet cannot be approached by the zero point of the gripper.
2. Extend gripper and open it.
3. Press the button „Save“ (3), and the content of the page will change.



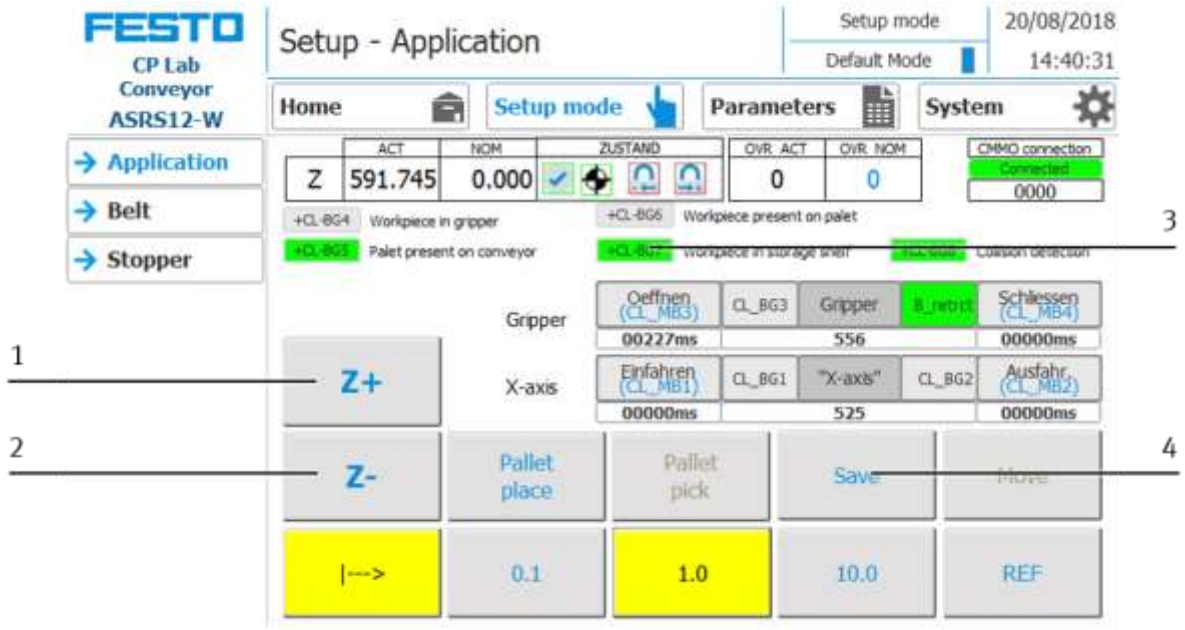
4. Click on the input rectangle „Offset Setup“ (1).
5. Here enter the offset that you have approached with the gripper’s centre point opposite the conveyor’s zero point.
6. Press the button „Conveyor position“ (3).
7. Press the button „Calculate position“ (2).
8. The content of the input window changes and the teaching of the conveyor position is finished.

	NOTE
	– After teaching, you should approach the stopper position of the conveyor manually, in order to check if the gripper is able to grip the workpiece and to transport it without collision into or out of the workpiece holder on the pallet.

7.4.2 Teaching the Shelf Position

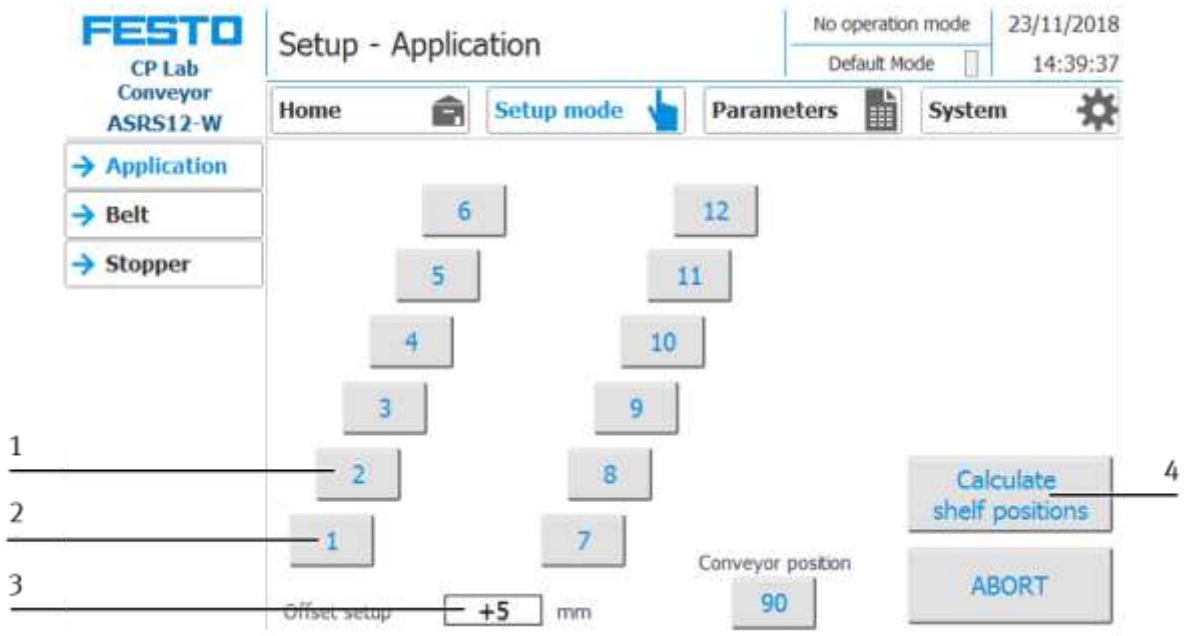
Storing or Retrieving

	NOTE
	– In practice, half the workpiece's height is specified as offset sector.



Here is a description of how to teach the shelf positions:

1. For teaching the position, move the handling manually with the buttons „Z+“ (1) and „Z-“ (2) to shelf 1 of the ASRS.
2. The sensor BG7 (3) in the gripper checks if there is a workpiece in the shelf.
3. Extend the gripper and open it.
4. Press the button „Save“ (4), and the content of the page will change.



5. Click on the input rectangle „Offset Setup“ (3).
6. Here you enter the offset that you have approached with the gripper’s centre point opposite the zero point of the shelf.
7. Press the button „1“ (shelf 1) (2) that you have approached with the handling .
8. Press the button „Calculate position“ (4).
9. The content of the input window changes, and the teaching of the shelf position for shelf 1 is finished.
10. For teaching the position, move the handling manually with the buttons „Z+“ (1) and „Z-“ (2) to shelf 2 of the ASRS.
11. Press the button „Save“, and the content of the page will change.
12. Click on the input rectangle „Offset Setup“ (3).
13. Here you enter the offset that you have approached with the gripper’s centre point opposite the zero point of the shelf.
14. Press the button „2“ (shelf 2) (1) that you have approached with the handling.
15. Press the button „Calculate position“ (4).
16. The content of the input window changes and the teaching of the shelf position for shelf 2 is finished.
17. All further positions of the shelfs are calculated automatically, and their teaching is also performed automatically.

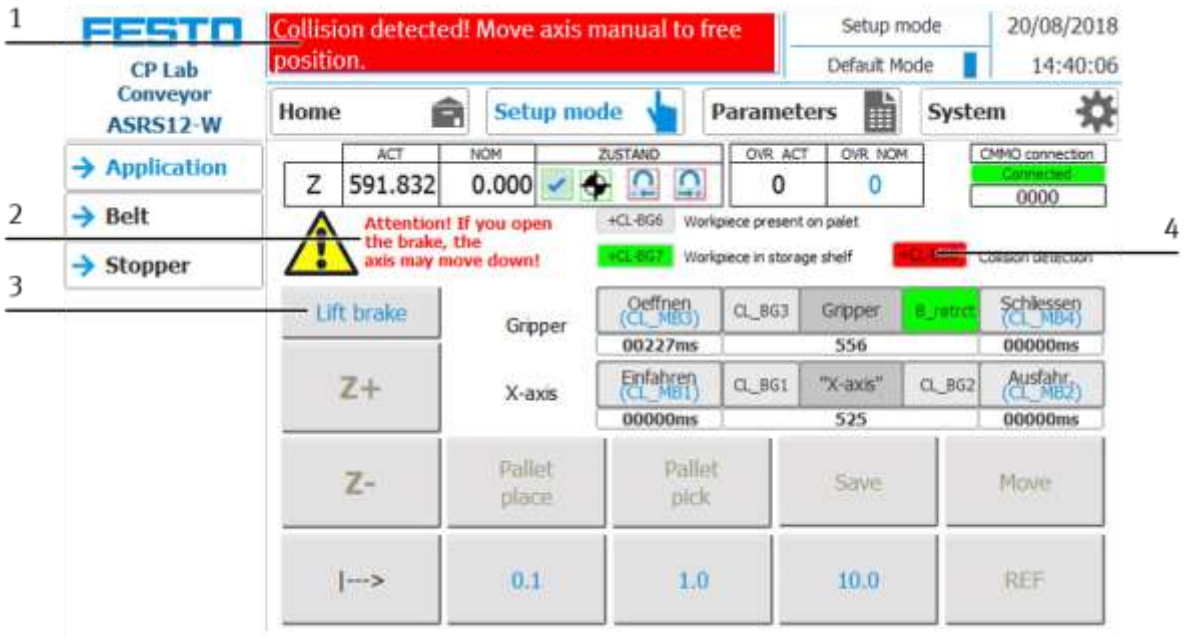
	NOTE
	– After teaching the positions, all shelfs (a maximum of 12 shelfs) should be approached manually, in order to check if the gripper is able to grip the workpiece and to transport it without collision into or out of the workpiece holder in the shelfs.

7.5 Collision Monitoring

7.5.1 Collision of Gripper's Mechanism displayed at the HMI

NOTE

– As soon as a collision has been detected, there is a message (1) displayed at the HMI. Scrolling between the menu pages is still possible.



A collision has happened. The gripper mechanism is moved out of the snap-in point (see chapter „Collision of Gripper Mechanism"). The collision monitoring (4) has detected the collision and has stopped the system. The following messages appear, respectively the colours of the collision monitoring (4) change at the HMI:

- message of a collision(1)
- a pictogram (attention) with corresponding text (2)
- button „Lift Break" (3)
- display collision detection (4) flashing red

No moving of the axis is possible in the Automatic and Setup Mode.
The button „Lift Break" only appears if:

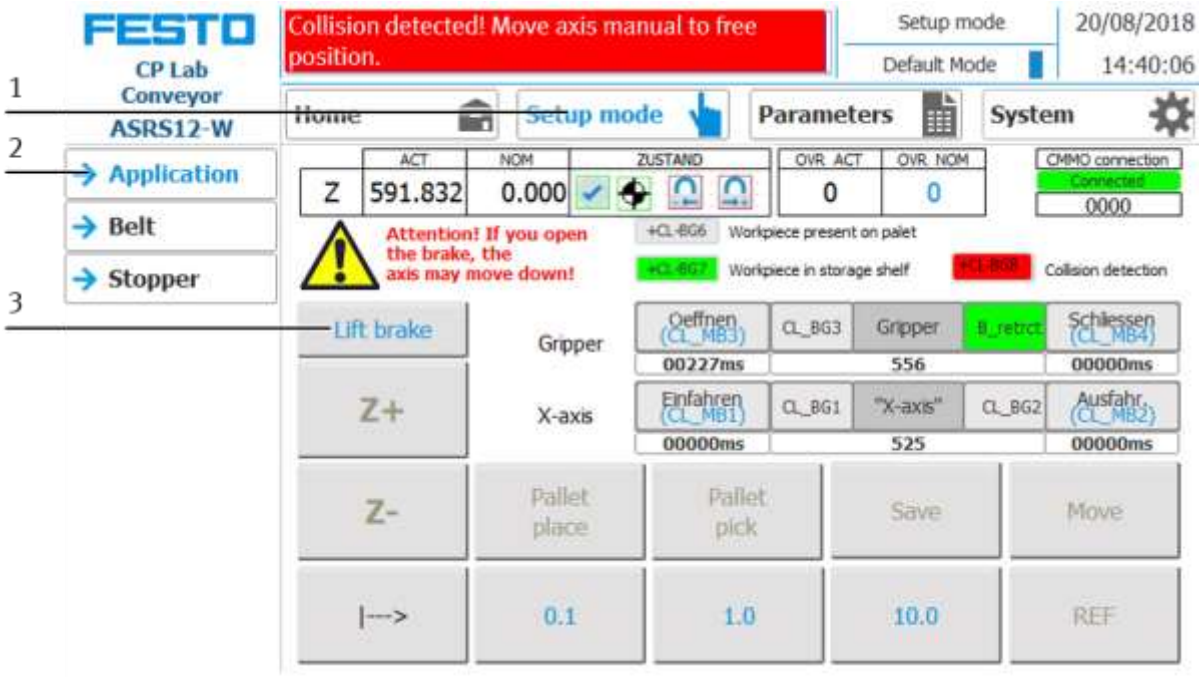
- the sensor BG8 has a signal and the display area collision monitoring (4) is flashing red.
- no operating mode has been selected.

7.5.2 Retrieve the Gripper Mechanism to Horizontal Position

In order to retrieve the gripper mechanism to a horizontal position, you have to take the following steps.

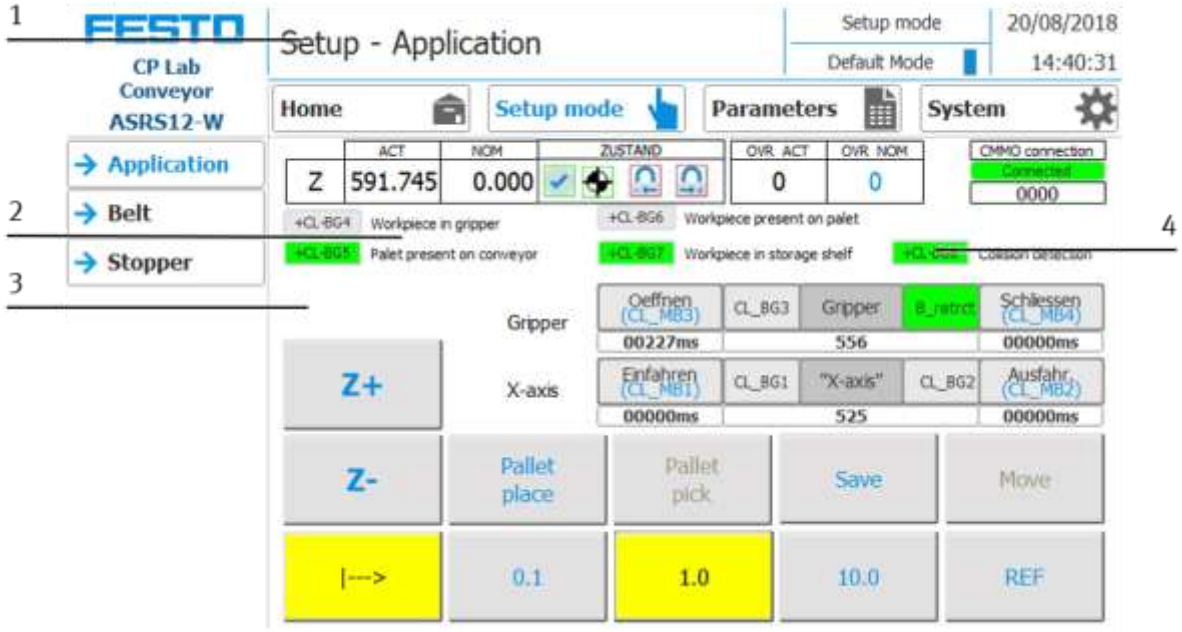
1. Open the front service door.

	NOTE
	– As soon as you have opened the front service door with the key, the stepper motor is switched to a torque-free operation via the STO (Safe Torque Off) function. You can now interfere manually without any safety risk.



2. Press the „Setup“ button (1) on the HMI in order to switch to the menu page „Setup – Application“.
3. Press the button „Application“ (2) on the HMI in order to get to the corresponding submenu.
4. Press the button „Lift Break“ (3) on the HMI while holding the X axis so that it does not move quickly downwards.

	CAUTION
	By pressing the button „Lift Break“, the stopping break of the X axis is opened. On this occasion, the X axis may move very quickly downwards. Therefore, the user/operator has to hold the X axis while lifting the break.

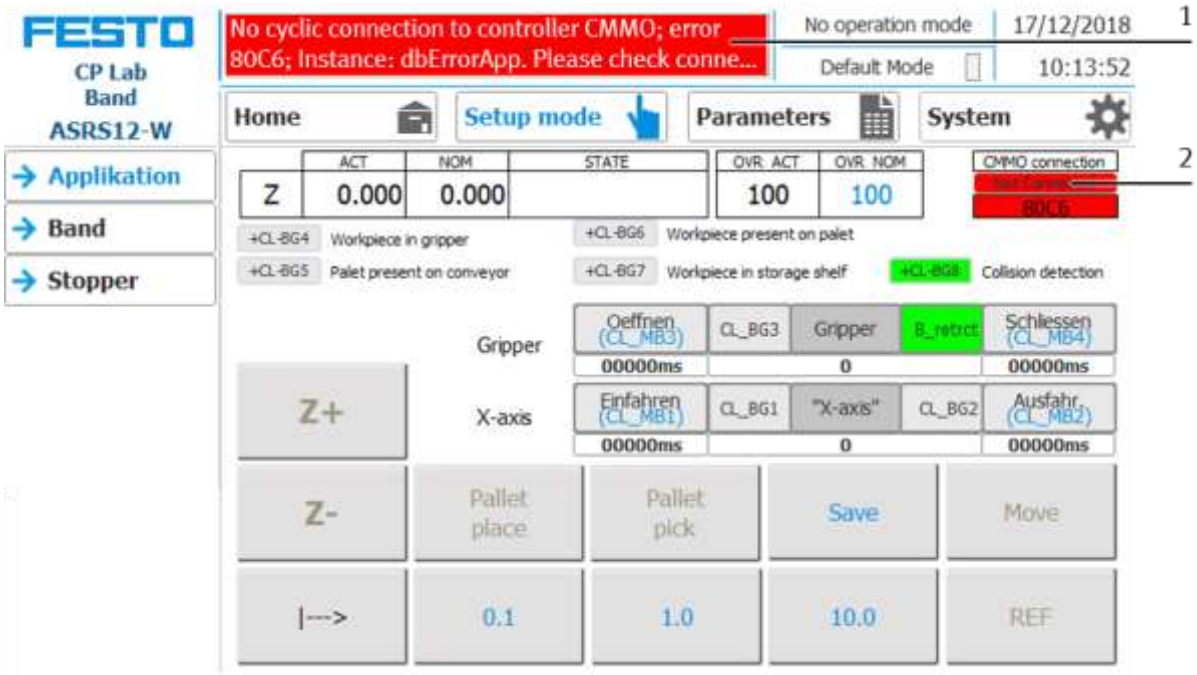


5. Guide the gripper mechanism out of the collision area.
6. Retrieve the gripper mechanism to a horizontal position and engage it, so that sensor BG8 (light barrier sensor) does not carry a signal and the display area of the collision detection (4) is flashing green again.
7. Check if the message of a collision (1) at the HMI has disappeared.
8. Check if the pictogram with the text (2) at the HMI has disappeared.
9. Check if the button „Lift Break“ (3) at the HMI has disappeared.
10. Check if the display area of the collision detection (4) is flashing green.
11. When all criteria have been met, you can close the front service door.
12. The collision monitoring is ready for use again, and the CP Application Module ASRS for Workpieces can be put into operation again.

7.6 Not connected Motor Controller displayed at the HMI

In case the motor controller is not connected, the display CMMO connection (2) is flashing red and the text „Not connected“ appears in the display area. Under the display area „Not connected“, there is the corresponding hex code (hexadecimal code) displayed (see chapter „No TCP connection of the PLC interface to motor controller“). An error message (1) is displayed, too.

	NOTE
	– In case the motor controller is not connected, a message (1) at the HMI is visible. But you can still scroll between the menu pages.



7.7 Process Description

7.7.1 MES Mode

Start Conditions

- The station has been mounted and adjusted correctly.
- The offset sectors are set correctly.
- All required connections have been established in conformity with the safety regulations.
- The compressed air supply is switched on.
- The power supply of the station is switched on.
- The system programmes of the PLC(s) and of the HMI of the station are loaded.
- The PLC(s) are in the Run Mode and the run time of the HMI has been started.
- The Automatic Mode is activated.
- The MES system has been started and is connected with the PLC of the station.
- A work schedule has been set up in the MES system where the station ASRS for Workpieces is contained and parametrized.
- There is an order in the MES system containing the execution of the work schedule.
- The MES mode of the station ASRS for Workpieces is activated.

Process Description Storing a Workpiece

1. The prepared order is started in the MES system.
2. A free carrier is assigned to the order.
3. The carrier runs through all stations defined in the work schedule until it reaches the station ASRS for Workpieces. The transponder of the carrier now contains the current order data for the station ASRS for Workpieces, where the storing shall be performed.
4. There is a pallet and a workpiece on the carrier.
5. At the stopper position, the carrier is recognized by the PLC of the station ASRS for Workpieces via an inductive proximity switch.
6. The transponder of the carrier is read out by the PLC of the station with the RFID read-write head. If the reading was not successful, there is an error message displayed at the HMI of the station.
7. If the reading was successful and the CP Application Module ASRS for Workpieces is ready to start, the PLC of the station sends an enquiry to the MES system on the basis of the read RFID data about a station-specific order for the carrier. If the CP Application Module ASRS for Workpieces is not ready to start, the carrier is released by the stopper.
8. In case there are order data existing, the MES system transfers them to the PLC of the station.
   If not, the carrier is released by the stopper and transferred to the next station.

9. The PLC of the station starts the functional sequence of the CP Application Module ASRS for Workpieces und communicates that to the MES system:
   - The gripper is opened.
   - The handling drives to the stopper position and the gripper is closed.
   - The handling with the gripper and the workpiece is now moved upwards to the corresponding shelf via an axle drive with a toothed belt (Z axis).
   - A sensor in the gripper checks if there is a workpiece in the shelf. This is performed by a light beam, which again is reflected back to the sensor by a reflecting foil on the inside of the transparent pane. If the light beam is reflected, there is no workpiece in the shelf.
   - The X axis drives the gripper (storing offset) to the shelf.
   - The workpiece is placed in the shelf and the gripper is opened.
   - The positioning of the workpiece is finished.
   - The handling is driven with the X axis (storing offset) from the shelf to its basic setting.
10. The functional sequence of the CP Application Module ASRS for Workpieces is finished.
    Special case: The functional sequence has been finished with an error:
    A window opens up at the HMI. The error text is displayed in this window, and the user/operator can restart the function sequence of the CP Application Module ASRS for Workpieces, ignore or cancel it or reset the order in the MES (further information is provided in the operating instructions of the basic module) by pressing the buttons “Repeat”, ”Ignore”, ”Cancel” or “Reject Order”.
11. The parameters are then transferred to the MES system by the PLC of the station.
12. The MES system acknowledges the receipt of the parameters from the PLC of the station.
13. The PLC of the station reports the completed function sequence to the MES system.
14. The MES system acknowledges the message of the PLC of the station and transfers the subsequent order data to the PLC of the station.
15. The PLC of the station writes them on the transponder of the carrier with the RFID read-write head.
16. If no carrier blockade has been recognized in front of the station and if there is no other order for the station, the carrier will be released by the stopper and transferred to the next station.

Process Description Retrieving a Workpiece

1. The prepared order is started in the MES-system.
2. A free carrier is assigned to the order.
3. The carrier runs through all stations defined in the work schedule until it reaches the station ASRS for Workpieces. The transponder of the carrier now contains the current order data for the station ASRS for Workpieces, where the retrieving shall be performed.
4. There is a pallet on the carrier.
5. At the stopper position, the carrier is recognized by the PLC of the station ASRS for Workpieces via an inductive proximity switch.
6. The transponder of the carrier is read out by the PLC of the station with the RFID-read-write head. If the reading was not successful, an error message is displayed at the HMI of the station.
7. If the reading was successful and the CP Application Module ASRS for Workpieces is ready to start, the PLC of the station sends an enquiry to the MES system on the basis of the read RFID data about a station-specific order for the carrier. If the CP Application Module ASRS for Workpieces is not ready to start, the carrier will be released by the stopper.
8. In case there are order data existing, the MES-system transfers them to the PLC of the station.
   If not, the carrier is released by the stopper and transferred to the next station.
9. The PLC of the station starts the functional sequence of the CP Application Module ASRS for Workpieces und communicates that to MES system:
   - The gripper is opened.
   - The handling drives upwards to the corresponding shelf via an axle drive with a toothed belt (Z axis).
   - A sensor in the gripper checks if there is a workpiece in the shelf. This is effected by a light beam, which again is reflected back to the sensor by a reflecting foil on the inside of the transparent pane. If the light beam is not reflected, there is a workpiece in the shelf.
   - The X axis drives the gripper (storing offset) to the shelf.
   - The gripper is closed, and the handling with the workpiece is moved back (storing offset) from the shelf with the X axis.
   - The handling drives downwards to the stopper position with the workpiece via an axle drive with toothed belt (Z axis).
   - The workpiece is put down on the pallet (conveyor offset), and the gripper is opened.
   - The positioning of the workpiece is finished.
   - The handling is driven back to its basic setting.

10. The functional sequence of the CP Application Module ASRS for Workpieces is finished.
    Special case: The functional sequence has been finished with an error:
    A window opens up at the HMI. The error text is displayed in this window, and the user/operator can restart the function sequence of the CP Application Module ASRS for Workpieces, ignore or cancel it or reset the order in the MES (further information is provided in the operating instructions of the basic module) by pressing the buttons “Repeat”, ”Ignore”, ”Cancel” or “Reject Order”.
11. The parameters are then transferred to the MES system by the PLC of the station.
12. The MES system acknowledges the receipt of the parameters from the PLC of the station.
13. The PLC of the station reports the completed function sequence to the MES system.
14. The MES system acknowledges the message of the PLC of the station and transfers the subsequent order data to the PLC of the station.
15. The PLC of the station writes them on the transponder of the carrier with the RFID read-write head.
16. If no carrier blockade has been recognized in front of the station and if there is no other order for the station, the carrier will be released by the stopper and transferred to the next station.

Process retrieving a workpiece and placing it on a workpiece on the conveyor

1. The prepared order is started in the MES system.
2. A free carrier is assigned to the order.
3. The carrier runs through all stations defined in the work schedule until it reaches the station ASRS for Workpieces. The transponder of the carrier now contains the current order data for the station ASRS for Workpieces, where the retrieving shall be performed.
4. Now there is a pallet and a workpiece on the carrier.
5. At the stopper position, the carrier is recognized by the PLC of the station ASRS for Workpieces by an inductive proximity switch.
6. The transponder of the carrier is read out by the PLC of the station with the RFID-read-write head. If the reading was not successful, an error message is displayed at the HMI.
7. If the reading was successful and the CP Application Module ASRS for Workpieces is ready to start, the PLC of the station sends an enquiry to the MES system on the basis of the read RFID data about a station-specific order for the carrier. If the CP Application Module ASRS for Workpieces is not ready to start, the carrier will be released by the stopper.
8. In case there are order data existing, the MES system transfers them to the PLC of the station.
   If not, the carrier is released by the stopper and transferred to the next station.

9. The PLC of the station starts the functional sequence of the CP Application Module ASRS for Workpieces und communicates that to the MES system:
   - The gripper is opened.
   - The handling drives upwards to the corresponding shelf via an axle drive with a toothed belt (Z axis).
   - A sensor in the gripper checks if there is a workpiece in the shelf. This is effected by a light beam which again is reflected back to the sensor by a reflecting foil on the inside of the transparent pane. If the light beam is not reflected, there is a workpiece in the shelf.
   - The X axis drives the gripper (storing offset) to the shelf.
   - The gripper is closed and the handling with the workpiece is moved back from the shelf with the X axis (storing offset).
   - The handling drives downwards with the workpiece to the stopper position via an axle drive with a toothed belt (Z axis).
   - The workpiece is placed on the workpiece available in the pallet (conveyor offset) and the gripper is opened.
   - The positioning of the workpiece is finished.
   - The handling is driven back to its basic setting.
10. The functional sequence of the CP Application Module ASRS for Workpieces is finished.
    Special case: The functional sequence has been finished with an error:
    A window opens up at the HMI. The error text is displayed in this window, and the user/operator can restart the function sequence of the CP Application Module ASRS for Workpieces, ignore or cancel it or reset the order in the MES (further information is provided in the operating instructions of the basic module) by pressing the buttons “Repeat”, ”Ignore”, ”Cancel” or “Reject Order”.
11. The parameters are then transferred to the MES system by the PLC of the station.
12. The MES system acknowledges the receipt of the parameters from the PLC of the station.
13. The PLC of the station reports the completed function sequence to the MES system.
14. The MES system acknowledges the message of the PLC of the station and transfers the subsequent order data to the PLC of the station.
15. The PLC of the station writes them on the transponder of the carrier with the RFID read-write head.
16. If no carrier blockade has been recognized in front of the station and if there is no other order for the station, the carrier will be released by the stopper and transferred to the next station.

7.7.2 Default Mode

Start conditions

- The station has been mounted and adjusted correctly.
- The offset sectors are set correctly.
- All required connections have been established in conformity with the safety regulations.
- The compressed air supply is switched on.
- The power supply of the station is switched on.
- The system programmes of the PLC(s) and of the HMI of the station are loaded.
- The PLC(s) are in the Run mode and the run time of the HMI has been started.
- The Automatic Mode is activated.
- A carrier, a pallet and a workpiece are prepared.
- There is no carrier in the station.
- The transition table of the station is set up in the HMI.
- A valid status code from the transition table is stored on the transponder of the prepared carrier.
- The Default Mode of the station ASRS for Workpieces is activated.

Sequence description Storing

1. You put the prepared carrier with pallet and workpiece on the conveyor of the station.
2. The carrier is recognized at the stopper position by the PLC of the station ASRS for Workpieces via an inductive proximity switch.
3. The transponder of the carrier is read out by the station's PLC with the RFID read-write head. If the reading was not successful, the carrier is released by the stopper and transferred to the next station. Furthermore, an error message is displayed at the station's HMI. If the reading was successful, however, the carrier remains at the stopper position.

   The read-out RFID data contain, among others, an order data record for the Default Mode.

NOTE

– The sequence will only start if the CP Application Module ASRS for Workpieces has been released for the functional sequence via the HMI. If it has not been released, the CP Application Module ASRS will not start, and the carrier will be released by the stopper (you will find further information on that in the operating instructions of the basic module).

4. If the option for initializing the carrier with a status code has been selected at the HMI, this is performed now.
5. If the status code from the order data record corresponds to a „start condition“ from the transition table of the HMI, the station's PLC will start the functional sequence of the CP Application Module ASRS for Workpieces. If not, the carrier will be released by the stopper and transferred to the next station.

6. If the status code from the order data record corresponds to a “start condition” from the transition table of the HMI, the PLC of the station will take the parameters assigned to the “start condition” from the transition table.
7. The station’s PLC starts the functional sequence of the CP Application Module ASRS for Workpieces:
   - The gripper is opened.
   - The handling drives to the stopper position and the gripper is closed.
   - The handling is now driven upwards to the corresponding shelf via an axle drive with a toothed belt (Z axis).
   - A sensor in the gripper checks if there is a workpiece in the shelf. This is effected by a light beam which again is reflected back to the sensor by a reflecting foil on the inside of the transparent pane. If the light beam is reflected, there is no workpiece in the shelf.
   - The X axis drives the gripper (storing offset) to the shelf.
   - The workpiece is put down in the shelf and the gripper is opened.
   - The positioning of the workpiece is finished.
   - The handling is driven back from the shelf to its basic setting via the X axis (storing offset).
8. The functional sequence of the CP Application Module ASRS for Workpieces is finished.
9. If the application finishes without error, the RFID read-write head takes the status code from OK, when finishing with an error, the status code from NOK. If nothing is written here, an interactive error message is displayed.
10. If no carrier blockade has been recognized in front of the station, the carrier will be released by the stopper and transferred to the next station.

Sequence Description Retrieving a Workpiece

1. You put the prepared carrier with pallet on the conveyor of the station.
2. The carrier is recognized by the PLC of the station ASRS for Workpieces at the stopper position via an inductive proximity switch.
3. The transponder of the carrier is read out by the station’s PLC with the RFID read-write head. If the reading was not successful, the carrier is released by the stopper and transferred to the next station. Furthermore, an error message is displayed at the station’s HMI. If the reading was successful, however, the carrier remains at the stopper position.

   The read-out RFID data contain, among others, an order data record for the Default Mode.

NOTE

– The sequence will only start if the CP Application Module ASRS for Workpieces has been released for the functional sequence via the HMI. If it has not been released, the CP Application Module ASRS will not start, and the carrier will be released by the stopper (you will find further information on that in the operating instructions of the basic module).

4. If the option for initializing the carrier with a status code has been selected at the HMI, this is performed now.
5. If the status code from the order data record corresponds to a „start condition“ from the transition table of the HMI, the station’s PLC will start the functional sequence of the CP Application Module ASRS for Workpieces. If not, the carrier will be released by the stopper and transferred to the next station.
6. If the status code from the order data record corresponds to a “start condition” from the transition table of the HMI, the PLC of the station will take the parameters assigned to the “start condition” from the transition table.
7. The station’s PLC starts the functional sequence of the CP Application Module ASRS for Workpieces:
   - The gripper is opened.
   - The handling drives upwards to the corresponding shelf via an axle drive with a toothed belt (Z axis).
   - A sensor in the gripper checks if there is of a workpiece in the shelf. This is effected by a light beam which again is reflected back to the sensor by a reflecting foil on the inside of the transparent pane. If the light beam is not reflected, there is a workpiece in the shelf.
   - The X axis moves the gripper (storing offset) to the shelf.
   - The gripper is closed and the handling with the workpiece is moved back from the shelf (storing offset) via the X axis.
   - The handling drives downwards with the workpiece to the stopper position via an axle drive with a toothed belt (Z axis).
   - The workpiece is placed on the pallet (conveyor offset) and the gripper is opened.
   - The positioning of the workpiece is finished.
   - The handling drives back to its basic setting.
8. The functional sequence of the CP Application Module ASRS for Workpieces is finished.
9. If the application finishes without error, the RFID read-write head takes the status code from OK, if it finishes with error, the status code from NOK. If nothing is written here, an interactive error message is displayed.
10. If no carrier blockade has been recognized in front of the station, the carrier will be released by the stopper and transferred to the next station.

Sequence description retrieving a workpiece and placing it on a workpiece available on the conveyor

1. You put the prepared carrier with pallet and workpiece on the conveyor of the station.
2. The carrier is recognized by the PLC of the station ASRS for Workpieces at the stopper position via an inductive proximity switch.
3. The transponder of the carrier is read out by the station’s PLC with the RFID read-write head. If the reading was not successful, the carrier is released by the stopper and transferred to the next station. Furthermore, an error message is displayed at the station’s HMI. If the reading was successful, however, the carrier remains at the stopper position.
   The read-out RFID data contain, among others, an order data record for the Default Mode.

NOTE

– The sequence will only start if the CP Application Module ASRS for Workpieces has been released for the functional sequence via the HMI. If it has not been released, the CP Application Module ASRS will not start, and the carrier will be released by the stopper (you will find further information on that in the operating instructions of the basic module).

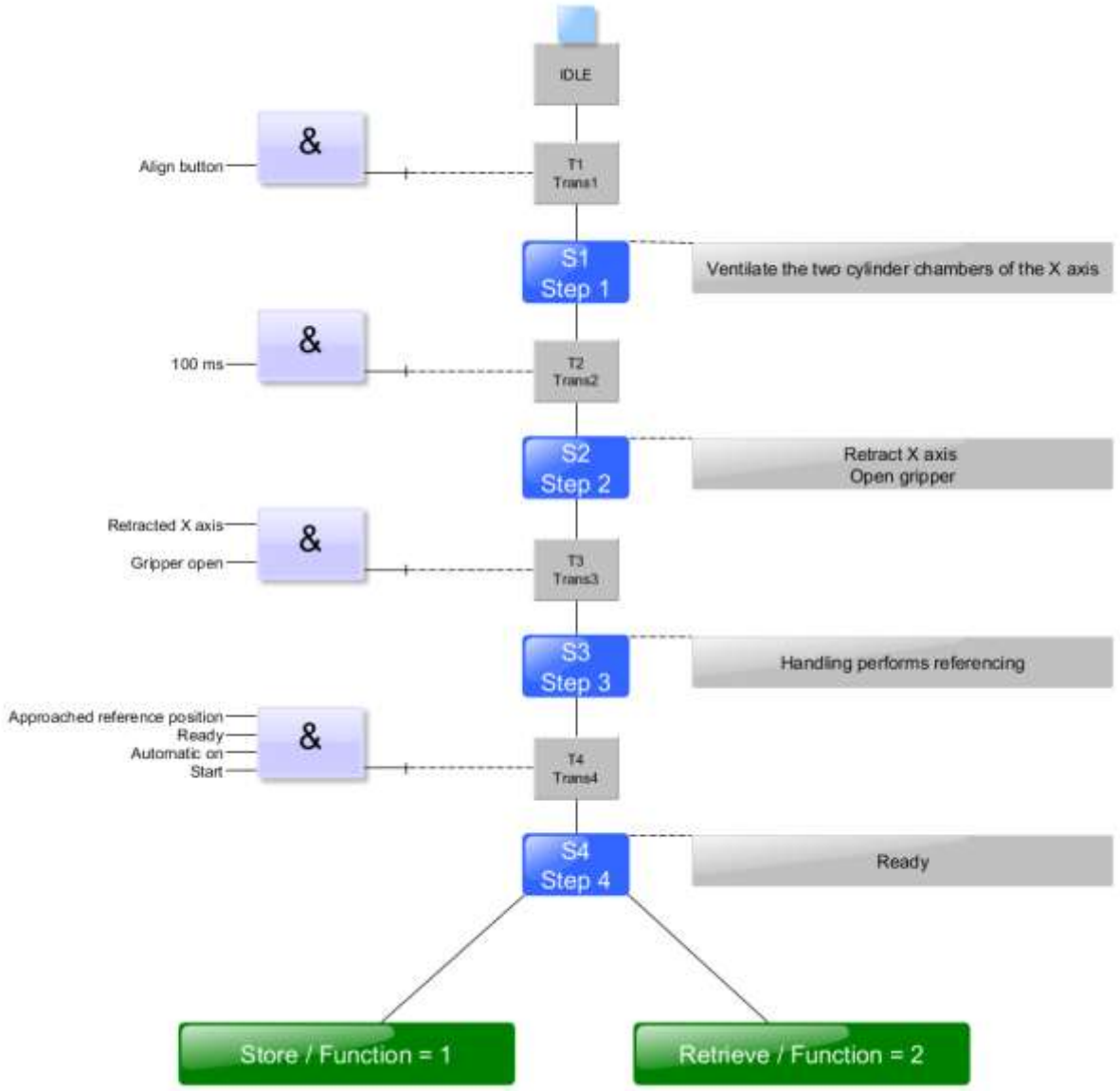
4. If the option for initializing the carrier with a status code has been selected at the HMI, this is performed now.
5. If the status code from the order data record corresponds to a „start condition“ from the transition table of the HMI, the station’s PLC will start the functional sequence of the CP Application Module ASRS for Workpieces. If not, the carrier will be released by the stopper and transferred to the next station.
6. If the status code from the order data record corresponds to a “start condition” from the transition table of the HMI, the PLC of the station will take the parameters assigned to the “start condition” from the transition table.
7. The station’s PLC starts the functional sequence of the CP Application Module ASRS for Workpieces:
   - The gripper is opened.
   - The handling drives upwards to the corresponding shelf via an axle drive with a toothed belt (Z axis).
   - A sensor in the gripper checks if there is a workpiece in the shelf. This is effected by a light beam which again is reflected back to the sensor by a reflecting foil on the inside of the transparent pane. If the light beam is not reflected, there is a workpiece in the shelf.
   - The X axis moves the gripper (storing offset) to the shelf.
   - The gripper is closed and the handling with the workpiece is moved back from the shelf (storing offset) via the X axis.
   - The handling drives downwards with the workpiece to the stopper position via an axle drive with a toothed belt (Z axis).
   - The workpiece is placed on the workpiece in the pallet (conveyor offset) and the gripper is opened.
   - The positioning of the workpiece is finished.
   - The handling drives back to its basic setting
8. The functional sequence of the CP Application Module ASRS for Workpieces is finished.
9. If the application finishes without error, the RFID read-write head takes the status code from OK, if it finishes with error, the status code from NOK. If nothing is written here, an interactive error message is displayed.
10. If no carrier blockade has been recognized in front of the station, the carrier will be released by the stopper and transferred to the next station.

7.7.3 Sequence Function Chart of the CP Application Module ASRS for Workpieces

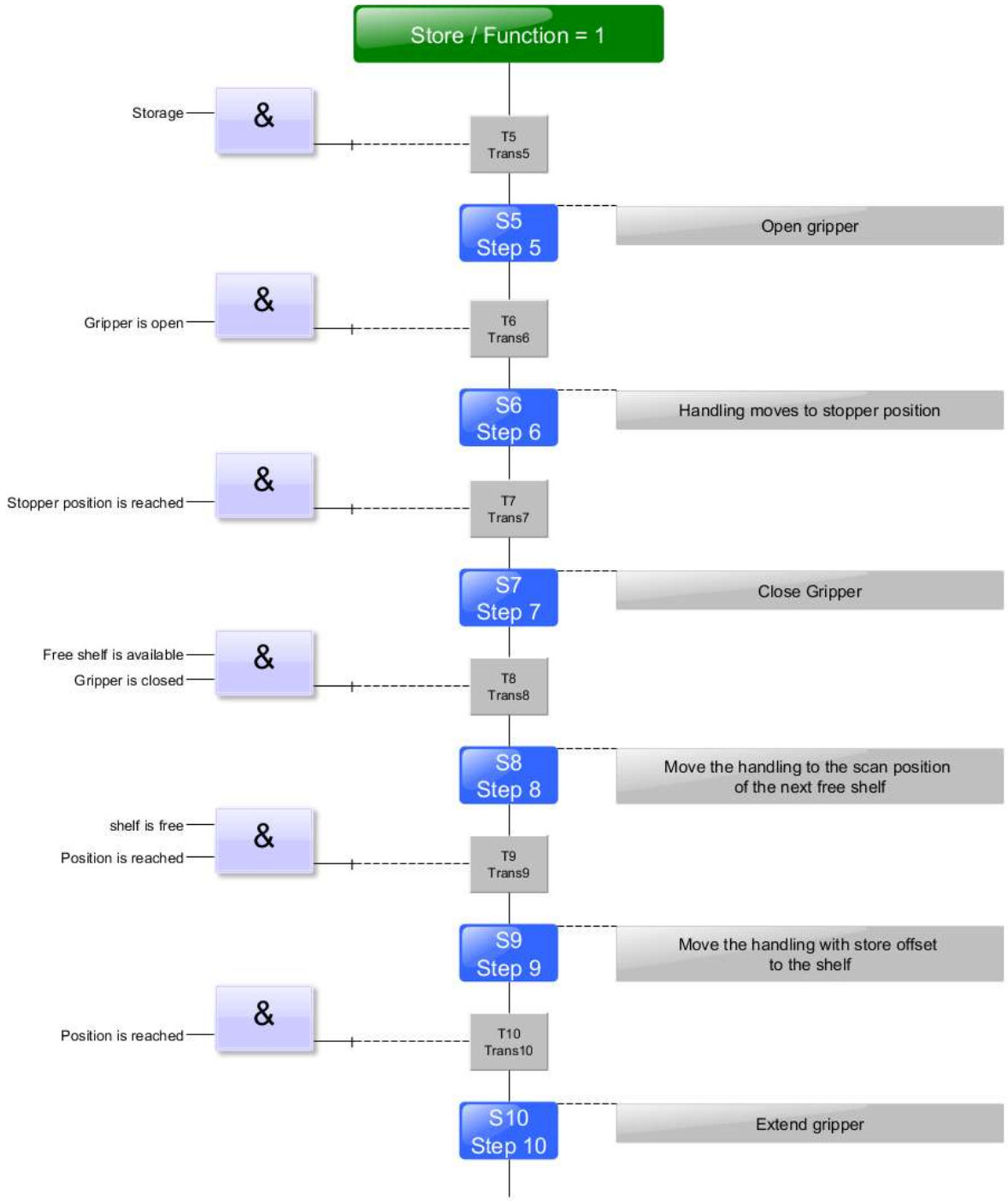
	NOTE
	– The sequence function chart of the basic module is explained in the operating instructions of the basic module

Only the sequence function chart for the CP Application Module ASRS for Workpieces is described as follows:

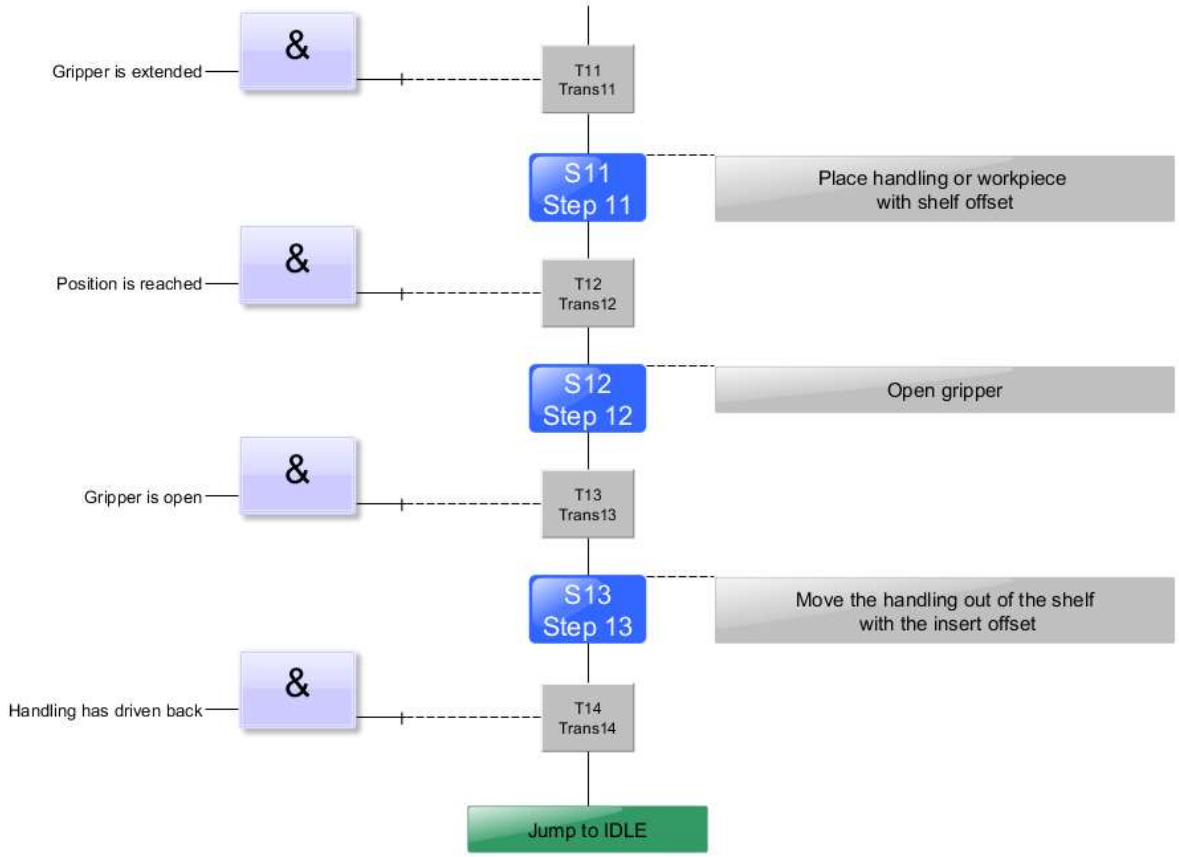
Sequence function chart



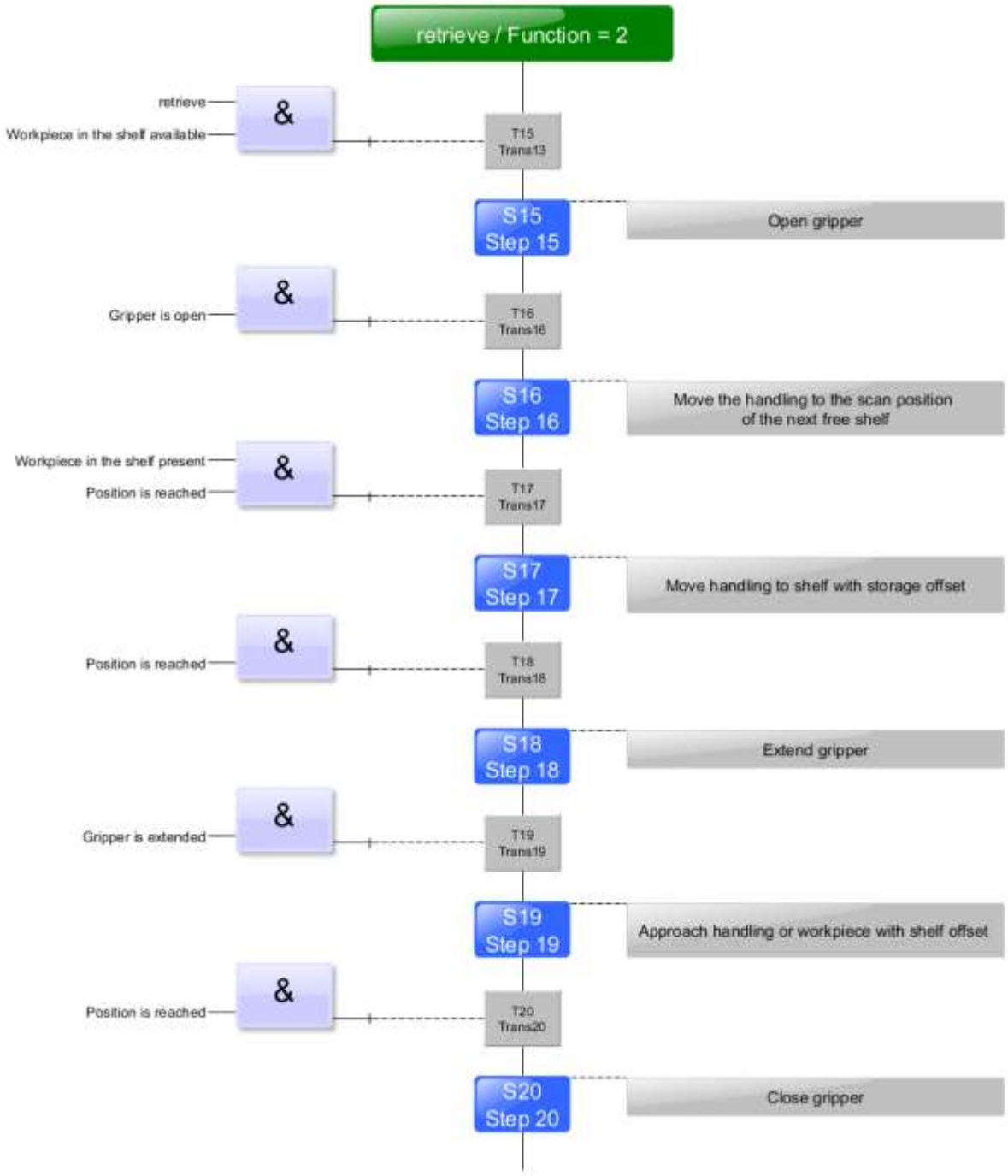
Sequence function chart S1... S4



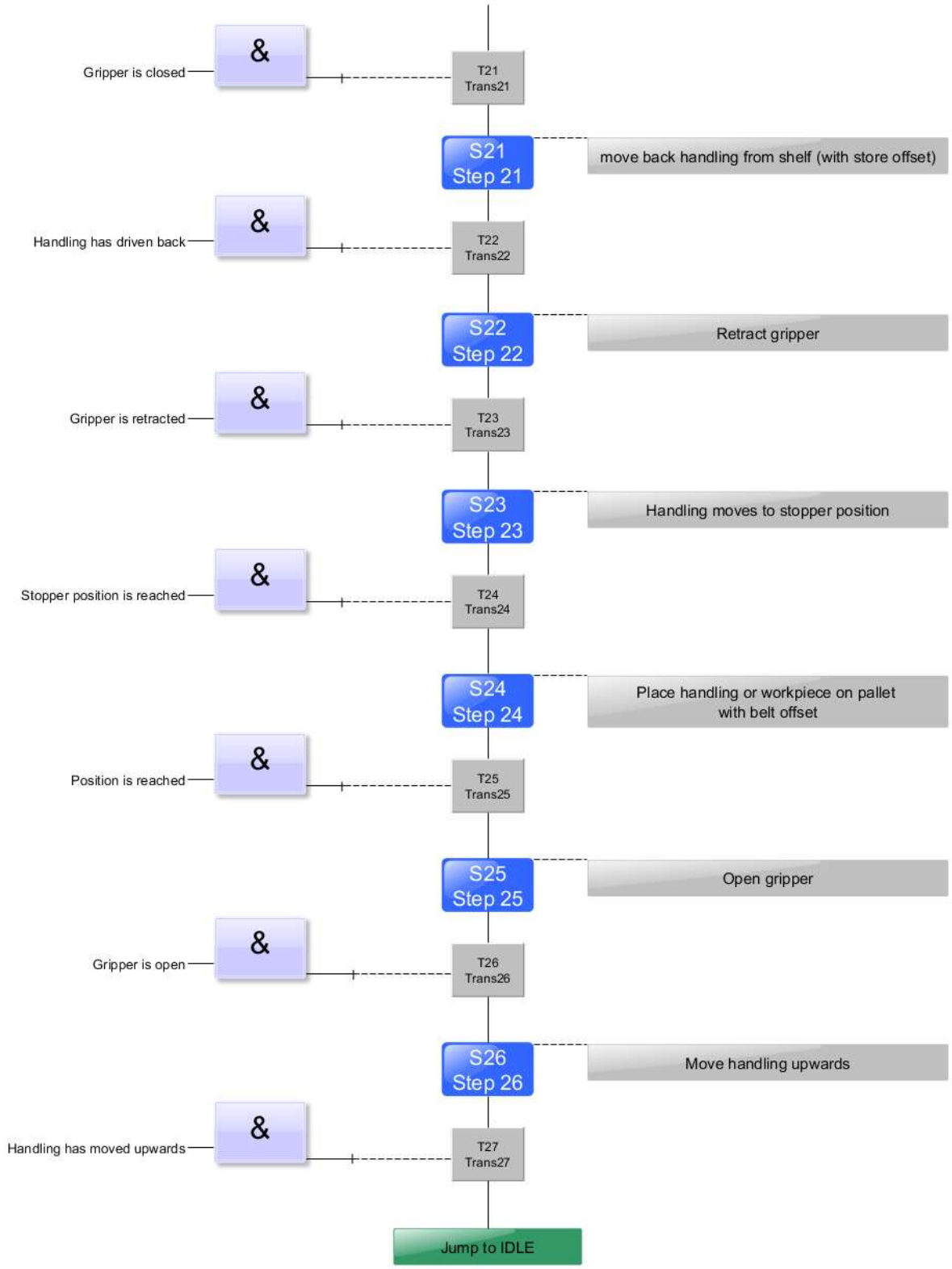
Sequence function chart store S5 ... S10



Sequence function chart store S11 ... S13



Sequence function chart retrieve S15 ... S20



Sequence function chart Retrieving S21 ... S26

7.7.4 Parameter (AS/RS for workpieces)

Illustration similar

Default:

Parameter-No.	Description
1	**Function [-]** 1: store at stopper 1 2: restore at stopper 1 Limitation: No limit to the value in the transition table
2	**Partnumber [-]** Limitation: No limit to the value in the transition table
3	Not used
4	Not used

MES:

Operation		Parameter	Description
210	Store P1	1	**Source** Value: 90 (conveyor position P1) Type: constant
		2	**Target** Value: 0 Type: on runtime
		3	**Part number** Value: 25 Type: changeable
212	Release P1	1	**Source** Value: 0 Type: constant
		2	**Target** Value: 90 (conveyor position P1) Type: on runtime
		3	**Part number** Value: 25 Type: changeable

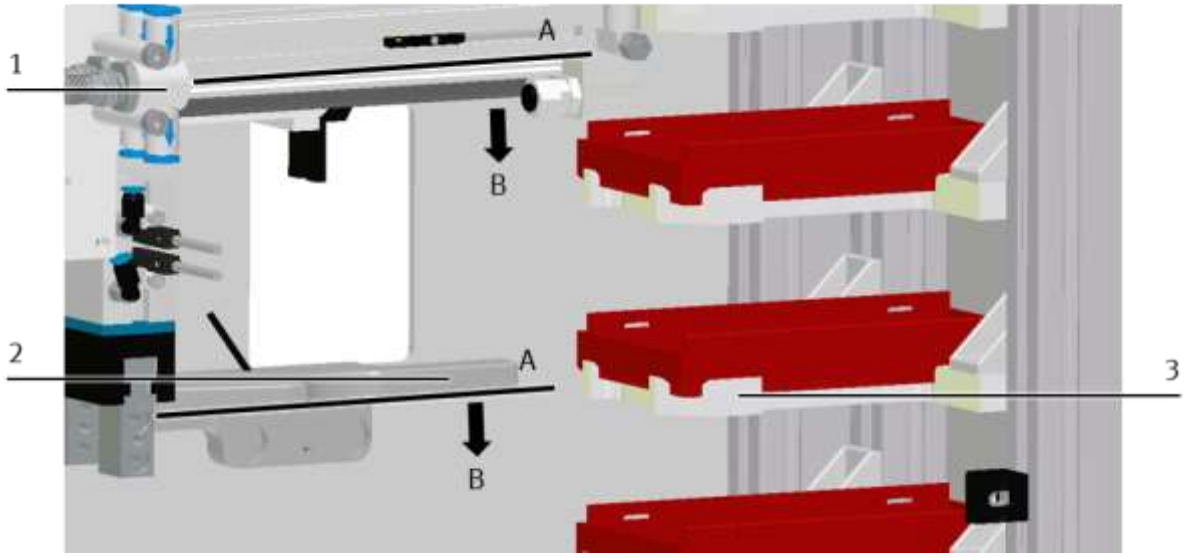
8 Malfunctions and Messages

8.1 Collision of the Gripper Mechanism

The flange of the gripper mechanism (1) on the Z axis is embedded in a pivot point. In the horizontal position (A) the gripper mechanism (1) is engaged. If there are too large torques working on the extended gripper (2), the gripper (2) is moved out of that snap-in point (B). This is detected by a light barrier sensor (sensor BG8) and used for collision monitoring in the control unit. Therefore the system is stopped and the collision is displayed by a message at the HMI (see chapter „Collision Monitoring“).
Large torques working on the gripper (2) are, for instance:

- The gripper‘s (2) moving on limit stop in the shelf.

In order to retrieve the gripper mechanism (1) to the horizontal position, you have to follow the steps in the chapter „Retrieve the gripper mechanism to the horizontal position“.



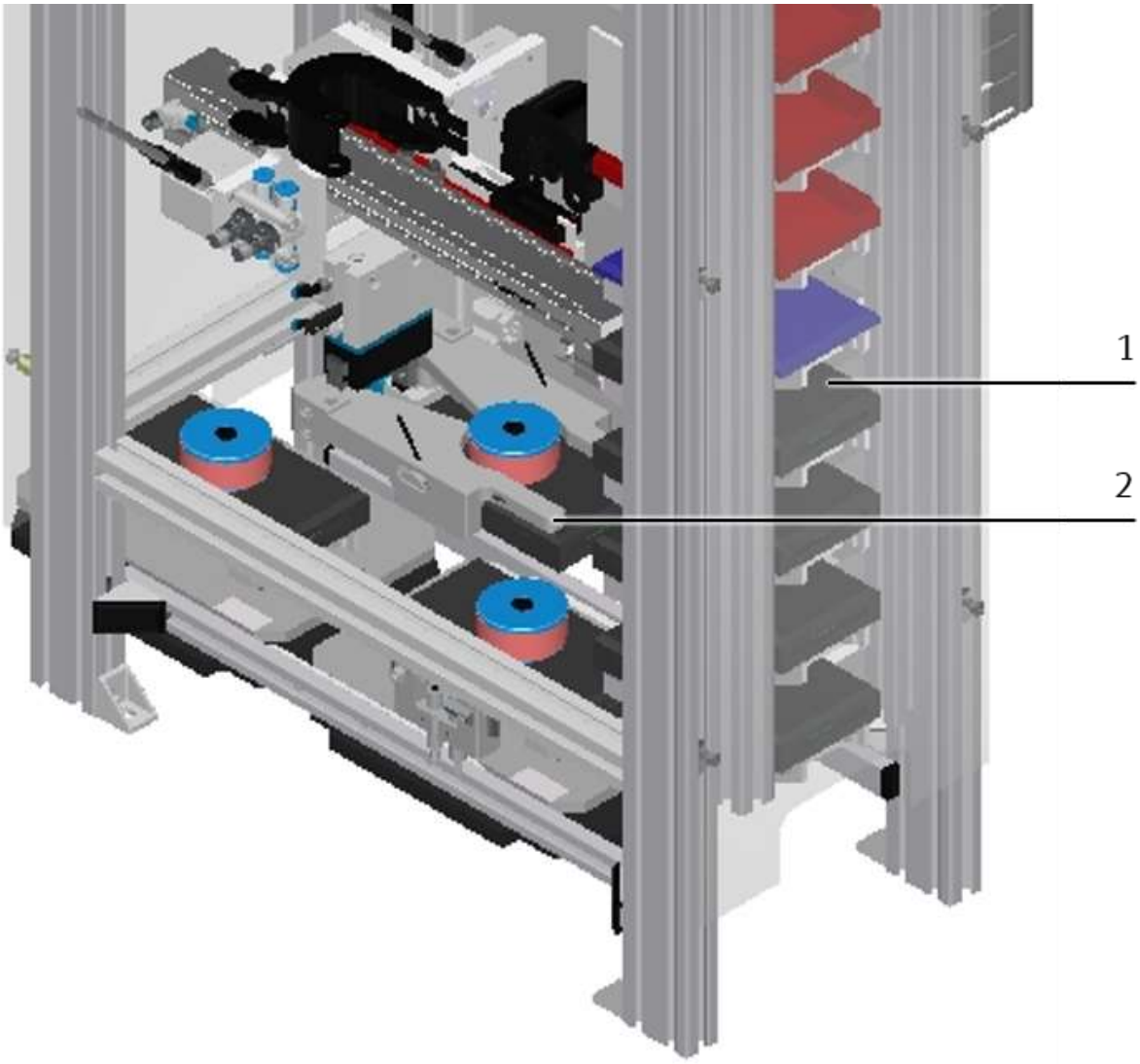
collision

Position	Description
1	gripper mechanism
2	gripper
3	shelf
A	gripper mechanism in horizontal position
B	gripper mechanism drives out of snap-in point

8.2 Allocation of the Shelf

8.2.1 Shelf Allocated

The handling wants to store a workpiece in the ASRS and drives to the corresponding shelf. The sensor BG7 (2) examines the shelf by emitting a light beam to the transparent pane (reflecting foil on the inside) (1). Since the light beam is interrupted, there is already a workpiece in the shelf. The handling cannot store a workpiece in the corresponding shelf, drives back to the conveyor and places the workpiece back onto the pallet of the carrier. Then the handling drives back to its basic setting. Now the CP Application Module ASRS for Workpieces returns a message to the MES system that there is already a workpiece available in the shelf. The conveyor moves the carrier with the workpiece further out of the CP Application Module ASRS for Workpieces. The next carrier moves into the CP Application Module ASRS for Workpieces.

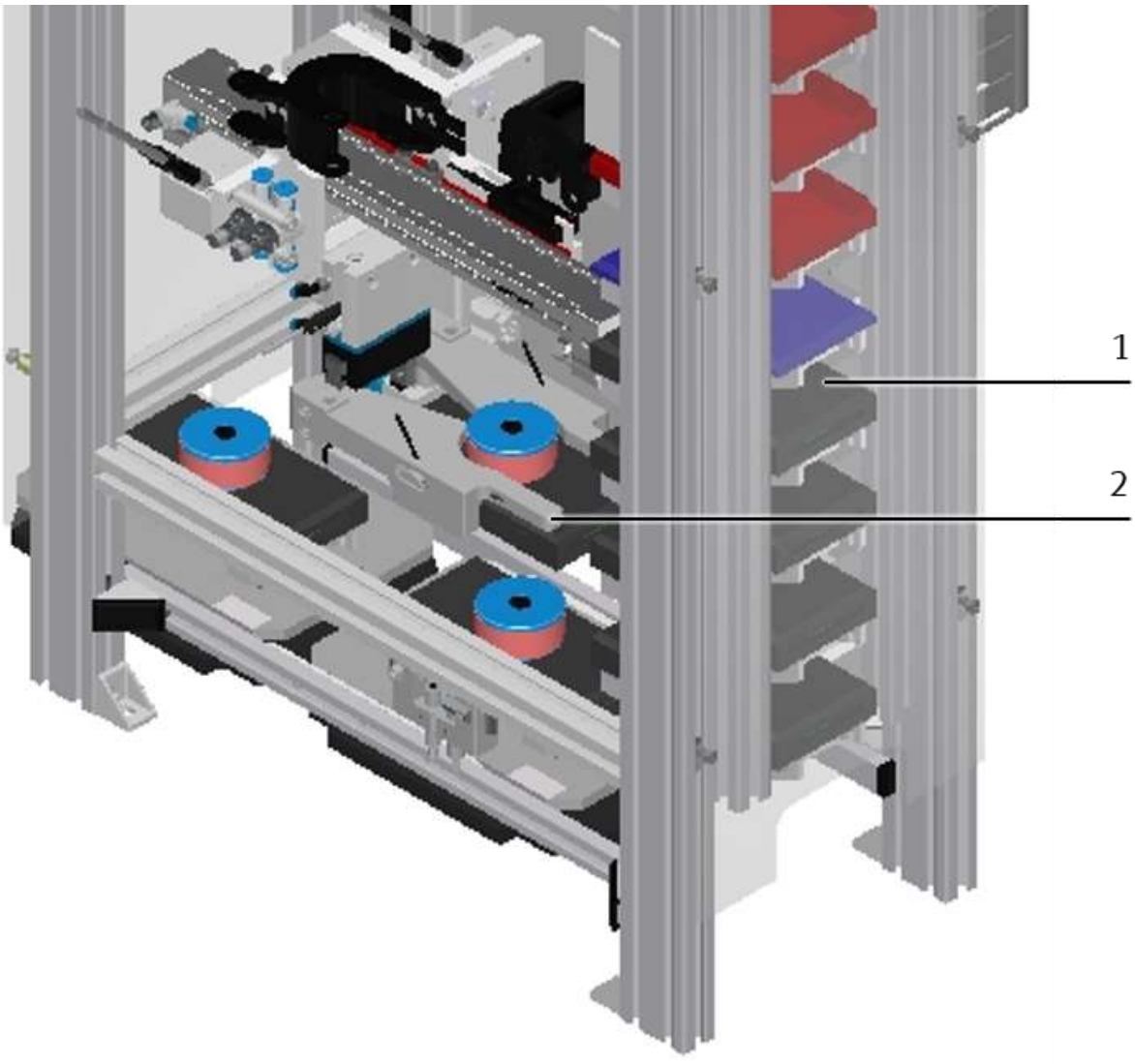


allocation of the shelf

Position	Description
1	transparent pane with reflecting foil
2	sensor BG7

8.2.2 Empty Shelf

The handling wants to retrieve a workpiece from the ASRS and drives to the corresponding shelf. The sensor BG7 (2) examines the shelf by emitting a light beam to the transparent pane (reflecting foil on the inside(1)). Since the light beam is reflected, there is no workpiece in the shelf. The handling cannot retrieve a workpiece from this shelf and drives back to its basic setting. The CP Application Module ASRS for Workpieces returns a message to the MES system that there is no workpiece available in the corresponding shelf. The conveyor moves the carrier without workpiece further out of the CP Application Module ASRS for Workpieces. The next carrier moves into the CP Application Module ASRS for Workpieces.



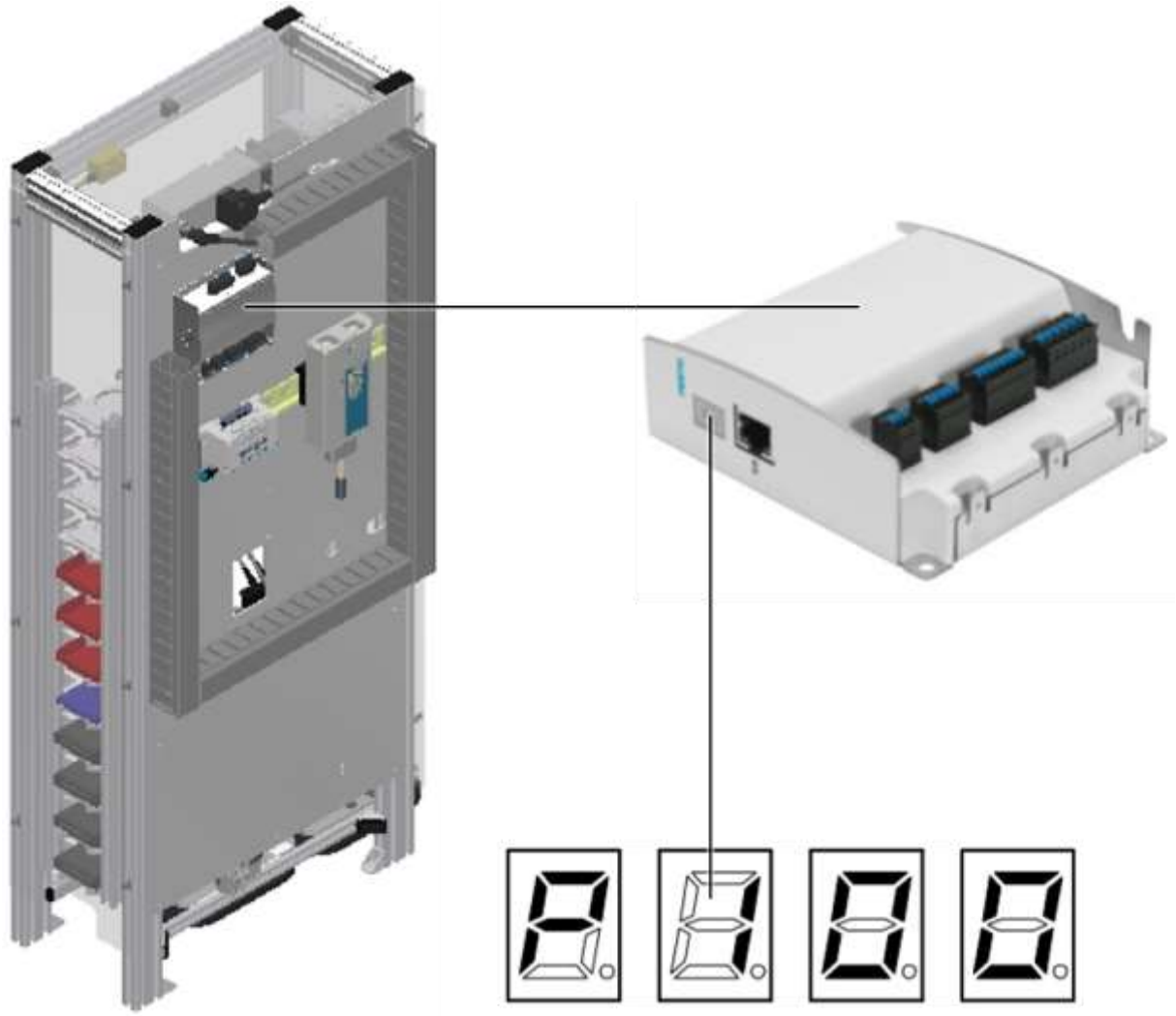
allocation of the shelf

Position	Description
1	transparent pane with reflecting foil
2	sensor BG7

8.3 Motor Controller

8.3.1 Motor Controller emits error message on its own

The motor controller can emit an error message on its own. Therefore the motor controller has got a 7 segment display. The 7 segment display of the motor controller reports the actual operating mode, errors and warnings. In general, 4 characters are displayed in a row, then there is a blank space. The numbers of diagnostic messages in the category of error or warning are coded hexadecimally (further information is provided in the description Motor Controller CMMO-ST-C5-1-LKP).



motor controller

8.4 No TCP Connection of the PLC Interface to Motor Controller

In case there is no TCP connection of the PLC interface to the Motor Controller available, an error message is displayed at the HMI. There is also a hexadecimal diagnostic message displayed at the HMI (see chapter „Motor Controller not connected display at the HMI“).
This hexadecimal code refers to the SIEMENS Modbus elements.
You will find any information on the hexadecimal code under the Siemens TIA support under the heading of „MB Client“.

9 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

9.1 Message texts

9.1.1 Message texts of the application module AS/RS for workpieces

9.1.2 RFID detection messages

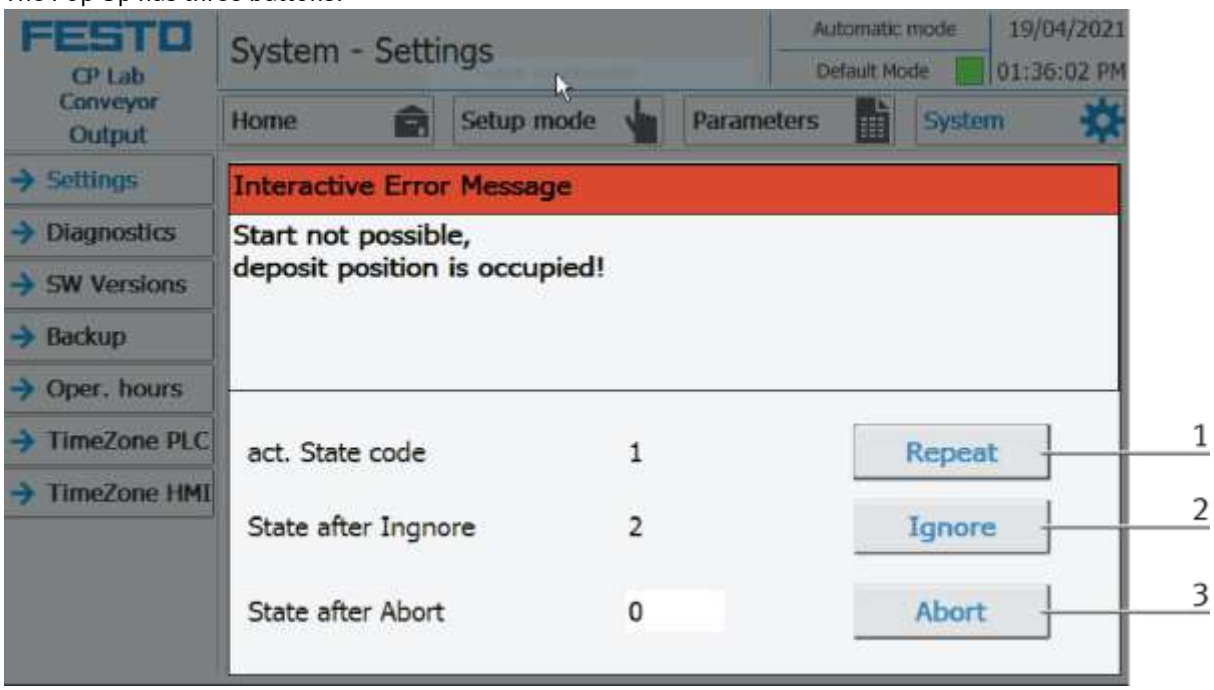
Report class	Location	Alarm name	Report text	Fix error
0	RFID_Control	fbErrRfidTout	Timeout at RFID writing / reading to RFID- Instance: "Calling function block!"	Check workpiece carrier / RFID Chip
0	RFID_Control	fbErrRfidErr	Error at RFID writing / reading to RFID- Instance: "Calling function block!"	Check workpiece carrier / RFID Chip
0	Stopper_Default	fbErrCarrier	No RFID tag identified at RFID- Instance: "Calling function block!"	Check workpiece carrier / RFID Chip
0	Stopper_Mes	fbErrCarrier	No RFID tag identified at RFID- Instance: "Calling function block!"	Check workpiece carrier / RFID Chip

9.2 Interactive error messages

9.2.1 Default operation

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

The Pop Up has three buttons.



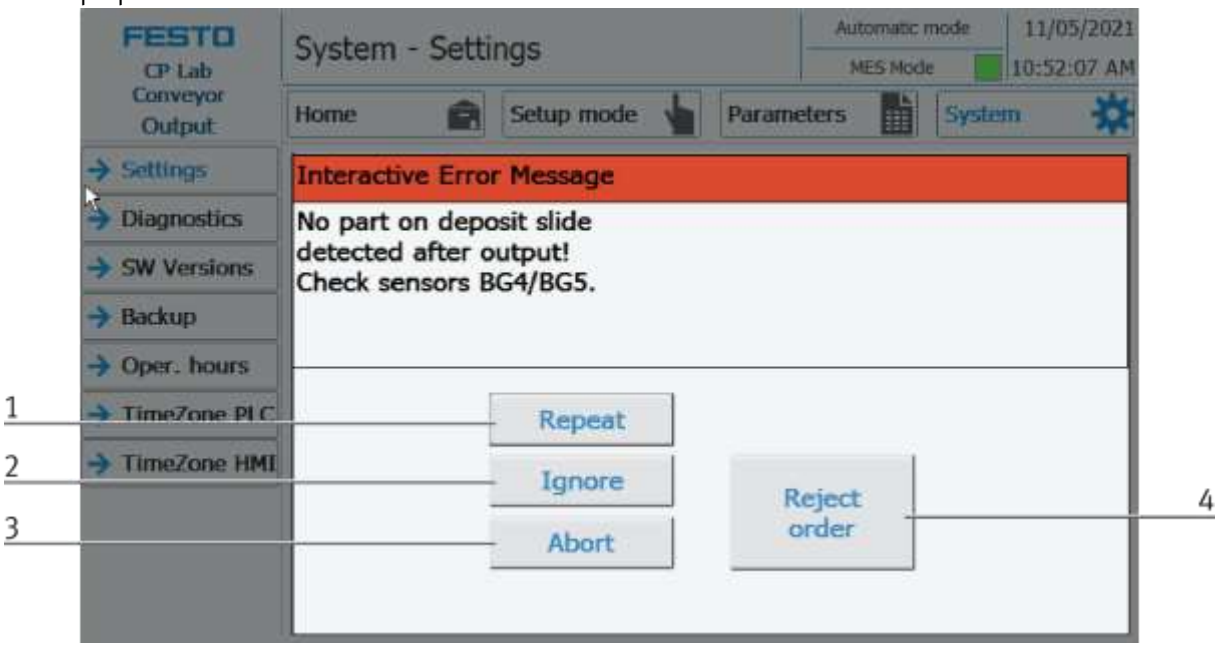
Example application module output - interactive error message in default mode

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.

9.2.2 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.

9.2.3 General

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

9.2.4 Application module AS/RS for pallets

Value	Text	Fix error
1120	Parameter for source or target position not correct	Check parameter
1121	No workpiece in shelf present	Check shelf and sensor +CL-BG7
1122	Workpiece already in shelf present	Check shelf and sensor +CL-BG7.
1123	Workpiece not gripped	Check sensor +CL-BG4 and workpiece
1124	No pallet available	Check releases on motor controllers
1125	No workpiece on pallet to store available!	Put on workpiece
1126	No empty shelf found in storage	Check storage booking
1127	Workpiece carrier already occupied	Remove workpiece
1128	Requested Part number in stock not available	Check storage booking
1129	Invalid parameters were transmitted to application	Check parameter
1130	No pallet at conveyor position detected	Check sensor +CL-BG5
1131	Offset value for conveyor position out of range (2...40mm)	Offset for conveyor position set right
1132	Offset value for storage shelf position out of range (0.....25mm)	Offset for storage shelf position set right

10 Spare part list

10.1 Electric parts

Description	Part number	Res.Ident	Use
sensor end position	551375	BG1	X axis is retracted
X axis	530907		X-axis
sensor	547860		gripper is open
fibre-optic	165360		Workpiece available in gripper
fibre-optic (light barrier sensor)	552828		collision detection
sensor	551375		end position X axis in shelf
fibre-optic	165358		workpiece in storing place
fibre-optic unit	165327	BG6	
fibre-optic unit	165327	BG5	
proximity switch	551375	BG1	
fibre-optic unit	165325	BG4	
fibre-optic	547860	BG3	
fibre-optic	165360	BG4	
fibre-optic	165360	BG5	
encoder cable Z axis	1451674		
motor controller	1512320		
motor cable Z axis	1450736		
I/O Module	8027412	XD1	
Z axis	556812		
stepper motor Z axis	1370473		

10.2 Pneumatic parts

Description	Part number	Res.Ident	Use
one-way flow control valve	175053		
one-way flow control valve	193965		
one-way flow control valve	193965		
gripper	1254045		
one-way flow control valve	175053		
valve terminal	525675		
X axis	530907		
gripper	1254045		

11 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.

12 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

13 Disposal

NOTE

Electronic waste contains recyclable materials and must not be disposed of with the domestic waste. Bring electronic waste to a designated municipal collection point.

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