8102603

Manual storage 20

FESTO

CP Factory

Translation of the original operating instructions

Festo Didactic
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Translation of the original 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.

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 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.

4.5 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.

4.6 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.**

4.7 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.

4.8 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.

4.9 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.

4.10 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.

4.10.1 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.

4.10.2 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
Power supply	5 V DC, 4.5 A
L x W x H	2302 x 470 x 1250 mm
Weight	65 kg

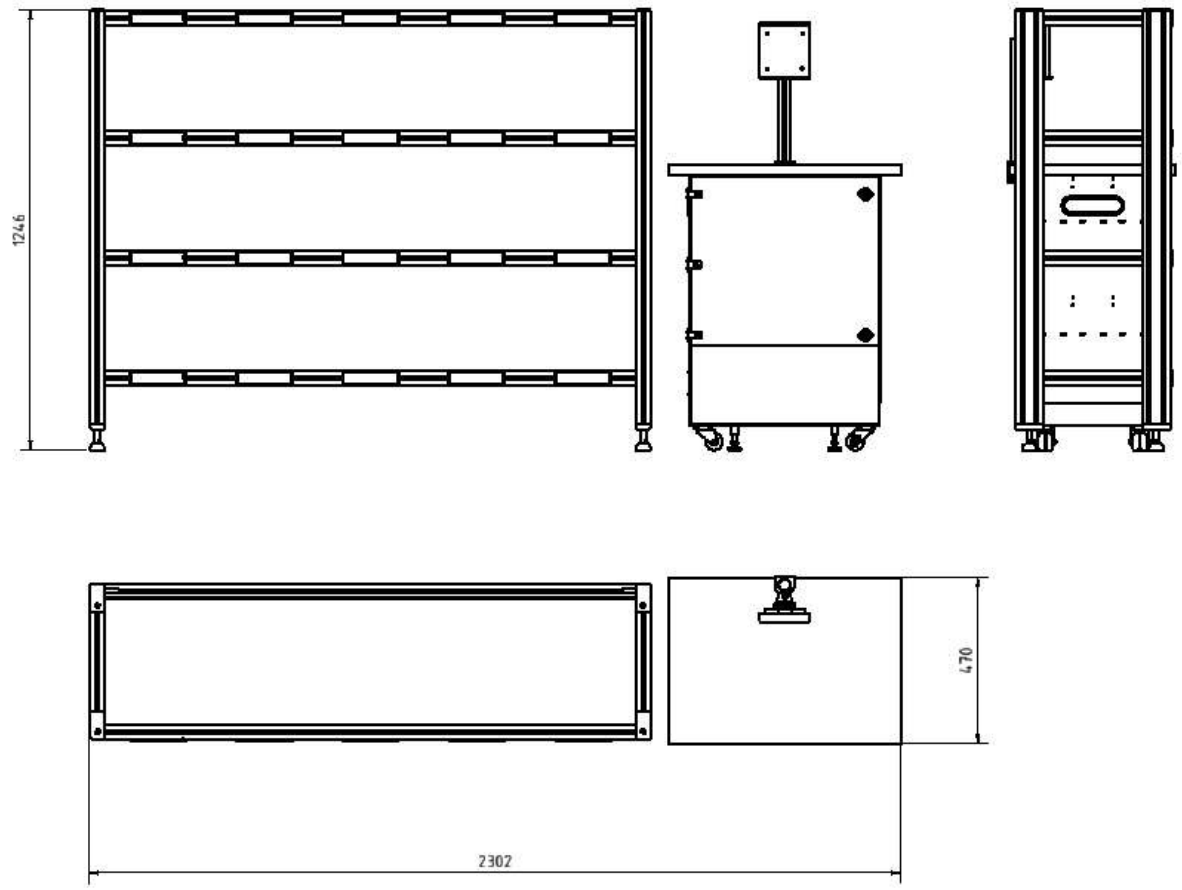


Illustration similar

5.1 Shelf numbers and rows

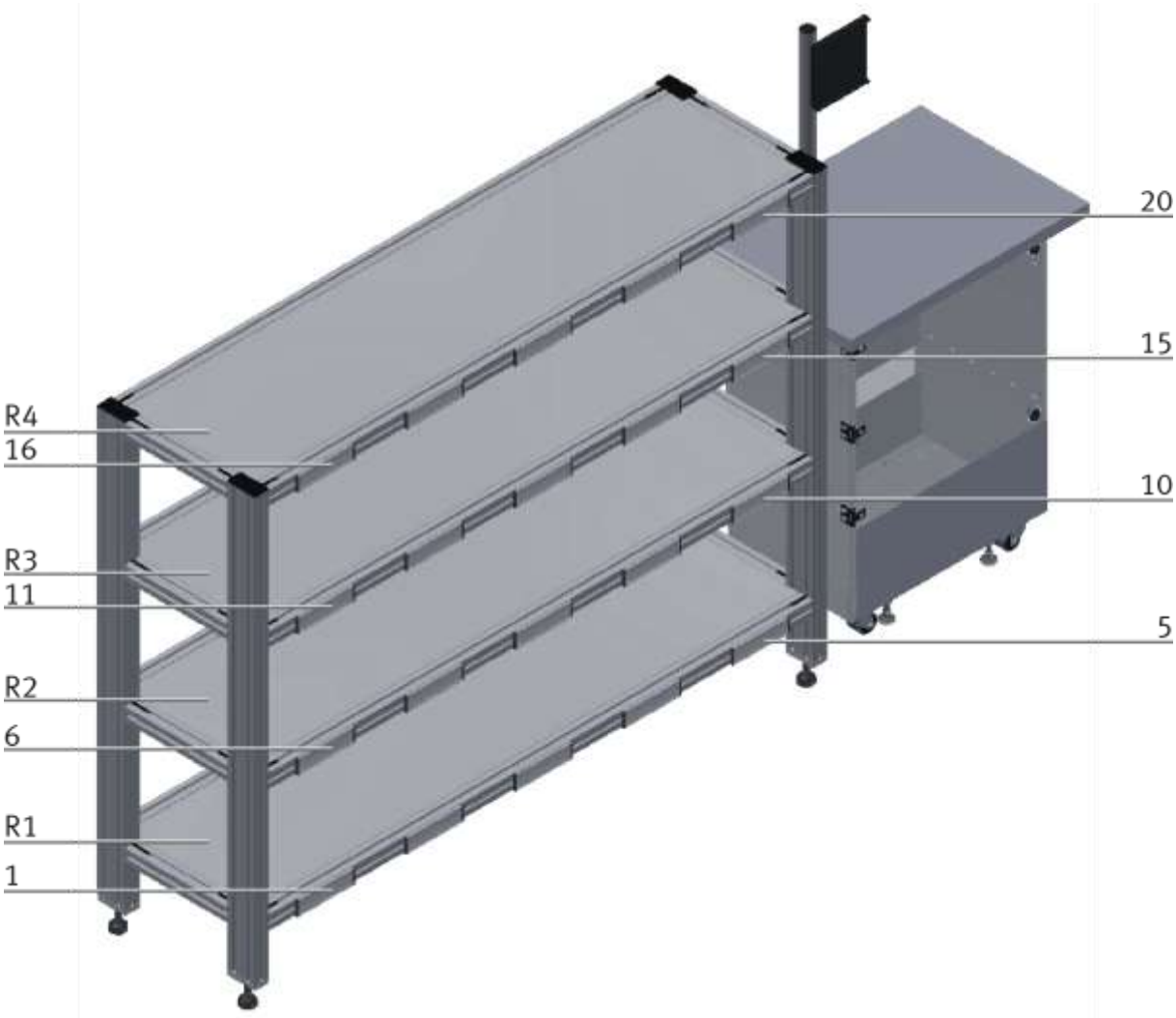


Illustration similar

Number	Value
R1	Row 1 with shelf 1 to 5
R2	Row 2 with shelf 6 to 10
R3	Row 3 with shelf 11 to 15
R4	Row 4 with shelf 16 to 20

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.

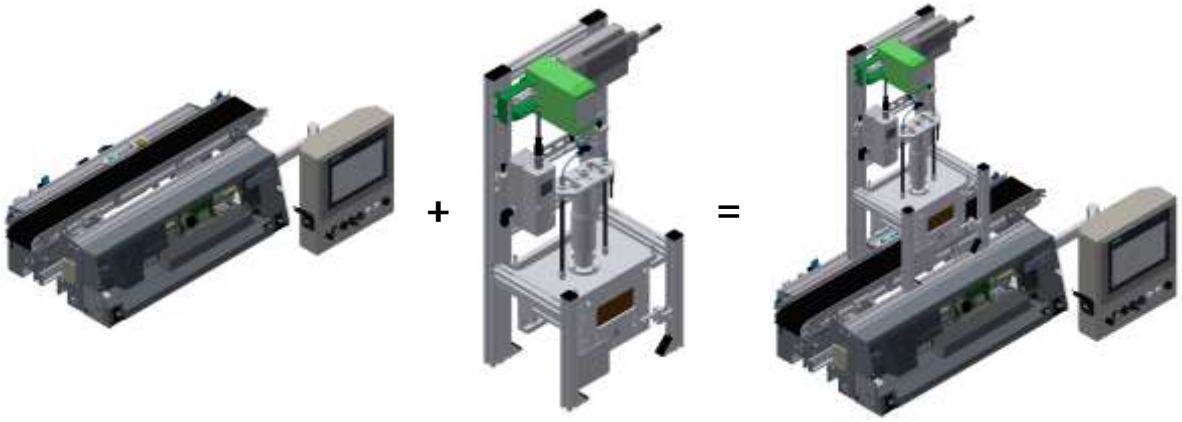
NOTE

- 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.

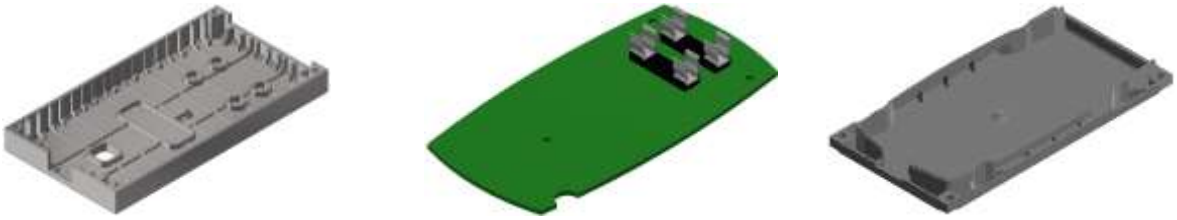
carrier

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 The application module MSRS 20

The application module MSRS20 is designed to

- Store boxes of the CP Factory system. The operation is done with a tablet and a worker is handling the boxes manually.
  There is no system to check the content of the boxes, for this reason a second station – the MR buffer station is required. A robotino is doing the transportation between the stations.

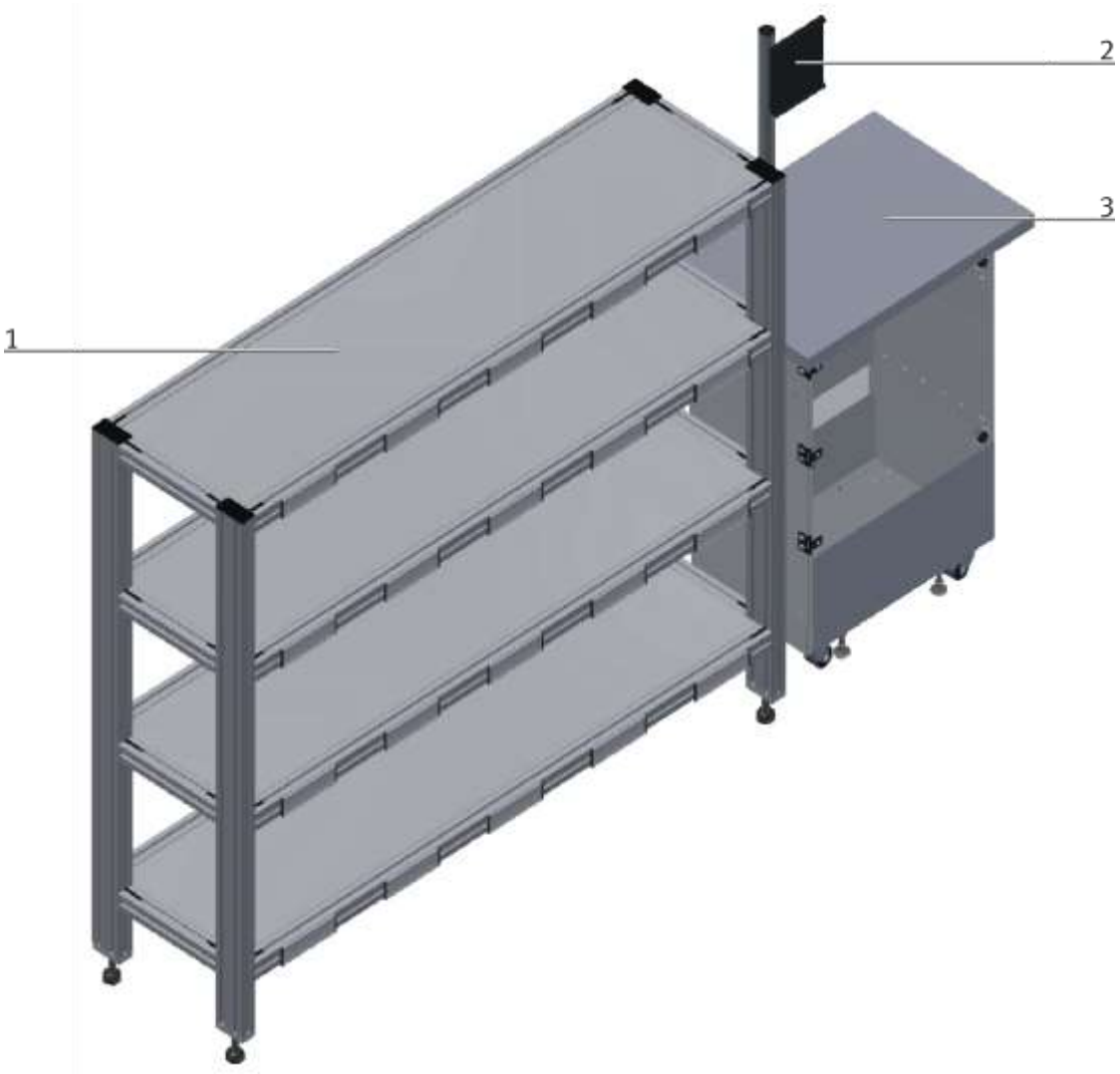


Illustration similar

Pos	Description
1	Manual storage with 20 shelfs
2	Holder with tablet
3	Table for worker

6.4 Function

The application module MSRS20 is a manual storage for boxes without periphery, just a tablet is available to operate the MSRS20.
The boxes can come from different stations, or they can go to different stations; in any case, the robotino is moving the boxes. The content of the boxes is saved in the MES system.
If a box with material is needed, the worker gets a task to remove the respective box from the storage. The robotino is picking up the box from the worker.
It is also possible to store boxes in MSRS20 – then the worker gets a task to store the box manually into the MSRS20. The box is coming from the robotino.

6.5 Sequence description

Start Conditions

- The tablet is ready and has no actual task.
- A worker for the manual feeding is available.

Sequence remove box

1. An order for the MSRS20 to remove a box is available in the MES.
2. The tablet has no actual task, then a task with the shelf number to remove a box is displayed on the tablet.
3. The worker has to remove a box from the MSRS20.
4. The worker has to press the “finished” button on the tablet.
5. Display “moving the buffer in MES”
6. Then no task is available is announced at the tablet again.
7. The robotino moves to the MSRS20
8. At the tablet the worker is requested to place the box on the robotino
9. If the box is on the robotino, the worker has to press the green button on the robotino
10. The tablet has no available task
11. The robotino moves to the target station

Sequence store box

1. An order for the MSRS20 to store a box is available in the MES
2. The robotino moves to the MSRS20
3. There is no task available at the tablet
4. Then a task to remove the box is announced at the tablet
5. The worker has to remove the box from the robotino.
6. If the box is removed from the robotino, the worker has to press the green button on the robotino
7. The robotino goes for its next task (becomes free)
8. At the tablet a task is announced that the worker has to store the box corresponding to the shelf number shown on the display
9. Then the worker has to put the box into the respective shelf
10. The worker has to press the “finished” button at the tablet

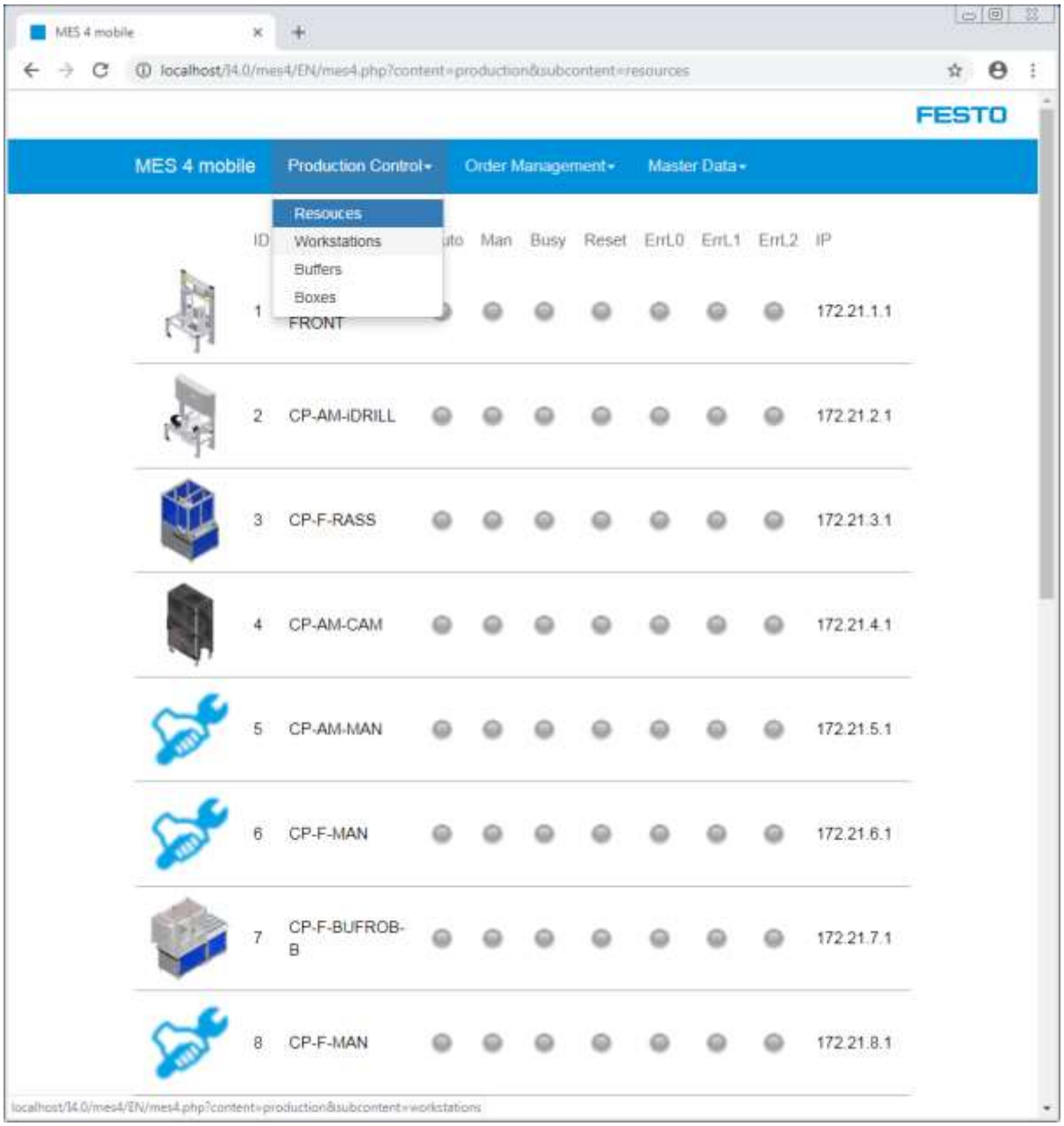
6.6 Electrical Connections

There are no electrical connections. Just a charging cable for the iPad is necessary.

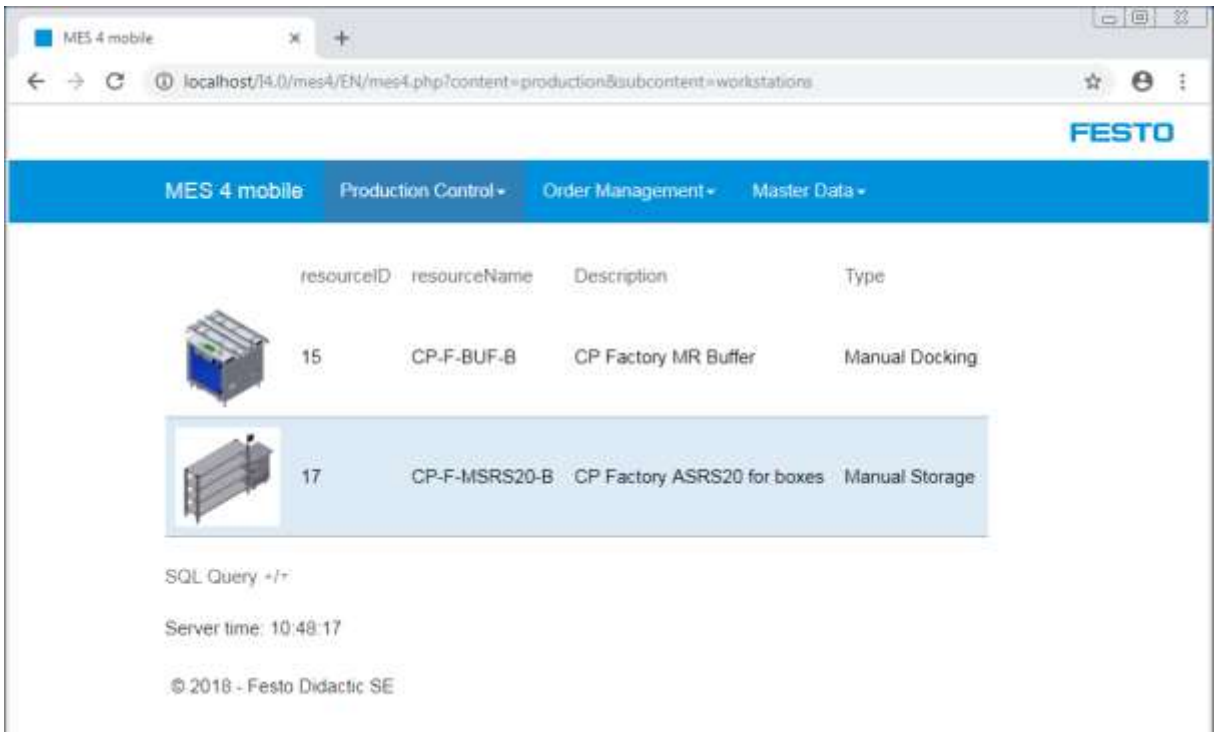
7 Operation

7.1 Start Web App

1. Ensure the tablet of the Manual Storage workstation is connected to the WiFi of the learning factory
2. Open the web browser on the tablet
3. Open MES4 Mobile using the URL http://172.21.0.90/I4.0/mes4
4. Navigate to “Production Control” – “Workstations”



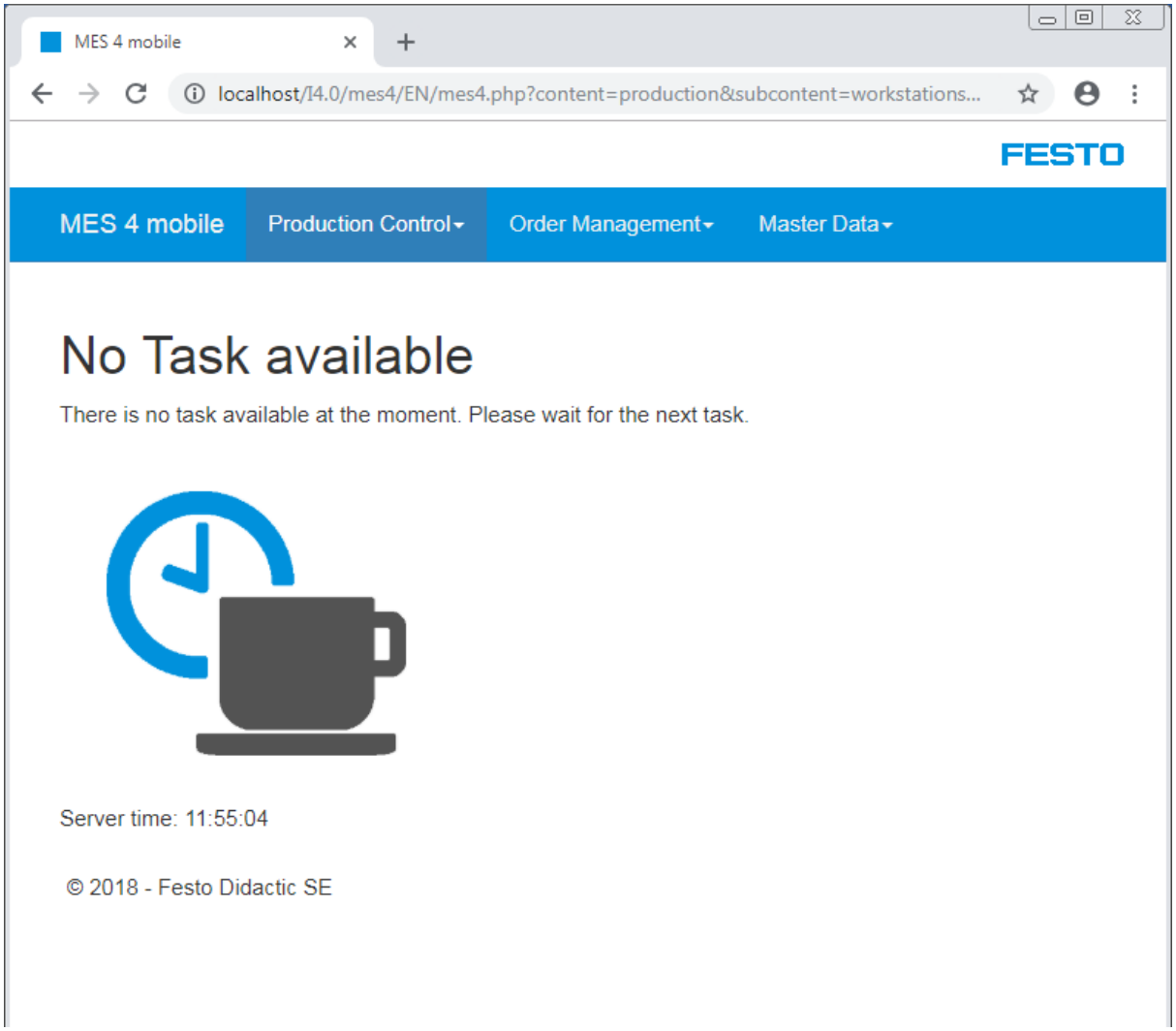
5. Select the manual storage, e.g. CP-F-MSRS20



7.2 Tasks

7.2.1 No task

Whenever no task is available at the workstation, the “No Task” page appears.
This web page is automatically refreshed each second and shows the next task to be done at this workstation.

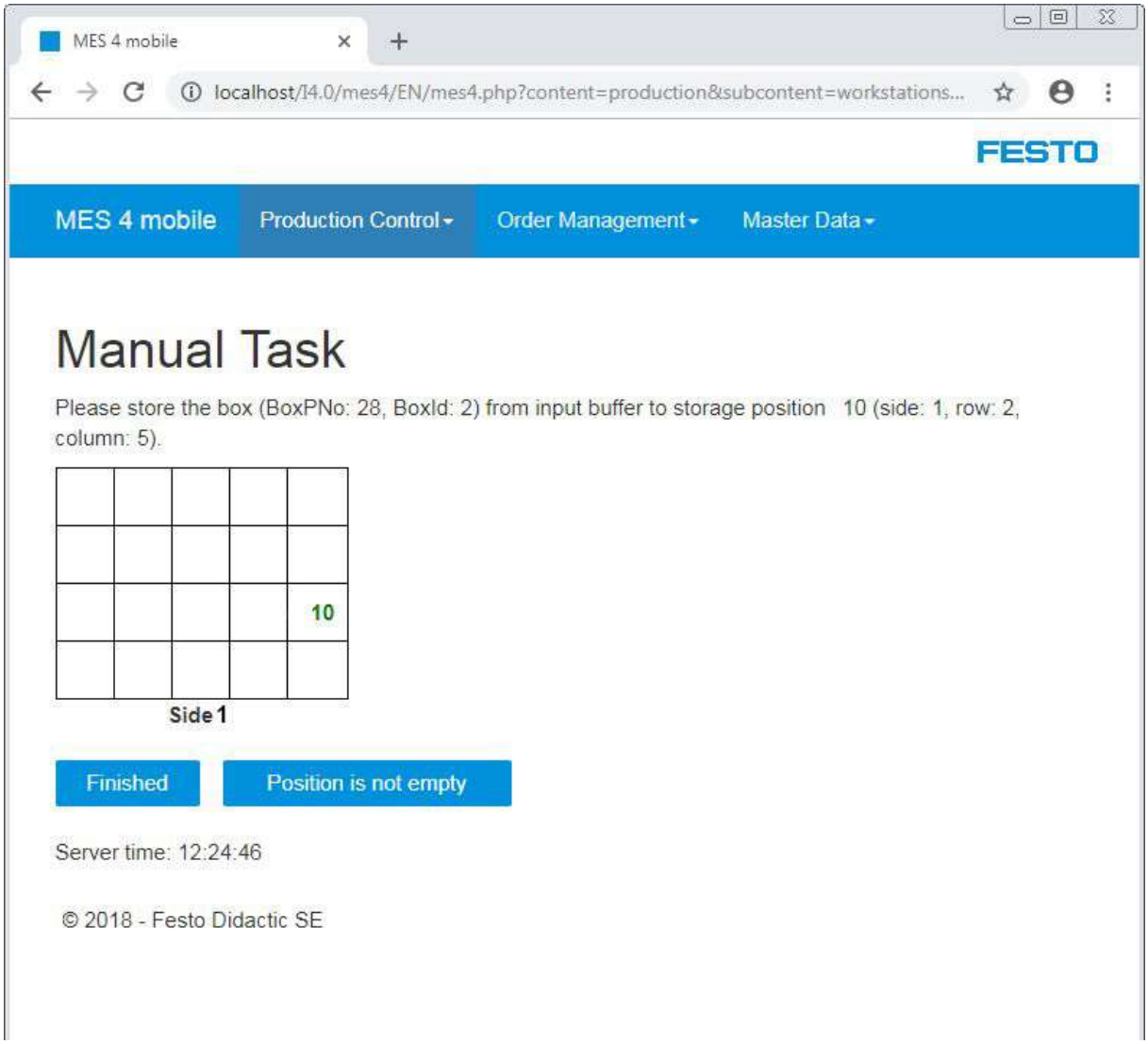


7.2.2 Storing a box in the storage

If a box in the input buffer of the Manual Storage has to be stored, a task is displayed. It shows the position the box has to be placed to.
The side, the row (bottom = 1) and column (left = 1) and the position number indicate the exact location.

Place the box at the indicated position and press “Finish” to finish the task.

In case the position is already occupied by another box, press “Position is not empty”. Another position will be suggested, and the information about the occupied position will be stored in the database.



7.2.3 Releasing a box from the storage

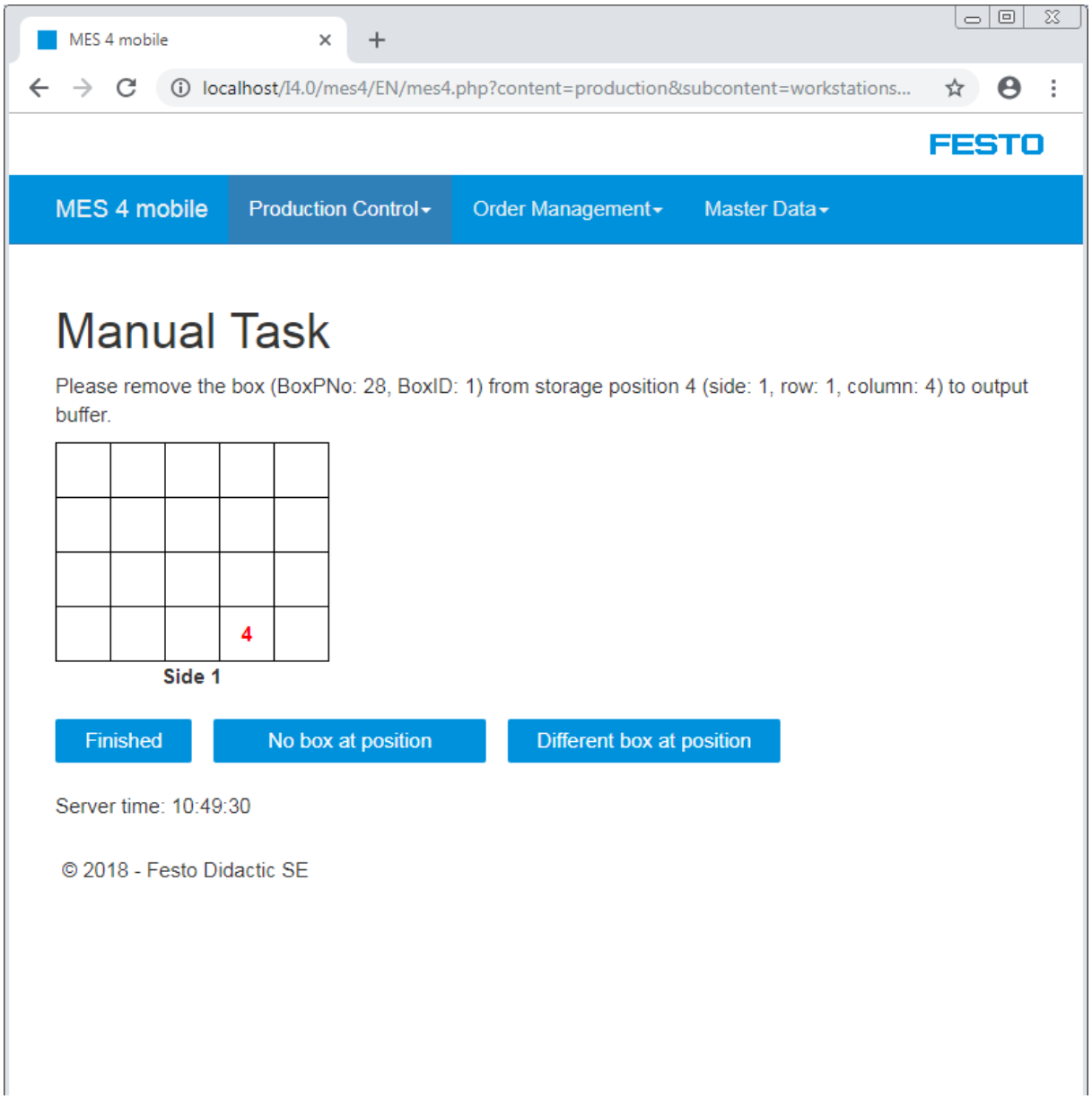
When a box has to be released from the storage, the task instructions are automatically shown.

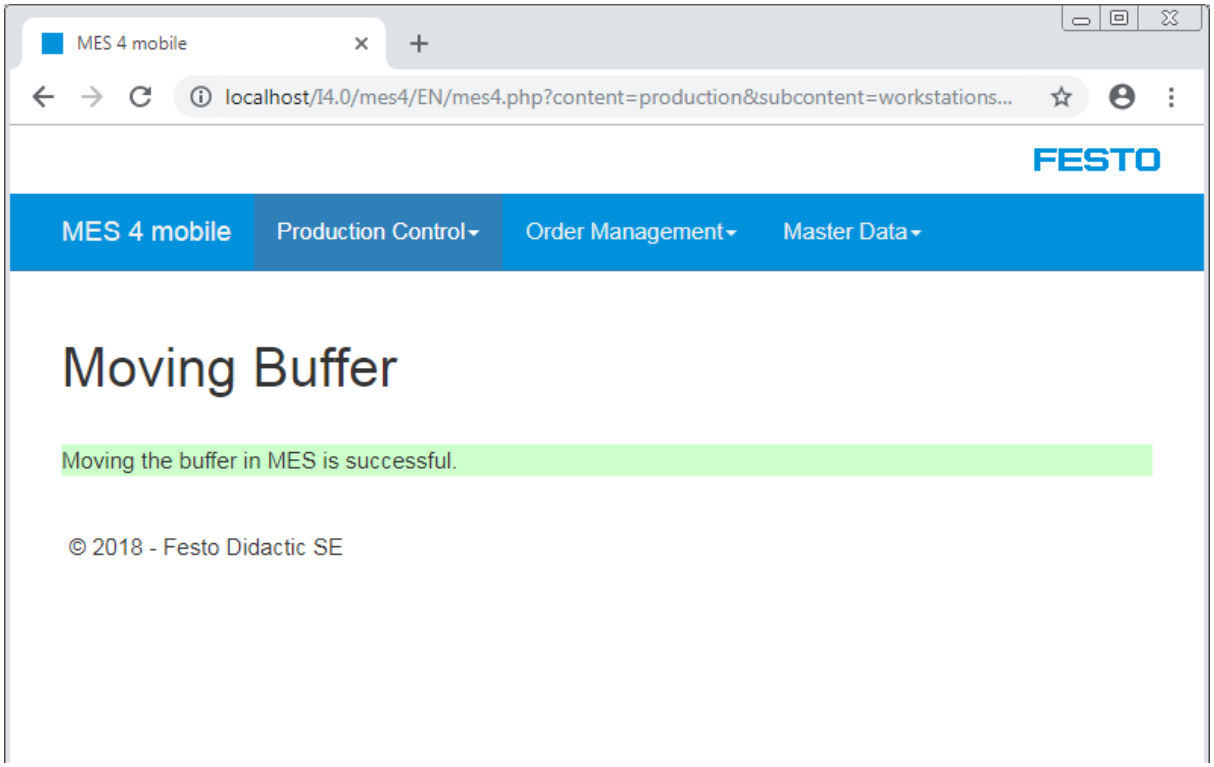
1. Remove the box from the shown position
2. Place the box to the output buffer
3. Press “Finished”
   In MES4, the box will be booked to the output buffer
4. The mobile robot will be triggered to collect the box.

In case

- there is no box at the position, press “No box at position”
- there is a different box at the given position, press “Different box at position”

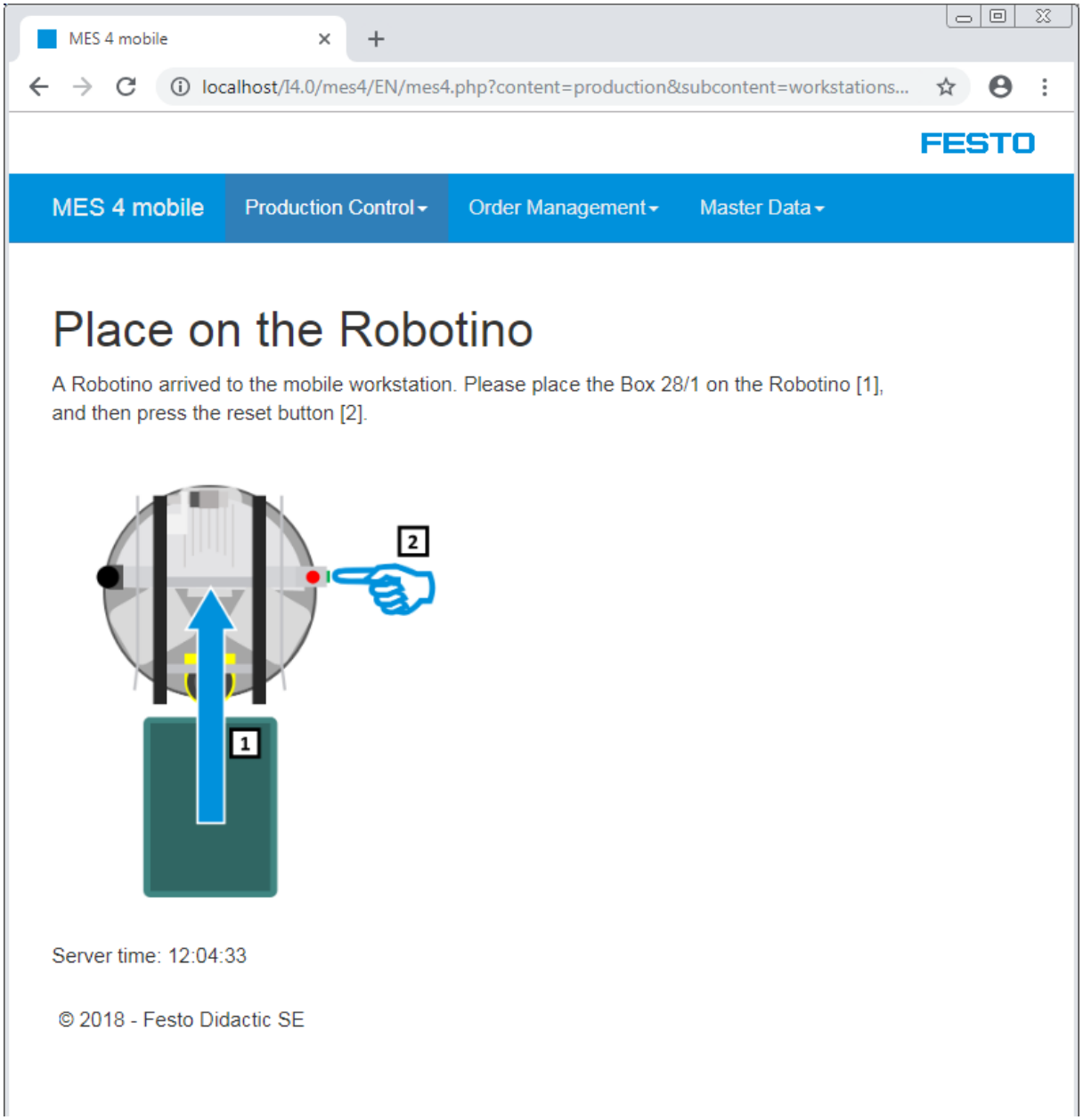
Then, MES4 will be informed and the buffer information will be updated in the database.




MES 4 mobile
localhost/I4.0/mes4/EN/mes4.php?content=production&subcontent=workstations...
FESTO
MES 4 mobile
Production Control
Order Management
Master Data
Moving Buffer
Moving the buffer in MES is successful.
© 2018 - Festo Didactic SE

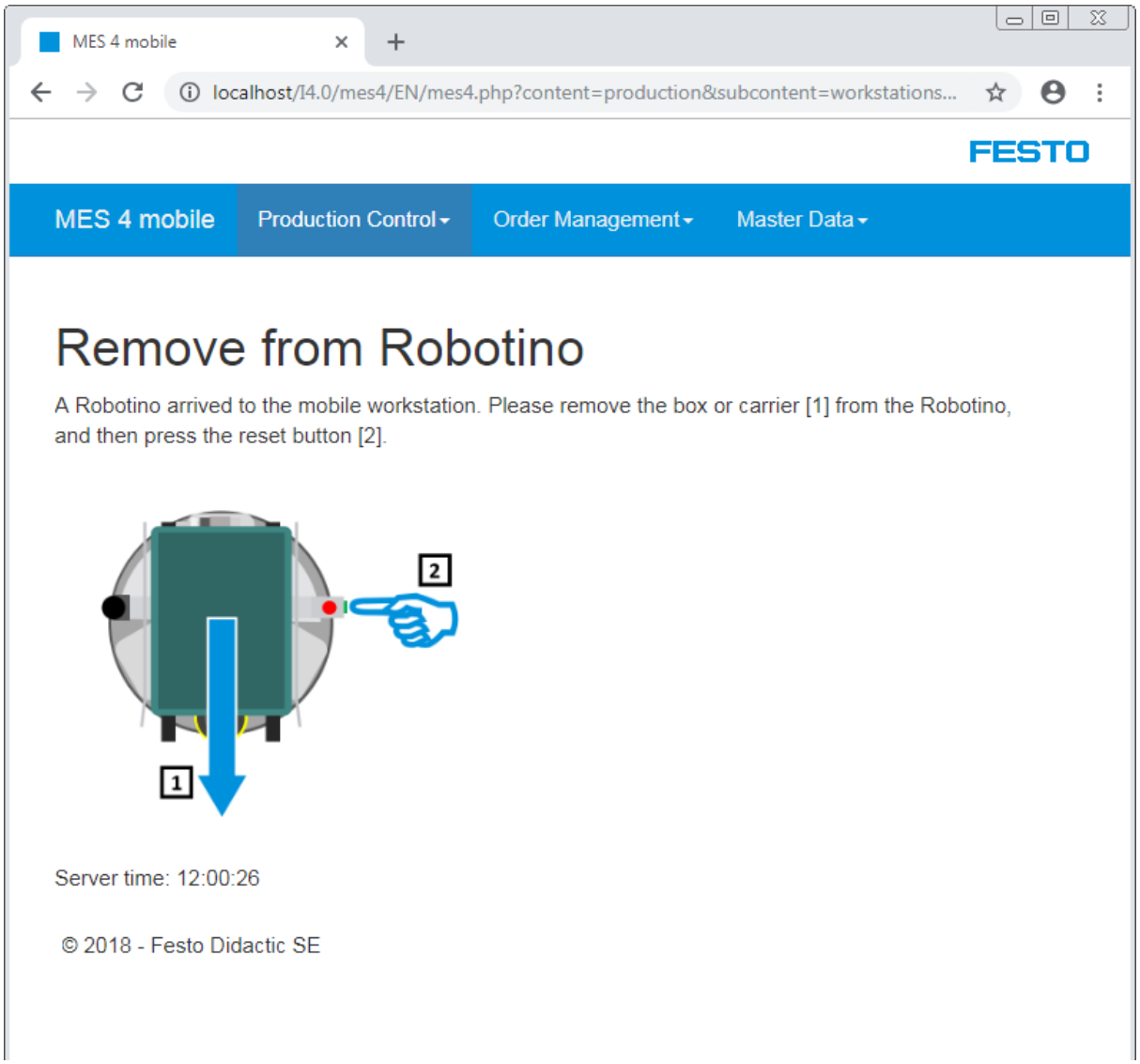
7.2.4 Placing a box on the robotino

If a robotino arrives at the Manual Storage to collect a box, a task to place the box is displayed. Move the box from the output buffer position of the Manual Storage on the robotino and press the green button. The robotino will start the transportation.



7.2.5 Removing a box from the robotino

If a robotino with a box arrived at the Manual Storage, a task to remove the box is displayed. Move the box to the input buffer position of the Manual Storage and press the green button at the robotino.



7.3 Parameter of application

Default:
There is no default mode available

MES:

Operation		Parameter	Description
215	Store box to target	1	**Source** Value: 91 Type: constant
		2	**Target** Value: 0 Type: on runtime

Operation		Parameter	Description
502	Manual boxing	1	**BoxPNo** Low Limit: 0 High Limit: 0 Type: changeable Value: 28
		2	**Part** Low Limit: 0 High Limit: 0 Type: changeable Value: 0

Operation		Parameter	Description
503	Manual unboxing		

8 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.

9 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

10 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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