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SkillsConveyor

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SkillsConveyor

Operating instruction

Festo Didactic
8184370
[8188529, 1, en_US]
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Original operating instructions

Table of contents

1 About this document

1.1 General information

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

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

1.2 Applicable documents

In addition to this documentation, the specified applicable documents must also be observed:

Electrical circuit diagram

You can find the electrical circuit diagram here:
https://ip.festo-didactic.com/go/SC-CircuitDiagrams

2 Safety

2.1 General prerequisites for operating the devices

- The national and company 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 permissible current loads for cables and devices must not be exceeded.
  - Always compare the current ratings of the device, cable and fuse.
  - If they are not the same, use a separate upstream fuse to provide appropriate overcurrent protection.
- Devices with a ground connection must always be grounded.
  - If a ground connection (green and yellow laboratory socket) is available, it must always be connected to protective grounding. The protective grounding must always be connected first (before voltage), and must always be disconnected last (after disconnecting the voltage).

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

- An EMERGENCY-OFF device must be provided.
  - At least one EMERGENCY-OFF device must be located within, and one outside of, the laboratory or classroom.
- The laboratory or classroom must be secured to prevent the operating voltage or the compressed air supply from being switched on by unauthorized persons.
  - E.g. key actuator
  - E.g. lockable on/off valves
- The laboratory or classroom must be protected by residual current devices (RCDs).
  - RCD circuit breaker with residual current $\leq$ 30 mA, type B.
- The laboratory or classroom must be protected by overcurrent protection devices.
  - Fuses or circuit breakers
- No damaged or defective devices may be used.
  - Damaged devices must be barred from further use and removed from the laboratory or classroom.
  - Damaged connecting cables, tubing and hydraulic hoses represent a safety risk and must be removed from the laboratory or classroom.

2.2 Safety instructions and pictograms

2.2.1 Safety instructions

DANGER!

... indicates an imminently dangerous situation which will result in fatal or severe personal injury if not avoided.

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

	**CAUTION!** ... indicates a potentially dangerous situation which may result in moderate or slight personal injury or severe property damage if not avoided.

	NOTICE! ... indicates a potentially dangerous situation which may result in property damage or loss of function if not avoided.

2.2.2 Pictograms

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

Warning signs	Type of danger
	Warning – danger zone.
	Warning – hand injuries.
	Warning – dangerous electrical voltage.
	Warning – danger of entanglement.
	Warning – lifting hazard due to heavy product.

2.3 Intended use

The components and sysytems may be used only:

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

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

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

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

2.4 For your safety

2.4.1 Important Notes

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

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

WARNING!

Malfunctions which may impair safety must be eliminated immediately!

CAUTION!

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

2.4.2 Obligations of the operating company

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

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

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

2.4.3 Obligations of trainees

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

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

2.5 Work instructions and safety instructions

2.5.1 General

CAUTION!

- Trainees should work with the components and systems only under the supervision of an instructor.
- Observe the specifications included in the datasheets for the individual components, in particular all safety instructions!
- Wear personal protective equipment (safety goggles, safety shoes) when working on circuits.

2.5.2 Mechanical system

WARNING!

Switch off the power supply!

- Switch off both the operating power and the control power before working on the circuit.
- Reach into the setup only when it is at a standstill.
- Be aware of potential overtravel times of the actuators.

Risk of injury during troubleshooting!

- Use a tool such as a screwdriver to actuate mechanical limit switches.

2.5.3 Electrical safety

WARNING!

Disconnect the system 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 to life due to series connection of voltage sources!

- Do not connect any voltage sources in series.

CAUTION!

- Use only safety extra-low voltage: max. 24 V DC.
- The power supply unit must be operated only with a power supply with a protective grounding conductor.
- Establishing and interrupting electrical connections
  - Electrical connections may be established only in the absence of voltage.
  - Electrical connections may be interrupted only in the absence of voltage.
- The maximum permissible current loads for cables and devices must not be exceeded.
  - Always compare the current ratings of the device, cable and fuse.
  - If they are not the same, use a separate upstream fuse in order to provide appropriate overcurrent protection.
- Use only connecting cables with safety plugs for electrical connections.
- When laying connecting cables, make sure they are not kinked or pinched.
- Do not lay cables over hot surfaces.
  - Hot surfaces are indicated by a corresponding warning symbol.
- Make sure that connecting cables are not subjected to continuous tensile loads.
- Devices with a ground connection must always be grounded.
  - If a ground connection (green and yellow laboratory socket) is available, it must always be connected to protective ground. The protective ground must always be connected first (before voltage), and must always be disconnected last (after disconnecting the voltage).
  - Some devices have a high leakage current. These devices must be additionally grounded with a protective earth conductor.
- When replacing fuses, use only specified fuses with the correct current rating and tripping characteristics.
- The device is not equipped with an integrated fuse unless otherwise specified in the technical data.
- Always pull the safety plug when disconnecting connecting cables. Never pull the cable.

	– Safe operation of the device is no longer possible with – Visible damage, – Malfunctions, – Inappropriate storage or – incorrect transport. – Switch off the power supply immediately. – Protect the device against inadvertent restarting. – Remove the device from the experiment area.

2.6 Safety sockets

Unless otherwise indicated in the technical data, the following color coding applies for supply and signal connections on components of the Festo Didactic SE Automation and Technology Learning System.

Color	Meaning
	Voltage greater than safety extra-low voltage e. g. mains voltage of 90 to 400 V AC per conductor Mains conductor L1 (gray with brown ring)
	Voltage greater than safety extra-low voltage e. g. mains voltage of 90 to 400 V AC per conductor Mains conductor L2 (gray with black ring)
	Voltage greater than safety extra-low voltage e. g. mains voltage of 90 to 400 V AC per conductor Mains conductor L3 (gray with gray ring)
	Voltage greater than safety extra-low voltage e. g. mains voltage of 90 to 400 V AC per conductor Mains conductor (gray)
	Neutral conductor (gray-blue)
	24 V DC (red)
	0 V DC (blue)
	Safety extra-low voltage, signal input/output (black)
	Safety extra-low voltage, signal input/output (white)
	Protective grounding conductor, configuration as 4 mm safety socket (green-yellow)

Color	Meaning
	Protective grounding terminal as PE+ contact, (green-yellow)
	Grounding terminal, internally connected to protective grounding conductor

The component might not include all of the safety sockets shown above. Further safety sockets may be included in the circuit setup due to the use of different components.

The specified protection classes and safe use will be achieved if safety laboratory cables supplied by Festo Didactic SE are used.

The protective grounding terminal is designed as a PE+ contact. This port provides a low-impedance, safe protective grounding conductor connection. The mechanically incompatible connection prevents connection errors with a 4 mm laboratory safety cable.

The operating company bears the responsibility for any removal of this adapter. The adapter can be unscrewed with a 1.5 mm socket head screw. The locking mechanism is located in the drilled hole of the adapter. Unscrew the screw in clockwise direction.

3 Transport/Unpacking

Packing and unpacking

The product is delivered in a transport package. Please keep it and use it when the product needs to be transported again or stored.

Carefully remove the filling material from the crate when unpacking the product.

Check the product for potential damage after unpacking it.

The forwarding agent and Festo Didactic SE must be notified immediately of any transport damage.

Transportation locks

The product is equipped with two mechanical transportation locks (on the left and right sides). They do not have to be removed in individual operation. However, if several SkillsConveyor are operated in series next to each other, the transportation locks must be removed.

Lifting and carrying

1.

CAUTION!

Heavy product

Back pain in the event of frequent lifting and carrying.

- Avoid frequent lifting and carrying of the product.
- Lift and carry the product by the handles only.
- Lift and carry the product together with a second person if necessary.

Avoid frequently lifting and carrying the product.

2.

CAUTION!

Objects falling when lifted and carried

Danger of crushing and injury to legs and feet.

- Lift and carry the product only with the transportation locks screwed in.
- Lift and carry the product horizontally only.
- Lift and carry the product only by the two recessed grips.

Install the lateral transportation locks to fix the connection box to the framework.

4 Design

The SkillsConveyor consists of the following main components:

Fig. 1: Outer view

1	Conveyor belt	5	Framework
2	Through-beam sensor	6	Transportation lock
3	Control panel	7	Idler head
4	Connection box	8	Diffuse light sensor

Conveyor belt (1)

The SkillsConveyor is designed to transport single workpieces.

With simple conversions, the SkillsConveyor can also be used to transport pallets (not included in scope of delivery).

The DC motor is connected with a universal flange. The motor can be easily replaced and converted into an AC motor incl. frequency converter (not included in scope of delivery).

Control panel (3)

The Control panel is of modular design and all individual elements can be replaced.

The operating and signal elements can be labeled variably.

Connection box (4)

The removable connection box is hinged. All components are thus easily accessible.

The connection box also accommodates the two tool-free latches for a secure connection to the framework.

Framework (5)

The Conveyor belt is attached to the framework. The framework is also used as a connecting element to the connection box.

Sensors (2), (8)

The scope of delivery includes a Diffuse light sensor (8) and a Through-beam sensor (2). The sensors can be flexibly adjusted and replaced.

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

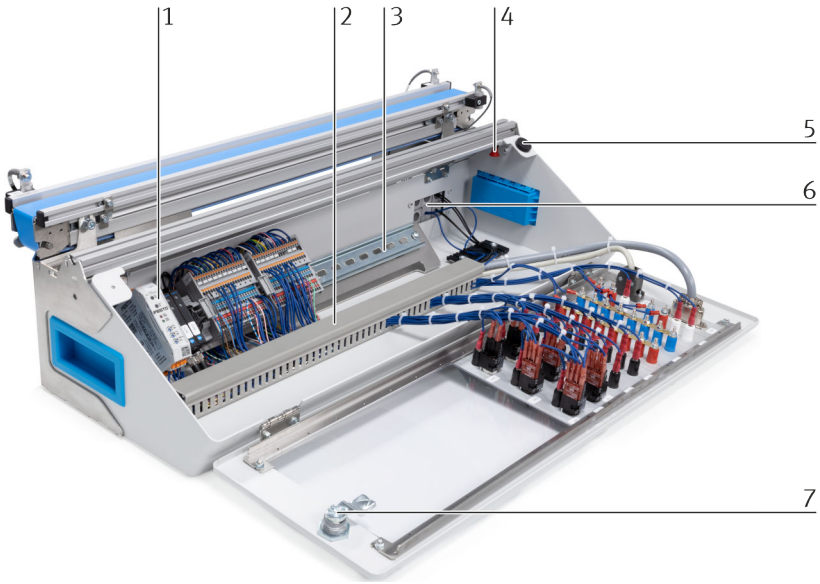


Fig. 2: Inside view

1 Motor controller SFC-DC
2 Cable duct
3 DIN rail with Terminal block
4 Latch (2x)
5 Magnetic lock
6 Cable entry
7 Control cabinet lock

5 Function

5.1 Opening the connection box

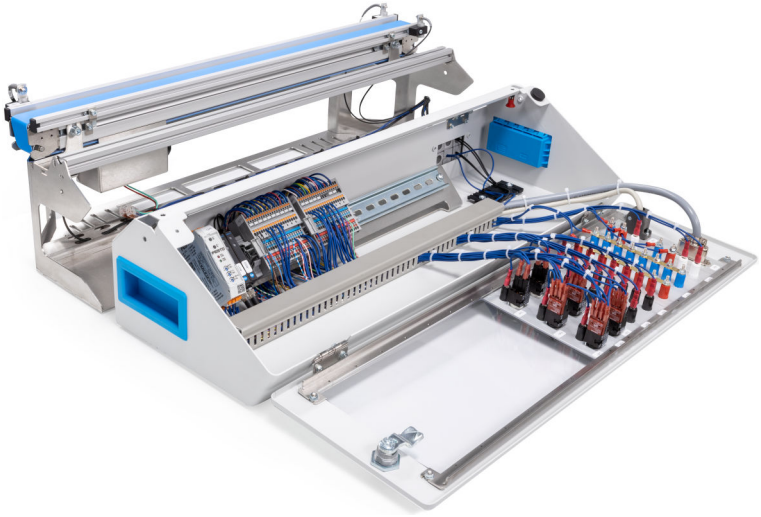


Fig. 3: Connection box open

The connection box can be opened if necessary. Follow these steps:

	**CAUTION!** **Switch off the power supply!** Disconnect the power supply before opening or working on the housing.

1. Remove the SkillsConveyor from service.
2. Remove all connecting cables plugged into the control panel of the connection box to avoid damage.
3. Open the control cabinet lock on the left side of the flap with the enclosed control cabinet key. On the right side, the flap is fixed with a magnetic lock.
4. Grip the flap on the left and right and fold it forward. Do not pull the control elements!

Extended access to the connection box

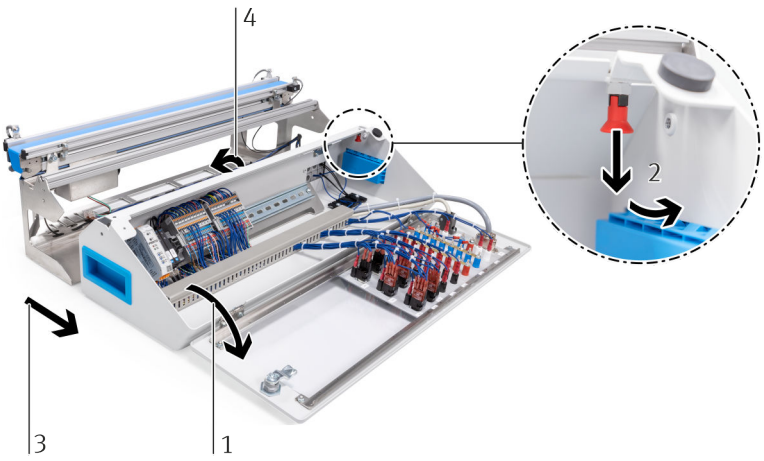


Fig. 4: Extended access to the connection box

If you want to create greater access to the workspace for work in the connection box, the connection box can be opened wider.

1. Open the connection box (1) as previously described.
2. Remove the transportation locks on the left and right of the framework ➦ *Chapter 4 "Design" on page 14*.
3. Undo the two latches (2) on the left and right by pulling them down and turning them.

   ➡ The latches remain open due to the rotation.
4. Grip the connection box by the recessed grips on the side and carefully pull it out of the framework (3). Pay attention to the limited length of the connecting cables between the connection box and the framework.
5. Flap the narrow rear flap (4) towards the rear.

5.2 Closing and retracting the connection box

1. Close the narrow, rear flap.
2. **CAUTION!**

   Narrow space between rack and junction box

   Crushing of hands or fingers between the framework and connection box.

   – Use the recessed grips on the side of the connection box for insertion into the rack.

   Carefully slide the connection box into the framework. Make sure no connecting cables are pinched between the connection box and the framework and become damaged.
3. Close the two latches on the left and right. They must be engaged.
4. **CAUTION!**

   Strong magnet used to close the flap

   Danger of crushing hands or fingers between the flap and connection box.

   – When closing the flap, grip it only at the recess provided.

   – Close the flap slowly.

   Close the front flap of the connection box and lock the control cabinet lock.

5.3 Control console

The SkillsConveyor comes with an expandable Control console. Each Control panel on the Control console is modularly interchangeable.

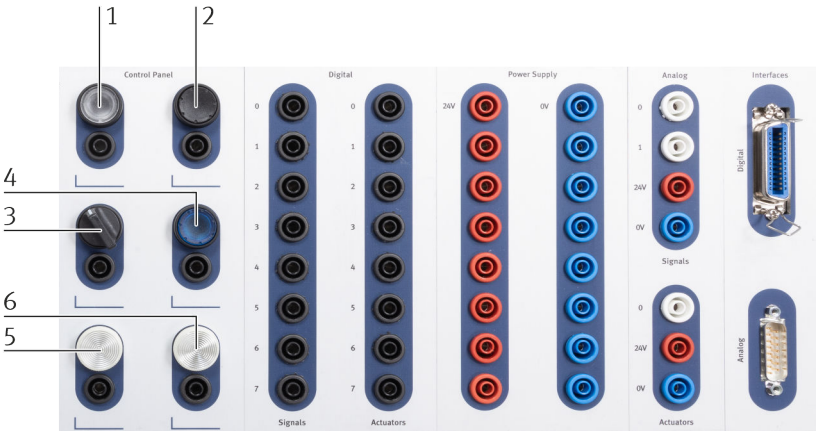


Fig. 5: Standard configuration of control console

All functions of the SkillsConveyor can be connected via the safety sockets on the Control console. The standard configuration is shown in the following tables.

Control Panel

Position	Function
1	Button start (N/O contact)
2	Button stop (N/C contact)
3	Operating mode selector switch
4	Button reset
5	Indicator light 1
6	Indicator light 2

Digital Signals

Safety socket	Function
0	Diffuse light sensor
1	Through-beam sensor
2	Button start
3	Button stop

Safety socket	Function
4	Operating mode
5	Button reset
6	Reserve
7	Reserve

Digital Actuators

Safety socket	Function
0	Forward operation
1	Reverse operation
2	Creep speed
3	Indicator light start
4	Indicator light reset
5	Indicator light 1
6	Indicator light 2
7	Reserve

Power Supply

Safety socket	Function
24 V	24 V supply
0 V	0 V potential

Analog Signals

Safety socket	Function
0	Analog input 0
1	Analog input 1
24 V	24 V supply

Safety socket	Function
0 V	0 V potential

Analog Actuators

Safety socket	Function
0	Analog output 0
24 V	24 V supply
0 V	0 V potential

Interfaces Digital

Designation	Safety socket	SysLink pin	SysLink insulated wire*	Function
Diffuse light sensor	DI0	13	GYPK	TRUE = workpiece at start of conveyor
Through-beam sensor	DI1	14	RDBU	TRUE = workpiece at end of conveyor
Button start	DI2	15	WHGN	TRUE = Button start pressed
Button stop	DI3	16	BNGN	FALSE = Button stop pressed (n.c.)
Selecting the operating mode	DI4	17	WHYE	FALSE = setup mode TRUE = automatic mode
Button reset	DI5	18	YEBN	TRUE = Button reset pressed
Not assigned	DI6	19	WHGY	
Not assigned	DI7	20	GYBN	
Forward operation	DQ0	1	WH	TRUE = switch on forward conveyor operation
Reverse operation	DQ1	2	BN	TRUE = switch on reverse conveyor operation
Creep speed	DQ2	3	GN	FALSE = normal TRUE = slow

Designation	Safety socket	SysLink pin	SysLink insulated wire*	Function
Indicator light start	DQ3	4	YE	TRUE = Indicator light start switched on
Indicator light reset	DQ4	5	GY	TRUE = Indicator light reset switched on
Indicator light 1	DQ5	6	PK	TRUE = Indicator light special function switched on
Indicator light 2	DQ6	7	BU	TRUE = Indicator light special function switched on
Not assigned	DQ7	8	RD	
* Color code according to IEC 60757:2021-06				

Interfaces Analog

PIN	Function
1	UA1 (OUT)
2	UA2 (OUT)
3	AGNDA (OUT)
4	IE2 (IN)
5	IE1 (IN)
6	AGNDE (IN)
7	UE2 (IN)
8	UE1 (IN)
9	IA2 (OUT)
10	IA1 (OUT)
11	n/c
12	IE4 (IN)
13	IE3 (IN)
14	UE4 (IN)
15	UE3 (IN)

6 Commissioning

The SkillsConveyor is completely assembled, wired and commissioned at the factory. Further installation and assembly work is not required.

Information on electrical installation:

- The connection box is completely wired internally.
- The universal belt and the sensors are electrically connected to the connection box.
- Details on the electrical installation: ➦ *Chapter 1.2 “Applicable documents” on page 5*

1. Place the SkillsConveyor on a flat surface. No special securing measures for fastening are required. The mounted rubber feet ensure safe standing on the work surface.
2. Connecting voltage
   - Via PLC to *[Interfaces Digital]*
   - Via the laboratory table to *[Power Supply]*
3. Teaching sensors
4. Setting the motor controller digitally
5. Setting the motor controller analogly
   - Reconnecting the bridges on the motor controller
   - Checking the wiring according to the circuit diagram
6. Testing the belt start-up with the test button on the motor controller

7 Operation

Before operating the product, the following conditions must be met:

1. Connection box pushed into the framework and locked in place.
2. Connection box closed and locked.
3.

CAUTION!

Running conveyor belt

Danger of fingers, loose clothing, hair or jewelry being pulled in.

- Do not reach into the area of the conveyor belt.
- Avoid being pulled in.

The conveyor belt can be started.

7.1 Individual labeling of control panel

The operating and signal elements on the control panel can be labeled individually with the supplied chalk pen. Thus, specific customer solutions are possible.

Removing the labeling

NOTICE!

- Do not use any aggressive or abrasive cleaning agents.
- Moisture must be prevented from entering the device.

1. Switch off the SkillsConveyor and disconnect it from the power supply.
2. Wipe the labeling off the control panel with a damp cloth.

8 Cleaning

Festo Didactic SE systems and components are to a great extent maintenance-free.

At regular intervals, the following components should be cleaned with a soft, lint-free cloth or brush:

- The lenses on the optical sensors, the fiber optics and the reflectors.
- The active surface of the proximity sensor.
- The entire product.

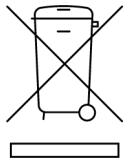
!	**NOTICE!**
	Do not use any aggressive or abrasive cleaning agents.

9 Conversion

Conversions or extensions to the SkillsConveyor are permitted only with the accessories offered by Festo Didactic SE. The accessories are specially coordinated for the SkillsConveyor and all the safety aspects required are taken into account.

Conversion instructions are enclosed separately with the corresponding products.

10 Disposal



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

11 Technical data

11.1 Technical data – General

Parameter	Value
Operating voltage	24 V DC, 4 A, ≤ 100 W output power, SELV/PELV limited power supply (LPS) ● When using an Edutrainer: via SysLink ● When using an external power supply: via safety sockets
Digital inputs/outputs ● Inputs: 8 ● Outputs: 8	Max. 24 V DC Max. 2 A per output Max. 4 A total
Analog inputs/outputs ● Inputs: 2 ● Outputs: 1	0 ... 10 V DC or ± 10 V DC
Electrical connection	Safety sockets
Dimensions	710 mm x 395.5 mm x 212.8 mm
Weight	16 kg
Material	
CE marking, UKCA marking	EMC directive RoHS directive EC Machinery Directive

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