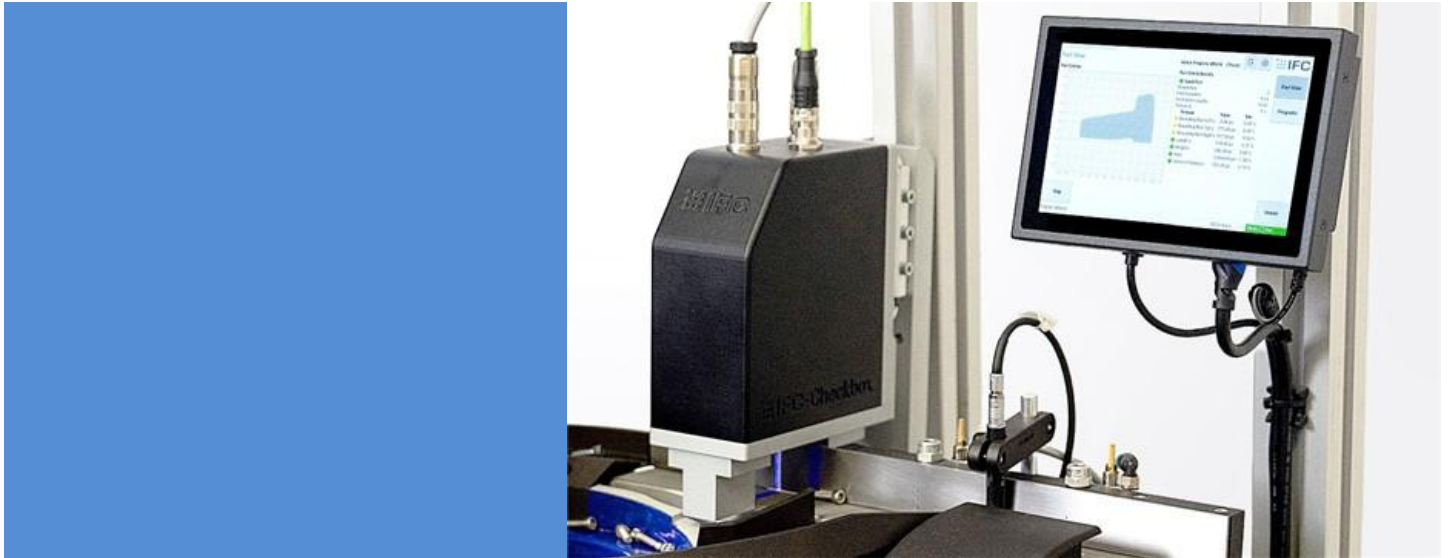




IFC-Checkbox[®]

Operating manual



English

Version 1.0.4
Firmware: 1.3.6
99.12627-00

Target audience: This operating manual is intended for trained specialist personnel.

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1. Related documents

All available documents for the product www.ifc-online.com/produkte

Document	Contents
Risk assessment	Hazard assessment
EU Declaration of Conformity	Compliance with all relevant EU safety requirements
EMC test report	Evidence of electromagnetic compatibility

Table1 : Related documents

2. Further information

For technical enquiries, support, accessories or spare parts, please contact your IFC representative:

Telephone: +49 7136 96395-0

Email: info@ifc-online.com

Website: www.ifc-online.com

3. Product-specific terms and abbreviations

Term / Abbreviation	Meaning
Deviation	The IFC-Checkbox evaluates the feature of a test part that differs most significantly from the teach data. The lower the value of the test part deviation, the more closely the test part matches the reference parts.
RUN Mode	Operating mode of the IFC-Checkbox for automatic part inspection (preset at start-up).
Part Deviation (Dev.)	Feature deviation (0.00 – 999.99%) Displays the largest detected deviation of the calculated characteristics as a percentage. If the value is > 100, the test part is rated as 'BAD' and is classified as a 'bad part'.
Good part	A test part for which all features are within tolerance. A distinction is made between - Correctly oriented good part - Incorrectly oriented good part
Training process	During the training process, sample parts are presented to the IFC-Checkbox on the transport device and the features are scanned. This is also referred to as 'teaching parts'.
Feature	Characteristic features are identified from the contour data of the sample and test parts; these are determined by tools (create test programme in CheckOpti). These include, for example, length, height, etc.
Sample parts	Good parts selected for the learning process that contain all the features required to identify the test programme.
Orientation	The parts to be inspected by the IFC-Checkbox may be positioned in different orientations on the conveyor. During the learning process, you define the orientations by showing the different positions. Orientation 1 is the preferred orientation (target orientation).
(System) Parameters	IFC-Checkbox settings (some settings can only be adjusted using the CheckKon configuration software).
Inspection data	The inspection data are the data used for testing. They correspond to the teach data plus the specified tolerances.
Test parts	All parts shown during the inspection process.
Inspection process	During the inspection process, test parts are presented to the IFC-Checkbox on the transport device and classified according to their characteristics in terms of orientation and compliance with tolerances. This is also referred to as 'part inspection'.
Bad part	A test part for which at least one characteristic is outside the tolerance range.

Term / Abbreviation	Meaning
Teach data	All characteristic values determined during the teach-in process, with the minimum and maximum limits calculated based on the average value.
Teach mode	Operating mode of the IFC-Checkbox in which the teach-in process is carried out.
Test programme	A programme defined by the teach data of the sample parts, using tools (configured in CheckOpti).
Tolerances	A factor expressed as a percentage of the average values, which affects the minimum and maximum limits of all features.

Table2 : Terms and Abbreviations

4. Software packages

Various software packages are available for convenient commissioning, optimisation and monitoring.

<https://www.ifc-online.com/downloads.php>

Software package	Functions
IFC-CheckKon IFC-Checkbox Configurator	→ Display of the last captured test part and evaluation of it → Display and logging of the part contour and the features derived from the contour → Display of the light intensity profile detected by the camera → Display and printout of the system configuration → Display and modifying the system parameters → Support for configuration, administration and documentation → Firmware updates
IFC-CheckOpti IFC-Checkbox Optimiser	→ Easy teach-in of sample parts → Monitored inspection of parts, displaying of recorded characteristics → Assessment of part inspection in terms of reliability (evaluation) → Graphical representation of the inspection process → Optimising part inspection by manually adjusting the minimum / maximum values of the teach data or by using additional tools → Support with configuration, administration and documentation

Table3 : Software packages

5. Functionality

The *IFC-Checkbox* is an automation component with optical workpiece identification for sorting small parts by type, orientation, quality and quantity. It is particularly suitable for the trouble-free feeding of small parts to assembly, manufacturing or packaging machines, especially for high part rates and a high variety of part types.

The *IFC-Checkbox* enables faulty parts to be reliably sorted out, prevents incorrect types from being assembled and reduces changeover times to a minimum.

The *ScanUnit* is housed in a robust enclosure, which contains the line-scan camera and telecentric lighting components. The *ProcessingUnit* is based on an industrial PC and processes the image and sensor data, calculates the inspection results and controls the part flow. The *ControlUnit* provides the input and output signals. All user interfaces are provided via the *TouchDisplay*. The connections for the *IFC-Checkbox* components, as well as those to the encoder and diagnostic PC, are designed as plug connectors.

The parts are scanned in a downward-open optical channel on the underside of the *ScanUnit*. This allows the *ScanUnit* to be mounted above various customer-supplied transport systems (e.g. a belt conveyor with an encoder).

The following basic functions are provided by the IFC-Checkbox:

Basic functions of the IFC-Checkbox	
Teach function	→ Teaching new parts (good and bad parts) without programming → Saving the characteristics of the trained inspection programme
Quality inspection¹⁾	→ Quality inspection (dimensions, geometry), e.g. for turned and milled parts → Automatic sorting of faulty and foreign parts
Position check (target orientation)	→ Position-controlled transfer of good parts to the following process → Return of incorrect oriented good parts to the small-parts conveyor → Position checking and accumulation monitoring can be performed simultaneously
Accumulation section monitoring	→ Monitoring of the buffer section using a sensor → When the buffer section is full: return of good parts to the small-parts conveyor. → If the conveyed parts accumulate on the accumulation section for an extended period, the small-parts conveyor switches off.
Accumulation monitoring with switching hysteresis ²	→ Monitoring of the accumulation section (min./max. accumulation) using two sensors for delayed switching of the small-parts conveyor (hysteresis).
Good part counting with a present quantity ²⁾	→ A running counter determines the total number of good parts → Feeding defined quantities of parts by specifying a target quantity of good parts → Quantity specification via touch display, fixed in the inspection programme or via external input
Feeder control (bowl feeder, area feeder)	→ Blow-off process → Delayed release of the feeder → Shutdown of the feeder after an adjustable time when the buffer section is full or the counter value has been reached
External sensor	→ Control of up to three external sensors (e.g. colour sensors, eddy current sensors, area-scan cameras, AI cameras, etc.) for additional evaluations at configurable positions. Integration of the result to the part while it is still in motion, with rejection via separately adjustable actuators.

1) Advanced quality inspection with CheckOpti

2) Activation or configuration of system parameters in CheckKon required

6. Safety

6.1. Safety instructions

- Use the product only in its original condition without unauthorised modifications. Only the modifications or alterations described in the product documentation are permitted.
- Use the product only when it is in technically faultless condition.
- Comply with all applicable national and international regulations.
- Before carrying out assembly, installation or maintenance work: switch off the power supply, verify that no voltage is present and secure it against being switched on again.

Requirements for product use

- To ensure the correct and safe use of the product, comply with the connection and environmental conditions specified in the technical data for the product and all connected components.
- Compliance with the limit values and load limits enables the product to be operated in accordance with the relevant safety guidelines.
- Observe the instructions and warnings in the documentation.

6.2. Intended use

- The product is intended for use under normal operating conditions in enclosed industrial premises.
- The product is intended exclusively for the non-contact inspection of the position and quality of small parts in transit.
- The features determining the orientation and quality of the part under inspection must be recognisable and distinguishable by the IFC-Checkbox.
- It must be possible to integrate the IFC-Checkbox into the material flow.

6.3. Qualification of specialist personnel

- Work on the product must only be carried out by qualified personnel who are able to assess the work and identify hazards.
- The qualified personnel must be familiar with the installation of electrical control systems.

7. Product overview

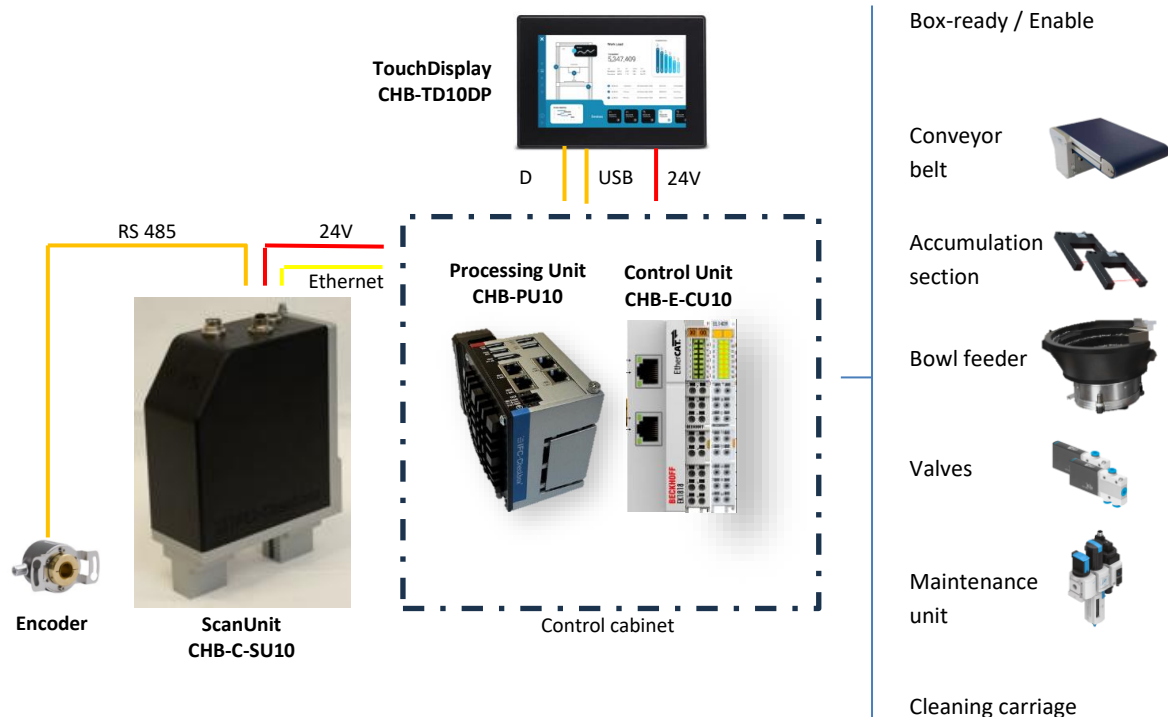
7.1. IFC-Checkbox system overview

The IFC-Checkbox comprises several components. In conjunction with a digital encoder (rotary encoder), the *ScanUnit* with telecentric lighting and a line-scan camera is used for the optical detection of the parts under inspection.

Data processing is handled by the *ProcessingUnit*. This is where image processing, the handling of inspection tasks, the tracking of components during the process and the control of actuators ('part flow control') take place.

The ControlUnit provides inputs and outputs for the integration of various actuators and components. Both units are mounted, installed and integrated into a suitable control cabinet. The system is visualised and controlled via an IP65-rated *touch display*.

The ControlUnit provides 24V high-power signals at its outputs, which can be used to directly control, for example, fast-acting pneumatic valves in order to safely eject incorrect or incorrectly oriented parts from the part flow using a jet of air. However, other actuators such as pneumatic or electric ejectors, diverters or turning stations can also be controlled.



By integrating up to 3 external sensors or cameras, additional quality characteristics can be checked. For this purpose, any inductive, capacitive or optical sensors, colour sensors, vision sensors or AI camera systems can be integrated into the process and into the part flow control for further complex workpiece inspections. All the control functions required for this can be easily configured.

The enhanced count function for good parts now works in conjunction with up to 3 external sensors.

Inputs for encoders for monitoring conveyor belt speed and for accumulation sensors, as well as an output for controlling the conveyor, complete the range of functions.

The system is visualised and controlled via a *TouchDisplay* suitable for industrial requirements. The modern and clearly structured user interface facilitates operation, teach-in process, inspection programme selection and troubleshooting.

7.2. Design integration and CAD models

Detailed CAD models for the IFC-Checkbox and suitable accessories are available to facilitate design integration. The IFC CAD catalogue can be accessed directly via the following link:

<https://ifc-online.partcommunity.com/3d-cad-models/ifc>

7.3. ScanUnit CHB-C-SU10

7.3.1. Product structure

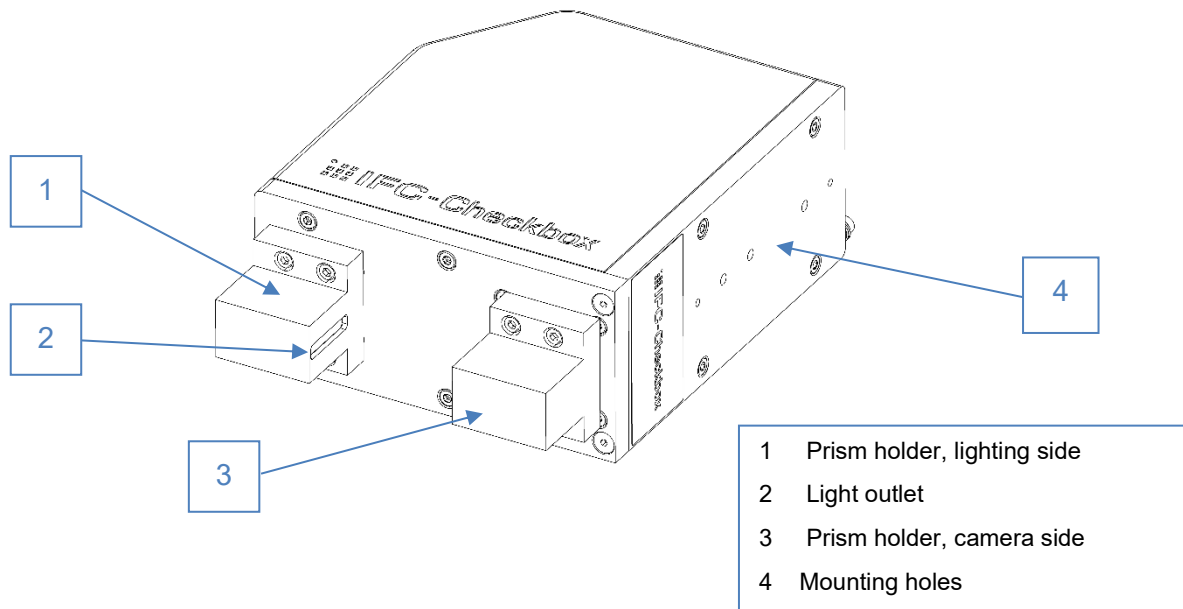


Figure 1 : Functional areas of the ScanUnit CHB-C-SU10

7.3.1. Connections

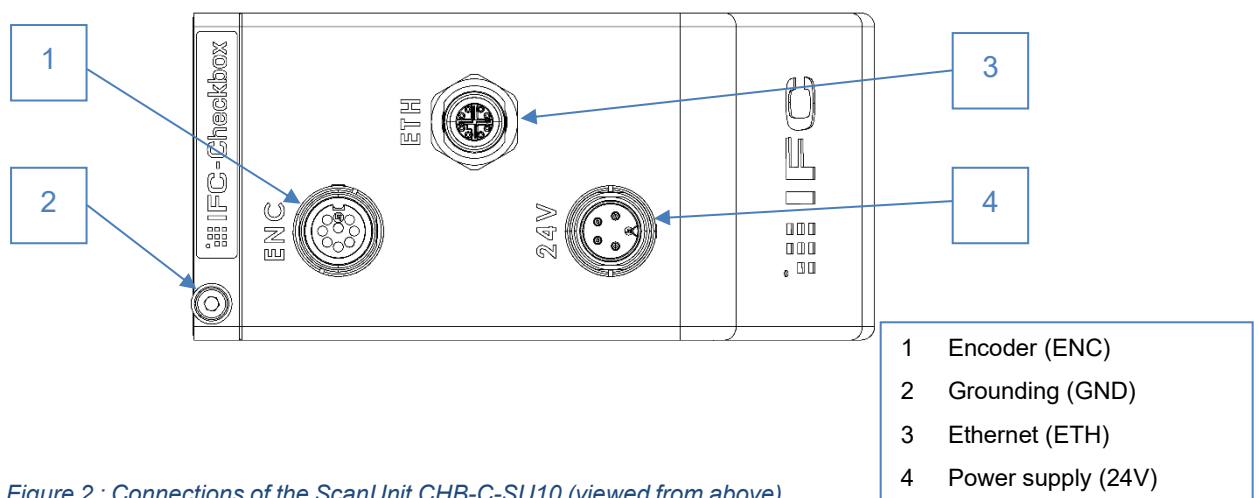


Figure 2 : Connections of the ScanUnit CHB-C-SU10 (viewed from above)

7.3.2. Connection terminals

1 Encoder connection (ENC)¹⁾

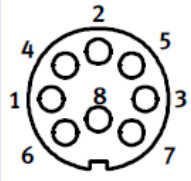
Socket	Pin	Signal
 M16, 8-pin	Interface for rotary pulse encoders according to the RS485 specification	
	1	A+
	2	n.c.
	3	B+
	4	A-
	5	B-
	6	5 V supply ²⁾
	7	GND
	8	n.c.

Table 4: Encoder connection

1) Interface for rotary pulse encoders according to the RS 485 specification; encoder not included

2) Maximum current rating 180 mA

2 Earthing connection (): Establish a suitable protective earth connection

3 Ethernet connection (ETH)

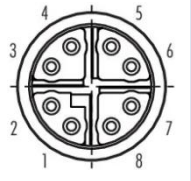
Socket ¹	Pin	Pair	Signal
 M12, 8-pin, x-coded	1	Pair 1	DA+
	2	Pair 1	DA-
	3	Pair 2	DB+
	4	Pair 2	DB-
	5	Pair 3	DC+
	6	Pair 3	DC-
	7	Pair 4	DD+
	8	Pair 4	DD-
Metal shield			Shield

Table 5: Ethernet connection

4 24 VDC connection

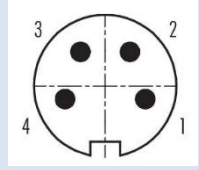
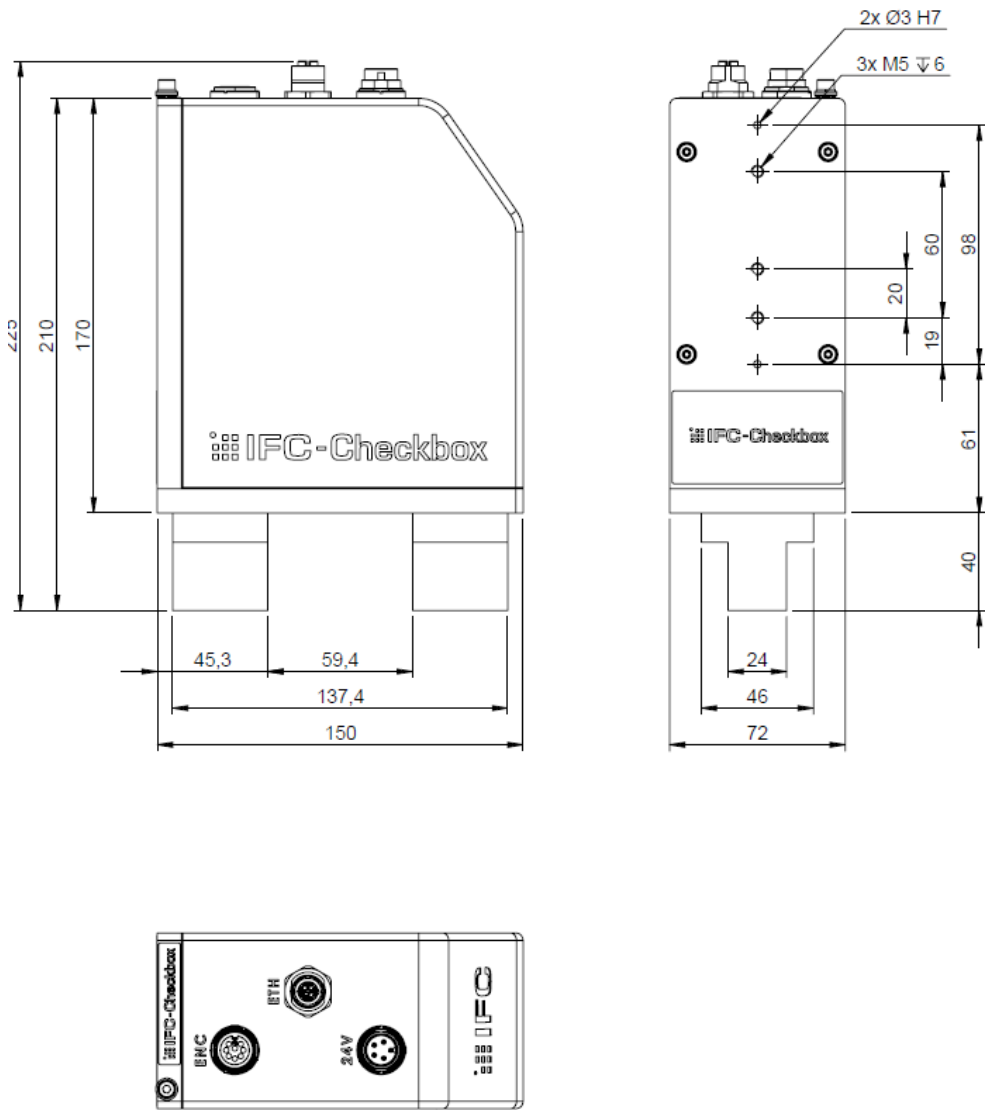
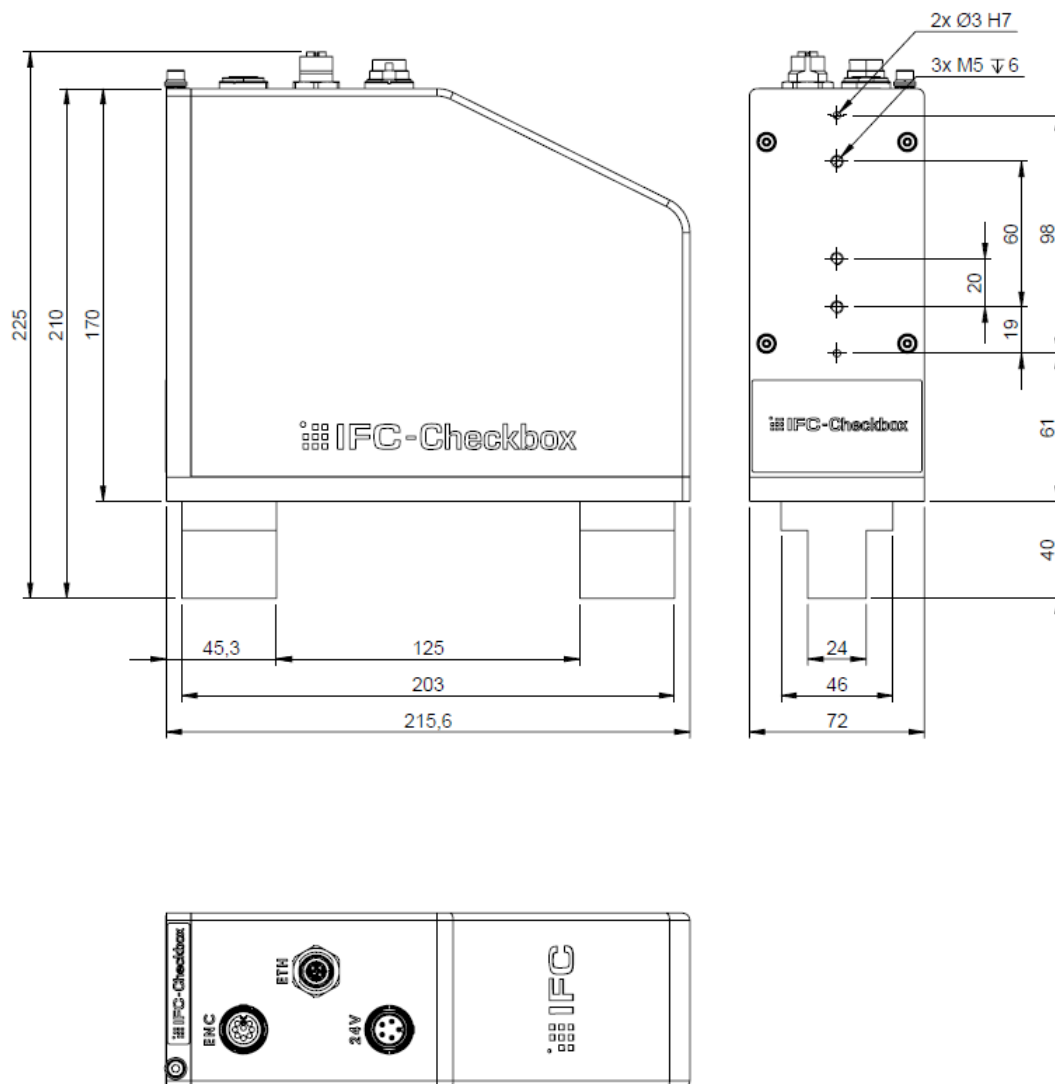
Connector	Pin	Signal
 M16, 8-pin	1	+24 V DC
	2	FE
	3	Do not connect
	4	GND

Table 6: 24 VDC connection

7.3.3. Dimensions ScanUnit CHB-C-SU10



7.3.4. Dimensions ScanUnit CHB-C-SU10XL



7.4. ProcessingUnit CHB-PU10

7.4.1. Product structure

The ProcessingUnit CHB-PU10 is a specially adapted industrial PC designed for control cabinet installation, with pre-installed and licensed firmware for the IFC-Checkbox.



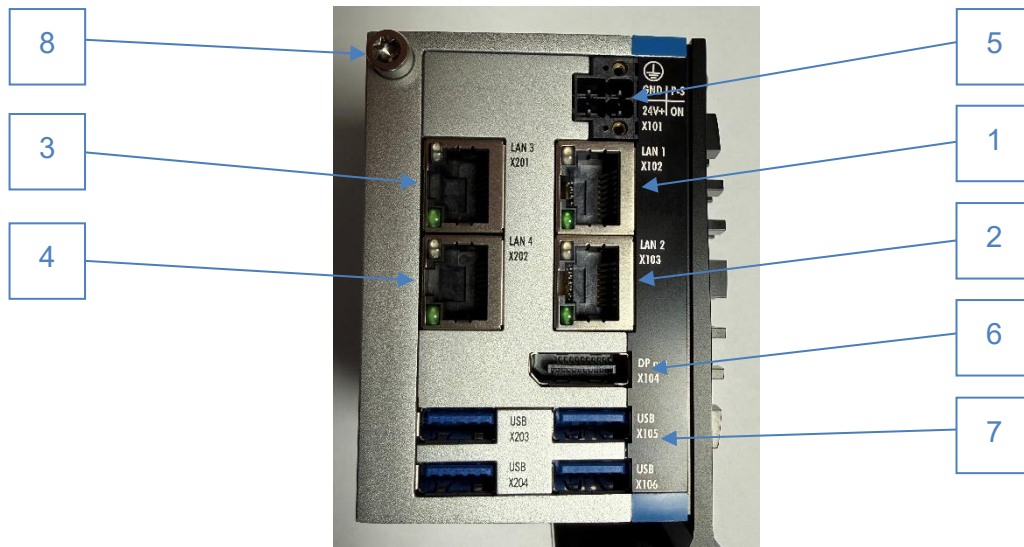
No.	Component	Description
1	Mounting bracket	For DIN rail mounting in the control cabinet; position can be adjusted if required.
2	Status LEDs	Status indicators for power, mass storage, TC (Checkbox)
3	Side cover	Access to battery and storage medium

7.4.2. Scope of supply

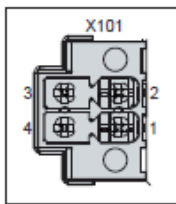
The following components are supplied with the ProcessingUnit:

No.	Component	Description
1	Industrial PC	For control cabinet mounting
2	Top-hat rail adapter	Pre-assembled, multiple mounting options
3	2x2-pin power socket	For connecting the power supply

7.4.3. Interfaces



Port	Designation	Connection for component
1	LAN 1	Ethernet ControlUnit / IO-Board
2	LAN 2	Ethernet ScanUnit
3	LAN 3	Diagnostic port (if required)
4	LAN 4	Diagnostic port (if required)
5	24V / GND (X101)	24V power supply
6	DP	DisplayPort TouchDisplay
7	USB (4x)	USB touch display (3x spare)
8		GND



The Processing Unit CHB-PU10 is powered via 2x2-pin power socket (item 5). The main supply voltage is applied between PIN 3 (0V) and PIN 4 (24V) of the socket.

Pin	Signal	Description
1	PC-ON	PC-ON input (do not connect)
2	P-S	Power status output (do not connect)
3	GND	0 V
4	24 V	Power supply

7.4.4. Status LEDs

The industrial PC has three status LEDs: PWR, TC, HDD. They provide information on the following aspects:

- the status of the power controller
- the TwinCAT status (no function)
- SSD activity

PWR LED

Colour	Flashing interval	Meaning
None	Steady	PC is off
White	Steady	VCC Power failure
Yellow	Steady	IPC shut down, supply voltage still present
Green	Steady	Normal operation
Red	Steady	Reset / Power failure
Green/Yellow	Flashing	Bootloader running without errors
Red/Yellow	Flashing	Bootloader starting
Cyan	Flashing (2 s)	Contact IFC Service

HDD LED

Colour	Flashing interval	Meaning
Red	Flashing	Activity (access to storage medium)

7.4.5. Connection

	Electrical voltage!
	• Commissioning and adjustment work only when the system is de-energised and after verifying that no voltage is present! • Ensure that the de-energised status is maintained for the duration of the work. • All work must only be carried out by trained qualified electricians!

To make the unit ready for operation, you must connect it. The first step is to ground the unit. You can then connect the cables and the power supply.

An external power supply unit is required for the power supply, which must provide 24 V DC from an isolated source. This must be protected by a fuse in accordance with UL 248 with a maximum rated current of 4 A. A nominal voltage of at least 22 V must be present at the device's power supply connector at all times.

Wire the device in the control cabinet in accordance with standard EN 60204-1:2006 Protective Extra Low Voltage (PELV):

- The protective earth (PE) conductor and the '0 V' conductor of the power source must be at the same potential (connected in the control cabinet).
- Standard EN 60204-1:2006, Section 6.4.1.b, stipulates that one side of the circuit or one point of the circuit's energy source must be connected to the protective conductor system.

Peripheral devices connected to the device with their own power supply must have the same potential for the PE and '0 V' conductors (no potential difference).

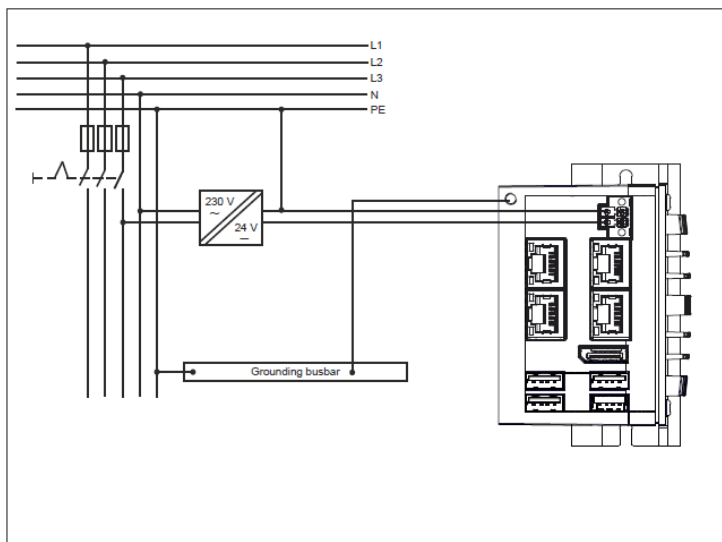


Figure 3: Wiring example

7.4.6. Grounding

Grounding or equipotential bonding of electronic equipment minimises differences in electrical potential (potential differences) and diverts electrical currents into the ground. This is intended to prevent dangerous touch voltages and electromagnetic interference.

Protective grounding

The protective grounding of a device is to prevent dangerous touch voltages. Establish the low-impedance protective ground connection via the PE protective conductor connection on the housing of industrial PC to prevent dangerous touch voltages.

Electromagnetic Compatibility (EMC)

NOTE

Property damage caused by electromagnetic interference

Using the device without a functional earth connection may result in property damage due to electromagnetic interference.

- Only use the device with functional grounding.

The electromagnetic compatibility (EMC) of the device involves, on the one hand, ensuring that other devices and systems are not affected by electromagnetic interference and, on the other hand, ensuring that the device itself is not affected by electrical or electromagnetic effects.

For this purpose, the device must comply with certain protection requirements. This device has EMC immunity in accordance with EN 61000-6-2. The EMC emissions of this device comply with the requirements of EN 61000-6-4.

Functional grounding is required for the device's EMC. Functional grounding is required for the EMC of the device. The functional ground connection must also be established via the grounding connection between the protective conductor connection (PE) on the device and the central grounding point of the control cabinet in which the PC is installed. Use cables with a cross-sectional area of at least 4 mm² or a flat conductor for the ground connection, as the conductor should have the largest possible surface area.

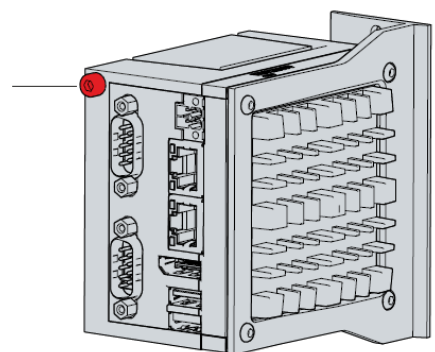
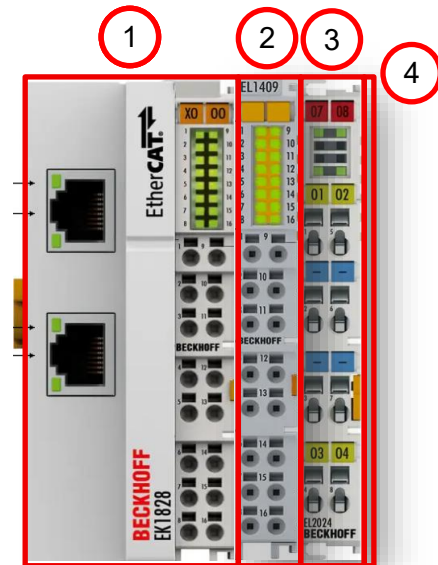


Figure 4: Protective ground connection PE

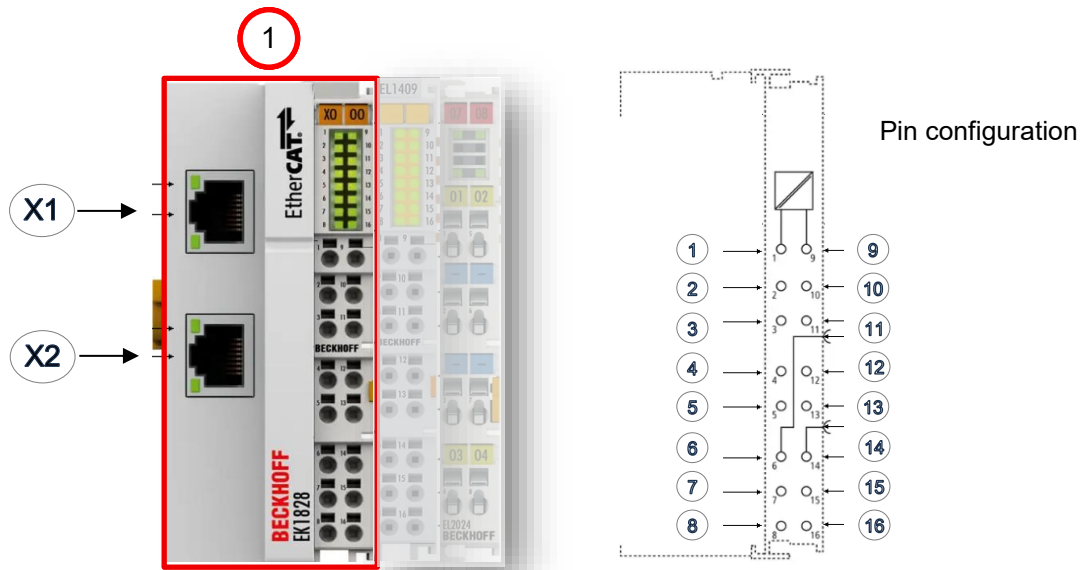
7.5. Control Unit CHB-E-CU10

The Control Unit CHB-E-CU10 is used to generate the digital inputs and outputs. It consists of the following individual components:

- (1) EtherCAT coupler – EK1828
- (2) EtherCAT Terminal – EL1409
- (3) EtherCAT Terminal – EL2024
- (4) End cap – EL9011

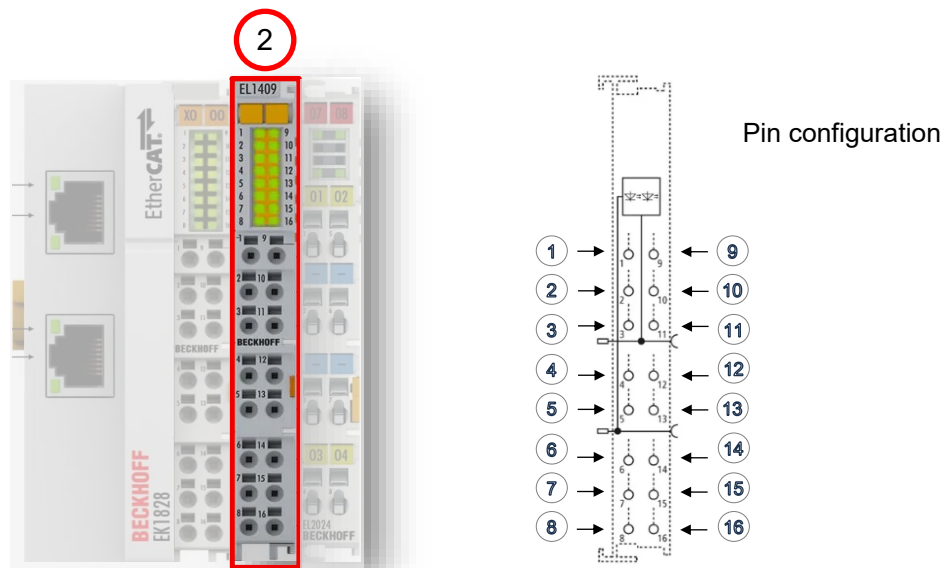


The following inputs and outputs are available on the respective terminals:

(1) EtherCAT coupler – EK1828

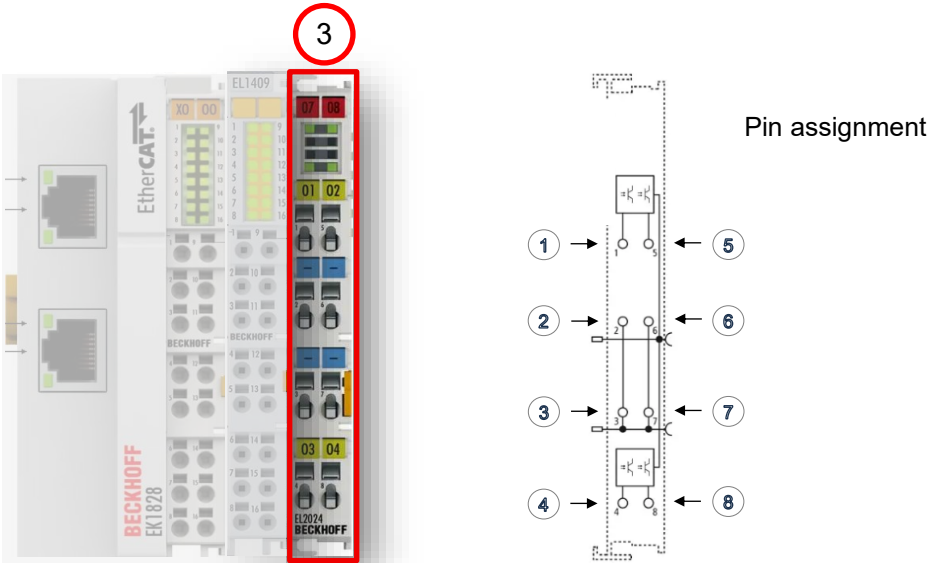
Terminal	Designation	Description
X1	EtherCAT IN	Connection to ProcessingUnit LAN1
X2	EtherCAT OUT	For special applications, if required
1	+24V Us	Control voltage
2 (In)	Type_BIT0	External type selection: Bit 0
3 (In)	Type_BIT2	External type selection: Bit 2
4 (Out)	OperationReady	Boot process complete, ready for operation
5 (Out)	Feeder	Control of the small parts conveyor (e.g. bowl feeder, area feeder, etc.)
6	+24V Up	Load voltage
7 (Out)	Warning	Status message: Warning (part shortage)
8 (Out)	Reserve	
9	0V Us	Control voltage GND
10 (In)	Type_BIT1	External type selection: Bit 1
11 (In)	Type_BIT3	External type selection: Bit 3
12 (Out)	BoxReady	Run mode, control of the transport device (e.g. test conveyor belt, centrifuge, etc.)
13 (Out)	Error	Status message: error condition
14	0V Up	Load voltage GND
15 (Out)	CounterReached	Counter mode, target value reached
16 (Out)	Reserve	

(2) EtherCAT Terminal – EL1409



Terminal	Designation	Description
1 (In)	Type_BIT4	External type selection: Bit 4
2 (In)	Type_BIT5	External type selection: Bit 5
3 (In)	Type_BIT6	External type selection: Bit 6
4 (In)	Type_BIT7	External type selection: Bit 7
5 (In)	Ext. Start	Start/stop operation, complete teach-in on the falling edge
6 (In)	Reserve	
7 (In)	External error	Signal = LOW → triggers 'external error' and 'compressed air error'
8 (In)	Counter Reset	Start a new counting cycle on a falling edge
9 (In)	Ext. Teach	Starts the teach-in process; switches to the next orientation
10 (In)	Jam1	Accumulation sensor 1
11 (In)	Jam2	Accumulation sensor 2, fill level with switching hysteresis, only used in conjunction with Jam1
12 (In)	External sensor	Additional testing of material characteristics (e.g. colour sensor, vision sensor, camera, etc.). Downstream inspection function, i.e. only good parts are inspected.
13 (In)	Reserve	
14 (In)	Reserve	
15 (In)	Reserve	
16 (In)	Reserve	

(3) EtherCAT Terminal – EL2024



Terminal	Designation	Description
1 (Out)	Actuator 1	Configurable via CheckKon (e.g. 'incorrect orientation', etc.)
2 (GND)	GND	GND
3 (GND)	GND	GND
4 (Out)	Actuator 2	Configurable via CheckKon (e.g. 'Bad parts', etc.)
5 (Out)	Actuator 3	Configurable via CheckKon (e.g. 'Good parts', etc.)
6 (GND)	GND	GND
7 (GND)	GND	GND
8 (Out)	Actuator 4	Configurable via CheckKon (special assignment)

7.6. TouchDisplay CHB-TD10DP

7.6.1. Product structure

The IFC-Checkbox and the connected components are operated via the central 7-inch TouchDisplay. Furthermore, teach and test parts are visualised, important inspection parameters are displayed, error messages are displayed in plain text, stored inspection programmes are selected, settings are entered and log files are provided.

7.6.2. Scope of supply

The following components are supplied with the TouchDisplay:

Item	Quantity	Description
1	1	7-inch touchscreen display with pre-installed rear cover
2	1	Moulded seal for cable entry, two-piece
3	1	DisplayPort cable, length 2.5 m
4	1	USB-A connection cable, length 2.5 m
5	1	230V power supply with 2.5m connection cable
6	1	9–36 V connector, detachable
7	1	Flat gaskets, adhesive-backed (not required)
8	4	Fixing screws

7.6.3. Connections

The TouchDisplay is equipped with a cover with seals to protect the connectors against the ingress of contaminants. The pre-installed cover must be removed to connect the supplied cables. The TouchDisplay has the following connections:



Port	Designation	Connection for component
1	DP	DisplayPort connection to the Processing Unit
2	USB-A	USB connection to the Processing Unit
3	9–36 V	Power supply
4	Operation	Control buttons (not required during operation)

7.6.4. Cable and seal installation

The TouchDisplay must be connected using the supplied DisplayPort cable (video signals) and the USB-A cable (touch signal). The TouchDisplay also requires a power supply (9–36 V DC). A power supply unit for standard 230V shockproof sockets is included in the scope of supply. However, IFC recommends connecting the power supply via a customer-provided 24V connection to a suitable power supply unit in the control cabinet. Use the supplied connector (item 6) for this purpose.

To protect the display against the ingress of dirt, water, oil, etc., the openings for the connection sockets must be sealed using gaskets and a metal cover. The following steps are required for this:

1. First, remove the rear metal cover by loosening the 6 Phillips-head screws on the cover.



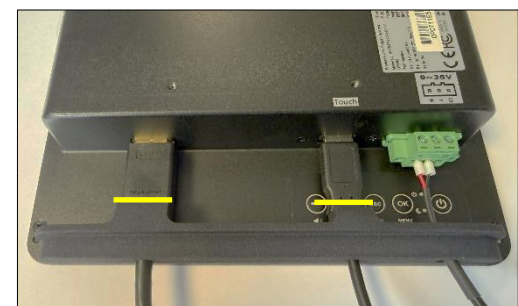
2. Now fit the lower sealing element (item no. 04.12699-03). To do this, remove the three fixing screws on the edge of the display. Position the lower sealing element at the lower edge and secure it with the supplied M3x12 screws (3 pieces).



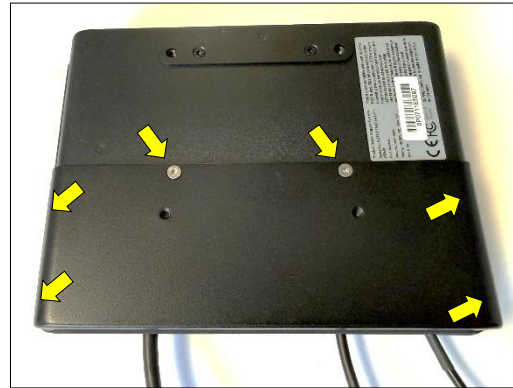
3. Connect the connection cables to the corresponding sockets. Secure the power supply plug for strain relief using the two integrated locking screws.



4. Place the upper sealing element (item no. 04.12700-03) onto the lower sealing element. Both elements fit together precisely. Ensure that the cables are correctly positioned in the designated recesses and that the upper sealing element provides strain relief for the DisplayPort and USB-A cables (strain relief).



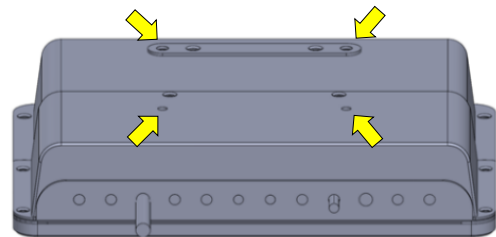
5. Now place the metal cover onto the rear and secure it using the supplied M3x6 screws (6 pieces). Check once again that the seal, cable and metal cover are correctly fitted. The 4x M4 mounting threads for a VESA75 bracket are only available when the cover is fitted and secured with screws.



Note: Only with the seals and covers properly installed is the rear IP 54 protection rating and consequently, reliable long-term operation ensured.

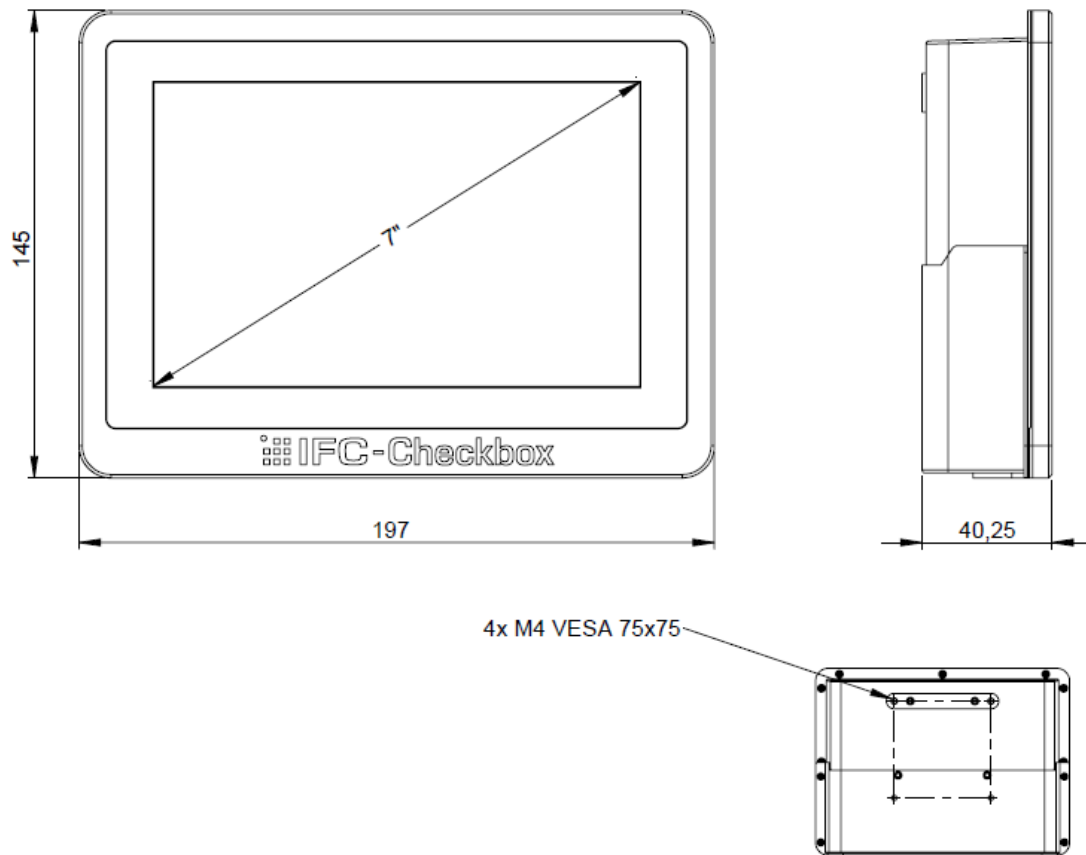
7.6.5. Mounting

The TouchDisplay features a VESA75 mounting option on the rear for attaching optional IFC brackets or standardised brackets.



Before mounting the device on a bracket, it is essential that all connection cables are connected, the seals are in place and the cover is screwed on.

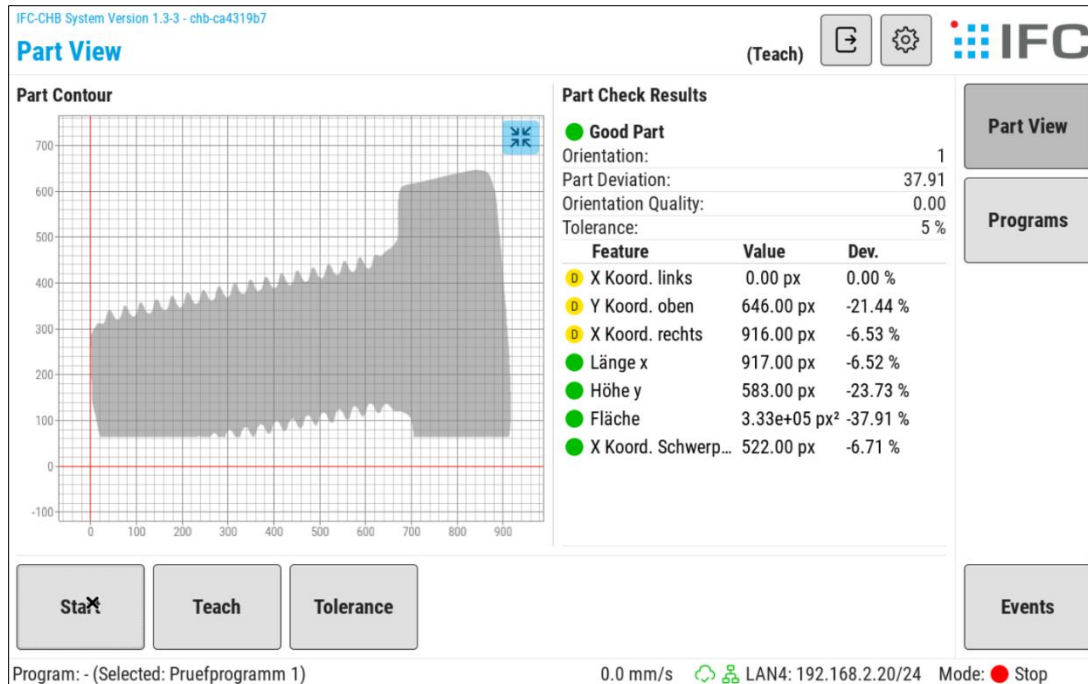
7.6.6. CHB-TD10DP TouchDisplay dimensions



8. User Manual

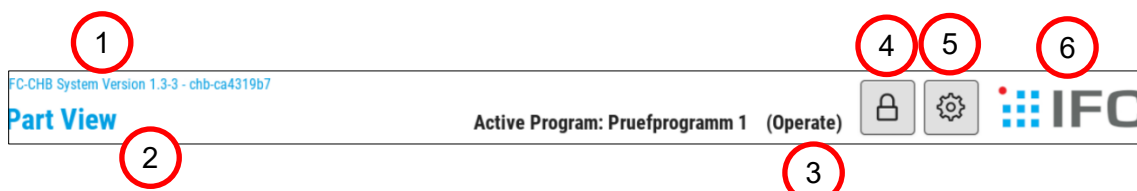
The IFC-Checkbox and its integrated components are operated and visualised via a TouchDisplay. The following section describes the use and operation of the system.

8.1. User interface



8.1.1. Header bar

The header bar is available on every visualisation page. The individual elements are used to display status information and provide access to user management and settings.

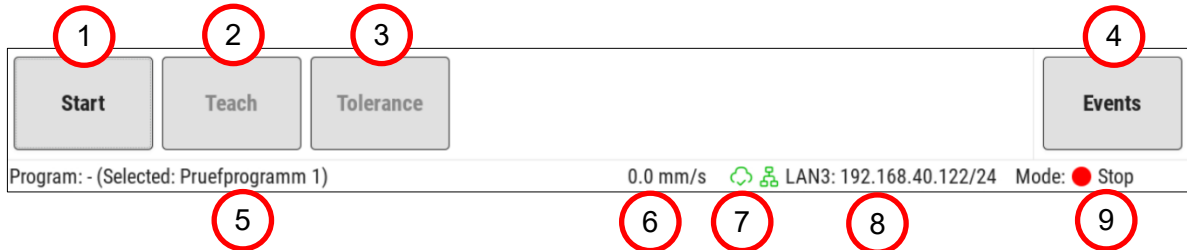


- (1) Displays the installed *firmware version* and the device ID of the processing unit
- (2) Displays the *name* of the currently displayed page
- (3) Displays the current *user level*
- (4) *User management*; press to access the user management
- (5) *Settings*; press to access the settings page
- (6) IFC company *logo*

8.1.2. Footer bar

The footer is used for general system operation, displays the active inspection programme and shows the system status. It is generally available on every page. The buttons displayed depend on the specific page.

Part View page (test part)



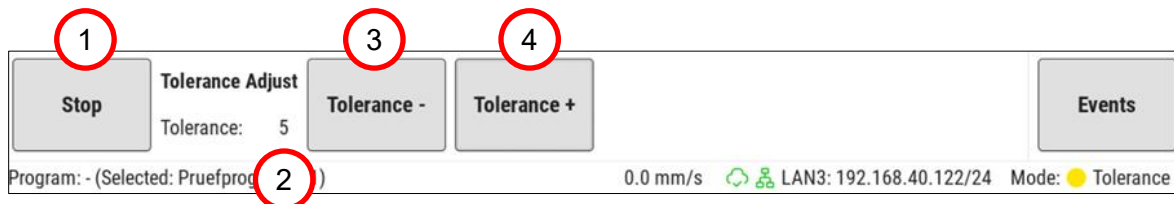
- | | |
|----------------------------|---|
| (1) <i>Start:</i> | Starts the system |
| (2) <i>Teach:</i> | Starts the process for teach-in new parts. |
| (3) <i>Tolerance:</i> | Allows adjustment of the general inspection tolerance for the currently selected inspection programme. |
| (4) <i>Events:</i> | Switches to the log table for errors, warnings, events and information |
| (5) <i>Program:</i> | Displays the active inspection programme |
| (6) <i>Conveyor speed:</i> | Displays the current speed of the conveyor belt. |
| (7) <i>Online monitor:</i> | Shows whether the system is connected to the internet. For this, 'Remote Device Management' must be enabled in the settings. This function is intended solely for extended support in the event of a fault. |
| (8) <i>IP Address:</i> | Displays the current IP address of the IFC-Checkbox when a network cable is connected to LAN3 or LAN4. If both ports are in use, the display changes automatically every 2 seconds. |
| (9) <i>Mode:</i> | Displays the current operating mode |

Teach page (programming test parts)



- (1) *Stop*: Ends the teach-in process. The limits of the inspection programme are automatically adjusted and adopted based on the parts fed into the machine.
- (2) *Orientation*: Indicates the orientation in which the next recorded component will be assigned
- (3) *Orientation*: Switch between the orientations to be taught, -1
- (4) *Orient. +*: Switch between the orientations to be taught, +1

Page Tolerance (adjustment of the general inspection tolerance)



- (1) *Stop*: Applies the set general inspection tolerance to the current inspection programme
- (2) *Tolerance*: Current tolerance value in %. The default value is 5%.
- (3) *Tolerance -*: Adjustment of the value, -1
- (4) *Tolerance +*: Adjustment of the value, +1

Program page (inspection programme management)



- (1) *Previous Page*: Back to the previous test programme page
- (2) *Next Page*: Go to the next test programme page
- (3) *Copy*: Copies the selected test programme
- (4) *Select*: Activates the selected test programme

Events page (logbook)



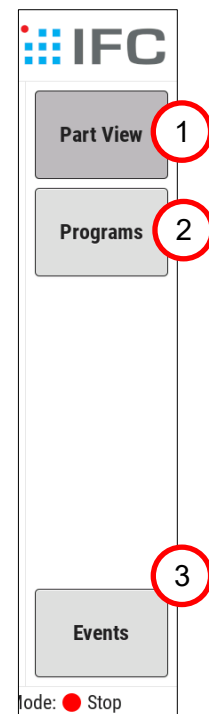
- (1) *Page 1*: Returns to the main page
- (2) *Errors*: Shows or hides stored error messages
- (3) *Info*: Shows and hides stored information messages
- (4) *Warnings*: Shows or hides stored warning messages
- (5) *Previous Page*: Back to the previous page
- (6) *Next Page*: Go to the next page

8.1.3. Navigation section

The page navigation is the main element for switching between pages. Pressing a button opens the corresponding page.

Depending on the user's current access level, some pages may not be available.

- (1) Goes to the *Part View* page
- (2) Goes to the *Programs* page
- (3) Goes to the *Events* page



8.1.4. User management

The IFC-Checkbox distinguishes between different user levels to limit access to certain functional areas.

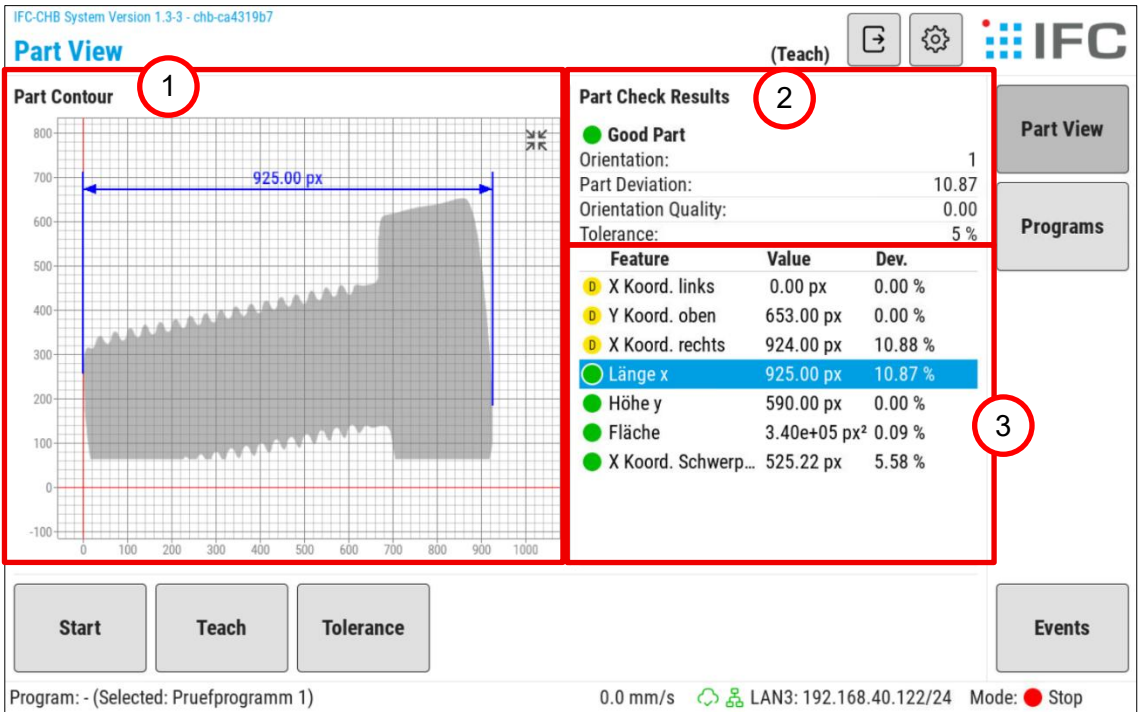
Level	User	Password	Permission
0	Operate		Start/Stop, Events
1	Select	100	Type selection, tolerance adjustment
2	Teach	200	+ Set up a new type (teach-in), change settings, firmware update

To switch to operator levels *1 Select* or *2 Teach*, press  and enter the corresponding password. The symbol on the button changes to .

To log out and switch to user level *0 Operate*, press .

8.1.5. control page *Part-View*

After system started up and during normal production, the *Part-View* screen displays the the last scanned part. It also displays various results from the inspection tools used, as well as the inspection result.



- (1) The **Part Contour** section displays the part currently being scanned. The display can be moved freely using a two-finger pinch-to-zoom gesture for detailed analysis. The scale always shows the number of pixels and changes with the selected zoom level.
- (2) The **Part Check Results** section displays the current inspection result, the deviation and tolerance, as well as the calculated results from the individual inspection tools.

Part Check Results		
● Bad Part		
Orientation:		2
Part Deviation:		999.00
Orientation Quality:		17.00
Tolerance:		10 %

Test result: *Bad Part*

Based on the selected inspection programme, the scanned component has been classified as ‘bad’ and is subsequently processed according to the step specified for this purpose in the inspection programme.

Test result: *Good Part*

The scanned component has been classified as 'good' based on the selected inspection programme and is subsequently processed according to the step specified for this purpose in the inspection programme.

Test result: *Orientation*

Displays the orientation of the part as detected based on the selected inspection programme (e.g. 'thread forward') and is subsequently processed according to the step specified for this purpose in the inspection programme.

Orientation 1: Component is correctly oriented

Orientation 2: Component is incorrectly oriented

Test result: *Part Deviation*

Indicates the current deviation from the optimal test result. If the value is higher than 100, the test part is rated as 'bad'.

Test result: *Orientation Quality*

Shows the calculated accuracy of the orientation detection.

Test result: *Tolerance*

Shows the current tolerance of the inspection programme.

- (3) The '**Feature**' section displays the calculation results for individual inspection tools and features in the selected inspection programme. These detailed results are used for analysis and troubleshooting. Individual rows can be selected to display the respective result graphically on the displayed part.

Feature	Value	Dev.
 Bounding-Rect Left x	0,00 px	0.00 %
 Bounding-Rect Top y	773,00 px	-22.19 %
 Bounding-Rect Right x	916,00 px	316.08 %
 Length x	917,00 px	315.65 %
 Height y	603,00 px	-28.08 %
 Area	3,37e+05 px ²	163.30 %
 Center of Gravity x	395,81 px	332.65 %
 Center of Gravity y	405,10 px	-34.08 %
 Inertia x	2,43e+10	1186.17 %
 Inertia y	6,24e+09	8.86 %

8.1.6. Control page *Teach* (teach process)

In Teach mode, the Checkbox determines the limit values of the tools and features used for one or more orientations by scanning sample parts.

To carry out this process, you must be logged in at the 'Teach' user level.

Carry out the learning process as realistic as possible. Use, for example, the feeding system intended for subsequent RUN mode (bowl feeder, area feeder, etc.). If required, this can be activated via a parameter in IFC-CheckKon ('Activate feeding system in teach mode').

Procedure:

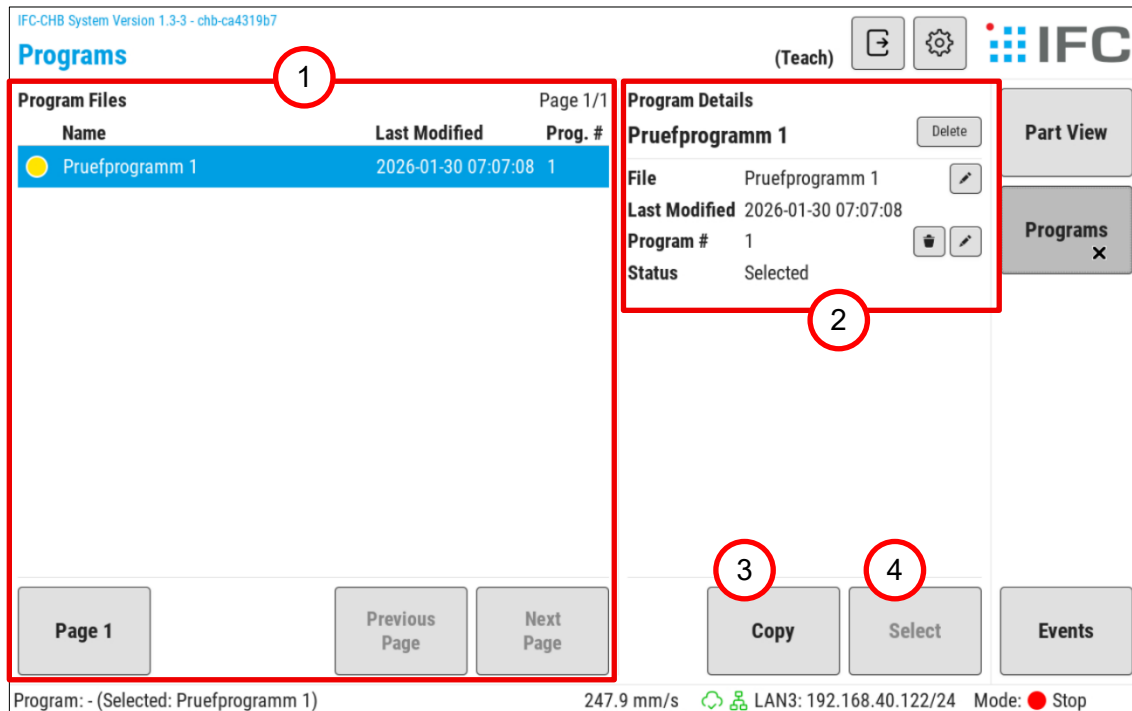
1. Manually clear the test belt conveyor to prevent incorrect parts from being taught by mistake.
2. Select the test programme to be used for teaching the parts.
3. If a new, additional part is to be permanently taught based on an existing test programme, an existing test programme can be copied and created using "Copy".
4. Start the process by pressing the '*Teach*' button. The conveyor belt starts automatically.
5. At the beginning, the parts must be fed in the desired target orientation (Orientation 1).
6. Up to seven additional orientations can be programmed using the buttons in the footer bar. All other orientations are classified as '*incorrect* oriented' by default. This can be adjusted via a parameter in CheckKon.
7. Once all the desired orientations have been taught, the process is completed by pressing the 'Stop' button.
8. Check the result to ensure that the desired result has been achieved

Notes:

- Depending on the inspection task and the underlying inspection programme, it may be necessary to teach in several sample parts. As a general rule, it is recommended to teach at least 10 sample parts with the target orientation (Orientation 1).
- Simulate real production conditions during the teach-in process: feed the parts with the conveyor switched on.
- During the teach process, monitor the displayed contour image to ensure that all parts have been recorded as required.
- If a part is fed incorrectly during the process, the teach process must be repeated.

8.1.7. Control page *Programs* (inspection programs management)

The '*Programs*' control page is used to manage and select the stored inspection programmes. Inspection programmes can also be renamed, assigned to programme slots or deleted.



- (1) The '**Program Files**' section lists all inspection programmes stored in the IFC-Checkbox. It displays the assigned inspection programme name ('Name'), the date and time of the last modification ('Last Modified') and the inspection programme number ('Prog. #').

The IFC-Checkbox can store an unlimited number of inspection programmes. If the number of stored inspection programmes exceeds the number of rows that can be displayed, they are split across several pages. The current page and the total number of pages are shown in the top right-hand corner ("Page X/Y"). You can navigate between pages using the 'Previous Page' and 'Next Page' buttons below the 'Program Files' section.

- (2) In the **'Program Details'** section, inspection programmes can be edited or deleted. Details of the inspection programme selected in the **'Program Files'** section are displayed here.

Note: The programme number (*Program #*) corresponds to the BCD code.

Program Details		
Pruefprogramm 1		Delete 2.1
File	Pruefprogramm 1	 2.2
Last Modified	2026-01-30 07:07:08	
Program #	1	  2.4
Status	Selected	2.3

(2.1) **Delete inspection programme:**

To delete the inspection programme displayed under **'Programme Details'**, press the **'Delete'** button and confirm the action in the following dialogue.

Warning: Deleting inspection programmes from the IFC-Checkbox cannot be undone.

(2.2) **Renaming a test programme:**

To name or rename the test programme displayed under **'Program Details'**, click the button in the **'File'** row with the *pencil icon*. You can then enter a new name for the selected test programme.

(2.3) **Remove test programme number assignment**

The 'bin' icon removes the association between the test programme and a programme number.

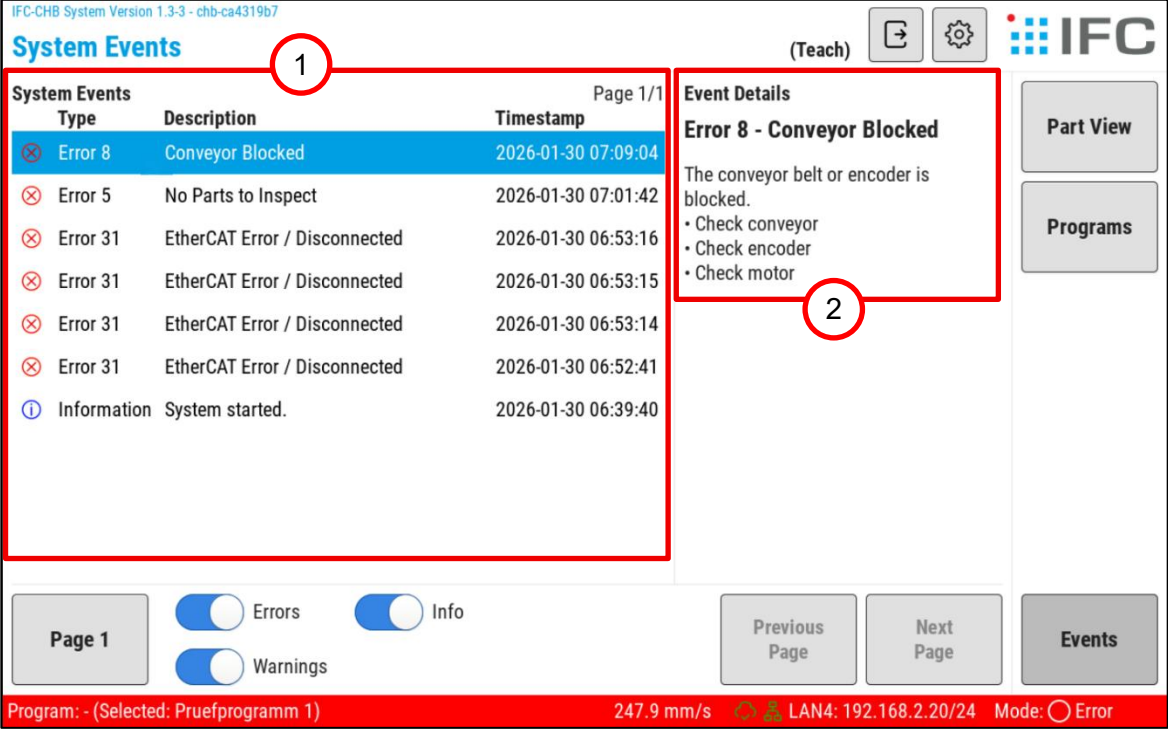
(2.4) **Assign or change test programme number:**

To enter a new test programme number for the test programme displayed under **'Programme Details'** or to change it, click the button with the *pencil icon* in the **'Programme #'** row. A new number can then be entered for the selected test programme. Duplicate numbers are not permitted and will be reported as an error.

- (3) The **Copy** button creates a copy of the selected test programme. After pressing the button, a name can be assigned to the new programme. The test programme is then added below.
- (4) The **'Select'** button is used to select the active test programme. This is only possible if no selection has been made via the digital inputs (BCD-coded).

8.1.8. Control page *System Events* (System messages)

The IFC-Checkbox logs important system messages such as *errors*, *information* (e.g. system started, teach procedure, etc.) or *warnings* over the course of time. This is used for analysis and troubleshooting.



The screenshot displays the 'System Events' control page. At the top left, it says 'IFC-CHB System Version 1.3-3 - chb-ca4319b7'. The main title is 'System Events' with a circled '1' next to it. Below the title is a table of events. The table has three columns: 'Type', 'Description', and 'Timestamp'. The first row is highlighted in blue and shows 'Error 8' with the description 'Conveyor Blocked' and timestamp '2026-01-30 07:09:04'. Other rows show 'Error 5' (No Parts to Inspect), 'Error 31' (EtherCAT Error / Disconnected), and 'Information' (System started.). To the right of the table is a section titled 'Event Details' with a circled '2' next to it. This section shows 'Error 8 - Conveyor Blocked' and provides a description: 'The conveyor belt or encoder is blocked.' followed by a list of troubleshooting steps: 'Check conveyor', 'Check encoder', and 'Check motor'. On the far right, there are buttons for 'Part View' and 'Programs'. At the bottom, there are toggle switches for 'Errors' and 'Info' (both checked), and 'Warnings' (unchecked). There are also buttons for 'Page 1', 'Previous Page', 'Next Page', and 'Events'. A red status bar at the bottom shows 'Program: - (Selected: Pruefprogramm 1)', '247.9 mm/s', 'LAN4: 192.168.2.20/24', and 'Mode: Error'.

Type	Description	Timestamp
Error 8	Conveyor Blocked	2026-01-30 07:09:04
Error 5	No Parts to Inspect	2026-01-30 07:01:42
Error 31	EtherCAT Error / Disconnected	2026-01-30 06:53:16
Error 31	EtherCAT Error / Disconnected	2026-01-30 06:53:15
Error 31	EtherCAT Error / Disconnected	2026-01-30 06:53:14
Error 31	EtherCAT Error / Disconnected	2026-01-30 06:52:41
Information	System started.	2026-01-30 06:39:40

Event Details

Error 8 - Conveyor Blocked

The conveyor belt or encoder is blocked.

- Check conveyor
- Check encoder
- Check motor

Page 1

Errors Info

Warnings

Previous Page Next Page Events

Program: - (Selected: Pruefprogramm 1) 247.9 mm/s LAN4: 192.168.2.20/24 Mode: Error

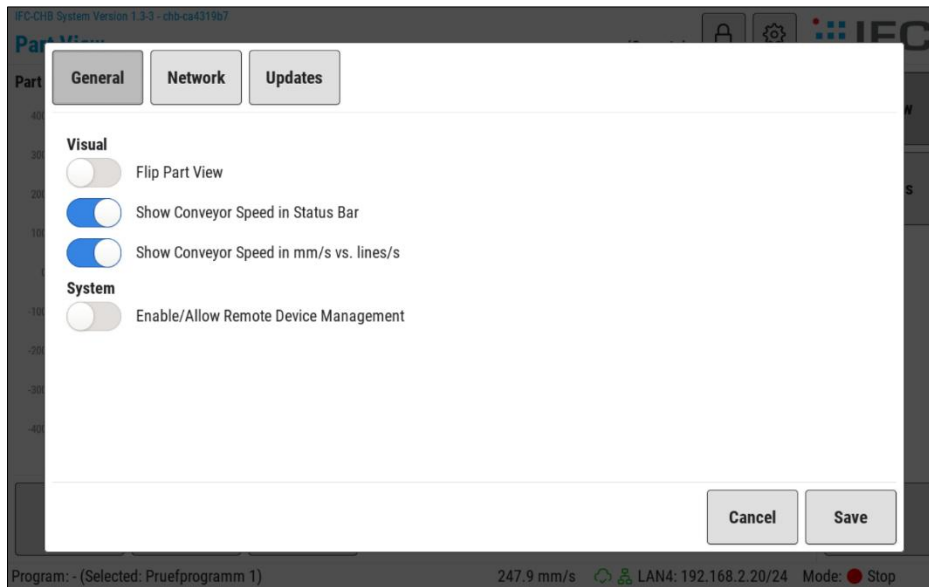
- (1) In the '**System Events**' section, all system messages are displayed over the course of time. The most recent messages are always at the top.

You can filter the content by using the toggle switches below the section.

- (2) The '**Event Details**' section displays a detailed description and, where applicable, troubleshooting instructions for the system message selected in the '*System Events*' section.

8.1.9. Settings

Pressing the *Settings* button in the header bar opens the *Settings* page. This is divided into *General* (general settings), *Network* (network settings) and *Updates* (management and installation of firmware updates).



General:

Visual: Flip Part View

If this slider is enabled, the displayed scan image of the test part is mirrored. Depending on the transport direction of the parts beneath the IFC-Checkbox, this can simplify operation and troubleshooting by providing a logical representation of the part direction. Changing the display of the test part has no effect on the test result.

Visual: Show Conveyor Speed ...

Displays the current speed of the conveyor belt, which is measured by the incremental encoder. The speed can be displayed in millimetres per second (mm/s) or in lines per second (lines/s).

System: Enable/Allow Remote Device Management

Enables remote access for advanced troubleshooting when an internet connection is available. Further information is available from the manufacturer if required.

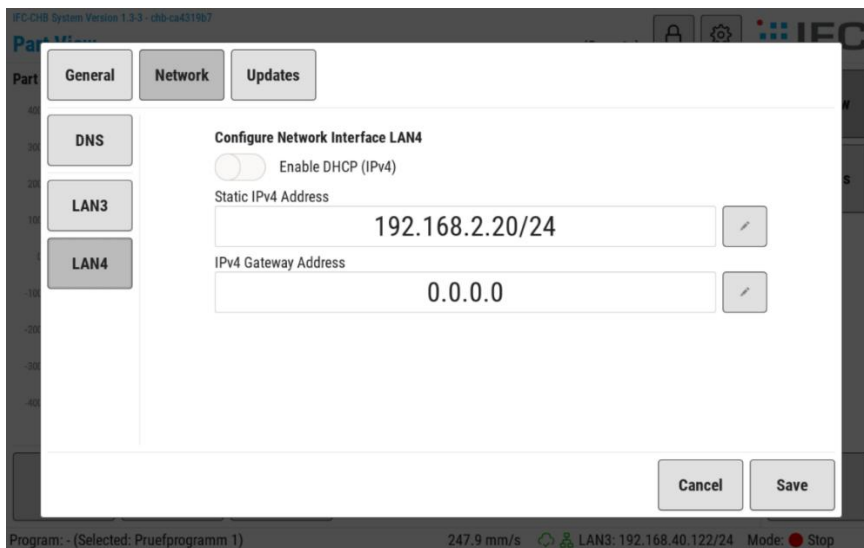
Network (Network Settings) control page:

This page contains the network settings for the LAN3 and LAN4 ports.

To establish a connection to the IFC-Checkbox using the CheckKon software, the 'Enable DHCP' slider must be set to the left position to disable automatic address assignment. The static IP address (IPv4) can be set in the field below. The subnet mask is entered in bit format after the '/'.
Example:

255.255.255.0 → 24 (see figure)

255.255.0.0 → 16

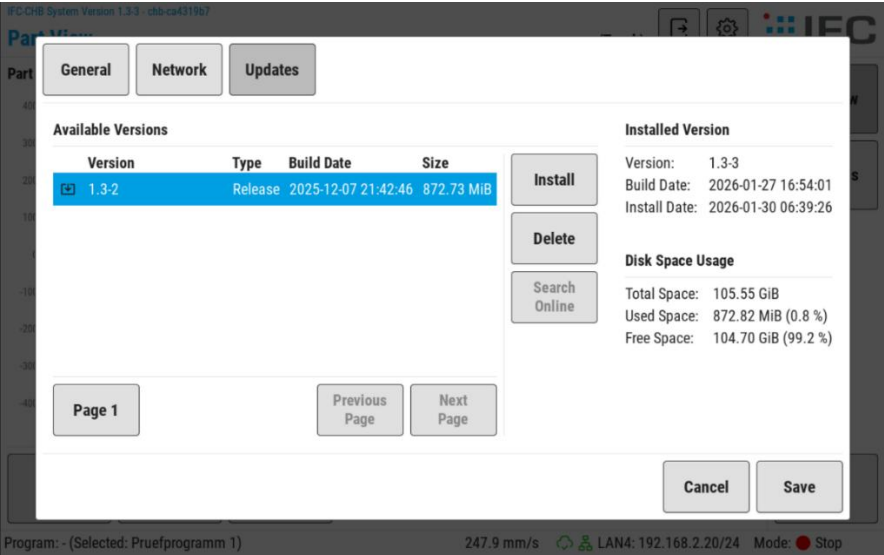


The adjusted setting is saved by pressing the 'Save' button. Clicking the 'Cancel' button exits the page without saving the changes.

Updates control page (Firmware updates management):

This page can be used to manage firmware updates that have been transferred to the Checkbox via CheckKon. The **‘Available Versions’** section displays all firmware versions stored on the Checkbox. The **‘Install’** and **‘Delete’** buttons can be used to install or delete the selected firmware. The **‘Search Online’** function will only be available at a later date.

The right-hand side displays information about the current version (**Installed Version**) of the Checkbox, as well as information about available storage space (**Disk Space Usage**).



9. Installation

CAUTION

Glare and eye irritation

With regard to blue light hazard, the product exceeds the limit values for the 'Free' group as defined in DIN EN 62471:2009-03. It is therefore classified as Risk Group 1 for blue light hazard.

- Prolonged or continuous exposure to the light source may cause glare and eye irritation.
- Take measures to prevent eye exposure:
- Do not remove any parts of the housing
- Only install or remove the prism holder when the system is switched off
- Install the product only in its original condition, with the housing closed and intact
- Only install or remove the product when it is switched off
- Install the product in such a way that it is not possible to look directly into the light beam
- Ensure, for example by using a shield, that no hazard arises from the reflected light beam caused by mirrored or reflective objects
- Do not stare directly into the light beam and do not direct the beam towards the eyes of other persons



Conventional light sources are divergent, meaning that the illuminated area increases with increasing distance from the light source. As a result, the risk to the eyes decreases with increasing distance from the light source. However, as the product uses parallel light, the eye hazard does not decrease with increasing distance when looking directly into the beam or at the beam reflected by a plane specular surface.

9.1. Installation location

Pay particular attention to the following environmental conditions:

- Low-vibration installation
- Stable mechanical mounting
- Clean ambient air: oil-free, no paint mist, no grinding dust
- Protection from external light sources, external heat and extreme magnetic fields (e.g. from induction furnaces).
- Mount as cool and vertical as possible

This ensures optimum test results and a long service life for the device.

9.2. Conveyor system

To ensure reliable and reproducible test results, the conveying system used (e.g. a belt conveyor with functional modules) must meet the following requirements:

- Use a high-quality transport system that conveys the parts at a constant speed and without any slippage between the parts and the belt.
- Ensure the stable positioning of the parts, e.g. by using mechanical devices.
- Ensure a smooth transfer of parts from the small-parts conveyor to the transport system and mechanical decoupling of the transport system from the small-parts conveyor.
- Also ensure the transfer of parts from the transport system into the accumulation section (e.g. downpipe, chute, hopper) of the downstream machine is secured by mechanical devices, so that the part orientation cannot change subsequently.
- The movement of the parts on the transport system must be detected using a suitable electronic rotary encoder. Ensure that there is no slippage between the conveyor belt and the encoder.

Suitable encoders with various resolutions and the corresponding mounting accessories are available separately from IFC.

<https://www.ifc-online.com/produkte>

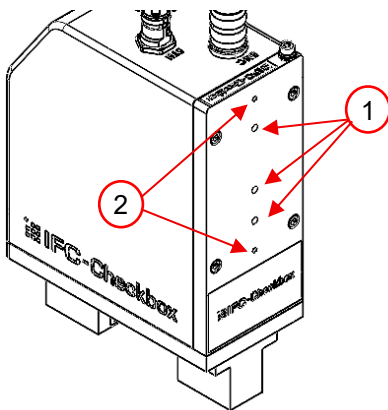
NOTE

To ensure reliable inspection results, the glass surfaces on the prism holders must not be scratched or soiled:

- Mount the ScanUnit so that passing parts do not come into contact with the glass surfaces.
- Ensure the parts are securely positioned, e.g. using mechanical fixtures.
- Do not touch the glass surfaces.
- Clean the glass surfaces if necessary.

9.3. Mounting the ScanUnit

Three M5 mounting threads with a maximum insertion depth of 6 mm, as well as two D3^{H7} fitting holes are provided for mounting the ScanUnit.



- ① 3x M5 mounting threads, maximum screw-in depth 6.0 mm
- ② Fitting holes D3^{H7}

	Thread damage
	Max. screw-in depth: 6.0 mm Tightening torque for M5 screws: max. 2.5 Nm

Two different mounting profiles with dovetail guides are available as **factory-fitted accessories** for the secure installation of the ScanUnit. These are used to secure the ScanUnit to a suitable bracket using horizontal or vertical clamping.



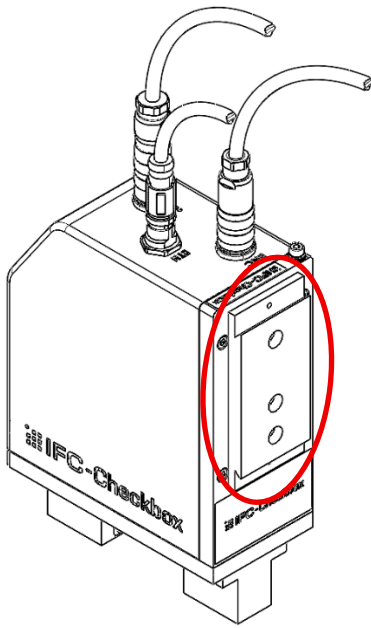
Mounting 1: CHB-C-N mounting profile

Mounting profile for vertical dovetail mounting, identical in design to the FESTO mounting profile CHB-C-N, compatible with the FESTO HMSV-12 connection kit

Article number: 04.12816-00
 Article description: Mounting profile CHB-C-N
 Vertical clamping

Fixing:

2x cylinder head screws ISO 4762 M5x14
 2x dowel pins D3

**Fastening 2: CBC dovetail**

Mounting profile for horizontal dovetail mounting

Article number: 04.00607-01

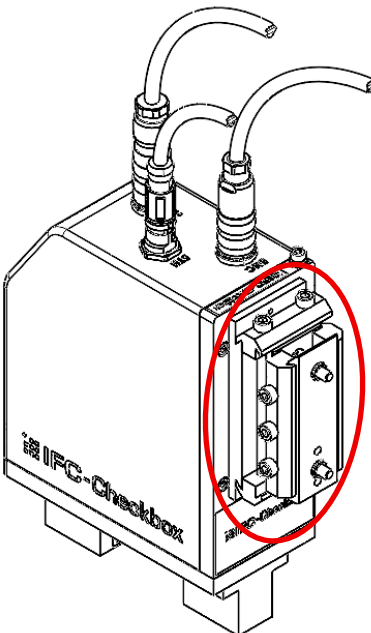
Article description: IFC mounting profile
transverse clamping

Compatible with IFC connection kit XY-mount

Attachment to ScanUnit:

2x cylinder head screws ISO 4762 M5x10

2x D3 dowel pins

**Mounting 3: XY bracket**

IFC connection kit XY-mount (includes CBC dovetail, 04.00607-01) for mounting the IFC-Checkbox on a suitable mounting bracket. Enables repeatable fine adjustment of height and position.

Article number: 05.00188-02

Article description: XY-mount

Mounting on ScanUnit:

2x cylinder head screws ISO 4762 M5x10

2x D3 dowel pins

This and other accessories are available separately from IFC

<https://www.ifc-online.com/produkte>

When mounting the ScanUnit above the conveyor system, observe the following:

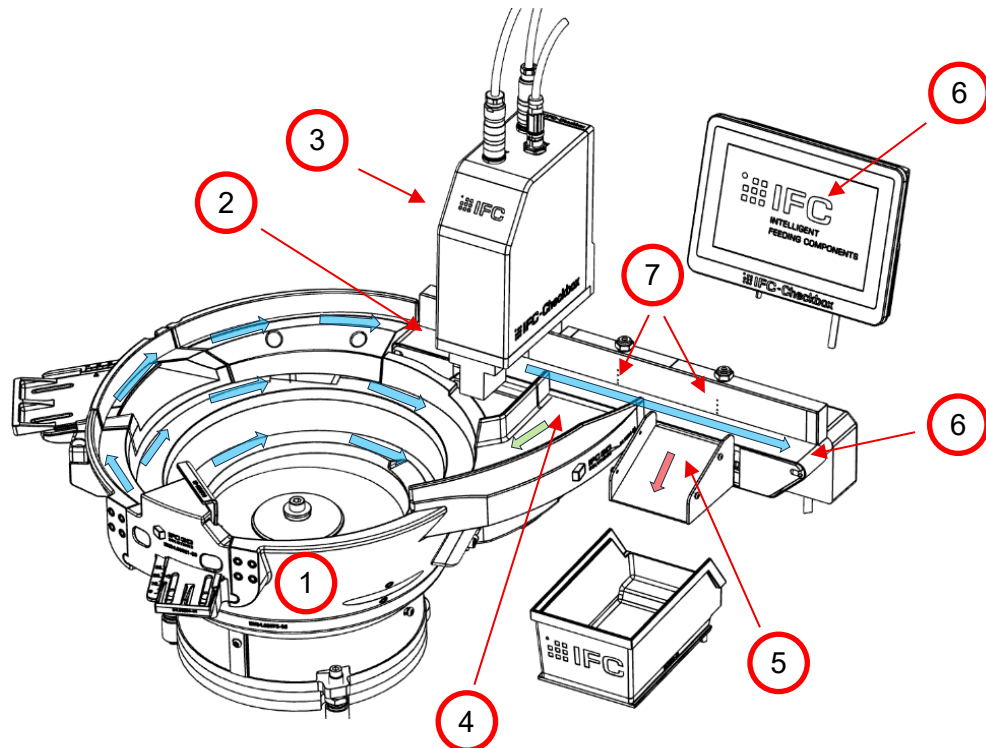
- Secure the product and the conveyor system relativ to each other.
- Keep the camera's field of view clear.
- Do not obstruct the optical path with the conveyor system.

The ScanUnit provides nearly constant imaging characteristics throughout the entire working area. The image contrast is optimised for very fine details on the sensor side.

- To achieve maximum contrast for small details, mount the product so that the objects pass as close as possible to the prism holder on the sensor side. This is the mounting side.

9.4. Operating principle

Example of integrating the IFC-Checkbox into a belt conveyor with 2 actuators and a vibratory bowl feeder.



- (1) Small-parts feeder, e.g. spiral feeder, step feeder, centrifuges or IFC flat feeder
- (2) Conveying equipment, e.g. IFC conveyor belt with centre drive
- (3) ScanUnit of the IFC-Checkbox
- (4) Return of incorrectly oriented parts to the area feeder
- (5) Sorting out rejected parts, e.g. faulty parts or foreign parts
- (6) Transfer of good parts to a buffer section or the downstream machine
- (7) Actuators, e.g. blow-off valves
- (8) Touch display of the IFC-Checkbox

The parts to be inspected are moved beneath the ScanUnit using a conveyor system. As they pass through the 'optical path', the part contour is scanned using a transmitted-light method.

The Checkbox sorts the parts based on the part contour data into:

- *Good part, correctly oriented:* The test part is conveyed to the end of the conveyor system and is transferred to the downstream station
- *Good part, but incorrectly oriented:* For example, the test part is rejected at the first actuator position and returned to the conveyor system or rotated into the correct orientation using a turning station. Rejection can be carried out, for example, using a blast of air

Rejected part or incorrect type: The test part is rejected at the second actuator position, for example

10. Installation

10.1. Safety

CAUTION

Danger due to unexpected movement.

- As part of the EMERGENCY STOP concept, check which measures are required for the machine/system to bring the system to a safe state in the event of an EMERGENCY STOP, e.g. switching off the operating voltage, pressure shut-off.

NOTE

- Interference caused by excessively long cables.
- Long cables reduce immunity to interference.
- Observe the maximum permissible cable length.

NOTE

- Mechanical damage to the electronics.
- Plugs and angled plugs can transmit significant forces into the product.
- When securing and mounting plugs and angled plugs, ensure that no excessive forces are exerted on the connections. Secure the cables in such a way that only minimal forces are exerted on the product's connections.

NOTE

- Avoiding interference caused by electromagnetic influences.
- Use only shielded cables and connectors.
- When connecting components with shielded cables, provide equipotential bonding. The cable shields and shield connections of the product are not designed to carry compensating currents caused by potential differences.
- Use cables that are as short as possible with a large cross-section.
- Connect the earth terminal FE and the cable shields to earth potential with low impedance and use an earth strap with a suitable cross-section

NOTE

Damage to the IFC-Checkbox caused by voltage overshoot during switch-on.

- Use only round cables and no individual wires for the power supply connection.
- To avoid voltage overshoot when connecting to low-impedance power supplies, ensure the supply cable has low inductance.
- For optimum damping of voltage overshoot, the supply cable should not have an excessively low impedance.
- Recommendation: cross-section 1.0 mm² or 1.5 mm²
- Observe the maximum current-carrying capacity of the cable.
- Properly protect the supply cable and do not exceed the values specified in the data sheet. Use only regulated power supplies. First establish the connection on the secondary side, then switch on the power supply on the primary side. Do not connect into live power sources.

NOTE

Protect the IFC-Checkbox and avoid overloading the GND pins of the interfaces.

- Do not connect outputs in parallel.
- Do not apply any voltages to the outputs; this will disable the internal current monitoring; reversed polarity may damage or destroy the product.
- Use only the GND terminal of the respective connector or the GND of the power supply as GND.
- Do not connect any of the output signals at the connector to the GND of any of the other output connectors.
- In the event of an overload, the outputs are switched off. This may also affect the 'Fault' and 'Warning' outputs of the PLC interface. These are intended for diagnostic purposes only.
- To detect operational readiness, use the 'Operational' signal, which operates with inverted logic. In the event of a fault, this signal is switched off. This allows an external control system to detect the fault.
- When connecting inductive loads, such as solenoids, valves, contactors or relays, provide a suitable suppression device directly at the load.
- Select suitable connectors and cables, as well as suitable cross-sections.

To ensure the IP rating of the fully assembled product:

- Tighten the connector cap nuts by hand.
- Seal unused sockets with protective caps.

10.2. Select the power supply

WARNING

Risk of injury due to electric shock.

- Use PELV circuits for extra-low voltage power supply, ensuring safe isolation from the mains.
- Comply with IEC 60204-1/EN 60204-1
- Ensure that the power supply meets the voltage and current or power requirements specified in the product data sheet.
- Allow for a sufficient power reserve.
- Consider the power consumption of the connected loads and system extensions.

10.3. Connect the supply voltage

WARNING

Fire hazard

- Protect the supply cable with a 4 A fast-acting fuse.
- Use a cable with a suitable conductor cross-section.
- Avoid large distances between the power supply and the product. Long cables reduce the voltage supplied by the power supply.

10.4. Signal description

The signals available via the ControlUnit for controlling the IFC-Checkbox and evaluating its states are described below.

10.4.1. Operating states

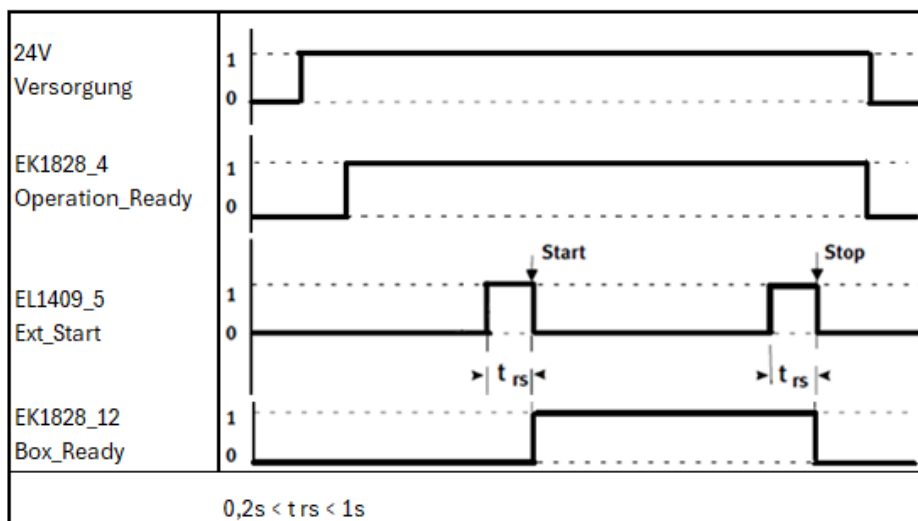
Control of the IFC-Checkbox requires that

- A. the supply voltage is present at the IFC-Checkbox
- B. the boot process has been completed (Operation Ready = HIGH)

The IFC-Checkbox is started by a signal sequence of LOW > HIGH > LOW (pulse) at the **Ext_Start** input and stopped again by the signal sequence LOW > HIGH > LOW (pulse)

The pulse duration should be between 0.2 and 1 second.

The **Box_Ready** signal is used to control the transport system (in most cases a conveyor belt).

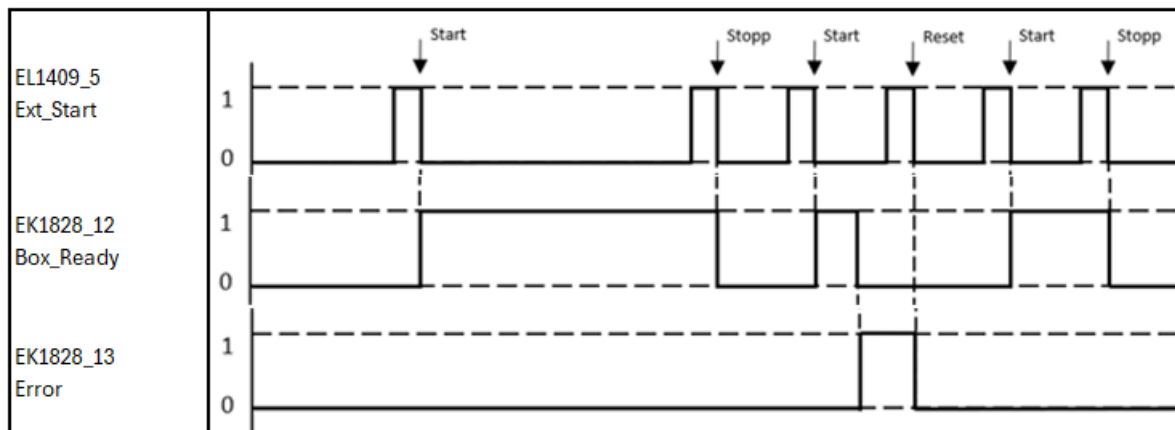


If an error occurs during operation, the states change

Box_Ready HIGH > LOW

Error LOW > HIGH

The error is acknowledged by a LOW > HIGH > LOW (pulse) signal sequences at the **Ext_Start** input and the IFC-Checkbox can be restarted by applying another pulse.



10.5. External type selection

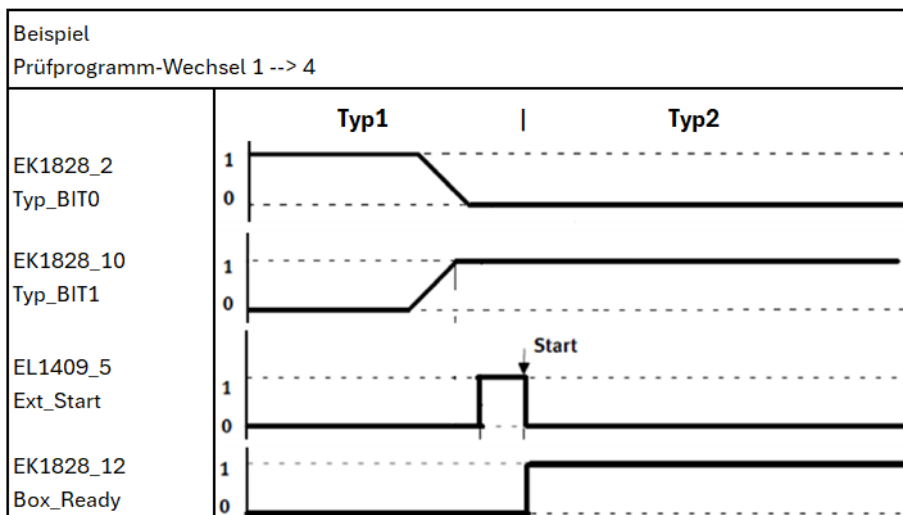
To automatically switch the test programme via a PLC, the following steps must be carried out:

- (1) The IFC-Checkbox must be in the stop state (**Box_Ready** = LOW)
- (2) Set the signals at the inputs according to the binary coding
- (3) Switch the IFC-Checkbox to the 'Run' state.

The binary coding for the first 4 bits is shown in the table below. Using all 8 bits, up to 255 inspection programmes can therefore be selected.

Binär-Codierung (BCD) Prg. Platz 1-15	EK1828_3 Typ_BIT3	EK1828_3 Typ_BIT2	EK1828_10 Typ_BIT1	EK1828_2 Typ_BIT0
1	LOW	LOW	LOW	HIGH
2	LOW	LOW	HIGH	LOW
3	LOW	LOW	HIGH	HIGH
4	LOW	HIGH	LOW	LOW
5	LOW	HIGH	LOW	HIGH
6	LOW	HIGH	HIGH	LOW
7	LOW	HIGH	HIGH	HIGH
8	HIGH	LOW	LOW	LOW
9	HIGH	LOW	LOW	HIGH
10	HIGH	LOW	HIGH	LOW
11	HIGH	LOW	HIGH	HIGH
12	HIGH	HIGH	LOW	LOW
13	HIGH	HIGH	LOW	HIGH
14	HIGH	HIGH	HIGH	LOW
15	HIGH	HIGH	HIGH	HIGH

An example signal sequence is shown below:

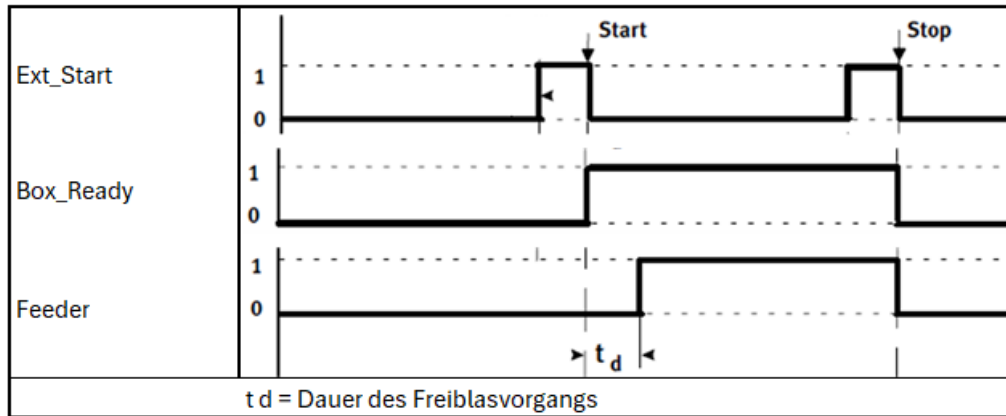


10.6. Feeder

The 'Feeder' signal (EK1828_5) is intended for controlling a small-parts feeder.

It outputs a HIGH signal as soon as the blow-off process has been fully completed following the start signal (via the display or the external start input).

The duration of the blow-off process depends on the distances between the actuators and the IFC-Checkbox, as well as the conveyor speed.

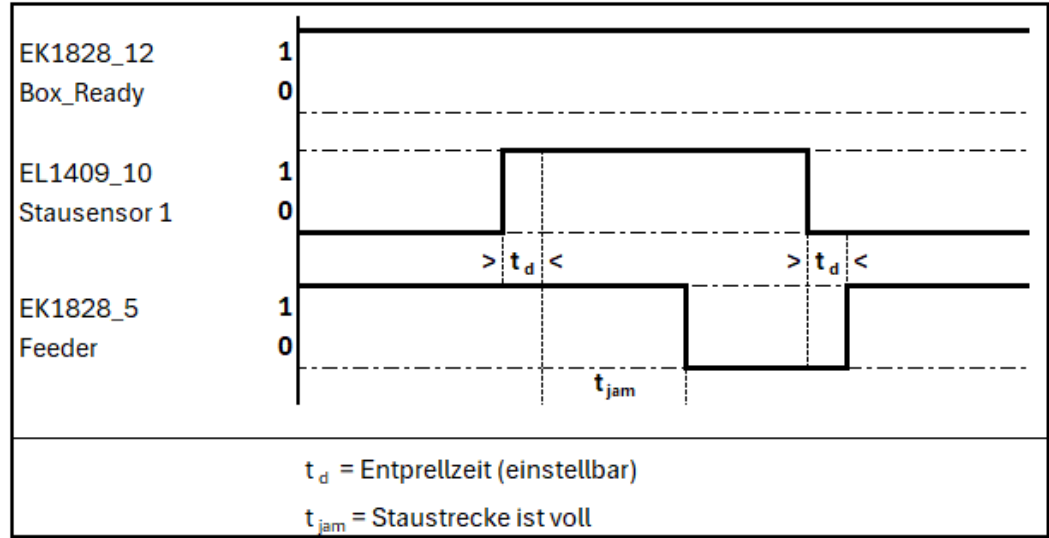


10.7. Accumulation section

When using an accumulation section, which serves as a parts buffer for the following machine, the IFC-Checkbox can be used to monitor the fill level. Either one sensor or two sensors with switching hysteresis can be used for this purpose. The debouncing times of the sensor inputs can be set via the operating software (*IFC-CheckKon*).

When the accumulation section is full, the good parts are returned to the small-parts feeder. If the buffer section remains occupied for an extended period (time adjustable), the small-parts feeder switches off and the 'Feeder'→ LOW. The transport mechanism (conveyor belt) continues to run, to make the next good parts available again as quickly as possible when the accumulation level falls below the specified level.

Example of use with a sensor:



10.8. Encoder calibration

The IFC-Checkbox uses an incremental encoder to determine the exact component length. An encoder matched to the conveyor system is essential for the image generation and component tracking functions.

Depending on the encoder used and the diameter of the drive roller (in the case of conveyor belts) or other transmitting components (e.g. centrifuges) that capture the component's movement during transport, the resolution (pulses per 1 mm of transport distance) must be determined. This can be done either by calculation or by means of a calibration process.

By calculation:

$$\text{Encoder Impulse/mm} = \frac{\text{Encoder Auflösung pro Umdrehung}}{\text{Durchm. Antriebsrolle (d) x Pi}}$$

The determined resolution is entered in the parameter 'Encoder pulses per 1 mm of transport distance = '.

Calibration process:

The calibration process can be carried out using the *IFC-CheckKon* software. It is started via a parameter:

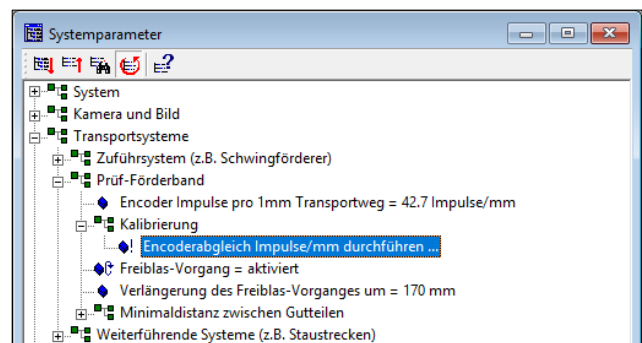
View → System parameters → Conveyor systems → Test conveyor belt → Calibration → Perform encoder calibration (pulses/mm)...

To perform the encoder calibration, a positionally stable part with a length of approximately 30 mm should be used to achieve optimum result.

Recommendation: dowel pin or gauge block

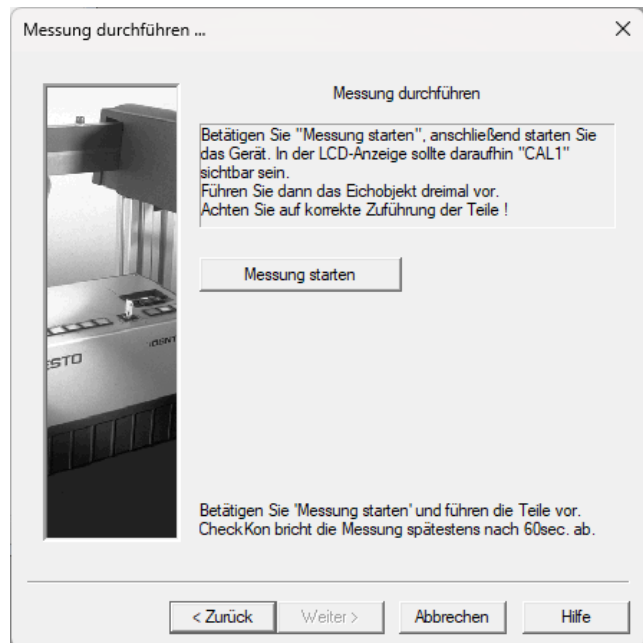
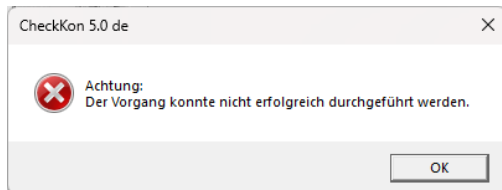
After starting the encoder calibration, the exact length of the calibration object must be entered in the designated field. The length should be entered with two decimal places (e.g. 30.12 mm).

The entry must then be confirmed using the 'Next >' button.



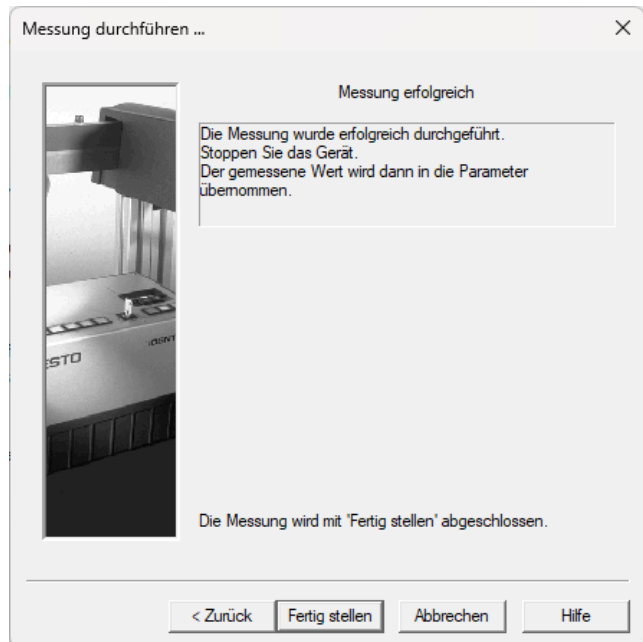
The measurement is started in the next window. After clicking *'Start measurement'*, the IFC-Checkbox and the transport system are started. The calibration object must then be fed through three times within 60 seconds.

If the IFC-Checkbox detects a difference in length between the three measurements, the process is aborted and must be repeated.



If the process was successful, the following window can be confirmed by clicking *'Finish'*.

The calculated resolution is then automatically entered in the parameter *'Encoder pulses per 1 mm travel ='*.



11. Commissioning

CAUTION

Property damage caused by movements of the connected actuators

Take the necessary measures for the machine/system to ensure the system is in a safe state when switching on and off if:

- The conveyor system is returned to its home position when the power supply is switched off,
- the conveyor system starts automatically after the IFC-Checkbox has started when it is controlled by the IFC-Checkbox.
- Preventing the transport mechanism from starting automatically after the operating voltage is switched on:
- In the *IFC-CheckKon* software, select the following:
 [View] [System Parameters] ◇ System ◇ Operating Modes ... ☐ Automatic start after supply voltage is applied = no (factory setting)
- During operation, ensure that the controlled peripherals do not pose any danger.

Switching on

1. Switch on the product's operating voltage via the power supply.
2. Optionally, start the *IFC-CheckKon* software to view and configure the system parameters
3. Start the conveyor system manually if necessary
4. Operational readiness is indicated by the STOP status on the display.

12. Diagnostics and troubleshooting

12.1. Operational faults

Operating faults are displayed on the product as follows:

- The Checkbox automatically switches to the STOP status and displays the error message in the footer bar.
- The footer bar also flashes red.
- A description of the current fault and possible causes can be found on the Events page.

Example:



Error number: Error 8
Error description: Conveyor blocked

The product can only be restarted after the fault has been resolved:

1. Resolve the cause of the fault
2. Acknowledge the fault message using the 'Acknowledge' button.
3. Set the Checkbox back to the 'Run' state.

Maintenance and repair work must only be carried out by qualified electrical personnel.

	<table><tr><th data-bbox="414 1476 1404 1550">Electrical voltage!</th></tr><tr><td data-bbox="414 1550 1404 1783"> • Terminal connections in a lockable terminal box; key provided • All work must only be carried out by trained qualified electrical personnel! • Before starting work, carry out a visual inspection of all live electrical parts </td></tr></table>	Electrical voltage!	• Terminal connections in a lockable terminal box; key provided • All work must only be carried out by trained qualified electrical personnel! • Before starting work, carry out a visual inspection of all live electrical parts
Electrical voltage!			
• Terminal connections in a lockable terminal box; key provided • All work must only be carried out by trained qualified electrical personnel! • Before starting work, carry out a visual inspection of all live electrical parts			

12.2. Error codes

Code	Cause	Action
Error 1 (Configurable in CheckKon)	External fault	→ Check the signal at the 'External error' digital input on the ControlUnit: HIGH = no external fault LOW = external fault
(Error 2) → Error 6	Optical error → Glass surfaces on the prism holders are dirty or defective → Blockage in front of the optical channel → The glass surface fogs up due to large temperature differences between the IFC-Checkbox and the surrounding environment → The camera captures the lower section of the conveyor system → Maximum part length exceeded	→ Remove any dirt using a soft cloth and a mild cleaning agent, or blow it off the glass surfaces with oil-free compressed air → If the glass surfaces are defective: Contact your IFC service team → Avoid large temperature differences With CheckKon: → Correct the image field limit setting → Correct the line rate or increase the ratio of encoder frequency to line frequency
Error 5 (Configurable in CheckKon)	Material jam The IFC-Checkbox has not received any material for at least 30 seconds ¹⁾ 1) Duration variable, adjustable via CheckKon	→ For manual feeding: Acknowledge the error, feed further test parts or stop the IFC-Checkbox → For automatic feeding: Refill the small parts feeder, check the feed section for a material jam, acknowledge the error
Error 6	Maximum permissible part length exceeded Only displayed if the corresponding error handling is enabled in CheckKon.	→ With CheckKon: Set the 'Max. part length' parameter correctly → Adjust the conveyor so that the parts pass through with a clearly defined gap between them.
Error 7 (Configurable in CheckKon)	Maximum number of forced stops exceeded Only displayed if the corresponding error handling is enabled in CheckKon.	→ Using CheckKon: Set the 'Max. number of forced interruptions' parameter correctly
Error 8 (Configurable in CheckKon)	Conveyor system blocked or encoder not rotating	→ Check the transport mechanism for a mechanical blockage. → If necessary, also check the bearings on the drive and deflection rollers → Check the assembly and installation of the encoder
Error 14 (Configurable in CheckKon)	Conveyor speed too high Conveyor speed is too high for the set ratio of encoder frequency to camera line frequency	→ Reduce the conveyor speed → Using CheckKon: Adjusting the encoder frequency to line frequency ratio

Error 16	Part rate too high (for evaluation)	→ Reduce the conveyor speed → Reduce the part rate → Simplify the test task of the active test programme → Reduce the line rate or increase the ratio of encoder frequency to line frequency
Error 18	The conveyed part has missed the actuator position	→ Arrange the actuator position sufficiently far away from the IFC-Checkbox, taking into account the lengths of the parts to be tested When operating without an encoder: → With CheckKon: Set the 'Speed' parameter correctly When operating with an encoder: → With CheckKon: Set the 'Encoder pulses per 1 mm travel' parameter correctly
Error 20	The target orientation cannot be distinguished from other orientations, for example because: → part orientations were accidentally swapped during the teaching process, or → the target orientation is too similar to other orientations.	→ Repeat the teaching process. Ensure that the sample parts are positioned in accordance with the displayed orientation. → Optimise teach data using the CheckOpti software
Error 40	The test programme cannot be read/found.	→ Delete the test programme using the CheckKon software and repeat the teach process
Error 30	Camera disconnected Connection to the ScanUnit has been lost	→ Check the power supply to the ScanUnit → Check the network connection between the ScanUnit and the ProcessingUnit
Error 31	EtherCAT error/disconnected Connection to the ControlUnit lost or an incompatible configuration is connected.	→ Check the network connection between the ControlUnit and the ProcessingUnit → Check that the ControlUnit hardware for completeness and ensure that the components are arranged (in the correct order)
Error 43	Test programme is not compatible with the firmware. At least one of the following tests has failed: → The test programme may be used with this firmware version → Tool settings are compatible with the firmware version	→ Use a compatible teach data format → Repeat the teaching process

Table 7: Error codes

12.3. Troubleshooting

Maintenance and repair work must only be carried out by qualified electrical personnel.

	Electrical voltage!
	• Terminal connections in a lockable terminal box; key provided • All work must only be carried out by trained qualified electrical personnel! • Before starting work, carry out a visual inspection of all live electrical parts

Fault	Possible cause	Action
TouchDisplay has no display	Cable connection	Check that the cables are securely connected to the display. To do this, open the rear cover of the touch display and make sure that the DisplayPort and power supply cable are securely connected. Check in the control cabinet or terminal box that the cable is securely connected to the ProcessingUnit.
Touch display does not respond to input commands	Cable connection	Check that the cables are securely connected to the display. To do this, open the rear cover of the touch display and make sure that the USB-A cable is securely connected. Check in the control cabinet or terminal box that the cable is securely connected to the ProcessingUnit.

13. Maintenance, cleaning and repair

The necessary maintenance work and maintenance intervals depend on the individual operating conditions, the degree of contamination and the stresses on the system components.

13.1. Maintenance work and intervals

In general, the IFC-Checkbox is designed for harsh industrial environments and is characterised by high reliability, a robust construction and a long service life. No special maintenance is required.

13.2. Cleaning

No fixed cleaning intervals are required. The frequency of cleaning depends on the local operating conditions.

Do not use solvent-based or abrasive cleaning agents that could damage the surfaces. Use only gentle, solvent-free cleaning agents.

Remove dirt from the housing, control elements and conveyor belt using a soft, damp cloth.

	Glare and eye irritation
	• Only clean the IFC-Checkbox when it is switched off

Note:

The optics of the IFC-Checkbox will only function correctly if the glass surfaces are clean and free from scratches. Take care not to scratch the glass surfaces and do not use abrasive cleaning agents. If dirt or deposits are present, clean the glass surfaces on the prism holders:

- with clean, oil-free compressed air
- with a soft, damp cloth and a mild cleaning agent, e.g. a standard glass cleaner.

This prevents damage that could lead to malfunctions of the IFC-Checkbox.

13.3. Repair

In the event of malfunctions or faults, please contact the service department of IFC Intelligent Feeding Components GmbH immediately.

You can reach us from Monday to Friday, 08:00 to 17:00, at the service number +49 7136 96395-0 or at checkbox@ifc-online.com

In all cases, provide the following information:

- Serial number of the ScanUnit or ProcessingUnit
- Description of the fault or defect that occurred
- Time and circumstances surrounding the fault
- Suspected cause

Based on your description of the fault or, if necessary, an analysis via remote access, our specialists will determine the next steps.

Defective devices can be sent to IFC or a certified partner for repair.

	Warranty
	The housing must only be opened by authorised technical personnel. Unauthorised tampering, interference or attempted repair by users or unauthorised third parties will result in the loss of all warranty, guarantee and liability claims.

14. Decommissioning, dismantling, disposal

All components must be properly dismantled at the end of their service life and disposed of in accordance with applicable national regulations and environmentally responsible manner.

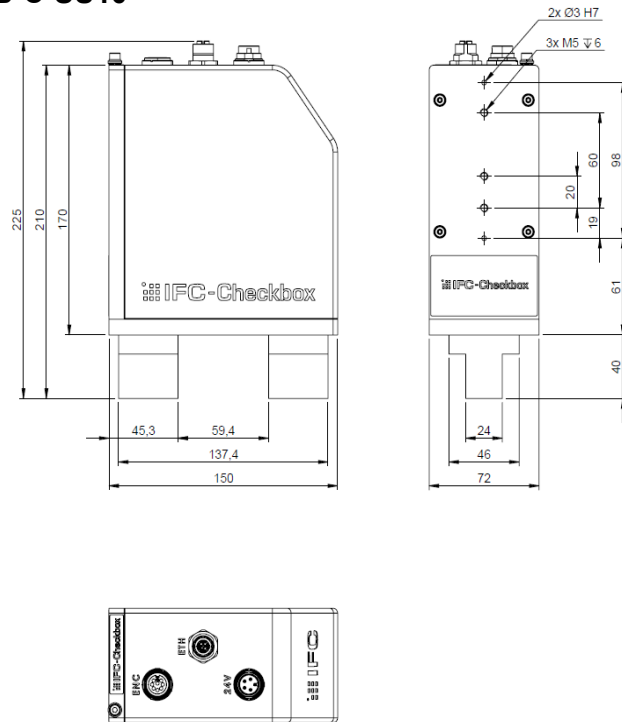
	Electrical voltage!
	• Carry out decommissioning and dismantling work only when the system is de-energised and after verifying that it is voltage-free! • Keep the system de-energised for the duration of the work • All work must only be carried out by trained qualified electricians!

	Warning
	• To avoid injuries, use only suitable tools! • Secure the components against falling! • Wear personal protective equipment.

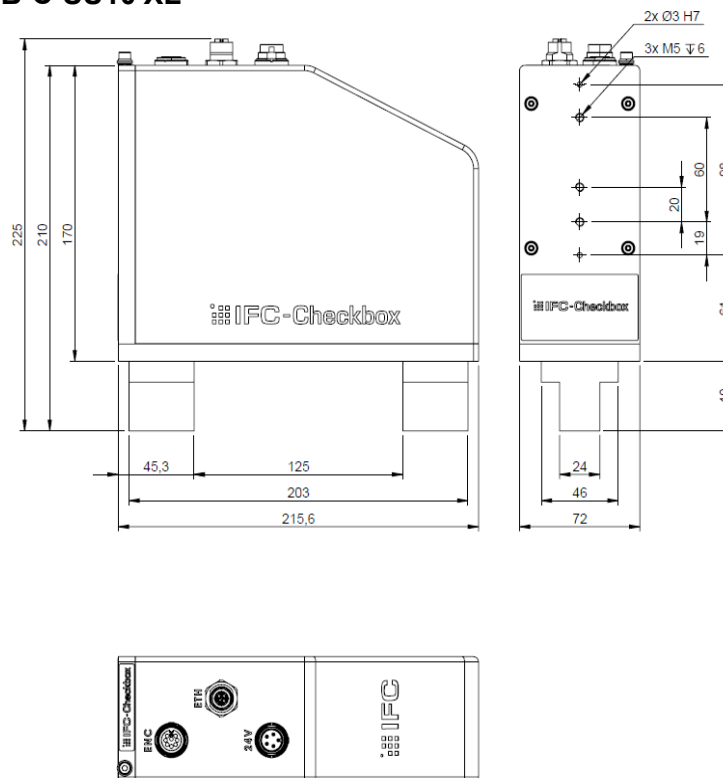
15. Technical data

15.1. ScanUnit CHB-C-SU10

ScanUnit CHB-C-SU10

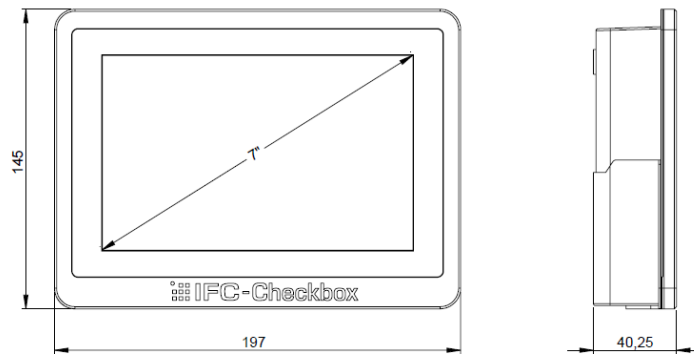


ScanUnit CHB-C-SU10 XL



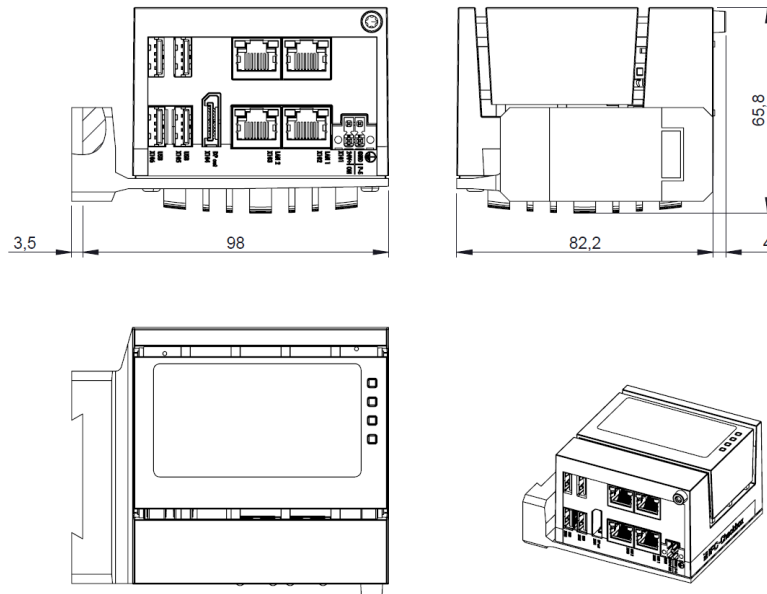
Technical Specifications		
Temperature range		
Ambient temperature	5 ... 45 °C	
Storage temperature	-20 to +70 °C	
Environmental conditions	Dry Protection against extreme external light sources; clean ambient air recommended	
Protection against electric shock (Protection against direct and indirect contact)	PELV (Protective Extra Low Voltage)	
CE mark (See Declaration of Conformity)	In accordance with EU EMC directive	
Vibration resistance in accordance with EN 0068-2-6	Severity level 2	
Shock resistance in accordance with EN 60068-2-27	Severity level 2	
Protection rating in accordance with EN 60529	IP64 (connectors fully extended or fitted with a protective cap)	
Maximum permissible cable lengths		
Power supply	30 m	
Encoder	5 m	
Ethernet	10 m	
Electrical data		
Rated operating voltage	24 V DC	
Permissible voltage fluctuations	-15 / +20 %	
Current consumption	250 mA	
Upstream protection	T 0.5A	
Interfaces		
Encoder connection	In accordance with RS485 specification	
Data connection to the ProcessingUnit	Ethernet 1,000 Mbit/s	
Dimensions		
Length/width/height (without connector)	Standard L: 155.8 mm W: 72.0 mm H: 210.0 mm	XL L: 221.4 mm W: 72.0 mm H: 210.0 mm
Clear aperture of the optical channel	Standard 59.4 mm	XL 125 mm
Clear height of the optical channel	40 mm	
Line-scan camera resolution	2048 pixels 14 x 14,µ m	
Line rate	1,000... 33,000 Hz	

15.2. TouchDisplay CHB-C-TD10DP



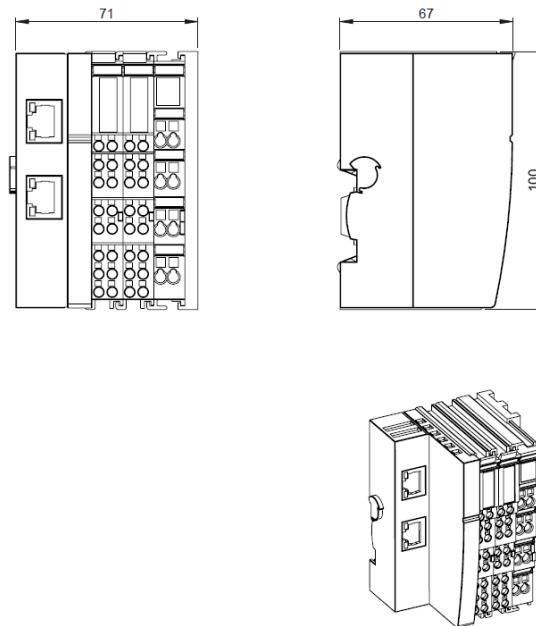
Technical data		
Dimensions		7 inches / 177.8 mm diagonal
Resolution		1,280 x 800 pixels
Touchscreen		PCAP multi-touch (USB)
Brightness		400 nits
Contrast		800:1 (typ.)
Max. colours		16.7 million
Active area		149.76 mm (H) x 93.6 mm (V)
Viewing angle		± 88° (H); ± 88° (V)
Interfaces		Cable length
USB	1x USB-A	Standard: 2.5 m, optional 5.0 m
Video	1x DisplayPort	Standard: 2.5 m, optional 5.0 m
Power	1x connector (screw-type) Input: 9–36 V DC, 15 watts (typical)	Max. 30 m
Surroundings		
Housing		Durable metal housing
Mounting		VESA 75x75 mm
Operating temperatures		-20°C to 60°C
Storage temperature		-30°C to 70°C
Humidity		10 to 95% (non-condensing)
External dimensions		194.8 x 140.8 x 32.2 mm
Weight		2.5 kg
Protection rating		Front IP65, rear IP54
Certification		CE / FCC Class B

15.3. ProcessingUnit CHB-PU10



Technical Specifications	
Dimensions (WxHxD)	82 mm x 82 mm x 66 mm, without mounting plate
Weight	Approx. 550 g without mounting plate Approx. 610 g with mounting plate
Supply voltage	22 – 30V DC (24V power supply) NEC Class 2
Power consumption	Maximum 17 watts
Protection rating	IP20
Vibration resistance (sinusoidal vibration)	EN 60068-2-6: 10 – 58 Hz: 0.035 mm 58 – 500 Hz: 0.5G (approx. 5 m/s²)
Vibration resistance (shock)	EN 60068-2-27: 5 G (approx. 50 m/s²), duration: 30 ms
EMC immunity	In accordance with EN 61000-6-2
EMC emissions	In accordance with EN 61000-6-4
Permissible ambient temperature	0°C to +50°C (operation) -25°C to +65°C (transport/storage)
Permissible relative humidity	Maximum 95%, non-condensing
Approvals/markings	CE, UL

15.4. ControlUnit CHB-E-CU10



Technical data	
Dimensions (WxHxD)	73 mm x 70 mm x 100 mm
Weight	227 g
Supply voltage	24 V DC (-15 %/+20 %)
Data transmission rate	100 Mbit/s
Bus interface	EtherCAT, 2x RJ45
Current consumption from UP	40 mA + load
Current consumption from US	150 mA
Signal voltage '0'	-3...+5 V (EN 61131-2, Type 1/3)
Signal voltage '1'	11...30 V (EN 61131-2, Type 3)
Operating temperature	-25...+60 °C
Storage temperature	-40...+85 °C
Relative humidity	95 % non-condensing
Vibration/shock resistance	In accordance with EN 60068-2-6/EN 60068-2-27
EMC immunity/emissions	In accordance with EN 61000-6-2/EN 61000-6-4
Protection class	IP20, installation in a suitable control cabinet/terminal box
Approvals/markings	CE, UL

16. EU Declaration of Conformity

EU-Konformitätserklärung

im Sinne der Niederspannungsrichtlinie 2014/35/EU, Anh. IV

Original



Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller

IFC Intelligent Feeding Components GmbH

Paul-Böhringer-Str. 8

DE - 74229 Oedheim

Gegenstand dieser Erklärung

Produkt	IFC- Checkbox
Seriennummer	00100 - ff
Typ	IFC-CHB
Projektnummer	54738-01
Modell	CHB / CHB-XL
Chargennummer	
Beschreibung	Das Produkt ist zum berührungslosen Prüfen der Lage und der Qualität von durchlaufenden Kleinteilen bestimmt.

Der oben beschriebene Gegenstand der Erklärung erfüllt die einschlägigen Harmonisierungsrechtsvorschriften der Union:

2014/35/EU	Richtlinie 2014/35/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung elektrischer Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen auf dem Markt Veröffentlicht in 2014/L 96/357 vom 29.03.2014
2014/30/EU	Richtlinie 2014/30/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit (Neufassung) Veröffentlicht in 2014/L 96/79 vom 29.03.2014

Angewandte harmonisierte Normen:

EN 60204-1:2018	Sicherheit von Maschinen – Elektrische Ausrüstung von Maschinen - Teil 1: Allgemeine Anforderungen (IEC 60204-1:2016, modifiziert)
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Sonstige angewandte Normen und Spezifikationen:

EN IEC 61326-1:2021	Elektrische Mess-, Steuer-, Regel- und Laborgeräte - EMV-Anforderungen – Teil 1: Allgemeine Anforderungen ((IEC 61326-1:2020) EN IEC 61326-1:2021)
EN IEC 61000-6-4:2019	Elektromagnetische Verträglichkeit (EMV) - Teil 6-4: Fachgrundnormen - Störaussendung für Industriebereiche (IEC 61000-6-4:2018)

Zusatzangaben

Unterzeichnet für und im Namen von:

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