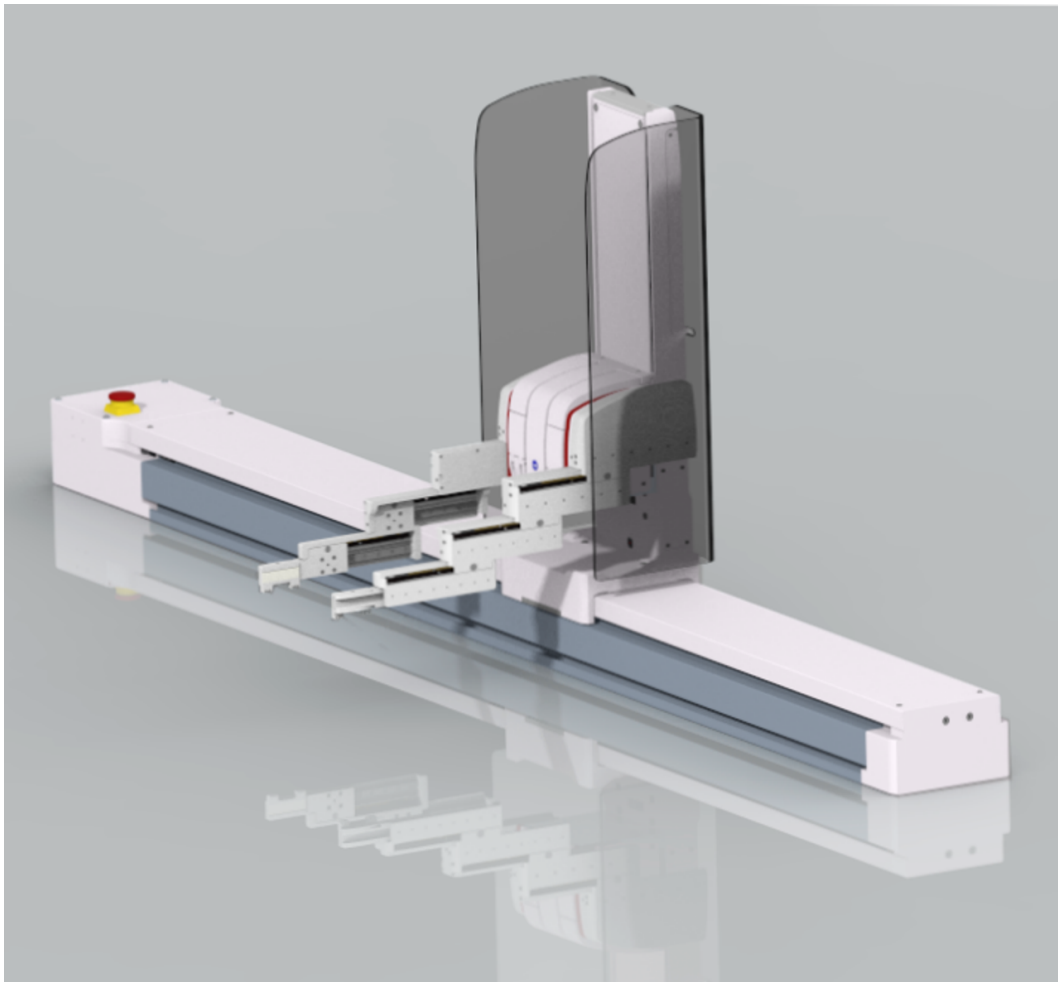


# Assembly Instructions

## CyBio Carry



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For a proper and safe use of this product follow the instructions. Keep the operating manual for future reference.

General Information           <http://www.analytik-jena.com>

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Technical Documentation      Analytik Jena GmbH+Co. KG

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# Table of contents

<b>1</b>	<b>Basic information .....</b>	<b>5</b>
1.1	About these assembly instructions .....	5
1.2	Intended use .....	6
<b>2</b>	<b>Safety.....</b>	<b>7</b>
2.1	General.....	7
2.2	Safety labeling on the device .....	7
2.3	Danger zone.....	8
2.4	Safety instructions for operation .....	9
2.5	Safety instructions – protection against explosion and fire.....	10
2.6	Safety instructions for maintenance and repair.....	10
2.7	Safety instructions: Transport.....	10
2.8	Behavior during emergencies .....	11
<b>3</b>	<b>Technical description.....</b>	<b>12</b>
3.1	Setup and operating principle.....	12
3.2	Connections and interfaces .....	16
3.3	Labware requirements .....	18
3.4	Scope of delivery.....	19
<b>4</b>	<b>Installation and commissioning .....</b>	<b>20</b>
4.1	Installation conditions.....	20
4.1.1	Ambient conditions .....	20
4.1.2	Spatial requirements .....	20
4.1.3	Power supply.....	20
4.2	Commissioning .....	21
4.3	Device configuration.....	22
4.3.1	Defining a new device configuration .....	22
4.3.2	Defining the interface to the control computer .....	24
4.3.3	Configuring the device and defining supporting points .....	25
4.3.4	Using the teach dialog.....	32
<b>5</b>	<b>Operation.....</b>	<b>34</b>
5.1	Control device with arrow keys .....	34
5.2	Calibrate device.....	35
5.3	Remove the microplate from the shelf.....	36
5.4	Detach/dispose of microplate from gripper .....	38
5.5	Creating a method .....	39
<b>6</b>	<b>Troubleshooting .....</b>	<b>40</b>
<b>7</b>	<b>Maintenance and care .....</b>	<b>43</b>
7.1	Maintenance overview .....	43
7.2	Cleaning the device.....	43
<b>8</b>	<b>Transport and storage .....</b>	<b>44</b>

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8.1	Transport.....	44
8.2	Preparing the device for transport.....	44
8.3	Moving the device in the laboratory.....	46
8.4	Storage .....	46
<b>9</b>	<b>Disposal .....</b>	<b>47</b>
<b>10</b>	<b>Specifications.....</b>	<b>48</b>
10.1	Technical data.....	48
<b>11</b>	<b>Maintenance and wear parts .....</b>	<b>50</b>

# 1 Basic information

## 1.1 About these assembly instructions

The assembly instructions describe the CyBio Carry plate transport system with the following models:

- CyBio Carry 800
- CyBio Carry 1200
- CyBio Carry 1400
- CyBio Carry 2000

The device is intended to be operated by qualified specialist personnel under observance of these assembly instructions.

The assembly instructions are German original instructions or a translation of the original instructions.

The assembly instructions inform about the device setup and operation and provide qualified operating personnel with the necessary know-how for the safe handling of the device.

### Conventions

Instructions for actions occurring in chronological order are numbered and combined into action units.

Warnings are indicated by a warning triangle and a signal word. The type, source and consequences of the hazard are stated together with notes on preventing the hazard.

Elements of the control and analysis program are indicated as follows:

- Program terms are in bold (e.g., the **System** menu).
- Menu items are separated by vertical lines (e.g., **System | Device**).

### Symbols and signal words used in this manual

The user manual uses the following symbols and signal words to indicate hazards or instructions. These warnings are always placed before an action.



### WARNING

Indicates a potentially hazardous situation which can cause death or very serious (possibly permanent) injury.



### CAUTION

Indicates a potentially hazardous situation which can cause slight or minor injuries.



### NOTICE

Provides information on potential material or environmental damage.

## 1.2 Intended use

The CyBio Carry has been designed for automatic transportation of labware in SLAS format in chemical and biological laboratories. In the field of medicine and diagnostics its use is limited to research.

The labware is usually microplates. The labware must comply with the ANSI/SLAS 1-2004 (Microplates - Footprint Dimensions) and ANSI/SLAS 2-2004 (Microplates - Height Dimensions) standards:

- The labware must be rectangular.
- The labware must have certain minimum dimensions.
- The labware must have a circumferential edge.

The solid plate edge must safely withstand the gripping force (25 N).

The CyBio Carry transports microplates in landscape format between lab devices. The maximum transport path in X-direction depends on the device model: 800 mm, 1200 mm, 1400 mm, or 2000 mm. The maximum deflection is 290 mm in Y-direction and 245 mm in Z-direction.

The device can briefly transport a weight of up to 500 g.

For proper use, please observe the following:

- The device must only be operated by qualified and trained personnel.
- The device must only be used in accordance with this manual. This applies in particular to the adherence to the connection values, conditions of use and notes on the maintenance, transport, and disposal.
- The safety instructions in this manual must be observed.

It is not permissible

- to operate this equipment in a medical laboratory,
- to work with explosive substances in this device,
- to operate this device in an explosive environment.
- to smoke or use a naked flame at the installation location.

As regards the safe handling of dangerous substances (radioactive, infectious, toxic, corrosive, combustible, and other hazardous substances), the owner/operator will be responsible in accordance with applicable laws and guidelines.

The same applies in terms of compliance with environmental protection rules (e. g. for disposal of reagents and consumables).

## 2 Safety

### 2.1 General

For your own safety and to ensure error-free and safe operation of the device, please read this chapter carefully before commissioning.

Screen

Observe all safety instructions listed in these instructions, as well as all messages and instructions displayed by the control and analysis software on the monitor.





Besides the safety instructions in these instructions and the local safety regulations that apply to the operation of the device, the general applicable regulations regarding accident prevention, occupational health and safety and environmental protection have to be observed and complied with.

### 2.2 Safety labeling on the device

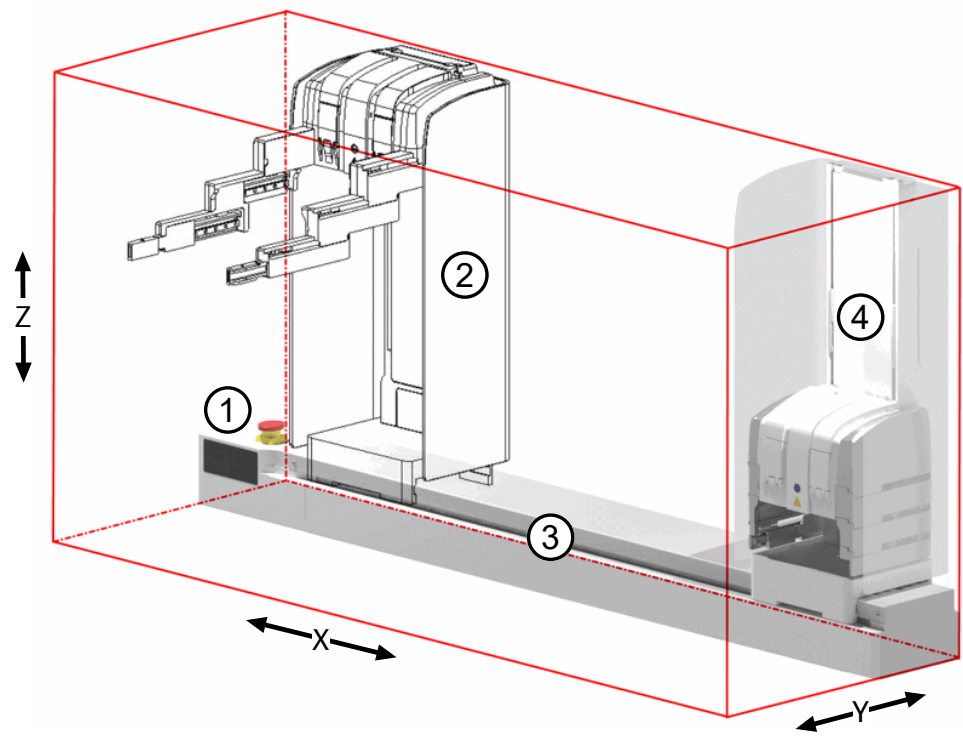
Warning and mandatory action labels have been attached to the device and must always be observed.

Damaged or missing warning and mandatory action labels can cause incorrect actions leading to personal injury or material damage. The labels must not be removed. Damaged warning and mandatory action labels must be replaced immediately!

The following warning and mandatory action labels have been attached to the device:

Warning symbol	Meaning	Comment
	Warning of a danger point	Warning of mechanical hazard from moving parts
	Warning of crushing	On the gripper: warning of hand injuries from moving parts
Mandatory signs/information symbols	Meaning	Comment
	Wear eye protection	On the gripper: wear eye protection when working on the device.
	For People's Republic of China only	The device contains controlled substances. Analytik Jena GmbH+Co. KG guarantees that these substances will not escape in the next 25 years if the device is used only as intended.

## 2.3 Danger zone



**Fig. 1 Movement range**

- |  |                    |
|--|--------------------|
| 1 Drive box with emergency stop button | 2 Protective glass |
| 3 Linear axis                          | 4 Gripper tower    |

The gripper fingers can be moved in 3+1 axes (X, Y, Z, gripper movement).

The device movements can endanger the operating personnel. Failure to observe warning information can result in crushing injuries, especially to hands. In addition, any interference with the device during operation can cause material damage.

The device is equipped with the following protective devices:

Emergency stop button	At the drive box of the linear axis	Stops all movement immediately
Protective glass	At the gripper tower	Stops all movement immediately

The transparent protective glass is mounted to the gripper tower. In the event of a collision with the protective glass, the device stops the drives immediately.

When the gripper fingers are extended, the device moves in X-direction at reduced speed. This safety measure reduces the risk of injury.

Note the following:

- Do not reach into the movement range of the device physically or with an object during operation.
- In an emergency, press the emergency stop button to stop the movement.



## 2.4 Safety instructions for operation

Obligations of the owner/ operator	<p>The device must only be operated by qualified specialist personnel instructed in the use of the device. The instruction must include conveying the content of these assembly instructions and the user manuals of the other system components. The assembly instructions must be accessible to the operating and service personnel at all times.</p> <p>The operator is responsible for the selection of substances used in the process as well as for their safe handling. This is particularly important for radioactive, infectious, poisonous, corrosive, combustible, explosive and otherwise dangerous substances.</p> <p>When handling hazardous substances, the locally applicable safety instructions and instructions in the safety data sheets from the manufacturers of the auxiliary and operating materials must be complied with.</p> <p>Observe the following:</p> <ul style="list-style-type: none"> <li>■ The operator is responsible for carrying out suitable decontamination should the device become contaminated externally or internally with dangerous substances.</li> <li>■ Splashes, drops or larger liquid spillages should be removed using an absorbent material such as cotton wool, laboratory wipes or cellulose.</li> <li>■ For biological contamination, wipe the affected area with a suitable disinfectant, such as an Incidin Plus solution. Then wipe the cleaned areas so that they are dry.</li> <li>■ The only suitable cleaning method for the housing is wipe disinfection. If the disinfectant has a spray nozzle, apply disinfectant to a suitable cloth before using it on the device.</li> </ul> <p>Work particularly carefully and cleanly with infectious material because the device cannot be decontaminated as a whole.</p> <ul style="list-style-type: none"> <li>■ Before using a cleaning or decontamination procedure other than that prescribed by the manufacturer, the user is required to check with the manufacturer that the intended procedure will not damage the device. Safety labels attached to the device must not have methanol applied.</li> </ul>
Commissioning	<p>Incorrect installation can create serious hazards.</p> <ul style="list-style-type: none"> <li>■ Only the Analytik Jena customer service or specialist personnel trained and authorized by Analytik Jena is allowed to install and commission the device and its system components.</li> <li>■ The external power supply unit must be connected to a proper power outlet to ensure that the device (ground connector) meets the protection class I. Do not replace the removable power supply unit with a different power supply unit (without protective ground conductor). Extensions of the supply cable are not permitted!</li> </ul>
Operation	<p>The operator must make sure that the device and its safety equipment is in sound condition each time before starting up the device. This applies in particular after each modification or extension of the device or its repair.</p> <p>Observe the following:</p> <ul style="list-style-type: none"> <li>■ The device may only be operated if all items of protective equipment (e.g. covers in front of electronic components) are in place, properly installed and fully operational.</li> <li>■ The sound condition of the protection and safety equipment must be checked regularly. Any defects must be corrected as soon as they occur.</li> <li>■ Protective and safety equipment must never be removed, modified or switched off during operation.</li> <li>■ Always ensure free access to the main switch and to the emergency shutdown switches and locks during operation.</li> <li>■ Keep all combustible materials away from the device.</li> <li>■ Ensure that no liquid enters the interior of the device, for example at cable connections. There is a danger of electric shock.</li> </ul>

- Modifications, conversions and extensions to the device are only permitted after consultation with Analytik Jena. Unauthorized modifications can jeopardize the device's operational safety and may lead to limitations regarding the warranty and access to customer service.

## 2.5 Safety instructions – protection against explosion and fire

The device may not be operated in an explosive environment.

Smoking or handling open flames are prohibited in the room in which the device is operated!

## 2.6 Safety instructions for maintenance and repair

The device is generally maintained by the customer service department of Analytik Jena or specialist personnel trained and authorized by them.

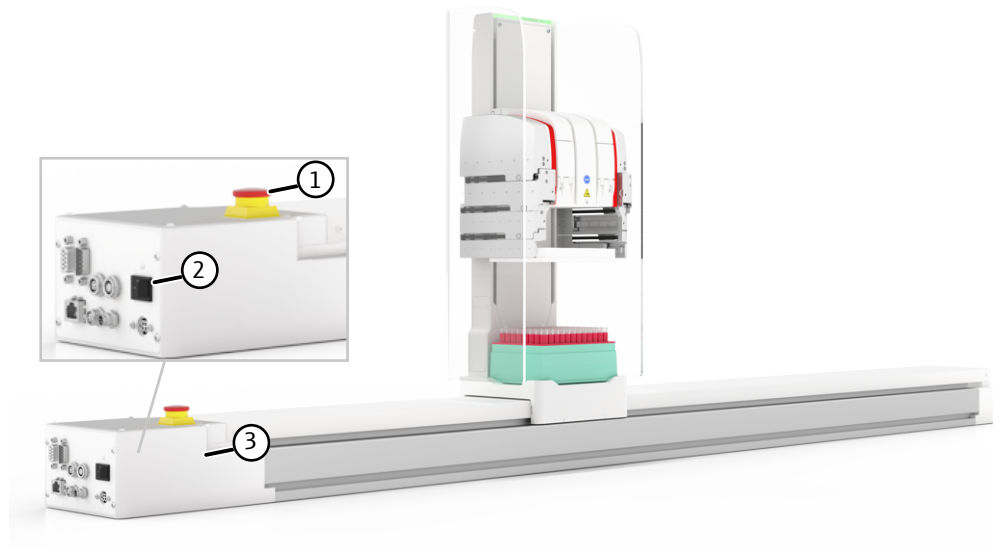
Unauthorized maintenance can damage the device. For this reason, only the activities described in the user manual in the "Maintenance and care" chapter may be performed by the operator.

- Work on the electronics may only be carried out by the customer service of Analytik Jena and specially authorized technicians.
- Only clean the exterior of the device with a slightly moistened, non-dripping cloth. Use only water and, if required, customary surfactants.
- Do not use organic solvents or abrasives to clean the device. Exercise caution when decontaminating the device with disinfectants containing alcohol. The alcohol can damage the safety labeling on the device.
- Use only original spare parts, wear parts and consumables. They have been tested and ensure safe operation. Glass part are wear parts and are not subject to the warranty.
- All protective equipment must be reinstalled and checked for proper function when the maintenance or repair work is complete.

## 2.7 Safety instructions: Transport

Only transport the device and its components in the original packaging! Ensure that all transport locks and safety devices have been fitted and that the device components are fully emptied and decontaminated if applicable.

## 2.8 Behavior during emergencies



**Fig. 2** Emergency switch-off

- 1 Emergency stop button
- 2 On/Off switch
- 3 Drive box

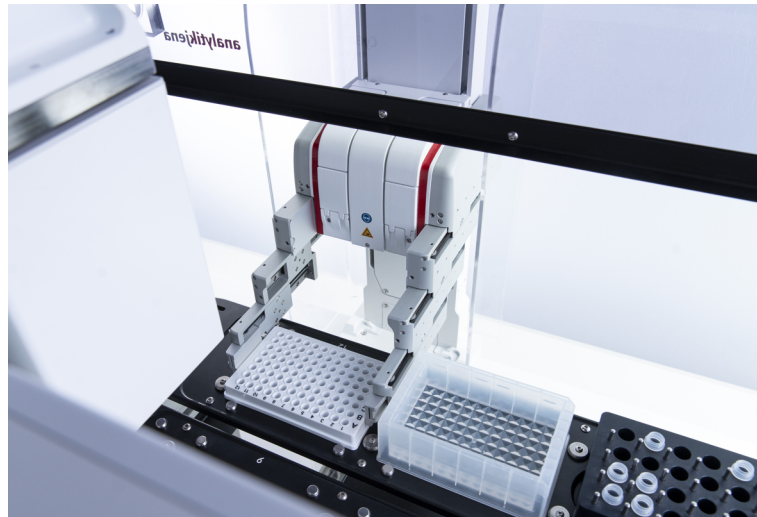
If there is no immediate risk of injury, stop the device movement in a dangerous situation with the emergency stop button.

Alternatively, switch the device off using the on/off switch or pull the power plug out of the power socket.

## 3 Technical description

### 3.1 Setup and operating principle

The CyBio Carry transports labware (preferably microplates) in landscape format between lab devices. The gripper fingers can be moved in 3+1 axes (X, Y, Z, gripper movement). The device can briefly transport a weight of up to 500 g.



**Fig. 3** CyBio Carry transports labware

The CyBio Carry is intended for integration in automated systems.

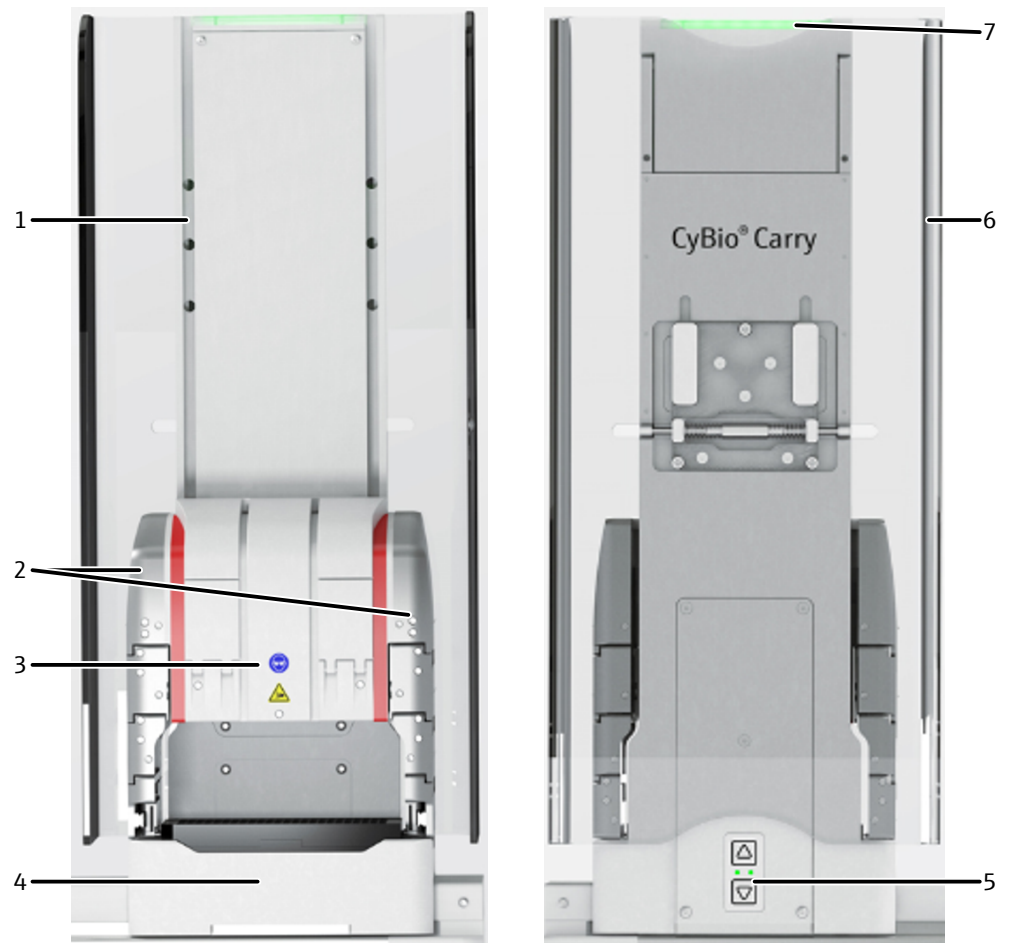


**Fig. 4** System with several lab devices by Analytik Jena

The device consists of the following two components:

- CyBio Carry Y/Z gripper tower
- CyBio Carry X linear axis

## Gripper tower

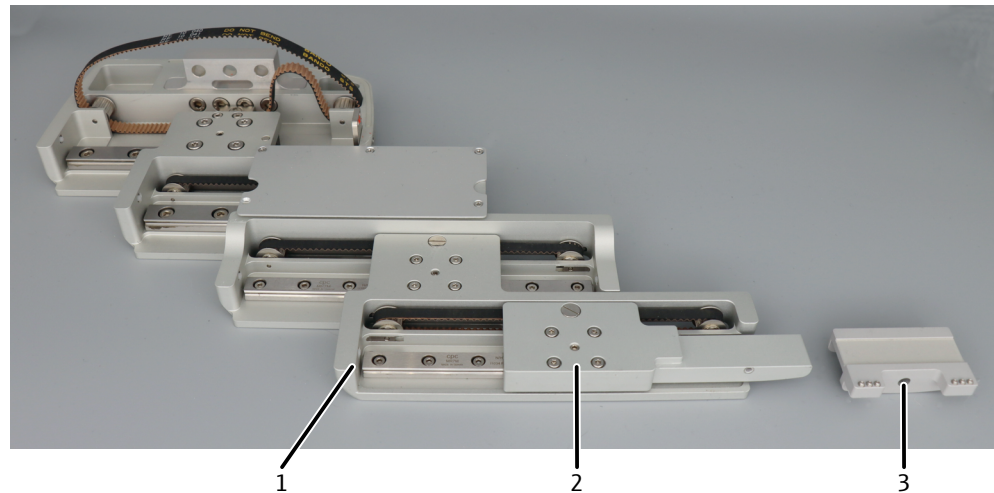


**Fig. 5 CyBio Carry Y/Z (gripper tower) setup, front and rear sides**

- |                                 |                                  |
|---------------------------------|----------------------------------|
| 1 Z-axis guide                  | 2 Telescopic gripper finger      |
| 3 Gripper                       | 4 Base with shelf for microplate |
| 5 Control panel with arrow keys | 6 Protective screen              |
| 7 LED with status indicator     |                                  |

The **gripper tower** can move along the linear axis in X-direction on the guide. During operation, the rear of the gripper tower is turned towards the user. The gripper can move up and down along the Z-guide on the gripper tower.

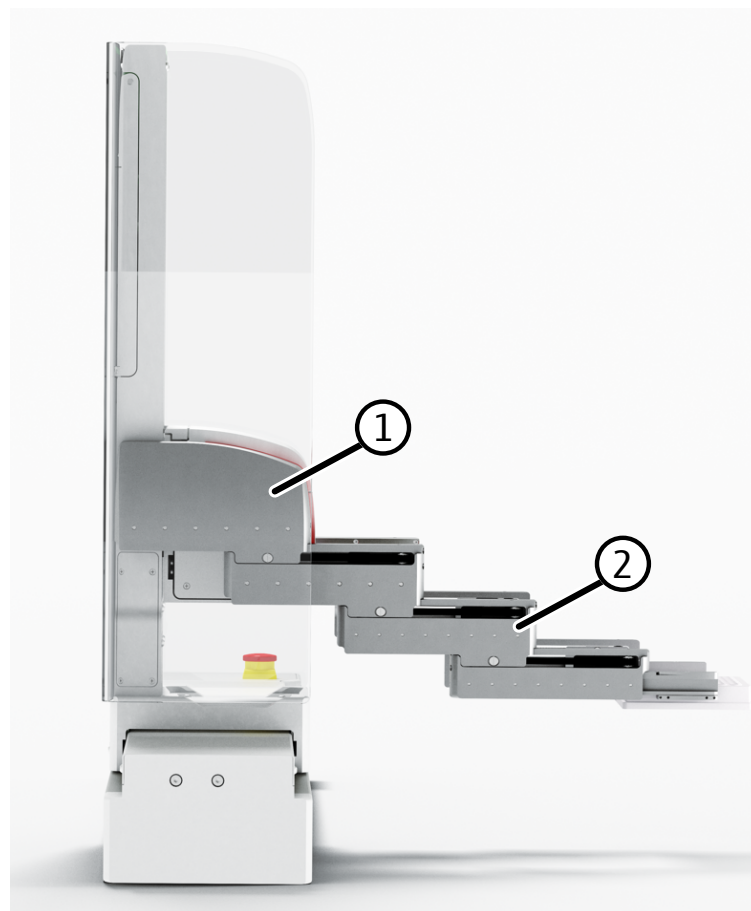
The **telescopic fingers** of the gripper consist of four finger elements each that are mounted to the two gripper sides. The gripper fingers can be extended and retracted in Y-direction.



**Fig. 6 Gripper finger, attachment of the gripper jaw to the bottom finger element**

- 1 Gripper finger
- 2 Bottom finger element
- 3 Gripper jaw

The **gripper jaws** are attached to the two bottom finger elements. The gripper jaws grip the labware on the left and right at its solid edge. The gripper jaws have silicone mats on the inside, which enables the gripper to lift and transport the labware without slipping, even if the edge of the labware is very slim.



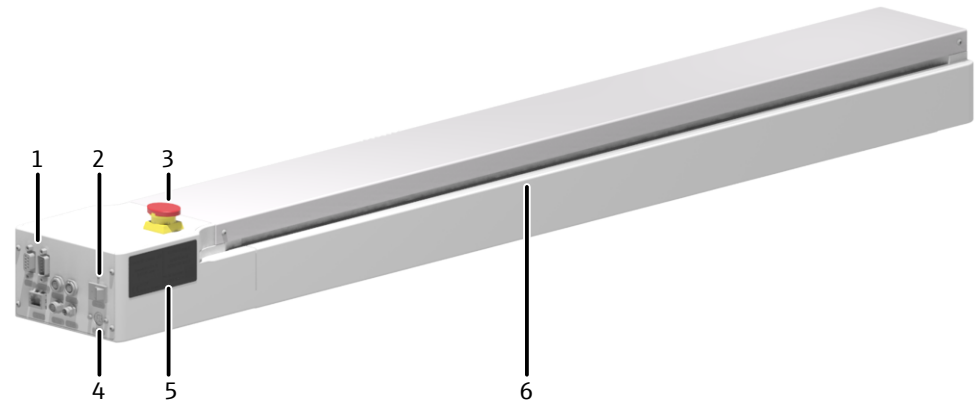
**Fig. 7 Side view, with gripper fingers extended**

- 1 Gripper
- 2 Telescopic finger, extended

A second microplate can be stored and transported in the **nest**. The nest is equipped with a sensor. The sensor issues an error message if a microplate is still in the nest when the device is switched on.

The gripper tower is equipped with a **protective glass** made of acrylic glass. The user can monitor the device movements through the transparent protective glass. If the user touches or tilts the protective glass during operation, the device stops all movement immediately.

#### Linear axis



**Fig. 8** CyBio Carry X (linear axis) setup

- |                         |   |
|-------------------------|---|
| 1 Interfaces            | 2 On/Off switch                             |
| 3 Emergency stop button | 4 Connection for external power supply unit |
| 5 Type plate            | 6 X-axis guide                              |

The drive box with the on/off switch, the connection for the external power supply unit, and the interfaces is located on the front end of the **linear axis** (→ "Connections and interfaces" 16). In an emergency, the user can stop the device immediately with the emergency stop button.

The maximum speed in X-direction is 500 mm/s. When the gripper fingers are extended, the device moves at reduced speed. This safety measure reduces the risk of injury.

#### Device models

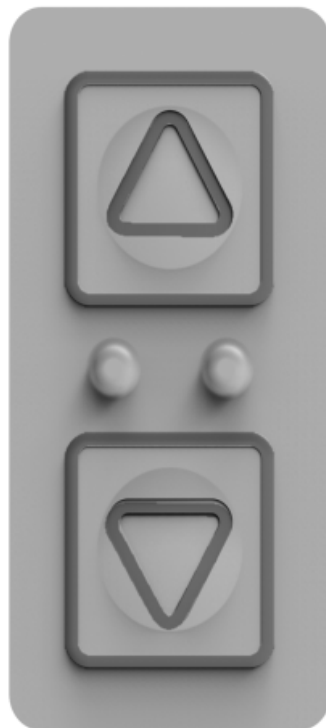
Analytik Jena offers four different models:

- CyBio Carry 800
- CyBio Carry 1200
- CyBio Carry 1400
- CyBio Carry 2000

The four models differ with regard to the length of the linear axis and therefore have different ranges in X-direction: 800 mm, 1200 mm, 1400 mm, and 2000 mm. The maximum deflection is 290 mm in Y-direction and 245 mm in Z-direction.

#### Indicator and control elements

On the back of the gripper tower there is a control panel with the "Arrow up" and "Arrow down" keys. The user can move the gripper and gripper finger to a desired position using the arrow keys. The right LED on the control panel lights up when the arrow keys are active. For safety reasons, the device cannot be controlled via the arrow keys during operation.



**Fig. 9 Control panel with arrow keys and 2 LEDs**

The **status LED** is located on the upper edge of the gripper tower. It is clearly visible from all sides. The status LED indicates the following operating states:

Green, constant light	The device is ready for operation. It can be operated via PC.
Green, flashing	The device is working. It is completing a preset sequence.
Yellow	A protective device has stopped the movement.
Red	A device error has occurred.

Type plates

The type plates are attached to the bottom of the gripper tower and the side of the linear axis. The type plates contain the following information:

- Company name and complete address of the manufacturer
- Name of the machine (type designation and trade name)
- Model and serial number
- Year of manufacture

### 3.2 Connections and interfaces

The connector panel is located on the front end of the linear axis.



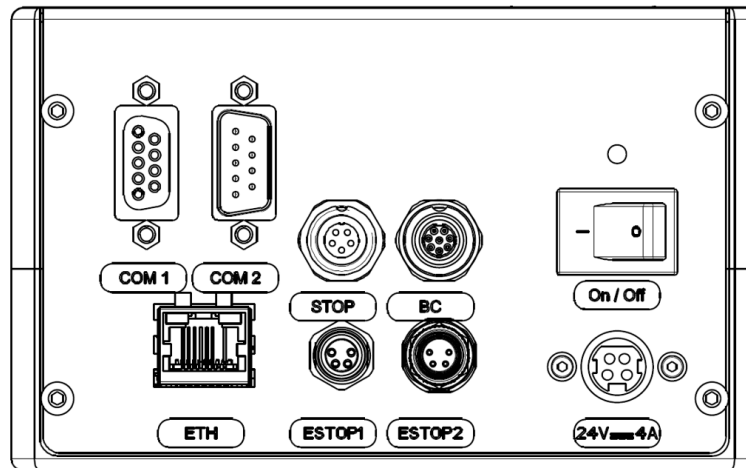


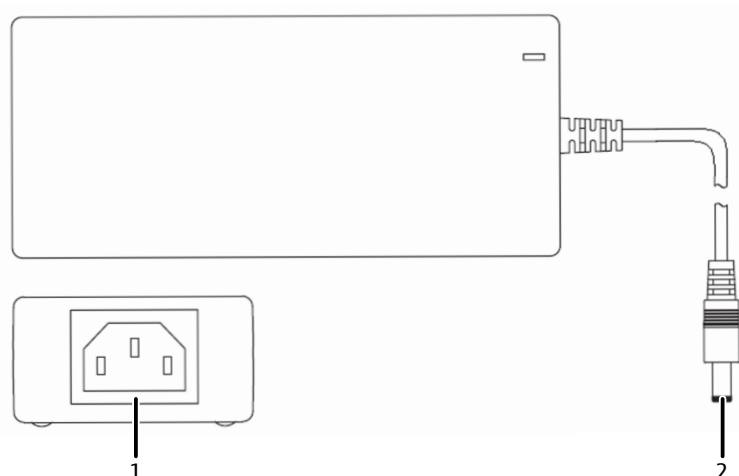
Fig. 10 Connections and interfaces

Name	Function
On / Off	On/Off switch
24 V DC, 4 A	Connection for external power supply unit (with specification of the operating voltage and maximum current consumption)
ESTOP 1	E-STOP OUT, forwarding interface to another device
ESTOP 2	E-STOP IN, connection for an opening switch element (STOP function)
STOP	Connection (2 x 24 V DC, 0.1 mA) for an opening switch element (STOP function)
BC	RS 232 interface for connecting a barcode reader
ETH	Ethernet port for network connection
COM 1	RS 232 interface for connection to the control computer
COM 2	RS 232 forwarding interface for connecting additional lab devices using the same control computer

#### External power supply unit

The power supply unit is a wide range power supply unit. The voltage supply on the primary side comes from a power socket providing an AC voltage of 100 to 240 V  $\pm$  10 % and a frequency of 50/60 Hz.

On the secondary side, the power supply unit provides a DC voltage of 24 V (max. 3.75 A).



**Fig. 11 External power supply unit**

1 Input

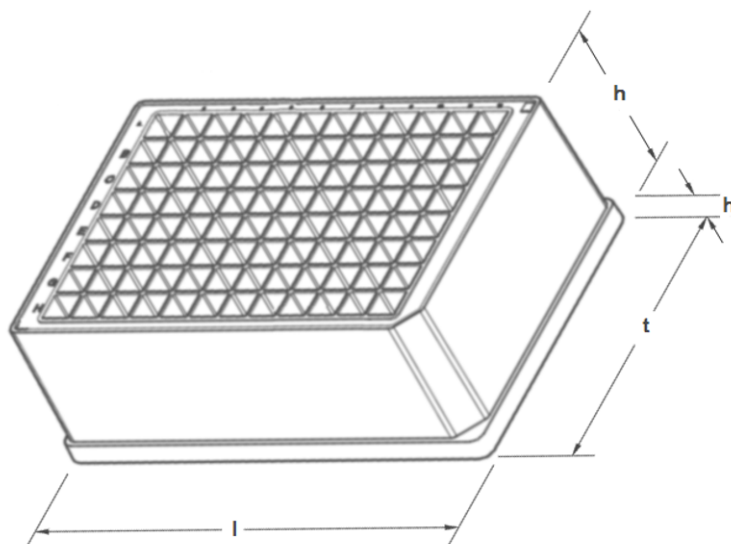
2 Output

### 3.3 Labware requirements

The labware is usually microplates. The labware must comply with the ANSI/SLAS 1-2004 (Microplates - Footprint Dimensions) and ANSI/SLAS 2-2004 (Microplates - Height Dimensions) standards:

- The labware must be rectangular.
- The labware must meet the minimum width and minimum depth requirements.
- The labware must have a circumferential edge.

The solid plate edge must safely withstand the gripping force (25 N).



**Fig. 12 Labware dimensions**

Minimum length (l)	127.76 mm ± 0.5 mm
Minimum depth (d)	85.48 mm ± 0.5 mm
Typical height (h + h')	14.35 mm ± 0.76 mm
(h' = height of the plate edge)	

The device transports the labware in landscape format.

### 3.4 Scope of delivery

The following components are included in the delivery:

- CyBio Carry plate transport system, consisting of:
  - CyBio Carry X (linear axis) variant
  - CyBio Carry Y/Z (gripper tower)
- External power supply unit and connecting cable, RS 232 cable
- Packaging box with transport locks

The following technical documentation is included in the scope of delivery:

- Declaration of incorporation
- Assembly instructions
- Software documentation (CyBio Composer)

# 4 Installation and commissioning

## 4.1 Installation conditions

### 4.1.1 Ambient conditions

Observe the following location requirements:

- This laboratory device is designed for inside use.
- Do not use the device in explosion-hazard environments.
- Do not locate the device near sources of electromagnetic interference.
- Place the device on a stable, horizontal surface.
- Avoid mechanical shocks and vibrations.
- The installation site must be free of drafts, dust and caustic fumes.
- Do not use the device in wet and damp environments. Keep the device surface clean and dry.
- Avoid direct sunlight and radiation from heaters onto the device. If necessary, provide air conditioning.
- Allow the device to acclimatize after transport and storage. Otherwise, condensed air moisture could damage the sensitive electronics during commissioning.
- Position the device so that the emergency stop button and the on/off switch are always easily accessible.

The following requirements are placed on the climatic conditions in the operating room:

- Operating temperature: +15 to +35 °C
- Humidity during operation: ≤75 % at +35 °C, non-condensing

### 4.1.2 Spatial requirements

The required space depends on all components that make up the system.

The CyBio Carry plate transport system has the following dimensions (depending on the model used):

Width	735 to 2375 mm (→ "Technical data" 48)
Height	530 mm
Depth	<ul style="list-style-type: none"> <li>▪ 140 mm</li> <li>▪ 400 mm (with protective glass and maximally extended gripper fingers)</li> </ul>

Provide sufficient space for a control computer, monitor, and other PC accessories.

### 4.1.3 Power supply



#### WARNING

##### Danger due to electrical voltage

- Only connect the device to a properly grounded socket which complies with the voltage specified in these instructions (→ "Technical data" 48).
- Do not use an adapter in the feeder.

The device operates on single-phase alternating current. The installation of the electrical equipment in the laboratory must comply with the DIN VDE 0100 standard. At the connection point, an electrical current in accordance with the standard IEC 60038 must be available.

## 4.2 Commissioning

The device may only be set up and installed by the customer service department of Analytik Jena or by persons authorized by Analytik Jena.

Observe the safety instructions in these instructions when installing and commissioning the device (→ "Safety" 7). Compliance with the safety instructions is a requirement for the trouble-free installation and operation of your system. Observe all warnings and instructions that are attached to the device or displayed by the control software.

To ensure trouble-free operation, make sure that the installation conditions are observed.

Initial commissioning includes the following:

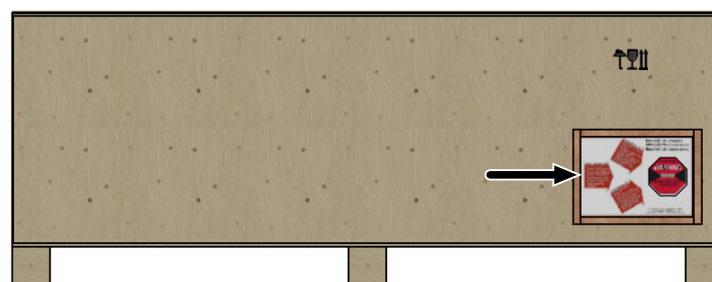
- Unpacking and positioning the device
- Connecting the cables (→ "Connections and interfaces" 16)
- Software installation (basic installation settings) and device configuration
- Instruction in the operation

The device is controlled by means of an external PC and the CyBio Composer software. The software controls all devices in a system, such as the Liquid Handling & Automation products of Analytik Jena and the devices of other manufacturers. The software includes a plug-in for the plate transport system.

### Unpacking the device

The device should be delivered directly to the final device location by a transport company. Ensure that a person responsible for positioning the device is present when the device is delivered.

A special label for transport inspection is attached to the front of the transport box. The special label contains a shock indicator.



**Fig. 13** Front of the transport box with special label

#### *Shock indicator*

- The label indicates whether the product was subjected to severe shocks and vibration during transport.
  - The glass tube in the indicator field turns red if a defined acceleration value was exceeded during transport.
- 
- When accepting the delivery, check the special label to verify that the transport conditions were observed.
  - Do not open the transport packaging if the indicator shows a defect. Inform Analytik Jena immediately.

- Only open the transport packaging of the indicator is undamaged (→ "Preparing the device for transport" 📄 44). Keep the original packaging for later transport.

#### Positioning the device

- ▶ Position the device so that it cannot tilt over during operation.
- ▶ Secure the linear axis on the workbench for this. **Or:**
- ▶ Secure the linear axis to the other Analytik Jena devices in the system using the optional positioning kits. A matching positioning kit is available for each device (CyBio FeliX, qTOWER<sup>3</sup> auto, etc.).
  - Screw the positioning kits to the linear axis.
  - Insert the feet of the other devices into the holes in the positioning kit.
- ▶ Observe a minimum distance of 1.5 cm to other devices in the system in Y-direction.
- ▶ For devices with an extendable tray, such as qTOWER<sup>3</sup> auto: position the plate transport system so that it has a distance of 1.5 cm from the fully extended tray.
- ▶ Position the plate transport system so that it can easily reach the transfer positions of the devices with extended gripper fingers. Maximum deflection in Y-direction: 290 mm.

## 4.3 Device configuration

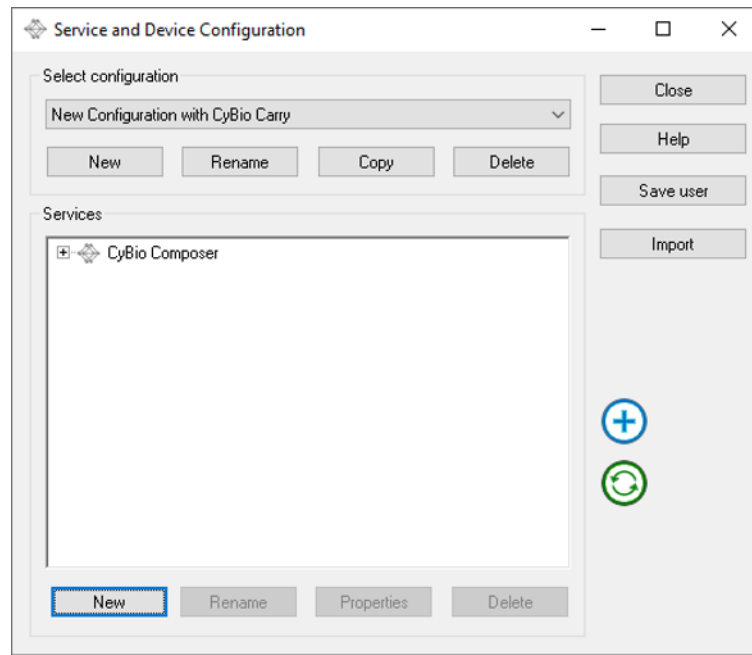
During commissioning, the service technician defines a new device configuration and sets up the plate transport system in the software so that it moves to the various transfer positions in the system safely and without collisions.

In the following cases, you can set up the device configuration yourself:

- You want to connect existing Analytik Jena lab devices to create an automated system using the CyBio Carry plate transport system.
- You want to integrate additional Analytik Jena lab devices into an existing system.
- You want to readjust the travel paths after transport and storage or cleaning of the system.

### 4.3.1 Defining a new device configuration

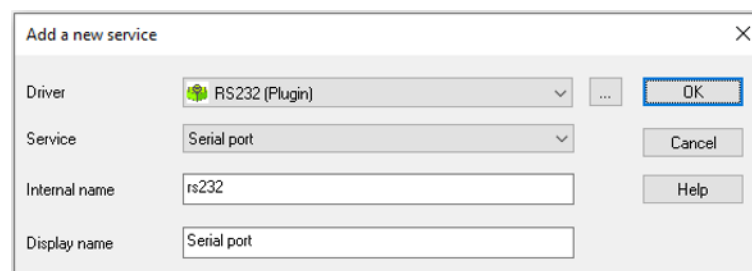
- ⇒ To define a new device configuration, you need a service dongle.
- ▶ Connect the service dongle to the control computer.
- ▶ Start the CyBio Composer software.
- ▶ Click on **Settings | Device Configuration** to open the **Service and Device Configuration** window.



**Fig. 14 Service and Device Configuration window**

- ▶ Define a new configuration. To do so, click on the **[New]** button in the **Select configuration** area.
- ▶ Enter a name for the new configuration in the **Configuration name** window. Confirm via **[OK]**.
  - ✓ You have defined a new device configuration.
- ▶ In the **Services** area, click on **[New]**. The **Add a new service** window opens. Define the following services:
  - Interface service
  - Device service

Defining new services



**Fig. 15 Add a new service window**

- ▶ Define a new interface service. To do so, select **RS232 (Plugin)** in the **Driver** drop-down list.
- ▶ In the **Service** drop-down list, select **Serial port**.
- ▶ Assign the internal name "RS232\_Carry" to the serial interface. Use the specified name to ensure that the scripts are interchangeable. Confirm your entries with **[OK]**.
- ▶ Click on **[New]** to open the **Add a new service** window again.

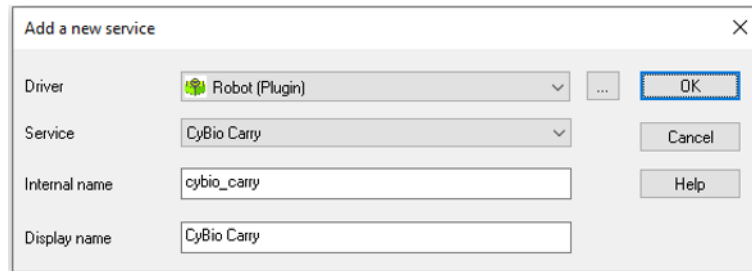


Fig. 16 Add a new service window

- ▶ Click on the [...] button. In the preset folder, select the PluginRobot.dll file.
- ▶ In the **Service** drop-down list, select **CyBio Carry** and assign the internal name "cybio\_carry" to the service.
- ▶ Exit the window with **[OK]**.
  - ✓ You have defined a new device configuration with interface and device services. The device configuration should look as follows:

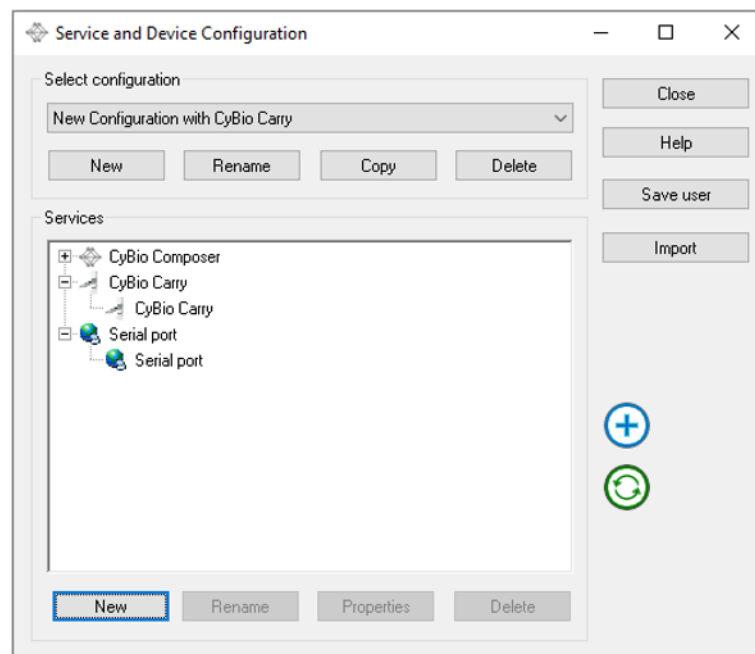


Fig. 17 New device configuration with defined services

### 4.3.2 Defining the interface to the control computer

- ▶ Select the serial interface in the **Service and Device Configuration** window.
- ▶ Click on **[Properties]** to open the **Properties Serial port** window.



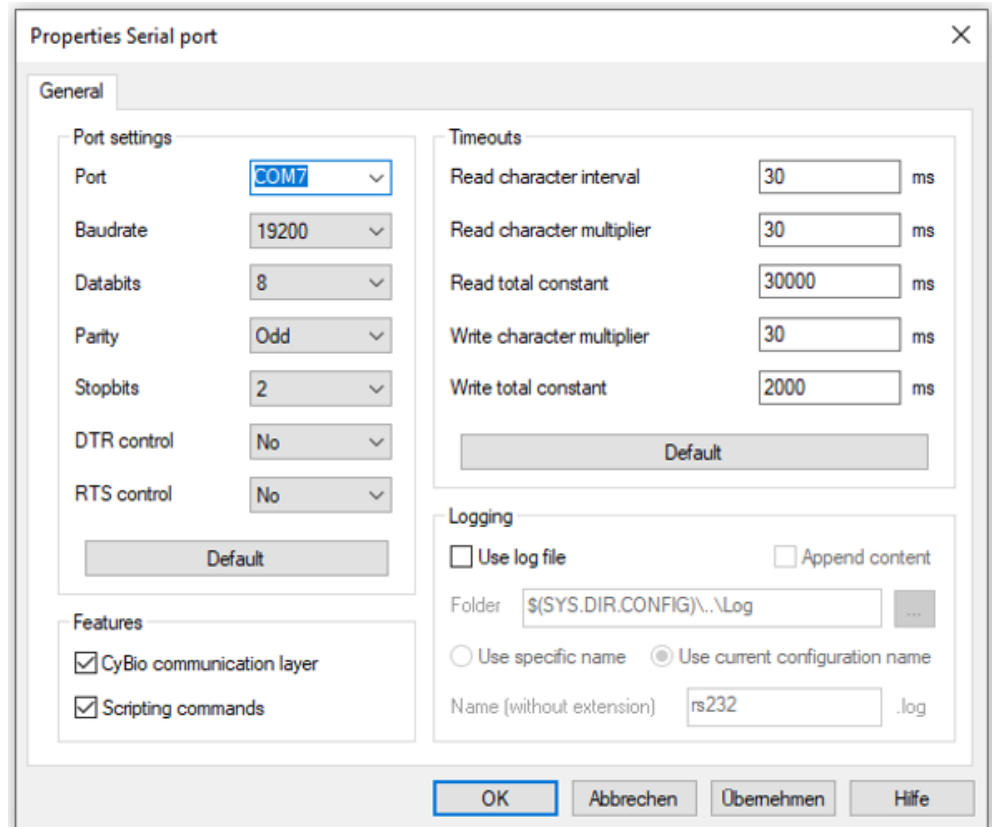


Fig. 18 Properties Serial port window

- ▶ Under **Port settings** | **Port**, select the interface via which the device is connected to the control computer.
- ▶ Do not change the other settings. Exit the window with **[OK]**.
  - ✓ You have defined the interface to the control computer.

### 4.3.3 Configuring the device and defining supporting points

- ▶ In the **Service and Device Configuration** window, select **CyBio Carry**.
- ▶ Click on **[Properties]** to open the **CyBio Carry** window.

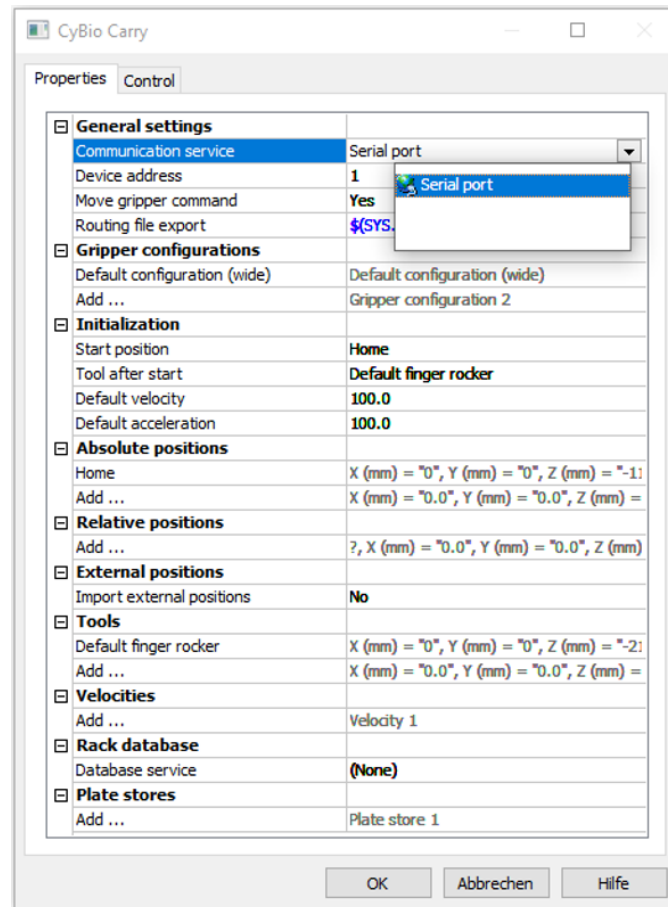
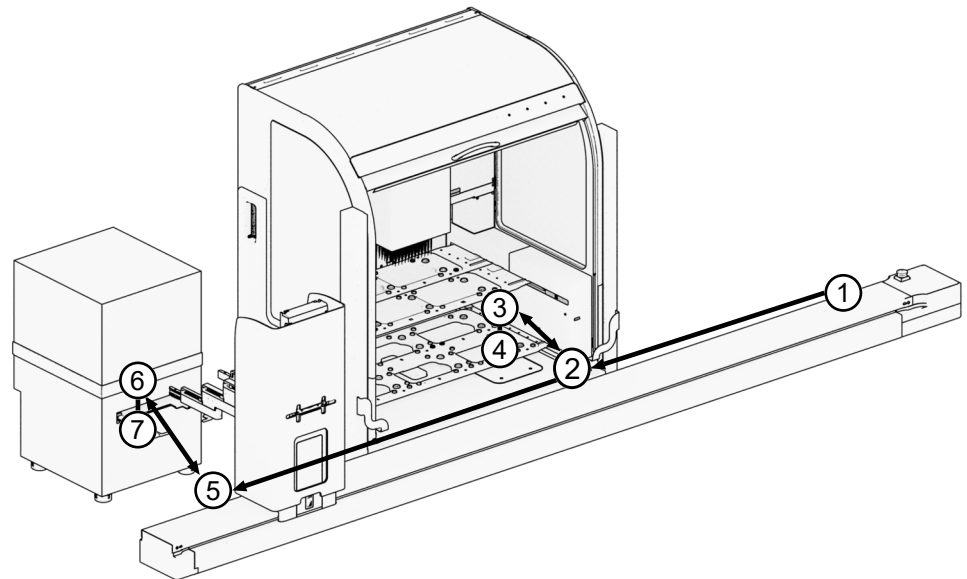


Fig. 19 CyBio Carry window

- ▶ Under **General settings** | **Communication service**, select the serial interface.  
The tool and the gripper configuration are preset in the software and do not need to be changed.
- ▶ Optionally: adjust the default speed and acceleration under **Initialization**.  
(A setting of 50 means that the gripper fingers move at 50% of the preset speed.)
- ▶ Confirm your selection with **[OK]**.

Supporting points

For the safe transportation of labware, the device needs supporting points to which it can move. Define the following supporting points in the device configuration:



**Fig. 20 Supporting points in the device configuration**

- |  |  |
|--|--|
| 1 Home position                        | 2 Safety position                      |
| 3 Parking position                     | 4 Transfer position at the CyBio Felix |
| 5 Safety position                      | 6 Parking position                     |
| 7 Transfer position at the qTOWER auto |  |

Position	Explanation	Description
Home position	<ul style="list-style-type: none"> <li>Starting position</li> <li>Preset in the software, does not need to be changed.</li> </ul>	Home
Transfer position	<ul style="list-style-type: none"> <li>Transfer position where the labware is put down or taken up</li> <li>Define at least one transfer position for each device in the system.</li> <li>Set it very precisely as an <b>absolute position</b> in the <b>teach dialog</b>.</li> </ul>	<device>
Parking position	<ul style="list-style-type: none"> <li>Position a few centimeters above the transfer position to enable the safe extension and retraction of the gripper fingers. The device moves to this position before and after the transfer.</li> <li>Define one parking position per transfer position.</li> <li>Define it as a <b>relative position</b> to the transfer position with a height offset of, e.g., Z = 10 mm.</li> </ul>	<device>_park
Safety position	<ul style="list-style-type: none"> <li>Position for moving to an adjacent device with fully retracted gripper fingers (Y = 0)</li> <li>Define one safety position per transfer position.</li> <li>Set it as an <b>absolute position</b> in the <b>teach dialog</b>.</li> </ul>	<device>_safety

Tips

- Assign unique names to the positions. Number the positions if the device has more than one transfer position, for example, like CyBio FeliX.
- Teach the device the transfer and safety positions using the **teach dialog** of the software.  
Analytik Jena offers a special teach tool with pins with which the positions can be moved to very precisely. Alternatively, you can use an empty microplate.
- Define the parking positions in relation to transfer positions, so that you do not have to re-teach the parking positions after each change to the system.
- Connect the positions via travel paths for which you define the respective target positions.

Defining a transfer position

Define each transfer position as follows:

- ▶ Open the **CyBio Carry** window.

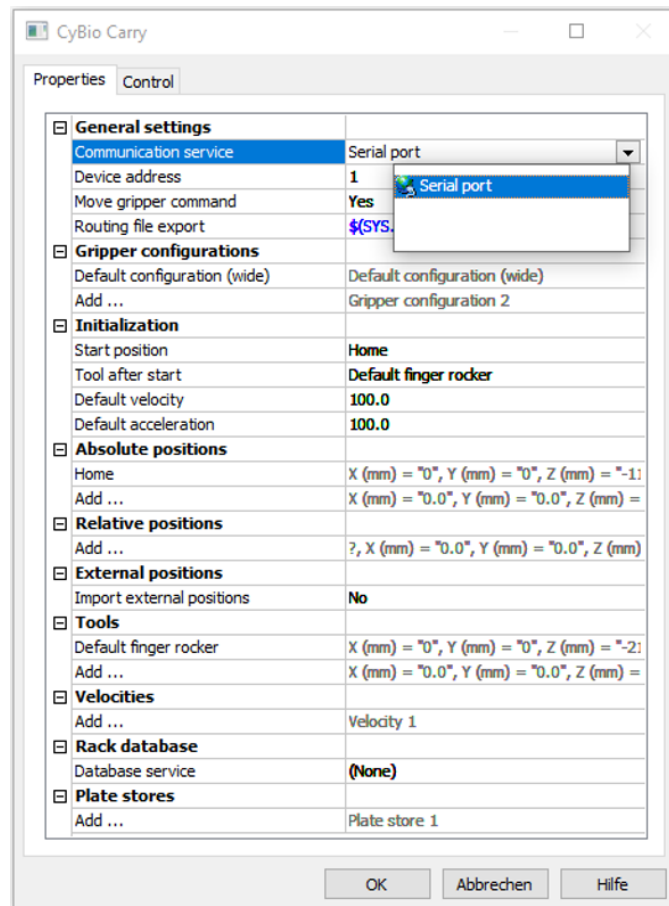


Fig. 21 CyBio Carry window

- ▶ Define the transfer position as a new absolute position.
  - Go to the **Absolute positions** section.
  - Click into the empty field next to **Add ....** An arrow appears. Click on the arrow to open the **Properties of <device> transfer** window.

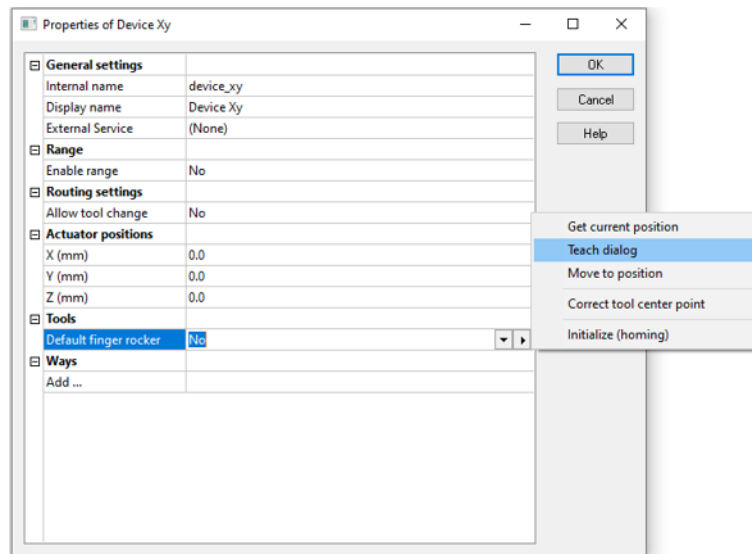



Fig. 22 Properties of <device> transfer window

- ▶ Assign a unique name to the transfer position in accordance with the suggested naming scheme.
- ▶ Click on the arrow button in the **Tools | Default finger rocker** section to open the context menu. Select **Teach dialog**.
- ▶ Define the transfer position using the teach dialog (→ "Using the teach dialog"  32).
- ▶ When you close the teach dialog, the software takes over the X, Y and Z-coordinates in the **Actuator positions** section and activates the tool. The entry for **Tools | Default finger rocker** changes from **No** to **Yes**.
- ▶ Click **[OK]** to close the window.
  - ✓ You have defined a transfer position for transferring labware in the device configuration.

#### Defining a parking position

- ▶ Define each parking position as follows:
  - ▶ Open the **CyBio Carry** window.
  - ▶ Define the parking position as a new relative position.
    - Go to the **Relative positions** section.
    - Click on the arrow next to **Add ...** to open the **Properties of <device> park** window.
  - ▶ Name the parking position in accordance with the naming scheme.
  - ▶ Select the correct parking position in the **General settings | Reference position** section.
  - ▶ In the **Actuator positions | Z(mm)** section, enter a suitable height offset for the parking position, e.g., 10 mm.

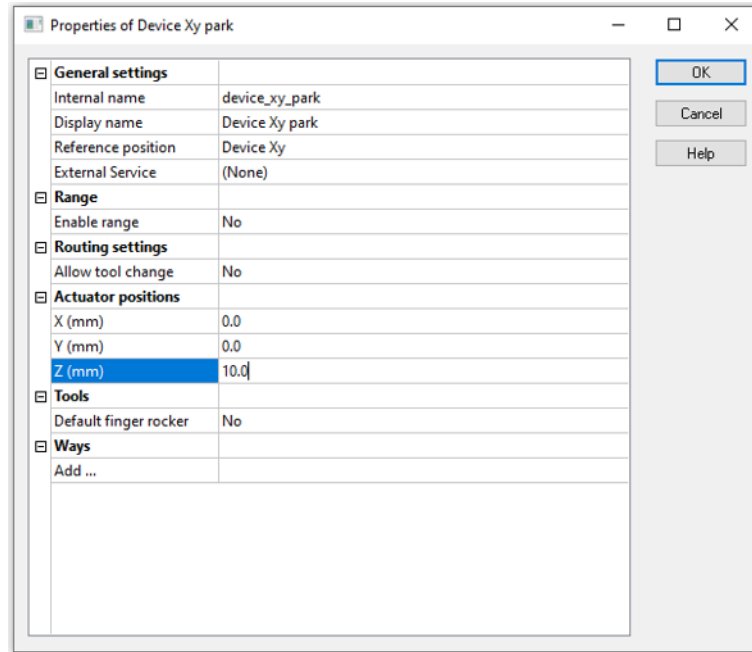


Fig. 23 Properties of <device> park window

- ▶ Activate the tool. To so, set the entry in the **Tools | Default finger rocker** section to **Yes**.
- ▶ Connect the parking position to the transfer position via a travel path. To do so, click on the arrow next to **Add ...** in the **Ways** section. Select the correct transfer position from the list as the target.

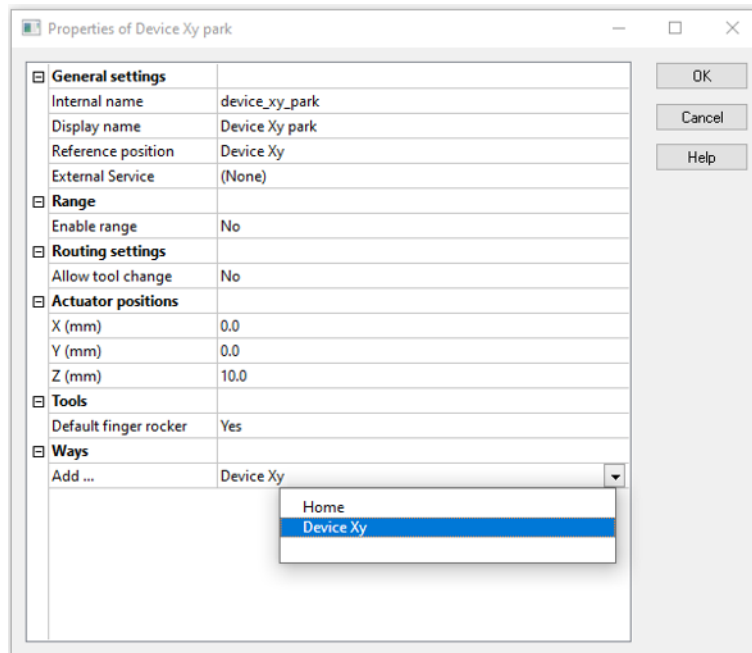


Fig. 24 Selecting the target position for the travel path

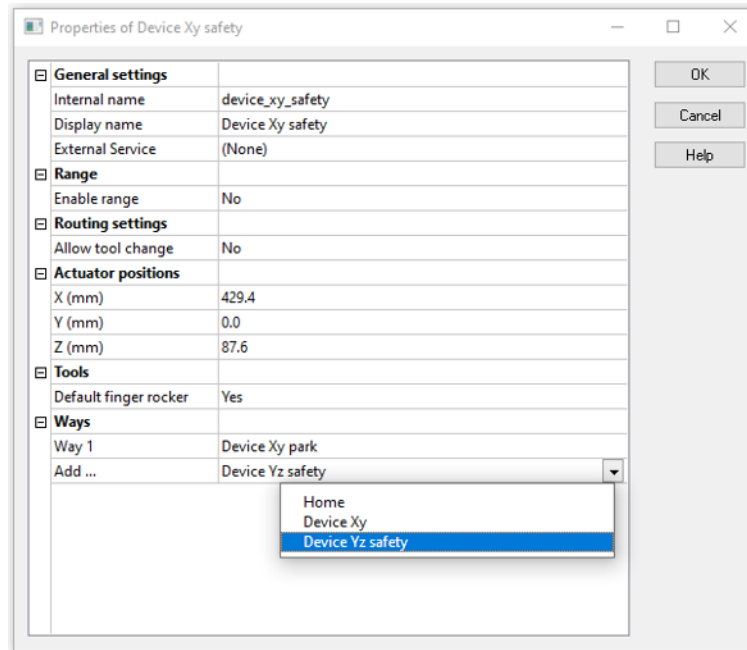
- ▶ Click **[OK]** to close the window.
  - ✓ You have assigned a parking position to a transfer position.

The travel paths are nondirectional: the plate transport system can move from A to B and from B to A.

## Defining a safety position

Define each safety position as follows:

- ▶ Open the **CyBio Carry** window.
- ▶ Define the safety position as a new absolute position.
- ▶ Proceed in the same manner as for defining a transfer position and use the teach dialog.
- ▶ Enter zero for **Y(mm)**. The gripper fingers should be completely retracted in the safety position.
- ▶ Connect the safety position to the correct parking position and the neighboring safety positions and/or the neighboring home position via travel paths.

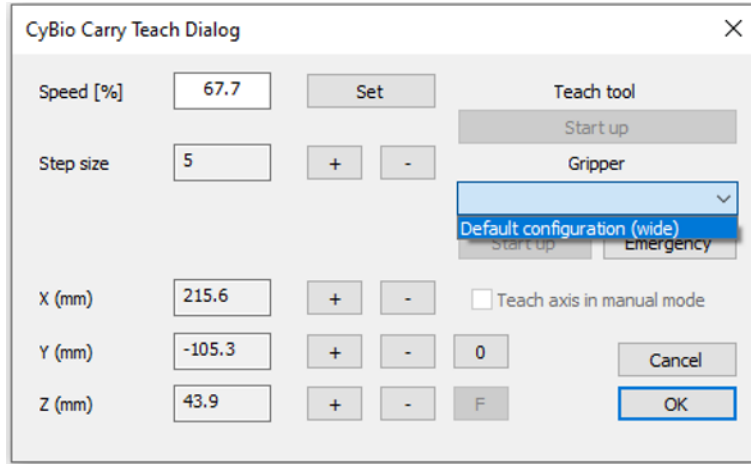


**Fig. 25** Defining travel paths to neighboring positions

- ▶ Click **[OK]** to close the window.
  - ✓ You have defined a safety position for a transfer position. The safety position enables the plate transport system to move to neighboring positions such as the home position.

### 4.3.4 Using the teach dialog

Open the teach dialog via the context menu in the **Propertis of position...** window. If the software is communicating with the device for the first time, you may have to commission the gripper first.



**Fig. 26 CyBio Carry Teach Dialog window**

Commissioning the gripper

- ▶ If the gripper has gripped labware: move the gripper over the nest or the desired transfer position using the **[+]** and **[-]** buttons.
- ▶ In the **Gripper** section, select **Default configuration (wide)**. Click on **[Start up]**. If there is any labware in the gripper, the gripper will drop this labware.
  - ✓ The gripper has been commissioned.

Teaching absolute positions

- ⇒ For the teach dialog, you need either the Analytik Jena teach tool or an empty microplate.
- ▶ Position the teach tool/microplate in the nest.
- ▶ Click on **[Pick up 30-3951-540-24]** in the **Teach tool** section to pick up the plate. The plate can only be picked up if the gripper is open and the sensor at the nest detects an object. Otherwise the button is grayed out.
  - ✓ After the plate has been gripped, the device returns to the previous position. A dialog asking whether the last Y-position should be restored appears.
- ▶ Check whether the last Y-position can also be moved to without collision with a plate in the gripper. In case of any doubt, click on **[No]** to cancel the process.
- ▶ Move to the X, Y and Z-positions precisely using the **[+]** and **[-]** buttons.
- ▶ If the defined Z-position is too low, the gripper can catch on the nest or strike hard against it when the Y-axis moves. For this reason the software displays warning and prohibition signs in the teach dialog. In that case correct the position immediately.



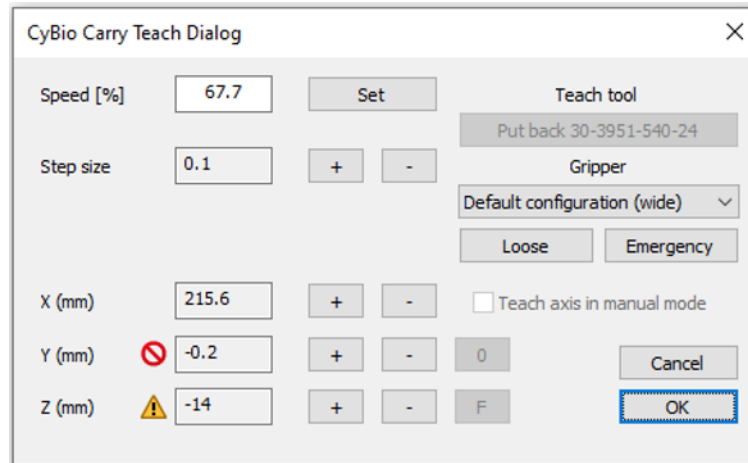


Fig. 27 CyBio Carry Teach Dialog window with warning and prohibition signs

- ▶ After completing the teach dialog, click on **[Put back 30-3951-540-24]** to place the plate back in the nest.
- ▶ Click on **[OK]** to exit the teach dialog.
  - ✓ The absolute position has been defined.

# 5 Operation



## CAUTION

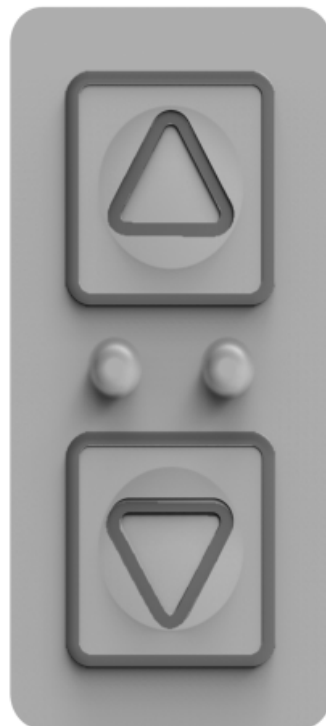
### Risk of injury

Risk of crushing in the movement range of the device, especially to hands.

- Do not reach into the movement range of the device physically or with an object during operation.
- In an emergency, press the emergency stop button to stop the movement.

## 5.1 Control device with arrow keys

On the back of the gripper tower there is a control panel with the "Arrow up" and "Arrow down" keys. The user can move the gripper and gripper finger to a desired position using the arrow keys. The right LED on the control panel lights up when the arrow keys are active. For safety reasons, the device cannot be controlled via the arrow keys during operation.



**Fig. 28 Control panel with arrow keys and 2 LEDs**

Move the gripper in the Z direction:

▪ Press the "Arrow up" key.	The gripper moves up to the desired position.
▪ Press the "Arrow down" key.	The gripper moves down to the desired position.

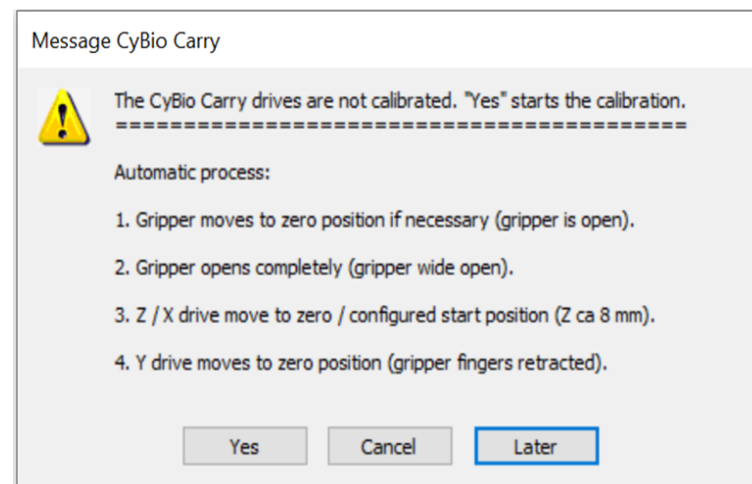
Move the gripper fingers in the Y direction:

<ul style="list-style-type: none"> <li>Press both arrow keys simultaneously.</li> </ul>	<ul style="list-style-type: none"> <li>The Y mode is activated. The right LED on the control panel starts to flash.</li> </ul>
<ul style="list-style-type: none"> <li>Press the "Arrow up" key.</li> </ul>	<ul style="list-style-type: none"> <li>The gripper fingers extend to the desired position.</li> </ul>
<ul style="list-style-type: none"> <li>Press the "Arrow down" key.</li> </ul>	<ul style="list-style-type: none"> <li>The gripper fingers retract, at most to the zero position.</li> </ul>
<ul style="list-style-type: none"> <li>Press both arrow keys simultaneously.</li> </ul>	<ul style="list-style-type: none"> <li>Z mode is selected again. The LED stops flashing.</li> </ul>

## 5.2 Calibrate device

The device must be calibrated each time it is switched on. The device must also be calibrated if it is actuated again after a pause and the drives are not in the zero position.

The software checks whether the device needs to be calibrated. If so, the software issues a message.



**Fig. 29 Software message: Drives are not calibrated (example)**

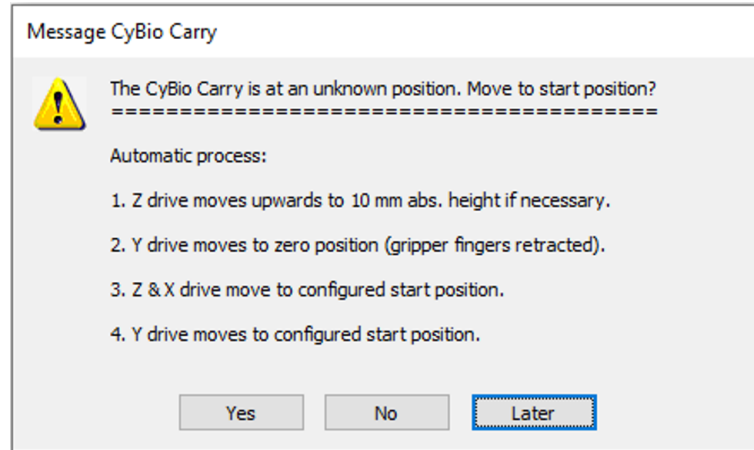
The software message and the automatic sequence during calibration differ depending on the initial situation.

- Clicking on **[Yes]** starts the automatic calibration.
- Clicking on **[Cancel]** aborts the automatic calibration. You can now control or dismantle the device with another software.
- Clicking on **[Later]** just minimizes the software message. You cannot continue to operate the device without calibration.

The software cannot start calibration if the gripper fingers are still holding a microplate (→ "Detach/dispose of microplate from gripper" 38). There must also no longer be a microplate on the shelf (→ "Remove the microplate from the shelf" 36).

Prevent collisions

If, for example, the drives are not in the zero position after an operating stop, the device moves to positions away from the predefined travel paths during calibration. This can lead to collisions. Therefore, the software issues a message:



**Fig. 30 Software message: Device in unknown position (example)**

As long as the software message is displayed, you can correct the position of the drives and steer the device around obstacles:

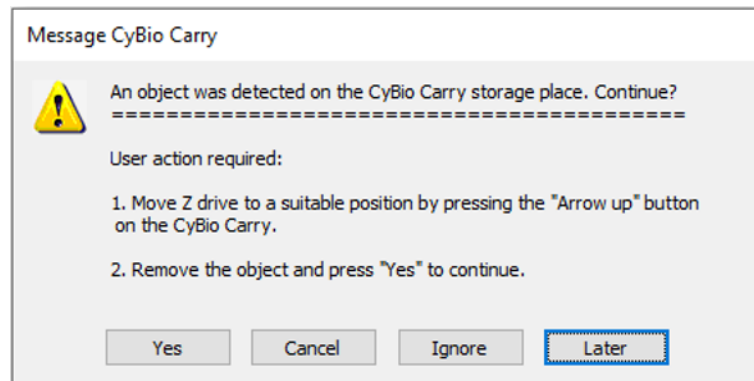
- You can move the gripper and gripper finger in the Y and Z direction using the arrow keys on the back of the gripper tower (→ "Control device with arrow keys" 34).
- The linear axis is de-energized. You can move the gripper tower manually along the linear axis in the X direction.

Confirming the message with **[Yes]** moves the device slowly to the home position, which is stored in the device configuration (→ "Configuring the device and defining supporting points" 25). Then the software starts the calibration.

### 5.3 Remove the microplate from the shelf

The software will display a message if there is still a microplate in the shelf in the following cases:

- The user starts by clicking **[Yes]** a calibration.
- The drives are in an unknown position.



**Fig. 31 Software message: Object in shelf**

Remove the microplate from the shelf

- ▶ Move the gripper upwards with the "Arrow up" key until you can reach into the shelf. Make sure that the gripper does not collide with other equipment in the system.
  - When necessary, retract the gripper fingers with the arrow keys (→ "Control device with arrow keys" 34).
  - When necessary, move the gripper tower manually along the linear axis. The drives of the linear axis are de-energized as long as the message is displayed.
- ▶ Remove the microplate from the shelf.

- ▶ Confirming the message with **[Yes]**.
  - ✓ The software starts the calibration. **Or:** The software moves the drives to a known position.

Even if you want to use **[Ignore]** the software starts with the calibration. The gripper jaws are opened to the maximum to avoid collision with the microplate in the shelf as far as possible. This procedure is not recommended.

### 5.4 Detach/dispose of microplate from gripper

If the gripper is closed and holding a microplate before calibration, the software issues a message.

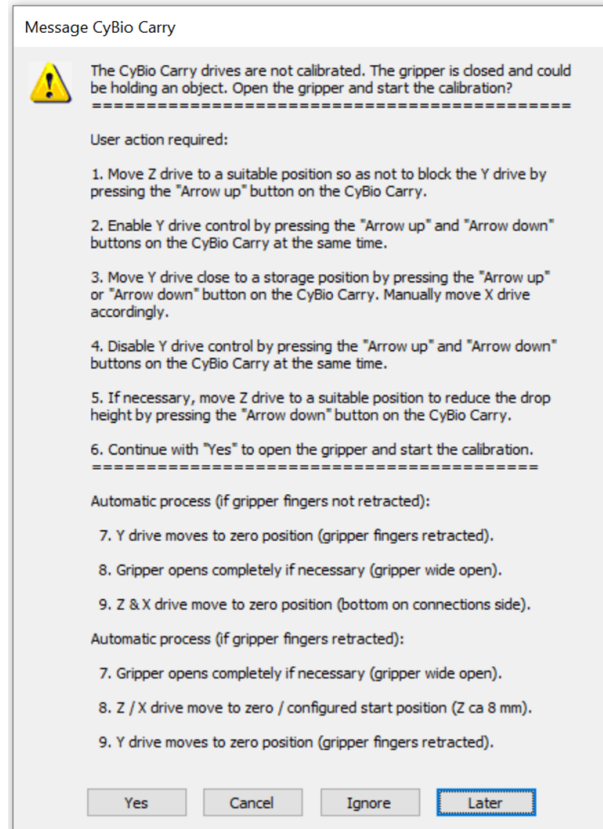


Fig. 32 Software message: Gripper closed

Put down microplate

- ▶ Use the "Arrow up" key to move the gripper to a position where you can retract the gripper fingers without collisions.
- ▶ If necessary, move the gripper tower manually along the linear axis. The drives of the linear axis are de-energized as long as the message is displayed.
- ▶ Retract the gripper fingers fully with the arrow keys (→ "Control device with arrow keys" 34).
- ▶ Use the "Arrow down" key to move the gripper over the shelf or a nearby position to reduce the drop height.
- ▶ Click on **[Yes]** to open the gripper jaws.
  - ✓ The gripper places the microplate in the shelf or a nearby position.
- ▶ Remove the microplate from the shelf. To do this, move the gripper upwards using the "Arrow up" key until you can reach into the shelf.
- ▶ Confirming the message with **[Yes]** .
  - ✓ The software starts the calibration with the described procedure.

Even if you want to use **[Ignore]** the software starts with the calibration.

- The gripper fingers are retracted.
- The gripper is lowered.
- The gripper jaws open and drop the microplate.

This procedure is not recommended.

## 5.5 Creating a method

A method defines the processes in the system for the plate transport system. Customer service creates methods for the system when positioning the device. You can extend these methods or create your own methods. Use the Scripting Studio tool of the CyBio Composer software for this.

The methods contain commands. Important commands are **Handle plate** or **Store plate internally**. The commands are described in detail in the online help for the software plug-in.

Command (examples)	Explanation
<b>Handle plate</b>	Command for picking up and putting down microplates. The device finds the way from the current position to the target position automatically.
<b>Store plate internally</b>	Command for getting and putting down microplates in the nest. The device finds the way from the current position to the next safety position automatically and then moves to the nest.

When executing the commands, the software uses the supporting points and travel paths that you or customer service have defined (→ "Configuring the device and defining supporting points" 25).

You can save frequently needed and recurring activities, such as transportation from device A to device B, in sub-methods. These sub-methods can then be accessed from various main methods.

At the start of each main method, the gripper has to be initialized. During initialization, the system checks how far the gripper opens. The gripper status is synchronized with the software.

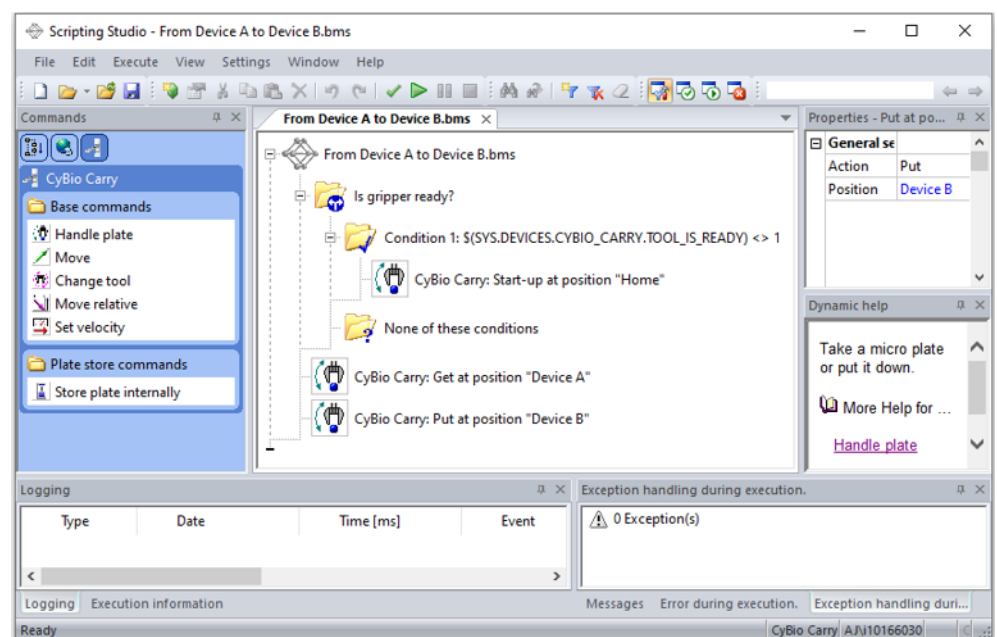


Fig. 33 Creating a method in the Scripting Studio tool

# 6 Troubleshooting



## NOTICE

### Risk of device damage

- Contact the Analytik Jena customer service in the following cases:
- The troubleshooting measures described do not provide a solution for eliminating the error.
- The error occurs frequently.
- The error message is not featured in the following list or the list refers to the customer service for troubleshooting the error.

The system is monitored as soon as the device is switched on. After starting the control software, all malfunctions of the device are reported using error messages. The error messages consist of an error code and/or an error message.

The following section describes a number of possible malfunctions, some of which users can troubleshoot themselves.

Error message	Cause	Remedy
The drives are not calibrated.	The drives have to be calibrated.	Restart the method and follow the on-screen instructions.
The gripper is not calibrated.	The gripper has to be calibrated before a different movement can be executed.	Restart the method and follow the on-screen instructions.
CyBio Carry reports a device error	The device reports a device-specific error.	Remedy: see list of error codes.

### Device errors

Error code	Cause	Remedy
1	Unknown command	Check the method settings and change them if necessary.
2	Parameter error – wrong parameter	Check the method settings and change them if necessary.
3	Missing parameter	Check the method settings and change them if necessary.
4	Program aborted	The user has aborted method processing via the software. <ul style="list-style-type: none"> <li>■ Restart the method.</li> </ul>
5	Command cannot be executed	Check the method settings and change them if necessary.
6	Unknown device address	Check the method settings and change them if necessary.
7	Internal error (system error)	Contact customer service.
11	Device not responding (RS 232 forwarding)	<ul style="list-style-type: none"> <li>■ Check the interface.</li> <li>■ A device error has occurred. Contact customer service.</li> </ul>
12	Parameter error in the command, unknown axis	Check the method settings.
22	General electronics/hardware error	Contact customer service.



Error code	Cause	Remedy
127	Axis busy	Contact customer service.
128	No plate gripped	Check whether the microplate is in the correct position and has not fallen down, for example.
160, 180, 200, 220, 240	Motor ...: movement error	<ul style="list-style-type: none"> <li>■ Remove the obstacle.</li> <li>■ Repeat the move command.</li> </ul> Check whether the axes can move freely.
161, 181, 201, 221, 241	Motor ...: no initialization (reference movement). Initialization is required for a command to be executed.	Check the method settings and change them if necessary. Calibration is necessary at the start of the method.
162, 182, 202, 222, 242	Motor ...: motor communication error	Contact customer service.
163, 183, 203, 223, 243	Motor ...: home position not found or cannot be left (during the reference movement)	<ul style="list-style-type: none"> <li>■ Remove the obstacle.</li> <li>■ Repeat the move command.</li> </ul> Check whether the axes can move freely.
164, 184, 204, 224, 244	Motor ...: <ul style="list-style-type: none"> <li>■ Incorrect or unknown command transmitted to the motor</li> <li>■ Wrong parameter(s)</li> <li>■ Parameter missing</li> </ul>	Contact customer service.
165, 185, 205, 225, 245	Motor ...: stall error detected (actual and target position do not match)	<ul style="list-style-type: none"> <li>■ Remove the obstacle.</li> <li>■ Repeat the move command.</li> </ul> Check whether the axes can move freely.
167, 187, 207, 227, 247	Motor ...: motor electronics overvoltage/motor overvoltage detected	Contact customer service.
168, 188, 208, 228, 248	Motor ...: motor electronics temperature/motor temperature too high	Contact customer service.
169, 189, 209, 229, 249	Motor ...: motor control generates excess current	<ul style="list-style-type: none"> <li>■ Remove the obstacle.</li> <li>■ Repeat the move command.</li> </ul> Check whether the axes can move freely. <ul style="list-style-type: none"> <li>■ Reduce the transport mass.</li> </ul>
1001 ... 1210	Internal communication error	Contact customer service.
1306	FRAM: CRC error	Contact customer service.
1311, 1312	FRAM X or Z not initialized	Contact customer service.
1400	General ESTOP hardware error of the safety device	Contact customer service.
1401	ESTOP: command sequence not adhered to/different command expected	Check the method settings and change them if necessary.
1410 ... 1483	ESTOP hardware error	A safety device is defective. <ul style="list-style-type: none"> <li>■ Contact customer service.</li> </ul>
2008	Motor current supply error	Contact customer service.
3200	General operating system error	Contact customer service.
3201, 3202	Mailbox 1/2 error	Contact customer service.

Error code	Cause	Remedy
65535	ESTOP	One of the safety devices has triggered an emergency stop. <ul style="list-style-type: none"><li data-bbox="1054 331 1426 394">■ Correct the emergency and then restart the device.</li></ul>

---

## 7 Maintenance and care

The operator may not undertake any service or maintenance work to this device and its components other than that specified in these instructions.

Observe the information in the "Safety instructions" section for all maintenance work. Compliance with the safety instructions is a prerequisite for the error-free operation of the device. Always observe all warnings and instructions that are displayed on the device itself or indicated by the control software.

To ensure faultless and safe functioning, Analytik Jena recommends an annual inspection and servicing by its Service department.

### 7.1 Maintenance overview

Maintenance interval	Maintenance task
Once per week and when contaminated	Clean the device housing.
Every six months	<ul style="list-style-type: none"> <li>▪ Check the electrical components and cables for damage.</li> <li>▪ Protective conductor test (only by a qualified electrician)</li> </ul>

### 7.2 Cleaning the device

Use a soft cloth dipped in mild soap solution or disinfectant solution to clean the device housing.

Never use cleaning powder, paint thinners or solvents like petrol or acetone to clean the device! These can corrode the housing surface.

For cleaning the device and any accessories which may only be cleaned by wipe disinfection, use a lint-free cloth with a cleaning agent / disinfectant recommended by WHO guidelines and not excluded in this manual (e.g., Incidin Liquid produced by the company: ECOLAB).

Spraying the device with disinfectant spray or similar can be dangerous and is prohibited for this reason. Sprays contain gases which may ignite.

Contamination and natural wear of assemblies leads to higher stress on the device and thus to a higher probability of device failure. Check for signs of wear on assemblies under mechanical strain and have these replaced when necessary.

## 8 Transport and storage

### 8.1 Transport

When transporting the device, observe the safety instructions in the "Safety instructions" section.

Avoid the following during transport:

- Impact and vibration  
Risk of damage due to shock, impact or vibration!
- Large temperature fluctuations  
Risk of condensation!

### 8.2 Preparing the device for transport




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#### WARNING

##### Risk of damage to health due to improper decontamination

- Decontaminate the device professionally and document the cleaning measures before returning the device to Analytik Jena.
  - The customer service department will send you the decontamination declaration when you register the return.
- 

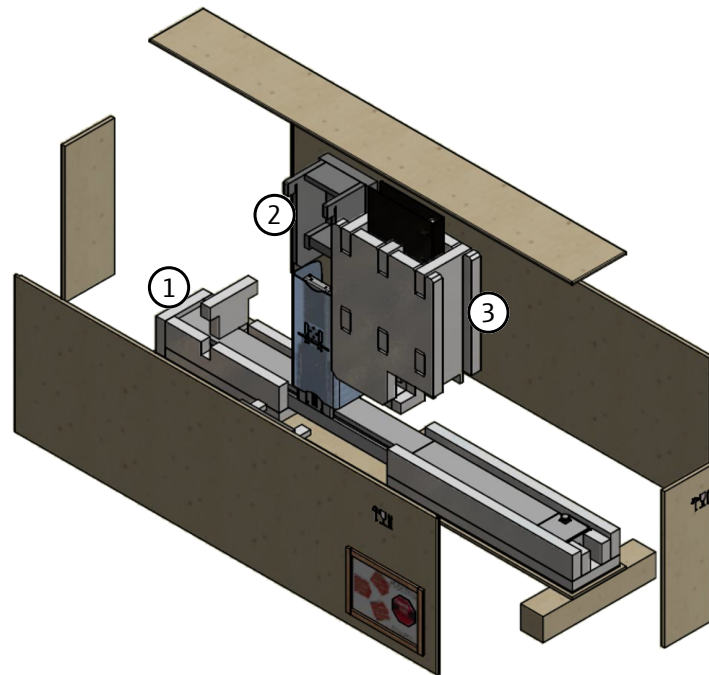



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#### NOTICE

##### Risk of device damage due to unsuitable packaging material

- Only transport the device and its components in the original packaging.
  - Empty the device completely and attach all transport locks before transporting the device.
  - Add a suitable desiccant to the packaging to prevent damage from moisture.
- 
- ▶ Remove all microplates from the device and clean the device.
  - ▶ If necessary, move the device to the zero position with the arrow keys on the rear of the gripper tower.
  - ▶ Switch off the device. Disconnect the power cable and the interface cables.
  - ▶ Package the device in the original packaging. The gripper tower remains mounted to the linear axis. The two components do not have to be separated for transport.
  - ▶ Move the gripper tower to the center of the linear axis so that it fits into the transport lock.
  - ▶ Insert the linear axis and the gripper tower into the molded foam parts. Push the loose pad onto the linear axis.
  - ▶ Slide the foam hold-down piece down until it is seated on the linear axis and secures the gripper tower in its position.
  - ▶ Place cables and technical documentation in the transport pocket.



**Fig. 34 Transport box**

- 1 Linear axis transport lock
- 2 Pad for gripper tower
- 3 Hold-down piece with transport pocket

Opening and reassembling the transport box



The transport box consists of a pallet floor, two short and two long side panels and a lid.

The individual parts are connected using clamping brackets that are inserted in the recesses at the edges of the side parts.

The brackets have a long and a short end and can be installed in only one way.



The tool required to remove the brackets is screwed to the transport box.

- ▶ Unscrew the opening tool from the box.
- ▶ Screw the tool back to the box after assembly.



- ▶ Remove the brackets as follows:
    - Slide the tool under the longer end of the bracket from the side and carefully lift off the bracket.
    - Hold the bracket with one hand while doing so.
- ⚠ CAUTION! Risk of injury!** If you do not hold the bracket when removing it, the bracket can fly off and cause injury.



- ▶ Assemble the box as follows:
  - First insert the shorter end of the bracket into the corresponding recess.
  - Push the longer end into the second recess.
    - ⚠ CAUTION! Risk of crushing! Take care not to pinch your hands when the bracket engages in the recess.
  - Assemble the side panels so that the arrows of the printed symbols point upwards.

### 8.3 Moving the device in the laboratory



#### CAUTION

##### Risk of injury during transport

Dropping the device poses a risk of injury and damage to the device.

- Proceed carefully when moving and transporting the device. Two persons are required to lift and carry the device.
- Grip the device firmly at the bottom with both hands and lift it simultaneously.

Observe the following when moving the device within the laboratory:

- Insufficiently secured components pose a risk of injury!  
Before moving the device, remove all loose parts and disconnect all connections from the device.
- For safety reasons, two persons are required to transport the device, one person on each side of the device.
- As the device does not have carrying handles, grip the device firmly with both hands at the lower end. Lift the device simultaneously.
- Observe the guide values and adhere to the legally mandated limits for lifting and carrying loads without auxiliary means.
- Observe the installation conditions at the new location.

### 8.4 Storage



#### NOTICE

##### Risk of device damage due to environmental conditions

Environmental influences and condensation can destroy individual components of the device.

- Only store the device in air-conditioned rooms.
- Ensure that the atmosphere is free of dust and corrosive vapors.

If the device is not installed immediately after delivery or not required for longer periods, it should be stored in its original packaging. A suitable desiccant should be added to the equipment to prevent damage from moisture.

The requirements for the climatic conditions of the storage location can be found in the specifications.

## 9 Disposal

At the end of its service life, the device and its electronic components must be disposed of as electronic waste in accordance with the applicable regulations.

# 10 Specifications

## 10.1 Technical data

### Model and order variants

Model name	Order number	CyBio Carry X (linear axis) variant	CyBio Carry Y/Z (gripper tower)
CyBio Carry 800	30-3951-102-26	30-3951-132-14	30-3951-200-25
CyBio Carry 1200	30-3951-103-26	30-3951-133-14	
CyBio Carry 1400	30-3951-104-26	30-3951-134-14	
CyBio Carry 2000	30-3951-107-26	30-3951-137-14	

### Technical data

	CyBio Carry 800	CyBio Carry 1200	CyBio Carry 1400	CyBio Carry 2000
Components	<ul style="list-style-type: none"> <li>▪ 1 CyBio Carry X (linear axis) variant</li> <li>▪ 1 CyBio Carry Y/Z (gripper tower)</li> </ul>			
Width	1095 mm	1575 mm	1775 mm	2375 mm
Height	530 mm			
Depth	<ul style="list-style-type: none"> <li>▪ 140 mm</li> <li>▪ 450 mm (with protective glass and maximally extended gripper fingers)</li> </ul>			
Weight	19 kg	22.5 kg	24 kg	28.5 kg
X axis travel path	800 mm	1200 mm	1400 mm	2000 mm
Y axis travel path	290 mm			
Z axis travel path	245 mm			
Speed (max.) in X-direction	500 mm/s			
Labware orientation	Landscape format			
Compatible Labware	Microplates in accordance with ANSI/SLAS 1-2004 (Microplates - Footprint Dimensions) and ANSI/SLAS 2-2004 (Microplates - Height Dimensions) (incl. deep-well and skirted PCR plates)			
Labware detection	Sensor monitoring for the nest			
Labware transportation	<ul style="list-style-type: none"> <li>▪ 1 microplate in the gripper and</li> <li>▪ 1 microplate in the nest</li> </ul>			
Gripping force	25 N			
Maximum mass of the handled object	500 g			
Control software	CyBio Composer			
Noise emission	<70 dB(A)			



## CyBio Carry (linear axis)

	30-3951-132-14	30-3951-133-14	30-3951-134-14	30-3951-137-14
Width	1095 mm	1575 mm	1775 mm	2375 mm
Height	85 mm			
Depth	130 mm			
Weight	11.0 kg	14.5 kg	16.0 kg	20.5 kg

## CyBio Carry Y/Z (gripper tower)

	30-3951-200-25
Width	205 mm
Height	475 mm
Depth	<ul style="list-style-type: none"> <li>■ 140 mm</li> <li>■ 450 mm (with protective glass and maximally extended gripper fingers)</li> </ul>
Weight	8.0 kg

## Electrical connection

Operating voltage	24 V DC, max. 4 A
Power consumption	≤80 VA
Interfaces	RS 232, Ethernet
External power supply unit data	
Input voltage	100 to 240 V ± 10 % AC, max. 1.5 A, 50/60 Hz
Output voltage	24 V DC, max. 3.75 A

## Ambient conditions

Operation	
Permissible ambient temperature	+15 to +35 °C
Permissible relative humidity	≤75 % at +35 °C, non-condensing
Storage and transport	
Permissible ambient temperature	-10 to +50 °C
Permissible relative humidity	≤80 % at +30 °C, non-condensing
Miscellaneous	
Installation location	Stable, horizontal, dry, free from vibration

# 11 Maintenance and wear parts

## Maintenance parts

For maintenance parts, Analytik Jena recommends regular maintenance by customer service.

Component	Part number	Maintenance information
At the CyBio Carry Y/Z gripper tower		
Linear guide	■ 30-101-787	Relubricate every two years
	■ 30-101-730	
	■ 30-101-098	
	■ 30-101-097	
At the CyBio Carry X linear axis		
Linear guide	■ 30-3951-133-12	Relubricate every two years
	■ 30-3951-133-13	

## Wear parts

CyBio Carry Y/Z gripper tower

Component	Part number
Protective glass	30-3951-520-10
M4 pressure screws	■ 30-101-541
	■ 30-101-101
Toothed belts/Bando	■ 30-101-780
	■ 30-101-783
Grooved ball bearings	■ 30-101-784
	■ 30-101-781
Z-drive	■ 30-101-729
	■ 30-101-782
	■ 30-016-550
	■ 30-013-600
Binder permanent magnetic brake	30-3951-112-91
Igus plain bearing	30-3951-116-91
Y/G worm shaft	30-101-473
Y/G worm gear	30-3951-336-10
Cables (drive)	■ 30-3951-126-96
	■ 30-3951-123-96
Flat flex cables	■ 30-101-810
	■ 30-101-812
Toothed belts, perforated	■ 30-3951-422-10
	■ 30-3951-419-10
Precision miniature ball bearing	30-101-099

## CyBio Carry X linear axis

<b>Component</b>	<b>Part number</b>
Tension spring	30-3951-133-28
Grooved ball bearings	▪ 30-102-311 ▪ 30-016-550
Toothed belt	30-102-164
Toothed belt/Bando	30-101-750
Flat flex cables	▪ 30-102-164 ▪ 30-101-742
PTFE adhesive tape	30-101-611

## List of figures

Fig. 1	Movement range.....	8
Fig. 2	Emergency switch-off .....	11
Fig. 3	CyBio Carry transports labware .....	12
Fig. 4	System with several lab devices by Analytik Jena.....	12
Fig. 5	CyBio Carry Y/Z (gripper tower) setup, front and rear sides .....	13
Fig. 6	Gripper finger, attachment of the gripper jaw to the bottom finger element.....	14
Fig. 7	Side view, with gripper fingers extended .....	14
Fig. 8	CyBio Carry X (linear axis) setup .....	15
Fig. 9	Control panel with arrow keys and 2 LEDs.....	16
Fig. 10	Connections and interfaces .....	17
Fig. 11	External power supply unit.....	18
Fig. 12	Labware dimensions .....	18
Fig. 13	Front of the transport box with special label .....	21
Fig. 14	Service and Device Configuration window .....	23
Fig. 15	Add a new service window .....	23
Fig. 16	Add a new service window .....	24
Fig. 17	New device configuration with defined services .....	24
Fig. 18	Properties Serial port window .....	25
Fig. 19	CyBio Carry window .....	26
Fig. 20	Supporting points in the device configuration .....	27
Fig. 21	CyBio Carry window .....	28
Fig. 22	Properties of <device> transfer window .....	29
Fig. 23	Properties of <device> park window .....	30
Fig. 24	Selecting the target position for the travel path .....	30
Fig. 25	Defining travel paths to neighboring positions.....	31
Fig. 26	CyBio Carry Teach Dialog window .....	32
Fig. 27	CyBio Carry Teach Dialog window with warning and prohibition signs .....	33
Fig. 28	Control panel with arrow keys and 2 LEDs.....	34
Fig. 29	Software message: Drives are not calibrated (example) .....	35
Fig. 30	Software message: Device in unknown position (example).....	36
Fig. 31	Software message: Object in shelf .....	36
Fig. 32	Software message: Gripper closed .....	38
Fig. 33	Creating a method in the Scripting Studio tool .....	39
Fig. 34	Transport box .....	45