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# Operating Manual

## CyBio QuadPrint HQ-M/L

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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

Documentation Number

30-5004-041-23

Edition

E (10/2024)

Technical Documentation

Analytik Jena GmbH+Co. KG

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# 1 General

## 1.1 Notes

This document contains information about the setup and operation of the device CyBio QuadPrint and provides the operating personnel with the necessary know-how for the safe handling of the device.

The supplier documentation for the label printer and the label applicator is provided with the device and is also available on the website of the manufacturer cab Produkttechnik.

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.

### 1.1.1 Scope

These instructions apply for

| Name | CyBio QuadPrint HQ-M | CyBio QuadPrint HQ-L |
|---|---|---|
| |  |  |
| Type key | 30-5004-027-26 | 30-5004-026-26 |

**Table 1 Scope of these instructions**

## 1.2 Intended use (purpose)

The operator is responsible to use of the device as intended.

The CyBio QuadPrint barcode labeling device has been designed for the automatic processing of labware in chemical and biological laboratories. In the field of medicine and diagnostics its use is limited to research.

The labware that can be processed with the device are microplates in ANSI/SLAS format, including deep-well and rigid full-skirted PCR plates. It is not possible to process flexible full-skirted PCR plates and half-skirted PCR plates with this device.

We recommend processing only empty or sealed filled labware.

The basic functions are:
- Picking up, temporarily holding and transferring labware
- Automatic printing of barcode labels and attaching these labels to labware

CyBio QuadStack can be loaded and unloaded manually via the stacker shaft doors. It is not permitted to manually transfer the labware to the access module for labeling purposes.

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).

The device may only be used for the processes described in the user manual. Only the specified use is regarded to be the intended use. Using the device for any other purpose may compromise the safety of the user and the device.

## 1.3 Standards and directives

The device was manufactured according to the currently applicable generally recognized codes of practice and the generally accepted safety-related regulations. The relevant safety and health requirements of the applicable laws, standards and regulations were applied during the construction of the device.

CE-labeling and a declaration of conformity confirm the device's compliance with all relevant safety and health requirements.

Any information regarding safety corresponds to the currently valid regulations of the European Union. In countries outside the EU, all applicable laws and country-specific regulations must be complied with.

# 2 Safety instructions

## 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 markings

The warning labels and safety symbols attached to the device are part of the device and must be strictly observed.

### CAUTION

**Risk of incorrect handling resulting in personal injury and material damage due to missing warning labels!**

Do not remove any warning labels or safety symbols!

Before switching on the device, check that the warning labels and safety symbols are complete and intact.

Do not put the device into operation if warning labels or safety symbols are missing or damaged.

Damaged or missing warning labels or safety symbols must be replaced immediately.

The “Risk of crushing injuries” and “Automatic startup” warning symbols are located on each of the 4 stacker shafts.

The following symbols are attached to the device:

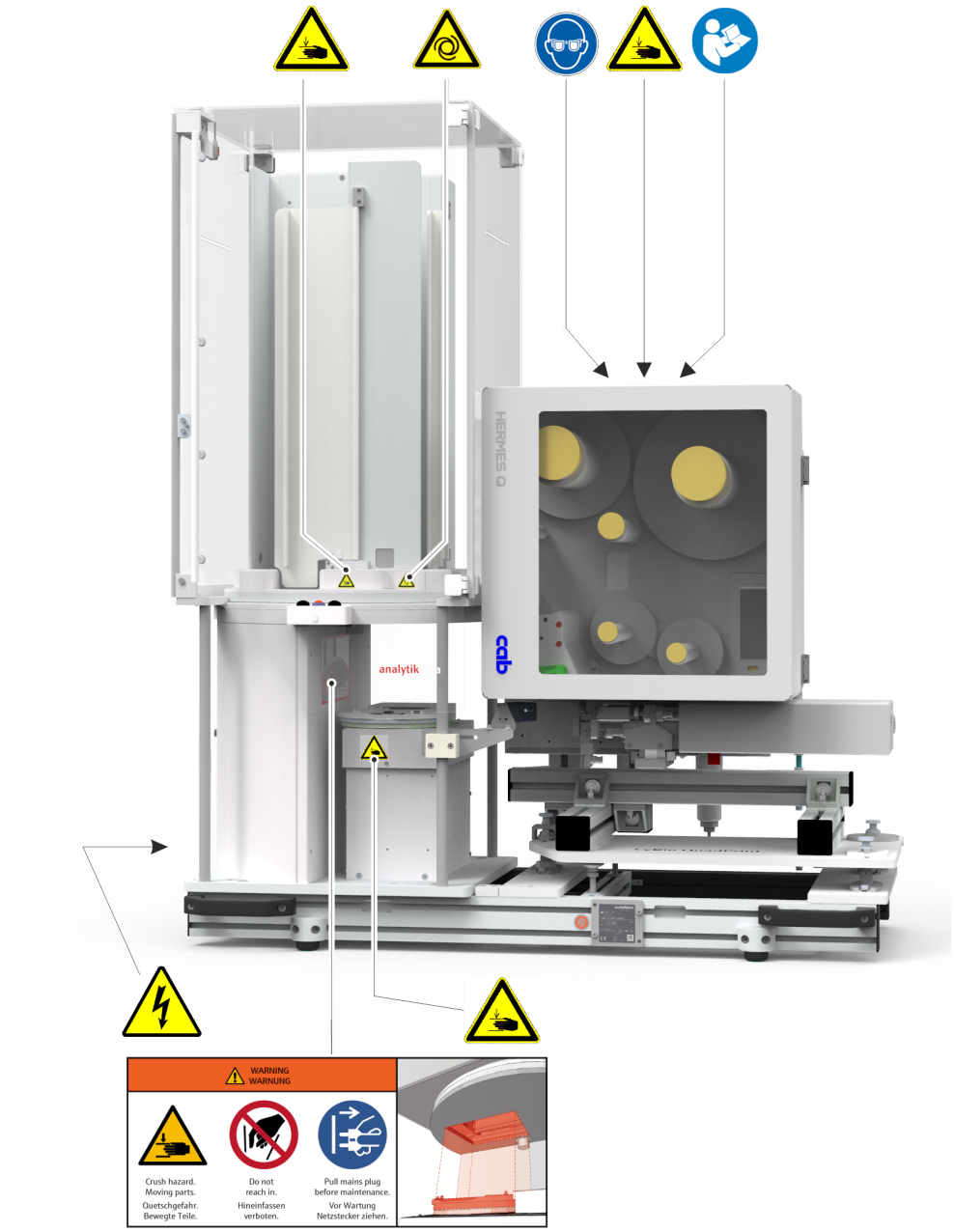


**Fig. 1 Warning labels on the device**

| Icon | Meaning | Comment |
|---|---|---|
|  | Hazard zone warning! | Warning of mechanical hazard from moving device components |
|  | Read the instructions! | These instructions contain important information on the safe operation of the device |
|  | Wear protective goggles | Wearing protective goggles is generally recommended in a laboratory |

| Icon | Meaning | Comment |
|---|---|---|
|  | Dangerous electrical voltage warning! | Never open the device!<br>All repairs must be performed by qualified personnel only!<br>Only replace defective fuses with fuses of the specified type! |
|  | Hand injury warning! | Warning of crushing injuries caused by moving device components (stacker shafts, turn-lift-turn module, printer, label applicator) |
|  | Automatic start warning! | Warning of automatically rotating stacker shaft during ongoing processes |
|  | Crushing injuries warning.<br>It is forbidden to reach into the device.<br>Unplug the power cord before carrying out any maintenance work on the device. | Risk of irreversible hand injuries due to shearing and crushing caused by moving device components in the area of the lower stacker shaft opening on the CyBio QuadStack and the vertical lifter of the access module. Unplug the power cord before carrying out any maintenance work on the device. |

**Table 2 Warning signs and warning symbols**

## 2.3 Danger areas and protective devices

### 2.3.1 Hazard zones

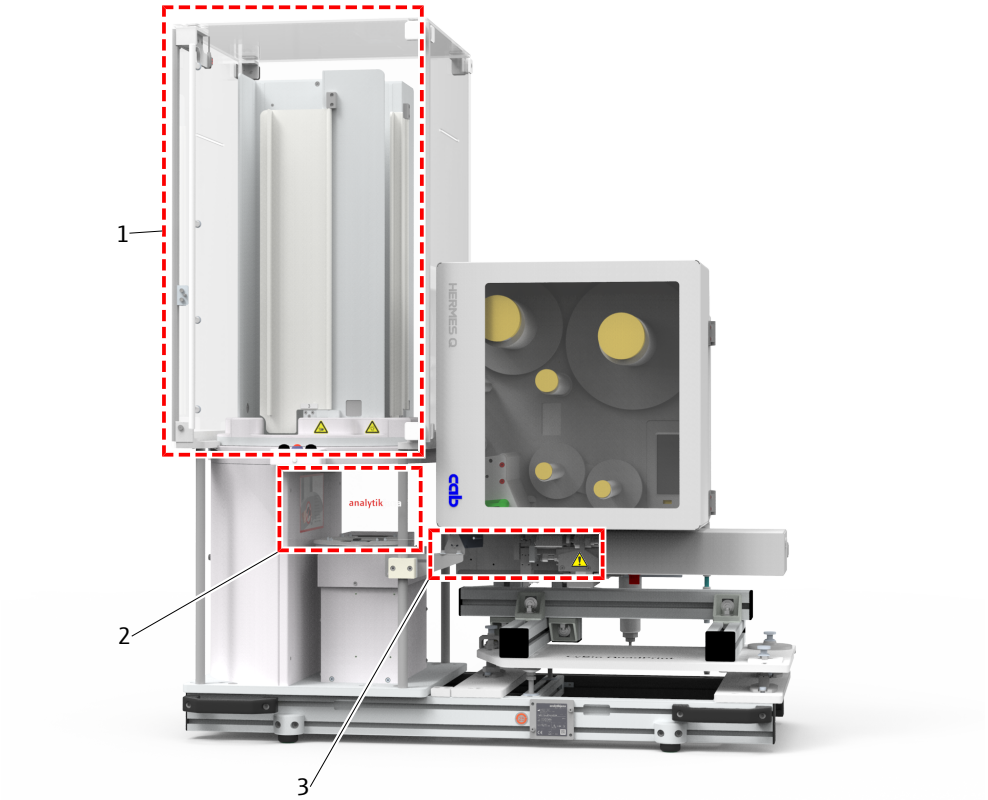


**Fig. 2 Hazard zones**

1 CyBio QuadStack, stacker shafts
2 CyBio QuadStack, shaft opening (bottom of the stacker shafts)
3 Label applicator

The rotation of the stacker shaft can put the operating personnel at risk. The 4-fold stacker shaft is equipped with a transparent protective housing for process security. The protective housing can be opened on the main operating side via a monitored door.

The lift-turn-lift module and the label applicator are located underneath a transparent access guard. There is a risk of crushing and shearing fingers and hands at the lower stacking shaft opening and in the travel range of the applicator.

The operation of the CyBio QuadPrint without the protective housing and the access guard is not compliant with the intended use and is thus prohibited. Failure to observe warning information can result in crushing injuries to hands. Any interference with the device during operation can result in damage to the device and to the samples.

Warning labels

- In the event of malfunction, first switch off the device. Unplug the power cord before, for example, removing microplates that got stuck or clamped inside the device.
- Never reach into the range of movement of the stacker shaft with your hands or with any type of object during operation. There is a particular risk of injury at the gaps at the four stacker shaft doors and at the lower stacker shaft opening. There is a risk of irreversible hand injuries caused by crushing or shearing.
- Never operate the CyBio QuadPrint without the protective housing and the access guard for the lift-turn-lift module and the label applicator.
- To abort a program, press the STOP button. All drives stop.
- The stacker shaft will only rotate when the stacker shaft doors are closed. The device monitors the position of the stacker shaft doors.
- Always correct any incorrect movement with the aid of the PC. Incorrect handling and operation can result in material damage and personal injury.
- Ensure proper compressed-air connection.

  The printer's cover must only be opened to carry out one of the following installation or maintenance tasks:

  - Setting up the printer
  - Replacing the label roll or the transfer ribbon
  - Troubleshooting
- Always close the housing of the printer before operating the CyBio QuadPrint. When the housing is open, it is possible to access hazard zone 2 (shaft opening of the CyBio QuadStack) as well as the print head which puts the operator at risk and may result in injuries.
- If the applicator is running, moving components are accessible. This particularly applies to the area in which the applicator is moved back and forth between its basic position and the labeling position. During operation, do not reach into this area and keep hair, loose clothing and jewelry away from this area. When working in this area, shut off the compressed-air supply.
- Hot surfaces: The printer (the print head in particular) can heat up during printing (approx. 50 °C); for this reason, do not touch it (during operation) and only carry out material change or removal after the printer has cooled down.

**See also**

Technical data [▶ 43]

### 2.3.2 Protective devices

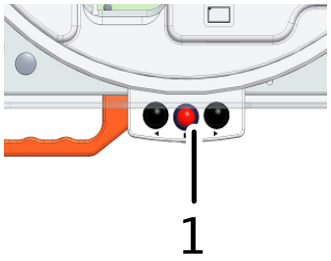


**Fig. 3 STOP button**

Press the STOP button (1 - see figure) to bring all drives to an immediate stop.

## 2.4 Requirements for the operating personnel

The device may only be operated by trained specialist personnel instructed in technical safety. The operating personnel must have read and understood the operating instructions.

The personal protective equipment must be worn to operate or service the device.

The operating personnel must be familiar with the dangers arising from the substances used.

## 2.5 Device-specific safety instructions

The system must be installed by the service personnel of the manufacturer or duly trained and authorized expert personnel under any circumstances.

Do not use aggressive substances of a type that may compromise the stable performance of the system

Before connecting to the mains, check the electrical requirements of the device.

Observe prescribed maintenance intervals!

Only use the accessory items, consumables and spare parts specified in this document or provided or recommended by the manufacturer!

### 2.5.1 Safety instructions for operation

The operator of the device must ensure that the device is in sound condition before each use. This applies especially after any modification or adaptation of the device or any repair.

Do not operate the system with defective safety devices or with improperly installed safety and protection devices.

Do not remove, modify or disable any safety and protection devices during operation.

Ensure easy access to the main power switch, as well as to any emergency shutdown systems and locks at all times during operation.

Ensure that all ventilation devices on the device are in proper functional condition. Covered ventilation grates or slots, etc. can result in malfunctions or device damage.

Only operate the device when connected to a power socket with grounding conductor. The grounding conductor must not be interrupted (e.g., when using a voltage regulating transformer). Only use extension cables equipped with grounding conductors!

When replacing the power cable, ensure that the new power cable has the proper dimensions for the intended operating voltage (see technical data).

Do not insert any objects into any device openings, and ensure that no liquid can get into the device through openings or joints.

Do not short-circuit the device fuses and only use fuses corresponding to the information in these instructions when replacing these.

### 2.5.2 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.

### 2.5.3 Safety instructions – maintenance and service

Service and repairs and work for the commissioning or dismantling the device for transport must only be carried out by authorized service personnel!

The operator may only carry out the tasks listed in the chapter "Maintenance and care".

Only carry out maintenance and service work on the device when it is switched off. Disconnect the power cord from the mains socket beforehand.

## 2.6 Safety instructions

### 2.6.1 Handling hazardous substances

Even with intended use there is a risk of health damage when handling hazardous substances. The operator is solely responsible for the compliance with all safety requirements to protect individuals and property when handling radioactive, infectious, toxic, caustic, flammable and other hazardous substances.

- Control the handling of hazardous substances in accordance with the safety category of the lab, the details in the safety data sheets of the respective substances, the manufacturer recommendations for use and additional national and international regulations (WHO, “Laboratory Biosafety Manual").
- Wear personal protective equipment when working with the device.
- Observe all notices on the cleaning and decontamination of the device.

### 2.6.2 Chemical resistance

Aggressive substances may damage the device. Although the materials used are resistant to most of the commonly used substances, material damage from aggressive substances cannot be completely excluded.

- Before using any aggressive substances (e.g., bases, acids or organic solutions): Check that the materials with direct contact to these substances are resistant.
- When in doubt, consult the manufacturer.

| Prohibited substances |
|---|
| Hydrofluoric acid (HF/hydrofluoric acid) |
| Highly concentrated acids |
| Cleaning powder |
| Paint thinner |
| Naphtha (crude gasoline) |
| Gasoline |
| Acetone |
| Cleaning spray |
| Ozone |

- Substances not listed in this table are not necessarily suitable.

- Do not use solvents (thinners), aggressive detergents, flammable liquids or caustic alkaline solutions for cleaning. These can lead to damage to the housing components.

| Disinfection method | Disinfectant | Can be used for |
|---|---|---|
| Wipe disinfection | Incidin Liquid (ECOLAB) | – Housing parts<br>– Accessories |

**Table 3 Permissible disinfection methods and disinfectants**

## 2.7 Behavior during emergencies

Emergency or dangerous situation:

- Switch off main switch
- Unplug power cord

# 3 Technical description

## 3.1 Layout

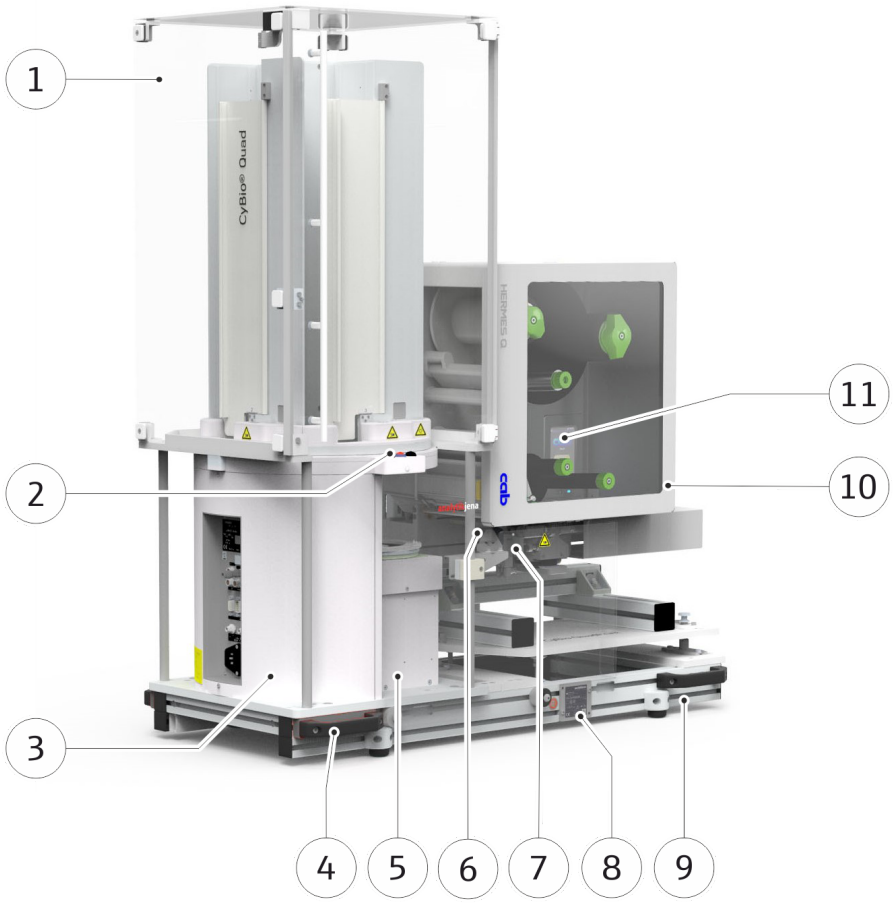


**Fig. 4 Design (CyBio QuadPrint HQ-M)**

1 Protective housing
2 Operating panel with STOP button and LED
3 CyBio QuadStack with 4-fold stacker shaft
4 Handles
5 Lift-Turn-Lift module
6 Barcode reader
7 Label applicator
8 Type plate
9 Basic frame
10 Printer
11 Touchscreen display

The CyBio QuadPrint HQ-x is a device for printing labels with 1D/2D barcodes, text or other information with subsequent labeling of microplates. Labels can be applied to all four sides of the microplates.

In the CyBio QuadStack with a rotating 4-fold stacker shaft, unlabeled microplates are prefilled in 3 shafts (shafts 2–4) and stored in shafts 1–3 after labeling.

The label height is automatically adjusted to the microplate type via the Lift-Turn-Lift module. A sensor monitors the stacking/dispensing process; a second sensor detects empty stacker shafts. The printing process settings are made via the CyBio QuadPrint Studio control software.

Rotation of the stacker shafts on the CyBio QuadStack can also be triggered manually. A control panel with buttons and a status LED is located on the main operating side of the CyBio QuadStack.

### 3.1.1 Type plate

The type plate contains this information:
- Manufacturer specifications
- Product designations (type designation, trade name)
- Identification data (model, serial number)
- Year of manufacture

### 3.1.2 Barcode/label printer

**NOTICE**

Observe the associated manufacturer's documentation.

The barcode/label printer is used to print the barcodes/labels using the thermal printing method.

The printer is connected directly to the mains socket via its mains connection socket.

For control, the printer is connected to the CyBio QuadStack via its interface.

### 3.1.3 Ram applicator

**NOTICE**

Observe the information in the corresponding documentation provided by the manufacturer. In particular, read the safety instructions that must be observed when operating the label applicator.

The label applicator removes the labels from the printer.

After the label applicator has picked up a label, it moves into the labeling position.

The label is then attached to the specified position on the microplate.

The transport lock must be released before putting the device into service. For this purpose, customer service removes the cover and moves the end position as far to the right as required for the label applicator to reach all microplates in all positions.

## 3.1.4 CyBio QuadStack

### Connections

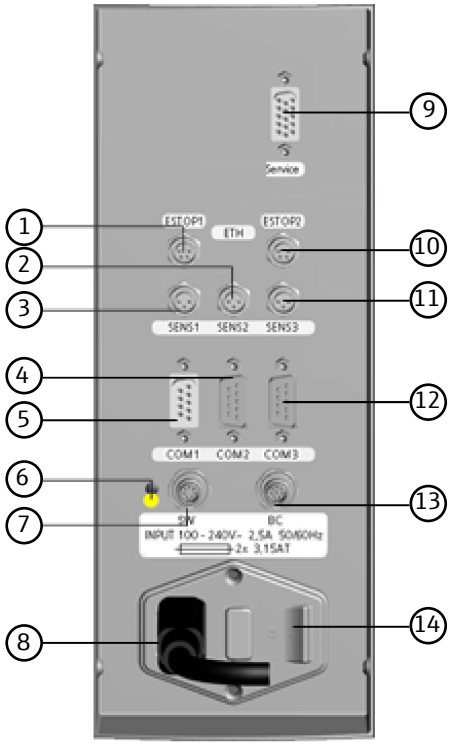


**Fig. 5 Connections**

1 ESTOP 1 -
Connection of the STOP button to the previous CyBio QuadStack

2 SENS2 -
External sensor

3 SENS1 -
External sensor

4 COM2 -
Main device

5 COM1 -
Previous device
(e.g. CyBio QuadStack)

6 LED -
Status (service only)

7 SW -
Switch output

8 INPUT - Power socket

9 Service -
Service interface

10 ESTOP2 -
Connection of the STOP button to the subsequent CyBio QuadStack

11 SENS3 -
External sensor

12 COM3 -
Subsequent device
(e.g. CyBio QuadStack)

13 BC -
Barcode reader

14 Mains switch

## Control elements

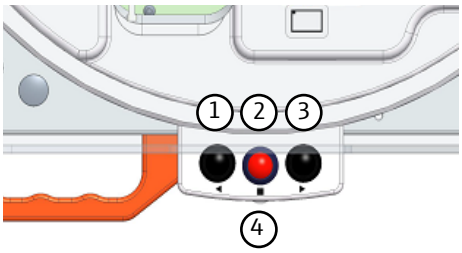


**Fig. 6 Control unit**

1 Button -
Clockwise rotation

2 STOP button

3 Button -
Counter-clockwise rotation

4 LED –
Operating status display

## Description

CyBio QuadStack is a compact and flexible microplate storage system with a 4-fold stacker shaft. It is used for storing, holding and dispensing microplates in ANSI/SLAS-format.

Electromechanical components and sensors are integrated into the lower housing; located on the housing is the 4-fold stacker shaft in which the microplates can be inserted or from which they can be dispensed via the lift-turn module.

The stacker shafts vary in length depending on the version. (→ "Technical data" 🖹 43)

- Medium (M)
- Large (L)

The rotating unit with the stacker shafts is equipped with a protective housing. The door of this protective housing and the doors of the individual shafts are monitored.

## Operating status display

The device front houses the control panel with an operating status display. This indicates the current operating status of the device:

| Display | Operating status |
|---|---|
| GREEN | The device is ready for operation. It can be operated manually or via PC. |
| ORANGE | The device is working.<br>A process is currently being carried out. |
| RED | The device indicates that a shaft door is not closed or an error is present. |

## Lift-turn-lift module

The lift-turn-lift module can perform 3 types of movement.

- Lift: The microplate is lifted by the lifter to place it in the stacker shaft or to dispense it from there.
- Turn: The tray turns the microplate.
- Lift: The tray lifts the microplate to a height specified in the software.

Function:

1. The microplate that is supposed to be labeled is taken out of the stacker shaft by the lifter and placed on the tray.
2. The tray with the microplate is turned and lifted in accordance with the stored configuration.

3. The positioned microplate is labeled by the label applicator.
4. The labeled microplate is positioned in accordance with the program and placed in the specified stacker shaft.

### 3.1.5 Barcode reader

The barcode reader (1) is used to capture the data of the label attached to the micro plates. It is checked whether the label is error-free and legible, and whether it corresponds to the desired presetting. If the barcode is OK, the information can be stored in a database and will then be available to other applications.


**Fig. 7 Barcode reader**

A signal tone confirms the successful reading process of the barcode reader (1).

### 3.1.6 Compressed air control unit

The ram applicator on the CyBio QuadPrint is moved with filtered compressed air.

A compressed air control unit attached to the rear is used to set or monitor the required compressed air. Observe the following:

- The compressed air can be switched on or off via the shut-off valve (1).
- The required pressure is set with the filter regulator knob (4).
- Any condensate that occurs is collected in the condensate collector (7). The condensate collector must be emptied at regular intervals (8).

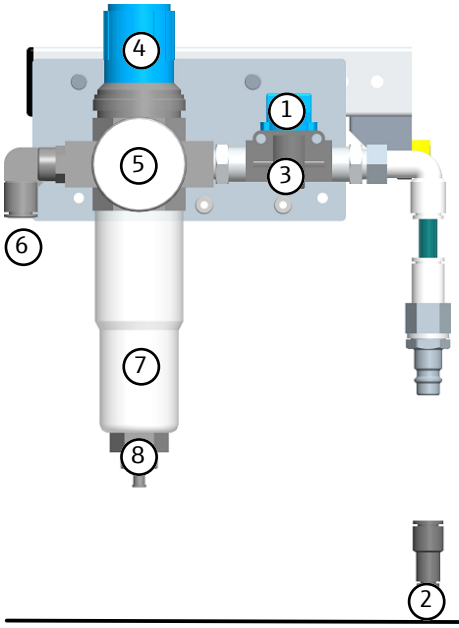


**Fig. 8 Compressed air control unit**

1 Shut-off valve
2 Compressed air power supply line
3 Filter
4 Filter regulator knob
5 Manometer
6 Line to the ram applicator
7 Condensate collector
8 Drain plug for condensate

## 3.2 Functionality

Three stacker shafts are filled with micro plates in preparation for labeling.
The empty shaft in each case is used to hold labeled plates.

After starting the program, the following operations are performed without manual intervention by the user:

- The lifter of the Turn-Lift module removes a micro plate from the filled stacker shaft. A sensor monitors whether a micro plate has been removed. If the stacking operation is not successful, an error message is displayed.
- The side of the micro plate to be labeled is turned towards the ram applicator by the turning unit of the module
- The turning unit is lifted as configured.
- The ram applicator removes the printed label from the barcode/label printer.
- A lifting motion of the ram presses the label onto the micro plates, where it adheres.
- After contact with the micro plates, the ram moves back to its starting position.

- The barcode reader reads the label content and makes it available to the control software.
- The CyBio QuadStack rotates the stacker shaft to be filled over the module. A sensor monitors the fill level.
- The turning unit of the module turns the micro plate into the correct position and the lifter lifts it into the stacker shaft to be filled. The stacking operation is monitored via a sensor. If the stacking operation is not successful, an error message is displayed.

# 4 Commissioning

## 4.1 Location requirements

Installation conditions

The following requirements are placed on the climatic conditions in the operating room:
- Temperature range: +15 °C to +35 °C
- Permissible relative humidity: ≤ 75% at 30 °C, non-condensing

The atmosphere of the operating room should be as low in dust as possible and free from draft and aggressive vapors. Smoking is prohibited in the operating room of the device.

Observe the following notes regarding the installation site of the device:
- The floor of the operating room must be stable, level, dry and vibration-free.
- Do not install the device in the direct vicinity of doors and windows nor near sources of electromagnetic interference.
- Avoid direct sunlight and radiation from heaters onto the device. If necessary, provide air conditioning.
- Always ensure free accessibility of the device and make sure that the ventilation slots are not obstructed by other equipment or installations.

Spatial requirements

The spatial requirement is based on the device configuration and the dimensions of other devices or the transport system used for micro plates.

For the exact dimensions of the device, refer to the chapter "Technical data". Sufficient space should also be provided for possible add-on devices and a PC, monitor and printer.

Power supply

If the grounding conductors are interrupted, there is risk of fatal injury due to electric shock!

Never connect the mains plug of the device to a socket without a protective ground contact! Ensure that the protection is not rendered ineffective by extension cords without protective ground contact or by the use of an adjustable transformer.

Operating the device with a different mains voltage or frequency as specified on the type plate can result in the destruction of the device.

Make sure that the mains data in the operating room match the data on the type plate of the device! In case of deviating data, the device must not be put into operation!

The CyBio QuadPrint or the barcode/label printer is operated on single-phase alternating current. The devices have a wide-range power supply and operate in the voltage range 100-240 VAC (±10%) at a frequency of 50/60 Hz.

Make sure to observe the information on the type plate of the device components and do not connect the devices to a supply voltage other than the one stated on the type plate.

Compressed air supply

Compressed air with a pressure of at least 6 bar (0.6 MPa; 87 Psi) must be provided by the customer for the ram applicator and the rotary drive. Ensure sufficient air volume flow.

The pressure relief valve at the connection point of the CyBio QuadPrint is used to set an operating pressure of 5.3...5 bar (0.53...0.55 MPa; 77...80 Psi).

## 4.2 Initial commissioning and configuration

Because of the complexity of the device and to ensure its proper functioning, all installation, commissioning and configuration work must be carried out by the manufacturer's customer service personnel or duly authorized expert technicians.

Commissioning essentially includes:

- Installation and adjustment of the device components
- Connecting all cables and plugging in the supply cables
- Software installation and configuration
- Device induction

Check for integrity, completeness and compliance with the packing list as you unpack the product shipment.

After setting up the device, customer service will test the proper functioning of the device and provide documented proof of successful testing.

## 4.3 Re-commissioning

After unforeseeable failure of the CyBio QuadPrint, re-commissioning can be performed by the operator. Make sure beforehand that it is possible to re-commission the machine without risk. For this purpose, observe the section (→ "Safety instructions" 10).

If error messages occur, observe the instructions in chapter (→ "Troubleshooting" 30).

# 5 Operation

## NOTICE

Please also observe the documentation of the cab Hermes Q barcode/label printer and the 4114 label applicator for operation of the CyBio QuadPrint. (→ "Supplier documentation" 48)

## 5.1 Switching on

## CAUTION

**Risk of injury and risk of damage to the device caused by incorrect connections and incorrect compressed-air supply**

- Before switching on the device, verify that all media are properly connected and that all connections are undamaged!
- Only operate the device with a correctly configured compressed-air supply.

## CAUTION

**Risk of injury caused by not assembling the protective cover!**

- Verify that the protective covers are firmly fitted to the device.

### Proceed as follows to switch on the CyBio QuadPrint:

- Check the correct mains connection of the CyBio QuadStack.
- Verify that the compressed air is correctly connected to the barcode/label printer.
- Verify that the number of labels and the quantity of the transfer ribbon inside the barcode/label printer is sufficient. If necessary, insert a new roll of labels and/or transfer ribbon (refer to the documentation provided with the barcode/label printer).
- Switch on the compressed air at the compressed-air supply.
- Press the arrow with the green background on the touch screen display of the barcode/label printer to start a synchronization process. After completing the synchronization process, manually remove any blank labels. Repeat this step.
- Check if the barcode/label printer display shows an error message. If necessary, correct the error and delete the error message by pressing the button with the red background.
- Close the printer's cover.
  ⚠ CAUTION! When the cover is open, there is a risk of burns when handling the device. When the housing is open, the lower stacker shaft opening is accessible. There is a risk of injury in this area.
- Press the button with the yellow background to set off the applicator arm 2 to 3 times.
- Switch the mains switch of the CyBio QuadStack on the rear of the device to position "I".

- Initialize the device by pressing one of the black control buttons on the CyBio QuadStack. If there is no error after initialization, the operating status indicator lights up "green". The device is operational.
- Launch the control software on the connected PC.

## 5.2 Inserting microplates

### CAUTION

**Risk of crushing when manually rotating the stacker shaft**

- Do not reach into the device, not even with objects, when rotating the stacker shaft using the buttons on the control panel

Rotating the stacker shaft using the control panel

It is possible to manually rotate the CyBio QuadStack's stacker shaft using the control unit in order to load it with microplates or to eliminate faults.

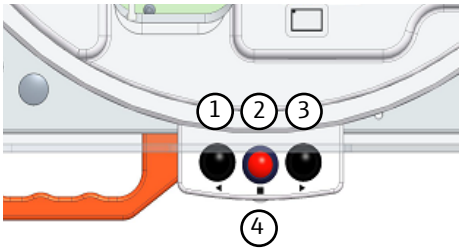


**Fig. 9 Control unit on the QuadStack**

1 Rotate clockwise
2 STOP
3 Rotate counter-clockwise
4 Status LED

Inserting microplates

There is the option to load the CyBio QuadStack with microplates to prepare a process. To do this, slide the microplates into the shafts 2, 3 and 4 and place them on the uppermost microplate which is still inserted in the shaft or on the magnetic latch.

Only remove or stack microplates in the stacker shaft when the shaft and the access module are not moving. Make sure that a process has not yet started or has not already ended.

Proceed as follows to load the QuadPrints:

- Currently executed process on CyBio QuadStack was completed. Operating status indicator lights up in “GREEN”.
- Open the door of the protective housing. Operating status indicator lights up in “RED”.
- Open the door on the shaft (2).
- Insert the microplate from the front and place it onto the magnetic latches or on the uppermost microplate in the shaft.
- Close the door on the shaft again.
- Close the door of the protective housing again. Operating status indicator lights up in “GREEN”.
- If necessary, use the buttons ← or → to rotate the stacker shaft and to load the stacker shafts (3, 4) with microplates. To do this, repeat the previous steps.

The maximum number of shafts that may be pre-loaded with microplates is 3 (shafts 2 to 4). Shaft 1 is used as a transfer shaft.

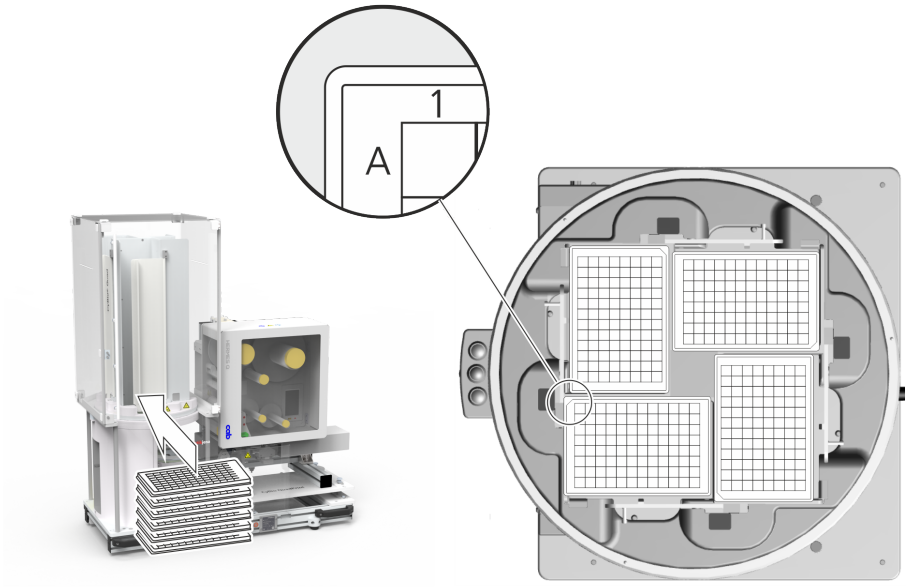


**Fig. 10 Loading QuadPrint HQ-x**

CyBio QuadStack is only ready for operation, if the doors on the shafts and the protective housing are closed. If one of the doors is open, the control software displays the following message: “Safety arrangement has been opened.”

Operating CyBio QuadPrint with the control software

To operate the CyBio QuadPrint with the control software, observe the explanations in the annex (→ "Software "CyBio PrintStudio"" 48).

## 5.3 Switching off

Switch off the CyBio QuadPrint as follows:

- Wait until all processes on the CyBio QuadPrint or any add-on devices have been terminated by the control software.
- Switch the mains switch of the CyBio QuadStack to position "0".
- Turn the mains switch of the barcode/label printer to position "0".
- Disconnect the compressed air supply.

# 6 Troubleshooting

## 6.1 General information on troubleshooting

### NOTICE

Error messages of the device (displayed on the touchscreen) alter the user to the cause and potential remedy.

Malfunctions are usually indicated:

- by the control software
- on the control panel of the printer
- by the status LED of the CyBio QuadStack (red)

If the malfunctions are obviously caused by the operator or by insufficient compressed air supply, work with the device can be continued after the fault has been eliminated.

If malfunctions occur, check all possible sources of error.

If any problems persist after this check or if there are other malfunctions that are not described, notify the manufacturer's customer service or the authorized service partner.

## 6.2 Behavior after fault reports

It is possible for the user to solve the following problems by themselves. If these issues occur more frequently or the fault is not described in this section, please contact the manufacturer's customer service or an authorized service partner.

Only correct such faults which are clearly caused by incorrect operation and if you are authorized to correct such fault.

Never carry out any unauthorized interventions on the control software!

| | **Simple fault that can be corrected immediately** | **Serious fault** |
|---|---|---|
| Example | Microplate (missing or inserted in the wrong place) | Device failure |
| Note/Caution | NOTICE! Certain defects on the devices can be corrected while the devices are switched on. | WARNING! Touching voltage-carrying device components can result in injury or death! |

| | Simple fault<br>that can be corrected immediately | Serious fault |
|---|---|---|
| Prerequisites | The program on the device is completed!<br>  <br>The corresponding warnings in the chapter “Hazard areas and protective devices” have been considered!<br>The corresponding warnings in the chapter “Manual operation” have been considered! | The device is disconnected from the mains!<br>  <br>The power cord has been pulled out of the mains socket!<br>The device is secured against unintentional reactivation during the troubleshooting process! |
| Steps | ■ Follow the instructions of the device program.<br>■ Fix the condition causing the fault.<br>■ If possible, resume the device program after that. | ■ Switch of the device(s) mains switch and unplug the power cord from the mains socket.<br>■ Where applicable, notify the responsible manager and affected specialist personnel.<br>■ Eliminate the cause of the fault.<br>■ Establish the defined initial state of the device program (e.g. reload the CyBio QuadStack).<br>■ Put the device back into operation.<br>■ If it is not possible to eliminate the fault, contact the manufacturer's customer service or an authorized service partner. |

## 6.3 Fault removal

| Error | Potential causes | Suggestions for troubleshooting |
|---|---|---|
| CyBio QuadStack does not respond to commands by the control software | Mains cable not connected to a mains socket | ■ Check the mains connection. |
| | Mains cable not plugged into an IEC socket | ■ Correctly insert the mains cable into the mains connection. |
| | Mains socket powerless | ■ Have the mains socket checked by a qualified electrician.<br>■ Use another mains socket. |
| | Device fuse malfunction | ■ Unplug the CyBio QuadStack mains plug and insert a new device fuse (only use the specified fuse type). |

| Error | Potential causes | Suggestions for troubleshooting |
|---|---|---|
| Execution of the program was aborted, drives do not move | STOP button was pressed | ■ After the STOP button was pressed, the drives must move back into their initial position.<br>■ Restart the program on the PC or use the buttons ◂ or ▸ on the QuadStack control panel. The drives move into their initial position. |
| Stacker shaft does not rotate<br>The control software displays the message: "Safety arrangement has been opened" | A door is open | ■ Verify that all shaft doors and the protective housing on the QuadStack are closed. |
| Microplate is not transported any further. | The microplate got jammed inside the shaft opening (bottom of the stacker shafts) | ⚠ CAUTION! Risk of crushing and shearing hands<br>■ First, disconnect the device from the mains.<br>■ Remove the jammed microplate from the shaft. |

**Table 4 CyBio QuadStack: Faults**

| Error | Potential causes | Suggestions for troubleshooting |
|---|---|---|
| Control software displays an error message | internal error | ■ Follow the instructions in the error message and, if necessary, read the information in the control software's online help.<br>■ Restart the CyBio QuadPrint. |
| The control software displays an error on the barcode/label printer | Faults on the barcode/label printer | ■ Follow the instructions in the "Troubleshooting" chapter of the operating manual for the barcode/label printer to eliminate the fault.<br>■ Note:<br>You will need to acknowledge that the fault on the printer was eliminated before you can continue working with the control software. |

**Table 5 Barcode/label printer: Faults**

| Error | Potential causes | Suggestions for troubleshooting |
|---|---|---|
| The control software displays an error on the label applicator | Fault on the label applicator | ■ Follow the instructions in the "Error messages" chapter of the operating manual for the label applicator to eliminate the fault. |

| Error | Potential causes | Suggestions for troubleshooting |
|---|---|---|
| Labeling position is not accurate | Barcode/label printer and label applicator are not aligned precisely with the microplate | ■ Barcode/label printer and label applicator must be realigned. To do this, notify the manufacturer's service department or an authorized service partner. |
| | An incorrect value is entered in the "Label height" field in the control software | ■ Check the setting of the "Label height" field in the control software. |

**Table 6 Label applicator: Faults**

Communication error

If communication between the barcode/label printer and the CyBio QuadStack fails during the initialization process, the CyBio Composer control software will issue an E121 printer error.

Fix this error using a simple test in the CyBio Composer software, without PrintStudio:

- Click on the gear icon in PrintStudio. Launch the CyBio Composer software using the command **[Open Composer with printing Configuration]**.
- Open a new blank script. Use **Start / F5** to start the script.
- Open the **PrinterReset.bms** script in the default path of the program files directory C:\Programdata\CyBio\PrintStudio\Composer\Libraries\Common. Run the script.
- Verify that the compressed air is correctly connected to the barcode/label printer.
- Check the status display on the barcode/label printer. If the touch screen display shows any error messages, exit the error message page by selecting **[Ignore]**.
- Use the green arrow icon on the touch screen display to initiate the label feed.
  - ✓ An unprinted label is transported to the peel-off edge. The applicator picks up the label.
- Place a deep-well plate onto the tray of the access module.
- On the touch screen display, tap the yellow icon once or twice to apply the label to the microplate.
- If the barcode/label printer works without generating an error message: Use the power switch to turn the CyBio QuadStack off, then switch the device back on after a short while.
- Repeat the test.
  - Check if the device executes the initialization without producing an error message.
  - Check if the **PrinterReset.bms** script is executed without producing an error message.

# 7 Maintenance

## 7.1 Safety instructions

### NOTICE

**Important information!**

Before starting any work, read the instructions in the main “Safety instructions” chapter.

### DANGER

**Touching live components may result in serious injury or death!**

Switch off the devices and disconnect the power cables from the mains socket before all maintenance and servicing work!

Secure the devices against unintentional reactivation!

The operator is prohibited from carrying out maintenance and servicing work on live devices!

Maintenance, adjustment work and repairs on live devices may be carried out only by a qualified electrician.

### CAUTION

**Damage to health due to contact with hazardous chemical biological substances.**

Before starting maintenance or cleaning work, inform yourself about the substances used on the device and their hazard potential.

If necessary, take suitable protective measures (e.g. wear personal protective equipment).

### NOTICE

**If the maintenance and servicing instructions are not observed, damage may be caused to the device.**

Please observe the instructions in the documentation provided by the manufacturers of the system components!

## 7.2 Maintenance schedule

The table below lists the maintenance and servicing tasks to be carried out with the corresponding time intervals.

| Maintenance task | Interval | Remark |
|---|---|---|
| Clean the device, especially the printing area | Weekly | Remove dust and paper residues with a soft brush |
| Clean barcode/label printer | Monthly | Observe the instructions in the barcode/label printer documentation (chapter "Cleaning"). |
| Empty condensate collector | Monthly | |
| Check compressed air connections for tight fit and leaks | Monthly | |
| Check the electrical connection for tight fit | Every six months | |
| Check the fastening screws of all moving parts for tight fit | Every six months | |
| Check electrical components and cables, protective conductor test | Every six months | By qualified electrician |

**Table 7 Maintenance schedule**

## 7.3 Maintenance instructions

### 7.3.1 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.

## 7.3.2 Checking compressed air

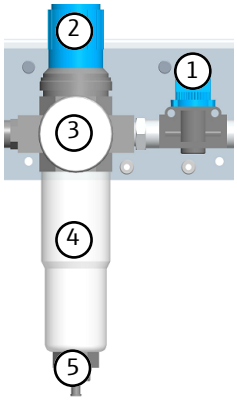


**Fig. 11 Compressed air control unit**

1 Shut-off valve
2 Filter regulator knob for adjusting the pressure
3 Manometer
4 Condensate collector
5 Drain plug for condensate

Check the operating pressure on the manometer (*item 3 )*

If necessary, adjust the operating pressure as follows:
- Pull out the filter regulator knob (*item 2*) slightly upwards to release the lock.
- Filter regulator knob: Clockwise rotation increases the operating pressure, counter-clockwise rotation decreases the operating pressure.
- Press the filter regulator knob down until it engages noticeably.

**Draining condensate**

After a longer period of operation, condensate may accumulate in the condensate collector (*item 4*).

This is how you can drain condensate:
- End all processes on the CyBio QuadPrint and switch off the device via the mains switch.
- Close the shut-off valve (1).
- Loosen the condensate drain plug (5)
- Drain the condensate.
- Close the condensate drain plug.
- Switch the compressed air back on using the shut-off-valve.
- Check the operating pressure on the manometer.

## 7.3.3 Changing label roll/transfer ribbon

### WARNING

**Hot print head!**

Verify that the print head has cooled down!

- Switching off all modules of the CyBio QuadPrint
- Replacing the label roll (→ "Supplier documentation" 48)
- Switching on all modules of the CyBio QuadPrint

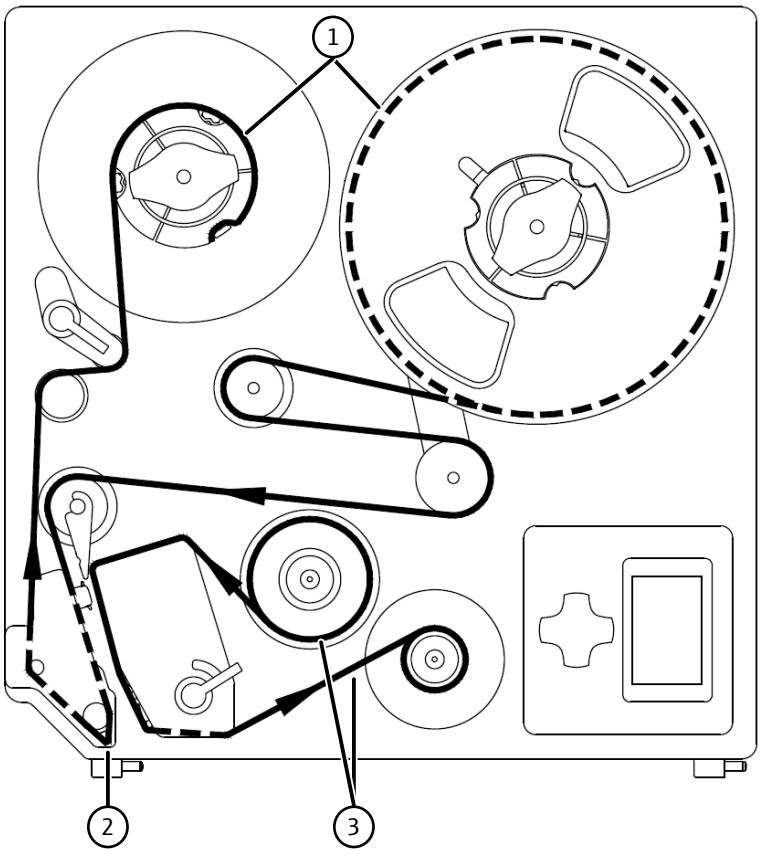


**Fig. 12 Replacing the label roll and the transfer ribbon**

1 Label roll (wound on the outside)

2 Attention: Route the label roll underneath the peel-off edge.

3 Transfer ribbon (coated on the inside)

# 8 Transport and storage

## 8.1 Transport

To prepare the system for transport, proceed as follows:

- Shut down the device.
- Remove all power cables from the mains sockets and from the device.
- Remove all other cables from the rear of the device.
- Attach transport locks and secure all moving parts with cable ties or adhesive tape. Please also observe the information in the manufacturer's documentation from cab. (→ "Supplier documentation" 48)
- Only use the original packaging for transport. Contact your service partner for this if necessary.
- Include protective PE material as padding for the device in the original packaging.

### Tip

**Use the handles to lift.**

If this is not observed: Damage to the device.

- Only lift the device with the provided handles.

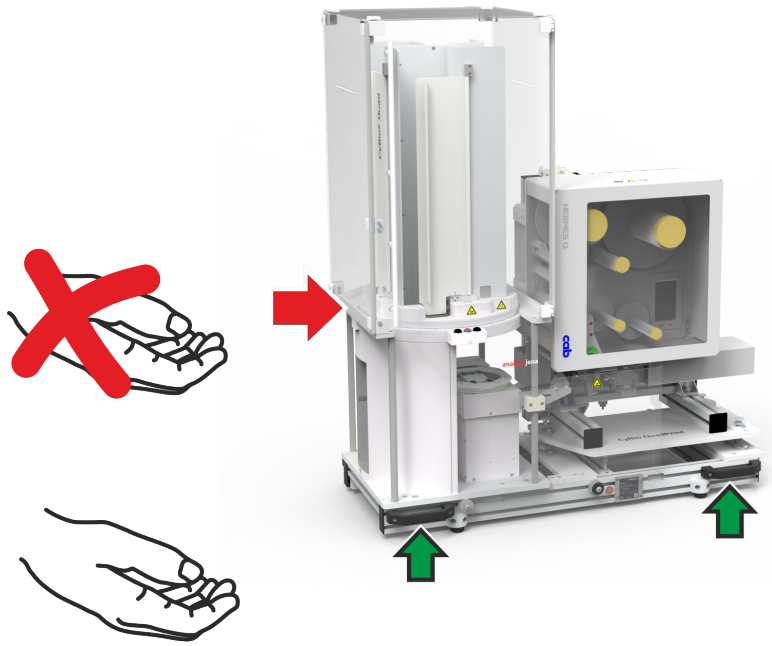

Fig. 13 QuadPrint HQ-L/M: Use handles

## NOTICE

The transport is carried out by the manufacturer's service or by the service partners authorized by the manufacturer.

## CAUTION

Material damage to the device or components!

Environmental influences, impact and condensation can destroy individual components!

Protect all components of the device against environmental stresses, impacts and condensation during transport by taking appropriate measures!

Intermediate storage of the device outdoors is not permitted!

## 8.2 Storage

If the device is not installed immediately after delivery or not required for prolonged periods, it should be stored in its original packaging.

The following requirements are placed on the climatic conditions in the storage room of the device:

- Temperature range: -10 °C to +50 °C

permissible relative humidity: ≤ 85% at 30 °C, non-condensing

# 9 Putting the device out of operation

If the device is not required for a longer period of time, shut the device down as follows:

- Exit any running process on the device.
- Remove all micro plates from the stacker shafts.
- Exit the control software.
- Shut down the corresponding control PC and switch it off.
- Switch off all device components via the power switch:
  - CyBio QuadStack
  - Hermes Q label printer
- Disconnect the RS-232 control cable from the CyBio QuadPrint.
- Switch the compressed-air supply off.
- Remove the printing foil from the barcode/label printer (see the printer documentation for this). (→ "Supplier documentation" 48)
- Check whether there is still a label on the label applicator. Remove this, if necessary.
- Clean and decontaminate the device, if necessary.
- Protect the device from dust.

# 10 Disposal

At the end of its useful life, the device or its components must be disposed of in accordance with the legal regulations. The responsibility rests with the owner of the device.

# 11 Accessories, spare parts, consumables

## 11.1 Consumables and wearing parts

| Name | Part number | Supplier/manufacturer |
|---|---|---|
| Printer head Hermes Q4 600 dpi | 5977380.001 | cab |
| DR4 printing roller | 5954180.001 | cab |
| ZR4 feed roller | 5961298.001 | cab |

**Table 8 Wearing parts**

| Name | Part number | Supplier/manufacturer |
|---|---|---|
| Labels 66.0 x 7.0 mm, label spacing 14 mm,<br>DMSO-resistant (7,500 pcs/roll) | 5705409 | cab |
| Labels 66.0 x 5.5 mm, label spacing 14 mm,<br>DMSO-resistant (8,000 pcs/roll) | 5705597 | cab |
| Transfer foil 360 m | 5556662 | cab |

**Table 9 Consumables**

## 11.2 Accessories

| Name | Part number | Use |
|---|---|---|
| Compressor Jun-Air (oil-free, 230 V) | OL3803-22-130 | Compressed air source |
| Compressor Jun-Air (oil-free, 115 V) | OL3803-22-131 | Compressed air source |

## 11.3 Spare parts

| Component | Supplier/manufacturer | Reference |
|---|---|---|
| CyBio QuadStack | Analytik Jena | (→ "Supplier documentation" 48) |
| Hermes Q4 printer | cab | (→ "Supplier documentation" 48) |
| 4114 linear applicator | cab | Service instructions with spare parts list:<br>(→ "Supplier documentation" 48) |
| NLV 3101 barcode reader | Opticon | - |

**Table 10 Device component spare parts list**

# 12 Technical data

| Configuration overview | | |
|---|---|---|
| Types | CyBio QuadPrint HQ-M | CyBio QuadPrint HQ-L |
| |  |  |
| Illustration number | 30-5004-027-26 | 30-5004-026-26 |
| Microplate storage | QuadStack M (medium) | QuadStack L (large) |
| Label printer | HERMES Q4 (cab) | |
| Label applicator | 4114 (cab) linear applicator | |
| Barcode reader | NLV 3101 (Opticon) | |
| Access module | Lift-turn-lift module / 30-5003-477-25 | |

| Operating data | |
|---|---|
| Labware that can be used | ■ Microplates in ANSI/SLAS format, including deep-well and rigid full-skirted PCR plates<br>■ No flexible full-skirted or half-skirted PCR plates<br>■ Empty or sealed<br>■ Labware height: ≥ 8 mm<br>■ Skirt height without fringe (are to be labeled): ≥ 6.5 mm |
| Application class | Table unit,<br>sealed and maintained rooms |
| Protection class | I |
| Protection type | IP20 |
| General safety (MRL 2006/42/EG) | DIN EN ISO 12100 |
| Electrical safety for laboratory devices<br>(NSRL 2014/35/EU) | DIN EN 61010-1 |
| Electromagnetic compatibility<br>(EMV-RL 2014/30/EU) | DIN EN 61326-1<br>Group 1 device<br>Class A device |
| Operating voltage | 100–240 VAC; (±10 %, 2.5 A max.); 50/60 Hz |
| Device fuse<br>(CyBio QuadStack) | 2 x device fuses, 5 x 20 mm T3.15 A |
| Power consumption (total) | <600 VA |
| Noise emission | <70 db(A) |
| Control interface | RS-232 Sub-D, 9-pin |
| Compressed-air supply | 0.6 MPa (6 bar / 87 psi) |

| Operating data | | |
|---|---|---|
| Consumption | Approx. 20 l/min<br>Note: If multiple devices are connected to a common connection line with the CyBio QuadPrint, a compressed-air reservoir is recommended for continuous supply. The applicator is sensitive to fluctuating compressed-air supply. | |
| Operating pressure (at the maintenance unit) | 0.53–0.55 MPa (5.3–5.5 bar / 77–80 psi) | |
| Dimensions and weights | | |
| Width x height x depth | CyBio QuadPrint HQ-M: 933 x 1096 x 442 mm<br>CyBio QuadPrint HQ-L: 933 x 1296 x 442 mm | |
| Mass | CyBio QuadPrint HQ-M: approx. 90 kg<br>CyBio QuadPrint HQ-L: approx. 100 kg | |

| CyBio QuadStack | | |
|---|---|---|
| Number of stacker shafts | 4 | |
| Shaft length | CyBio QuadPrint HQ-M | CyBio QuadPrint HQ-L |
| | 555 mm | 755 mm |
| Microplate storage capacity per shaft | | |
| Microplate stacking height per plate used | CyBio QuadPrint HQ-M | CyBio QuadPrint HQ-L |
| 9 mm height | 69 | 94 |
| 14.6 mm height | 43 | 58 |
| 44 mm height | 13 | 18 |

| Access module - Lift-turn-lift module (LTLM) | |
|---|---|
| Lifting force (max.) | 80 N |
| Additional data | (→ "Supplier documentation" 48) |

| HERMES Q4 barcode/label printer | |
|---|---|
| Print resolution | 600 dpi |
| Technical data | (→ "Supplier documentation" 48) |

| 4114 linear applicator | |
|---|---|
| Technical data | (→ "Supplier documentation" 48) |

| Barcode reader | |
|---|---|
| Technical data | (→ "Supplier documentation" 48) |

Operation, storage and transport conditions

| Operation | |
|---|---|
| Permissible ambient temperature | +15 °C to +35 °C |
| Permissible relative humidity | ≤75 % at 30 °C, non-condensing |
| Maximum operating altitude above sea level | 2000 m |

| | |
|---|---|
| Storage and transport | |
| Permissible ambient temperature | -10 °C to +50 °C |
| Permissible relative humidity | ≤85 % at 30 °C, non-condensing |
| Miscellaneous | |
| Installation location | Stable, horizontal, dry, free from vibration |

**Table 11 Operation, storage and transport conditions**

# Glossary

## ANSI/SLAS

Standard created by the "Society for Laboratory Automation and Screening". Here, normally reference is made to the standards (formerly SBS standards) for the standardization of Labware dimensions. Footprint: 127.76 x 85.48 mm (±0.5 mm); Source: https://www.slas.org/education/ansi-slas-microplate-standards/

## ESTOP

ESTOP is a safety function. It causes the connected components to stop for safety reasons when an ESTOP state is triggered. This state can be triggered by opening a monitored door or pressing an ESTOP button.

# Index

# 13 Appendices

## 13.1 Software "CyBio PrintStudio"

The "CyBio PrintStudio" software is described in a separate document and can be requested from the manufacturer under this number: OL9502-40-002BLxxx (xxx: language / version)

## 13.2 Supplier documentation

CyBio QuadStack operating instructions

HERMES Q Installation instructions

HERMES Q spare parts list

411x applicator installation instructions

411x applicator service manual and spare parts list (for S/N 9741 and lower)

411x applicator service manual and spare parts list (for S/N 9742 and higher)

Manual NLV3101-SR 2012.11.04_01

CE NLV 3101