Operating Manual
Pipetting Head for CyBio FeliX

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Einbauerklärung (inhaltliche Wiedergabe)

Name und Anschrift des Herstellers:

Analytik Jena GmbH+Co.KG
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Hiermit erklären wir, dass das nachstehend beschriebene unvollständige Produkt

Declaration of Incorporation (content reproduction)

Name and address of the manufacturer:

Herewith we declare, that the partly completed product described below

Leicht-Pipettierkopf

OL3316-14-xxx

alle grundlegenden Anforderungen der Maschinenrichtlinie 2006/42/EG erfüllt, soweit es im Rahmen des Lieferumfangs möglich ist.

is complying with all essential requirements of the Machinery Directive 2006/42/EC, as far as the scope of delivery allows.

Ferner erklären wir, dass die speziellen technischen Unterlagen gemäß Anhang VII Teil B dieser Richtlinie erstellt wurden.

Additionaly we declare that the relevant technical documentation is compiled in accordance with part B of Annex VII.

Das unvollständige Produkt entspricht zusätzlich den Bestimmungen der europäischen Richtlinien 2006/95/EG über elektrische Betriebsmittel und 2004/108/EG über elektromagnetische Verträglichkeit.

In addition the product is in conformity with the EC Directives 2006/95/EC relating to electrical equipment an 2004/108/EC relating to electromagnetic compatibility.

Wir verpflichten uns, den Marktaufsichtsbehörden auf begründetes Verlangen die speziellen Unterlagen zu dem unvollständigen Produkt über unsere Dokumentationsabteilung zu übermitteln.

We commit to transmit, in response to a reasoned request by the market surveillance authorities, relevant documents on the partly completed product by our documentation department.

Das unvollständige Produkt darf erst in Betrieb genommen werden, wenn ggf. festgestellt wurde, dass das Produkt oder die Anlage, in welche das unvollständige Produkt eingebaut werden soll, den Bestimmungen der Richtlinie 2006/42/EG über Maschinen entspricht und die EG-Konformitäts-erklärung gemäß Anhang II A ausgestellt ist.

The partly completed product must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of Directive 2006/42/EC on Machinery, where appropriate, an until the EC declaration of conformity according to annex II A is issued.

Bevollmächtigter für die Zusammenstellung der relevanten technischen Unterlagen:

The person authorized to compile the relevant technical documentation

Analytik Jena GmbH+Co. KG, Konrad-Zuse Straße 1, D-07745 Jena

1 General Information

1.1 Note

This User Manual informs about the setup and function of the Pipetting Head for the CyBio-FeliX from Analytik Jena GmbH+Co. KG.

This Manual further contains instructions and advice about general product care and the Manufacturer's defined scope of maintenance work items.

In addition, you may use this Manual to analyze fault situations for potential causes and take appropriate measures for fault removal.

This User Manual must be readily available to operating and maintenance personnel at all times!

TIP

The information contained herein reflects the latest state of knowledge at the moment of going to press. Analytik Jena GmbH+Co. KG reserves the right to make changes if deemed necessary in the interest of technical progress.

1.2 Target Group

This User Manual addresses:

- Personnel incorporating the Pipetting Head into a host system.
- Qualified and properly trained expert personnel who are able to operate the system and provide general care for the product (→ *"Requirements for Operating Personnel" on page 19*).
- Employees with responsibility for:
  - the planning of process sequences/operating procedures,
  - preventive maintenance & cleaning work,
  - safety devices, etc.

1.3 Conventions

1.3.1 Textual Markups

Work instructions involving a timed sequence are numbered and merged to action units to specify related results.

Enumeration involving no timed sequence is shown as a bullet-style list, sub-level numbering or as a dash-style list.

Safety notes are marked by a pictogram and a signal word
(→ *"Warning Signs" on page 3*).
Specific action-related safety notes will **precede** the actual instruction.

For graphic design styles of **cross-references**, you are referred to the table below:

Table 1: Graphic design styles of cross-references

Type of cross-reference	Graphic style	Explanatory note
Reference to an illustration	→ *Fig. 1*	Illustration is on the same page
Reference to an illustration and a page	→ *Fig. 1 on page 11*	Illustration is on another page
Reference to a position (within an illustration)	*Pos. 1*, → *Fig. 1*	Provides reference to a position within a specified illustration – illustration is on the same page
Reference to a position (within an illustration and a page)	*Pos. 1*, → *Fig. 1 on page 11*	References a position within a specified illustration – illustration is on another page
Reference to a page	→ *page 1*	References a given page
Reference to a headline and a page	→ *"Conventions" on page 2*	References a given page, supplemented by a headline
Reference to a table and a page	→ *Table 1, "Graphic design styles of cross-references", on page 2*	References a given table

1.3.2 Warning Signs

WARNING

Indicates a potentially hazardous situation.

May result in death or serious injury (crippling) if not avoided.

CAUTION

Dangerous situation!

Potential consequences: light or moderate physical injury.

NOTE

Dangerous situation!

Potential consequences: material damage.

TIP

Useful application advice, no potential danger involved.

TIP

Note regarding environmental protection.

1.4 Intended Purpose

This pipetting head is intended for use in the CyBio-FeliX (flexible pipetting platform for fully automated single-channel or multiple channel liquid handling).

Its range of capabilities is restricted by the scope of integrated functional software and firmware, as well as the scope of delivery. For this reason, the user is prohibited from operating the product in any way other than specified in this User Manual.

1.5 Conforming Use

The Pipetting Head has been developed for fully automated processing of microplates and special sample holders in chemical and biological laboratories. In medical and diagnostic applications, conforming use is restricted to research.

Its main functions are the aspiration and dispensing of liquid from and into microplates, columns (single wells or tubes).

The **conforming use** is further defined as follows:

- the product is operated by qualified and trained research and laboratory personnel
- all operating requirements, procedural sequences and related safety notes quoted or described in this User Manual are duly observed
- all specifications in this Manual regarding product start-up, operation, preventive maintenance and care are met
- applicable safety standards or rules are always fulfilled.

Any use other than or in excess of these rules will be regarded as non-conforming! The user will be solely liable for damage resulting from a case of non-conformance.

TIP

In the event of non-conforming use of the pipettor, Analytik Jena GmbH+Co. KG will refuse warranty or liability claims for alleged material damage and personal injury!

The definition for **non-conforming use** includes:

- operating the product in medical laboratories of a non-research profile
- working with explosive substances
- working in an explosive atmosphere – operation in a potentially explosive zone is prohibited

TIP

Operation involving dangerous substances will be at the sole responsibility of the user!

This shall include compliance with all valid safety requirements for the protection of persons and material goods during work with radioactive, infectious, poisonous, corrosive, combustible and other hazardous substances. The user is under obligation to fulfil all requirements for laboratory equipment and the conduct of personnel handling substances of this nature and on the practices in place for cleanliness, sterilization, environmental protection and waste disposal.

The user is advised to issue special operating instructions where the product is to be operated with the involvement of hazardous substances. Accordingly, this User Manual contains no safety note warning of personal injury or material damage caused by substances being examined.

Process control must rely on included Analytik Jena GmbH+Co. KG software. Alterations or damage to product software may give rise to faults in process flow and damage the product or its components. Software protection is the sole responsibility of the user.

1.6 Warranty & Liability

The period of warranty and scope of liabilities will be as stipulated under binding law and provided for in the General Terms of Business of Analytik Jena GmbH+Co. KG.

Warranty will be limited to repair services or replacement of damaged parts. It will exclude consequential damage of any kind. Damage to wear & tear parts and cases of glass breakage are not covered by warranty.

Any deviation from conforming use as defined in this User Manual (operating requirements, process sequences) will result in restricted acceptance of warranty or liability claims in the event of damage.

In the event of personal injury or material damage, no claim for warranty and liability will be accepted, unless the product is operated as specified in section → *"Intended Purpose" on page 4*.

TIP

This loss-of-warranty clause shall apply to potential periods of interruption in business and to any product component that had not been directly affected by authorized warranty work.

1.7 Scope of Delivery

Included in delivery are:

- Pipetting Head (OL3316-14-XX)
- Shipping lock
- Documentation

2 Technical Specifications

2.1 CHOICE Pipetting Head

General characteristics	
Designation	Pipettierkopf/Head
Typ	CHOICE
Drawing number	OL3316-14-250
Materials	Aluminium, stainless steel, polyethylene (PE), silicone, polypropylene (PP)
Specifikation	
Number of pipette tips	1, 8, 12, 16, 24* (CHOICE adapter)
Volume range	500 nl – 1 ml
Volume range 0.5 µl – 50 µl	selectable in steps of 0.01 µl
Precision in the volume range 3 – 5 µl	Variation coefficient ≤ 2%
Precision in the volume range 5 – 50 µl	Variation coefficient ≤ 1%
Volume range 10 µl – 1000 µl	selectable in steps of 0.1 µl
Precision in the volume range 25 – 100 µl	Variation coefficient ≤ 2%
Precision in the volume range 100 – 1000 µl	Variation coefficient ≤ 1%
Pipette tip types	
CyBio Tips (accessories; → *„Accessories & Spare Parts" on page 59*)	
Specifications regarding selectable microplates	
SBS-format	96, 384, Tubes 0.2 – 2 ml
Operating data	
Line voltage	+24 V DC (±5%) / 3 A
Interface	Panel connector, male HD-Sub, 15-pin
Airborne sound emission	< 70db (A)
Dimensions & weight	
Width x height x depth	(165 x 280 x 123) mm (height without pipette tip)
Weight	approximately 6.7 kg
Storage & operating conditions	
Operation:	
Permissible ambient temperature	+15 °C to +35 °C
Permissible relative air humidity	≤ 75% at +35 °C
Storage & transportation:	
Permissible ambient temperature	−10 °C to +50 °C
Permissible relative air humidity	≤ 85% at +30 °C, no formation of condensate

2.2 CyBio-FeliX Head R 384/60 µl

General characteristics	
Designation	CyBio-FeliX Kopf/Head R
Type	384/60 µl
Drawing number	OL3316-14-550
Materials	Aluminium, stainless steel, polyethylene (PE), silicone, polypropylene (PP)
Specification	
Number of pipette tips	384; 1, 16, 24* (LH-adapter)
Volume range	0.5 – 60 µl
Volume range (LH-adapter)	0.5 – 50 µl
Volume range	selectable in steps of 0.01 µl
Precision in the volume range 3 – 5 µl	Variation coefficient ≤ 2%
Precision in the volume range 5 – 60 µl	Variation coefficient ≤ 1%
Pipette tip types	
CyBio Tips (accessories; → *„Accessories & Spare Parts" on page 59*)	
Specifications regarding selectable microplates	
SBS-Format	384, Tubes 0.2 – 2 ml (LH-adapter)
Operating data	
Line voltage	+24 V DC (±5%) / 3 A
Interface	Panel connector, male HD-Sub, 15-pin
Airborne sound emission	< 70 db (A)
Dimensions & weight	
Width x height x depth	(165 x 280 x 123) mm (height without pipette tip)
Weight	approximately 6.9 kg
Storage & operating conditions	
Operation:	
Permissible ambient temperature	+15 °C to +35 °C
Permissible relative air humidity	≤ 75% at +35 °C
Storage & transportation:	
Permissible ambient temperature	−10 °C to +50 °C
Permissible relative air humidity	≤ 85% at +30 °C, no formation of condensate

2.3 CyBio-FeliX Head R 96/60 µl

General characteristics	
Designation	CyBio-FeliX Kopf/Head R
Type	96/60 µl
Drawing number	OL3316-14-750
Materials	Aluminium, stainless steel, polyethylene (PE), silicone, polypropylene (PP)
Specification	
Number of pipette tips	96,1, 8, 12 (LH-adapter)
Volume range	0.5 – 60 µl
Volume range (LH-adapter)	0.5 – 50 µl
Volume range	selectable in steps of 0.01 µl
Precision in the volume range of 3 – 5 µl	Variation coefficient ≤ 2%
Precision in the volume range of 5 – 60 µl	Variation coefficient ≤ 1%
Pipette tip types	
CyBio Tips (accessories; → *„Accessories & Spare Parts" on page 59*)	
Specifications regarding selectable microplates	
SBS-Format	96, 384, Tubes 0.2 – 2 ml (LH-adapter)
Operating data	
Line voltage	+24 V DC (±5%) / 3 A
Interface	Panel connector, male HD-Sub, 15-pin
Airborne sound emission	< 70 db (A)
Dimensions & weight	
Width x height x depth	(165 x 280 x 123) mm (height without pipette tip)
Weight	approximately 6.7 kg
Storage & operating conditions	
Operation:	
Permissible ambient temperature	+15 °C to +35 °C
Permissible relative air humidity	≤ 75% at +35 °C
Storage & transportation:	
Permissible ambient temperature	−10 °C to +50 °C
Permissible relative air humidity	≤ 85% at +30 °C, no formation of condensate

2.4 CyBio-FeliX Head R 96/250 µl

General characteristics	
Designation	CyBio-FeliX Kopf/Head R
Type	96/250 µl
Drawing number	OL3316-14-850
Materials	Aluminium, stainless steel, polyethylene (PE), silicone, polypropylene (PP)
Specification	
Number of pipette tips	96; 1, 8, 12 (LH-adapter)
Volume range	5 – 250 µl
Volume range (LH-adapter)	5 – 250 µl
Volume range	selectable in steps of 0.1 µl
Precision in the volume range of 10 – 25 µl	Variation coefficient ≤ 2%
Precision in the volume range of 25 – 250 µl	Variation coefficient ≤ 1%
Pipette tip types	
CyBio Tips (accessories; → *„Accessories & Spare Parts" on page 59*)	
Specifications regarding selectable microplates	
SBS-Format	96, 384, Tubes 0.2 – 2 ml (LH-adapter)
Operating data	
Line voltage	+24 V DC (±5%) / 3 A
Interface	Panel connector, male HD-Sub, 15-pin
Airborne sound emission	< 70db (A)
Dimensions & weight	
Width x height x depth	(165 x 280 x 123) mm (height without pipette tip)
Weight	approximately 7.0 kg
Storage & operating conditions	
Operation:	
Permissible ambient temperature	+15 °C to +35 °C
Permissible relative air humidity	≤ 75% at +35 °C
Storage & transportation:	
Permissible ambient temperature	−10 °C to +50 °C
Permissible relative air humidity	≤ 85% at +30 °C, no formation of condensate

2.5 CyBio-FeliX Head R 96/1000 µl

General characteristics	
Designation	CyBio-FeliX Kopf/Head R
Type	96/1000 µl
Drawing number	OL3316-14-950
Materials	Aluminium, stainless steel, polyethylene (PE), silicone, polypropylene (PP)
Specification	
Number of pipette tips	96
Volume range	10 – 1000 µl
Volume range	selectable in steps of 0.1 µl
Precision in the volume range of >25 – 100 µl	Variation coefficient ≤ 2%
Precision in the volume range of >100 – 1000 µl	Variation coefficient ≤ 1%
Pipette tip types	
CyBio Tips (accessories; → *„Accessories & Spare Parts" on page 59*)	
Specifications regarding selectable microplates	
SBS-Format	96
Operating data	
Line voltage	+24 V DC (±5%) / 3 A
Interface	Panel connector, male HD-Sub, 15-pin
Airborne sound emission	< 70 db (A)
Dimensions & weight	
Width x height x depth	(165 x 280 x 123) mm (height without pipette tip)
Weight	approximately 7.0 kg
Storage & operating conditions	
Operation:	
Permissible ambient temperature	+15 °C to +35 °C
Permissible relative air humidity	≤ 75% at +35 °C
Storage & transportation:	
Permissible ambient temperature	−10 °C to +50 °C
Permissible relative air humidity	≤ 85% at +30 °C, no formation of condensate

2.6 CyBio-FeliX Head R 384/25 µl

General characteristics	
Designation	CyBio-FeliX Kopf/Head R
Type	384/25 µl
Drawing number	OL3316-14-452[1]
Materials	Aluminium, stainless steel, polyethylene (PE), silicone, polypropylene (PP)
Specification	
Number of pipette tips	384
Volume range	0.5 – 25 µl
Volume range	selectable in steps of 0.01 µl
Precision in the volume range 3 – 5 µl	Variation coefficient ≤ 2%
Precision in the volume range 5 – 25 µl	Variation coefficient ≤ 1%
Pipette tip types	
CyBio Tips (accessories; → *„Accessories & Spare Parts" on page 59*)	
Specifications regarding selectable microplates	
SBS-Format	384
Operating data	
Line voltage	+24 V DC (±5%) / 3 A
Interface	Panel connector, male HD-Sub, 15-pin
Airborne sound emission	< 70 db (A)
Dimensions & weight	
Width x height x depth	(165 x 280 x 123) mm (height without pipette tip)
Weight	approximately 7.0 kg
Storage & operating conditions	
Operation:	
Permissible ambient temperature	+15 °C to +35 °C
Permissible relative air humidity	≤ 75% at +35 °C
Storage & transportation:	
Permissible ambient temperature	−10 °C to +50 °C
Permissible relative air humidity	≤ 85% at +30 °C, no formation of condensate

1 OEM – variant

3 Safety Notes

3.1 General

TIP

You should carefully read this chapter.

Follow all safety notes that precede described action in the various chapters of this Manual, as well as any message or advisory prompt that may be displayed on the monitor screen by control and evaluation software tools.

In addition to the safety notes in this Manual and local safety practices as may be applicable to product operation from case to case, generally established accident prevention, industrial labor protection and environmental protection rules must be considered and duly observed.

A reference to potential danger cannot be regarded as replacing the appropriate labor protection rule that must be observed in each particular case.

Follow these general safety rules:

- Do not analyze or use aggressive substances of a type that may compromise the stable performance of the product or its components (→ *"Chemical resistance" on page 22*)!
- Do not make changes in product engineering design, unless by prior agreement with Analytik Jena GmbH+Co. KG!
- Do not manipulate or damage software or software configuration settings!
- Do not operate the product with safety devices in a defective state or with safety and protection devices installed in a nonconforming manner!
- Operate the product only at a line voltage that complies with nameplate specifications!
- Observe prescribed maintenance intervals! (→ *"Maintenance & Care" on page 51*)!
- Use only accessory items, consumable materials and spare parts specified in this User Manual or provided or recommended by Analytik Jena GmbH+Co. KG!
- Service and repair work may not be performed by anyone other than authorized service personnel!
- Refrain from any kind of unauthorized conversions or changes in product setup, notably those impacting the safety of personnel or the environment.

3.2 Standards & Guidelines

The Pipetting Head has been built to meet currently valid rules of technology and generally established requirements on safety engineering.

The product and its components have been designed in accordance with basic safety and health requirements under applicable laws, standards and guideline regulations.

All specifications relating to safety reference the European Union regulations in their latest binding revisions.

Other specific national laws and regulations must equally be observed.

3.3 Safety Labeling

TIP

Affixed warning notes and safety symbols are an integral part of the Pipetting Head and must be followed under any circumstances!

Check warning labels and safety symbols for intactness and completeness before you begin any kind of start-up action. Do not proceed to start-up action if you have identified a missing or damaged warning note or safety symbol!

Damaged or missing warning notes or safety symbols may lead to faulty action with consequential injury to persons or material damage to equipment! Warning notes and safety symbols must not be removed! Replace damaged warning labels and safety symbols immediately!

The following safety symbols are affixed on the product:

Table 2: Safety symbols

Safety symbol	Meaning	Comment
	Warns of a danger point	Warns of mechanical hazard from mechanically moving product parts[1]
	Warns of hand injury	Warns of crushing/pinching by mechanically moving parts

1 Also an integral part of a warning note.

Warning note	Meaning	Comment
	Warns of crushing or pinching accidents	Consider the pipetting head's weight for installation or deinstallation work

A general warning sign (“Warning of danger point“)

requires clarification of the following aspects – based on documentation:

- the type of likely or potential hazard
- action necessary to prevent such hazard

3.4 Mechanical Danger Zones – Notice

NOTE

Mechanical motion of the Pipetting Head as an integral part of a host system may pose potential hazards to personnel.

Always keep your hands/fingers clear of the mechanical motion range as the Pipetting Head (with pipette tips) performs vertical down-motion.

There is danger of crushing/pinching one's hands!

3.5 Mechanical Danger Zones

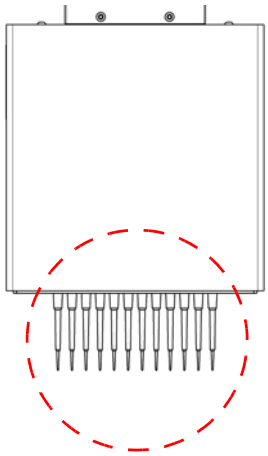

Fig. 1: Danger zone below the Pipetting Head

In order to prevent dangerous situations, you are advised to follow these general rules:

- Consider its weight/mass when handling the Pipetting head.
- Do not place your hands or fingers into the head's motion range as long as mechanical motion has not finished, nor should tools or aids be used to interfere with running motion.
- Faulty action or mis-operation may result in material damage or damage to persons.
- Turn electric power supply off before any kind of intervention in the product.

3.6 Requirements for Operating Personnel

Requirements under specific product aspects:

- The product may not be started up, operated or maintained other than by duly trained expert personnel having received instructions on operational safety. Such training will also include familiarization with the contents of this Manual and manuals of related product components or additional equipment units as may be appropriate from case to case.
- The product must not be operated by minors or persons under the influence of alcohol, drugs or medication.
- A security schedule must be put in place to ensure that only authorized personnel can work with the product.
- Operating personnel must be aware of the potential dangers that emanate from substances being processed. Appropriate personal protective equipment should be applied if necessary.

Requirements under specific laboratory aspects:

- Before a break in operation or on completion of work, adequate measures should be taken for skin cleaning and skin protection.
- You are prohibited from eating, drinking, smoking or using open a naked flame at or near the product installation site!

3.7 Safety Requirements for Transportation

Follow these general safety rules:

- There is danger of physical injury if product parts are not secured in a conforming manner! For transportation, product components must be secured as prescribed in the relevant transporting equipment manuals or in this User Manual (→ *"Packaging, Transportation & Storage" on page 37*).
- Use only original packaging for the transportation of product components! Make sure that all shipping retainers are installed and product components are completely empty where necessary.

3.8 Safety Notes for Operation

3.8.1 General

- Operating personnel are obliged to convince themselves of the proper technical condition of the product and its components, including that of safety devices, before they can proceed to action for powering up. Notably, this requirement applies following a change in, an extension to or a repair of the product.
- Do not operate the product, unless all protective devices are in place, properly installed and fully functional.
- Make sure that all ventilation devices of the Pipetting Head are in a fully functional condition. Obstructed ventilation grids, vents, etc. may cause operating trouble or damage to the product.
- Do not introduce objects/aids into a product opening and prevent penetration of liquid into the inner space of the Pipetting Head through openings or joints.
- Do not use aggressive substances of a type that may compromise the stable performance of the Pipetting Head (→ *"Chemical resistance" on page 22*).
- Use only accessory items, consumable materials and spare parts provided or recommended by Analytik Jena GmbH+Co. KG!

3.8.2 Explosion Proofness, Fire Prevention

- The product must not be operated in an explosive environment or using explosive substances.
- It is forbidden to smoke or use open fire inside of the operating room!
- Operating personnel must be duly informed about the locations and the proper handling of fire-extinguishing equipment in the operating room.

3.8.3 Electrical

- Work on electrical and electronic parts of the product and its components may only be carried out by a suitably qualified electrician and in accordance with latest binding electrical regulations.
- Refrain from start-up action of any kind if cables are damaged (e.g. cuts in cabling, worn or chafed places)!
- Do not remove shielding parts from the product. There is life-threatening danger of exposure to electric current when shielding parts are removed!
- Do not introduce objects/aids into a product opening and prevent penetration of liquid into the inner space of the Pipetting Head through openings or joints.

3.8.4 Fundamental Maintenance & Care Rules

- Maintenance may not be carried out by anyone other than service personnel of Analytik Jena GmbH+Co. KG or expert personnel properly trained and duly authorized by Analytik Jena GmbH+Co. KG.
- Unauthorized maintenance work may cause damage.
- Always turn product power off before you perform work for maintenance or cleaning of the product. Pull the main power plug from the power socket at first.
- Use only original accessory items and original spare parts or such accessories and spare parts that are recommended by Analytik Jena GmbH+Co. KG.

3.8.5 Handling of Dangerous Substances

TIP

When working on the pipetting head or on accessories it is recommended to wear personal protective equipment (PPE).

The following documents / chapters show the scope of the safety labeling (as a mandatory component of accident prevention measures):

- Chapter → *"Safety Labeling" on page 17*
- operating manual CyBio-FeliX, chapter "Safety labeling"[1]

The product owner will be solely responsible for compliance with all safety requirements in place for the protection of persons and material goods during work involving radioactive, infectious, toxic, etching, combustible and other dangerous substances.

The product owner/operator is advised to establish a special operating practice for product operation with involvement of dangerous substances. This User Manual includes no safety notes aimed at preventing personal injury or material damage that may be caused by substances being examined.

1 If not included, this can be obtained from Analytik Jena GmbH+Co. KG.

3.8.6Chemical resistance

The manufacturer cannot be held liable if the operator of the device analyzes aggressive
substances which may affect the durability of the components.

- Caution when handling bases, acids and organic solutions. These substances may negatively affect the useful life of the device.
- Only use substances compatible with the materials listed.

The following components have direct contact with the processed substances:

Table 3: Components

Component	Material
Pipette tips	PP
Piston seals[1]	PE-HD
Reagent cups	PMMA PTFE
Hoses	Silicone
Wash tubs	PEEK
Reservoir	PEEK Teflon Stainless steel
Waste boxes	Stainless steel Teflon

1 Aerosols may lead to indirect contact between the substances and the piston seals or the piston. The pistons are made of stainless steel, the piston seals are made of polyethylene (high density).

The components listed in the overview (→ *Table 3, "Components", on page 22*), the basic unit CyBio-FeliX (including the corresponding pipetting heads) and any accessories are **not** resistant to the following substances:

Table 4: Substances

Substances[1]
Hydrofluoric acid (HF / fluoric acid)
Highly concentrated acids
Cleaning powder
Paint thinner
Naphtha (straight-run gasoline)
Gasoline
Acetone
Cleaning spray
Ozone
Oxidative solutions
Sodium hypochlorite with concentrations > 1 %
Halogens
Highly concentrated alkaline solutions (except sodium hydroxide with concentrations ≤ 1 %)

1 This table is not exhaustive.

The following table contains the permissible / possible methods and agents for disinfecting the device:

Table 5: Disinfection methods / disinfectants

Disinfection method	Disinfectant[1]	Remark
Spray disinfection	Not applicable	Impermissible disinfection method
Wipe disinfection	Incidin® Liquid (Manufacturer: ECOLAB)[2]	Standard disinfection method for – Housing parts – Pipetting heads – Accessories
Immersion disinfection	3 % Korsolex® basic solution (manufacturer: BODE Chemie)[2]	Consider the restricted scope of application

1 Depending on the application, it may be possible to use other disinfectants. Such agents must be generally conceived for this application, tested (if required) and must **not** be restricted (by any requirements in this manual).

2 Proof of suitability (including approval) carried out using tests.

Disinfection and chemical resistance

Approved for *wipe disinfection* (→ *Table 5, "Disinfection methods / disinfectants", on page 23*):

- CyBio-FeliX Basic Units (OL5015-2X-1XX / OL5015-2X-5XX)
- CyBio-FeliX Heads (OL3316-14-X5X)
- Cover magazine (transport protection; OL3316-11-200)
- BioShake 3000 series (QINSTRUMENTS-2016-0XXX)
- BioShake wiring
- Mounting Kit – BioShake 3000 series (OL3317-23-692)
- Adapter for BioShake 3000 series (848-2016-1XXX)
- Liquid handling adapter (OL3316-11-3XX / OL3317-11-3XX)
- Gripper (OL3317-11-800)
- ALPAQUA® MAGNUM FLX™ Enhanced Universal Magnet Plate (OL3317-11-285)
- Waste box I (small) (844-00430-0)
- Tip transfer tool 96/250 µl DW; filter / 96/1000 µl (OL3396-352-25 / OL3396-25-354)
- TipRack 96/1000 µl (OL3317-11-140)
- 96-channel magazine (OL3810-13-024)
- Supports (OL3317-11-1XX)

TIP

Any other disinfection method for the above mentioned devices and assemblies is not permissible because it may cause irreparable damage.

Approved for *immersion disinfection* (→ *Table 5, "Disinfection methods / disinfectants", on page 23*):

- Waste box I (small) (844-00430-0)
- Tip transfer tool 96/250 µl DW; filter / 96/1000 µl (OL3396-352-25 / OL3396-25-354)
- TipRack 96/1000 µl (OL3317-11-140)
- 96-channel magazine (OL3810-13-024)
- Supports (OL3317-11-1XX)

TIP

If in doubt, consult Analytik Jena GmbH+Co. KG.

3.9 Rules of Conduct in Cases of Emergency

Use the product's main power switch (On/Off switch) immediately on noticing a dangerous situation and/or disconnect the power plug from the line socket in this case!

Since prompt reaction can save lives in a situation of danger, make sure that the following requirements are met:

- Operating personnel must be aware of the locations and the proper handling of safety devices, accident and hazard alarms, as well as first-aid kits and emergency/rescue equipment.
- The product owner/operator will be responsible for providing adequate training for operating personnel.
- All first-aid items (medical chest, eyewash bottles, stretchers, etc.) and fire fighting equipment (fire extinguishers) must be kept within easy reach and readily available at all times. Related equipment must be in a fault-free
  condition and undergo regular inspection for normal operating condition.

Actuation of Emergency Shutdown

You should familiarize yourself thoroughly with all documentation parts relating to the host system that integrates your Pipetting Head.

4 Technical Description

4.1 Setup

4.1.1 Pipetting Head

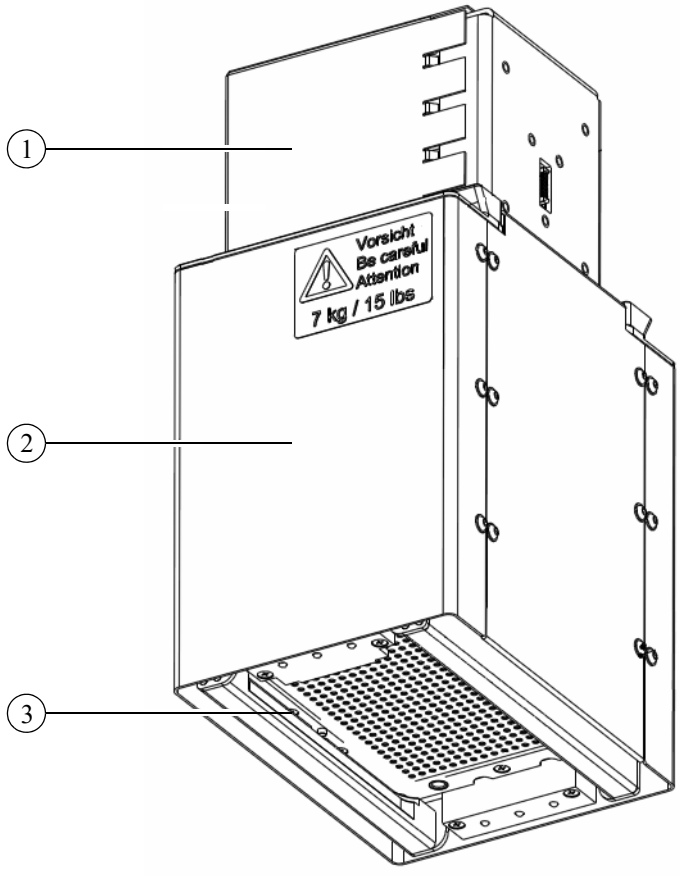

Fig. 2: Pipetting Head (principal setup)

1 Pipetting Head – upper part with electrical connection
→ *"Electrical Connection" on page 31*

2 Middle part (pipetting base)
→ *"Head Mount Dovetail Guide" on page 31*
→ *"Nameplate" on page 28*
→ *"Safety Labeling" on page 17*

3 Pipetting Head – lower part (tip holder)[1]
→ *"CyBio®-FeliX Head R" → page 29*
→ *"CHOICE™ Head" on page 29*

1 Figure shows a version Head R

4.1.2 Nameplate

Fig. 3: Nameplate at Pipetting Head

Nameplate specifications/details:

- Manufacturer's data
- Product information (type designation, tradename)
- Identification code (model & serial number)
- Year of manufacture

4.2 Versions Summary Table

	Head R	CHOICE Head
Tip change (automatic)	X	X
CyBio RoboTipTrays	X	–
LH-adapter (OL3316...)	–	X
LH-adapter (OL3317...)	X	–

4.3 Components

4.3.1 Pipetting Heads

CyBio-FeliX Pipetting Head R

This Pipetting Head is equipped with a mechanism to allow the automated mounting of CyBio RoboTipTrays and liquid handling adapters.

Liquid handling adapters are intended for single-channel column-by-column or line-by-line pipetting.

A liquid handling adapter provides support bases (cone(s)) for mounting the pipette tips onto.

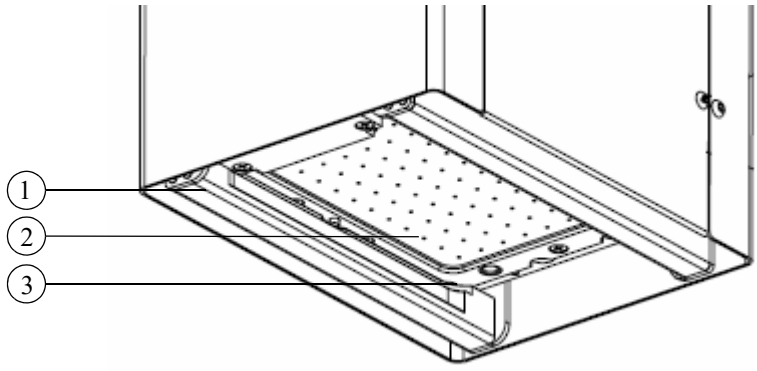

Fig. 4: Pipetting Head R (bottom view)

1 Gripper claws
2 Sealing mat
3 Frame for sealing mat

For further information about accessories, you should consult chapter 11 (CyBio-FeliX Basic Unit).

CHOICE Head

This Pipetting Head is equipped with a mechanism to allow the automated mounting of CHOICE adapters for single-channel column-by-column or line-by-line pipetting.

A CHOICE adapter provides support bases (cone(s)) for mounting the pipette tips onto.

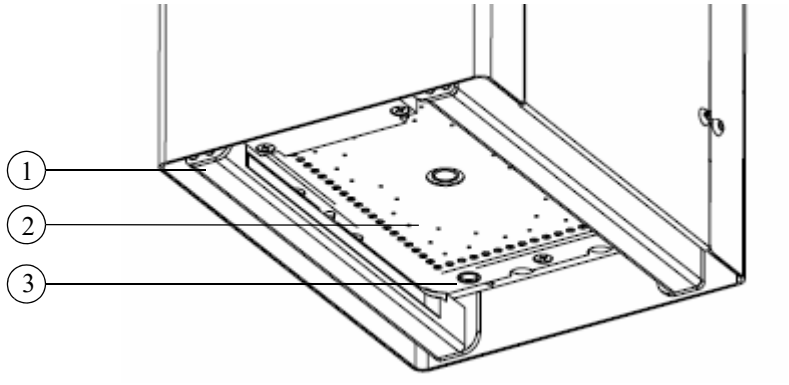

Fig. 5: CHOICE™ Head (bottom view)

1 Gripper claws
2 Sealing mat
3 Frame for sealing mat

CHOICE adapter

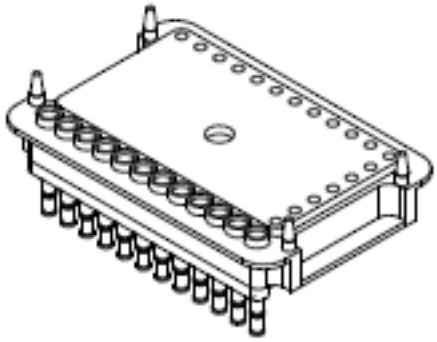

Fig. 6: CHOICE adapter (12 channels)

For further information about accessories, you should consult chapter 11 (CyBio-FeliX Basic Unit).

4.3.2 Head Mount Dovetail Guide

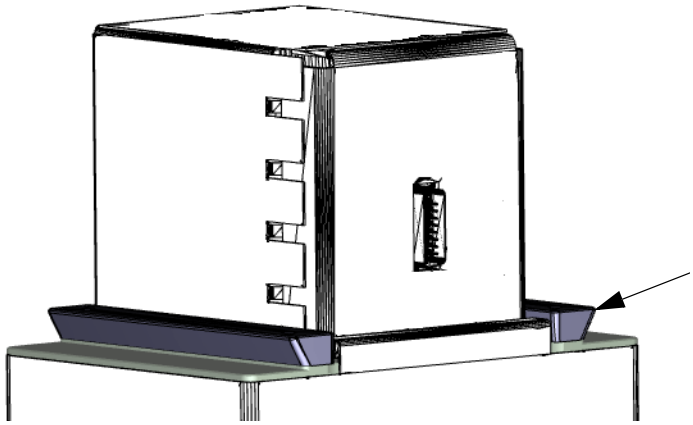

Fig. 7: Dovetail guide at the Pipetting Head

4.3.3 Electrical Connection

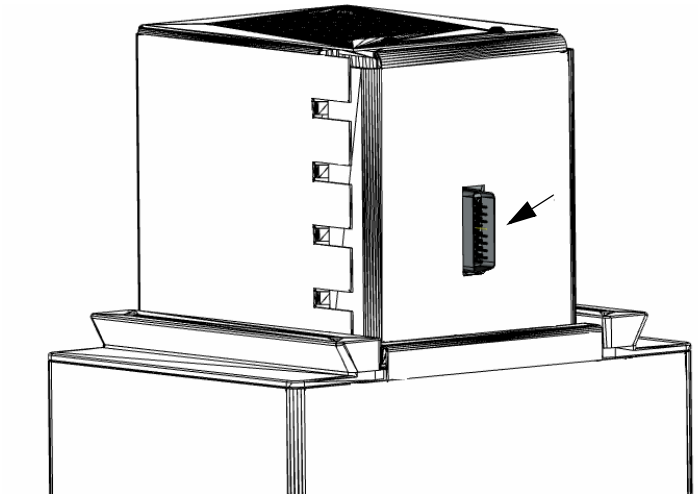

Fig. 8: Electrical connection (connector terminal)

4.4 Mode of Operation

The pipetting head works based on the principle of air displacement. The pipette tips and their related internal seals create air spaces. Pistons perform motion within these air spaces. They are powered by a common drive.

Liquid is drawn in via channels (1, 8, 12, 16, 24, 96 or 384).

Piston motion occurs in steps of 0.1 µm, thus achieving an accuracy/resolution that corresponds to a fraction of a microliter.

Further main factors of influence on accuracy/resolution performance are the:

- wettability of tips
- dimensional accuracy of outlet openings
- way the system and liquid are handled.

Further information → *"Pipetting Head Precision Test" on page 41*.

TIP

Piston motion creates negative pressure or positive pressure, thus causing liquid to be aspirated or released. Upon reaching pressure equalization state, the current process is completed. The time required to reach this state depends - among other factors - on the properties of the liquid being handled.

For further information, please refer to the CyBio-FeliX Manual.

4.4.1 Pipetting

The term pipetting means that a defined volume of liquid is aspirated (with/without additional stroke) from a source to be subsequently dispensed into a destination or a waste bin (with/without blow-out function).

For pipetting, we distinguish between aspiration without additional stroke (simple transfer) and aspiration with additional stroke
(→ *"Aspiration Without Additional Stroke" on page 36* and
→ *"Aspiration With Additional Stroke" on page 34*).

In the case of reverse pipetting, an extra volume is automatically taken in to be returned back into the source or a waste position.

In contrast to dispensing mode, pipetting reproduces certain minor inaccuracies in tip geometry with each cycle so these variances have no influence on precision.

TIP

Reverse pipetting is recommended for the pipetting of foamy solutions. For precise reverse pipetting of small volumes, you are advised to absorb the full tip volume with additional stroke and to release a given desired volume as a sub-volume.

4.4.2 Dispensing

The term dispensing means that a given aspired volume of liquid is discharged again in several sub-volume portions. For dispensing, a total volume must be taken in with additional stroke. Blow-out is performed in a separate position – in some cases, extra volume may have to be aspired, for example, where viscous liquids are handled or a great number of partial liquid discharges are required.

A particular feature distinguishing all air displacement systems is that a thermodynamic equilibrium must be established in the air volume before dispensing may begin. For this reason, the initial portion – after a short pause – should be discharged back into the source, before (precise) dispensing into the target plate may start.

4.4.3 Tip Rinsing

The behaviour of liquid on the surface of a solid body is different for surfaces already wetted and surfaces unwetted. Greater precision is achieved where a tip had been wetted prior to dispensing or pipetting. The behavior of liquid will remain reproducible for each process in this case. The recommended procedure is a triple rinsing cycle with the maximum possible volume of an installed tip.

4.4.4 Residual Discharge (Blow-Out)

Having dispensed its “last” volume, the piston performs downward-motion into lower-most end position, in order to ensure that no liquid will remain in the tips. This process is referred to as blow-out.

TIP

If blow-out is performed into a liquid, bubbles may form.

4.4.5 Piston Zero-Position

On completion of blow-out action, the piston returns into zero-position, thus restoring its starting position for aspiration of liquid.

NOTE

Piston motion into zero-position must not occur in liquid. Otherwise, there is danger of piston contamination or destruction of the pipetting head.

4.5 Operating Modes

Different operating modes are available.

For further information, please refer to the CyBio-FeliX Manual.

4.6 Volume Cycle

Liquid volumes are aspirated and discharged by piston motion. The mechanical design of piston suspension implies a certain freeplay (backlash). This means that after each reversal of the direction of piston motion, the piston drive travels a certain path length without producing actual piston motion, i.e. without aspirating or ejecting liquid. This

path length corresponds to the amount of freeplay.

In order to prevent pipetting errors, a volume cycle is organized in a manner to ensure that the piston reversal point is located outside of the actual pipetting range (motion to zero-position, aspiration with additional stroke) or the reversal zone will be compensated by appropriate motion, respectively (discharge with blow-out)

4.6.1 Aspiration With Additional Stroke

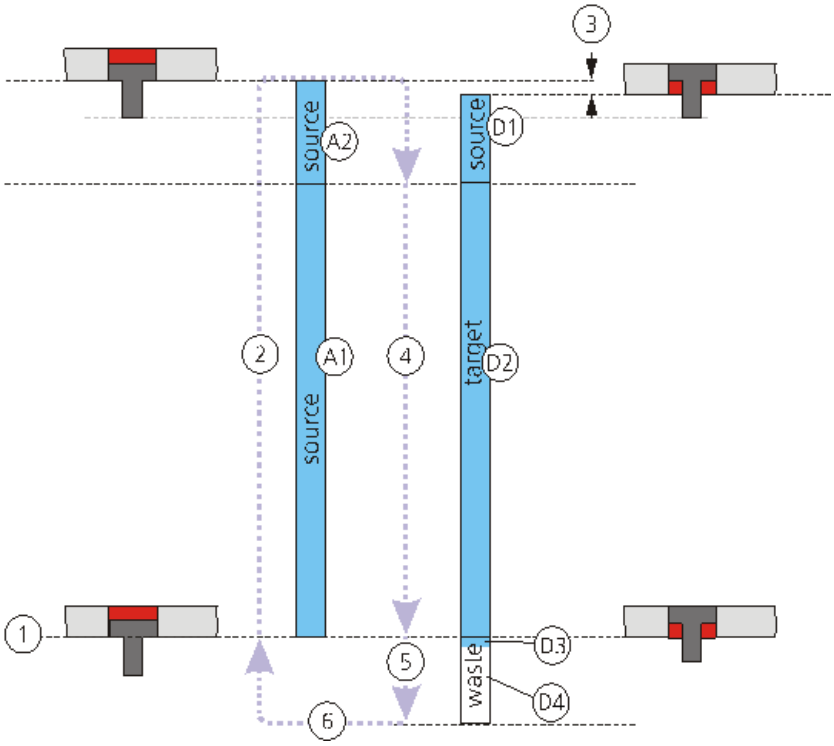

Fig. 9: Aspiration with additional stroke

1	Zero-position	A1 = D2:Nominal pipetting volume
2	Aspirate volume with additional stroke and reverse piston direction	A2:Additional aspiration volume
3	Upper freeplay	D1:Discharged additional volume < A2 (additional stroke)
4	Exactly dispense volume (single volume or partial volumes)	D2:Nominal pipetting volume
5	Residual discharge	D3:Residual volume (proportional to freeplay)
6	Motion to zero-position	D4:Air

Starting from zero-position (1), the pistons move beyond the position that corresponds to the nominal pipetting volume. Subsequently, they are lowered back into this position (2).

The upper freeplay zone (3) is thus overcome. In the course of direction reversal, additional volume (D1) is discharged. As a consequence of piston reversal, this additional amount of volume is smaller than the volume of additional stroke motion (A2). What
actually remains in the tip is the nominal pipetting volume (D2) and a residual volume (D3).

In the next step (4) exact volume portions can be discharged as follows:

- in a single step (→ *"Pipetting" on page 32*) or
- in several steps (→ *"Dispensing" on page 33*).

Once the nominal pipetting volume has been fully ejected, the residual volume (D3), which results from the piston's upper direction reversal, will be contained in the pipette tip. This remainder is now discharged into a waste box or back into the source with a

blow-out (5) function (→ *"Residual Discharge (Blow-Out)" on page 33*).

A volume cycle is completed on "Motion to zero-position".

The "Move pistons into zero-position" (6) command triggers upward piston motion into the starting position, overcoming the lower amount of freeplay.

This process step must be performed without liquid (tips cannot make contact with liquid). If liquid is aspirated in the course of this step, this is going to cause dosing errors and may, in some cases, even result in contamination of pistons or destruction of the pipetting head.

4.6.2 Aspiration Without Additional Stroke

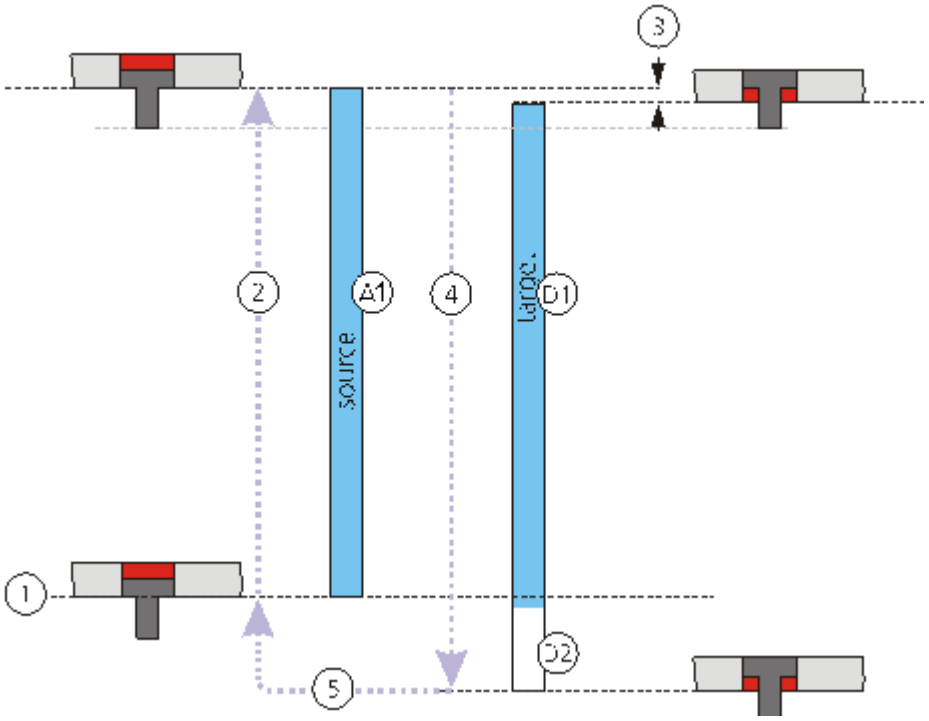

Fig. 10: Aspiration without additional stroke

1	Zero-position	A1=D1:Nominal pipetting volume
2	Aspiration	D2:Air
3	Upper freeplay	
4	Discharge with additional stroke	
5	Motion to zero-position	

Where liquid is taken up without additional stroke motion, it must be discharged in a single step in order to achieve precise results. As a vital by-condition, the motion length for discharging (4) must be greater than the motion length for aspiration (2). Because the point of piston motion reversal is located within the motion area for discharging, no volume is released as the upper freeplay zone is overcome (3).

For discharging, a greater motion length is travelled than that required for the nominal volume; the whole volume is discharged, followed by the ejection of air (D2).

Having received a "Move pistons into zero-position“ (5) command, the pistons will move up into their starting position, overcoming the lower amount of freeplay as they do so.

This process step must be performed without the involvement of liquid (tips cannot make contact with liquid). If liquid is aspirated in the course of this step, this is going to cause dosing errors and may, in some cases, even result in contamination of pistons or destruction of the pipetting head.

5 Packaging, Transportation & Storage

5.1 Safety Notes

NOTE

Environmental influences, mechanical shocks or formation of condensed water may destroy individual product components!

Adequate precautions should be taken to protect all components from environmental impacts, mechanical shock or formation of condensed water during transportation or shipment! Temporary open-air storage of the product is forbidden!

NOTE

There is potential damage from improper packaging!

The Pipetting Head, including its accessory parts, may only be shipped or transported in original packing!

NOTE

There is danger of material damage!

Install the shipping lock to protect the pistons from unwanted motion during shipment. Transportation of the Pipetting Head without the shipping lock in place will void any claims for warranty or guarantee.

5.2 Description

5.2.1 Packaging

To prepare the Pipetting Head for shipment or transportation, proceed as follows:

1. Drain residual liquid, if any, from pipette tips.
2. Loosen and remove the tips.
3. Install shipping lock for pistons.

CAUTION

Danger of crushing/pinching!

There is danger of crushing one's fingers as the gripper claws close.

Use caution to keep all fingers off the space between the shipping lock and the gripper claws. Hold the shipping lock at the bottom only.

4. Remove Pipetting Head from the pipettor.
5. Place Pipetting Head into original packing!
6. Close packing and tape it firmly.
   ✓ The Pipetting Head is completely packed and ready for shipment.

5.2.2 Storage

If the Pipetting Head is not installed immediately after arrival of product shipment or not required for a longer period of time, it should preferentially be stored in its original

packing case.

Climatic requirements on facilities for the Pipetting Head storage are as follows:

■ Temperature range:	-10 °C to +50 °C
■ Permissible relative air humidity:	≤ 85 % at 30 °C, no formation of condensate

6 Routine Start-Up Procedure

6.1 Safety Notes

The requirements regarding operating climate are as follows:

- Temperature range:+15 ˚C to 35 ˚C
- Permissible relative air humidity: ≤ 75 % at 35 ˚C, no formation of condensate

The atmosphere inside the operating room should be dust-free to a maximum possible degree, free from drafts and free from etching vapours. You are prohibited from smoking in the operating room.

For pipettor site selection, the following rules should be observed:

- The operating room must have a stable, horizontal, dry and vibration-free floor.
- Do not install the system directly at doors or windows nor close to sources of electromagnetic interference.
- Prevent direct exposure to sunlight and radiation emitted by heaters. Provide air conditioning for the room if necessary.
- Provide easy access to all system parts at all times and do not obstruct ventilation slots by placing other equipment or fixtures on such inlet/outlet positions.
- Allow enough time for the system to adjust to the installation site temperature, especially where storage and installation are in different locations.

6.1.1 Energy Supplies

Applies in conjunction with the instrument CyBio-FeliX:

WARNING

In the event of a break in protective conductor wiring, there is life-threaten ding danger due to electrical shock!

Insert the main power plug only into a mains socket with a grounded PE contact! Make sure that the protection effect is not rendered ineffective by extension cables without a PE conductor or by the use of a voltage regulating transformer!

CAUTION

Operation at a mains voltage level or frequency other than specified on the nameplate may result in destruction of the pipettor!

Make sure that power supply specifications in the operating room do agree with those on the nameplate! You are prohibited from starting the system up if there is a mismatch in specifications.

The system requires a single-phase alternating current net for normal operation. The system includes a wide-range power pack. It is rated for AC voltage levels of 115/230V and a frequency of 50Hz/60Hz. You should make absolutely certain that nameplate specifications are actually met and power is supplied with values as indicated on the nameplate.

6.2 Initial Start-Up & Configuration

Because of the system's complexity and to guarantee its failsafe function, work for installation, initial start-up and configuration on your premises may be performed by noone other than Analytik Jena GmbH+Co. KG service personnel or duly authorized expert technicians.

Initial start-up essentially includes:

- Installation and adjustment of system components
- Providing cable connections and connecting power supply cables
- Software installation (factory-performed) and configuration
- Briefing and on-the-job training

Check shipment for integrity, completeness and agreement when unpacking the various system units.

6.3 Function Tests

TIP

On completion of manufacturing, the test procedures described in this chapter are carried out in standardized conditions (test & metrology room). Resulting test reports are included in the scope of delivery.

6.3.1 Pipetting Head Precision Test

Testing for variation coefficient CV (percentage standard deviation) is performed using a 96-well or 384-well microplate with transparent flat bottom and dye solution.

A suitable vertical photometer serves as the measuring tool. Its own precision must have been tested/verified and documented prior to measurement.

Two test volumes are specified.

Material/preparation:

- 96- or 384-well microplate with flat transparent bottom.
- 0,1 N NaOH solution
- Dye (e.g. p-nitrophenol)
- Film for taping plates off
- Microplate shaker
- Microplate centrifuge

TIP

A certain evaporation inhomogeneity across the microplate surface has a negative influence on the result of measurement.

For this reason, you should tape the microplates immediately after prefilling of diluent, pipetting of the test volume and before shaking. Use only new microplates, do not use washed ones. Otherwise the variance in measured readings will become to great.

Use new tips for precision measurement in all cases.

Rinse new tips prior to precision measurement using appropriate p-nitrophenol solution and test settings as follows:

Piston speed:	1/3 Default
Number of rinsing cycles:	5
Rinsing volume:	maximal tip volume

1. Use only new plates and new tips
2. Total volume is 200 µl for 96-well plates (50 µl for 384-well plates)
3. Wait for 2 seconds, then perform aspiration/ejection
4. Rinse tips with test parameter settings specified above
5. Perform aspiration always with additional stroke (full tip volume)
6. Eject first pipetting cycle back into source
7. Submerge by approximately 1 mm below the liquid surface (0.1 N NaOH)
8. Pipette test volume as a portion of the total volume into test plate with NaOH prefilling
9. Eject residual volume via blow-out back into source or waste box
10. Seal (tape) off immediately
11. Shake plate (on orbital shaker, parameter: wait for 30 minutes, at least)
12. Subject plate to hydro-extraction for removal of bubbles; parameter: for 2 minutes at 2000 r.p.m.
13. Do not measure results earlier than 60 minutes thereafter

Table 6: Aspiration and test volume

Head type	Prefill volume	Test volume	p-nitrophenol dye solution[1]
96/60 µl	190 µl &197 µl MP 96	10 µl & 3 µl	2,4 mM for 10 µl 12 mM for 3 µl
96/250 µl	150 µl &190 µl MP 96	50 µl & 10 µl	2,4 mM for 10 µl 0,48 mM for 50 µl
96/1000 µl	150 µl u.175 µl MP 96	50 µl und 25 µl	0,96 mM für 25 µl 0,48 mM für 50 µl
384/60 µl	40 µl & 47 µl MP 384	10 µl & 3 µl	0,6 mM for 10 µl 3 mM for 3 µl
16 u. 24 Kanal CHOICE	40 µl & 47 µl MP 384	10 µl & 3 µl	0,6 mM for 10 µl 3 mM for 3 µl
8 u. 12 Kanal CHOICE	100 µl &175 µl MP 96	100 µl & 25 µl	0,24 mM for 100 µl 0,96 mM for 25 µl

1 Select a dye concentration with an extinction rate between 0.4 and 1.2 OD at 405 nm.

Table 7: : Mixing times

	96-well microplate	384-well microplate
Orbital shaker of 700 r.p.m.	Shake for 15 min 30 min pause Shake for 15 min	–
Centrifuge of 2000 r.p.m.		2 min centrifuge 15 min pause 2 min centrifuge
Orbital shaker[1] of 1100 r.p.m.	–	Shake for 15 min 45 min pause Shake for 15 min

1 Alternative (Orbital shaker)

- Measure extinction in vertical photometer.
- Analyze data in order to establish CV value.
- Compare this CV value result to specified CV values (→ *"Technical Specifications" on page 7*).

6.3.2 Accuracy Test

Accuracy defines the degree of agreement between a measured dispensed volume (mean value of all measurements in a 96-well or 384-well microplate) anda specified (target) volume.

Material / preparation:

- Laboratory scales with resolution not less than 1mg
- Laboratory scales must be subject to regular calibration schedule (check for calibration mark).
- Lidded 96-well or 384-well microplate with flat bottom.

NOTE

Since new microplates are, typically, vacuum-packaged (sealed), the selected test plates must be unpacked not later than one week before testing (the weight of a new microplate may decrease due to evaporation or increase due to absorption).

- Accuracy testing is performed with de-ionized water (1 bar and 998 mg/cm³).

Test procedure:

- Place a reservoir with de-ionized water in a position of the transporting unit.
- Place microplates in a different position.
- For preliminary wetting of tips, use rinsing procedure as follows: number of cycles 5, with test volume.
- Prefill a volume of 50 µl.
- Weigh microplate in prefilled lidded condition.
- Unlid plate and deposit it in a place.
- Dispense desired volume into the microplate immediately thereafter (Method → *"Pipetting Head Precision Test" on page 41*).
- Mount lid onto microplate.
- Weight microplate in filled and lidded condition.

TIP

The time interval from weighing before and weighing after the test volume is added should not be greater than 15 seconds.

- Determine the result of measurement, based on the deviation of the actual volume against the nominal/specified volume.
- Each volume must undergo not less than three measurements.

6.3.3 Leak Test

Leak testing is necessary to ensure that the pipetting head does not leak liquid. Subject to testing are the pistons, the pipette tips and the O-rings.

A leak test is performed drawing a particular volume of dye solution into the pipette tips and watching their liquid level over a time of 30 minutes.

Procedure:

- Make sure that the pipettor is in a horizontal position. To do this, carefully place a water level on its transporting unit. Use setting screws as necessary to adjust horizontal position.
- Remove tips, CyBio TipTray, CyBio RoboTipTray and LH-adapter as may be necessary from case to case.
- Inspect O-rings thoroughly for cracks or sedimentation with the help of a suitable light source. (Replace on detection of obvious signs of wear and tear.
- Carefully inspect sealing mat for cracks or sedimentation with the help of a suitable light source. Perform necessary cleaning in accordance with → *"Sealing Plate" on page 56*.
- CyBio TipTray, CyBio RoboTipTray, LH-adapter and tips take on.
- Place reagent reservoir in position below the tips.
- Bring reagent reservoir close to the tips — the pipette tips should dip below the surface of dye solution by not less than 2 mm.
- Wet the pipette tips on their inside by performing five rinse cycles.
- Aspirate 50% (of maximum tip volume) of dye solution.

TIP

For leak testing, the pipette tips must penetrate into the liquid to a depth not less than 2 mm. This is necessary to exclude the possibility of droplets forming at their end, because these would falsify the result of testing.

- Visually check the liquid level in all pipette tips over a time of 30 minutes. Document all tips whose level is found to have changed.

Result of leak testing

On completion of leak testing, there must be no visible differences in the filling level of pipette tips.

7 Operation

7.1 Safety Notes

CAUTION

Dangerous situation!

Beware of crushing of pinching effects – the Pipetting Head weighs approximately 6 – 7 kg. Always hold the head with both hands.

CAUTION

There is danger of crushing or pinching during motion for CyBio TipTray tightening!

Do not place your hands or fingers into the motion range for tip tightening or Pipetting Head motion.

NOTE

Dangerous situation!

Motion into zero-position must always be performed without any liquid, in order to prevent damage!

7.2 Operation

Carefully read the following information:

- Chapter 7 of the CyBio-FeliX user manual[1]
- Chapter → *"Changing the pipetting head" on page 46*

1 If not included, this can be obtained from Analytik Jena GmbH+Co. KG.

7.3Changing the pipetting head

- The pipetting head can be inserted / replaced while the device is switched on or off.
- The seating of the head (X axis) should be in central position (can be moved manually).

The seating of the head (Z axis) should not be in its topmost position. We recommend an offset of - 30 mm starting from the top vertical position for replacing the head.

NOTE

Make sure that the cover magazine (transport protection; OL3316-11-200) was attached before removing the pipetting head because the head must only be put down when resting on this protective cover.

This is essential for preventing damage to the device!

7.3.1 Mounting the Pipetting Head

1. Make sure that the head mount is in mid-pipettor position, not in uppermost vertical position.
2. Swing clamping lever around into front position.

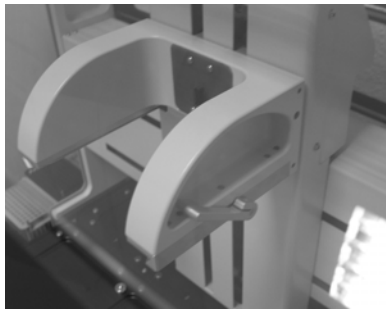

Fig. 11: Head mount (with clamping lever in front position)

3. Mount pipetting head.

Fig. 12: Insertion of pipetting head

4. Secure pipetting head, i.e. swing clamping lever back again.

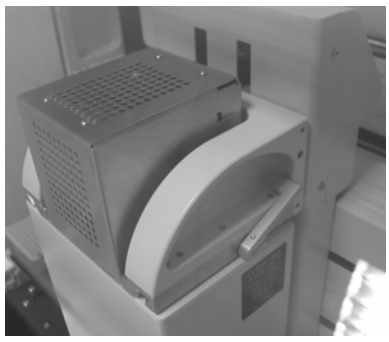

Fig. 13: Pipetting head ready for operation

5. Check for proper fixation and move blind down to close[1].
6. Remove transportation lock.

7.3.2 Replacement of Pipetting Head

1. Install transportation lock.

1 Does not apply for enclosure-less model (for example 30-5015-500-24).

2. Raise blind to open[1].
3. Swing clamping lever into front position.

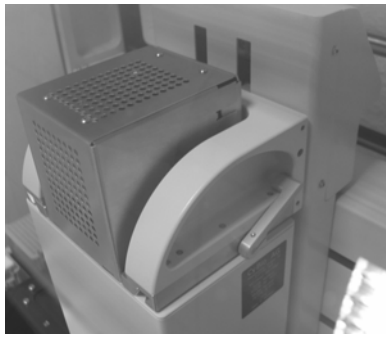

Fig. 14: Pipetting head (fixed)

4. Take the pipetting head off.

Fig. 15: Removal of pipetting head

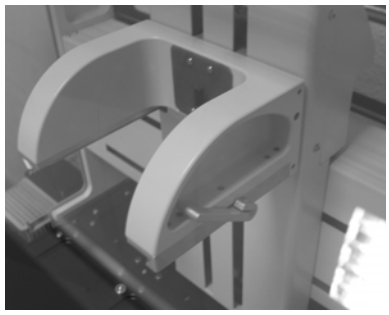

Fig. 16: Head mount (with clamping lever in front position)

Check for proper fixation of the head and close the blind[2].

1 Does not apply for enclosure-less model (for example 30-5015-500-24).
2 Does not apply for enclosure-less model (for example 30-5015-500-24).

8 “What to do if...“

8.1 Safety Notes

TIP

Refrain from unauthorized repair work, notably, repair work on the Pipetting Head. This may render potential claims for warranty null and void.

WARNING

Danger as a result of electric voltage!

Observe all safety rules when you inspect cabling for possible faults.

8.2 Description

Check all potential fault sources on occurrence of a fault. If problems are found to persist after this check or on identification of an undescribed fault, you should notify the
Customer Service of Analytik Jena GmbH+Co. KG.

You should also follow any of these advisory notes when you perform fault location or fault assessment:

- Always check for any noise other than normal operating noise,
- Make sure that connected assemblies are firmly seated,
- Track any increasing freeplay in mechanically moving assemblies (effects of wear & tear).

Further advice on trouble shooting or fault removal is contained in chapter 8 of the CyBio-FeliX User Manual.

9 Maintenance & Care

9.1 Safety Notes

WARNING

Please note that physical contact with voltage-carrying product parts may lead to body injury or even death!

Turn system power off and detach power cable from the line power socket before you proceed to any kind of work for maintenance or care! Take adequate precautions to protect the product from accidental restoration of power!

Operating personnel are prohibited from performing work for maintenance, repair or adjustment of voltage-carrying system parts! Maintenance, repair or adjustment of product modules under electrical voltage may only be carried out by a qualified electrician!

CAUTION

Penetrating liquid may cause material damage to electrical and electronic components!

Make sure that no liquid can penetrate into the inner space during any kind of maintenance or care.

TIP

Intervention to mechanical or electronic parts in the inner Pipetting Head space may not be performed by anyone other than customer service personnel or specially authorized expert technicians.

To ensure that your Pipetting Head will keep a state of optimal adjustment and faultless function over a longer period of time, we recommend the conclusion of a service/maintenance contract with Analytik Jena GmbH+Co. KG.

9.2 Maintenance Work

Perform care and maintenance work tasks at regular intervals as specified herein and following these general advisory rules:

Contamination and natural wear of modules give rise to increased strain levels and, hence, an increased probability of failure. Check for signs of wear and tear on assemblies under mechanical strain and initiate necessary replacements promptly on identifying a case of wear and tear.

All systems parts capable of manual or motorized motion are subject to natural wear. Similarly, electronic components have no unlimited lifetime.

TIP

Dirt, e. g. dried-on liquid, may increase wear dramatically in some cases.
Always maintain clean working conditions!

9.2.1 Overview

Table 8: Maintenance summary table

Maintenance action	Maintenance intervals		
	Weekly	Monthly	As required
→ *"Cleaning housing parts" on page 55*	x		
→ *"Sealing Plate" on page 56*	x		

9.3 Maintenance/Inspection Instructions

TIP

When working on the pipetting head or on accessories it is recommended to wear personal protective equipment (PPE).

The following documents / chapters show the scope of the safety labeling (as a mandatory component of accident prevention measures):

- Chapter → *"Safety Labeling" on page 17*
- Operating manual CyBio-FeliX, chapter "Safety labeling"[1]

NOTE

Remove contamination and damage immediately!

However, never use the following substances for cleaning purposes:

- Solvents (thinner)
- Cleaning powder
- Corrosive or flammable agents (e.g. gasoline, acetone)
- Phenols or caustic alkaline solutions

These cause corrosion on the device surfaces.

Carefully observe the information regarding this topic in chapter → *"Chemical resistance" on page 22*.

Processing biological samples of a risk group

Take particular care when using the device for processing biological samples of a risk group because the CyBio-FeliX cannot be decontaminated as a whole.

In this case, we recommend applying the WHO safety recommendations (WHO Laboratory Biosafety Manual). For servicing which involves FeliX heads or liquid handling adapters the operator is obliged to decontaminate these components prior to shipment. This process must be documented in a decontamination declaration which must be attached to the outside of the packaging and readable for the recipient of the shipment. The form for the declaration of decontamination is provided by Analytik Jena GmbH+Co. KG when servicing is requested.

For surface disinfection of the device, we recommend using suitable chemicals which are featured on the most recent version of the RKI list (Robert-Koch-Institut, Germany) or the DVV list (German Association for the Control of Viral Diseases).

1 If not included, this can be obtained from Analytik Jena GmbH+Co. KG.

9.3.1 Cleaning housing parts

TIP

If in doubt, consult Analytik Jena GmbH+Co. KG.

NOTE

Pipetting heads must only be disinfected using the *wipe disinfection* method!

For this purpose, use a lint-free cloth with a disinfecting / cleaning agent which is recommended by WHO guidelines and which is not excluded in this manual (such as Incidin® Liquid, produced by ECOLAB).

Carefully observe the information regarding this topic in chapter → *"Chemical resistance" on page 22*.

TIP

To prevent damage, pipetting heads must never be cleaned / decontaminated using the *spray disinfection* method!

Procedure:

1. Remove the tips.
2. Attach the cover magazine (transport protection; OL3316-11-200).

Fig. 17:Cover magazine (transport protection) attached

3. Switch the **basic unit off using the device switch** and pull the mains plug from the power outlet.
4. Remove any micro plates, reservoirs, wash tubs and other accessories.
5. Remove the pipetting head (→ *"Changing the pipetting head" on page 46*) and place it on the head's cover magazine (transport protection).
6. Clean the pipetting head (must only be performed **without** applying pressure).
7. Wait until all cleaned surfaces have completely dried.
8. Reinsert the pipetting head and put all accessories which were removed for cleaning back into the decks.
9. Close the blind.
10. Insert the mains plug back into the power outlet and press the device switch to turn on the basic unit. The device is now ready for operation. Detach the cover magazine (transport protection), if attached.

9.3.2 Sealing Plate

TIP

Where pipette tips are changed more frequently, fine fluff-ball stock or dust may settle on the sealing plate, impairing the efficiency of sealing.

Procedure:

1. Do not use dusty pipette tips.
2. Check the cleanness of the sealing mat (once per week).
3. Initiate the tip replacement process to check and clean the component.
4. After starting the process, the sealing mat is accessible from below.
5. The cleaning must be carried out using the adhesive foils for micro plates / sealing tapes **"nunc™ 236366" or "Thermo Scientific™ 236366" (manufacturer: Thermo Fisher Scientific)**.

   Observe the following instructions when dealing with adhesive foils:

   - Carefully place the adhesive foil onto the sealing mat and flatten the foil while ensuring that all channels are covered.
   - The adhesive foil must be removed immediately afterwards. For this purpose, carefully pull off the foil from one corner.

NOTE

Leaving the foil stuck to the surface for a longer period of time may cause damage to the sealing mat when pulling the foil off!

Only the previously mentioned foils are permitted for this purpose. Using other foils may cause damage to the sealing mat!

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6. Proceed with particular care during the cleaning process to **prevent** displacing the sealing mat. Otherwise, lint may enter the holes in the sealing mat.
7. The tip magazine / liquid handling adapter must only be tightened after the foil has been pulled off again.

10 Shutting Down

CAUTION

There is danger of physical injury and damage to the product if cabling is removed in power-on state!

Do not remove cables as long as they are energized! Make absolutely certain that power has been turn off before you remove a cable!

Make sure that all of the following requirements are met:

- Tipsadapter have been removed.
- Line-power switch is in position "0".
- Power cable is unplugged from power multiple or line power socket.
- All microplates, reservoirs have been removed.
- The product and its components have been properly cleaned and disinfected in accordance with the rules for handling of currently processed materials and substances.
- The product is protected from sedimentation of dust.

11 Accessories & Spare Parts

11.1 Accessories

For further information regarding accessories/spare parts, you should contact the Customer Service Department of Analytik Jena GmbH+Co. KG.

12 Waste Disposal

12.1 Consumables

TIP

Consumable materials must be disposed in accordance with binding workplace safety and environmental provisions of law.

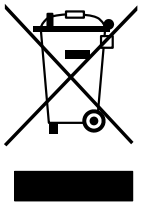
12.2 System, Components & Accessories

TIP

- Unless otherwise agreed, the pipettor system, including any of its components, must be disposed in accordance with currently binding regulations of law on termination of use.
- Action for disposal will be the responsibility of the system owner.

TIP

The procedures to be followed for disposal, including parts thereof, are legally based on these EC Directives and related rules for implementation in national legislations within the EC:



- EC Directive RoHS
- EC Directive waste electrical and electronic equipment