Instructions for use

Infrared Vortex Evaporator

CombiDancer II

prepared by

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Subject to change!

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1. Terms and symbols used

Certain terms and symbols are used in this manual and on the device to warn you of potential hazards or to prevent injury or property damage. To avoid accidents and damage, it is important that you read and follow these instructions. The terms and symbols are explained below.

1.1 Explanation of the terms used

	DANGER	Indicates a hazard with a high degree of risk which, if not avoided, will result in death or serious injury.
	WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

1.2 Explanation of the symbols used

	Symbol on the device: Attention, general danger area. Before using the device, please read the operating instructions and observe the safety instructions!
	Symbol in this document: Attention, general danger point. This symbol indicates safety-relevant information and indicates potentially dangerous situations. Failure to observe these instructions may result in property damage.
	Symbol in this document: This symbol indicates important facts.
	Symbol on the device and in this document: Biohazard warning.
	Symbol on the device and in this document: Warning about hot surfaces.
	Symbol on the device and in this document: Warning of hand injury
	Symbol on the device and in this document: Work may only be carried out under ESD-compliant conditions.
	Symbol on the device and in this document: Symbol for the separate collection of electrical and electronic equipment according to WEEE. Used in the countries of the European Union, Norway and Switzerland. The symbol of the crossed-out waste bin indicates that the device must not be disposed of with household waste.

Symbol in this document:
Unplug the power cord

Symbol in this document:
Wearing safety gloves

Symbol in this document:
Important or useful additional information

Attention! Read the operating instructions

2. Intended use and function

The device is an infrared vortex concentrator/evaporator. This evaporator is specially designed to allow the evaporation of liquids in an accelerated and gentle manner. During the entire process, the samples are continuously "shaken" to ensure even evaporation.

The evaporator is intended exclusively for the above-mentioned purpose. Any other or additional use is considered improper. The manufacturer or its authorized national representative is not liable for damage resulting from such improper use.

Proper use also includes observing all instructions in this manual and the manuals for the remaining system components such as the pump and chiller to dancer (cold trap) and other accessories, as well as the relevant guidelines for accident prevention and compliance with inspection and maintenance work.

If the evaporator is installed in another machine or integrated into a system, the manufacturer of the overall system is responsible for its safety, instruction, maintenance and care and its implementation.

The manufacturer's expected lifespan of the device is seven (7) years. The lifespan of some parts and accessories may vary, see chapter 9 Maintenance and service work as well as instructions for accessories.

2.1 Storage and transfer

This manual is part of the device and must always be kept in such a way that people working on the device have access to it. It is the owner's responsibility to ensure that people working on the device know where this manual is located. We recommend that it is always kept in a protected place near the device. Make sure that the manual is not damaged by heat or moisture. If the device is sold on or transported and reinstalled in another location, this manual must be included.

Other documents you need to consider:
- the separate operating instructions for the vacuum pumpand the vacuum controller
- the separate operating instructions for then Chiller to Dancer

For service, maintenance and repair work, contact Hettich customer service.

2.2 Owner's responsibility

This manual describes the structure, function, transport, operation and maintenance of the CombiDancer II in particular and as an evaporator in a system with a vacuum pump and Chiller To Dancer (cold trap) in general. It is intended for use by trained personnel who are responsible for operating and/or maintaining the respective device.

If you are tasked with working on the device, read these instructions carefully before starting work. Familiarize yourself with the safety regulations. Only carry out work that is described in these instructions. If you do not understand something or are missing information, ask your supervisor or contact the manufacturer or your country representative. Do not act on your own initiative.

The owner:

- is responsible for the safe installation of the device in accordance with specifications and applicable guidelines and laws.
- is responsible for the proper condition and operation of the device, in accordance with specifications and applicable guidelines and laws.
- is responsible for ensuring that the persons entrusted with operation or service are qualified for these tasks, have been appropriately instructed and are familiar with these operating instructions.
- must be familiar with the applicable guidelines, requirements and safety regulations and train employees accordingly.
- is responsible for ensuring that unauthorized persons do not have access to the device.
- is responsible for ensuring that the maintenance plan is followed and that maintenance work is carried out with due care.
- must, for example, ensure through appropriate instructions and inspections that the equipment and its operating environment are kept clean and tidy.
- is responsible for ensuring that operating personnel wear personal protective equipment (e.g. work clothing, protective gloves, etc.).
- must ensure that all qualifications, such as Installation Qualification (IQ), Operational Qualification (OQ) and Process Qualification (PQ), are in place before starting work with this equipment.
- is responsible for regular flushing, cleaning and disinfection of the device and for checking the required quality of the liquid used.
- ensures the protection of passwords and user settings

2.3 Requirements for operating personnel

The device may only be operated and maintained by adults who have received appropriate training. Persons who are in training or are to be trained on the device may only operate the device under the constant supervision of an experienced person. Repairs may only be carried out by qualified specialists who have been authorized by the manufacturer to carry out this work. In addition, the instructions provided by the manufacturer must be taken into account.

2.4 Changes and modifications

The device must not be subjected to any unauthorized changes or modifications. The device must not be supplemented with components that have not been approved by the manufacturer. Unauthorized changes or modifications will invalidate the EU declaration of conformity and the device may no longer be operated. The manufacturer shall not be liable for any damage, danger or injury of any kind resulting from unauthorized changes, modifications or failure to comply with the provisions in this manual.

2.5 Warranty

If not ALL instructions in this manual are followed, no warranty claim can be made against the manufacturer. The manufacturer rejects all warranty claims in the event of unauthorized modifications or installation of unauthorized components.

3. Safety instructions

If not ALL instructions in this manual are followed, no warranty claim can be made against the manufacturer.

Before using the device and accessories, read and follow the operating instructions. Only persons who have read and understood the operating instructions may operate the device.

The device and accessories must be set up so that it can be operated in a stable manner and the lid can be opened easily. Sufficient fresh air supply and appropriate exhaust air extraction must be ensured.

If the CombiDancer II is brought into the operating room from a cold environment, condensation may form. In such a case, the device should be allowed to acclimatize for at least 24 hours before it is put into operation.

Observe permissible ambient conditions and ensure sufficient supply of fresh air.

No solvent containers or other objects may be placed on the CombiDancer II.

When cleaning, never use abrasive materials or cleaning agents as this may damage the surface.

Never use blades or knives for cleaning or handling.

To clean the housing, use only a soft cloth moistened with lukewarm water.

The viewing window can be cleaned with commercially available window cleaner.

Caution	Wear personal protective equipment when handling chemicals and vacuum, including safety goggles.

Caution	The information on mains voltage and current consumption must be taken into account.

Caution	When the solvents evaporate, the vacuum pump creates a vacuum. The relevant safety regulations for generating and measuring vacuum must therefore be taken into account. In this context, also observe the operating instructions for the vacuum pump used.

Caution	Only qualified personnel may work on the device. Only use original parts and accessories. Using components from other manufacturers may limit the functionality and safety of the device as well as its electromagnetic compatibility.

Danger	Only connect the CombiDancer II to a protective contact socket that is equipped with a residual current device. Only use flawless power cables that comply with the regulations. Defective or inadequate earthing can pose a life-threatening danger.

warning	When working with hazardous substances (according to the Hazardous Substances Ordinance (GefStoffV)), appropriate protective measures must be taken in accordance with local regulations, e.g. keeping the device and accessories under a fume hood. When using such substances, they can become airborne - especially during the process and after opening the device.

In addition to the operating instructions and the binding accident prevention regulations, the recognized technical rules for safe and professional work must also be taken into account. This operating manual must be read together with the national environmental protection and safety regulations of the respective country of operation.

3.1 Improper use

Improper use or application that does not comply with the technical data may result in personal injury or property damage.

Danger	Operation under impermissible environmental and operating conditions. Operation in the event of obvious malfunctions, damage, or defective safety precautions. Handling the device and its accessories with sharp-edged, pointed objects.

3.2 Misuse

Danger	The use of the entire system or individual components in potentially explosive environments. Working with oxidizing and pyrophoric, as well as unstable and explosive substances, liquids or solids.

3.3 Residual risks

The device is built according to the state of the art and is safe to operate. However, it may pose a risk to the user or third parties if it is not used by trained personnel or is used improperly or for purposes other than those intended.

The machine may only be used for its intended purpose and only when in a safe and perfect condition.

Faults that may affect safety must be eliminated immediately. The device must not be put into operation until these faults have been eliminated.

The device has been designed for a closed network, i.e. the operating computer must not be connected to any public network. If the operating computer has to be temporarily connected to the public network for maintenance work, a second network connection on the operating computer is essential.

3.4 Resistance of the vacuum chamber

According to our chrome steel supplier Nirosta®, the evaporation of the following chemicals poses the risk of abrasive surface corrosion, pitting, crevice corrosion or stress cracking.

This could cause a vacuum leak:

- Aluminium chloride (AlCl3 * 6H2O), ammonium bifluoride (NH4HF2), ammonium chloride (NH4Cl), aniline hydrochloride (C6H5NH2HCl), antimony trichloride (SbCl3).
- Barium chloride (BaCl2 *2H2O), blood (in the presence of salt, pitting and crevice corrosion can occur, especially in pig blood), bromine (Br2), bromine water.
- Calcium chloride (CaCl2 * 6H2O), calcium hypochloride (Ca(OCl)2 * 4H2O), chlorine (Cl2), chlorinated lime ((3CaCl(OCl) * Ca(OH)2) * 5H2O), chlorinated acid (HClO3), chlorosulfonic acid (HSO3Cl), chlorinated water, hydrogen chloride gas (HCl).
- Iron-III-chloride (FeCl3), iron gall ink (salt-containing ink can lead to pitting and crevice corrosion)
- Hydrofluoric acid (HF)
- Mine water
- urine
- Iodine (J2), iodine tincture
- Potassium bifluoride (KHF2), potassium bromide (KBr), potassium chloride (KCl), potassium hypochloride (KClO), aqua regia (HCl + HNO3), copper(II) chloride (CuCl2 * 2H2O).
- Magnesium chloride (MgCl2 * 6H2O), monochloroacetic acid (CH2ClCOOH)
- Sodium chloride (NaCl), sodium chlorite (NaClO2), sodium hypochlorite (NaClO)
- Nickel chloride (NiCl2 * 6H2O)
- Photographic fixer, pickling solution, pink salt ((NH4)2(SnCl6))
- Mercury-II-chloride (HgCl2)
- Hydrochloric acid (HCl), sauerkraut brine, sulphuric acid (H2SO4), sea water, mustard, silver bromide (AgBr), silver chloride (AgCl)
- Toluenesulfonic chloramide sodium (CH3C6H4SO2NClNa * 3H2O), trichloroacetic acid (CCl3COOH)
- Water, acidic (mine water, depending on the chloride concentration), zinc chloride (ZnCl2), tin-IV-chloride (SnCl4), tin ammonium hexachloride.

⚠ When evaporating the above-mentioned solvents with the CombiDancer II, we recommend daily flushing and thorough cleaning of the vacuum chamber.

This also includes the rack, the hose connection system to the vacuum pump and, if applicable, to the chiller to dancer.

ATTENTION!!! Despite all preventive measures, it cannot be guaranteed that no signs of wear will occur over the service life.

⚠ It is recommended to integrate an aeration phase into the program after the process has been completed. This serves to remove any solvents from the system and the associated lines.

4. Device overview

4.1 Technical data

Manufacturer	Hettich AG, CH-8806 Baech	
Model	CombiDancer II	
Type	C2.1002	C2.1001
UDI-DI	07640173559023	07640173559016
Mains voltage	230V, 1~, ±10%	100V - 120V, 1~, ±10%
Grid frequency	50Hz	60Hz
Power consumption	1800 Watts	
Device fuse	T10A	T16A
Overvoltage category	II (according to IEC 60364-4-443)	
Device protection class	I	
EMC	IEC 61326-1 / FCC CFR47, Part 15, Edition 2015, Class A	
Heating capacity	1000 Watts	
Vacuum chamber volume	approx. 18 liters / 360mm diameter	
Vacuum chamber material	1.4301 (10088-2, 304, V2A)	
Shaking plate	1.4301 (10088-2, 304, V2A)	
Vacuum connection	DN25	
max. applicable vacuum	5mbar	
Ventilation connection	6mm Swagelock® hose connection, max. 3bar; 43psi	
Location:		
Environmental conditions IEC61010-1	Not suitable for use in potentially explosive environments, indoor use only	
Geographical height	up to 2000 m above sea level	
Ambient temperature	18 °C to 30 °C	
Humidity	25%RH to 80%RH / non-condensing	
Storage/transport conditions	5°C to 50°C / 20% to max. 60% relF non-condensing	
Degree of contamination	2	
Dimensions:		
Width	765mm (930mm with open lid)	
Depth	600mm (670mm with ext. vacuum sensor)	
Height	450mm (650mm including air circulation)	
Weight	approx. 65 kg	
Shaker speed	0 rpm to 1000 rpm	
max. loading of the shaking plate	6000g (including shaking plate) – must not be exceeded	
max. height of sample vessels	145mm	

4.2 Software

With the CombiDancer II, a distinction was made between GUI app (user interface) and firmware (basic control software of the device).

The CombiDancer II is delivered with the latest software.

The features described in this manual refer to the latest version of the GUI app (v1.0.15 or higher) and the CombiDancer II firmware (v1.0.11 or higher).

The status of the software is displayed in the GUI app. However, the status of the firmware (FW) only becomes visible once a connection has been established with the CombiDancer II:

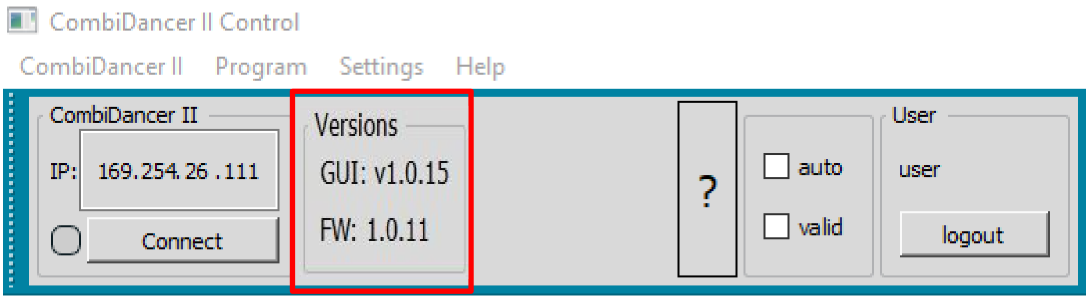


Illustration 1: Software version on the GUI app

☞ In order to connect the computer to the device, you must be logged in (standard user or service user). See chapter 6.3.1 Overview of connections.

☞ The service user has an extended representation on the GUI app and can create additional users.

4.3 Device views

4.3.1 Front view

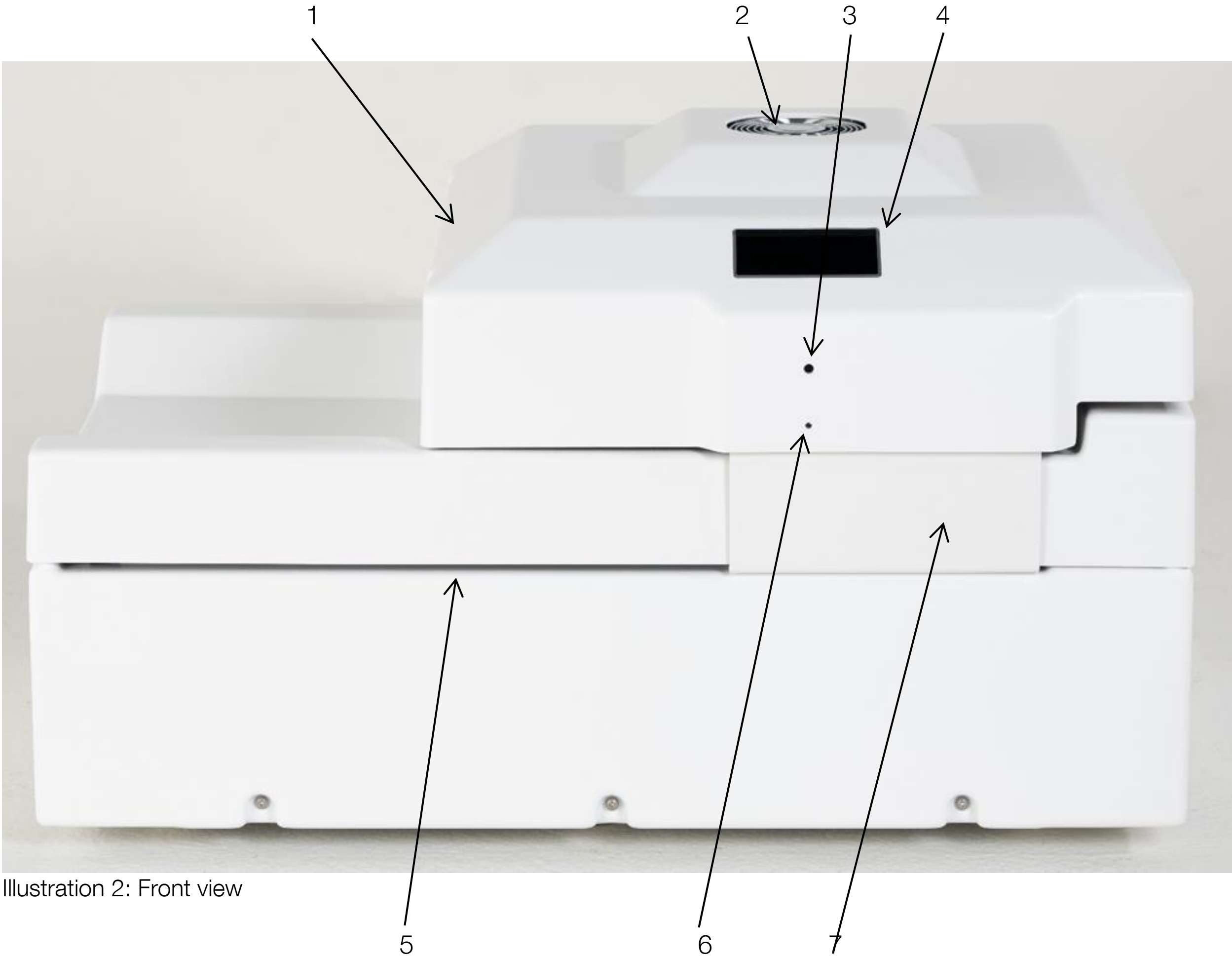


Illustration 2: Front view

Legend:

1. Cover housing
2. Ventilation slots for fan, lid
3. Emergency opening, glass lifting mechanism
4. Viewing window
5. Travel path for carrying handle cover
6. Interlocking glass motor, front
7. Carrying handle lid

Caution	Be careful of moving parts when opening and closing the lid. Be careful near the lid rail. Keep your distance when operating the device, especially when opening and closing the lid.

4.3.2 Rear view

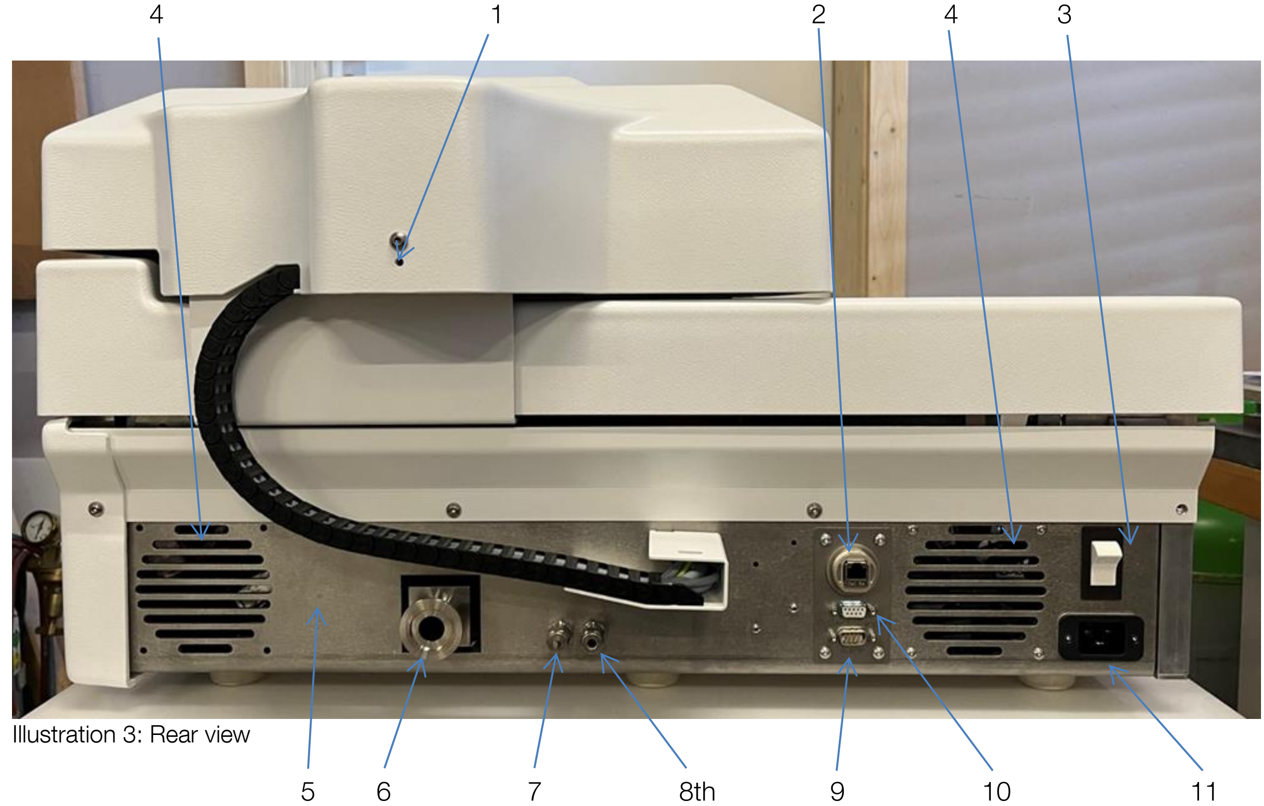


Illustration 3: Rear view

Legend:

1. Interlocking glass motor, rear
2. RJ45 LAN port (Ethernet, for PC)
3. Power switch, power on-off (bottom-top)
4. Ventilation slots, rear
5. Marking (type plate)
6. Vacuum connection
7. Inert input or connection, optional
8. Ventilation inlet or connection
9. Output Alarm / Status
10. Connection for Chiller To Dancer
11. Device socket power input

⚠ When connecting the power plug, pay attention to the mains voltage and frequency. If the mains voltage/frequency is incorrect, the device may be damaged.

⚠ Do not block the ventilation slots as this could cause the device to overheat.

This also applies to the ventilation slot on the top of the lid.

⚠ When setting up and operating the device, care must be taken to ensure that the cable chain can move freely and cannot get caught anywhere.

☞ The ventilation outlet must either be connected to a central exhaust system or led out of the work area to ensure orderly discharge of the exhaust air.

For connection dimensions see chapter 4.1 Technical data.

4.3.3 View with open lid

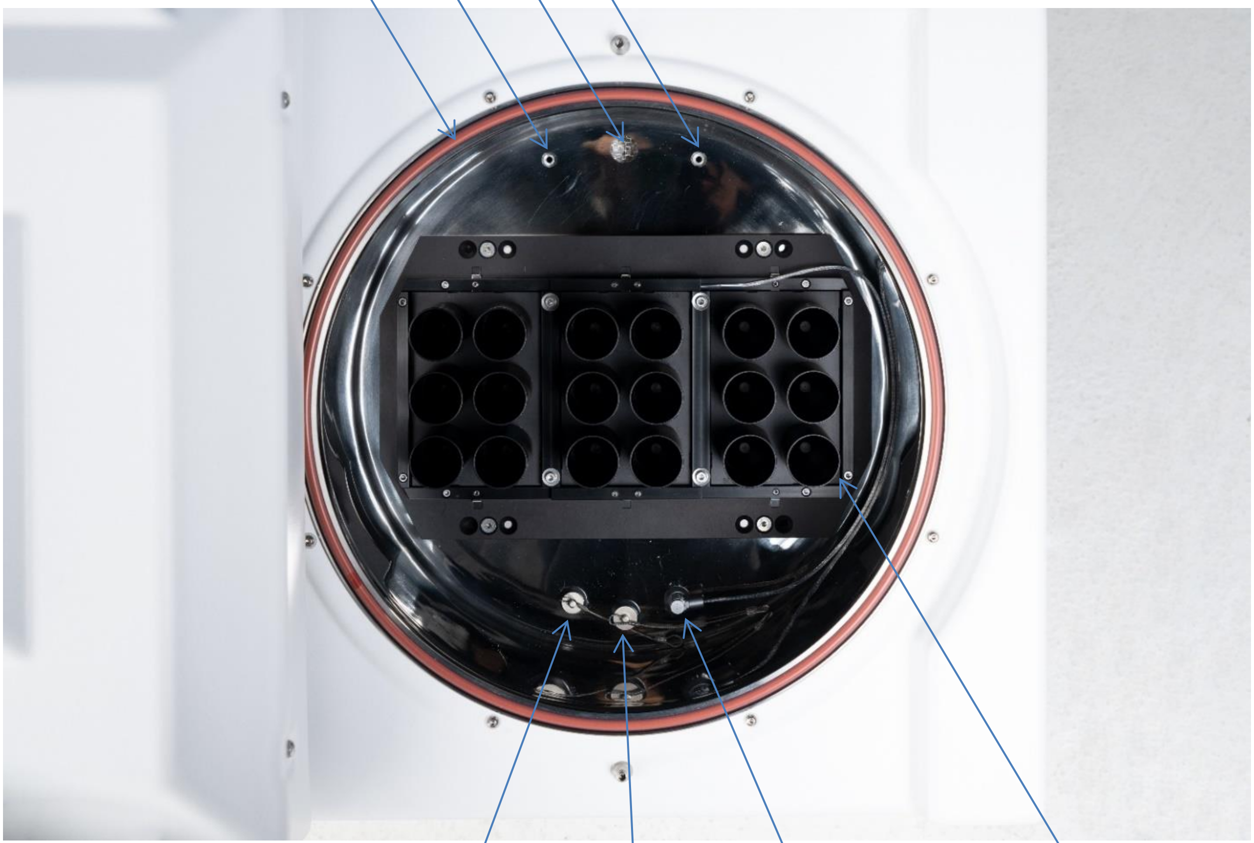


Illustration 4: View with open lid

Legend:

1. O-ring
2. Release inert gas (optional)
3. Outlet for vacuum connection
4. Release Vacuum
5. Temperature sensor T1 – IR emitter
6. T3 (optional – not yet available)
7. Temperature sensor T4 – Probe (optional)
8. Rack with block inserts

The O-ring contributes to the tightness of the system. When handling samples, care must be taken not to damage the O-ring.

Instead of block inserts, microtiter plates or DWP can also be used.

Caution

When removing samples or the rack, be aware of the risk of burns on the vacuum chamber wall and the equipment inside the vacuum chamber, such as temperature sensors, block inserts, sample vessels, etc.

4.3.4 Side view, left

Illustration5: Side view, left

The cover on the left side can be opened by loosening 5 screws (four on the left side, one on the back) to gain access to the PCB and microSD card.

When working inside the device, it must be switched off and disconnected from the power supply.

In addition, ESD protection must be used.

4.3.5 Installation of optional external vacuum sensor

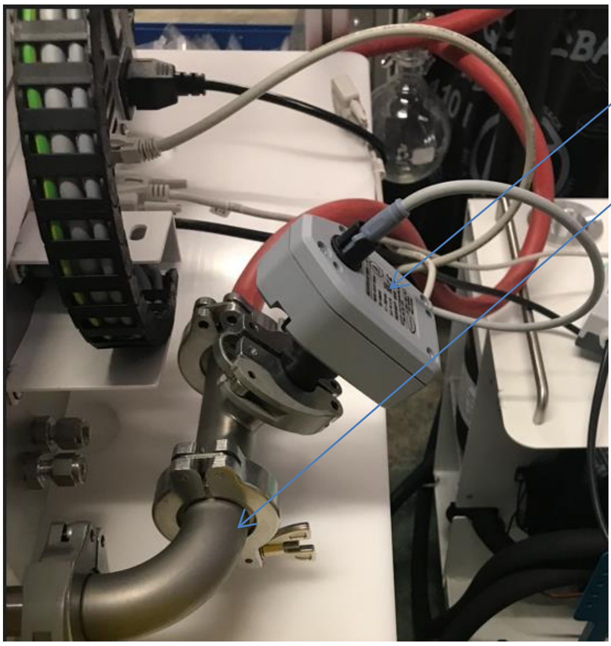


Illustration 6: Installation of external vacuum sensor

Legend:

1. External vacuum sensor (mounting vacuum sensor at an angle of 45°±15°).
2. Connection from the CombiDancer II to the vacuum pump.

With the external vacuum sensor you can measure the pressure as close to the vacuum chamber as possible.

The ventilation valve integrated in the external vacuum sensor allows the vacuum chamber to be slowly ventilated. This reduces the likelihood of the sample foaming over.

If the vacuum sensor is not installed correctly, it may not produce correct measurement results.

Please refer to the relevant sensor instructions.

4.3.6 Shaking plate

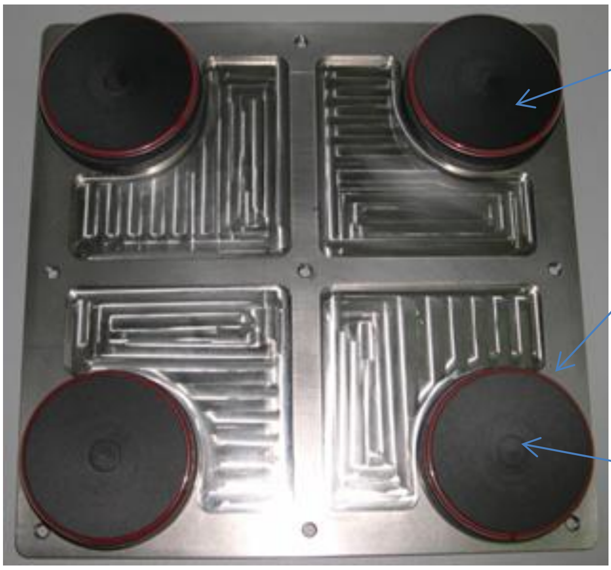


Illustration 7: Shaking plate, from below

Legend:

1. Foot, set of 4, including O-ring and magnet (CD.M125)
2. O-ring, set of 4 (CD.M101)
3. Slight elevation on the base (during operation, the shaking plate slides on these elevations -> when inserting, do not press too hard so that these elevations are not pressed in)

The shaker plate is supplied with each device. The rack must be mounted on the shaker plate (the shaker plate is screwed to the rack).

When inserting the shaking plate into the device, care must be taken to ensure that it can move freely in the recesses provided in the vacuum chamber.

Treat carefully.

4.3.7 Rack2000

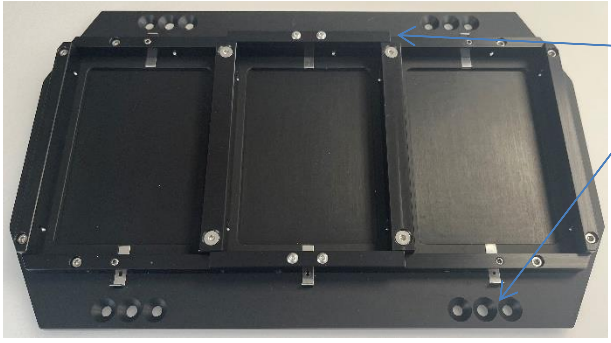


Illustration 8: Rack2000

Legend:
1. Hole for the temperature sensor
2. Holes (4 pieces) for fastening to the shaking plate.

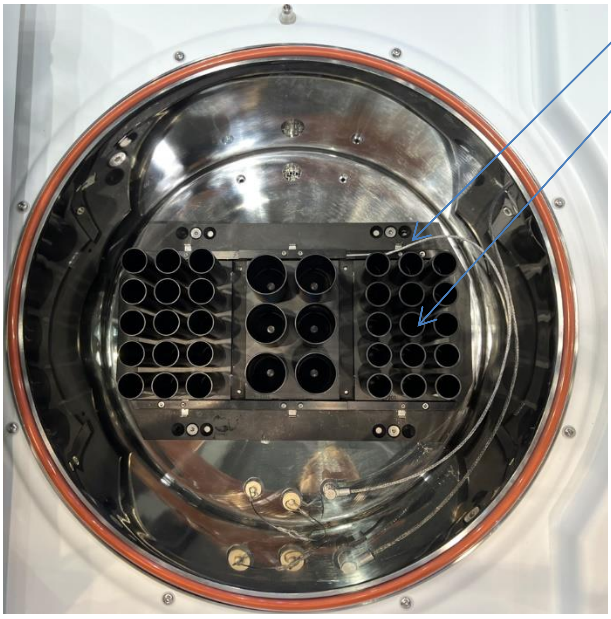


Illustration 9: Example of a built-in rack including block inserts

3. Mounted temperature sensor
4. Block inserts (as an example, various types of block inserts are mounted here). It is important to ensure that the maximum weight is not exceeded (see chapter 4.1 Technical data).

The rack is made of black anodized aluminum. Proper functioning of the device can only be guaranteed when original racks are used.

To ensure optimal heat transfer and homogeneity during evaporation, only the sample tubes intended and approved for this purpose should be used in rack or block inserts.

If glass tubes with an outer diameter that is too small compared to the inner diameter of the rack bore or rack sleeve are used, this can lead to the tube shearing off (glass breakage) during shaking (vortex).

Self-built racks or superstructures not approved by the manufacturer or its national representative will invalidate the warranty.

When removing the rack, the temperature sensor must first be removed from the hole and put aside to prevent the PTFE sheath of the temperature sensor or temperature sensor cable from being kinked or abraded.

Bending the temperature sensor can cause the sensor to break and the device to stop working.

If the PTFE sheath of the temperature sensor is abraded, this can lead to a leak, meaning that the vacuum pump can no longer reach the final value. In both cases, the warranty for a new temperature sensor, its installation and any travel costs will be void.

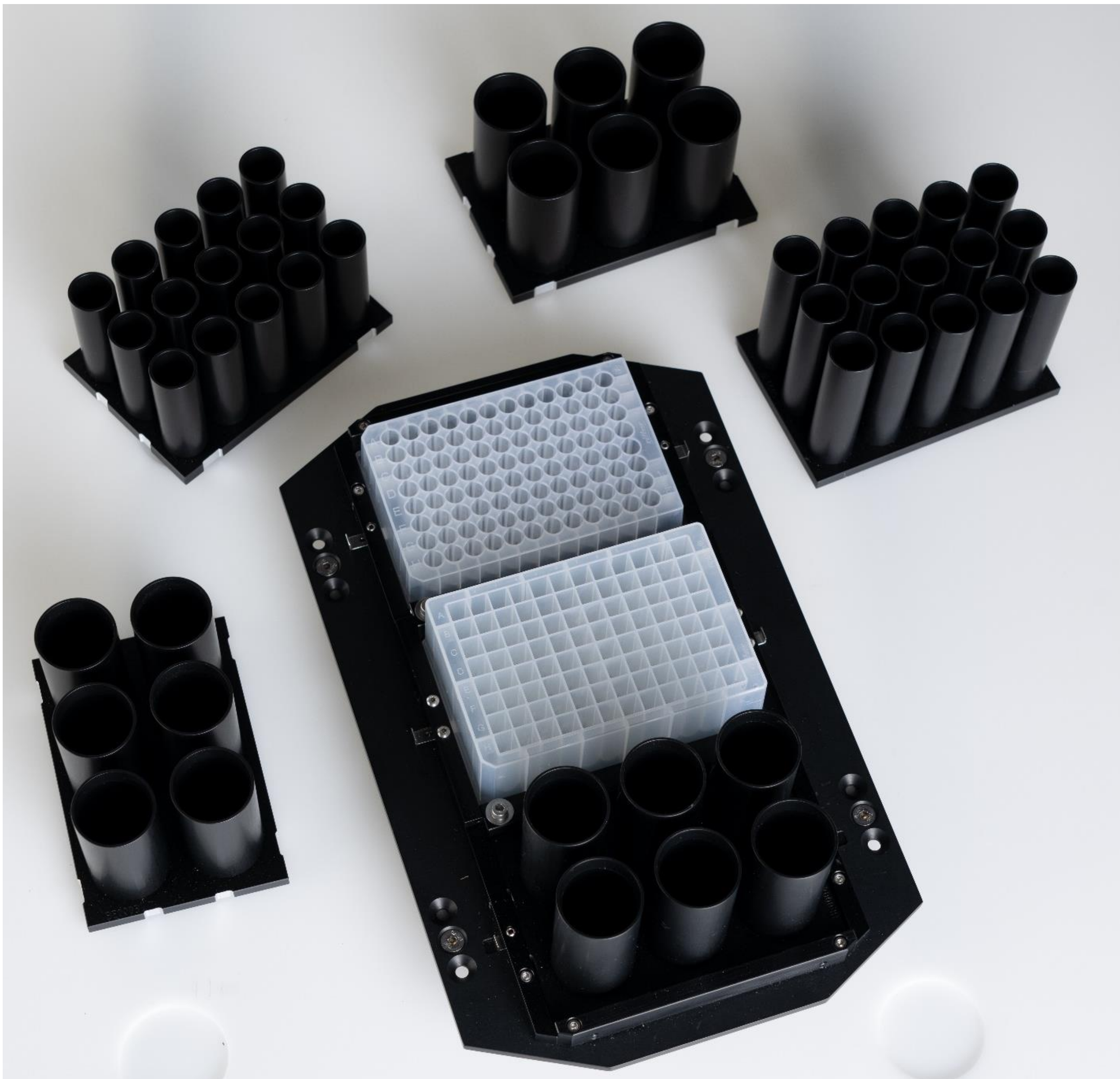


Illustration 10: Rack 2000 with various inserts

If the surface of the rack or the block inserts is damaged (e.g. the black anodized layer is flaking off), heat transfer can no longer be guaranteed.

For further information see chapter 6.6 Installation of the Rack 2000 and the shaker plate

4.4 The individual components

4.4.1 Vent valve

The vent valve is used to shut off or open the ventilation inlet on the back of the device (see chapter 4.3.2 rear view).

The valve opens when the power is off so that samples can be taken from the device in the event of a power failure.

Illustration 11: Control of the ventilation valve in the GUI app

The vent valve installed in the device is used for express venting of the vacuum chamber. Express venting increases the probability of the sample foaming over.

To prevent over-foaming, see chapter 7.5.1 Example - Slow venting at the end of the process.

When operating a Vacuubrand diaphragm pump in “Automatic Evaporation” mode, the vent valve must not be opened during the cycle. Otherwise, the cycle must be restarted from the beginning to avoid over-effervescence of the samples.

If it is not possible to create a vacuum, the vent valve may be open. The vent valve must be closed in order to create a vacuum.

warning

When ventilating or opening the device, residual amounts of solvent may remain in the vacuum chamber.

The ventilation outlet must either be connected to a central exhaust system or led out of the work area to ensure orderly discharge of the exhaust air.

For connection dimensions see chapter 4.1 Technical data.

4.4.2 Jacket heating

The jacket heating is used to heat the vacuum chamber wall. By heating the vacuum chamber wall, condensation of solvent gases on the cold vacuum chamber wall is reduced or completely prevented.

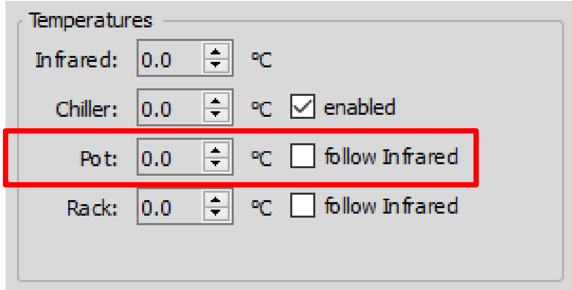


Illustration 12: Control of the jacket heating in the GUI app

The jacket heating can be coupled to the set temperature of the IR emitter using the “follow Infrared” command.

It is recommended not to set the jacket heating above 40°C.

At a temperature of 80°C the thermal switches switch and the heating of the jacket heater is interrupted.

The thermal switches must be reset manually for safety reasons. Please contact the responsible service personnel.

Caution

When removing samples or the rack, be aware of the risk of burns on the vacuum chamber wall and the equipment inside the vacuum chamber, such as temperature sensors, block inserts, sample vessels, etc.

warning

For safety reasons, jacket heating should not be used when evaporating volatile solvents, as there is a risk of the gas/air mixture igniting. Consult the data sheet for the respective solvent.

4.4.3 IR emitters

The two infrared emitters (IR emitters) are used to heat the sample. They are located in the lid of the device.

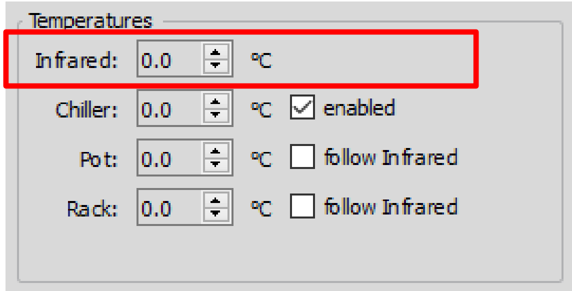


Illustration 13: Control of the IR emitter in the GUI app

At a temperature of 80°C the thermal switches switch on and the control of the IR emitters is interrupted.

The thermal switches must be reset manually for safety reasons. Please contact the responsible service personnel.

See Chapter 7.3.1 Create a program regarding recommended temperature values.

The IR emission curve can be seen in the infrared spectrum of the IR emitters below (2400K curve).

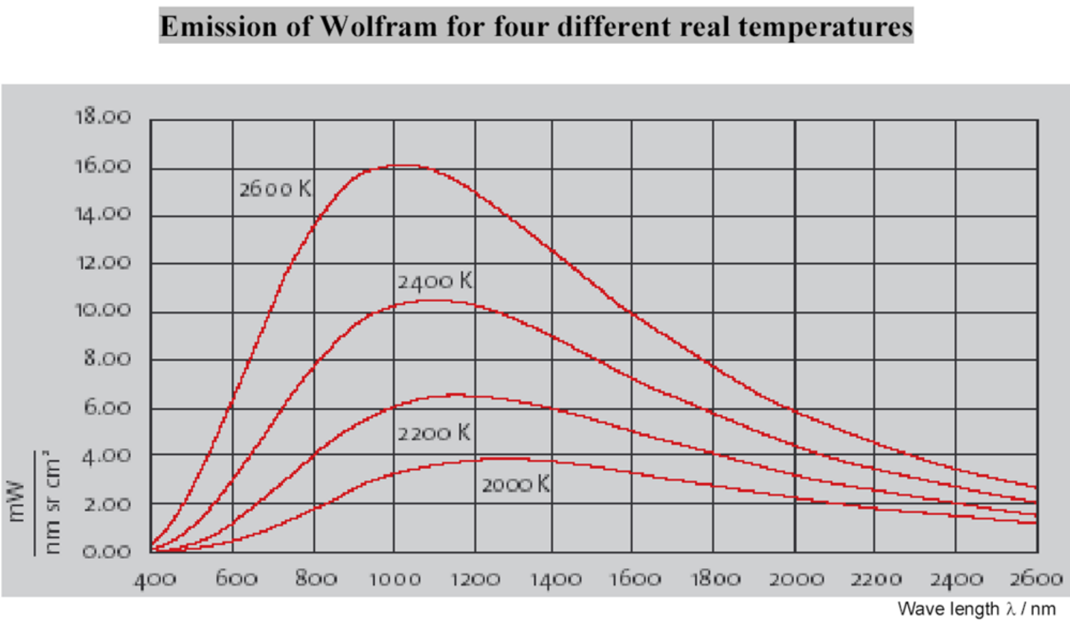


Illustration 14: IR emission curve of the IR emitter

When replacing the IR tubes, always make sure that the new tubes are NEVER touched directly with your fingers! Always use a lint-free cloth!

4.4.4 Vortex drive

The vortex drive (shaker) is responsible for the orbital shaking of the samples.

In the GUI app, this can be set from 0rpm to 1000rpm, depending on the loading and filling of the sample vessels. A speed lower than 100rpm can be unfavorable from a process engineering perspective.

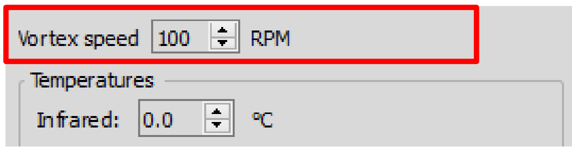


Illustration 15: Controlling the Vortex drive in the GUI app

The vortex speed depends on the load and the filling of the sample vessels.

For regular operation, the vortex speed is between 400rpm to 500rpm.

The higher the load/filling, the slower the speed should be. With a low load and an advanced degree of evaporation, the speed can be selected higher.

Excessive loading can damage the vortex drive. For the maximum load, see chapter 4.1 Technical data.

Excessive speed combined with excessive loading can damage the vortex drive.

4.4.5 Lid and glass motor

The lid and glass seal the vacuum chamber, vacuum tight. They are controlled via the GUI app.

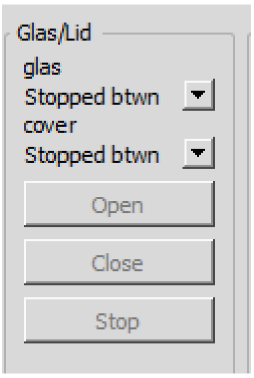


Illustration 16: Control of the lid and glass motor in the GUI app

Care must be taken to ensure that the sample vessels or other objects inside the device do not protrude beyond the edge of the vacuum chamber. See max. height of sample vessels chapter 4.1 Technical data.

Caution

Be careful of moving parts when opening and closing the lid.

Be careful near the lid rail.

Keep your distance when operating the device, especially when opening and closing the lid.

4.4.6 LED lighting

The LED lighting is used to illuminate the interior of the device.

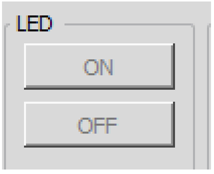


Illustration 17: Control of LED lighting in the GUI app

4.4.7 Temperature sensors

The temperature sensors display the current temperature at the corresponding locations.

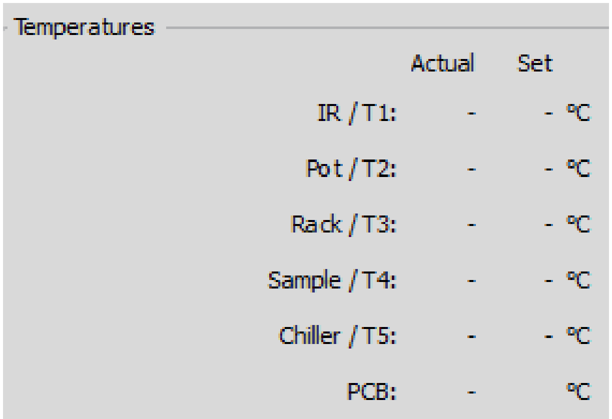


Illustration 18: Overview of temperature measurements in the GUI app

T1: Temperature IR emitter
T2: Temperature jacket heating

T4: Temperature probe (optional)

T5: Temperature Glycol in Chiller To Dancer

PCBs: Temperature of the PCB board in the device

The temperature sensor T1 and the optional temperature sensor T4 are both connected in the vacuum chamber. For details see chapter 4.3.3 View with lid open.

The optional T4 temperature sensor can be used to measure the temperature in the sample, which can be beneficial for the process.

The two temperature sensors T1 and T4 are mounted on the movable rack and in the sample respectively. It is important to ensure that the sensor cable is carefully routed to ensure that it cannot be damaged during operation.

Caution

Before working in the vacuum chamber, the device should first cool down. To speed up the cooling process, open the lid.

Alternatively, a process step can be installed in which heating is no longer used and the ventilation valve is opened at the same time. See chapter 4.4.1 Ventilation valve.

warning

Depending on the type of samples, you should consider the potential biological hazard. Wear appropriate protective gloves and goggles and disinfect the device before use.

Risk of contamination for the user due to insufficient cleaning or failure to follow cleaning instructions.

4.4.8 Inert gas valve (optional)

The inert gas valve is available as an option.

If this was not ordered, the inlet on the back of the device is closed with a plug.

To retrofit the inert gas valve, a large part of the device must be dismantled. It is recommended that the device be returned to the manufacturer for retrofitting.

The inert gas valve is used to shut off or open the inert gas inlet on the back of the device (see chapter 4.3.2 rear view).

The valve closes when the power is off so that no inert gas flows into the vacuum chamber or work area in the event of a power failure.

Illustration 19: Control of the inert gas valve in the GUI app

To ensure that all residues that may remain in the vacuum chamber after the process are removed, the vacuum chamber should be flushed several times with inert gas.

The exact definition of the flushing processes is the responsibility of the process specialist.

warning

The device does not have a leak measurement or leak warning.

When working with inert gas, a leak measurement (e.g. CO2 measurement etc.) or leak warning must be installed in the room or on the inert gas system.

The ventilation outlet must either be connected to a central exhaust system or led out of the work area to ensure orderly discharge of the exhaust air.

For connection dimensions see chapter 4.1 Technical data.

5. Transport and Storage

5.1 Scope of delivery

1x CombiDancer II, including shaking plate
1x Rack 2000 for three (3) DWP, microtiter plates or block inserts
1x Power cable
1x GUI app and user manual as download

«Optional» depending on the order:
3x Block inserts
1x Chiller to Dancer, with Initial filling of glycol in a container
1x Emission condenser including valve and connections for Chiller to Dancer

1x Hose set consisting of T-connection and adapter to chemical vacuum pump
1x Vacuum pump
1x External vacuum sensor with ventilation valve

Please inform the manufacturer or dealer if the delivery is incomplete.

5.2 Transport

The device may only be transported upright and with the lid closed – the device must be switched off for at least 2 hours before transport.

If the device has to be transported, e.g. for a move or for repairs at the manufacturer or supplier, we recommend using the original packaging; if necessary, order new packaging.

warning

Devices, device components or accessories that have already been used and are to be returned must be properly decontaminated, cleaned and marked with an appropriate note (decontamination declaration) before shipment in order to protect people, the environment and materials.

We reserve the right to refuse acceptance of contaminated equipment or accessories.

Any costs incurred for cleaning and disinfection measures will be invoiced to the customer placed.

To return the device or device components via local device dealers, a Return Material Authorization (RMA) number must be requested.

For transport conditions see chapter 4.1 Technical data.

5.3 Storage

5.3.1 Storage after delivery

If storage is necessary after delivery of the device, check the packaging for external damage and, if necessary, inform the transport company and the dealer.

Device must be stored in the original packaging.

For storage conditions see chapter 4.1 Technical data.

5.3.2 Storage after decommissioning

warning	Before storing the device, device components or accessories, it must be decontaminated and cleaned for the safety of people, the environment and property. It is recommended to affix a note to the device indicating the date, signature and cleaning/disinfecting solution used.

In addition, the conditions set out in the previous chapter apply.

6. Installation

6.1 Unpacking and lifting

If the packaging arrives damaged, this must be confirmed by the transport company and the device must be specifically inspected.

To avoid damage, do not unpack the device until you reach the installation site. Check the delivery note for completeness. Check the device for damage.

Do not lift by the front panel or the lid. Be aware of the weight of the CombiDancer II, see chapter 4.1 Technical data. Danger of cuts on the edges of the box when unpacking the device!

With the required number of helpers, lift the device on both sides and remove it from the box. Use carrying straps if available.

If possible, lift the CombiDancer II transport pallet to the height of the transport trolley using a forklift, relocate it and bring it to the installation site

According to the laboratory equipment standard EN / IEC 61010-2-020, the building's electrical installation must be equipped with an emergency stop switch to interrupt the power supply in the event of a fault. This emergency stop switch must be installed away from the device, preferably outside the device's operating room or near the exit.

Caution

Set up the device in a suitable location and level it. When setting it up, the safety area of 300 mm required in EN / IEC 61010-2-020 must be maintained all around the device. During operation of the device, no persons, dangerous substances or objects must be within a safety area of 300 mm around the device in accordance with EN / IEC 61010-2-020.

NON STERILE

The device was packaged under non-sterile conditions.

If the delivery note contains any discrepancies, or if there are any damages or irregularities, do not operate the device but first inform the transport company and the dealer.

If possible, store transport materials and transport locks in a safe and dry place.

6.1.1 Disposal of packaging material

Disposal of packaging materials (cardboard, polyurethane foam, plastic bags and straps) must be carried out in accordance with the waste disposal regulations applicable in the respective country. If you have any further questions, please contact your local product distributor. We recommend keeping at least one set of the original packaging for transport purposes.

6.2 Installation and connecting

6.2.1 Installation after storage

If the storage conditions were outside the conditions specified for the operating environment, the device must first be allowed to acclimatize to the new environment for 24 hours while still disconnected.

6.2.2 Installation location

The device must be installed in such a way that it can be operated in a stable manner.

Sufficient fresh air supply must be ensured, the ventilation slots must not be obstructed or blocked with fabric, paper, a folder, etc., a distance of at least 20cm from any obstacle must be maintained. The fan should always work at the same time as the IR emitter, with the lid closed.

The device must be installed in such a way that no containers containing liquids, for example, can fall onto the device.

When using the device for the first time, do not leave it unattended until it has reached a steady state.

Danger

Please note that the device described here and its accessories are not explosion-proof (they do not comply with the German professional association regulation VBG 24). Explosive gas/air mixtures must not be created in the immediate vicinity of the device.

Heavy dust or aggressive fumes in the vicinity of the device can lead to deposits inside the device and, as a result, to short circuits or damage to the electronics. Therefore, adequate precautions must be taken to prevent heavy dust and aggressive fumes in the immediate vicinity of the device.

For any cleaning and repair work, a minimum distance of 30 cm all around from other devices or partitions is recommended when dismantling the side panels and the glass pane.

The device and its accessories operate unstable, i.e. these devices must not be placed on the same work surface as, for example, a microbalance, microscope, HPLC, sensitive analytical devices, storage area for samples, cell cultures, etc.

The device has been designed for a closed, non-public network, i.e. the operating computer must not be connected to any public network.

If the device is nevertheless connected to a public network, it is the operator's responsibility to ensure cybersecurity.

If the device and its accessories are integrated into a robot system, the responsibility for implementation lies with the supplier of the robot system.

6.2.3 Mains connection

When connecting the power plug, pay attention to the mains voltage and frequency. If the mains voltage/frequency is incorrect, the device may be damaged.

6.3 Data connection and communication

6.3.1 Overview of connections

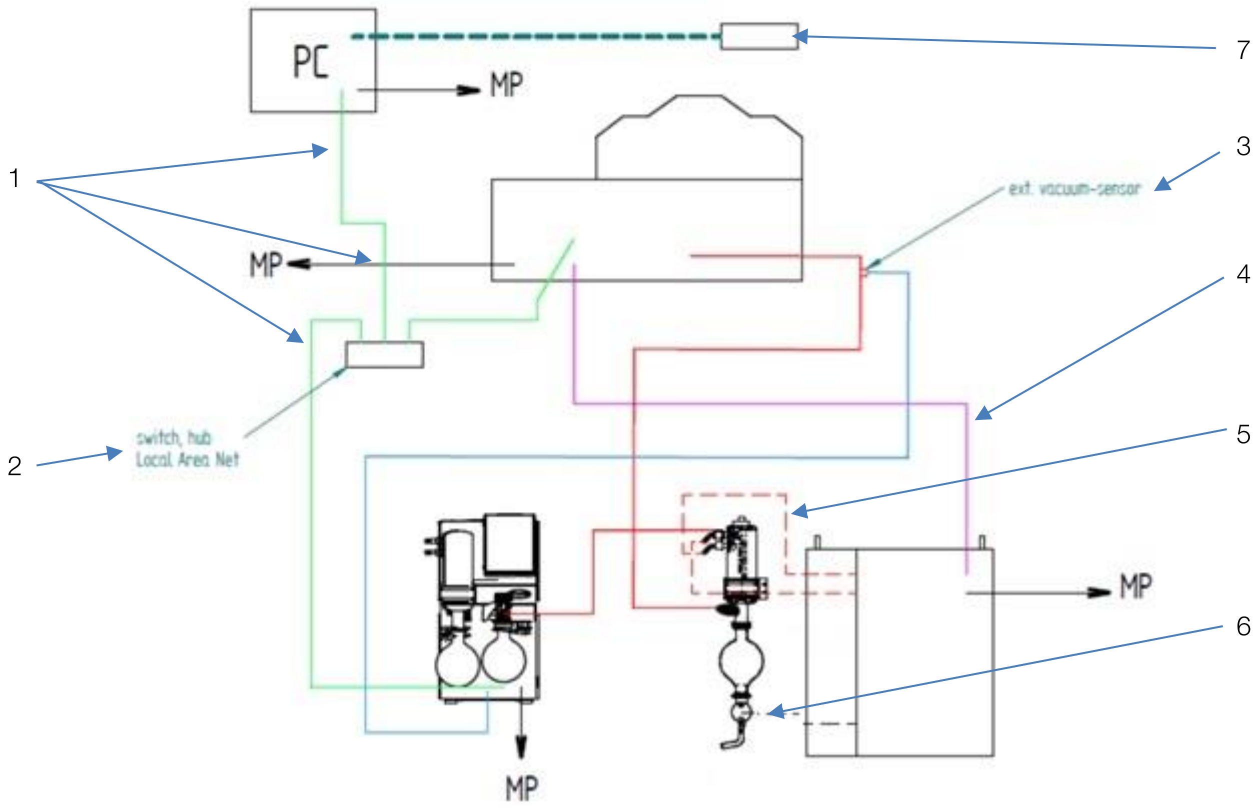


Illustration 20: Overview of connections

Legend:
MP power connection

1. LAN connection (System / Robotic)
2. Switch hub (e.g. Netgear® GS308EP)
   not included in the delivery
3. External vacuum sensor - optional
4. Connection, CD II / Chiller to Dancer, analogue (24VDC)
5. Cooling circuit, glycol mixture
6. Valve, Waste 2
7. Firewall / router / modem for occasional, short-term remote maintenance work, via a second network connection

For an initial functional check, the CombiDancer II can be connected directly to a computer without a switch hub, but the pump cannot be controlled.

The factory default IP address is 169.254.26.111

To connect to the CombiDancer II, you must first log in:
Name: user
PW: user

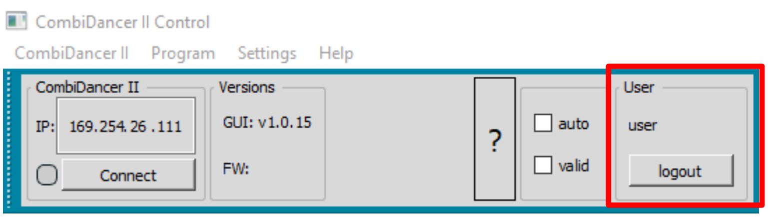


Illustration 21: Login overview in the GUI-APP

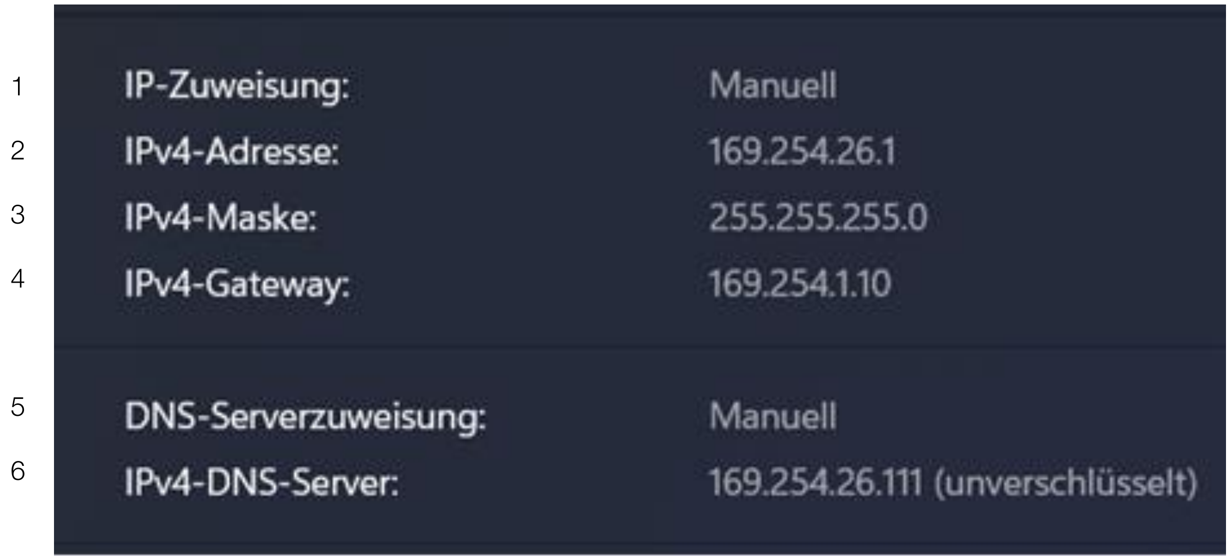
6.3.2 Requirements for the operating computer

The following minimum requirements apply to the operating computer:

- Windows 10 Pro or higher
- 8GB RAM
- Network connection with RJ45
- USB-A port

☞ Recommendation:
- SSD storage device (not a mechanical hard disk)
- 16GB RAM
- USB-C port
- microSD slot

6.3.3 Network adapter settings on the operating computer



Legend:
1. IP Assignment – Manual
2. IPv4 address
3. IPv4 mask
4. IPv4 gateway
5. DNS Server Assignment – Manual
6. IPv4 DNS server: - (unencrypted)

☞ The assistance of an IT specialist can be helpful when setting up the network settings.

6.3.4 Choosing the IP address

The factory-set IP address of the CombiDancer II is: 169.254.26.111

☞ The pump must be set in the same IP address range, see table, i.e. in the range 169.254.1 (already used by the PC here) to 169.254.26.254 (note exclusions according to note*)

Scenario	1 PC, 2 CDII, 2 pumps. both systems (CD II & pump) connected to the same LAN switch (Netgear)				
	IP Address	Subnet	port	grade	Grade *
PC, LAN 1	169.254.26.1	255.255.255.0			
CD II, Device A	169.254.26.111	255.255.255.0		The IP address is on the micro SD card	
Pump A	169.254.26.100	255.255.255.0	502	After having connected the GUI-app 1 / A to the CDII, use the service menu to setup the pump IP (169.254.26.100) and port (502) and use the "save" button in the lower left to save all settings	A
PC, LAN 1	169.254.26.1	255.255.255.0			
CD II, Device B	169.254.26.211	255.255.255.0	502	Edit the IP address onto the micro SD card from 169.254.26.111 to 169.254.26.211)	C
Pump B	169.254.26.200	255.255.255.0	502	After having connected the GUI-app 2 / B to the CDII, use the service menu to setup the pump IP (169.254.26.200) and port (502) and use the "save" button in the lower left to save all settings	B

Grade* A:
Lowest possibility: 169.254.26.2
Highest possibility: 169.254.26.254
Except: 169.254.26.100, 169.254.26.111, 169.254.26.200

Grade* B:
Lowest possibility: 169.254.26.2
Highest possibility: 169.254.26.254
Except: 169.254.26.100, 169.254.26.111, 169.254.26.211

Grade* C:
Lowest possibility: 169.254.26.2
Highest possibility: 169.254.26.254
Except: 169.254.26.100, 169.254.26.111, 169.254.26.21

Scenario	1 PC, 2 CDII, 2 pumps. both systems (CD II & pump) connected to a separate LAN switch (Netgear)				
	IP Address	Subnet	port	grade	Grade*
PC, LAN 1 / A	169.254.26.1				
CD II, Device A	169.254.26.111	255.255.255.0		The IP address is on the micro SD card	
Pump A	169.254.26.100	255.255.255.0	502	After having connected the GUI-app 1 / A to the CDII, use the service menu to setup the pump IP (169.254.26.100) and port (502) and use the "save" button in the lower left to save all settings	A
PC, LAN 2 / B	208.187.195.1	255.255.255.0			
CD II, Device B	208.187.195.200	255.255.255.0	502	Edit the IP address onto the micro SD card from 169.254.26.111 to 208.187.195.200)	
Pump B	208.187.195.222	255.255.255.0	502	After having connected the GUI-app 2 / B to the CDII, use the service menu to setup the pump IP (208.187.195.222) and port (502) and use the "save" button in the lower left to save all settings	B

Grade* A:
Lowest possibility: 169.254.26.2
Highest possibility: 169.254.26.254
Except: 169.254.26.111

Grade* B:
Lowest possibility: 208.187.195.2
Highest possibility: 208.187.195.254
Except: 208.187.195.200

6.3.5 Contents of the microSD card

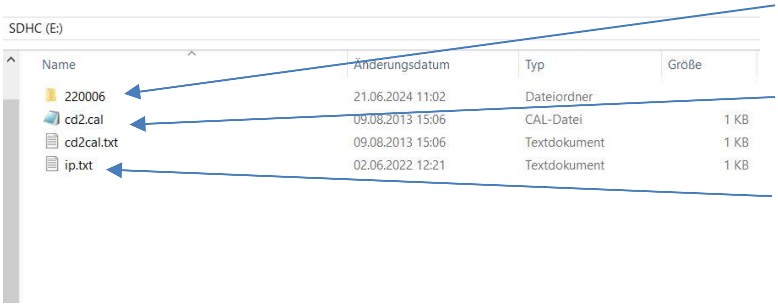


Illustration 22: Contents of the microSD card

1. Folder, (folder name corresponds to the serial number of the CombiDancer II)
2. Offset values (calibration settings) cd2.cal and cd2cal.txt
3. IP file (text file with the IP address). Content of the IP file (corresponds to the content of the IP address field in the GUI app)

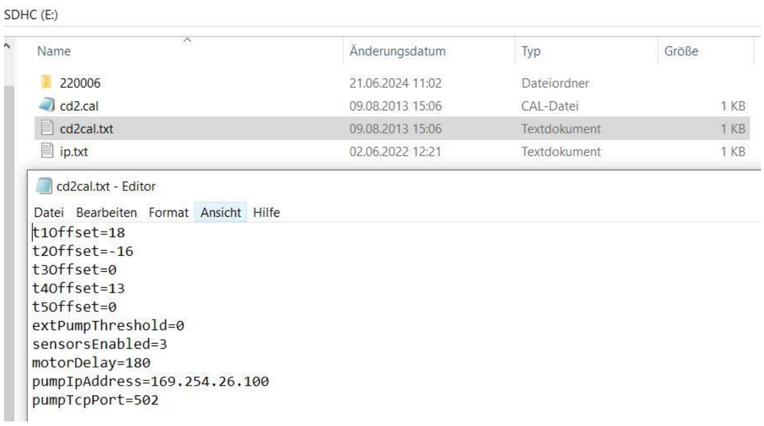


Illustration 23: Details of the cd2cal.txt file

The cd2cal.txt file is only available from FW version 1.0.8.

The cd2cal.txt file contains the plain text of the offset values (calibration settings) which are stored in the cd2.cal file.

See Chapter 6.5.2 Firmware update for setting the offset values (calibration settings).

The folder, 2200XX, (serial number), contains a copy of the offset values (calibration settings) and the IP file, created at the time of the factory exit inspection and additionally a text file with the contents of the serial number of the CombiDancer II.

The IP file, with the factory content = 169.254.26.111, does not necessarily have to be stored on the micro SD card, since the CombiDancer II firmware uses the address 169.254.26.111 instead of the IP file by default.

If the microSD card can no longer be written to, you can reset it to the factory settings (format). After that, it should be writable again.

The previously noted offset values (calibration settings in the «cd2cal.txt» file) must then be re-entered in the GUI and saved to the microSD card.

6.3.6 Changing the IP address on the CombiDancer II

To change the IP address, the SD card must be accessed (see chapter 6.5).

Open the IP file on the SD card and adjust it accordingly. If necessary, the IP file must be copied from the 2200XX folder.

The network adapter settings and the sub-network settings recommendations must be taken into account.
The network settings, see chapter 6.7.5 Pump network setting must be considered and adjusted if necessary.

6.4 Install GUI app and start GUI app

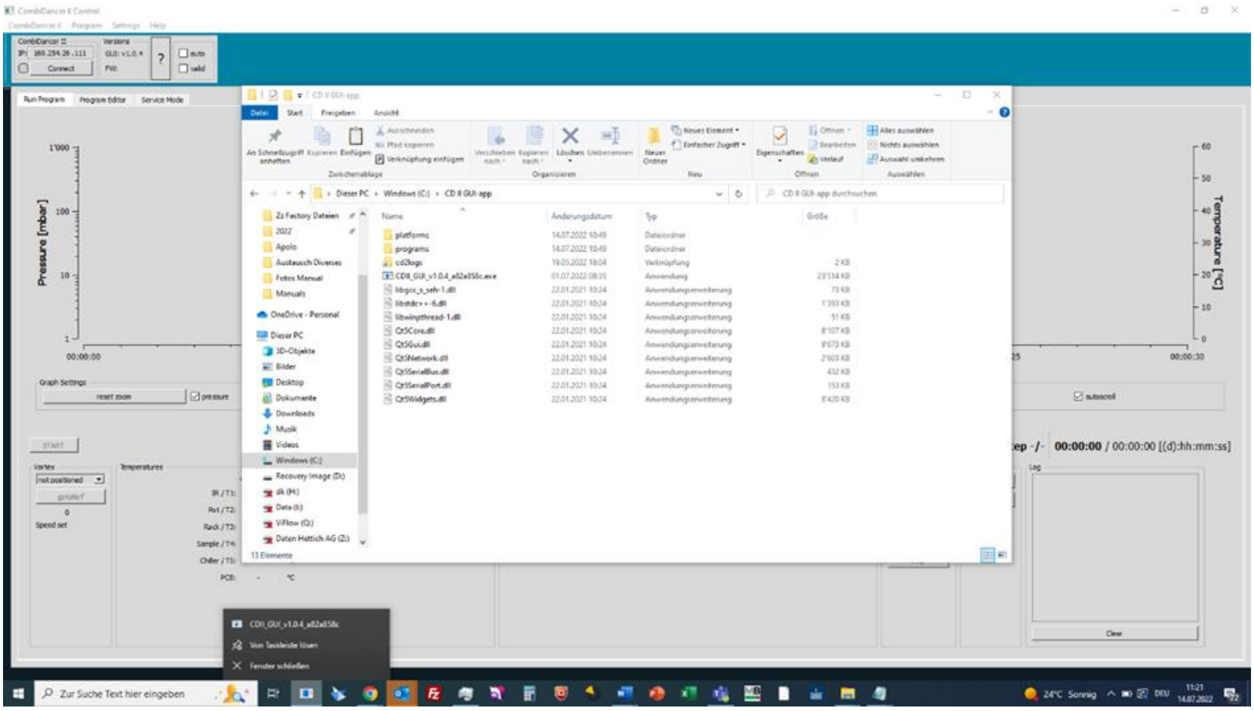


Illustration 24: Starting and installing the GUI app

The CombiDancer II software (GUI app), for operating the device in stand-alone mode, is saved on the operating computer via drag & drop. The app is started with a double click and is ready for use.

☞ The application can be pinned to the taskbar.

6.4.1 Software update of the GUI app

When updating the software, the existing application CDII_GUI_v1.0.xx (the old version) must be deleted and replaced with the new version CDII_GUI_v1.0.xy via drag@drop.

☞ Existing links to the application must be adjusted accordingly.

☞ ATTENTION!!! Configured users may need to be re-created after a GUI update.

The two users (standard user and service user) remain after an update.

6.5 Firmware and firmware update

6.5.1 Firmware

The firmware (FW) is installed on the microSD card in the device. The FW performs basic functions in the device and occupies an intermediate position between the hardware and the GUI app.

6.5.2 Firmware update

When updating the firmware to version 1.0.8, the offset values (calibration settings) are reset to the default settings. It is therefore imperative to note down the current values and re-enter them before the update.

The offset values can be set with the service user in service mode. Then press "Save to SD" to save the values.

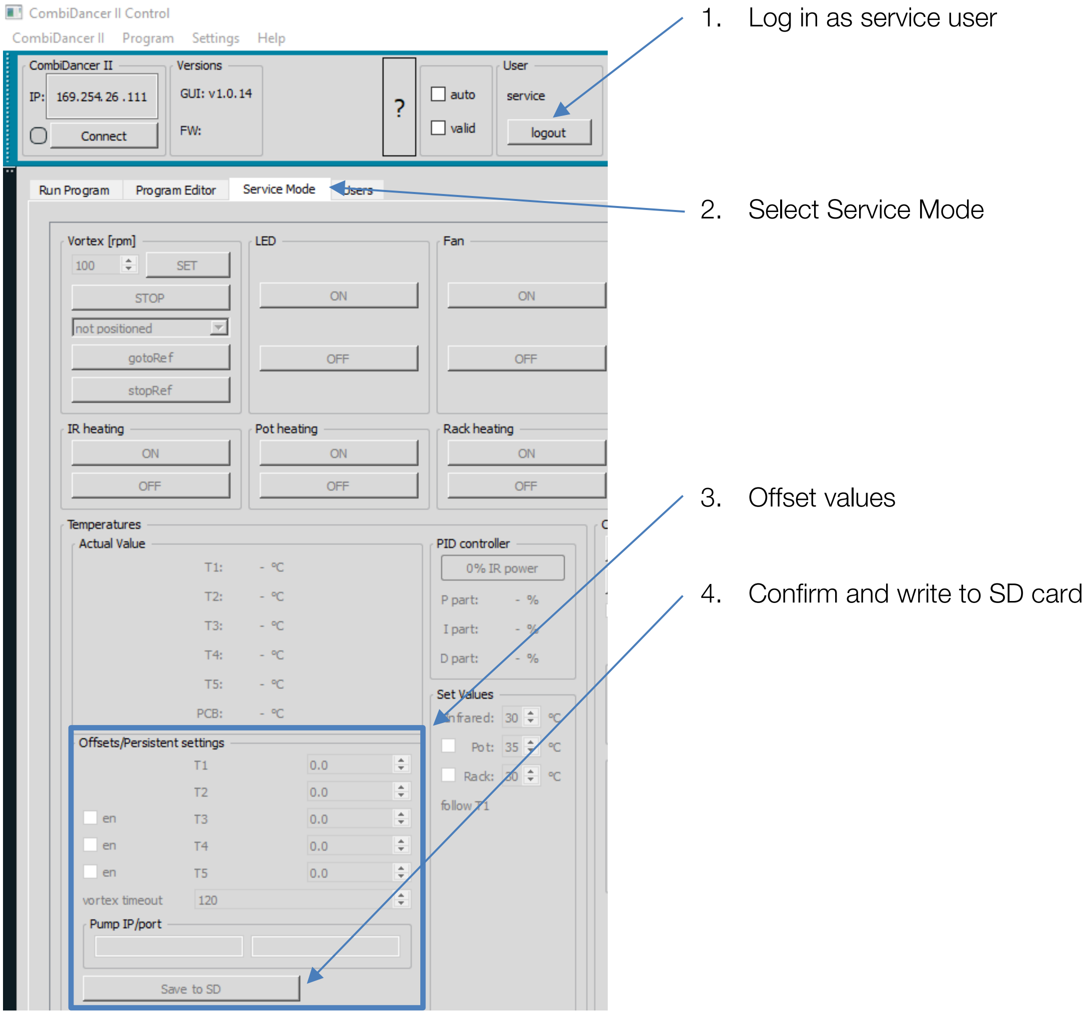


Illustration 25:Check offset values

When updating from version 1.0.8 to a higher FW version, the offset values (calibration settings) are retained.

1. Switch off the device at the main switch.

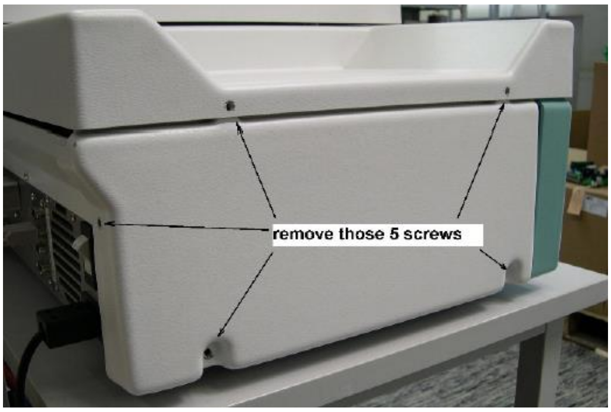


Illustration26: Loosen screws

2. Remove the cover on the left side. To do this, loosen the following five screws.

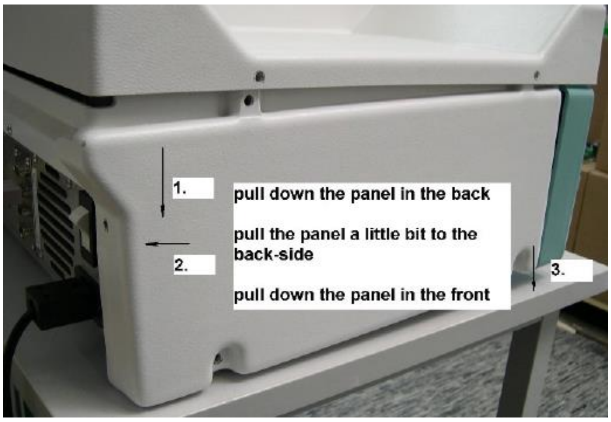


Illustration27: Remove side panel

3. The side panel is removed as shown in the next picture to gain access to the electronics.

Care must be taken when handling electronics (take ESD precautions).

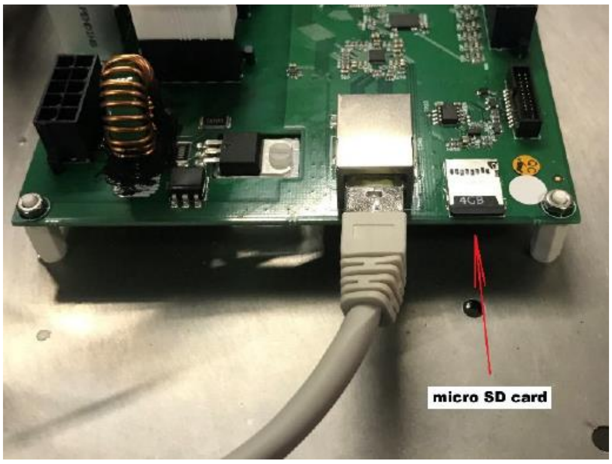
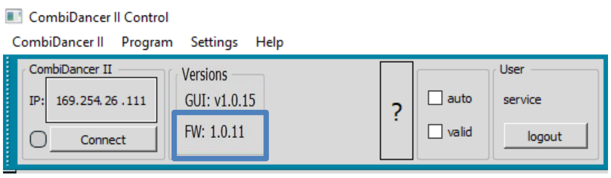


Illustration28: Electronics with microSD card and RJ45 connector

4. Carefully remove the microSD card from the electronics (see picture).
5. Connect the microSD card to a computer or notebook (a USB adapter can also be used).
6. New firmware version (e.g. CombiDancerII.X_v1.0.11_production.bin), copy to the microSD card via drag&drop (top folder level) and rename to: «cd2.bin»
7. Carefully reinsert the microSD card into the electronics and start the CombiDancer II (update time approximately 3 minutes).
8. Reconnect CombiDancer II and perform a function check.



Verify that the update to the new firmware worked.
If the update is successful, this file «cd2.bin» will be automatically deleted from the microSD card.

6.6 Installation of the Rack 2000 and the shaker plate

The rack is screwed to the shaking plate in such a way that the hole for the temperature sensor is located in the rear, right area.

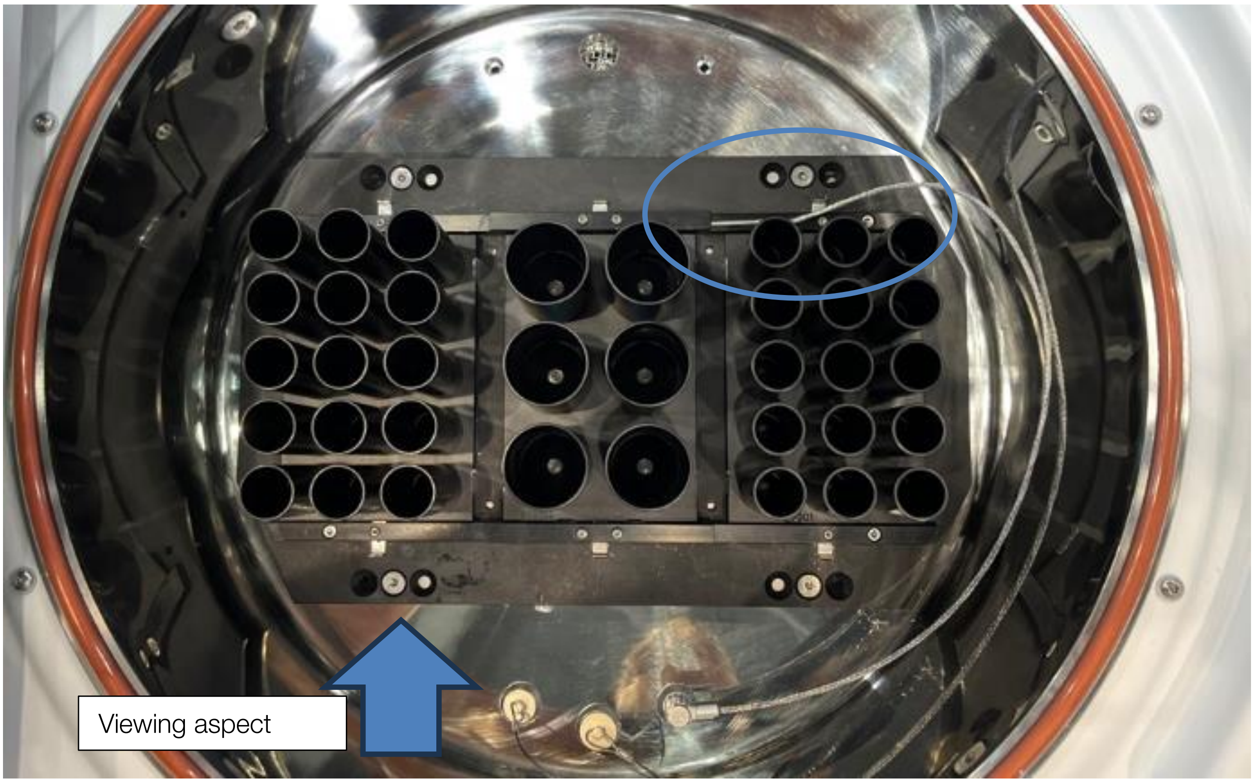


Illustration 29: Alignment of the rack with shaker plate

Carefully insert the rack with the shaking plate into the vacuum chamber so that all four feet of the shaking plate are completely in the holes provided in the vacuum chamber (for the magnetic drive). Insert the temperature sensor into the hole provided, see chapter 4.3.7 Rack2000.

To improve heat transfer to the temperature sensor, thermal paste can be used if necessary.

ATTENTION!!! It must be ensured that the thermal paste does not interfere with the evaporation process and/or contaminate the samples.

In the event of the shaker plate, rack or block insert falling to the floor, a thorough inspection of the proper functionality of the rack is required.

Before inserting the rack and shaker plate, make sure that all contact surfaces are clean and that there is no dirt or similar between the parts, especially moving parts.

6.7 Connecting the vacuum pump

6.7.1 Introduction

The following procedures refer to connecting a Vacuubrand PC 3003 VARIO select or PC 3010 NT VARIO select chemical pump.

Please refer to the relevant instructions provided by the pump supplier. Many of the following points are based on them.

As shown in chapter 6.3.1 Overview of connections, the vacuum pump will be connected to the CombiDancer II via a network.

Switch on the vacuum pump, consult the separate instructions if necessary and wait for the start-up phase.

6.7.2 Setting the pump data logger

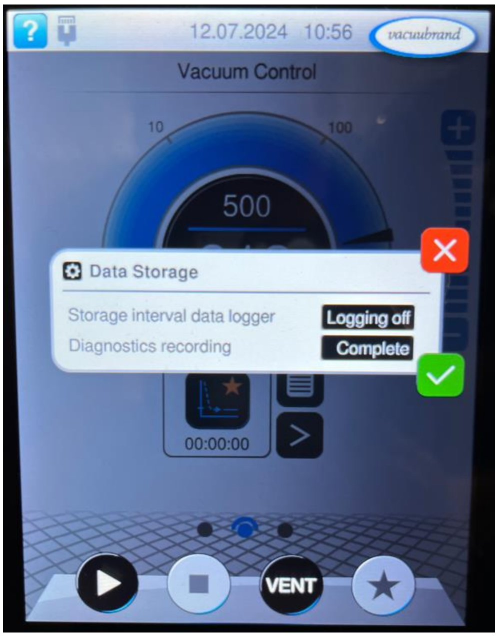


Illustration 30: Setting the pump data logger

The log can be activated when the pump is switched on.

Storage interval = Logging Off
Means that the vacuum controller does not save the measured values.

However, logging or saving the measured values can be of interest for testing, process validation, IQ/OQ/PQ.

However, it should be noted that the pump creates a separate log file for each step of a program (in the GUI app in the program editor).

Diagnostic recording = Complete
Means that in case of an error all relevant data is saved (this can be helpful for error analysis).

6.7.3 Basic setting for the internal vacuum sensor

Illustration 31: Basic setting

Autostart = On
Means that after a power failure the vacuum controller restarts, ideal with a system main switch (factory setting of the pump = off).

Vacuum sensor = VS-C 1
Means that the vacuum controller accesses the measured values of the internal pressure sensor (factory setting of the pump).

Ventilation valve = On means that if the vacuum exceeds the set point, the valve can be used to ventilate the vacuum to the set point.

Only possible with a pump with vent valve or an optional external vacuum sensor with vent valve.

6.7.4 Calibration of the vacuum sensor

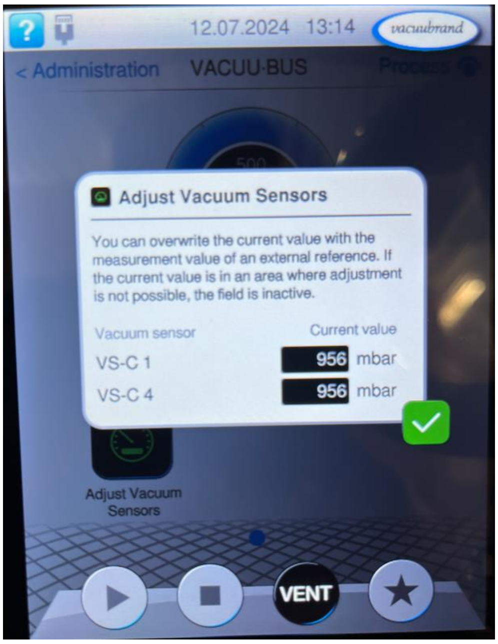


Illustration 32: Adjustment of the vacuum sensor

Before the vacuum pump can be put into operation, a pressure adjustment should be carried out using a calibrated pressure gauge for the internal or optional external sensor.

Comparison of the following points:

- Range of atmospheric pressure
- Range of 20 mbar
- Range of 5 mbar

6.7.5 Network setting of the pump and connection to the CombiDancer II

In order to connect the pump to the CombiDancer II and then remote control it, certain parameters must be adjusted in the vacuum controller. A connection to the pump can then be established via the GUI app.

Please refer to the relevant instructions of the pump supplier or consult chapter 0 Error Description.

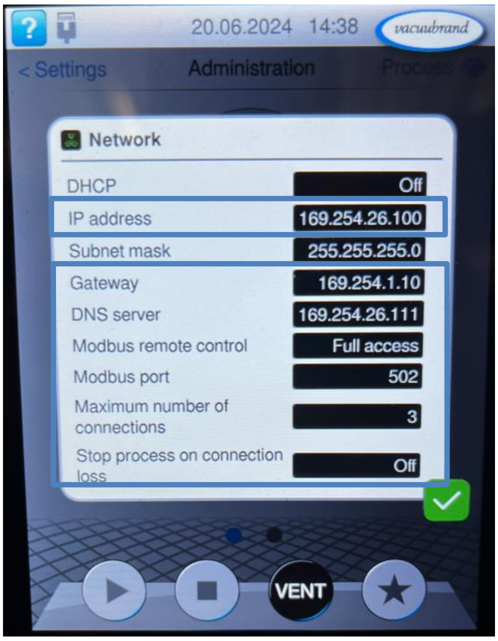


Illustration 33: Network setting of the pump

The factory default network settings of the pump in conjunction with the CombiDancer II must be changed as shown in the illustration, before the pump can be connected in the GUI app.

The network adapter settings and the sub-network settings recommendations must be taken into account.

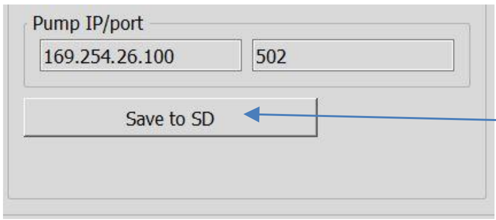


Illustration 34: Pump IP address in GUI app

To be executed in service mode:
The IP address set on the pump must match the address in the GUI APP.

IP address must be saved on the microSD card.

To make this setting you must be logged in with the service user.

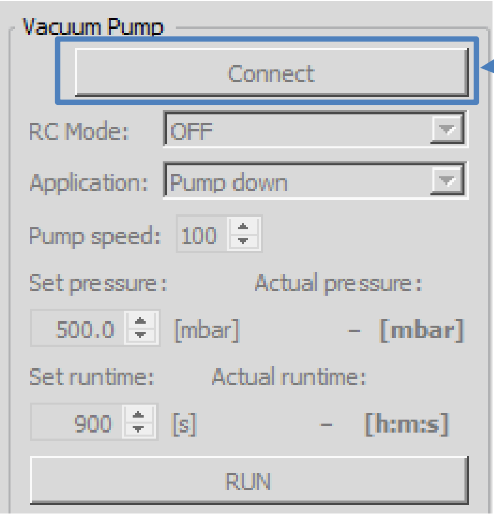


Illustration 35: Connecting the pump on the GUI app

The pump can then be connected to the CombiDancer II.

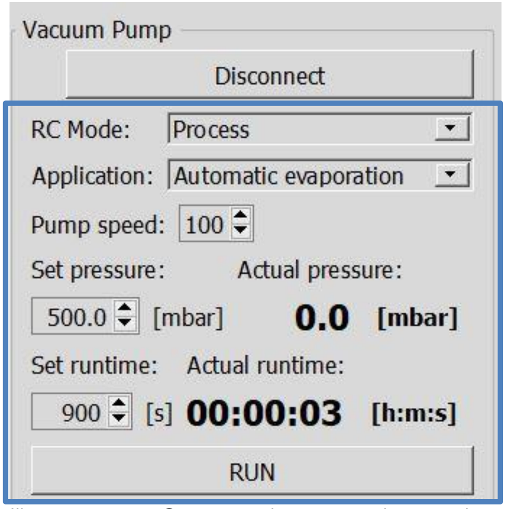


Illustration 36: Connected pump and manual test

In service mode you can test whether and how the pump works.

The “RUN” button starts the pump for a manual check.

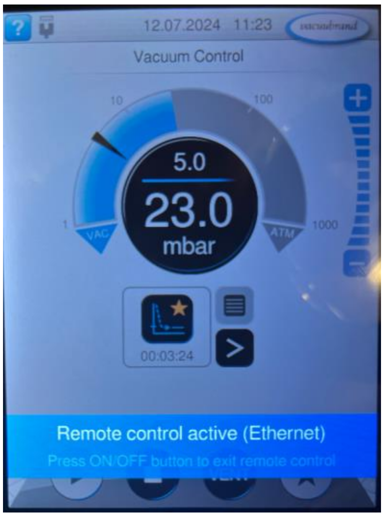


Illustration 37: Pump in remote access

When accessed remotely, the pump display looks like the picture on the left.

To release the pump from remote access, press the On/Off switch on the side of the vacuum controller or consult the pump supplier's instructions.

6.7.6 Connecting the optional external vacuum sensor

To connect the optional external vacuum sensor to the pump, consult the relevant instructions from the pump supplier. This chapter only gives a rough overview of important settings.

The optional external vacuum sensor can slowly ventilate the system through the integrated ventilation valve. This can offer process-related advantages.

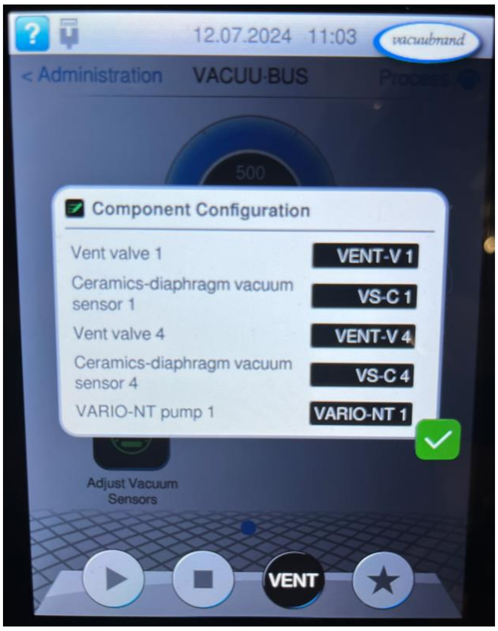


Illustration 38: Connecting the external vacuum sensor

Illustration 39: Basic setting for the external vacuum sensor

The illustration shows the configuration after connecting and adjusting the optional external vacuum sensor.

Before connecting the external vacuum sensor, we recommend that you make a note of the current settings. This will prevent double naming of the newly connected optional external sensor (shown as VS-C 4 in the figure) with the already configured internal sensor (shown as VS-C 1 in the figure).

Possible designations VS-C 1 to VS-C 6

Double naming can cause the pump to malfunction.

A vacuum calibration of the newly connected vacuum sensor is advisable. See chapter 6.7.4 Calibration of the vacuum sensor.

In the basic settings, the external vacuum sensor must be selected instead of the internal sensor.

Vacuum sensor = VS-C 4

For the other settings see chapter 6.7.3 Basic setting for the internal vacuum sensor.

6.8 Connecting the «Chiller To Dancer»

The D-Sub connection cable, see chapter 6.3.1 Overview of the connections between the Chiller To Dancer and the CombiDancer II may only be plugged in or unplugged when both devices are switched off.

The signal between CombiDancer II and Chiller To Dancer is analog. Using a different D-Sub connection cable or extending the existing cable can lead to faulty data transmission.

Caution

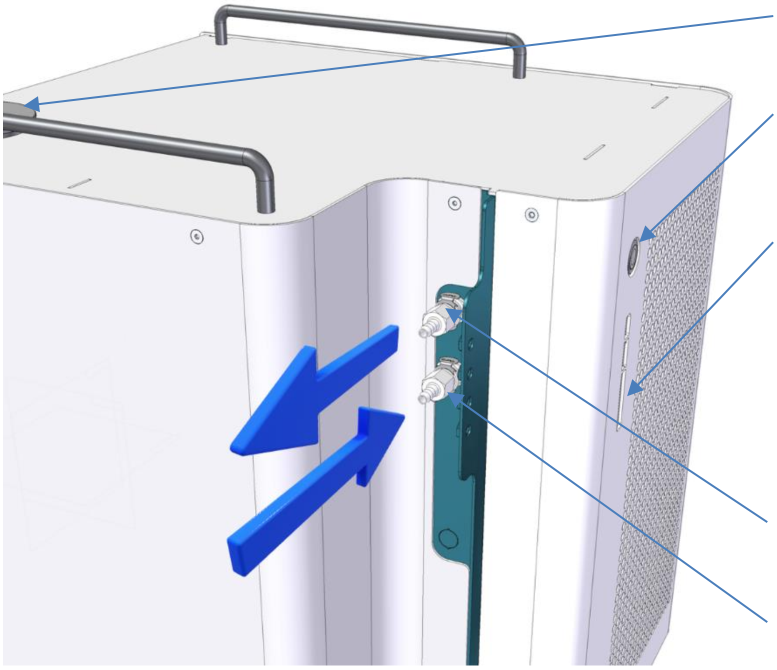
Connecting the emission condenser to the Chiller To Dancer and filling the secondary medium, a glycol mixture, may only be carried out by trained personnel and with the necessary protective equipment.

Please consult the separate instructions: Operating instructions – Chiller To Dancer.

The emission condenser must be connected correctly to the feed and return.

The Chiller To Dancer may only be switched on after checking the level indicator, correctly filling the glycol, and connecting the connection cable.

Without glycol in the system, there is a risk of the circulation pump running dry and overheating, which can lead to damage to the pump. In such cases, no warranty claim can be made against the manufacturer.



1. Filling funnel, with lid
2. Release or standby button cooling / circulation pump
3. Level indicator
4. Feed, glycol, to emission condenser
5. Return, glycol, into the tank in the chiller

Illustration 40: Connections on the Chiller To Dancer

6.8.1 Connect the emission capacitor to the «Chiller To Dancer»

1. Connection to the vacuum pump
2. Connection to the return
3. Connection to the feed
4. Connection from CombiDancer II to emission condenser/vacuum pump

Illustration 41: Emission capacitor on the «Chiller To Dancer»

6.8.2 Catchpot and waste valve

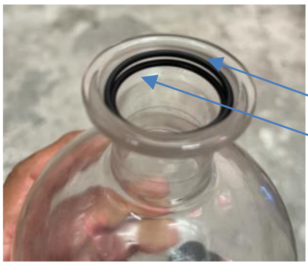


Illustration 42: O-ring set in spherical joint

In order to ensure a vacuum-tight connection between the catchpot and the emission condenser, it is necessary that both O-rings are correctly inserted into the spherical joint connection as shown in the picture.

1. O-ring, Ø29 x 2
2. O-ring, Ø27 x 2

In the next step, connect the catchpot to the emission condenser using the spherical joint clamp and tighten it.

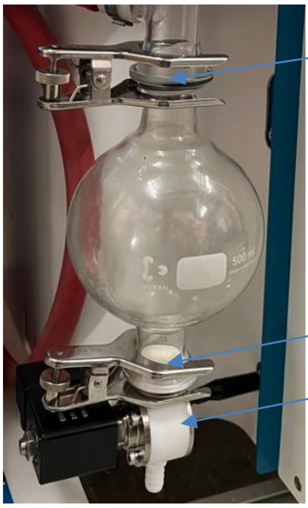


Illustration 43: Connected catchpot with valve

1. Upper catchpot clip with O-ring set

It is important to ensure that the O-rings fit completely and evenly on the spherical joint. The transition should be as straight as possible.

2. Lower catchpot clip
3. Waste 2 valve

Align the valve as straight as possible. Pay attention to the flow direction of the valve. Make sure that the O-rings are evenly positioned on the spherical joint. Connect the outlet to a waste canister.

6.8.3 Filling the secondary medium at the «Chiller To Dancer»

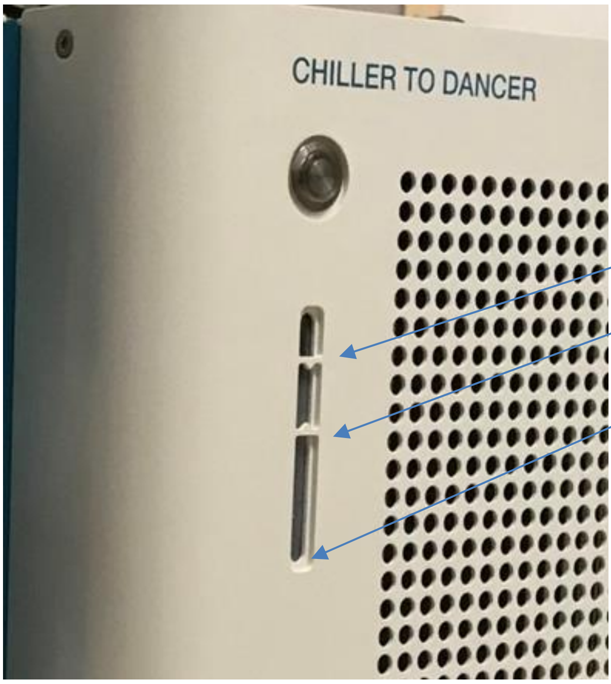


Illustration 44: Level indicator of the glycol mixture

Use a funnel to fill the supplied glycol mixture into the Chiller To Dancer.

It is important to always keep an eye on the fill level.

1. maximum filling
2. minimal filling
3. lower end of the level indicator

Caution

Wear protective goggles and gloves when handling the secondary medium, the 40% ethylene glycol – 60% distilled water mixture according to the Chiller To Dancer operating instructions.

For maintenance and service work on the Chiller To Dancer, it must be sent back to the manufacturer.

If the maximum filling level is exceeded, there is a risk of the secondary liquid overflowing from the tank and onto the base of the Chiller To Dancer. The tank is not hermetically sealed, see the Chiller To Dancer operating instructions.

To transport the Chiller To Dancer, the glycol must be completely drained. Otherwise there is a risk that it will leak and contaminate the environment.

This also includes pumping the glycol out of the tank. Further information can be found in the Chiller To Dancer manual.

The Hettich drain pump set (CH.Z020) can be helpful for pumping out the tank.

6.9 First start

Make sure that all previous installation steps have been completed correctly before starting the device for the first time. Check that all components are correctly positioned and securely fastened.

Make sure that any transport locks have been removed and that the shaker plate can move freely.

Make sure that all safety instructions have been taken into account.

During initial operation, monitor the device closely for signs of problems or malfunctions. If necessary, follow the troubleshooting steps provided in the manual, see chapter 10 Malfunctions and errors.

Make sure that operators are thoroughly familiar with the safe operation and handling of the equipment.

It is important that all steps are carried out carefully to ensure safe and efficient commissioning of the device. In case of any doubt or problem, always consult the manual or contact the manufacturer or a qualified technician.

7. Program – GUI app

7.1 System Overview

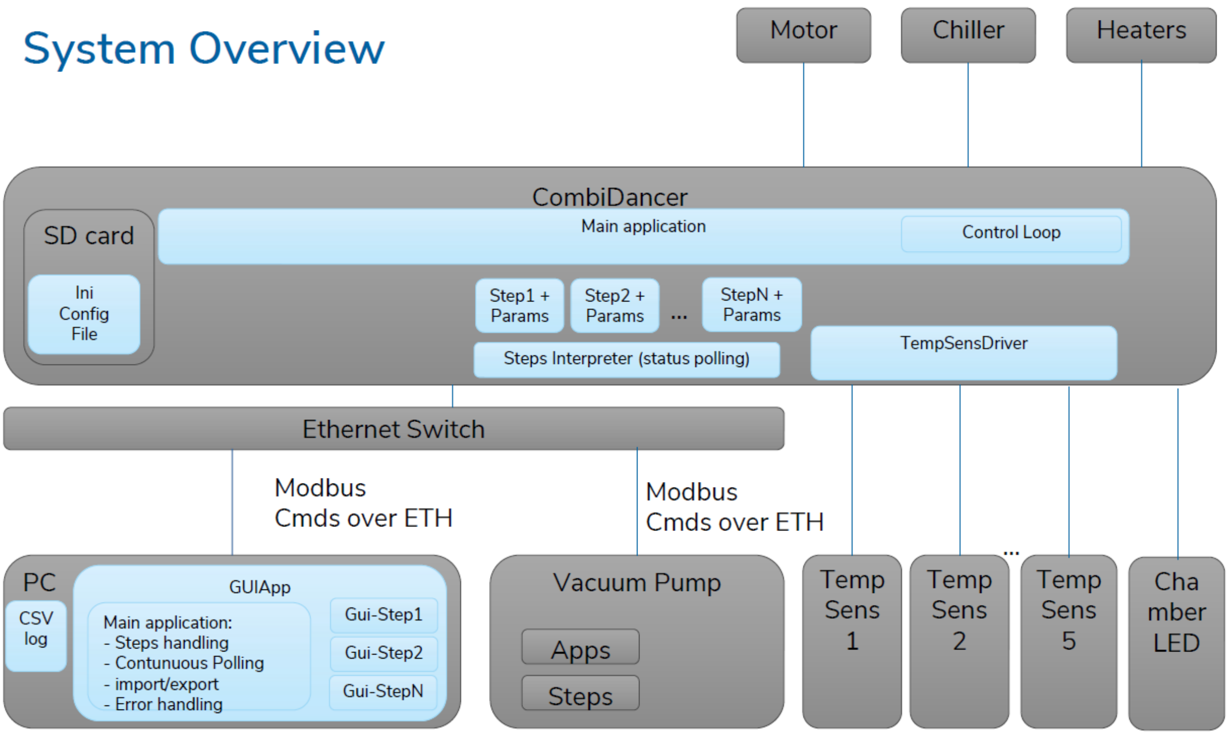


Illustration 45: System Overview CombiDancer II Internal to Accessories

7.2 Run Program – Interface

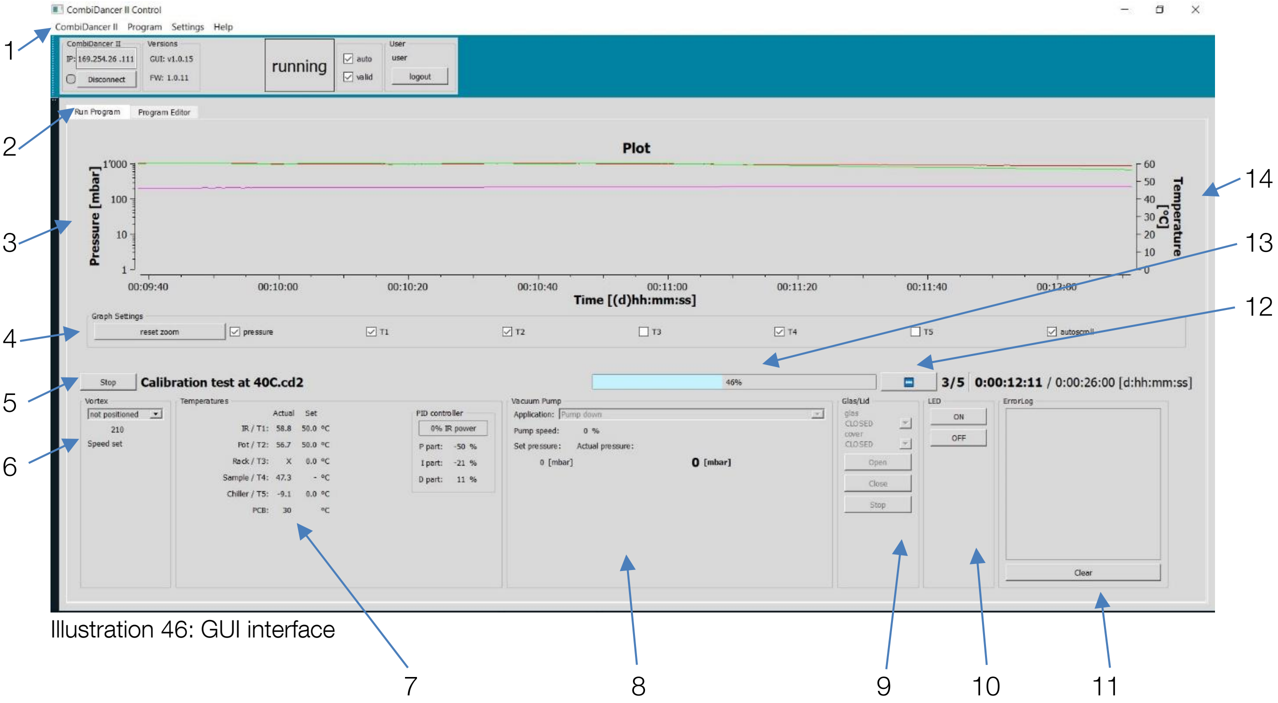


Illustration 46: GUI interface

Legend:

1. Tool bar
2. Mode bar
3. Graph – Pressure Scale
4. Setting Graph
5. Program bar (start and stop program)
6. Vortex window
7. Temperature window
8. Pump Mode and Pressure - Window
9. Lid control
10. LED lighting control
11. Error window (Error Log)
12. Skip program step and display program step
13. Display program step in % and display program duration
14. Graph – Temperature scale

7.3 Program Editor

The following chapter describes how to create a program, save it, load it onto the device and play it.

The example is not a program that can be used for a process!

To create a program, you must first log in. See chapter 6.3.1 Overview of connections.

Before executing a program automatically, it is advisable to carefully monitor each step of the process to ensure that everything is running as expected.

The process parameters to be set are the responsibility of the process specialist. The device manufacturer can only provide limited assistance in this case.

The recommended speed of the vortex drive is between 400rpm to 500rpm.

The vortex speed depends on the load and the filling of the sample vessels. The higher the load/filling, the slower the speed should be so that nothing is destroyed/spilled.

7.3.1 Creating a program

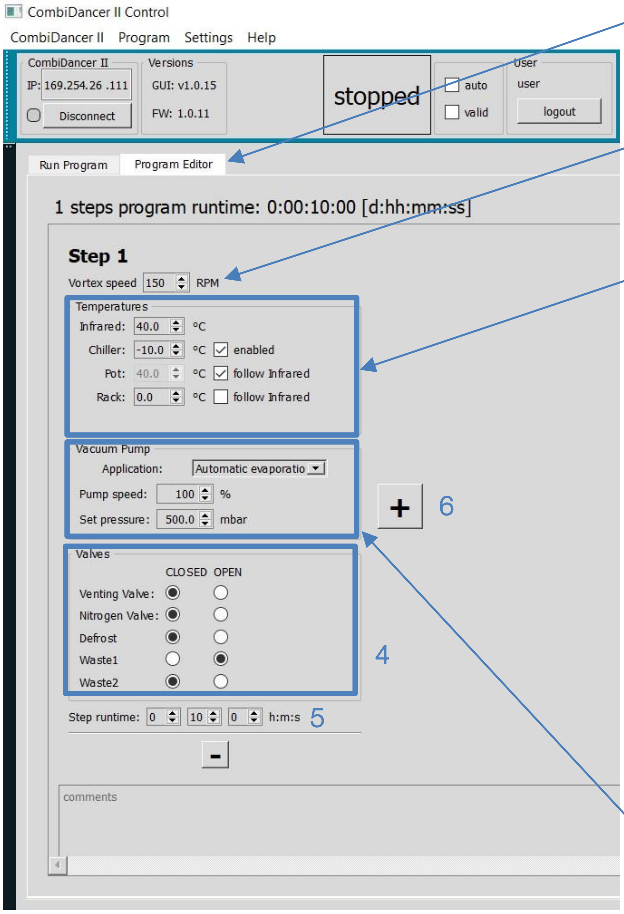


Illustration 47: Program creation in the "Program Editor"

A program can be created in the “Program Editor” tab.

Step 1:
Determine the speed of the vortex drive. Make sure that the speed is adapted to the conditions.

Step 2:
Set the desired temperatures. Infrared and Pot are for heating, Chiller for cooling. For further details see chapter 4.4 The individual components.

Maximum temperature for devices built before 2024:
Infrared: 60°C
Chiller: -10°C
Pot: 40°C

Maximum temperature for devices built from 2024:
Infrared: 70°C
Chiller: -15°C
Pot: 40°C

Step 3:
These settings only work with Vacuubrand pumps (recommended PC 3003 VARIO select or PC 3010 NT VARIO select).
Application: There are various applications to choose from. For details on the applications, see the relevant Vacuubrand manual.
Pump speed: By specifying a reduced pump speed (in %), a gentle evacuation is possible.
Set pressure: Specified pressure for this process step.

Step 4:
Venting, Nitrogen (optional) and Defrost (not available) – must be closed during the process (when there is a vacuum in the vacuum chamber).
Waste 1 – this valve must be open during the process so that the condensate can enter the catchpot.

Since Waste 1 is no longer used, the setting is no longer relevant. In the picture, Waste 1 would be placed at the position of the upper catchpot clip.

Waste 2 – this valve must be closed during the process. It closes the vacuum area from the environment (in the picture – the lower valve).

If Waste 1 is not installed, Waste 2 should only be opened when there is no vacuum.

Step 5:
Setting the time for each process step. The process step ends as soon as the time has elapsed.

When working with the pump application «Automatic Evaporation», the time must be adjusted to the automatic evaporation mode of the pump

Step 6:
By pressing the «+» a new process step is created that can be edited.

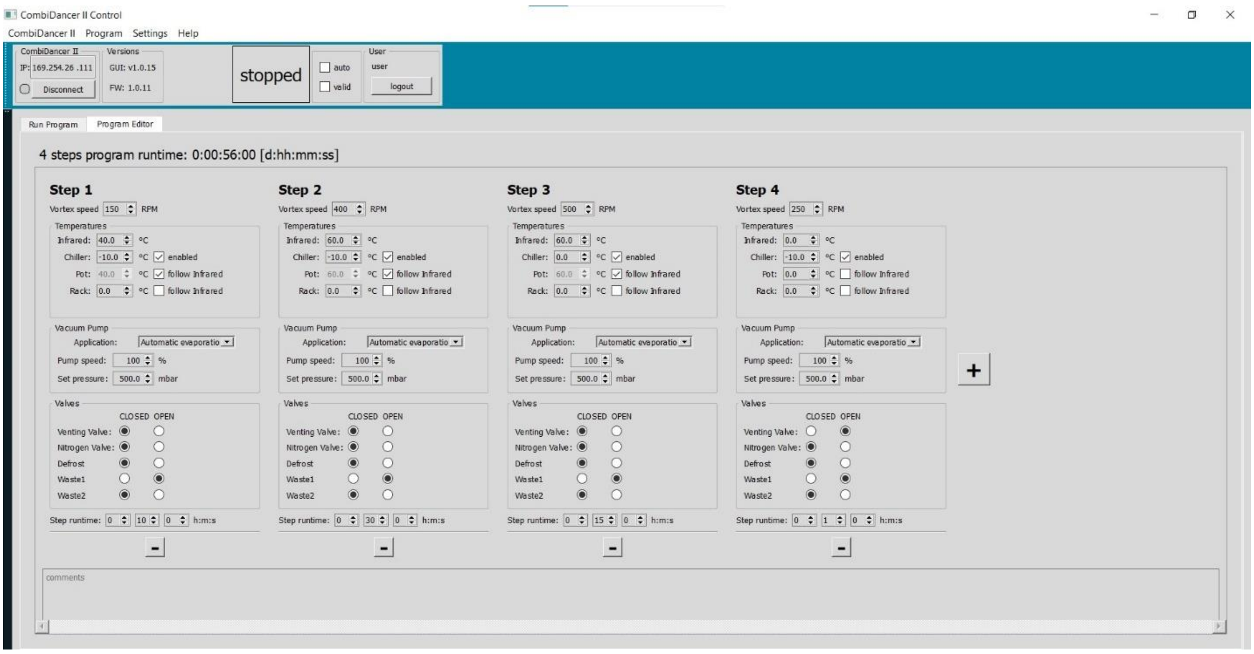


Illustration 48: Created program with four (4) process steps

By pressing «-» (below the input fields), the corresponding process step is deleted.

By clicking and holding the left mouse button on a process step, the order can be changed. Simply drag it to the desired position and release the left mouse button..

In the tool bar under “Program” the created program can be saved in the desired folder.

Under the same tab you can also load programs you have already created.

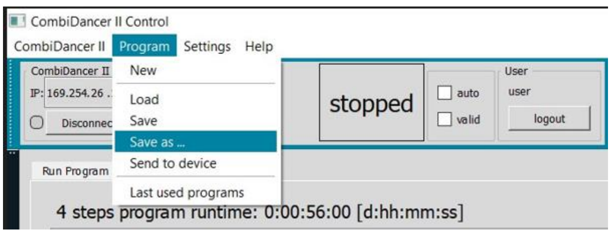


Illustration 49: Save created program

Please note that it may take some time for the set temperatures to be reached. This should be taken into account when creating the program.

The Chiller To Dancer is designed for an operating temperature of -10°C. However, it is possible to reduce the temperature to -15°C (it is recommended to proceed cautiously).
It is possible to set a temperature of -20°C, but this is at the performance limit of the device. Please note that operation under these conditions is at your own risk.

7.3.2 Upload to the device and start the program

In the tool bar, select “Program” and then “Send to device”.

The program can only be played after it has been sent to the device.

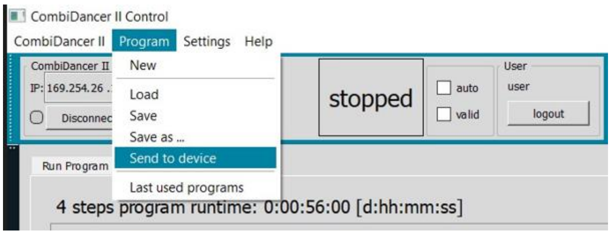


Illustration 50: Send program to device

The “Run Program” tab displays the program loaded onto the device and can be started from there.

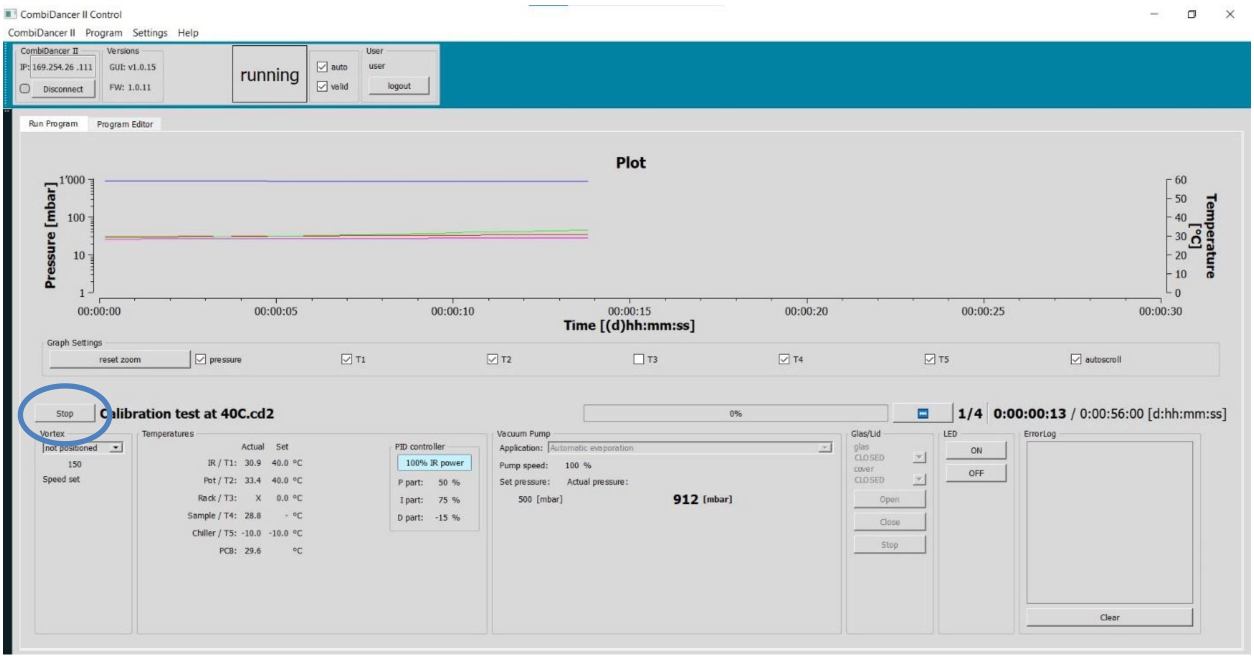


Illustration 51: Start program

As soon as the lid is closed, the program can be started by pressing «START».

If you press the same button a second time (now «STOP»), the program is stopped, the system is ventilated and the lid is opened.

After the program has been started, the actual and target values are displayed on the interface of the “Run Program” tab:

- Temperature T1 to T5 (can be displayed as a graph)
- Pressure (can be displayed as a graph)

Additionally displayed:

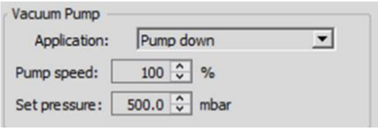
- Vortex speed
- Strength of the IR emitter
- Which program step is currently being played
- Total duration of the program
- Error Log

7.4 Essential applications of the pump

The most important pump applications are described in more detail below:

Pump Down:

The apparatus is evacuated to the lowest achievable vacuum.



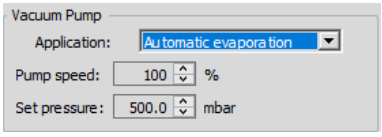
Pump speed: By specifying a reduced pump speed (in %), a gentle evacuation is possible. The pump speed is automatically optimized at low target pressures.

Set pressure: In this mode, the pressure cannot be selected. The pump evacuates to the lowest achievable vacuum.

Duration: The process step is terminated after the time has elapsed, even if the lowest vacuum has not yet been reached.

Automatic Evaporation:

The boiling pressure is controlled automatically and optimally adjusted at all times so that the process takes place in a short time and without over-foaming.



Pump speed: By specifying a reduced pump speed (in %), a gentle tracking of the boiling point is possible.

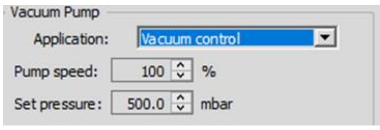
Set pressure: In this mode, the pressure cannot be selected. The pump regulates the pressure itself.

Duration: The process step will end after the time has elapsed, even if the automatic pumping mode has not yet been completed.

Vacuum Control:

The vacuum is regulated to a predetermined target pressure.

The “Vacuum Control” application should be preferred over “Pump Down”.



Pump speed: By specifying a reduced pump speed (in %), a gentle evacuation is possible. The pump speed is automatically optimized at low target pressures.

Set pressure: The vacuum is regulated to the set value.

Duration: The process step is terminated after the time has elapsed, even if the set value has not yet been reached.

7.5 Tips and tricks for program design

7.5.1 Example - Slow venting at the end of the process

To prevent the samples from over-foaming at the end of a process due to the vacuum being removed too quickly, it is recommended to insert a specially designed process step. This could look like this and be added at the end of a program:

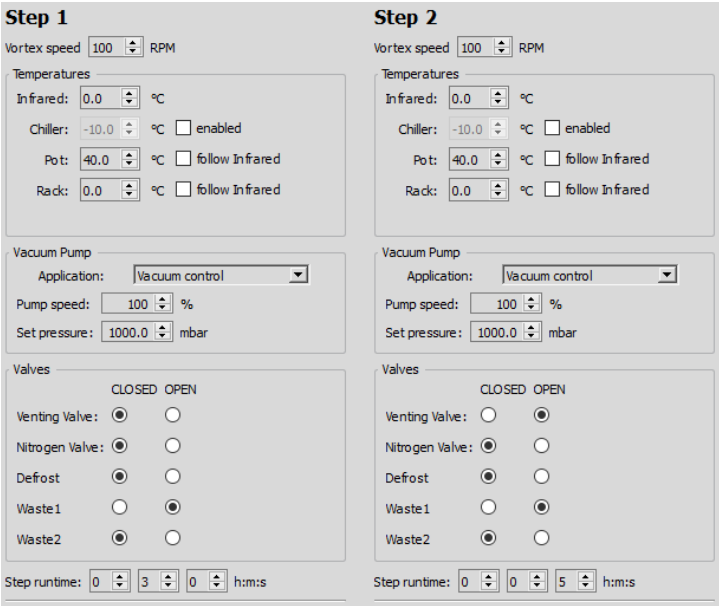


Illustration 52: Program example for slow venting

This procedure is necessary if the pump does not have a slow vent function, either on the pump itself or on the optional external vacuum sensor.

If a slow vent function is not available, the system will be express vented.

Step1:	Slow venting
Vortex speed:	It is recommended to move the samples slightly during venting to further reduce the possibility of foaming over.
Temperatures:	At the end of the process, the IR temperature can be set to 0°C. In addition, it is possible to remove the hook from the chiller and thus put it out of operation (reduces the risk of icing) To prevent the formation of condensate on the walls of the vacuum chamber, it can continue to be heated.
Pump application:	The “Vacuum Control” application can be used for venting. Set the pressure to 1000 mbar. If there is no slow vent, the pressure can be increased gradually.
Valves:	These values can be taken from the evaporation process (previous process step). -Waste 1, on «OPEN» - Remaining valves remain closed
Time:	The slow venting takes between 3 and 5 minutes, depending on the depth of the vacuum. The process step ends as soon as the time has elapsed.

Step 2:	**Achieving the final state**
Vortex speed:	As in Step 1
Temperatures:	
Pump application:	
Valves:	-Ventilation valve to «OPEN». Waste 1 remains open / remaining valves remain closed
Time:	For this process step, 5 seconds are sufficient. The process step ends as soon as the time has elapsed.

At the end of the process, it is possible to empty the catchpot. This step can either be carried out after "Step 2" or integrated directly into "Step 2".

Caution

When removing samples or the rack, be aware of the risk of burns on the vacuum chamber wall and the equipment inside the vacuum chamber, such as temperature sensors, block inserts, sample vessels, etc.

Caution

The condensate in the catchpot should be drained into a collecting container (e.g. a waste canister).

Wear protective goggles and gloves when handling the condensate

warning

When emptying the catchpot or venting the system, residual amounts of solvent can enter the working environment.

Adequate ventilation of the work area must be ensured. See also chapter 4.4.1 Ventilation valve.

7.5.2 Example - Emptying the catchpot

To empty the catchpot, the regular evaporation process must be stopped and the system brought back to normal pressure.

The emptying process step can be integrated into the overall process. It is advisable to choose the optimal time by determining when the catchpot is full. This process step can also be carried out when the samples have to be removed from the device.

Step1 Step 2 Step 3 Step4

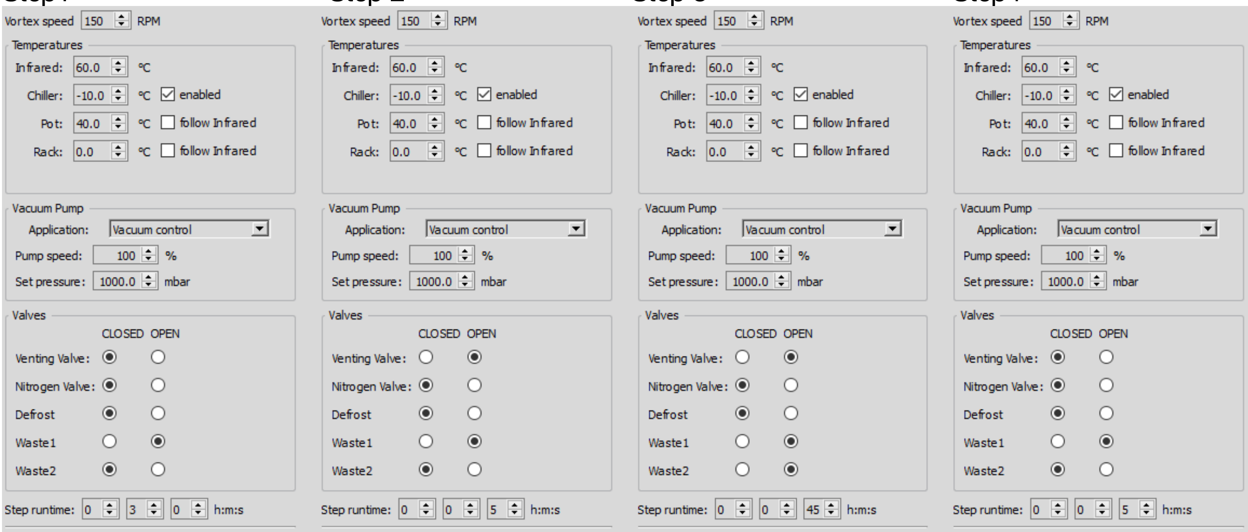


Illustration 53: Program example for emptying the catchpot

Step1:	**Slow venting**
Vortex speed:	It is recommended to move the samples slightly during venting to further reduce the possibility of foaming over.
Temperatures: Valves:	These values can be taken from the regular evaporation process (previous process step). Since the pressure normalizes in this step, the evaporation process is reduced.
Pump application:	The “Vacuum Control” application can be used for venting. Set the pressure to 1000 mbar. If there is no slow vent, the pressure can be increased gradually.
Time:	The slow venting takes between 3 and 5 minutes, depending on the depth of the vacuum. The process step ends as soon as the time has elapsed.
Step 2:	**Ensuring normal pressure**
Vortex speed: Temperatures: Pump application:	As in Step 1
Valves:	-Ventilation valve to «OPEN» Waste 1 remains open / remaining valves remain closed
Time:	For this process step, 5 seconds are sufficient. The process step ends as soon as the time has elapsed.

Step 3:	**Emptying**
Vortex speed: Temperatures: Pump application:	As in Step 1
Valves:	-Waste 2 to «OPEN» - catchpot is emptied. Ventilation valve and Waste 1 remain open / remaining valves remain closed.
Time:	This process step depends on the filling level of the catchpot. It should be ensured that enough time is defined so that the catchpot can be emptied. The process step ends as soon as the time has elapsed.
Step 4:	**Transition to regular process**
Vortex speed: Temperatures: Pump application:	As in Step 1
Valves:	-Waste 1, remains on «OPEN» -Remaining valves on «CLOSED»
Time:	For this process step, 5 seconds are sufficient. The process step ends as soon as the time has elapsed.

During the emptying process, the sample temperature must be monitored at all times. It is important to ensure that excessive temperatures do not cause damage to the samples.

Alternatively, “Step 4” can also be combined directly with the following process step (regular evaporation process).

After the emptying example shown, the regular evaporation process can be continued.

Caution

When removing samples or the rack, be aware of the risk of burns on the vacuum chamber wall and the equipment inside the vacuum chamber, such as temperature sensors, block inserts, sample vessels, etc.

Caution

The condensate in the catchpot should be drained into a collecting container (e.g. a waste canister).

Wear protective goggles and gloves when handling the condensate

warning

When emptying the catchpot or venting the system, residual amounts of solvent can enter the working environment.

Adequate ventilation of the work area must be ensured. See also chapter 4.4.1 Ventilation valve.

7.5.3 Example - Emptying the catchpot with Waste 1 valve

This method can lead to unwanted evaporation in front of the catchpot. For this reason, it is no longer offered in newer devices.

In this configuration, the catchpot can be emptied under vacuum. The two valves Waste1 and Waste 2 act like a lock.

This emptying step can be integrated into the overall process. The evaporation process does not have to be interrupted for this. It is advisable to choose the optimal time by determining when the catchpot is full.

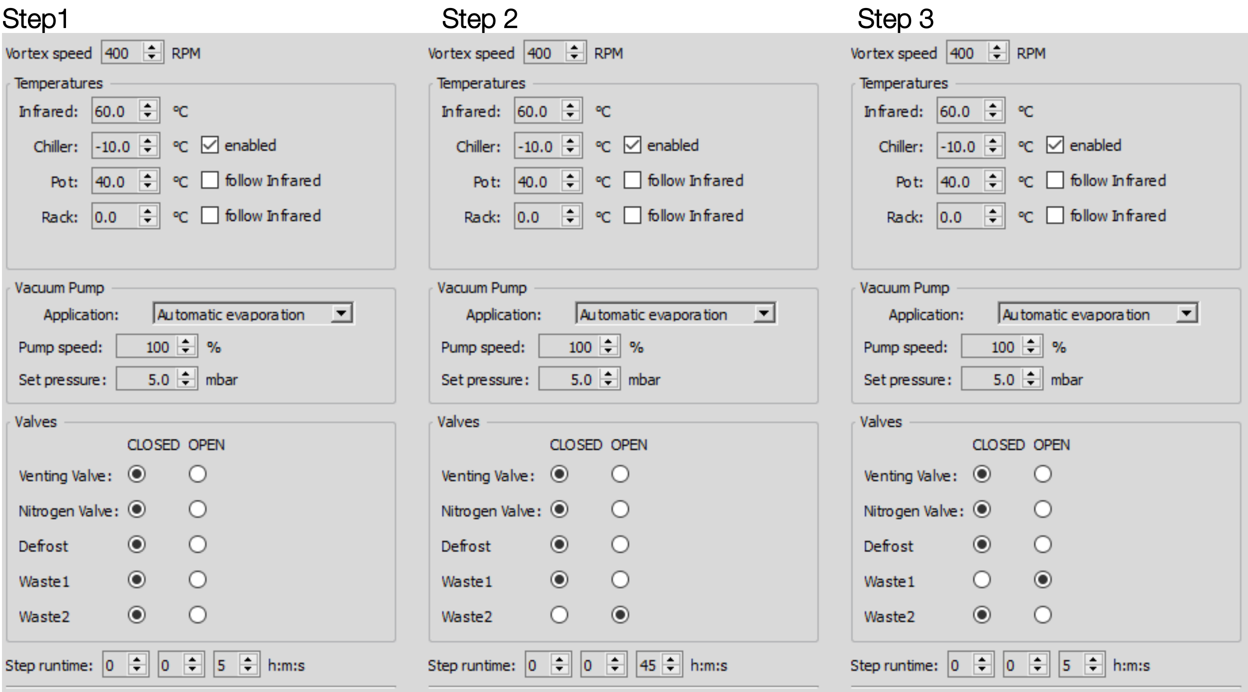


Illustration 54: Program example for emptying the catchpot with Waste 1 and Waste 2

Step1:	**Transition to emptying**
Vortex speed: Temperatures: Pump application:	These values can be taken from the regular evaporation process (previous process step). The evaporation process continues.
Valves:	-Waste 1, on «CLOSED» Remaining valves remain closed.
Time:	For this process step, 5 seconds are sufficient. The process step ends as soon as the time has elapsed.
Step 2:	**Emptying**
Vortex speed: Temperatures: Pump application:	These values can be taken from the regular evaporation process (previous process step). The evaporation process continues.

Valves:	-Waste 2 to «OPEN» - catchpot is emptied. Remaining valves remain closed. Since there is a vacuum in the catchpot, the medium in the catchpot can foam over when the valve is opened.
Time:	This process step depends on the filling level of the catchpot. It should be ensured that enough time is defined so that the catchpot can be emptied. The process step ends as soon as the time has elapsed.
Step 3:	**Transition to regular process**
Vortex speed: Temperatures: Pump application:	These values can be taken from the regular evaporation process (previous process step). The evaporation process continues.
Valves:	-Waste 1, on «OPEN» Remaining valves remain closed.
Time:	For this process step, 5 seconds are sufficient. The process step ends as soon as the time has elapsed.

Alternatively, “Step 3” can also be combined directly with the following process step (regular evaporation process).

After the example shown for draining, the regular evaporation process can be continued.

Caution

When removing samples or the rack, be aware of the risk of burns on the vacuum chamber wall and the equipment inside the vacuum chamber, such as temperature sensors, block inserts, sample vessels, etc.

Caution

The condensate in the catchpot should be drained into a collecting container (e.g. a waste canister).

Wear protective goggles and gloves when handling the condensate

warning

When emptying the catchpot or venting the system, residual amounts of solvent can enter the working environment.

Adequate ventilation of the work area must be ensured. See also chapter 4.4.1 Ventilation valve.

8. Cleaning and care

This chapter does not contain any instructions or recommendations for decontamination. Cleaning and maintenance of the device can be carried out by a trained user.

8.1 Instructions for cleaning and disinfection

warning

Before carrying out any cleaning or disinfection work, the device must be switched off and the power cable must be unplugged at both ends.

Before using a cleaning or disinfectant other than that recommended by the manufacturer, the user must check with the manufacturer that the intended procedure will not damage the device.

Never use agents such as acetone – this will damage all plastic parts.

Cleaning and/or disinfection agents must be used which are in the pH range of 5pH to 8pH and do not have abrasive properties.

In order to avoid corrosion caused by cleaning or disinfectant agents, the special application instructions provided by the manufacturer of the cleaning or disinfectant agent must be strictly taken into account.

We recommend weekly cleaning for periodic operation (normal use). If very aggressive liquids, as described in chapter 3.4 Resistance of the vacuum chamber, are used, we recommend daily cleaning.

For stubborn dirt, we recommend that you first soak or soften the dirt with water or alcohol. Except for the plastic housing parts, the “Scotch-Brite® professional” cleaning sponge can be used.

The device should be allowed to cool down before you start working on it. To speed up the cooling process, open the lid.

warning

Depending on the type of samples, you should consider the potential biological hazard. Wear appropriate protective gloves and goggles and disinfect the device before use.

Risk of contamination for the user due to insufficient cleaning or failure to follow cleaning instructions.

When working on the device, make sure that no liquid can penetrate into the housing openings, especially the ventilation slots.

Work inside the device may only be carried out by authorized technicians.

The device and accessories must not be cleaned in dishwashers or autoclaves.

Disinfection must always be preceded by cleaning of the relevant components. Observe the concentration and exposure time of the disinfectant according to the manufacturer's instructions.

8.2 Cleaning and disinfection plan

The following cleaning and disinfection plan is a recommendation for periodic operation. Depending on the application and the frequency of operation, the cleaning frequency can be shortened or extended.

Tasks	frequency				
	if required	daily	weekly	monthly	yearly
Cleaning the device			X		
Cleaning accessories *(Rack, block inserts, hoses, pump, sensors, etc.)*			X		
Disinfect the device	X				
Disinfect accessories *(Rack, block inserts, hoses, pump, sensors, etc.)*	X				

Malfunctions can occur if periodic cleaning, especially inside the vacuum chamber (process area) and the ventilation slots, is neglected.

For cleaning and disinfection of Chiller To Dancer, the pump, pressure sensors and other additional systems, please follow the relevant manufacturer instructions.

8.3 Procedure

8.3.1 Housing parts

Check the ventilation slots for dust residue and clean them with a dry brush or vacuum the dust off using a vacuum cleaner.

Never use compressed air to blow dust away or into the interior of the device. This can lead to excessive dust accumulation inside the device and poses a fire hazard.

The housing parts may be cleaned with a cloth moistened with a mild soap solution.

Ingredients of suitable cleaning agents: soap, anionic surfactants, non-ionic surfactants.

If e.g. methylated spirits, alcohol or light petrol etc. are used, the labelling on the device can be destroyed and the colour can be removed.

After using cleaning agents, remove any residue by wiping with a damp cloth.

The surfaces must be dried immediately after cleaning

8.3.2 Process area - vacuum chamber

To make it easier to clean the process area in the vacuum chamber, first remove the shaker plate and the rack. Please refer to chapter 4.3.6 Shaking plate and 4.3.7 Rack2000.

Cleaning these parts is covered in the following chapter.

Regular cleaning of the vacuum chamber helps to avoid residues that, if left for a long time, can affect the appearance and functionality, especially that of the vortex drive. Depending on the degree of contamination, the device's vacuum chamber can be cleaned with glass cleaner, 70% ethanol and, if necessary, with commercially available stainless-steel cleaner.

Make sure that no rusting objects come into contact with the vacuum chamber. Rust deposits lead to infection of the chrome steel.

If rust spots appear on the surface of the vacuum chamber due to contamination, the affected areas must be cleaned and polished immediately; if necessary, contact the manufacturer or the authorized supplier.

Never use knives, screwdrivers, scissors or similar tools to remove stubborn deposits.

Soak the encrustation in soapy water, disinfectant or 70% ethanol for 15 to 30 minutes. Then remove the encrustation with a dry cloth. If necessary, you can use a wooden or plastic spatula.

Remove the O-ring (the orange ring between the vacuum chamber and the glass) and clean it with glass cleaner or 70% ethanol. Check the O-ring for kinks and cuts. If necessary, it must be replaced. Do not forget to also clean the O-ring guide groove on the vacuum chamber.

Clean the glass surfaces and the side walls of the four recesses intended for the feet of the shaking plate until no residue is visible.

Residues can hinder or even completely block the operation of the vortex plate. Such an obstruction can lead to a shortened service life of the drive.

Do not pull on the temperature sensor cable during cleaning as this may cause a leak.

To clean the cable and sensor, hold the cable with one hand. Then use the other hand to clean the cable and sensor with a cloth soaked in mild soapy water. Check the sheathing of the cable and sensor for kinks or cuts; the temperature sensor may need to be replaced.

8.3.3 Shaking plate and rack

Disassemble the rack from the shaker plate (see chapter 4.3.7 Rack 2000). Clean the shaker plate and its feet with a cloth soaked in mild soapy water.

Ingredients of suitable cleaning agents: soap, anionic surfactants, non-ionic surfactants.

Pay particular attention to the O-rings on the feet. Deposits or wear on the O-rings can impede the shaker drive or even block it completely. Such impairment can lead to a shortened service life of the drive. You should replace the O-rings if necessary.

We strongly advise against submerging the shaker plate in liquid for cleaning. This could damage the magnets and ball bearings in the feet.

Please pay attention to the slight elevation of the feet; these should be clean and intact.

The risers are subject to normal wear and tear and it may be necessary to replace the feet. These are available as a set. For further information please contact the manufacturer or an authorised supplier.

Spray the rack with disinfectant or place it in a mild soap solution. Then flush the rack under running water and let it dry.

Please make sure that the black anodized layer is not damaged. A damaged anodized layer hinders heat transfer and is therefore detrimental to the process.

If the black anodized layer is damaged, it is recommended to replace the rack.

8.3.4 Glass panel

Cleaning the glass panel should be carried out by qualified personnel.

To clean the glass panel, it must first be removed from the device. To do this, close the lid and make sure that the glass panel has reached its final position on the vacuum chamber. From this point on, the device must be disconnected from the power supply.

Remove the cover housing by loosening the four (4) fastening screws. Now loosen the two hex socket set screws that fix the glass panel to the lifting mechanism (hex socket set screws do not have to be completely unscrewed).

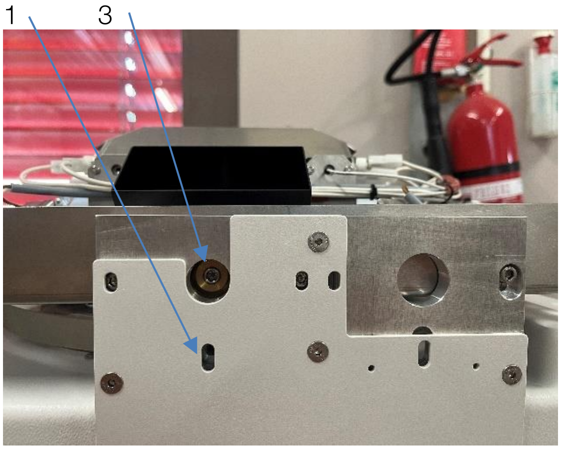


Illustration 55: Front view without cover housing

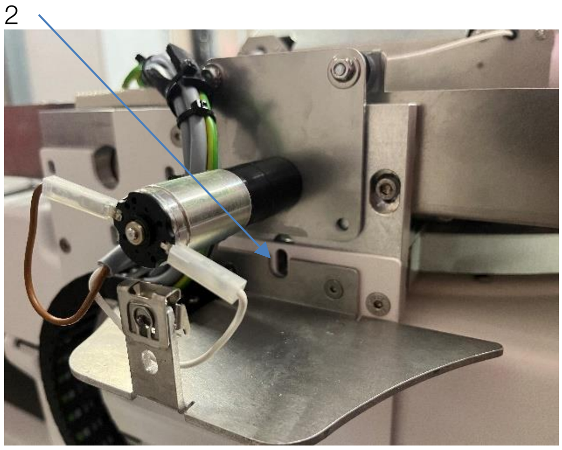


Illustration 56: Rear view without cover housing

Legend:
1. Locking glass motor on the front (hex socket set screw, open with 2.5 turns)
2. Locking glass motor on the back (hex socket set screw, open with 2.5 turns)
3. Emergency opening, glass position

After the hex socket set screws have been removed, the emergency opening of the glass lifting mechanism can be operated using a hexagon screwdriver. By slowly turning, the lifting mechanism lifts and the glass panel remains on the vacuum chamber.

Make sure that the guide pins of the lifting mechanism are fully extended from the glass panel holder and carefully push the cover open by hand. The glass panel can now be removed and cleaned.

The glass panel can be cleaned on both sides with a commercially available glass cleaner, soapy water or, if necessary, 70% ethanol. If there is heavy encrustation, the Scotch-Brite® Professional sponge can be used.

Care must be taken when cleaning the glass panel. Damage to the glass can lead to malfunctions.

Make sure that no abrasive cleaning media are used. Scratching the glass panel can cause vacuum leaks. Damaged glass panels must be replaced.

The IR emitter and reflector may only be cleaned by an authorized technician. Improper handling can lead to failure of the IR emitter, bending and/or scratching of the reflector.

When reassembling the glass panel, proceed in the reverse order to disassembly.

8.3.5 Hose set, emission condenser and catchpot with valve

Clean dirty surfaces with a clean, slightly damp cloth. We recommend using water or a mild soap solution to moisten the cloth.

Ingredients of suitable cleaning agents: soap, anionic surfactants, non-ionic surfactants.

The hose set can be flushed with soapy water when dismantled. Heavily soiled parts can be cleaned inside with a pipe cleaner or something similar. Then allow to dry.

Inspect the hoses and seals. Any brittle, softened or decomposed parts should be replaced.

Seals that are still intact can also be cleaned with a damp cloth.

The vacuum adapter (transition from the vacuum chamber to the hose set) can also be flushed with soapy water. To do this, carefully pour the soapy water into the vacuum outlet (see chapter 4.3.3 View with open lid). Make sure the soapy water is collected at the vacuum port on the back of the device."

The emission condenser must first be dismantled and all attachments removed. The emission condenser can then be flushed with soapy water. Then let it dry.

The emission capacitor is made of glass. Care must be taken when handling this part.

Separate the catchpot and the valve. The catchpot and the valve can be flushed with soapy water. Then let both parts dry.

Inspect the seals. Any that are brittle, softened or deteriorated should be replaced.

Seals that are still intact can also be cleaned with a damp cloth.

The catchpot is made of glass. Care must be taken when handling this part.

9. Maintenance and service work

9.1 Notes on maintenance and service work

warning	Before carrying out any maintenance or servicing work, switch off the device and unplug the power cord at both ends.
	Repair and service work may only be carried out by authorized technicians. Only certified original parts from the manufacturer may be used for repairs.
Caution	The device should be allowed to cool down before you start working on it. To speed up the cooling process, open the lid.
warning	Depending on the type of samples, you should consider the potential biological hazard. Wear appropriate protective gloves and goggles and disinfect the device before use. Risk of contamination for the user due to insufficient cleaning or failure to follow cleaning instructions.

9.2 Maintenance plan

Annual maintenance of the device and its accessories is recommended. This includes professional cleaning of the inside of the vacuum chamber, checking all wearing parts and safety elements, replacing them if necessary, and carrying out a safety measurement.

This maintenance plan is a recommendation for periodic operation. Depending on the application and the frequency of operation, the maintenance frequency can be shortened or extended.

The following wear and spare parts may have a shorter service life than the complete device, as described in Chapter 2 Intended use.

The list is not exhaustive and can be expanded continuously. If necessary, ask the manufacturer.

It cannot be ruled out that the device may need to be disassembled or returned to the manufacturer to replace some parts.

Wearing parts and spare parts are not covered by the warranty for the complete device.

9.2.1 Wear parts

Wear parts are parts that have to withstand increased stress and should be replaced periodically to ensure the quality of the device. Wear parts can also be considered spare parts.

Order number	Description
CD.M125	Set of 4 feet, O-ring & magnet, 50.39mm
CI.E253	IR emitters
CI.M103	Tiing belt for vortex drive
CI.M119	Timing belt for lid drive
CI.M150	Ventilation valve
CI.M151	Inert gas valve
CI.M152	Vortex drive, complete
CI.M134	Set of universal centering rings for hose set PC3003/Z
CH.M001	Set of O-rings for catchpot

9.2.2 Spare parts and accessories

Basically, all components of the device are available as spare parts. The following list contains the most common spare parts.

Order number	Description
CD.M101	O-ring, FEP/Silicone, 50.39 x 3.53mm, set of 4 pieces.
CD.M102	O-ring, FEP/Silicone, 367.7 x 7.0
CD.Z900	Shaking plate with rotating feet
CI.E250	Lid fan
CI.E251	Side fan
CI.E252	LED lighting
CI.E254	PCB incl. firmware
CI.E255	Power adapter
CI.E256	Gear motor glass drive
CI.M257	Motor lid drive
DP.E101	Temperature probe with LEMO connector
CD.E212	Temperature probe, for jacket heating
R2000	Rack
CH.1000	Chiller To Dancer
CH.M101	Catchpot clip
CH.M102	Catchpot, with two connections
CH.M103	Catchpot, with one connection
CH.M104	Set of connecting hoses
CH.M150	DMSO valve with WAGO connector, PTFE connectors
CH.M151	DMSO valve with jack plug, PTFE connectors
CH.Z020	Hettich drain pump set
CH.Z099	3.0l glycol ready mix in container for the Chiller To Dancer

10. Malfunctions and errors

10.1 Behavior in the event of disruptions and irregularities

The device may only be operated when it is in perfect working condition. If you as the user notice any irregularities, faults or damage, immediately take the device out of service and inform your supervisor.

10.1.1 Emergency shutdown of the device

If the device is switched off or disconnected from the mains, e.g. in the event of a power failure or POWER RESET, the vent valve opens automatically and if the vacuum pump is stopped or switched off, the lid can be opened manually after approx. 3 to 5 minutes to remove the samples from the device.

Caution

Depending on the operation, the surfaces in the vacuum chamber, the temperature sensor, the rack and the sample vessels contained therein may still be hot after switching off or after a power failure. You may get burns if you touch them. Use temperature-resistant protective gloves or allow the CombiDancer II to cool down after switching off.

To speed up cooling, open the lid once the vacuum is released.

warning

Depending on the sample, consider possible biological (contact) as well as toxic (inhalation) hazards and wear protective gloves and goggles. If necessary, it is possible to extract fumes and supply fresh air.

10.1.2 Emergency opening of the lid

Turn off the device using the power switch on the back and disconnect it from the mains. The points in chapter 10.1.1 Emergency shutdown of the device, must be considered.

Once the vacuum is released, the glass lifting mechanism can be operated by slowly turning it with a hexagon screwdriver via the emergency opening (see chapter 4.3.1 Front view). Then carefully slide the lid open by hand.

Danger

Depending on the solvents used and the progress of the process, an explosive gas mixture can form in the vacuum chamber as soon as the process is stopped and the vacuum is released.

10.2 Perform a NETWORK RESET

If the device does not function normally again after an error, it is recommended to perform a network reset.

1. Turn off the device at the power switch, wait 10 seconds
2. Turn the device back on using the power switch

The points from chapter 10.1.1 must be taken into account.

10.3 Error Description

If the fault cannot be rectified using the troubleshooting table, contact customer service. State the device type and serial number. Both numbers can be found on the device's rating plate.

Error Description	Caused	Remedy
Condensation on the glass.	• Target temperature set too high • Pump performance set too low.	• Check temperature setting • Check the pump's capacity • Check the cooling capacity of the chiller/cold trap. • Check the hose system for blockages (check vacuum).
Condensation on the vacuum chamber edge.	• vacuum chamber jacket heating switched off.	• Switch on jacket heating • Check the cooling capacity of the chiller/cold trap. • Check the hose system for blockages (check vacuum).
Condensation on the glass and the edge of the vacuum chamber.	• Pump in stand-by	• Pump was not started or not correctly set up for the process. • Pump does not start automatically after a power failure.
Heat input disturbed by IR radiator - target temperature T1 is not reached	• IR emitter defective (not lit) • Insufficient ventilation and thus triggering of the thermal switch -> message OVERTEMP_IR	• Replace IR emitters. • Check the air supply via the ventilation grille on the lid and clear it if necessary. Reset the thermal switch manually. • Fan defective. Replace fan and reset thermal switch manually.
Target temperature T1 is not reached.	• The temperature sensor T1 is defective • There is no or only insufficient heat transfer to the temperature sensor T1. • Temperature sensor T1 is "cooled" by overflowing sample.	• Replace sensor • Check the sensor installation in the rack and use thermal paste if necessary. • Reduce over-foaming of the sample
Target temperature T2 is not reached	• Defective jacket heating • Defective temperature sensor T2 • Insufficient ventilation and thus triggering of the thermal switch.	• Replace jacket heater • Replace sensor • Manually reset the thermal switch and ensure that the system does not get too hot.
OVERCURRENT_LID	• Lid is mechanically blocked.	• Check the lid drive and associated parts and remove any blockage.

Error Description	Caused	Remedy
OVERCURRENT_GLASS	• Glass drive is mechanically blocked. • Glass drive is blocked by vacuum.	• Check the glass drive setting. • If necessary, install the latest software version. • The glass holder guide is not aligned. Replace the glass including the guides. • Extend the time until the jar is opened by a process step, e.g. slow venting.
Rack or shaking plate does not move.	• Shaking plate with rack not correctly inserted in the vacuum chamber. • Recesses in the bowl for the feet of the shaking plate are dirty. • Elevation of the feet no longer intact. • Vortex drive defective • Software problem	• Check that the rack or shaking plate is correctly fitted. • Clean and check the shaking plate for wear. • Replacing the feet • Replace vortex drive • Restart the GUI app
Vacuum is not achieved	• Leak in the system	• Check the hose system connections and tighten if necessary. • Check that all seals around the emission condenser are correctly installed. • Check that the coating around the temperature sensors in the vacuum chamber is not damaged. • Check the seal between the glass and the vacuum chamber and clean or adjust if necessary.
Device cannot connect to GUI app.	• Not logged in to the GUI app.	• Log in as a normal user or service user and connect again.
Pump cannot be connected to device.	• Error while adopting the setting values. • System error	• Check settings and adjust if necessary. • Reset pump to factory settings and set values according to chapter 6.7.5. • Apply pump default values in the GUI app.

10.4 Error codes

The current implementation is that the firmware outputs a list of "error flags" that indicate the error status of an individual component. Some of these are defined as "fatal", i.e. they lead to the program being aborted.

In addition, corresponding text messages are displayed in the GUI app under “Error Log”.

Error flags	Error Description	Fatal
PERSDATA	Calibration data on SD card invalid	-
OVERCURRENT_LID	Overcurrent cover	-
OVERCURRENT_GLASS	Overcurrent glass	-
OVERTEMP_IR	Overtemp IR	Yes
OVERTEMP_0	Overtemp switch	Yes
OVERTEMP_1	Overtemp switch	Yes
SAFETY_SWITCH	TÜV switch	Yes
POT_SSR	Pot heating switching element defective	-
LED_FAIL	LED lighting defective	-
MOTOR_DRIVER_FAIL	Motor or control of lid or glass defective	-
OOR_T1	Out-out-range T1	Yes
OOR_T2	Out-out-range T2	Yes
OOR_T3	Out-out-range T3	Yes
OOR_T4	Out-out-range T4	Yes
OOR_T5	Out-out-range T5	Yes
HALL	Hall sensor for positioning does not deliver pulses	-

☞ Some error codes can be cleared by pressing “Clear” so that the device is ready for use again.

11. Disposal

warning

Before disposing of the device, device components or accessories, it is necessary to decontaminate and clean it for the safety of people, the environment and property. All relevant legal requirements must be considered when disposing of the device. It is recommended to affix a note to the device indicating the date, signature and cleaning/disinfecting solution used.

When disposing of the device, the relevant legal regulations must be considered. According to Directive 2012/19/EU, the devices may no longer be disposed of with household waste.

The device is intended for commercial use ("Business to Business" - B2B).

The device belongs to group 4 (large devices).

The symbol of the crossed-out waste bin indicates that the device must not be disposed of with household waste. Disposal regulations may vary from one EU country to another. If you need further information on device disposal, please contact the relevant authorities or your supplier.

Note for Germany:
The device must not be disposed of via public or municipal waste collection points or recycling points. If necessary, contact the relevant authorities or your supplier for further information on device disposal.

12. Revision history

Rev.	Superseded version	Revision description	Date
0.0	-	Creation	25.05.2023
0.1	0.0	Chapter Adjustments	05.07.2023
0.2	0.1	Adjustments in chapter 1.6 Technical data – EMC standard	30.08.2023
0.3	0.2	Additions and adjustments across all chapters	05.09.2023
1.0	0.3	Final release for printing	12.10.2023
1.1	1.0	Chapter 1.7 Technical data: Adjustments of power consumption from 1600VA to 1800W. Chapter 4.5 Overview of connections: Added information regarding logins before connecting to CDII. Chapter 5 The individual operating functions: Information regarding open ventilation valve added. Chapter 4.10 Software update of the CombiDancer II firmware – ATTENTION: After the update, the calibration values are reset to the default settings.	23.11.2023
2.0	1.1	Complete revision Safety instructions updated	17.07.2024