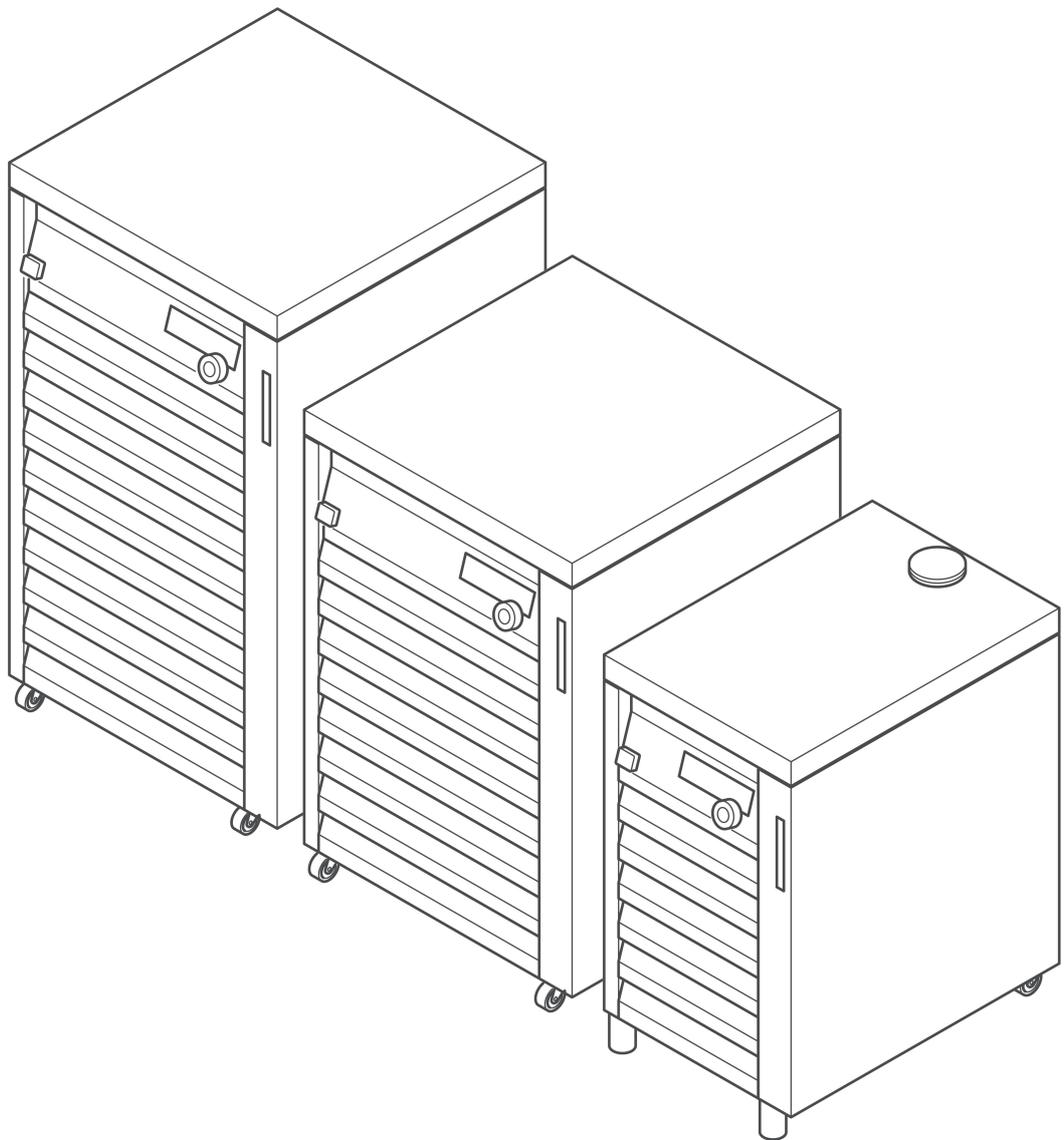




Recirculating Chiller F-305 / F-308 / F-314

Operation Manual



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1 About this document

This operation manual is applicable for all variants of the instrument.

Read this operation manual before operating the instrument and follow the instructions to ensure safe and trouble-free operation.

Keep this operation manual for later use and pass it on to any subsequent user or owner.

BÜCHI Labortechnik AG accepts no liability for damage, faults and malfunctions resulting from not following this operation manual.

If you have any questions after reading this operation manual:

- ▶ Contact BÜCHI Labortechnik AG Customer Service.

<https://www.buchi.com/contact>

1.1 Warning notices in this document

Warning notices warn you of dangers that can occur when handling the device.

There are four danger levels, each identifiable by the signal word used.

Signal word	Meaning
DANGER	Indicates a danger with a high level of risk which could result in death or serious injury if not prevented.
WARNING	Indicates a danger with a medium level of risk which could result in death or serious injury if not prevented.
CAUTION	Indicates a danger with a low level of risk which could result in minor or medium-severity injury if not prevented.
NOTICE	Indicates a danger that could result in damage to property.

1.2 Symbols

The following symbols may be displayed in this instruction manual or on the device:

1.2.1 Warning symbols

Symbol	Meaning	Symbol	Meaning
	General warning		Corrosive substance
	Dangerous electrical voltage		Flammable substance
	Biological hazard		Potentially explosive atmosphere
	Breakable items		Dangerous gases
	Hot surface		Health-harming or irritant substances

Symbol	Meaning	Symbol	Meaning
	Risk of hand injury		Strong magnetism

1.2.2 Mandatory directive symbols

Symbol	Meaning	Symbol	Meaning
	Wear safety goggles		Wear protective clothing
	Wear protective gloves		Heavy load, do not lift without assistance

1.2.3 Other symbols



NOTE

This symbol draws attention to useful and important information.

- This character draws attention to a requirement that must be met before the instructions below are carried out.
- ▶ This character indicates an instruction that must be carried out by the user.
- ⇒ This character indicates the result of a correctly carried out instruction.

1.3 Available languages

These operating instructions were originally produced in German and have been translated into several other languages. The translations are available on the enclosed CD or can be obtained as a PDF file via <http://www.buchi.com>.

2 Safety

2.1 Intended use

The [*Recirculating Chiller F-3xx*] has been designed and built as an item of laboratory equipment. It is intended to be used for cooling sealed circulation systems (e.g. Rotavapor R-300, reaction vessels).

If the [*F-3xx*] is used in combination with other equipment (e.g. Rotavapor R-300 and extraction unit), all relevant operating instructions must be followed.

2.2 Use other than that intended

Use of any kind other than that referred to and any application that does not comply with the technical specifications in Chapter 3.3 "Technical data", page 18 constitutes use other than that intended.

In particular, the following applications are not permissible:

- Installation of the [*F-3xx*] in areas that require apparatus that is safe to use in potentially explosive atmospheres.
- Use of accessories or replacement parts that are not specified in the operating instructions provided.
- The [*F-3xx*] may not be used in conjunction with flammable substances.
- Placing objects on top of the [*F-3xx*].

Damage or hazards attributable to use of the product other than as intended are entirely at the risk of the user alone.

2.3 Staff qualification

Unqualified persons are unable to identify risks and are therefore exposed to greater dangers.

The device may only be operated by suitably qualified laboratory staff.

These operating instructions are aimed at the following target groups:

Users

Users are persons that meet the following criteria:

- They have been instructed in the use of the device.
- They are familiar with the contents of these operating instructions and the applicable safety regulations and apply them.
- They are able on the basis of their training or professional experience to assess the risks associated with the use of the device.

Operator

The operator (generally the laboratory manager) is responsible for the following aspects:

- The device must be correctly installed, commissioned, operated and serviced.
- Only suitably qualified staff may be assigned the task of performing the operations described in these operating instructions.
- The staff must comply with the local applicable requirements and regulations for safe and hazard-conscious working practices.
- Safety-related incidents that occur while using the device should be reported to the manufacturer (quality@buchi.com).

BUCHI service technicians

Service technicians authorized by BUCHI have attended special training courses and are authorized by BÜCHI Labortechnik AG to carry out special servicing and repair measures.

2.4 Residual risks

The device has been developed and manufactured using the latest technological advances. Nevertheless, risks to persons, property or the environment can arise if the device is used incorrectly.

Appropriate warnings in this manual serve to alert the user to these residual dangers.

2.4.1 Overheating and toxic vapors

Should the device overheat and/or catch fire, corrosive and toxic vapors may be produced.

- ▶ Do not inhale vapors in the event of fire and/or explosion.
- ▶ Wear a protective breathing mask.
- ▶ Avoid overheating the device by carefully following the installation instructions.

2.4.2 Corrosive refrigerant

Direct contact with the refrigerant R134a can cause freeze burns and eye injuries.

- ▶ If liquid escapes: avoid contact with skin and eyes.
- ▶ Wear safety goggles.
- ▶ Wear protective gloves.

2.4.3 Faults during operation

If a device is damaged, sharp edges, moving parts or exposed electrical wires can cause injuries.

- ▶ Regularly check device for visible damage.
- ▶ If faults occur, switch off the device immediately, unplug the power cord and inform the operator.
- ▶ Do not continue to use devices that are damaged.

2.5 Personal protective equipment

Depending on the application, hazards due to heat and/or corrosive chemicals may arise.

- ▶ Always wear appropriate personal protective equipment such as safety goggles, protective clothing and gloves.
- ▶ Make sure that the personal protective equipment meets the requirements of the safety data sheets for all chemicals used.

2.6 Modifications

Unauthorized modifications may impair safety and lead to accidents.

- ▶ Use only genuine BUCHI accessories, spare parts and consumables.
- ▶ Technical modifications to the device or accessories should only be carried out with the prior written approval of BÜCHI Labortechnik AG and only by authorized BUCHI technicians.

BUCHI accepts no liability whatsoever for damage arising as a result of unauthorized modifications.

3 Product description

3.1 Description of function

The [Recirculating Chiller] has a sealed circulation system for use with suitable laboratory equipment. The [Recirculating Chiller] has a control unit and an integral display for controlling and displaying the actual and set chilling temperature.

Capacity:

- The F-305 is sufficient for chilling one Rotavapor system.
- The F-308 is sufficient for chilling 1 or 2 Rotavapor systems.
- The F-314 is sufficient for chilling 1 to 3 Rotavapor systems.

3.2 Configuration

3.2.1 Front view

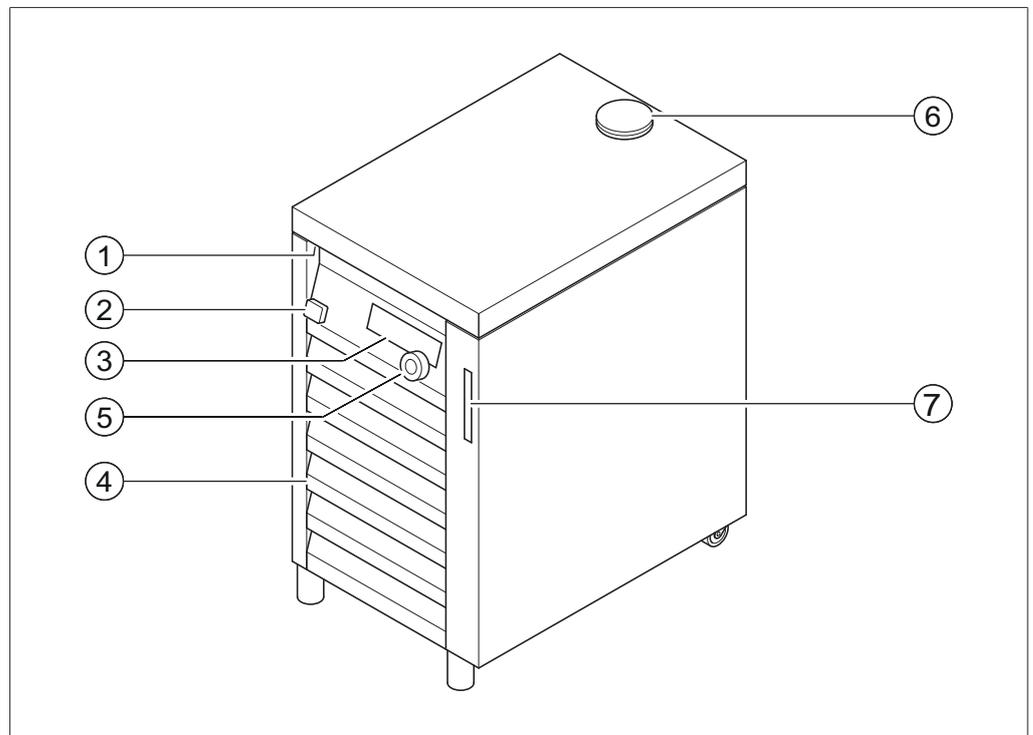


Fig. 1: Recirculating Chiller F-305, front view

- | | | | |
|---|----------------------|---|------------------------------|
| 1 | Handle | 6 | Filler cap for coolant |
| 2 | On/Off switch | 7 | Coolant fill level indicator |
| 3 | Display | | |
| 4 | Air intake (louvers) | | |
| 5 | Control knob | | |

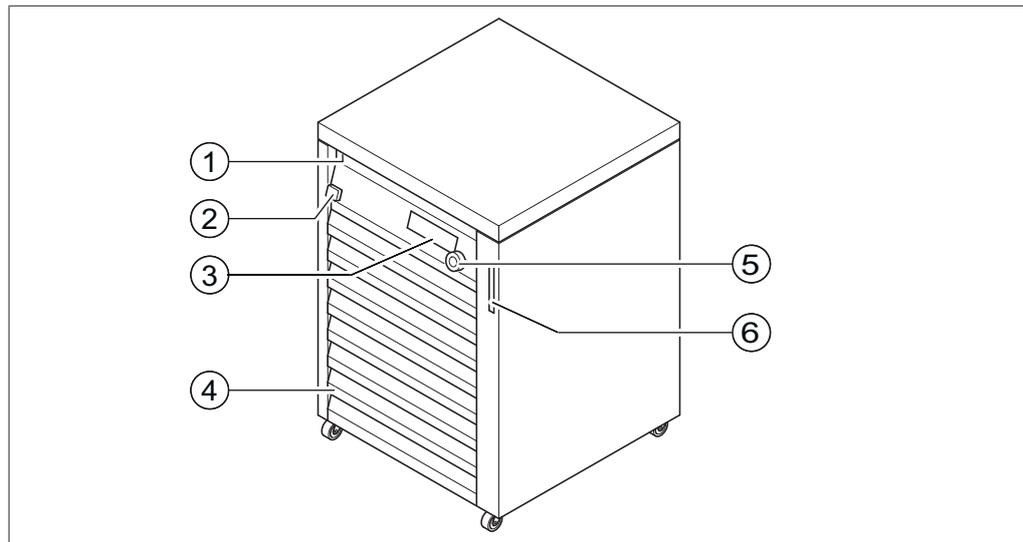


Fig. 2: Recirculating Chiller F-308, front view

- | | | | |
|---|----------------------|---|------------------------------|
| 1 | Handle | 5 | Control knob |
| 2 | On/Off switch | 6 | Coolant fill level indicator |
| 3 | Display | | |
| 4 | Air intake (louvers) | | |

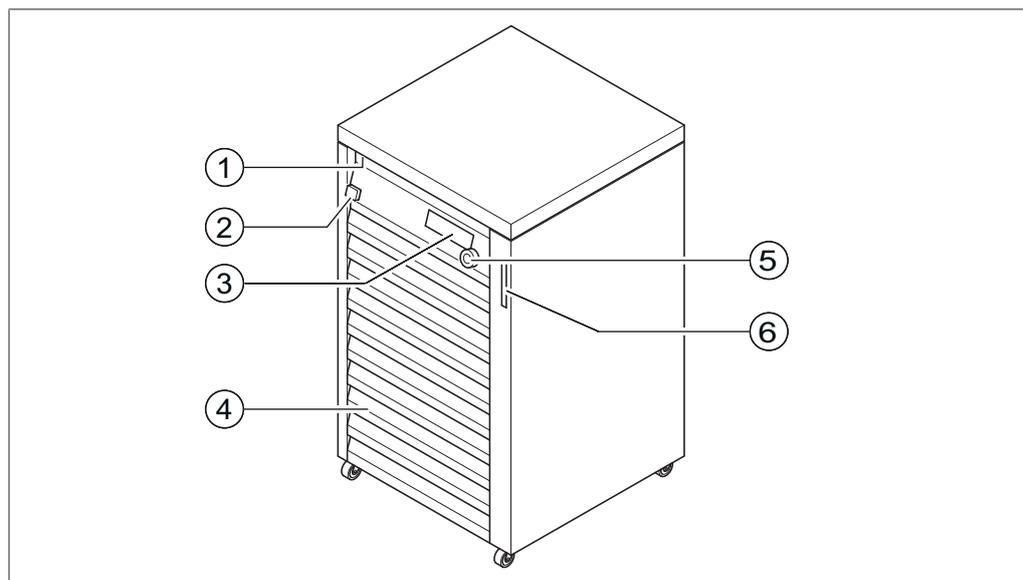


Fig. 3: Recirculating Chiller F-314, front view

- | | | | |
|---|----------------------|---|------------------------------|
| 1 | Handle | 5 | Control knob |
| 2 | On/Off switch | 6 | Coolant fill level indicator |
| 3 | Display | | |
| 4 | Air intake (louvers) | | |

3.2.2 User Interface



Fig. 4: Temperature display on the control panel

- | | | | |
|---|--------------------|---|--|
| 1 | Operating status | 3 | Set temperature locked |
| 2 | Actual temperature | 4 | Connection symbol – device is being controlled via a BUCHI interface |
| | | 5 | Option activated if control knob is pressed |
| | | 6 | Set temperature |

3.2.3 Fill level indicator

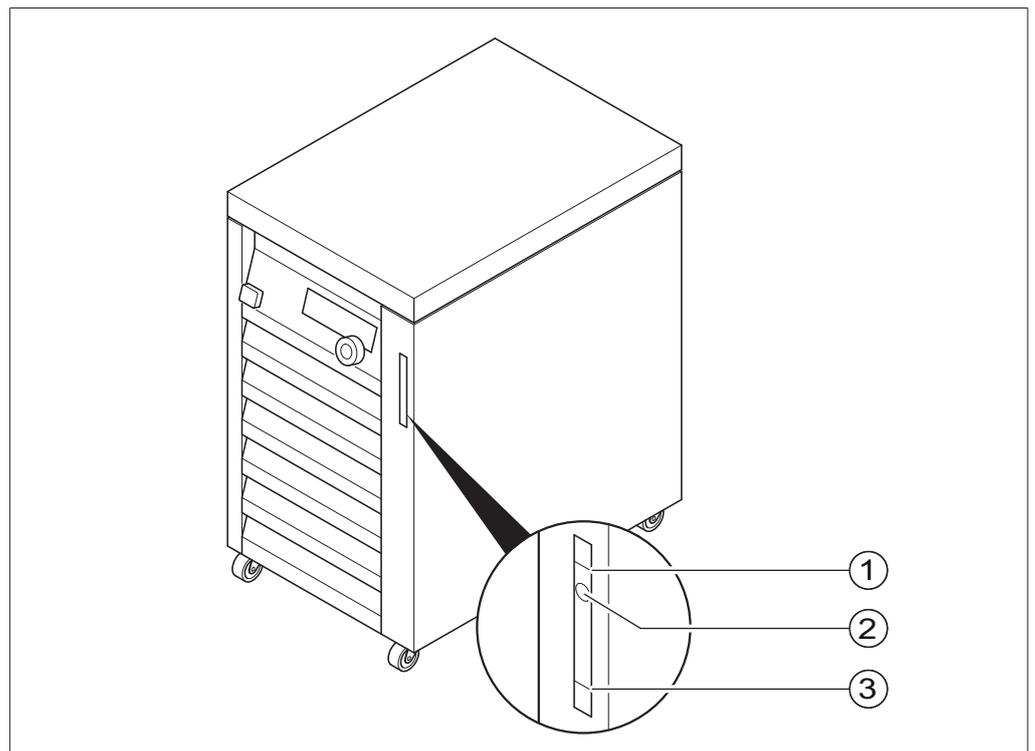


Fig. 5: Coolant fill level indicator

- | | | | |
|---|-------------------------------|---|---------------------|
| 1 | Max fill level mark | 3 | Min fill level mark |
| 2 | Current fill level indication | | |

3.2.4 Rear view

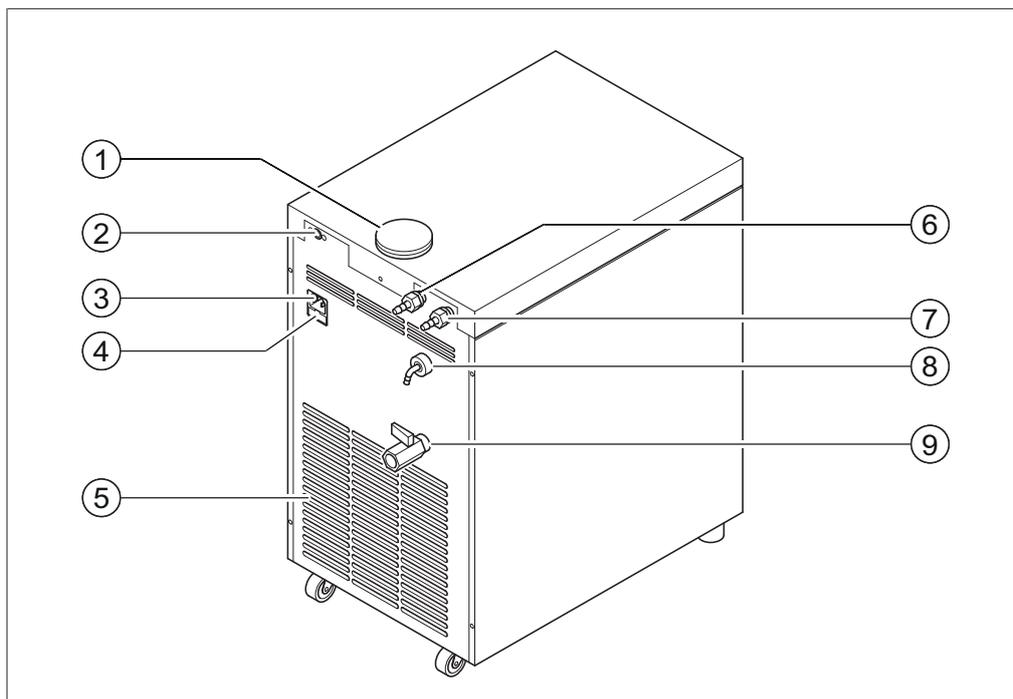


Fig. 6: Recirculating Chiller F-305, rear view

- | | | | |
|---|---|---|----------------------------|
| 1 | Filler cap for coolant | 6 | Coolant inlet "IN" |
| 2 | Standard BUCHI communication port (COM) | 7 | Coolant outlet "OUT" |
| 3 | Power supply connection | 8 | Tank overflow |
| 4 | Fuses | 9 | Drain tap for coolant tank |
| 5 | Air outlet | | |

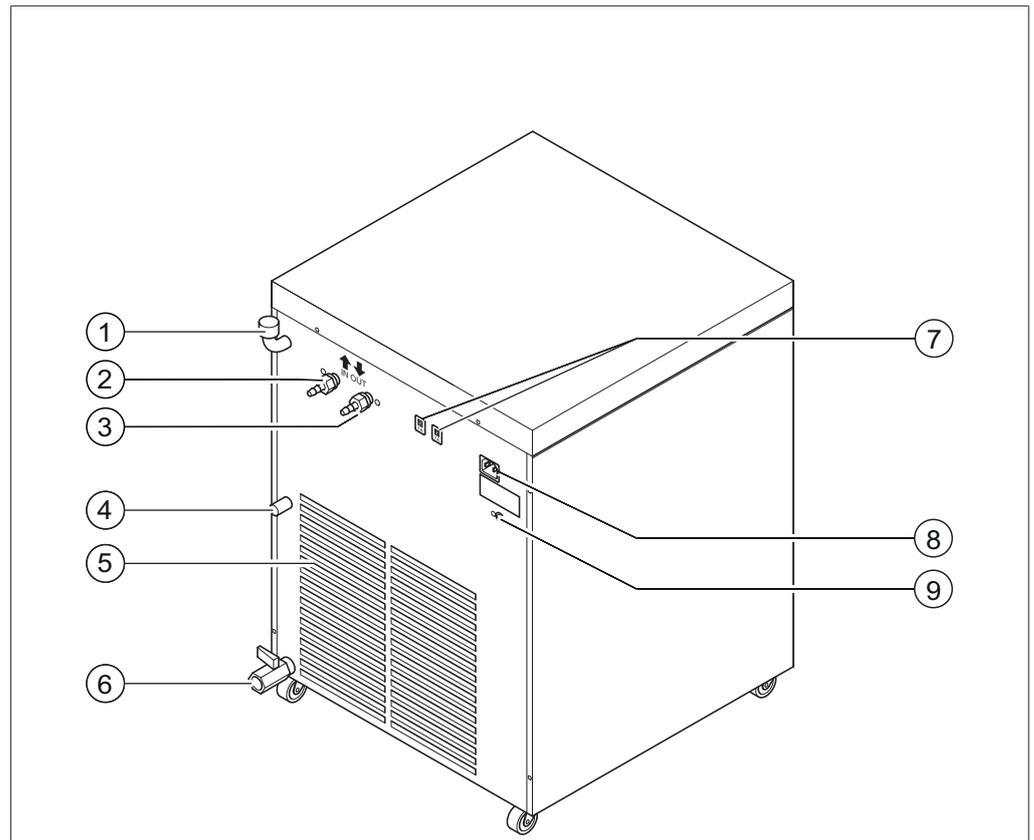


Fig. 7: Recirculating Chiller F-308, rear view

- | | | | |
|---|------------------------|---|---|
| 1 | Filler cap for coolant | 6 | Drain tap for coolant |
| 2 | Coolant inlet "IN" | 7 | Fuses |
| 3 | Coolant outlet "OUT" | 8 | Power supply connection |
| 4 | Tank overflow | 9 | Standard BUCHI communication port (COM) |
| 5 | Air outlet | | |

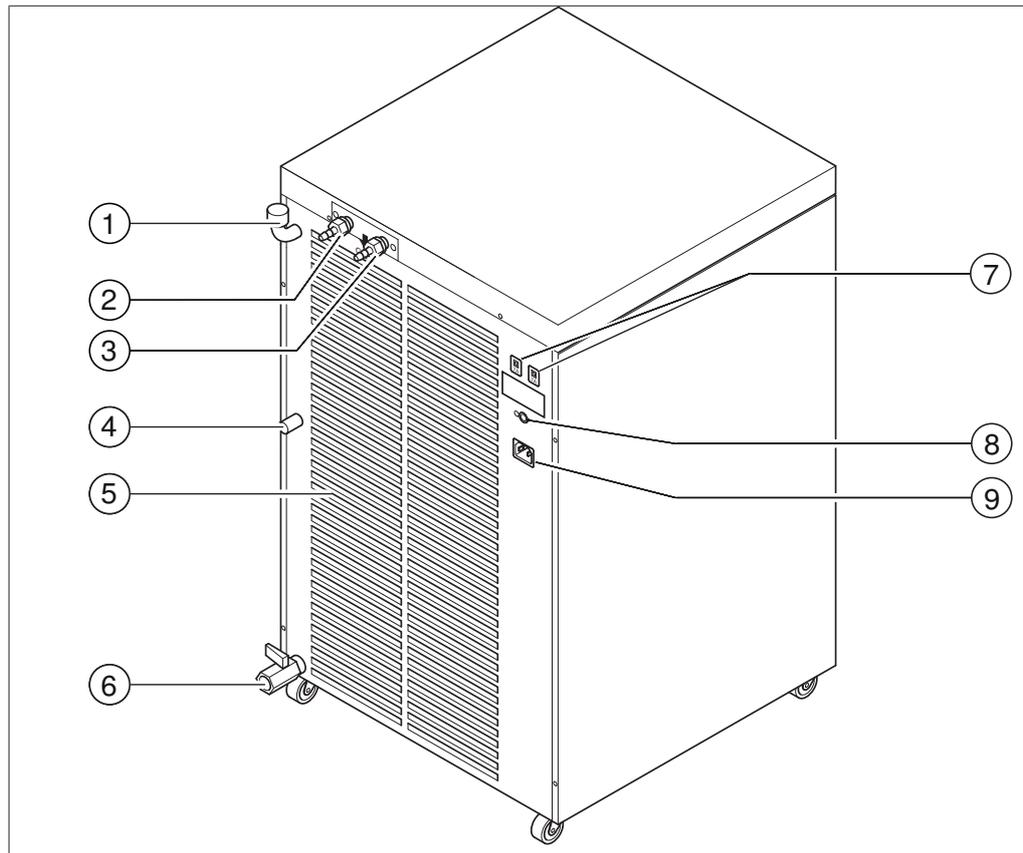


Fig. 8: Recirculating Chiller F-314, rear view

- | | | | |
|---|------------------------|---|---|
| 1 | Filler cap for coolant | 6 | Drain tap for coolant |
| 2 | Coolant inlet "IN" | 7 | Fuses |
| 3 | Coolant outlet "OUT" | 8 | Standard BUCHI communication port (COM) |
| 4 | Tank overflow | 9 | Power supply connection |
| 5 | Air outlet | | |

3.2.5 Type plate

The type plate is on the rear of the [Recirculating Chiller F-3xx].

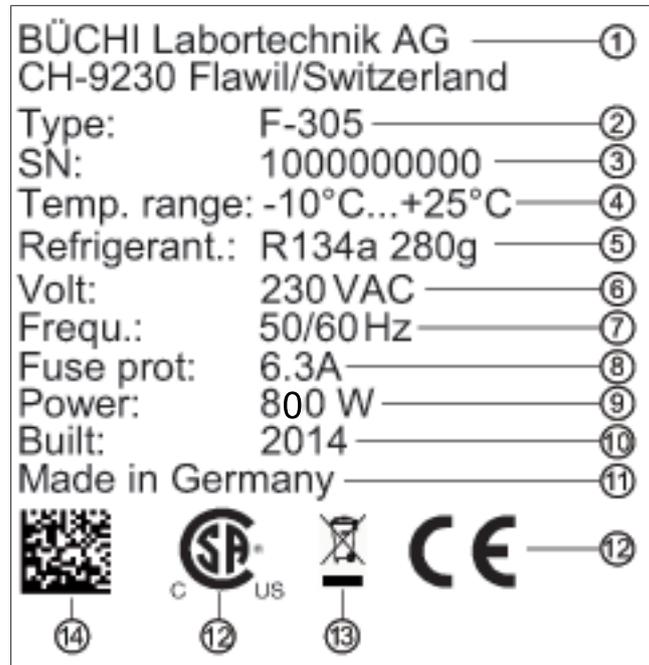


Fig. 9: Type plate (example)

- | | | | |
|---|--------------------------|----|---|
| 1 | Company name and address | 8 | Fuse rating |
| 2 | Device name | 9 | Power consumption |
| 3 | Serial number | 10 | Year of manufacture |
| 4 | Temperature range | 11 | Country of manufacture |
| 5 | Refrigerant | 12 | Approvals |
| 6 | Voltage | 13 | Symbol for "Do not dispose of as household waste" |
| 7 | Frequency | 14 | Product code |

3.3 Technical data

3.3.1 Recirculating Chiller

	F-305	F-308	F-314
Dimensions (W x D x H)	280x 500 x 400mm	400 x 500 x 580 mm	400 x 500 x 670 mm
Weight	31 kg	41 kg	52 kg
Cooling capacity at 15 °C*	550 W	900 W	1'400 W
Cooling capacity at 10 °C*	440 W	730 W	1'150 W
Cooling capacity at 0 °C*	250 W	450 W	720 W
Cooling capacity at -10 °C*	80 W	180 W	350 W
Temperature range	-10 to +25°C	-10 to +25°C	-10 to +25°C
Heating emission	750 W	1'400 W	2'100 W
Power consumption	800 W	1'100 W	1'500 W
Voltage	230 V AC ± 10% 115 V AC ± 10%	230 V AC ± 10% 115 V AC ± 10%	230 V AC ± 10% 115 V AC ± 10%
Frequency			
at 230 V	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz
at 115 V	60 Hz	60 Hz	60 Hz
Temperature reading resolution	0.1°C	0.1°C	0.1°C
Hysteresis	± 1°C	± 1°C	± 1°C
Refrigerant	R134a	R134a	R134a
Tank capacity	3.0 L	4.5 L	6.5 L
Tubing connector	8 + 9.5 mm	8 + 9.5 mm	9.5 + 13.5 mm
Pump pressure	0.6 bar	0.6 bar	1 bar
Pump delivery rate	2.5 L/min	3 L/min	11 L/min
Overvoltage category	II	II	II
Display	Digital	Digital	Digital

* Measured at 20°C ambient temperature.

3.3.2 Ambient conditions

Max. altitude above sea level	2000 m
Ambient temperature	5 - 40°C
Maximum relative humidity	80% for temperatures up to 31°C decreasing linearly to 50% at 40°C

The laboratory apparatus described here may only be used indoors.

3.3.3 Materials

Component	Material
Casing	Stainless steel (1.4301), powder-coated with polyester epoxy
Internal piping and condenser	Copper
Foil	Polyester
Circuit board	Glass-fiber reinforced epoxy resin
Cable	Polyvinyl chloride
Refrigerant	R134a

3.4 Safety features

3.4.1 High temperature cut-out

The *[Recirculating Chiller]* is equipped with a high-temperature cut-out for the compressor and the motor.

3.4.2 Fill level sensor

The F-308 and F-314 *[Recirculating Chiller]* are fitted with a fill level sensor. The fill level sensor checks whether the *[Recirculating Chiller]* is filled with the minimum amount of coolant. See also Chapter 3.2.3 "Fill level indicator", page 13.

4 Transport and storage

4.1 Transport



NOTICE

Risk of breakage due to incorrect transportation

- ▶ Make sure that all parts of the device are safely packed in such a way as to prevent breakage, ideally in the original box.
 - ▶ Avoid sharp movements during transit.
-
- ▶ Transport the device in an upright position.
 - ▶ Empty the coolant tank before transportation.
 - ▶ After transportation, check the device for damage.
 - ▶ Damage that has occurred in transit should be reported to the carrier.
 - ▶ Keep packing for future transportation.

4.2 Storage

- ▶ Make sure that the ambient conditions are complied with (see Chapter 3.3 "Technical data", page 18).
- ▶ Wherever possible, store the device in its original packaging.
- ▶ Empty the coolant tank before storing the device.
- ▶ After storage, check the device and all tubing for damage and replace if necessary.

5 Installation

5.1 Important considerations prior to commissioning



DANGER

Risk of fatal injury if used in potentially explosive atmospheres

- ▶ Do not store or operate the device in potentially explosive atmospheres.
- ▶ Do not bring the device into close proximity with flammable vapors.
- ▶ Do not place any open solvent containers near to the device.



WARNING

Risk of fire from overheating device

- ▶ Do not cover over the device.
- ▶ Make sure there is adequate air circulation.
- ▶ Position the device at least 40 cm away from other objects.



CAUTION

Risk of injury if device falls or is dropped

- ▶ The device should be lifted carefully and by two persons.
- ▶ Do not drop the device or shipping crate.
- ▶ Place the device on a firm, level and vibration-free surface.

5.2 Installation site

The installation site must meet the following requirements:

- Firm and level surface
- Min. space requirement 500 mm x 600 mm (W x D)
- Clearance on all sides: at least 40 cm
- Adequate air circulation
- Power supply outlet easily accessible (even after device has been set up)

The [Recirculating Chiller] is intended for use in laboratory environments (see Chapter 3.3.2 "Ambient conditions", page 18).

5.3 Connecting the F-3xx to the power supply

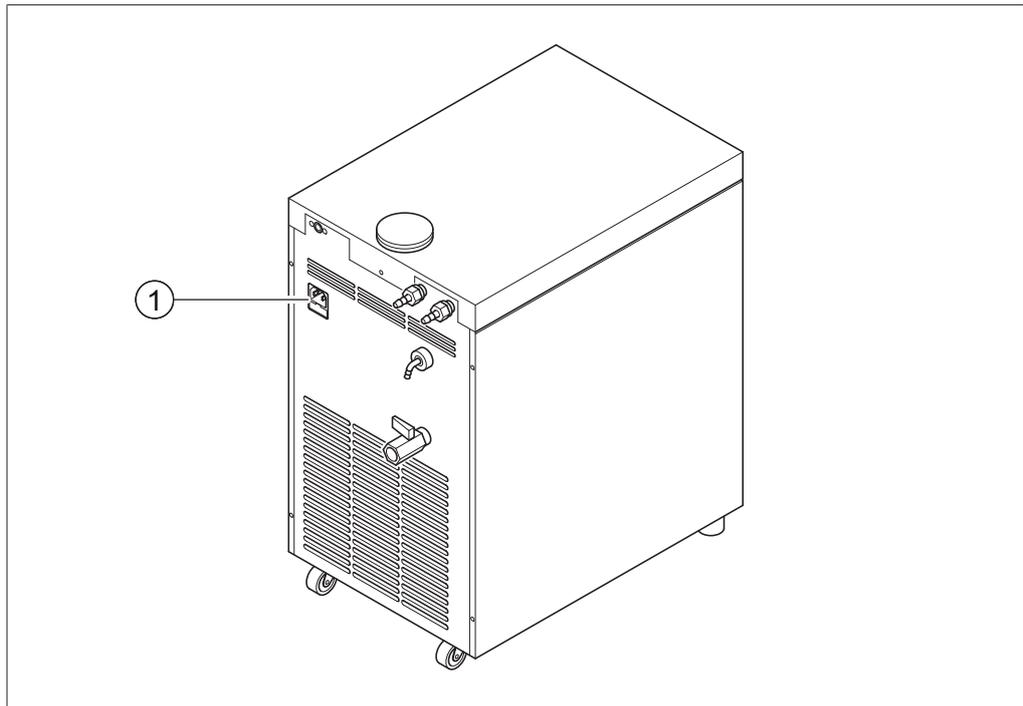


Fig. 10: Power supply connection (example shows F-305)

1 Power supply connection

- ▶ Make sure that the available power supply matches the rating indicated on the type plate.
- ▶ Plug the mains power cord supplied into the power supply socket (1) on the rear of the *[Recirculating Chiller]*.
- ▶ Plug the mains power cord into a grounded mains power socket.

5.4 Assembling the BUCHI distillation system

The following devices are typically used in combination:

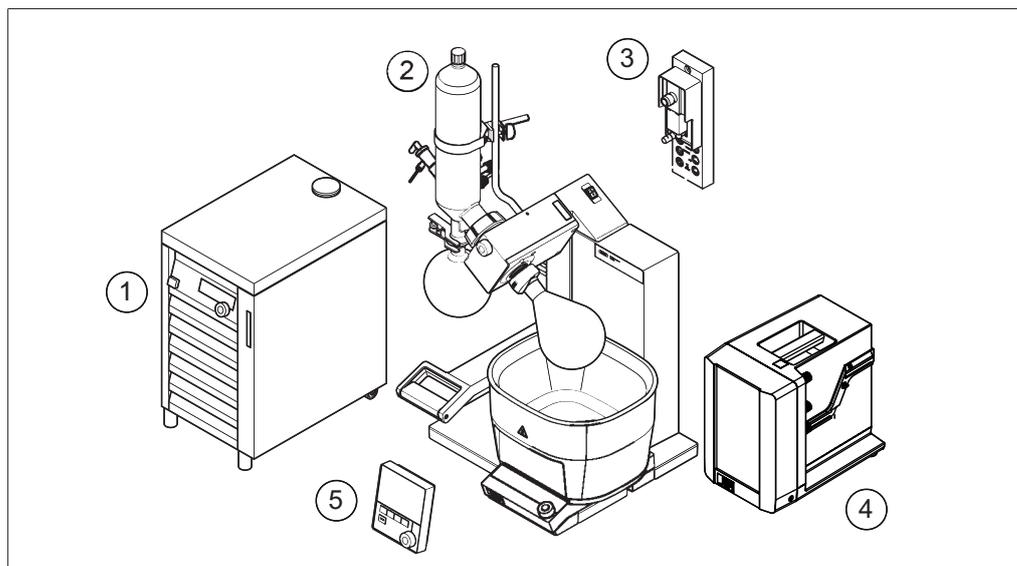


Fig. 11: Typical application (communication connections)

- | | | | |
|---|-----------------------------------|---|-----------------------|
| 1 | Recirculating Chiller F-3xx | 4 | Vacuum Pump V-300 |
| 2 | Rotavapor R-300 with heating bath | 5 | Interface I-300 B-300 |
| 3 | VacuBox | | |

Data communication between the BUCHI laboratory equipment takes place via the communication ports. See Chapter 5.4.1 "Overview: Setting up communication connections (COM)", page 24 and Chapter 5.4.2 "Connecting the communication cable to the F-3xx", page 25.

The coolant circulates around the distillation system through a separate tubing system. See Chapter 5.4.3 "Connecting the coolant tubing to the F-3xx", page 26 and Chapter 5.4.4 "Overview: setting up coolant tubing connections", page 27.

5.4.1 Overview: Setting up communication connections (COM)

The laboratory apparatus can be connected in any order.

As well as the interface unit, a VacuBox also has to be connected.

Below is an example of the connections between the laboratory apparatus.

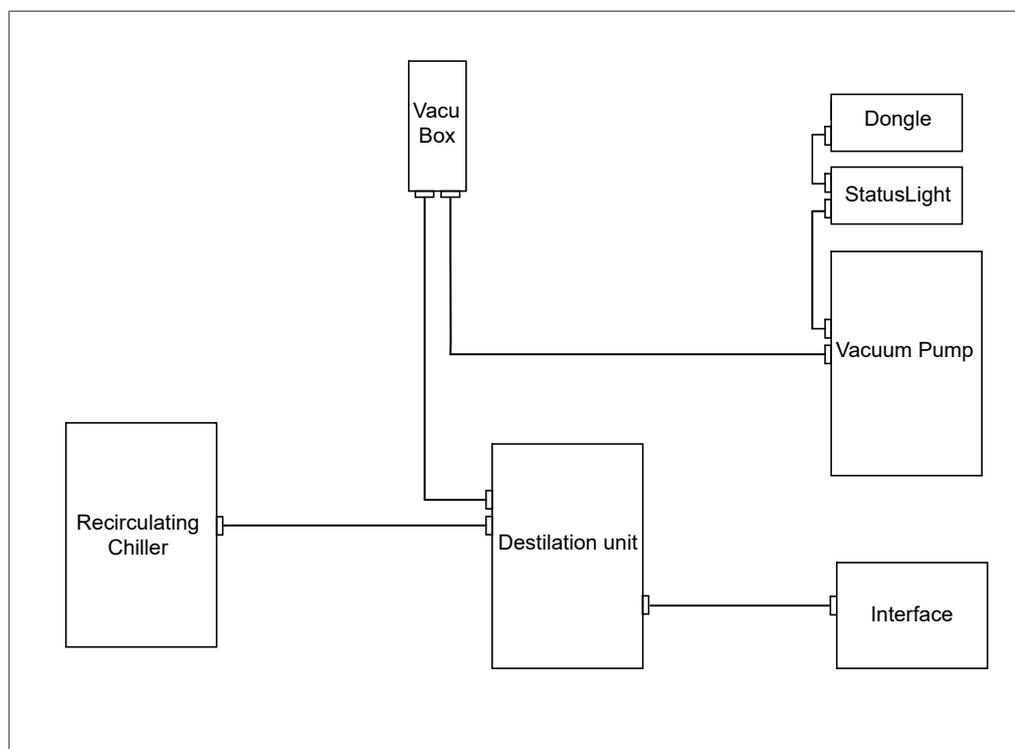


Fig. 12: Schematic diagram of communication connections between the BUCHI laboratory equipment (example)



NOTE

Connections on R-220 Pro:

Information on the connection of communication cables, coolant and vacuum tubing with the Rotavapor R-220 Pro can be found in the operating instructions for the Rotavapor R-220 Pro.

5.4.2 Connecting the communication cable to the F-3xx

The connections between the BUCHI laboratory apparatus are established by means of a standard BUCHI communication cable in each case.

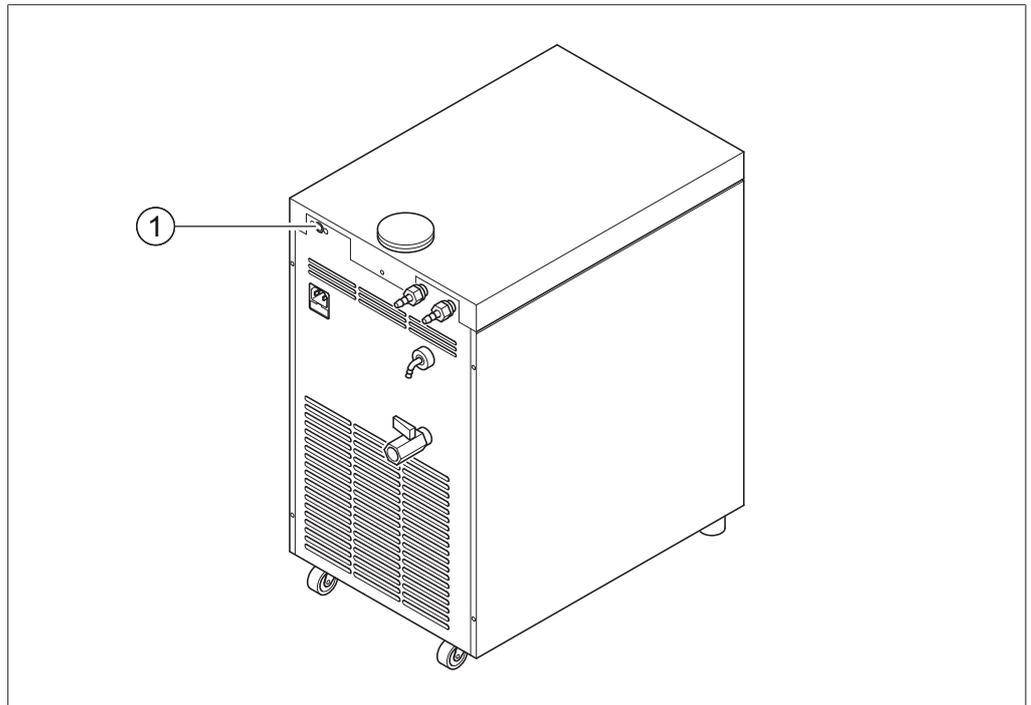


Fig. 13: Communication cable connection on recirculating chiller (example shows F-305)

- 1 Standard BUCHI communication port (COM)
- ▶ Plug the communication cables for connecting to other items of BUCHI laboratory equipment into the socket for the standard BUCHI communication connection (1) on the rear of the recirculating chiller.
 - ▶ Plug the communication cable into the green communication port on the other item of laboratory equipment.

5.4.3 Connecting the coolant tubing to the F-3xx

The coolant circulates via tubing connections between the various items of BUCHI laboratory equipment. **Important:** The complete tubing circuit must form a sealed circulation system.



NOTE

The tubing used for connecting the BUCHI laboratory equipment together must be capable of withstanding a temperature of at least -10 °C and a pressure of at least 2 bar. The tubing must be secured by means of the standard hose clips.

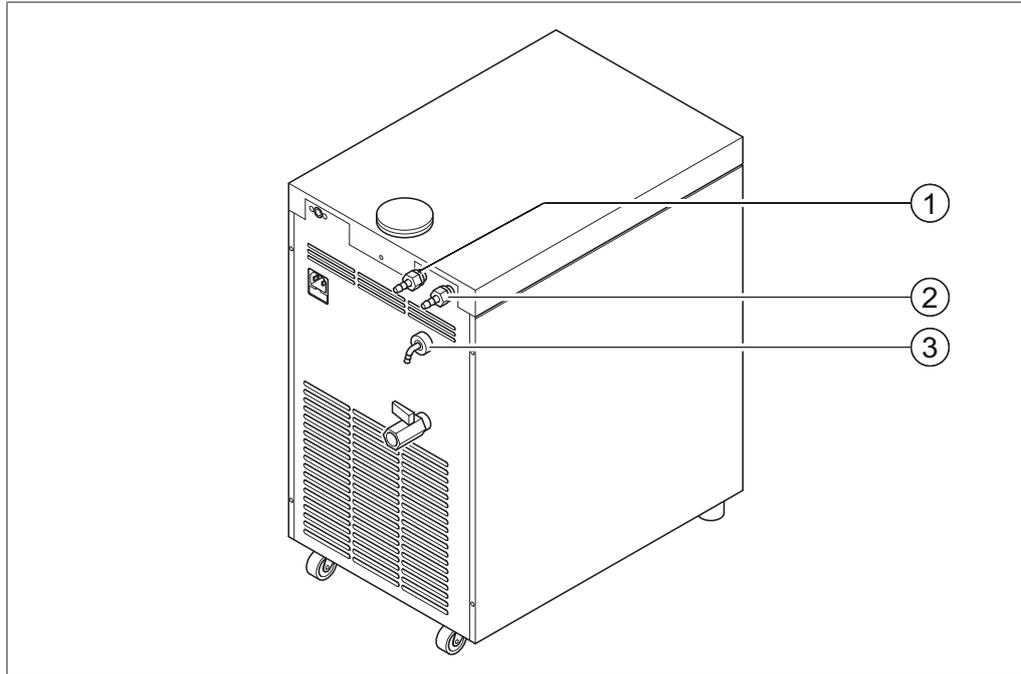


Fig. 14: Connections for coolant tubing and overflow on recirculating chiller

- 1 Coolant inlet "IN"
- 2 Coolant outlet "OUT"

- 3 Tank overflow

- ▶ Push the coolant tube onto inlet spigot (1)/outlet spigot (2) and tighten GL14 union nut together with pipe seal.

5.4.4 Overview: setting up coolant tubing connections

The tubing connections between the various items of BUCHI laboratory equipment form a sealed circulation system. The starting and finishing point is always the recirculating chiller (F-3xx).

Below is an example of the tubing connections between the laboratory apparatus.

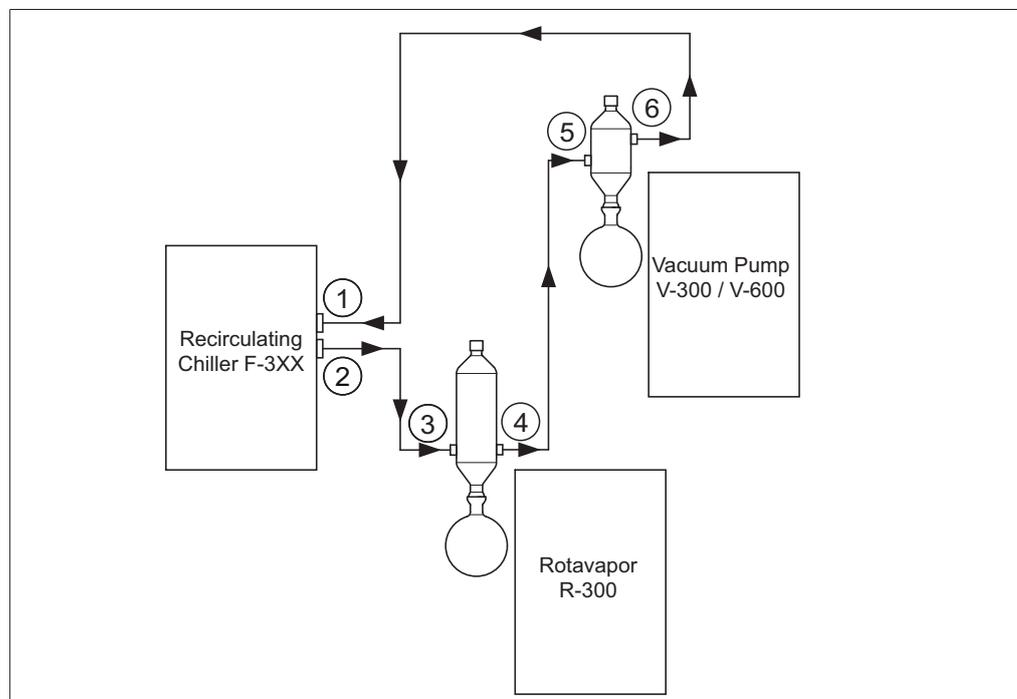


Fig. 15: Coolant tubing connections in a BUCHI distillation system (example)

- | | | | |
|---|---------------------------------------|---|---|
| 1 | Inlet on Recirculating Chiller F-3xx | 4 | Condenser outlet on Rotavapor R-300 |
| 2 | Outlet on Recirculating Chiller F-3xx | 5 | Secondary condenser inlet on Vacuum Pump V-300/V-600 |
| 3 | Condenser inlet on Rotavapor R-300 | 6 | Secondary condenser outlet on Vacuum Pump V-300/V-600 |

- ▶ Connect a tube between the outlet of the recirculating chiller (2) and the inlet of the condenser on the Rotavapor R-300 (3).
- ▶ Connect a tube between the outlet of the condenser on the Rotavapor R-300 (4) and the inlet of the secondary condenser on the Vacuum Pump V-300/V-600 (5).
- ▶ Connect a tube between the outlet of the secondary condenser on the Vacuum Pump V-300/V-600 (6) and the inlet of the recirculating chiller (1).



NOTE

Use GL14 hose barbs for the tubing connections.

Secure tubes with spring clips where necessary.

5.4.5 Overview: setting up coolant tubing connections for 2 Rotavapor units

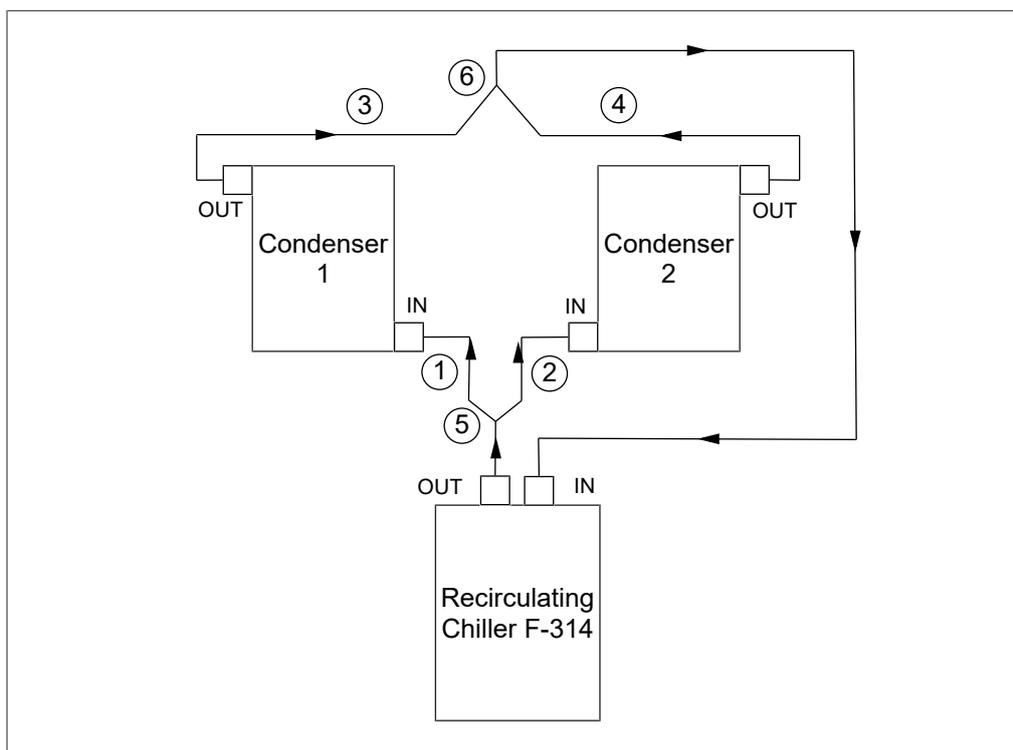


Fig. 16: Connection of 2 Rotavapor units with one chiller

- ▶ This set up is used for an equal distribution of cooling liquid/power.
- ▶ Cooling connections (1) & (2) need to have an equal length, also (3) & (4).
- ▶ To connect 2 Rotavapor units use the distribution piece (5) and Y-connectors (6) Chapter 10.1 "Spare parts and accessories", page 39.

5.5 Filling and draining the coolant tank

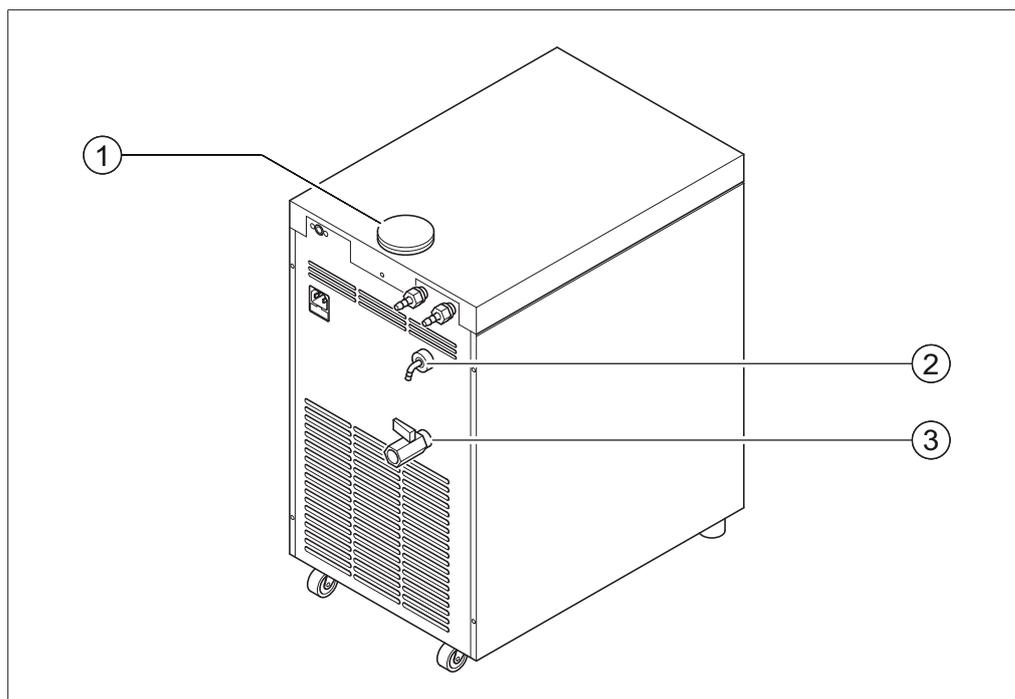


Fig. 17: Filler and drain tap for coolant (example shows F-305)

- | | | | |
|---|--------------------|---|----------------------------|
| 1 | Coolant filler cap | 3 | Drain tap for coolant tank |
| 2 | Tank overflow | | |

Filling with coolant



NOTICE

Risk of property damage if incorrect coolant used

- ▶ When selecting the coolant, take account of the chiller temperature setting.
- ▶ Make sure that the coolant is suitable for the desired chiller temperature setting, especially with regard to the freezing point.
- ▶ BUCHI recommends a mixture of ethylene glycol and water with a ratio of at least 40:60 with a freezing point of $-16\text{ }^{\circ}\text{C}$.
- ▶ Do not use silicone oil.

Precondition:

- Device is not in operation and has cooled down.
- [Recirculating Chiller] is not connected to any other device.
- ▶ Remove the coolant filler cap (1) and pour coolant into the filler neck.
- ▶ Keep an eye on the fill level indicator on the front of the [Recirculating Chiller]. In the case of large cooling systems with long tubing runs and/or several condensers connected in series, fill the coolant tank to the maximum level. See also Chapter 3.2.3 "Fill level indicator", page 13.
- ▶ Replace filler cap on coolant filler neck.
- ▶ (Re-)connect other devices to the [Recirculating Chiller]. See Chapter 5.4.3 "Connecting the coolant tubing to the F-3xx", page 26.

Draining the coolant tank

Precondition:

- Device is not in operation and has cooled down.
- [*Recirculating Chiller*] is not connected to any other device.
- ▶ Place a suitable receptacle below the drain tap (3) on the rear of the [*Recirculating Chiller*] to collect the coolant.
- ▶ Open the drain tap and allow coolant to run into the receptacle. When doing so, keep an eye on the minimum fill level mark (see Chapter 3.2.3 "Fill level indicator", page 13) unless the tank is to be completely drained.
- ▶ Once the desired quantity of coolant has been drained off, close the drain tap again.

6 Operation

6.1 Preparing for operation

Before commissioning, the following points should be checked and dealt with:

- ▶ Installation site: set up the [Recirculating Chiller] on a firm surface. Leave sufficient clearance from other equipment and walls. See Chapter 5.2 "Installation site", page 21.
- ▶ Lock the front castors on the F-308 and F-314.
- ▶ Power supply: connect the [Recirculating Chiller] to the power supply. See Chapter 5.3 "Connecting the F-3xx to the power supply", page 22.
- ▶ Control system: if necessary, connect the [Recirculating Chiller] to a BUCHI interface. See Chapter 5.4.2 "Connecting the communication cable to the F-3xx", page 25.
- ▶ Tubing: correctly connect the [Recirculating Chiller] to the other laboratory equipment. See Chapter 5.4.3 "Connecting the coolant tubing to the F-3xx", page 26.
- ▶ Coolant: fill the coolant tank of the [Recirculating Chiller] with a sufficient quantity of the correct coolant. See Chapter 5.5 "Filling and draining the coolant tank", page 29.

6.2 Commissioning the recirculating chiller



⚠ CAUTION

Risk of property damage

- ▶ Make sure that no objects are lying on the device or are placed on the device while it is in operation.



Fig. 18: Display

- | | | | |
|---|------------------------|---|--|
| 1 | Operating status | 4 | Connection symbol – device is being controlled via a BUCHI interface |
| 2 | Actual temperature | 5 | Options activated if control knob is pressed |
| 3 | Set temperature locked | 6 | Set temperature |

Precondition:

- Device is ready for operation (see Chapter 6.1 "Preparing for operation", page 31).

- ▶ Set the required temperature, see Chapter 6.3 "Operating chiller without control system (interface)", page 32 or Chapter 6.4 "Operating chiller with Interface I-300/I-300 Pro", page 33.
- ▶ Press control knob/START button (on Interface I-300) to start the chilling process.
- ▶ Check the coolant fill level from time to time during operation, see Chapter 3.2.3 "Fill level indicator", page 13.
- ▶ If a defined operating period and automatic shut-off (eco mode) has not been set by an external control system (Interface I-300), press control knob/STOP button (on Interface I-300) to end the chilling process.

Locking the set temperature

The recirculating chiller has a locking function that prevents the set temperature being inadvertently altered.

- ▶ To lock the set temperature, press and hold the control knob until the padlock symbol (3) appears on the display.
- ▶ To cancel the lock function, press and hold the control knob again until the padlock symbol disappears.

6.3 Operating chiller without control system (interface)

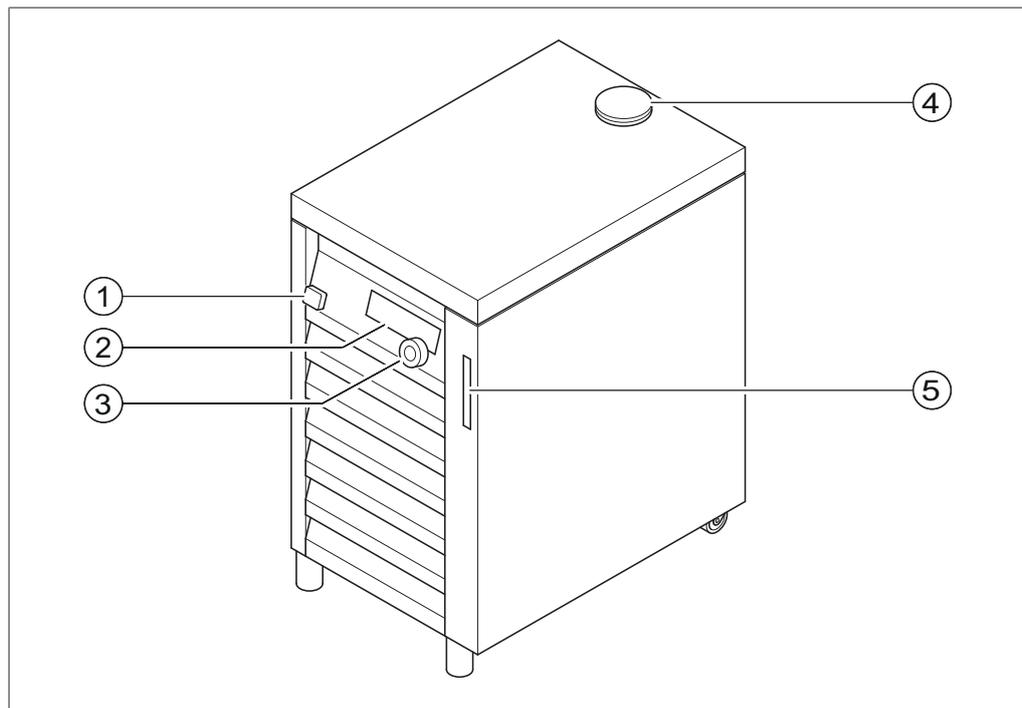


Fig. 19: Operating the recirculating chiller (F-305)

- | | |
|-----------------|--------------------------------|
| 1 On/Off switch | 4 Filler cap for coolant * |
| 2 Display | 5 Coolant fill level indicator |
| 3 Control knob | |

* On the F-308 and F-314, the filler cap for the coolant is on the back of the device.

Precondition:

- Device is ready for operation (see Chapter 6.1 "Preparing for operation", page 31).

- ▶ Switch on the device by means of the On/Off switch (1).
- ▶ Check the fill level of the coolant tank (see Chapter 7.3 "Checking the coolant level", page 34).
- ▶ Set the required temperature using the control knob (3) and confirm the setting by briefly pressing and releasing the button.
- ▶ Start/stop the chilling process by pressing the control knob.

6.4 Operating chiller with Interface I-300/I-300 Pro

The *[Recirculating Chiller]* can also be externally controlled by an Interface I-300/I-300 Pro.

- ▶ Switch on the device by means of the On/Off switch (1).
- ▶ Connect the Interface I-300/I-300 Pro (see Chapter 5.4.2 "Connecting the communication cable to the F-3xx", page 25) and the relevant sections of the instruction manual for the I-300/I-300 Pro.
- ▶ Set the required temperature via the Interface I-300/I-300 Pro, see operating instructions for I-300/I-300 Pro.
- ▶ Start/stop the chilling process via the Interface I-300/I-300 Pro, see operating instructions for I-300/I-300 Pro.

7 Cleaning and servicing



NOTE

Users may only carry out the servicing and cleaning operations that are described in this section. Any other servicing or repair work which involves opening up the casing may only be carried out by BUCHI service technicians.

- ▶ Prior to all maintenance and cleaning work the device is to be disconnected from the power supply by unplugging the power cord from the power outlet.
- ▶ Use only genuine BUCHI consumables and spare parts in order to ensure correct operation of the device and preserve the warranty.
- ▶ Regularly check the casing for visible defects (switches, connectors, covers).

7.1 Cleaning the casing



NOTE

The casing can be cleaned with warm water or ethanol.

- ▶ Regularly wipe down the casing with a damp cloth.
- ▶ Immediately wipe off any chemical splashes with a damp cloth.



NOTICE

Risk of overheating and fire from drawing in dirty air

- ▶ Clean the dust off the air intake (louvers) on the front of the device with a damp cloth at least once a year.

7.2 Checking and replacing tubing

- ▶ Check all tubing for wear at least every six months.
- ▶ Replace any damaged tubing.

7.3 Checking the coolant level

The coolant fill level should always be checked before using the device. The required level of coolant depends on the length of the tubing and/or the number of laboratory devices and condensers connected. For details, see Chapter 3.2.3 "Fill level indicator", page 13 and Chapter 5.5 "Filling and draining the coolant tank", page 29.

7.4 Adding coolant

- ▶ See Chapter 5.5 "Filling and draining the coolant tank", page 29.

8 Help with faults

8.1 Display of error messages

The [Recirculating Chiller] shows a fault code on the display if a malfunction has occurred on the device.

8.2 Faults and rectifying them

Prior to all repair work and fault rectification, e.g. fuse replacement, the recirculating chiller is to be disconnected from the power supply by unplugging the power cord from the power outlet.

8.2.1 Indication of faults on the display

Fault code	Fault	Remedy
E01	Temperature sensor defective	<ul style="list-style-type: none"> ▶ Switch off the device and allow it to cool down. ▶ Clean the air intake (see Chapter 7.1 "Cleaning the casing", page 34).
E02	Temperature error	<ul style="list-style-type: none"> ▶ Switch the appliance on again. ▶ Contact Customer Service if the problem cannot be rectified.
E03	Coolant tank empty or level too low, pump malfunction	<ul style="list-style-type: none"> ▶ Switch off the device and allow it to cool down. ▶ Top up coolant level (see Chapter 5.5 "Filling and draining the coolant tank", page 29). ▶ Switch the appliance on again. ▶ Contact Customer Service if the problem cannot be rectified.
E04	Compressor pressure fault	<ul style="list-style-type: none"> ▶ Switch off the device and allow compressor to cool down. ▶ Switch the appliance on again. ▶ Contact Customer Service if the problem cannot be rectified.
E05	Data error	<ul style="list-style-type: none"> ▶ Switch the appliance off and then on again. ▶ Contact Customer Service if the problem cannot be rectified.
E06	Electronic circuitry overheated	<ul style="list-style-type: none"> ▶ Switch off the device and allow it to cool down. ▶ Clean the air intake (see Chapter 7.1 "Cleaning the casing", page 34). ▶ Switch the appliance on again. ▶ Contact Customer Service if the problem cannot be rectified.

8.2.2 Other malfunctions

Fault	Cause	Remedy
Device chilling function cuts out	Overheat cut-out has tripped.	Switch off the device and allow it to cool down. Check whether the installation site meets the required conditions. In particular, the clearance around the device must be sufficient to allow the air to circulate. See also Chapter 5.2 "Installation site", page 21.

Malfunctions on F-305

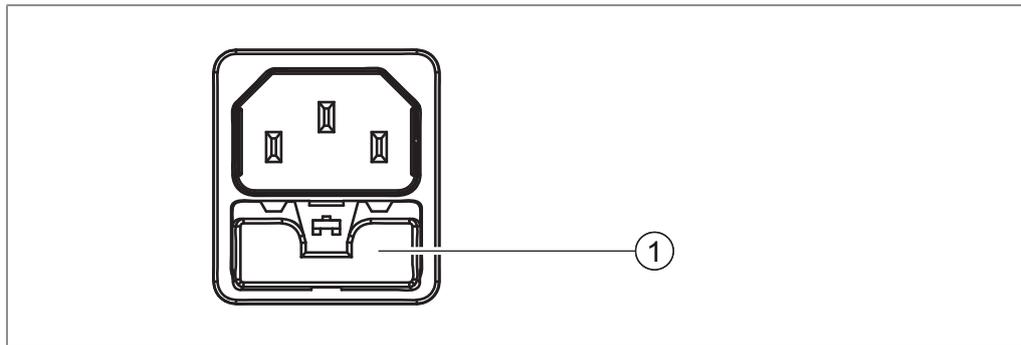


Fig. 20: Fuse holder with 2 fuses on F-305

1 Fuse holder on power supply connection socket (on F-305)

Fault	Remedy
F-305 fails to operate	<ul style="list-style-type: none"> ▶ Switch off the device and unplug the power supply cable. ▶ Pull out the fuse holder (1) by the tab and replace the two fuses in the fuse holder paying attention to the technical specifications (see Chapter 3.3.1 "Recirculating Chiller", page 18). ▶ Reconnect the power supply cable and switch the device on again. ▶ Contact Customer Service if the problem cannot be rectified.

Malfunctions on F-308 and F-314

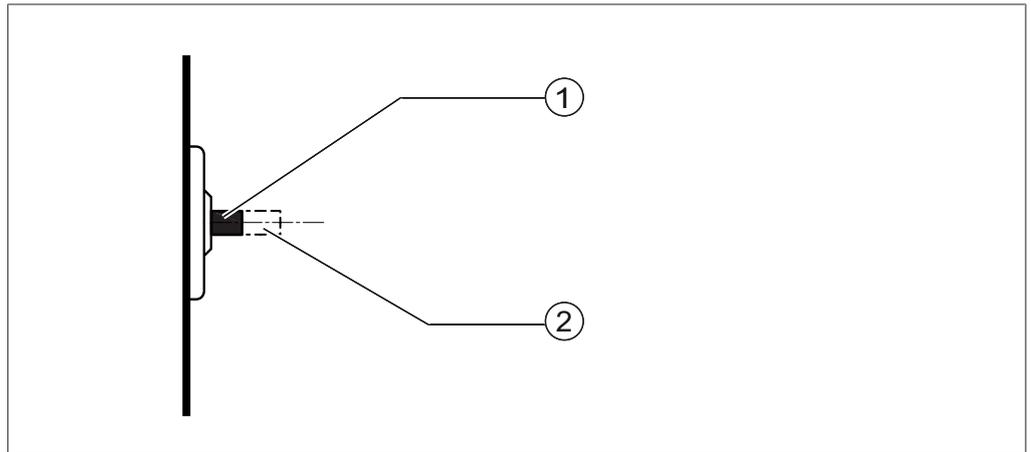


Fig. 21: Circuit-breaker on F-308 and F-314

- 1 "OK" position of resettable circuit-breaker (on F-308 and F-314) 2 "Tripped" position of resettable circuit-breaker (on F-308 and F-314)

Fault	Remedy
F-308/F-314 fails to operate	<ul style="list-style-type: none"> ▶ Switch off the device and allow it to cool down. ▶ Carefully press the resettable circuit-breaker back into the spring-loaded position (1). ▶ Switch the appliance on again. ▶ Contact Customer Service if the problem cannot be rectified.

8.3 Customer service

Repairs to the device may only be carried out by authorized service technicians. The service technicians have been comprehensively technically trained and are aware of the potential hazards that can arise from the device.

The addresses of the official BUCHI Customer Service offices can be found on the BUCHI website at: www.buchi.com. If you have any questions regarding technical issues or faults, please contact those offices.

Customer Services can offer you:

- supply of spare parts
- repairs
- technical advice

9 Taking out of service and disposal

9.1 Disposal

The operator is responsible for proper disposal of the *[Recirculating Chiller]*.



CAUTION

Potential environmental hazard

The refrigerant R134a is used in the device. This refrigerant is toxic and must not be allowed to enter the soil or groundwater.

- ▶ Dispose of the appliance properly, if necessary using a professional disposal service.
-
- ▶ When disposing of equipment observe the local regulations and statutory requirements regarding waste disposal.

10 Appendix

10.1 Spare parts and accessories

Use only genuine BUCHI consumables and spare parts in order to ensure correct, safe and reliable operation of the system.



NOTE

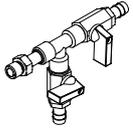
Any modifications of spare parts or assemblies are only allowed with the prior written permission of BUCHI.

10.1.1 Communication cable

	Order no.	Image
Communication cable. BUCHI COM, 1.8 m, 6p Enables connection between Rotavapor® R-300 / R-220 Pro, Interface I-300 / I-300 Pro, Vacuum Pump V-300 / V-600, Recirculating Chiller F-3xx, VacuBox and LegacyBox.	11058707	
Communication cable. BUCHI COM, 5.0 m, 6p Enables connection between Rotavapor® R-300 / R-220 Pro, Interface I-300 / I-300 Pro, Vacuum Pump V-300 / V-600, Recirculating Chiller F-3xx, VacuBox and LegacyBox.	11058708	
Communication cable. BUCHI COM, 15 m, 6p Enables connection between Rotavapor® R-300 / R-220 Pro, Interface I-300 / I-300 Pro, Vacuum Pump V-300 / V-600, Recirculating Chiller F-3xx, VacuBox and LegacyBox.	11064090	
Communication cable. Mini-DIN 6p to RJ45, 1.5 m Connection between Vacuum Controller V-850 / V-855 and Vacuum Pump V-300 / V-600 or between Vacuum Controller V-850 / V-855, Interface I-100 and Recirculating Chiller F-305 / F-308 / F-314.	11060649	
Communication cable. Mini-DIN 6p to RJ45, 3 m Connection between Vacuum Controller V-850 / V-855 and Vacuum Pump V-300 / V-600 or between Vacuum Controller V-850 / V-855, Interface I-100 and Recirculating Chiller F-305 / F-308 / F-314.	11064104	

10.1.2 Further accessories

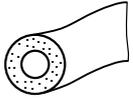
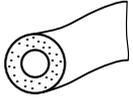
	Order no.	Image
BUCHI Bluetooth® Dongle, connects instrument to smartphone via Bluetooth® Needed for firmware updates and eSupport.	11067770	
Coupling, set. Quick-release coupling, 8 mm, set of 2 Use: connection of two cooling tubes together.	042885	

	Order no.	Image
Distribution piece. T-piece incl. shut off valve, hose barb \varnothing 9 mm Use: to connect two peripherals with one recirculating chiller	037742	

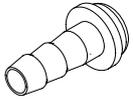
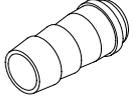
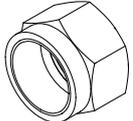
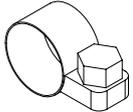
10.1.3 Tubing

	Order no.
Tubing. Nylflex, PVC-P, \varnothing 8/14 mm, transparent, per m	004113

10.1.4 Insulation

	Order no.	Image
Hose insulation, Kaiflex, 11/23 mm, 1 m, black	028696	
Hose insulation, Kaiflex, 16/27 mm, 1 m, black	11056888	

10.1.5 Spare parts

	Order no.	Image
Hose barb, 8 mm	11062530	
Hose barb, 9.5 mm	046792	
Hose barb, 13.5 mm	040329	
Union nut, M16x1, Rf, for hose barbs	019889	
Hose clip, 8-16 mm	022352	
Y-connector, PP, 8 mm	011043	

	Order no.	Image
Y-connector, PP, 12 mm	11058358	

10.1.6 Power cords

	Order no.
Power cord, 3-pin, type CH	010010
Power cord, 3-pin, type DE	010016
Power cord, 3-pin, type GB	017835
Power cord, 3-pin, type AU	017836
Power cord, 3-pin, type US	010020
Power cord, 3-pin, type US for F-314	11061527
Power cord, 3-pin, type IND	11060536
Power cord, 3-pin, type JP	11061564

10.2 Health and safety approval

To guarantee the health and safety of our staff and to comply with the law and the regulations for handling hazardous materials, for the purposes of health and safety at work and safe disposal of waste, no products may be sent back to BÜCHI Labortechnik AG or repaired unless we have received the declaration below, completed and signed.

Products sent to us will not be accepted for repair until we have received this declaration.

- ▶ Copy the form overleaf and complete it.
- ▶ Make sure that you know the full details of the substances with which the device has been in contact and that all questions have been answered fully and correctly.
- ▶ Send the completed form to us in advance by post or fax. The declaration must reach us before the device.
- ▶ Enclose a copy of the declaration with the device.
- ▶ If the product is contaminated, inform the carrier (in accordance with GGVE/ GGVS/RID/ADR).

If the declaration is missing or the procedure described is not followed, the repairs will be delayed. We ask for your understanding and cooperation with regard to these measures.

10.3 Health and safety

Declaration regarding the safety, hazards and safe disposal of waste

To guarantee the health and safety of our staff and to comply with the law and the regulations for handling hazardous materials, regarding health and safety at work, and to comply with safety regulations, health and safety requirements and

requirements for safe disposal of waste such as chemical waste, chemical residues or solvents, the form below must be fully completed and signed whenever devices or faulty components are to be sent back to our factory.

Products or components will not be accepted if this declaration has not been provided.

Device Model: _____ Part/Device no.: _____

Declaration for non-hazardous materials

- We hereby assure that the products returned
- have not been used in the laboratory and are new.
 - have not been in contact with toxic, corrosive, biologically active, explosive, radioactive or other hazardous materials.
 - are not contaminated. The solvents or residues of the substances pumped have been removed.

Declaration for hazardous materials

- In respect of the products returned, we hereby assure that
- all substances (toxic, corrosive, biologically active, explosive, radioactive or otherwise hazardous) that have been pumped by the products or have otherwise been in contact with the products are listed below.
 - the products have been cleaned, decontaminated, sterilised inside and outside and all inlets and outlets are sealed.

List of hazardous materials that have been in contact with the products:

Chemical, material	Hazard category

Final declaration

- We hereby declare that
- we are fully conversant with the substances that have been in contact with the products and have answered all questions correctly.
 - we have taken all measures necessary to prevent potential hazards in respect of the products returned.

Company name or stamp: _____

Place, date: _____

Name (block letters), position (block letters): _____

Signature: _____

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