Imprint

Product Identification:
Operation Manual (Original) Recirculating Chiller F-305 / F-308 / F-314
11593747

Publication date: 03.2018

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1 About this document

These operating instructions describe the Recirculating Chiller F-3xx at the time supplied. They are an integral part of the product and contain important information that is necessary for safe operation and maintenance.

These operating instructions apply to all variants of the Recirculating Chiller F-3xx and are intended primarily for laboratory staff.

- To ensure safe and trouble-free operation, read these operating instructions before starting up the device and follow the guidance they contain.
- Keep the operating instructions somewhere near to the device.
- Pass on the operating instructions to any subsequent owner or user.

BÜCHI Labortechnik AG accepts no liability whatsoever for any faults or damage that result from the failure to follow these operating instructions.

- If you still have any questions after reading these operating instructions, please contact BÜCHI Labortechnik AG Customer Service. Contact details for your local agents can be found on the back cover of these operating instructions or on the Internet at http://www.buchi.com.

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.

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

1.2 Symbols

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

1.2.1 Warning symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="symbol.png" alt="General warning" /></td>
<td>General warning</td>
</tr>
<tr>
<td><img src="symbol.png" alt="Corrosive substance" /></td>
<td>Corrosive substance</td>
</tr>
<tr>
<td><img src="symbol.png" alt="Dangerous electrical voltage" /></td>
<td>Dangerous electrical voltage</td>
</tr>
<tr>
<td><img src="symbol.png" alt="Flammable substance" /></td>
<td>Flammable substance</td>
</tr>
<tr>
<td><img src="symbol.png" alt="Biological hazard" /></td>
<td>Biological hazard</td>
</tr>
<tr>
<td><img src="symbol.png" alt="Potentially explosive atmosphere" /></td>
<td>Potentially explosive atmosphere</td>
</tr>
<tr>
<td><img src="symbol.png" alt="Breakable items" /></td>
<td>Breakable items</td>
</tr>
<tr>
<td><img src="symbol.png" alt="Dangerous gases" /></td>
<td>Dangerous gases</td>
</tr>
</tbody>
</table>
### Symbols and Meanings

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="symbol" alt="Hot Surface" /></td>
<td>Hot surface</td>
<td><img src="symbol" alt="Health-harming" /></td>
<td>Health-harming or irritant substances</td>
</tr>
<tr>
<td><img src="symbol" alt="Risk of Hand Injury" /></td>
<td>Risk of hand injury</td>
<td><img src="symbol" alt="Strong Magnetism" /></td>
<td>Strong magnetism</td>
</tr>
</tbody>
</table>

#### 1.2.2 Mandatory Directive Symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="symbol" alt="Wear Safety Goggles" /></td>
<td>Wear safety goggles</td>
<td><img src="symbol" alt="Wear Protective Clothing" /></td>
<td>Wear protective clothing</td>
</tr>
<tr>
<td><img src="symbol" alt="Wear Protective Gloves" /></td>
<td>Wear protective gloves</td>
<td><img src="symbol" alt="Heavy Load, Do Not Lift Without Assistance" /></td>
<td>Heavy load, do not lift without assistance</td>
</tr>
</tbody>
</table>

#### 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](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 17 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
2 On/Off switch
3 Display
4 Air intake (louvers)
5 Control knob
6 Filler cap for coolant
7 Coolant fill level indicator
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
3 Set temperature locked  5 Option activated if control knob is pressed
4 Connection symbol – device is being controlled via a BUCHI interface  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
2 Standard BUCHI communication port (COM)
3 Power supply connection
4 Fuses
5 Air outlet
6 Coolant inlet "IN"
7 Coolant outlet "OUT"
8 Tank overflow
9 Drain tap for coolant tank
Fig. 7: Recirculating Chiller F-308, rear view

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

<table>
<thead>
<tr>
<th></th>
<th>F-305</th>
<th>F-308</th>
<th>F-314</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (W x H x D)</td>
<td>280 x 400 x 500 mm</td>
<td>400 x 580 x 500 mm</td>
<td>400 x 660 x 500 mm</td>
</tr>
<tr>
<td>Weight (net)</td>
<td>31 kg</td>
<td>41 kg</td>
<td>52 kg</td>
</tr>
<tr>
<td>Cooling capacity at 15 °C</td>
<td>550 W</td>
<td>900 W</td>
<td>1400 W</td>
</tr>
<tr>
<td>Cooling capacity at 10 °C</td>
<td>440 W</td>
<td>730 W</td>
<td>1150 W</td>
</tr>
<tr>
<td>Cooling capacity at 0 °C</td>
<td>250 W</td>
<td>450 W</td>
<td>720 W</td>
</tr>
<tr>
<td>Cooling capacity at -10 °C</td>
<td>80 W</td>
<td>180 W</td>
<td>350 W</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-10 to +25 °C</td>
<td>-10 to +25 °C</td>
<td>-10 to +25 °C</td>
</tr>
<tr>
<td>Power consumption</td>
<td>800 W</td>
<td>1100 W</td>
<td>1500 W</td>
</tr>
<tr>
<td>Voltage</td>
<td>230 V AC ± 10 %</td>
<td>230 V AC ± 10 %</td>
<td>230 V AC ± 10 %</td>
</tr>
<tr>
<td></td>
<td>115 V AC ± 10 %</td>
<td>115 V AC ± 10 %</td>
<td>115 V AC ± 10 %</td>
</tr>
<tr>
<td>Frequency</td>
<td>50 - 60 Hz</td>
<td>50 - 60 Hz</td>
<td>50 - 60 Hz</td>
</tr>
<tr>
<td></td>
<td>60 Hz</td>
<td>60 Hz</td>
<td>60 Hz</td>
</tr>
<tr>
<td>Temperature reading resolution</td>
<td>0.1 °C</td>
<td>0.1 °C</td>
<td>0.1 °C</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>± 1 °C</td>
<td>± 1 °C</td>
<td>± 1 °C</td>
</tr>
<tr>
<td>Refrigerant</td>
<td>R134a</td>
<td>R134a</td>
<td>R134a</td>
</tr>
<tr>
<td>Tank capacity</td>
<td>3.0 L</td>
<td>4.5 L</td>
<td>6.5 L</td>
</tr>
<tr>
<td>Tubing connector</td>
<td>8 + 9.5 mm</td>
<td>8 + 9.5 mm</td>
<td>9.5 + 13.5 mm</td>
</tr>
<tr>
<td>Pump pressure</td>
<td>0.6 bar</td>
<td>0.6 bar</td>
<td>1 bar</td>
</tr>
<tr>
<td>Pump delivery rate</td>
<td>2.5 L/min</td>
<td>3 L/min</td>
<td>11 L/min</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>II</td>
<td>II</td>
<td>II</td>
</tr>
<tr>
<td>Display</td>
<td>Digital</td>
<td>Digital</td>
<td>Digital</td>
</tr>
</tbody>
</table>

* Possible temperature range if a Rotavapor is connected and distillation is performed.

3.3.2 **Ambient conditions**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. altitude above sea level</td>
<td>2000 m</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>5 - 40 °C</td>
</tr>
<tr>
<td>Maximum relative humidity</td>
<td>80 % for temperatur...</td>
</tr>
</tbody>
</table>

The laboratory apparatus described here may only be used indoors.
### 3.3.3 Materials

<table>
<thead>
<tr>
<th>Component</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casing</td>
<td>Stainless steel (1.4301), powder-coated with polyester epoxy</td>
</tr>
<tr>
<td>Internal piping and condenser</td>
<td>Copper</td>
</tr>
<tr>
<td>Foil</td>
<td>Polyester</td>
</tr>
<tr>
<td>Circuit board</td>
<td>Glass-fiber reinforced epoxy resin</td>
</tr>
<tr>
<td>Cable</td>
<td>Polyvinyl chloride</td>
</tr>
<tr>
<td>Refrigerant</td>
<td>R134a</td>
</tr>
</tbody>
</table>

### 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 12.
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 17).
- 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 17).
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 |
| 2 | Rotavapor R-300 with heating bath B-300 |
| 3 | VacuBox |
| 4 | Vacuum Pump V-300 |
| 5 | Interface I-300 |

Data communication between the BUCHI laboratory equipment takes place via the communication ports. See Chapter 5.4.1 "Overview: setting up communication connections", page 23 and Chapter 5.4.2 "Connecting the communication cable to the F-3xx", page 24.

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 25 and Chapter 5.4.4 "Overview: setting up coolant tubing connections", page 26.
5.4.1 Overview: setting up communication connections

The laboratory apparatus can be connected in any order. **Important:** as well as the Interface I-300/I-300 Pro, a VacuBox also has to be connected.

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

![Diagram of communication connections]

- Connect the Recirculating Chiller F-3xx to the Rotavapor R-300.
- Connect the Rotavapor R-300 to the VacuBox.
- Connect the VacuBox to the Vacuum Pump V-300.
- Connect Rotavapor to the Interface I-300/I-300 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.

---

![Diagram of recirculating chiller](image)

**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.

![Diagram of recirculating chiller showing connections](image)

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 BÜCHI 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.

![Coolant tubing connections diagram]

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

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

- 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 (5).
- Connect a tube between the outlet of the secondary condenser on the Vacuum Pump V-300 (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.
5.5 Filling and draining the coolant tank

Fig. 16: Filler and drain tap for coolant (example shows F-305)

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

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 °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 12.
- 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 25.

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 12) 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 20.
- 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 21.
- 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 24.
- 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 25.
- 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 27.

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.

![Display](image)

Fig. 17: Display

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

Precondition:
- Device is ready for operation (see Chapter 6.1 "Preparing for operation", page 29).
- Set the required temperature, see Chapter 6.3 "Operating chiller without control system (interface)", page 30 or Chapter 6.4 "Operating chiller with Interface I-300/I-300 Pro", page 31.
- 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 12.

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)**

- 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 32).
- 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.

---

* 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 29).

**Fig. 18: Operating the recirculating chiller (F-305)**

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

* On the F-308 and F-314, the filler cap for the coolant is on the back of the device.
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 24) 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 BÜCHI 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 BÜCHI 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 12 and Chapter 5.5 "Filling and draining the coolant tank", page 27.

7.4 Adding coolant
- See Chapter 5.5 "Filling and draining the coolant tank", page 27.
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

<table>
<thead>
<tr>
<th>Fault code</th>
<th>Fault</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| E01        | Temperature sensor defective       | ▶ Switch off the device and allow it to cool down.  
|            |                                    | ▶ Clean the air intake (see Chapter 7.1 "Cleaning the casing", page 32).  
| E02        | Temperature error                  | ▶ Switch the appliance on again.  
|            |                                    | ▶ Contact Customer Service if the problem cannot be rectified.  
| E03        | Coolant tank empty or level too low, pump malfunction | ▶ 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 27).  
|            |                                    | ▶ Switch the appliance on again.  
|            |                                    | ▶ Contact Customer Service if the problem cannot be rectified.  
| E04        | Compressor pressure fault          | ▶ 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                         | ▶ Switch the appliance off and then on again.  
|            |                                    | ▶ Contact Customer Service if the problem cannot be rectified.  
| E06        | Electronic circuitry overheated    | ▶ Switch off the device and allow it to cool down.  
|            |                                    | ▶ Clean the air intake (see Chapter 7.1 "Cleaning the casing", page 32).  
|            |                                    | ▶ Switch the appliance on again.  
|            |                                    | ▶ Contact Customer Service if the problem cannot be rectified.  

8.2.2 Other malfunctions

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device chilling function cuts out</td>
<td>Overheat cut-out has tripped.</td>
<td>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 &quot;Installation site&quot;, page 20.</td>
</tr>
</tbody>
</table>
Malfunctions on F-305

![Fuse holder on power supply connection socket (on F-305)](image)

Fig. 19: Fuse holder with 2 fuses on F-305

<table>
<thead>
<tr>
<th>Fault</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-305 fails to operate</td>
<td>▶ Switch off the device and unplug the power supply cable.</td>
</tr>
<tr>
<td></td>
<td>▶ 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 &quot;Recirculating Chiller&quot;, page 17).</td>
</tr>
<tr>
<td></td>
<td>▶ Reconnect the power supply cable and switch the device on again.</td>
</tr>
<tr>
<td></td>
<td>▶ Contact Customer Service if the problem cannot be rectified.</td>
</tr>
</tbody>
</table>

Malfunctions on F-308 and F-314

![Circuit-breaker on F-308 and F-314](image)

Fig. 20: Circuit-breaker on F-308 and F-314

<table>
<thead>
<tr>
<th>Fault</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-308/F-314 fails to operate</td>
<td>▶ Switch off the device and allow it to cool down.</td>
</tr>
<tr>
<td></td>
<td>▶ Carefully press the resettable circuit-breaker back into the spring-loaded position (1).</td>
</tr>
<tr>
<td></td>
<td>▶ Switch the appliance on again.</td>
</tr>
<tr>
<td></td>
<td>▶ Contact Customer Service if the problem cannot be rectified.</td>
</tr>
</tbody>
</table>
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
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 Spare parts

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>Power cord, 3-pin, type CH</td>
<td>10010</td>
</tr>
<tr>
<td>Power cord, 3-pin, type DE</td>
<td>10016</td>
</tr>
<tr>
<td>Power cord, 3-pin, type GB</td>
<td>17835</td>
</tr>
<tr>
<td>Power cord, 3-pin, type AU</td>
<td>17836</td>
</tr>
<tr>
<td>Power cord, 3-pin, type US</td>
<td>10020</td>
</tr>
<tr>
<td>Power cord, 3-pin, type US for F-314</td>
<td>11061527</td>
</tr>
<tr>
<td>Power cord, 3-pin, type IND</td>
<td>11060536</td>
</tr>
<tr>
<td>Power cord, 3-pin, type JP</td>
<td>11061564</td>
</tr>
<tr>
<td>T-connector with taps. For 6 mm tubing</td>
<td>37742</td>
</tr>
<tr>
<td>Interface cable.</td>
<td>11058707</td>
</tr>
<tr>
<td>Hose barb, 8 mm</td>
<td>11062530</td>
</tr>
<tr>
<td>Hose barb, 9.5 mm</td>
<td>46792</td>
</tr>
<tr>
<td>Part Description</td>
<td>Part Number</td>
</tr>
<tr>
<td>-----------------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Hose barb, 13.5 mm</td>
<td>40329</td>
</tr>
<tr>
<td>Union nut, M16x1, Rf, for hose barbs</td>
<td>19889</td>
</tr>
<tr>
<td>Hose clip, 8-16 mm</td>
<td>22352</td>
</tr>
<tr>
<td>Hose insulation, Kaiflex, 11/23 mm, 1 m, black</td>
<td>28696</td>
</tr>
<tr>
<td>Hose insulation, Kaiflex, 15/27 mm, 1 m, black</td>
<td>11056888</td>
</tr>
<tr>
<td>Y-connector, PP, 8 mm</td>
<td>11043</td>
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<tr>
<td>Y-connector, PP, 12 mm</td>
<td>11058358</td>
</tr>
<tr>
<td>Quick-release coupling, 8 mm, set of 2</td>
<td>42885</td>
</tr>
</tbody>
</table>
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

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:

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<thead>
<tr>
<th>Chemical, material</th>
<th>Hazard category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:
### BUCHI Affiliates:

**Europe**

<table>
<thead>
<tr>
<th>Country</th>
<th>Address</th>
<th>Phone Numbers</th>
<th>Email</th>
<th>Website</th>
</tr>
</thead>
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<tr>
<td>Switzerland</td>
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</tr>
</tbody>
</table>

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