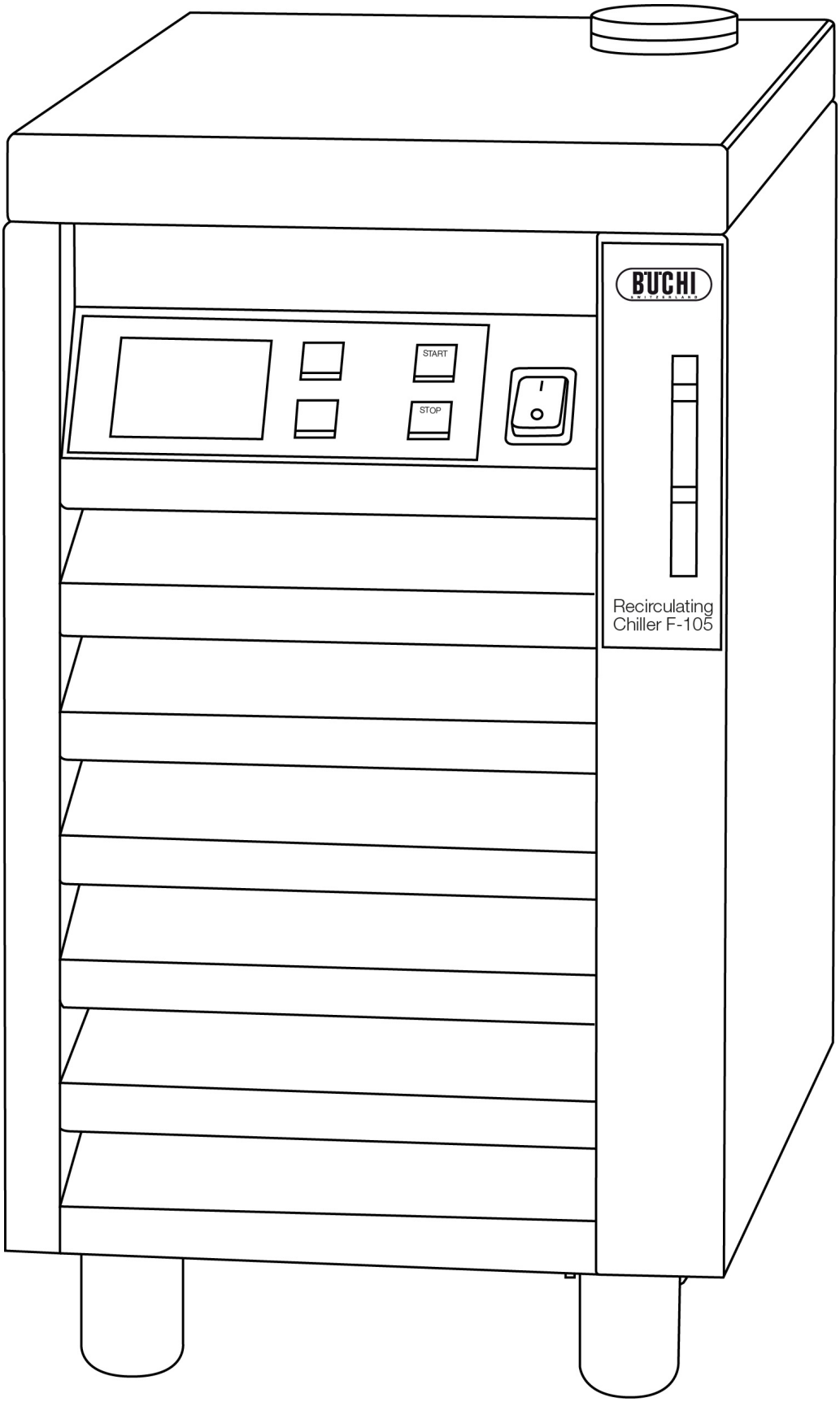
Recirculating Chiller
F-100 / F-105 / F-108 / F-114
Operation Manual



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1 About this manual

This manual describes the Chiller and provides all information required for its safe operation and to maintain it in good working order.
It is addressed to laboratory personnel and operators in particular.

Read this manual carefully before installing and running your system and note the safety precautions in section 2 in particular. Store the manual in the immediate vicinity of the instrument, so that it can be consulted at any time.
No technical modifications may be made to the instrument without the prior written agreement of BUCHI. Unauthorized modifications may affect the system safety or result in accidents. Technical data are subject to change without notice.

NOTE
The symbols pertaining to safety (WARNINGS and ATTENTIONS) are explained in section 2.

The German manual is the original language version and serves as basis for all translations into other languages. If you need another language version of this manual, you can download available versions at www.buchi.com or reorder manuals from a BUCHI representative.

Recirculating Chiller – Types

F-100

F-105

F-108

F-114

2 Safety

This section introduces the safety concept of the instrument and contains general rules of behavior and warnings from direct and indirect hazards concerning the use of the product.
For the users safety, all safety instructions and safety messages in the individual sections shall be strictly observed and followed. Therefore, the manual must always be available to all persons performing any tasks described herein.

2.1 User qualification

The instrument may only be used by laboratory personnel and other persons who on account of training and professional experience know the potential dangers that can develop when operating the instrument.
Untrained personnel, or persons who are currently being trained, require careful supervision by a qualified person. This Operation Manual serves as a basis for training.

2.2 Proper use

The Recirculating Chiller is conceived and built as a piece of laboratory equipment. Its regulation use is the cooling of closed cycles (e.g. rotary evaporators, reaction vessels).
When the Recirculating Chiller is used in combination with other instruments (e.g. rotary evaporator and extraction unit) all related manuals are to be fully observed.
The regulation use of the Recirculating Chiller also includes its care.

2.3 Improper use

Any other use than the one stated above and any application that does not comply with the technical data is considered to be improper use. Improper use can cause hazardous situations for the operator and / or for the instrument and might cause consequential property damage.

The operator bears the sole risk for any damages or hazards caused by improper use!

In particular, the following uses must not be permitted

- Installation or use of the instrument in rooms, which require ex-protected instruments.
- The use of spare parts or accessories other than those mentioned in these operating instructions.
- The equipment may not be operated using combustible substances.
- It is not allowed to put anything on the top of the Recirculating Chiller.

2.4 Safety warnings and safety signs used in this manual

DANGER, WARNING, CAUTION and NOTICE are standardized signal words for identifying levels of hazards and risks related to personal injury and property damage. All signal words, which are related to personal injury are accompanied by the general safety sign.

For your safety it is important to read and fully understand the table below with the different signal words and their definitions!

Sign	Signal word	Definition	Risk level
⚠	**DANGER**	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.	★★★★
⚠	**WARNING**	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.	★★★☆
⚠	**CAUTION**	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.	★★☆☆
no	**NOTICE**	Indicates possible property damage, but no practices related to personal injury.	★☆☆☆ (property damage only)

Supplementary safety information symbols may be placed in a rectangular panel on the left to the signal word and the supplementary text (see example below).

Space for supplementary safety information symbols.	⚠ **SIGNAL WORD**
	Supplementary text, describing the kind and level of hazard/risk seriousness. • List of measures to avoid the described hazard or hazardous situation. • … • …

Table of supplementary safety information symbols

The reference list below incorporates all safety information symbols used in this manual and their meaning.

Symbol	Meaning
	General warning
	Electrical hazard
	Heavy weight, avoid overexertion
	Explosive gases, explosive environment

Symbol	Meaning
	Fire hazard
	Harmful to life forms
	Hot item, hot surface
	Device damage
	Inhalation of substances
	Chemical burns by corrosives
	Cuts by sharp edges
	Flooding
	Wear laboratory coat
	Wear protective goggles
	Wear protective gloves

Additional user information

Paragraphs starting with NOTE transport helpful information for working with the device/software or its supplementaries. NOTEs are not related to any kind of hazard or damage (see following example).

NOTE
Useful tips for the easy operation of the instrument/software.

2.5 Product safety

The Recirculating Chiller has been designed and built in accordance with current state-of-the-art technology, at the time of development. Safety warnings in this manual (as described in section 2.4) serve to make the user alert to, and avoid hazardous situations emanating from residual dangers by giving appropriate counter measures.
However, risks to users, property and the environment can arise when the instrument is damaged, used carelessly or improperly.

2.5.1 General hazards

The following safety messages show hazards of general kind which may occur when handling the instrument. The user shall observe all listed counter measures in order to achieve and maintain the lowest possible level of hazard.

Additional warning messages can be found whenever actions and situations described in this manual are related to situational hazards.

DANGER

Death or serious injuries when used in explosive environments.

- Do not store or operate the instrument in explosive environments
- Remove all sources of flammable vapors
- Do not store chemicals in the vicinity of the device

CAUTION

Risk of minor or moderate cuts by sharp edges.

- Do not touch defective or broken glassware with bare hands
- Do not touch thin metal edges

NOTICE

Risk of instrument damage by liquids or mechanical shocks.

- Do not spill liquids over the instrument or its components
- Do not drop the instrument or its components
- Keep external vibrations away from the instrument

Safety messages regarding Refrigerant R134a:

⚠ WARNING

Danger of injury and material damage due to overheating.

- Keep at a temperature not exceeding 45 °C

⚠ WARNING

Danger of corrosion and poisoning through inhalation of the fumes.

- In case of fire and/or explosion do not breathe fumes

⚠ CAUTION

If R134a escapes in the event of a fault..

- Avoid contact with skin and eyes
- Always wear safety goggles
- Always wear safety gloves

2.5.2 Personal protective equipment

Always wear personal protective equipment such as protective eye goggles and protective clothing. The personal protective equipment must meet all requirements of all data sheets for the chemicals used. These instructions are an important part of the Recirculating Chiller and must be made available at all times to the operating personnel at the place where the equipment is deployed.

⚠ WARNING

Serious chemical burns by corrosives.

- Always wear protective goggles
- Always wear protective gloves
- Always wear laboratory coat

2.5.3 Built-in safety elements and measures

The instrument is fitted with a thermal overload protection for the compressor.
The presence of a minimum quantity of coolant is monitored by a fluid level sensor (F-108 and F114 only).

2.6 General safety rules

Responsibility of the operator

The head of the laboratory is responsible for training his/her personnel.
The operator shall inform the manufacturer without delay of any safety-related incidents which might occur during operation of the instrument or its accessories. Legal regulations, such as local, state and federal laws applying to the instrument or its accessories must be strictly followed.

Duty of maintenance and care

The operator is responsible for the proper condition of instrument. This includes maintenance, service and repair jobs that are performed on schedule by authorized personnel only.

Spare parts to be used

Use only genuine consumables and spare parts for maintenance to assure good system performance, reliability and safety. Any modifications of spare parts or assemblies are only allowed with the prior written permission of the manufacturer.

Modifications

Modifications to the instrument are only permitted after prior consultation and with the written approval of the manufacturer. Modifications and upgrades shall only be carried out by an authorized BUCHI technical engineer. The manufacturer will decline any claim resulting from unauthorized modifications.

3 Technical data

This section introduces the reader to the Recirculating Chiller and its specifications. It contains the technical data, requirements and performance data.

3.1 Technical data

Technical data (230 V)				
	F-100	F-105	F-108	F-114
Power consumption (max.)	850 W	850 W	1350 W	1850 W
Supply voltage	230 VAC ±10 %	230 VAC ±10 %	230 VAC ±10 %	230 VAC ±10 %
Fuse	6.3 AT	6.3 AT	7 AT	8 AT
Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Environmental conditions	For indoor use only			
- Temperature	5–35 °C	5–35 °C	5–40 °C	5–40 °C
- Altitude	up to 2000 m			
- Humidity	Maximum relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C			
Display	No display	digital, resolution 0.1 °C	digital, resolution 0.1 °C	digital, resolution 0.1 °C
Overvoltage category	II	II	II	II
Degree of protection	IP20	IP20	IP20	IP20
Pollution degree	2	2	2	2
Instrument dimensions W×H×D [mm]	280×500×420	280×500×420	400×580×500	400×660×500
Weight	28 kg	30 kg	40 kg	42 kg
Cooling capacity at 15 °C	---	530 W	800 W	1400 W
Cooling capacity at 10 °C	300 W	390 W	650 W	1100 W
Cooling capacity at 0 °C	---	120 W	400 W	700 W
Cooling capacity at -10 °C	---	10 W	150 W	350 W
Refrigerant	R134	R134	R134	R134
Temperature range	fix +10 °C	–10 °C … +25 °C	–10 °C … +25 °C	–10 °C … +25 °C
Accuracy	±2 °C	±1 °C	±1 °C	±1 °C
Tank volume	3 L	3 L	4.5 L	6.6 L
Hose connection	8 mm	8 mm	9.5 mm	13.5 mm
Pump flow rate	2.5 L/min	2.5 L/min	3.0 L/min	11.0 L/min
Pump pressure	0.6 bar	0.6 bar	0.6 bar	1.0 bar

Technical data (115 V)				
	F-100	F-105	F-108	F-114
Power consumption (max.)	850 W	850 W	1350 W	1650 W
Supply voltage	115 VAC ±10 %	115 VAC ±10 %	115 VAC ±10 %	115 VAC ±10 %
Fuse	10 AT	10 AT	12 AT	15 AT
Frequency	60 Hz	60 Hz	60 Hz	60 Hz
Environmental conditions	For indoor use only			
- Temperature	5–35 °C	5–35 °C	5–40 °C	5–40 °C
- Altitude	up to 2000 m			
- Humidity	Maximum relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C			
Display	No display	digital, resolution 0.1 °C	digital, resolution 0.1 °C	digital, resolution 0.1 °C
Overvoltage category	II	II	II	II
Degree of protection	IP20	IP20	IP20	IP20
Pollution degree	2	2	2	2
Instrument dimensions W×H×D [mm]	280×590×420	280×590×420	400×580×500	400×660×500
Weight	37 kg	40 kg	40 kg	42 kg
Cooling capacity at 15 °C	---	530 W	800 W	1400 W
Cooling capacity at 10 °C	300 W	390 W	650 W	1100 W
Cooling capacity at 0 °C	---	120 W	400 W	700 W
Cooling capacity at -10 °C	---	10 W	150 W	350 W
Refrigerant	R134	R134	R134	R134
Temperature range	fix +10 °C	–10 °C … +25 °C	–10 °C … +25 °C	–10 °C … +25 °C
Accuracy	±2 °C	±1 °C	±1 °C	±1 °C
Tank volume	3 L	3 L	4.5 L	6.6 L
Hose connection	8.0 mm	8.0 mm	9.5 mm	13.5 mm
Pump flow rate	2.5 L/min	2.5 L/min	3.0 L/min	11.0 L/min
Pump pressure	0.6 bar	0.6 bar	0.6 bar	1.0 bar

Technical data (100 V)		
	F-100	F-105
Power consumption (max.)	850 W	850 W
Supply voltage	100 VAC ±10 %	100 VAC ±10 %
Fuse	10 AT	10 AT
Frequency	50/60 Hz	50/60 Hz
Environmental conditions	For indoor use only	
- Temperature	5–35 °C	5–35 °C
- Altitude	up to 2000 m	
- Humidity	Maximum relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C	
Display	No display	digital, resolution 0.1 °C
Overvoltage category	II	II
Degree of protection	IP20	IP20
Pollution degree	2	2
Instrument dimensions W×H×D [mm]	280×590×420	280×590×420
Weight	37 kg	40 kg
Cooling power at 15 °C	---	530 W
Cooling power at 10 °C	300 W	390 W
Cooling power at 0 °C	---	120 W
Cooling power at -10 °C	---	10 W
Refrigerant	R134	R134
Temperature range	fix +10 °C	–10 °C … +25 °C
Accuracy	±2 °C	±1 °C
Tank volume	3 L	3 L
Hose connection	8.0 mm	8.0 mm
Pump flow rate	2.5 L/min	2.5 L/min
Pump pressure	0.6 bar	0.6 bar

3.2 Materials used

Materials used			
Component	Material designation	Material code	Hazardous substances
Stainless steel, powder-coated with polyester-epoxide	Housing	1.4301	–
Copper	Internal pipes and coolers	CU	–
Polyester	Foil	PES	–
Glass-fiber-reinforced epoxy resin	Circuit board		–
Polyvinyl chloride	Cable	PVC	–
R134	Refrigerant	1,1,1,2-tetrafluoro-ethane	Check MSDS

4 Description of function

This section explains the basic working principle of the Recirculating Chiller. It also shows how the instrument is structured and provides a general functional description of its assemblies.

4.1 Functional principle

The BUCHI Recirculating Chillers are a closed-circuit cooler for use with appropriate laboratory instruments. The four models are distinguished by their outputs and control. The F-100 has a fixed cooling temperature without display. The models F-105 to F-114 are equipped with a control unit and built in display to regulate and indicate the actual and set value of the cooling temperature. The F-100 is optimal for cooling one BUCHI Rotavapor system. The F-114 is sufficient for cooling up to two small to medium Rotavapor systems (e.g. R-210).

Diagram F-100

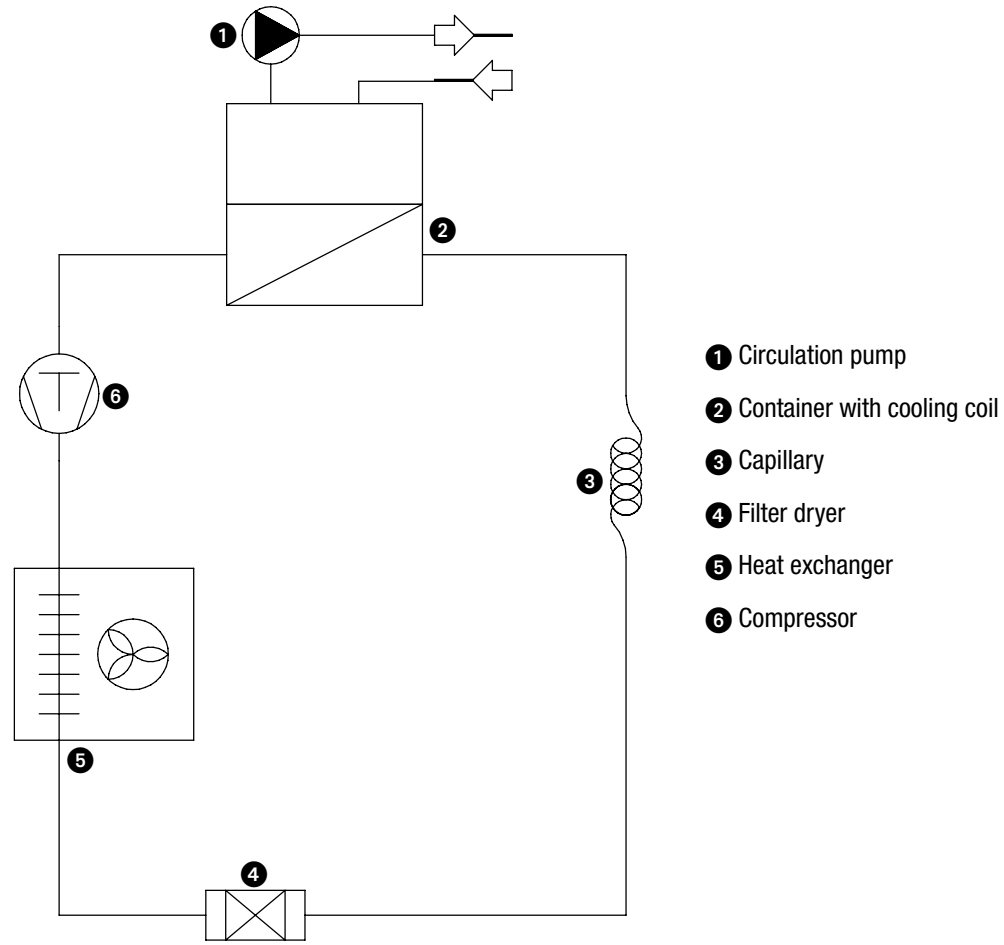
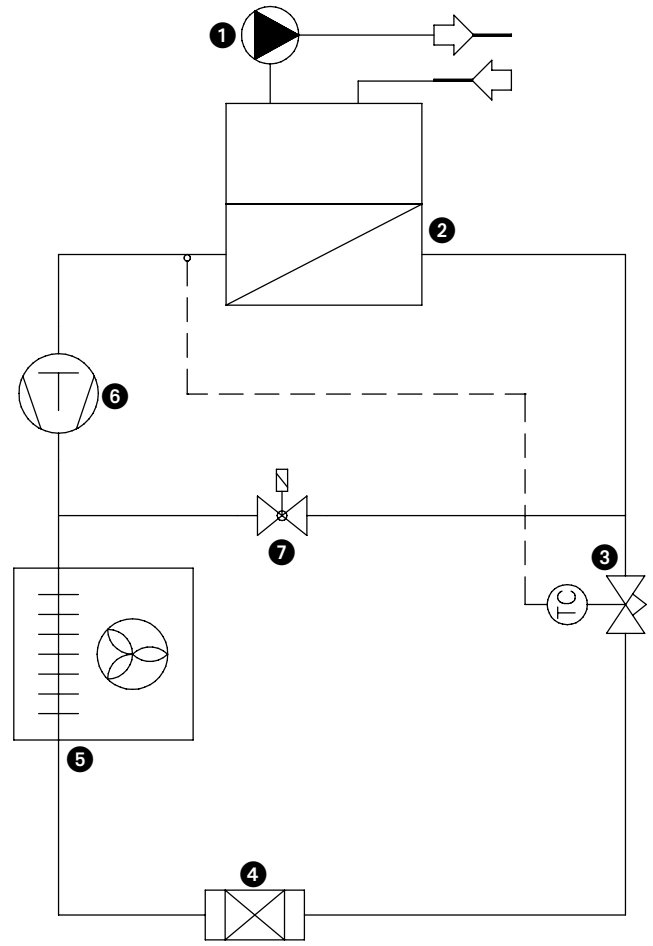


Diagram F-105 / F-108 / F-114



1. Circulation pump
2. Container with cooling coil
3. Thermostatic expansion valve
4. Filter dryer
5. Heat exchanger
6. Compressor
7. In-line valve

5 Putting into operation

This section describes how the instrument has to be installed. It also gives instructions for the initial startup.

NOTE

Inspect the instrument for damage during unpacking. If necessary, prepare a status report immediately and inform customer and your local BUCHI representative. Keep the original packaging for future transportation.

Also adhere to all instructions concerning transport as described in section 9.1, Storage and transport.

To move the instrument use the handle (as described in section 6.1, Operating controls and housing), slightly lift the side of the instrument with the fix anti-slip foots and pull the instrument carefully by the rollers.

5.1 Installation site

DANGER

Death or serious injuries when used in explosive environments.

- Do not store or operate the instrument in explosive environments
- Remove all sources of flammable vapors
- Do not store chemicals in the vicinity of the device

Put the instrument onto a clean, stable and horizontal surface. Consider the maximum product dimensions and weight. Obtain the environmental conditions as described in section 3.1, technical data.

Installation pre-requisites and installation steps:

- Do not place any objects in front of or behind the instrument.
- The instrument must have a clearance of 40 cm between itself and the wall, both in front and behind (sufficient cooling).
- Do not place containers, chemicals or other items behind the instrument.
- Do not place anything on top of the Recirculating Chiller.

NOTE

- *After transport, wait at least 2 hours before switching on the chiller! Within this time the refrigerant gathers in the compressor, avoiding damage of the compressor.*
- *To ensure that the power can be cut by unplugging in case of an emergency, the mains plug must not be blocked by the instruments or any other items!*
- *Depending on the environmental conditions, condensation water at the cooling tubes and all other cold surfaces of the instruments can collect!*

WARNING

Stumbling or falling due to improper installation of the cables and hoses.

- The length of the cables and hoses should be kept as short as possible
- Absorb condensate water from tubes and all other cold surfaces
- If possible, avoid installing cables and hoses in aisle areas
- If installation of cables and hoses in aisle areas is unavoidable, use an adequate protective pad in order to avoid the danger of stumbling and damage

WARNING

Fire hazard, damage to the instrument through overheating due to inadequate air circulation.

- Do not cover the instrument
- Minimum distance from other objects must be at least 40 cm

CAUTION

Risk of minor or moderate injury due to the heavy weight of the instrument.

- Do not drop the instrument or its transport box
- Place the instrument on a stable, even and vibration-free surface
- Keep limbs out of crushing zone

CAUTION

Danger from falling objects due to inadequate stability.

- Do not place other objects or instruments on the Chiller

5.2 Electrical connections

Notice

Risk of instrument damage if mains supply is incorrect.

- External mains supply must meet the voltage given on the type plate
- Check for proper grounding
- Exchange defective cabling immediately

After the installation procedure has been completed successfully, the power plug of the Recirculating Chiller can be connected to mains.

The used mains circuit has to:

- provide the voltage that is given on the type plate of the instrument.
- be able to handle the load of the connected instruments.
- be equipped with adequate fuses and electrical safety measures, in particular proper grounding.

See also technical data of all components regarding the different minimum system requirements!

NOTE

- *Additional electrical safety measures such as residual current breakers may be necessary to meet local laws and regulations!*
- *External power switches (e.g. emergency stop switches) must meet IEC 60947-1 and IEC 60947-3 requirements. Such devices must be clearly labeled and accessible at any time.*
- *External connections and extension lines must be provided with a grounded conductor lead (3-pole couplings, cord or plug equipment). All electrical cables used must be suitable for the required power rating.*

5.3 Factors affecting chilling capacity

The available chilling capacity is dependent on various factors. The most important aspect to be aware of is that the chilling capacity diminishes as the chilling temperature is lowered. In the case of the F-105 it is approx. 600 W at 20 °C and only around 50 W at –5 °C. The ambient temperature has an effect as well. At room temperatures above 35 °C the chiller's air cooling may, depending on chilling capacity, no longer be sufficient and the chiller may switch off for safety reasons to protect itself against overheating. At an ambient temperature of 30 °C the F-105 still has a chilling capacity of around 150–W. We recommended a chilling temperature setting of 10–15 °C and a room temperature that does not exceed 25 °C. Outside of those parameters, the chilling capacity is substantially reduced.

6 Operation

This section gives examples of typical instrument applications and instructions on how to operate the instrument properly and safely. See also section 2.5 “Product safety” for general warnings.

6.1 Operating controls and housing

Front side

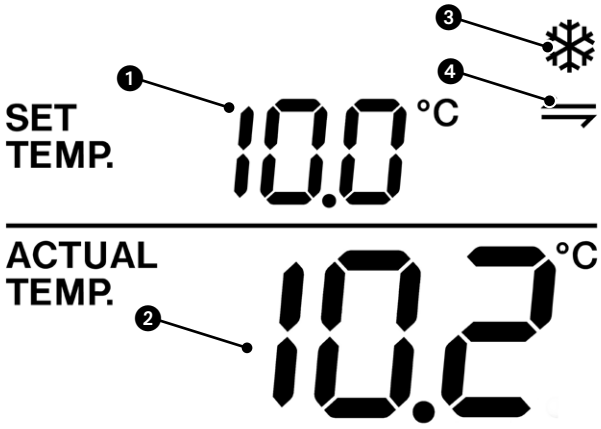
1. Opening for cooling medium
   (At F-108 / F-114 models, the opening is located at the rear side of the housing)
2. Handle (to pull the instrument)
3. On-/Off switch (lights green when instrument is switched on)
4. Cooling media level indicator
5. Cooling lamella for air flow in
6. Wheels (not lockable)
7. Fix anti-slip feet
   (The models F-108 / F-114 are equipped with two lockable front wheels)
8. Operating panel with various parameter displays (not available on the F-100)

Buttons (not for F-100)

Button	Functionality
	Increase the desired set temperature in steps of 0.1 °C.
	Decrease the desired set temperature in steps of 0.1 °C.
	Button to start or continue the cooling regulation.

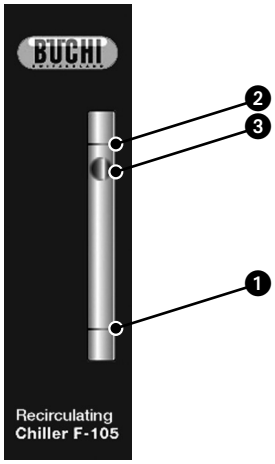
Button to stop the cooling regulation.

Display (not for F-100)



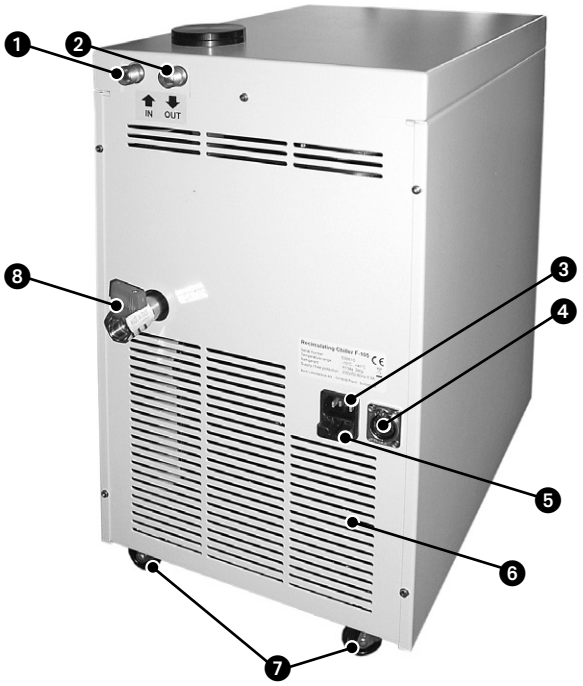
1. Set temperature of Recirculating Chiller in °C
2. Actual temperature of Recirculating Chiller in °C
3. Active cooling is indicated by the snow flake
4. If the Recirculating Chiller is connected to the BUCHI vacuum controller the connection symbol is displayed

Level indicator



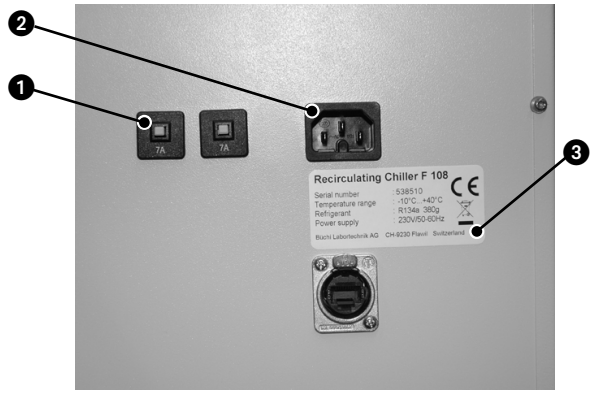
1. Lower black line: minimum filling level
2. Upper black line: maximum filling level
3. Ball float: actual fill level of coolant

Rear side



1. Cooling medium flow in
2. Cooling medium flow out
3. Power socket
4. Communication cable socket, RS485 (not available for F-100 models)
5. Fuse
6. Slots for air flow out
7. Antistatic wheels (not lockable)
8. Drainvalve, to empty the cooling medium tank

Connection field with resettable fuses



1. Resettable fuses (F-108 and F-114 only)
2. Power socket
3. Type plate

6.2 Preparing for use

Prerequisites

- All parts must be clean and free of damage.
- Close the drainvalve.

6.2.1 Installing the hoses

⚠ WARNING

Stumbling or falling due to improper installation of the cables and hoses.

- The length of the cables and hoses should be kept as short as possible
- If possible, avoid installing cables and hoses in aisle areas
- If installation of cables and hoses in aisle areas is unavoidable, use an adequate protective pad in order to avoid the danger of stumbling and damage

- Connect out flow and return flow connections of the Recirculating Chiller with the condenser of the rotary evaporator.

NOTE

Only use hoses which can withstand min. –10 °C and 2 bar pressure and secure them with the usual hose clamps.

- Connect Chiller outlet (OUT) to the second condenser installed on the pump.
- Connect the outlet of the second condenser to the Rotavapor® Condenser.
- Connect the outlet of the Rotavapor® Condenser to the inlet (IN) of the Recirculating Chiller.

6.2.2 Filling the chiller

NOTICE

Risk of instrument damage if wrong cooling medium is used.

- Check to ensure that the cooling medium is suitable for use at the desired cooling temperature and does not freeze at the working temperature

Fill the cooling liquid in the opening to maximum filling level while the chiller is not connected to another device. We recommend a mixture of ethylene glycol/water at least 40/60, which does not freeze until –16 °C.

6.3 Start operation

NOTE

See installation instructions (chapter 5.1) for initial startup!

WARNING

Danger of injury due to tipping or failure of the instrument due to vibrations.

- Before starting, the rollers of the instrument must be blocked (exception: Chiller F-100 and F-105 each have fixed feet in front)
- After being transported, the recirculating chiller must be allowed to stand for at least 2 hour before it is switched on.

Start the Recirculating Chiller by switching on the Instrument by the main switch. Press start on the Chiller to fill the cooling coils.

6.4 No BUCHI vacuum controller connected to the system

Preparational steps

- System must be in good working order. See final installation check, section 5.1.
- Turn on instrument.
- Check level of cooling transfer medium as described in section 6.1 Level indicator.
- Set the desired working temperature by the UP and DOWN buttons (not for F-100).
- Press the START button to start the cooling process (not for F-100).
- Check the actual temperature on the Chiller until it has reached the required temperature and start working.

Working steps

- The cooling temperature can be adjusted during the operation process by pressing the UP and DOWN buttons on the Chiller (not for F-100).
- If the Chiller can't keep the required temperature, do a slower distillation, by means of decreasing the vacuum to a slightly higher level so that less vapour is coming to the cooling coil.

Steps for end of process

- Press the STOP button on the Chiller.
  - ➡ The cooling stops immediately.
  - ➡ After a few seconds ventilation also stops.

NOTE

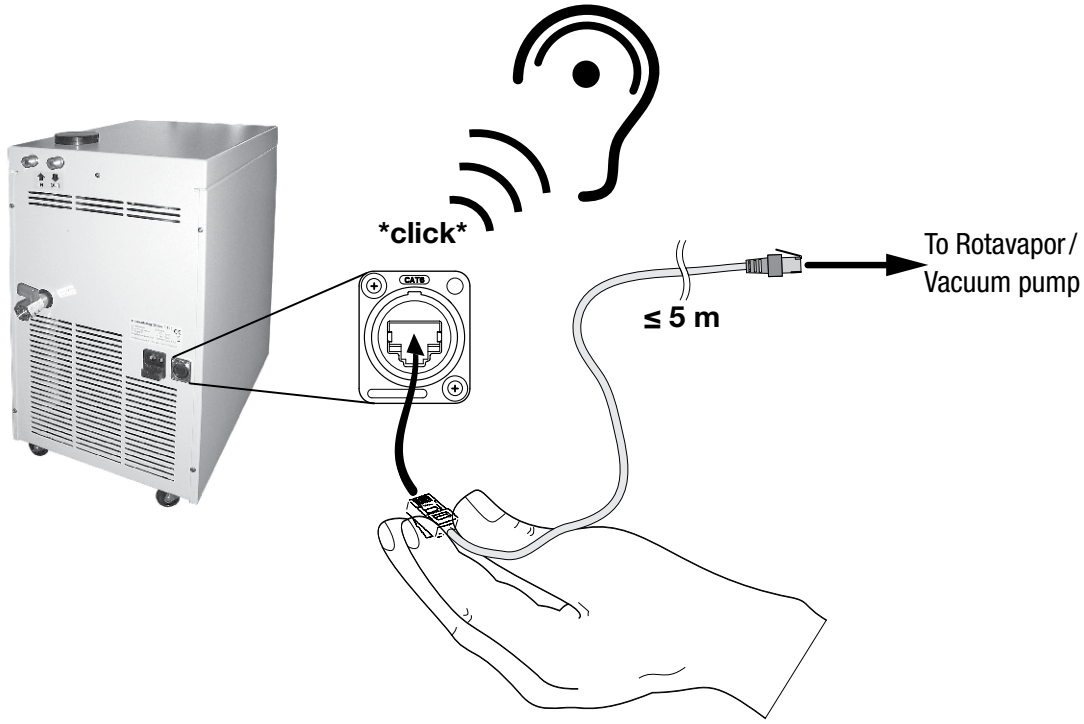
F-108, F-114

To avoid the rattling of the compressor when the chiller is started, please consider the following:

Keep the chiller connected to the power supply during the entire operation.

6.5 Working with BUCHI vacuum controller

The Chiller models F-105 and above are equipped with a communication socket. Here, a BUCHI Rotavapor setup or other appropriate laboratory instruments equipped with a BUCHI vacuum controller (model V-850 or higher with firmware version 3.0 or higher) can be attached.
To establish communication switch on all connected devices. After bootup time the UP and DOWN buttons of the Chillers operation panel are blocked – the Chiller can be controlled via the Vacuum Controller buttons.



NOTE

Do not exceed max. recommended cable length (5 m). For more information about operation see respective manual of the Vacuum Controller in use.

7 Maintenance and repairs

This section gives instructions on maintenance work to be performed in order to keep the instrument in a good and safe working condition. All maintenance and repair work requiring the opening or removal of the instrument housing must be carried out by trained BUCHI service personnel and only with the tools provided for this purpose.

WARNING

Death or serious burns by electric current.

- Switch off the instrument, disconnect the power cord and prevent unintentional restart before touching any of the elements inside the Recirculating Chiller
- Do not spill liquids over the device

NOTICE

Risk of housing and instrument damage by liquids and detergents.

- Use only ethanol or soapy water for cleaning

NOTE

Use only genuine consumables and spare parts for any maintenance and repair work in order to assure warranty and continued system performance. Any modifications of the Recirculating Chiller or parts of it require the prior written permission of the manufacturer.

7.1 Customer service

Only authorized service personnel are allowed to open up the housing and/or perform repair work on the instrument which is not described in this manual. Authorization requires a comprehensive technical training and knowledge of possible dangers which might arise when working at the instrument. Such training and knowledge can only be provided by BUCHI.

Addresses of official BUCHI customer service offices are given on the BUCHI website under: www.buchi.com. If malfunctions occur on your instrument or you have technical questions or application problems, contact one of these offices.

The customer service offers the following:

- Spare part delivery
- Repairs
- Technical advice

7.2 General inspection and cleaning instructions

Check the housing for visible defects (switches, plugs, enclosure etc.) and clean it regularly under safe conditions with a damp cloth. Wipe off any splashes of aggressive chemicals immediately using a damp cloth in order to avoid any damage being caused to the coating on the housing. Ethanol as a cleaning agent is also possible to use.

Cleaning under safe conditions

- Switch off the Recirculating Chiller and unplug the power cord.
  ➡ Let the system reach ambient temperature completely!
- Perform cleaning actions with a damp cloth.
- Regularly clean lamella with a damp cloth to remove dust, at least once a year.

Hoses

- Check the hoses for wear at least every six months.
- Exchange damaged hoses.

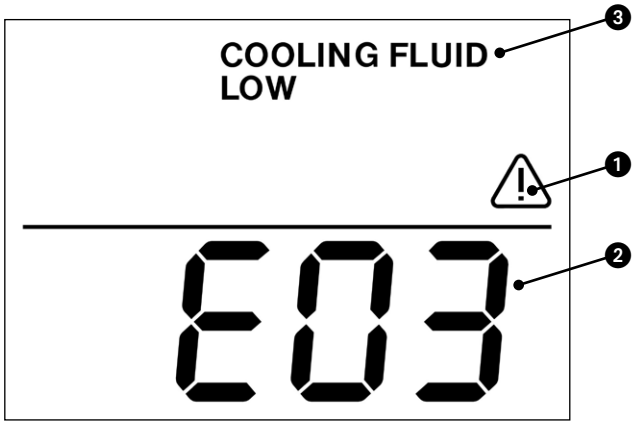
Cooling media tank

- Check before prior use the filling level of the Recirculating Chiller
- Exchange the cooling liquid once a year by means of the drainvalve and renew.

8 Troubleshooting

This section helps to resume operation after a problem has occurred with the instrument which does not require special technical training. It lists possible occurrences, their probable causes and suggests how to remedy the problem.

8.1 Error message display



1. For every error the triangle lights.
2. The error number is indicated on the display.
3. Error 03 also includes a written message at the top “COOLING FLUID LOW” (F-108 and F-114 only).

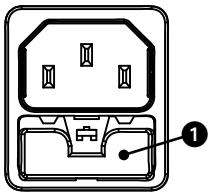
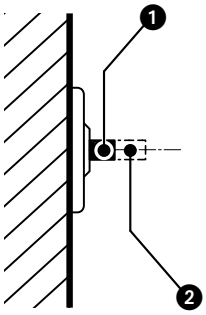
8.2 Malfunctions and their remedies

The troubleshooting table below lists possible malfunctions and errors of the instrument. The operator is enabled to correct some of those problems or errors by him/herself. For this, appropriate corrective measures are listed in the column “Remedy”.

Malfunctions and their remedies

Error Code	Problem	Remedy
E01	Temperature fault Temperature sensor circuit break	Switch off the unit, and restart. Call service if the problem persists.
E03	No / too little cooling liquid Pump breakdown	Fill up cooling liquid. Call service if the problem persists.
E04	Pressure fault of the compressor	Switch off the unit, let it cool down the compressor. Call service to check the system if the problem persists.
E05	Data fault	Switch off the unit and restart. Call service if the problem persists.
E06	Temperature fault in the electronics	Switch off the unit, let it cool down, clean air inlet and restart. Call service if the problem persists.

Malfunctions and their remedies

Problem	Remedy		
F-100 / F-105 does not work	Switch off the unit and unplug the power cord. Change the fuse according to technical data and restart. Call service if the problem persists.		❶ Fuse
F-108 / F-114 does not work	Switch off the unit and let it cool down. Gently push the resettable fuses back into prestressed position when fuses are activated. Call service if the problem persists.		❶ Fuse ok ❷ Fuse triggered

9 Shutdown, storage, transport and disposal

WARNING

Poisoning or serious injuries through contact with or incorporation of harmful substances.

- Wear safety goggles
- Wear safety gloves
- Wear a laboratory coat
- Clean the instrument and all accessories thoroughly to remove possibly dangerous substances
- Do not clean dusty parts with compressed air
- Store the instrument and its accessories in a dry place in the original packaging

This section instructs how to shut down and pack the instrument for storage or transport. Specifications for storage and shipping conditions can also be found listed here.

NOTE

See manufacturer safety data sheet (chapter 11) about the refrigerant!

9.1 Storage and transport

NOTICE

Defective instrument due to improper packaging or improper transport.

- Pack the instrument for safe transport with new, suitable packaging material
- In particular, secure the compressor for transport
- Secure the properly packaged instrument on a pallet for transport

Switch off the instrument and remove the power cord. To disassemble the Recirculating Chiller follow the installation instructions in section 5 in reverse order. Clean the instrument thoroughly! The cooling liquid is to be drained before storage or shipping. The instrument is to be stored in the original packaging in a dry location. Shipping is also to be done in the original packaging and in upright position only.

NOTE

- *After transport, wait at least 1 hour before switching on the chiller! Within this time the refrigerant gathers in the compressor, avoiding damage of the compressor.*
- *Completely drain off coolant fluid (tilt appliance slightly if necessary). Then turn off the drain tap.*

9.2 Disposal

⚠ CAUTION

Freeze-burns and eye injuries through direct contact with R134.

- Avoid contact with skin and eyes
- Always wear safety goggles
- Always wear safety gloves
- Hoses can be additionally insulated (see optional offering for hose insulation)

Disposal of instrument

For instrument disposal in an environmentally friendly manner, a list of materials is given in section 3.2. This helps to ensure that the components can be separated and recycled correctly by a specialist for disposal.
You have to follow valid regional and local laws concerning disposal. For help, please contact your local authorities!

NOTE

When returning the instrument to the manufacturer for repair work, please copy and complete the health and safety clearance form on the following page and enclose it with the instrument.

Disposal of Refrigerant R134

The cooling medium R134 must be destroyed in an approved facility, which is equipped to absorb and neutralize acidic gases and other toxic processing products.

Health and Safety Clearance

Declaration concerning safety, potential hazards and safe disposal of waste.

For the safety and health of our staff, laws and regulations regarding the handling of dangerous goods, occupational health and safety regulations, safety at work laws and regulations regarding safe disposal of waste (e.g. chemical waste, chemical residues or solvents) require that this form must be completed, signed and enclosed to every return shipment of equipment or defective parts.

Instruments or parts will not be accepted if this declaration is not present.

Equipment

Model: Part/Instrument no.:

1.A Declaration for non dangerous goods

We assure that the returned equipment:

☐ is unused and new.

☐ has not been exposed to toxic, corrosive, biologically active, explosive, radioactive or other dangerous matters. No hazard emanates from the device!

☐ is free of contamination (e.g.that chemicals, solvents or residues of pumped media have been drained prior to shipment). No hazard emanates from the device!

1.B Declaration for dangerous goods

Exhaustive list of dangerous substances the equipment has been exposed to:

Chemical, substance	Danger classification

We assure that:

☐ all hazardous substances (e.g. toxic, corrosive, biologically active, explosive, radioactive etc.) which have been processed or been in contact with the equipment are listed above.

☐ the equipment has been cleaned, decontaminated and is free of transmissible agents such as hazardous fungi, bacteria, viruses etc. If sterilization is applicable, all in- and outlets of the equipment have been properly sealed the process.

2. Final Declaration

We hereby declare that:

- we know all about the substances which have been in contact with the equipment and all questions have been answered correctly.
- we have taken all measures to prevent potential risks that might emanate from the delivered equipment.
- this document will be attached clearly visible and securely to the outside of the transport box.

Company name or stamp: _____

Place, date: _____

Name (print), job title (print): _____

Signature: _____

Health and Safety Clearance_20081110_KESS.doc_20081110 Version 1.0 Page 1/1

10 Spare parts

This section lists spare parts, accessories and options including their ordering information.
Only order spare parts and consumables from BUCHI to maintain the warranty status and to assure best performance and reliability of the system and affected components. Any modifications to the spare parts used are only allowed with the prior written permission of the manufacturer.

Always state the product designation, instrument serial and part numbers for warranty clearance when ordering spare parts!

10.1 Enclosed parts

Enclosed parts matrix

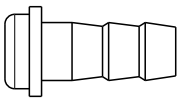
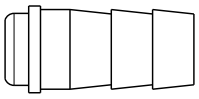
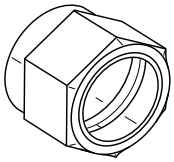
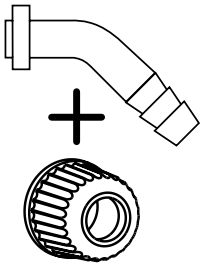
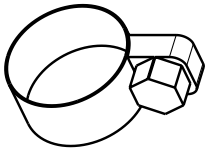
	F-100	F-105	F-108	F-114
mains cables	✓	✓	✓	✓
Control cable RJ45, 2 m	—	✓	✓	✓
Hose D6/9 2 m, 2×	✓	✓	✓	✓
Hose D10/14 3 m, 2×	—	—	—	✓
Hose nipple 8 mm, 4×	✓	✓	—	—
Hose nipple 9.5 mm, 2×	—	—	✓	✓
Hose nipple 13.5 mm, 2×	—	—	—	✓
Screw cap GL14, 4×	✓	✓	—	—
Screw cap M16x1, 4×	—	—	✓	✓
Hose clamp 9.9 mm, 4×	✓	✓	—	—
Hose clamp, 4×	—	—	✓	✓
Operation Manual	✓	✓	✓	✓

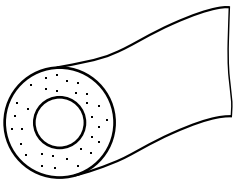
10.2 Instrument configuration

Content	
Instrument versions:	Order no.
BUCHI Recirculating Chiller	
F-1XX 230 V	
F-100 Model 300 Watt fix at 10 °C	11060000
F-105 Model 500 Watt controlled	11060002
F-108 Model 800 Watt controlled	11056464
F-114 Model 1400 Watt controlled	11056466
F-1XX 115 V	
F-100 Model 300 Watt fix at 10 °C	11060001
F-105 Model 500 Watt controlled	11060003
F-108 Model 800 Watt controlled	11056465
F-114 Model 1400 Watt controlled	11056467
F-1XX 100 V	
F-100 Model 300 Watt fix at 10 °C	11061352
F-105 Model 500 Watt controlled	11061353

10.3 Spare parts, optional accessories

Spare parts	
Description	Order no.
Power cable 3 pin, type CH	010010
Power cable 3 pin, type SCHUKO	010016
Power cable 3 pin, type GB	017835
Power cable 3 pin, type AU	017836
Power cable, 3 pin, type US	010020
Power cable, 3 pin, type IND	11060536
Power cable 3 pin, type JP	11061564
Distribution piece	037742

	Ethernet cable, 2 m, RJ45 Cat. 5e, gray	044989
	Cable RJ45, 5 m	11056240
	Tubing, silicone, 6/9 mm, 1 m, transparent (F-100, F-105, F-108)	04133
	Tubing, silicone, 10/14 mm, 1 m, semi-transparent (F-114)	04134
	Connection piece for B-471, 8 mm (F-108, F-114)	046792
	Hose barb, 13.5 mm (F-114)	040329
	Cap nut, M16, stainless steel (F-108, F-114)	019889
	Set of hose barbs, GL14 olive bent (4 pcs), cap nut (4 pcs)	037287
	Hose clamp 9.9 mm	027738
		
	Hose clamp 8–16 mm (F-108, F-114)	022352



Insulation hose for silicone hose, Kaiflex, 11/23 mm, 1m, black	28696

Insulation tubing, Kaiflex, 15/27 mm, 1 m, black	11056888
Y piece tubing coupling, 8 mm	011043

Y piece tubing coupling, 12 mm	11058358
Quick-fit coupling, 12 mm set of 2 pieces	048688

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