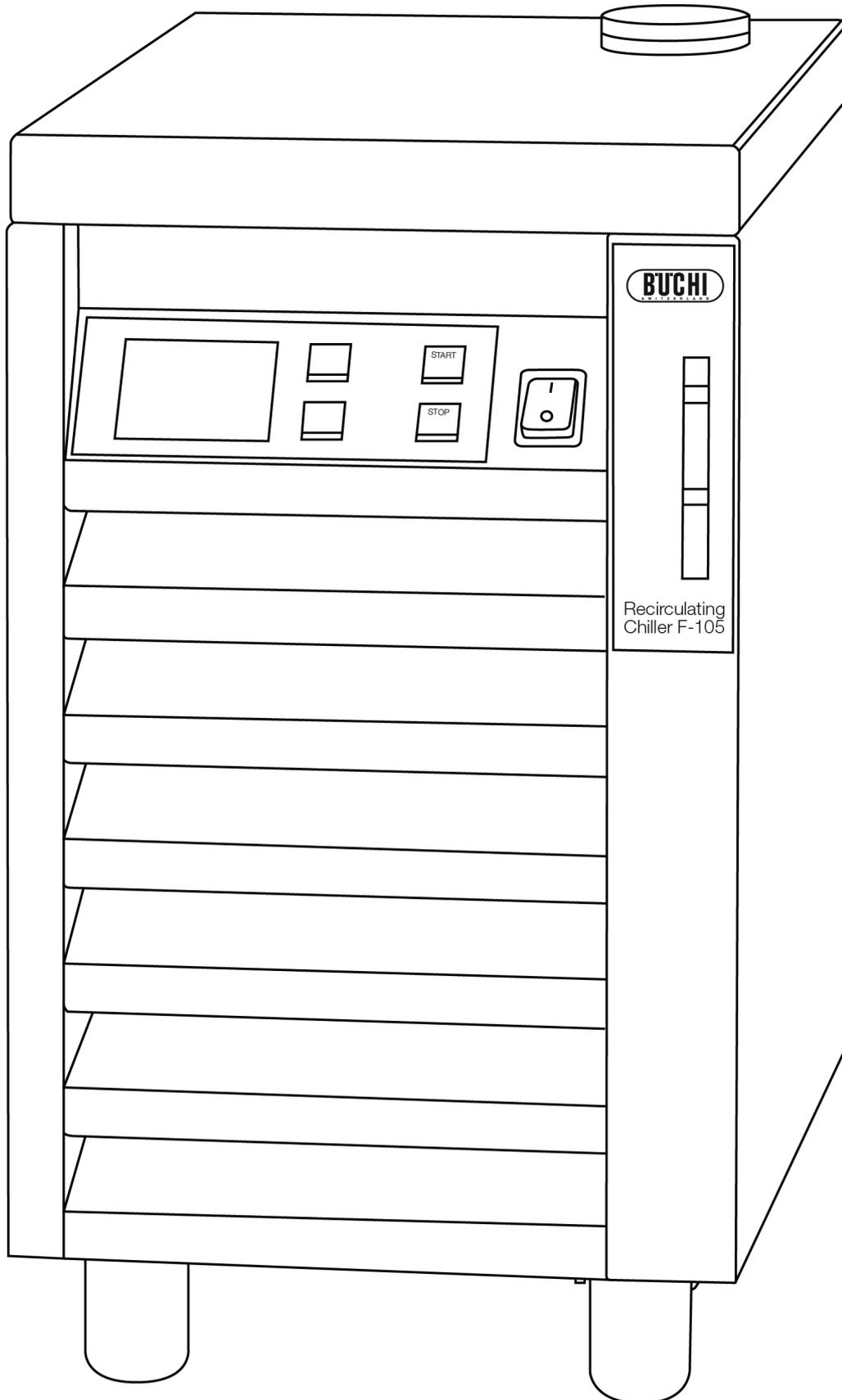




Recirculating Chiller F-100 / F-105

Operation Manual



Imprint

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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.

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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

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. <ul style="list-style-type: none"> 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.

	<p>! DANGER</p> <p>Death or serious injuries when used in explosive environments.</p> <ul style="list-style-type: none"> • 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
	<p>! CAUTION</p> <p>Risk of minor or moderate cuts by sharp edges.</p> <ul style="list-style-type: none"> • Do not touch defective or broken glassware with bare hands • Do not touch thin metal edges
	<p>NOTICE</p> <p>Risk of instrument damage by liquids or mechanical shocks.</p> <ul style="list-style-type: none"> • 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:

	<p>! WARNING</p> <p>Danger of injury and material damage due to overheating.</p> <ul style="list-style-type: none"> • Keep at a temperature not exceeding 45 °C
	<p>! WARNING</p> <p>Danger of corrosion and poisoning through inhalation of the fumes.</p> <ul style="list-style-type: none"> • In case of fire and/or explosion do not breathe fumes
	<p>! CAUTION</p> <p>If R134a escapes in the event of a fault..</p> <ul style="list-style-type: none"> • 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.

	<p>! WARNING</p> <p>Serious chemical burns by corrosives.</p> <ul style="list-style-type: none"> • 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.

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

	F-100	F-105
Dimensions (W x D x H)	280 x 420 x 500 mm	280 x 420 x 500 mm
Weight	28 kg	30 kg
Power consumption (max.)	800 W	800 W
Heating emission	700 W	700 W
Cooling capacity at 15 °C	-	530 W
Cooling capacity at 10 °C	300 W	390 W
Cooling capacity at 0 °C	-	120 W
Cooling capacity at -10 °C	-	10 W
Set temperature range	fix at 10 °C	-10 °C to +25 °C
Connection voltage	230 VAC ± 10 % -	230 VAC ± 10 % or 115 VAC ± 10 %
Frequency at 230 V at 115 V	50 / 60 Hz -	50 / 60 Hz 60 Hz
Fuse at 230 V at 115 V	6.3 AT -	6.3 AT 8 AT
Temperature display	no display	digital, resolution 0.1 °C
Refrigerant	R 134a (280 g)	R 134a (280 g)
Temperature regulation accuracy	± 2 °C	± 1 °C
Tank volume	3 L	3 L
Tubing connection	8 mm (GL14)	8 mm (GL14)
Pump pressure (max.)	0.6 bar	0.6 bar
Flow rate	2.5 L/min	2.5 L/min
Compatibility with interface	-	I-100, V-850, V-855
Overvoltage category	II	II
IP Code	IP20	IP20
Pollution degree	2	2

Max. altitude above sea level	2000 m
Ambient temperature	5 - 35 °C (25 °C)
Maximum relative humidity	80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C
Storage temperature	max. 45 °C

For indoor use only.

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	–
R134a	Refrigerant	1,1,1,2-tetrafluoroethane	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 F-100 has a fixed cooling temperature without display. The model F-105 is equipped with a control unit and built in display to regulate and indicate the actual and set value of the cooling temperature.

Diagram F-100

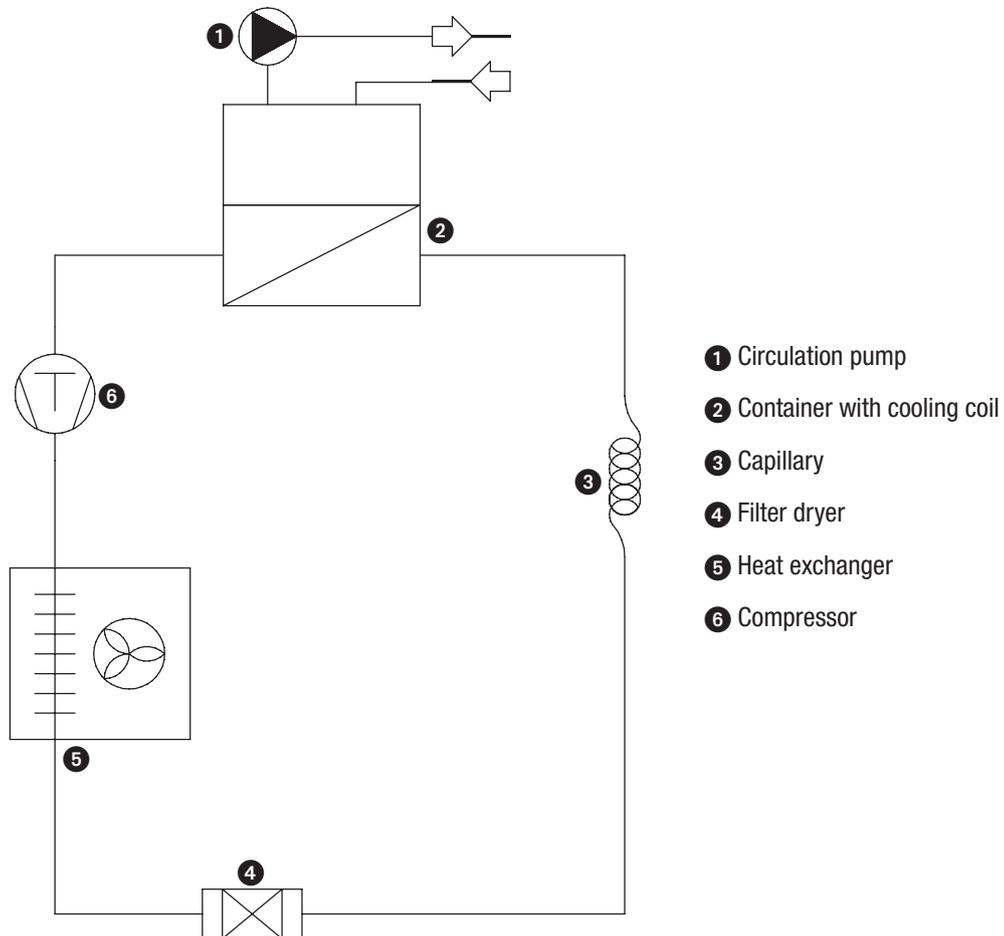
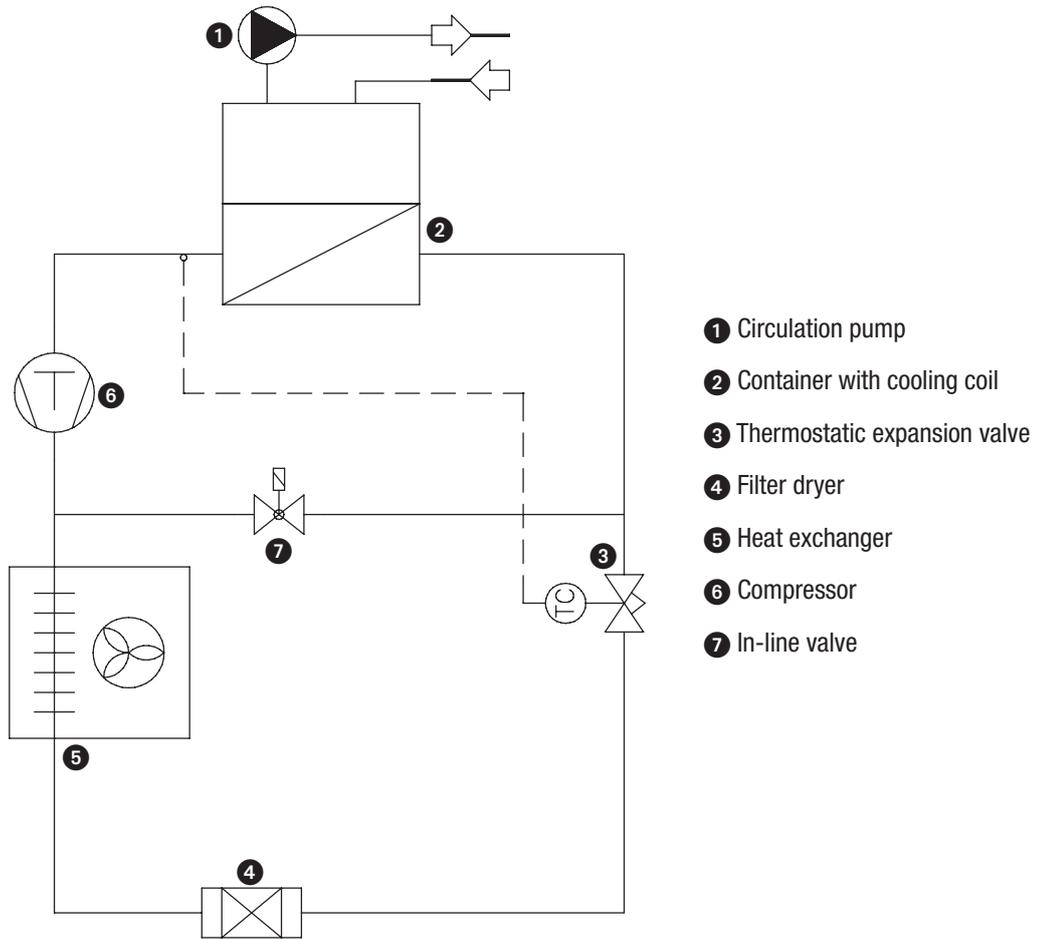


Diagram F-105



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
	<p>Death or serious injuries when used in explosive environments.</p> <ul style="list-style-type: none"> • 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!*

	<p>! WARNING</p> <p>Stumbling or falling due to improper installation of the cables and hoses.</p> <ul style="list-style-type: none"> • 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
	<p>! WARNING</p> <p>Fire hazard, damage to the instrument through overheating due to inadequate air circulation.</p> <ul style="list-style-type: none"> • Do not cover the instrument • Minimum distance from other objects must be at least 40 cm
	<p>! CAUTION</p> <p>Risk of minor or moderate injury due to the heavy weight of the instrument.</p> <ul style="list-style-type: none"> • 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
	<p>! CAUTION</p> <p>Danger from falling objects due to inadequate stability.</p> <ul style="list-style-type: none"> • Do not place other objects or instruments on the Chiller

5.2 Electrical connections

	<p style="text-align: center;">Notice</p> <p>Risk of instrument damage if mains supply is incorrect.</p> <ul style="list-style-type: none"> • 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

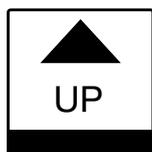


- ❶ Opening for cooling medium
- ❷ Handle (to pull the instrument)
- ❸ On-/Off switch (lights green when instrument is switched on)
- ❹ Cooling media level indicator
- ❺ Cooling lamella for air flow in
- ❻ Wheels (not lockable)
- ❼ Fix anti-slip feet
- ❽ Operating panel with various parameter displays (not available on the F-100)

Buttons (not for F-100)

Button

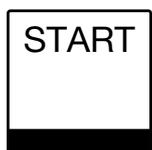
Functionality



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.

STOP

Button to stop the cooling regulation.

Display (not for F-100)

SET TEMP. 10.0 °C

ACTUAL TEMP. 10.2 °C

- ❶ Set temperature of Recirculating Chiller in °C
- ❷ Actual temperature of Recirculating Chiller in °C
- ❸ Active cooling is indicated by the snow flake
- ❹ If the Recirculating Chiller is connected to the BUCHI vacuum controller the connection symbol is displayed

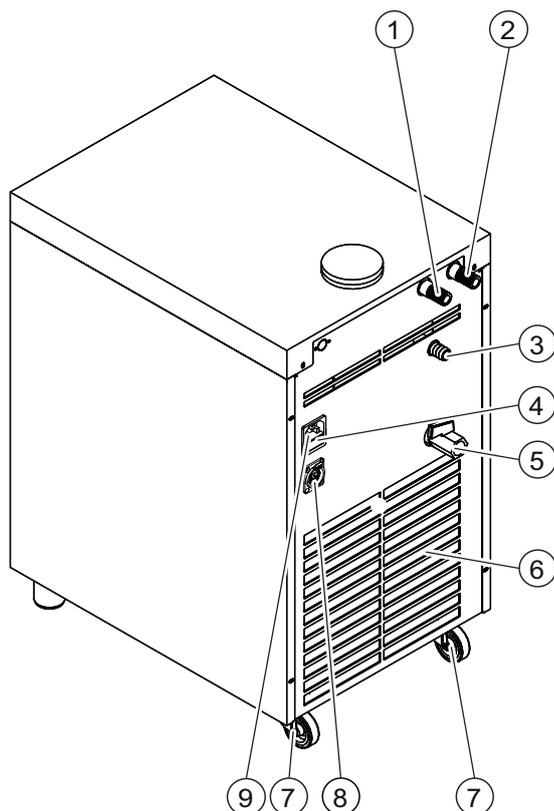
Level indicator

BUCHI

Recirculating Chiller F-105

- ❶ Lower black line: minimum filling level
- ❷ Upper black line: maximum filling level
- ❸ Ball float: actual fill level of coolant

Rear side



- ❶ Cooling medium flow in
- ❷ Cooling medium flow out
- ❸ Tank overflow
- ❹ Fuse
- ❺ Drainvalve, to empty the cooling medium tank
- ❻ Slots for air flow out
- ❼ Antistatic wheels (not lockable)
- ❽ Communication cable socket, RS485 (not available for F-100 models)
- ❾ Power socket

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
	<p>Stumbling or falling due to improper installation of the cables and hoses.</p> <ul style="list-style-type: none"> • 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. $-10\text{ }^{\circ}\text{C}$ 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
	<p>Risk of instrument damage if wrong cooling medium is used.</p> <ul style="list-style-type: none"> • 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 $-16\text{ }^{\circ}\text{C}$.

6.3 Start operation

NOTE

See installation instructions (chapter 5.1) for initial startup!

	WARNING
	<p>Danger of injury due to tipping or failure of the instrument due to vibrations.</p> <ul style="list-style-type: none"> • 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.

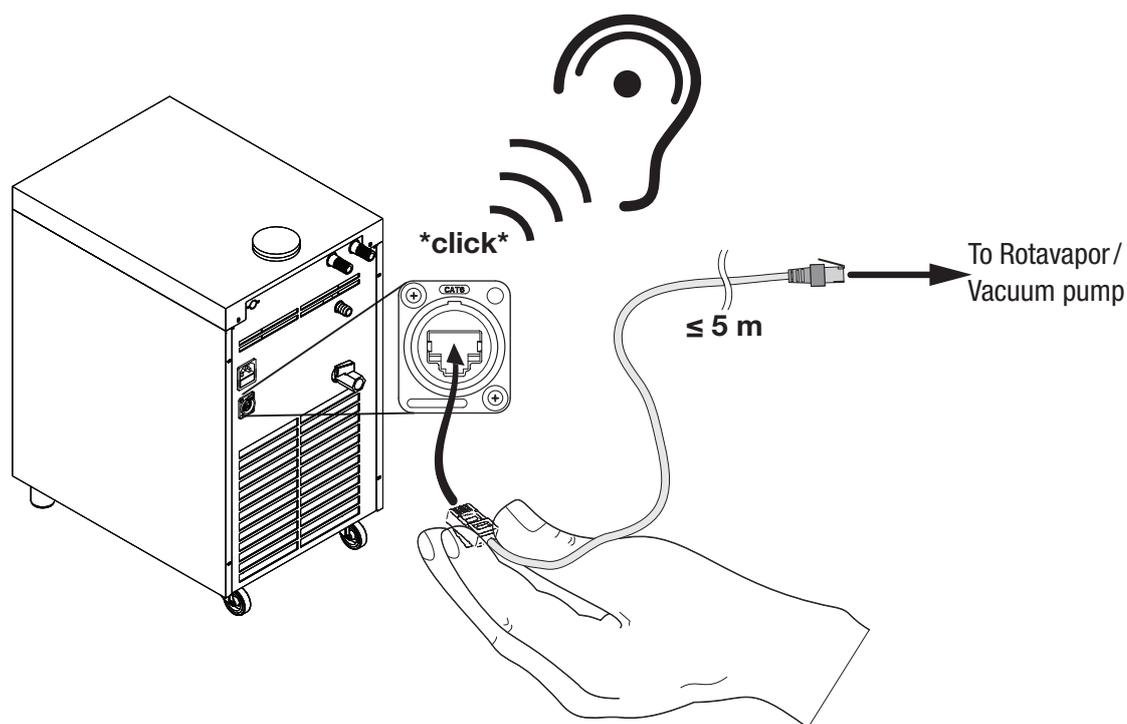
Steps for end of process

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

6.5 Working with BUCHI vacuum controller

The Chiller model F-105 is 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.

Communication F-105

	Vacuum Controller V-850 or V-855	Interface I-100	Interface I-300 with Legacy box
Start or stop chiller via controller or interface	Yes	Yes	Yes
Display set point and current temperature	Yes	No	Yes
Adjust set point via controller or interface	Yes	No	Yes

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
	<p>Death or serious burns by electric current.</p> <ul style="list-style-type: none"> • 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
	<p>Risk of housing and instrument damage by liquids and detergents.</p> <ul style="list-style-type: none"> • 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.

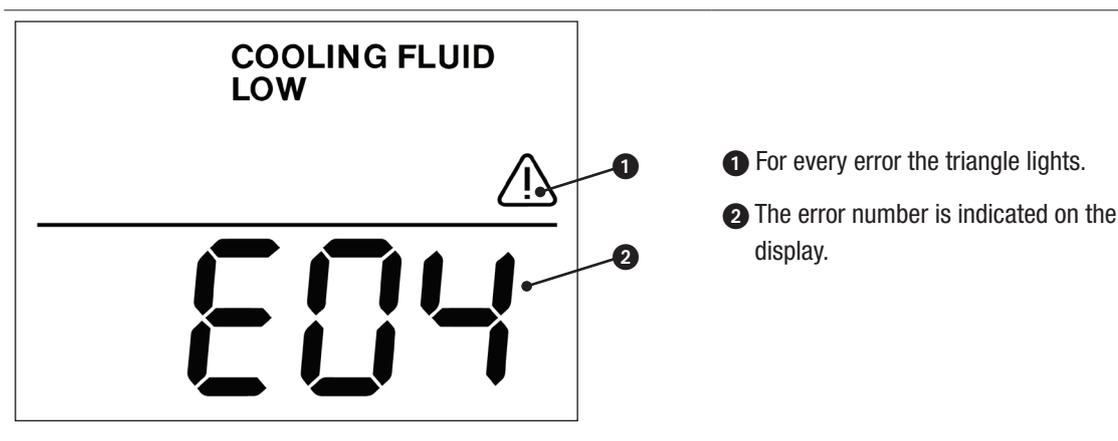
Cooling media tank

- 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.

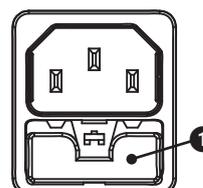
8.1 Error message display (only F-105)



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.
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.
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.	



1 Fuse

9 Shutdown, storage, transport and disposal

	<p>! WARNING</p> <p>Poisoning or serious injuries through contact with or incorporation of harmful substances.</p> <ul style="list-style-type: none"> • 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
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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

	<p>NOTICE</p> <p>Defective instrument due to improper packaging or improper transport.</p> <ul style="list-style-type: none"> • 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
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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 2 hours 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

 	<p>CAUTION</p> <p>Freeze-burns and eye injuries through direct contact with R134a.</p> <ul style="list-style-type: none"> • 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)
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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 R134a

The cooling medium R134a 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: _____

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
Mains cables	✓	✓
Control cable RJ45, 2 m	—	✓
Hose D6/9 2 m, 2×	✓	✓
Hose nipple 8 mm, 4×	✓	✓
Screw cap GL14, 4×	✓	✓
Hose clamp 9.9 mm, 4×	✓	✓
Operation Manual	✓	✓

10.2 Instrument configuration



Content

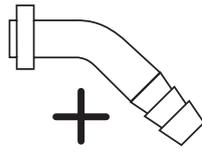
Instrument versions:	Order no.
BUCHI Recirculating Chiller	
F-1XX 230 V	
F-100 Model 300 Watt fix at 10 °C	11056460
F-105 Model 500 Watt controlled	11056462
F-1XX 115 V	
F-105 Model 500 Watt controlled	11056463

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
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)	04133



+



Set of hose barbs, GL14
olive bent (4 pcs), cap nut (4 pcs)

037287



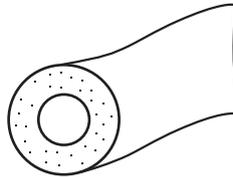
Hose clamp 9.9 mm

027738



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

28696



Y piece tubing coupling, 8 mm

011043



Quick-fit coupling, 12 mm
set of 2 pieces

042885



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