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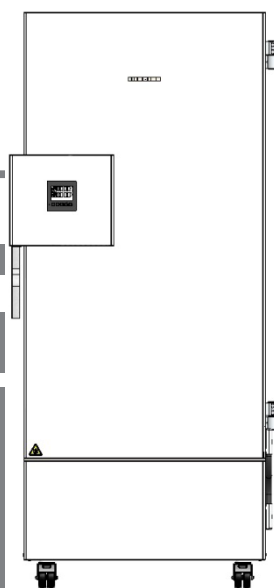
Installation manual for the CO₂ Emergency Cooling

Ultra-Low Temperature Freezer SUFsg

	Model	Gross content in liters	Voltage
	SUFsg 5001,001	491	230 V
	SUFsg 7001,001	728	230 V
UL chambers	SUFsg 5001,137	491	120 V
	SUFsg 5001,123	491	208-240 V
	SUFsg 7001,137	728	120 V
	SUFsg 7001,123	728	208-240 V
Chambers with water cooling	SUFsg 5001,H72	491	230 V
	SUFsg 7001,H72	728	230 V

SUFsg 5001
SUFsg 7001

7085 886-01



LIEBHERR

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1. Preface

1.1 General guidelines

This installation manual describes the installation of the CO₂ emergency cooling of the SUFsg ultra-low temperature freezer and is aimed at service personnel who should install these units.

The repair of the cooling system must only be performed by personnel having specialized training and special tools must be available.

References about the required qualification of the personnel can be found in chap. 2.1.

Before starting the service work at an SUFsg ultra-low temperature freezer, compare order and serial number of the unit with the validity note on the front page of this manual.

The of electrical equipment marking of the components refers to the circuit diagrams. With other sizes of the device the marking can deviate. Therefore use always the appropriated circuit diagram of the device.

Additional options are indicated in the text.

This manual will be updated if necessary. Always use the latest version of the manual.

All information about initial operation, normal operation, cleaning, alarm and error messages can be found in the relevant operating manual delivered with the SUFsg ultra-low temperature freezer.



Before connecting the unit, compare the data given on the type plate with the values of your power supply network.

1.2 Syntax

Syntax	Meaning
(-1A1)	Marking of electrical equipment or components of the cooling system, and of electric contacts (Equipment code)
<Taste>	Button to be pushed
"Text"	Displayed text or text to be entered

1.3 Safety instructions structure

This installation manual employs the terms and symbols below to describe dangerous situations, in line with the harmonization of ISO 3864-2 and ANSI Z535.6.

1.3.1 Safety instructions structure

- Instruction how to avoid the hazard: mandatory action
- ⊘ Instruction how to avoid the hazard: prohibition

1.3.2 Warning levels

Depending on the probability of serious consequences, potential dangers are identified with a signal word, the corresponding safety color, and if appropriate, the safety alert symbol.


 DANGER
Indicates an imminently hazardous situation that, if not avoided, will result in death or serious (irreversible) injury.

 WARNING
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious (irreversible) injury.







 CAUTION
Indicates a potentially hazardous situation which, if not avoided, may result in moderate or minor (reversible) injury.

NOTICE
Indicates a potentially hazardous situation which, if not avoided, may result in damage to the product and/or its functions or of a property in its proximity.




1.3.3 Safety alert symbol

	Risk of injury. Observe all measures that are marked with the safety alert symbol in order to avoid death or injury.
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1.3.4 Warning signs

	Danger of electric shock
	Danger of cutting injuries
	Danger of injuries by jumping off mechanical components
	Danger of suffocation by CO ₂
	Danger of suffocation by oxygen deficiency
	Danger by gas cylinders

1.3.5 Mandatory action signs





	Pull out the power plug
	Wear protective goggles
	Wear protective gloves

1.3.6 Information symbol

	Important information
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2. Safety instructions

2.1 Qualification of service personnel

	<p style="text-align: center;"> WARNING</p>
	<p>Danger of malfunctions due to incorrect maintenance or repair. Injuries, damage to the chamber and samples</p> <ul style="list-style-type: none">➤ General maintenance work must be conducted by licensed electricians or experts authorized by the manufacturer.➤ Maintenance work at the refrigeration system must only be conducted by qualified personnel who underwent training in accordance with EN 13313:2010 (e.g. a refrigeration technician with certified expert knowledge acc. to regulation 303/2008/EC). Follow the national statutory regulations.
	<p style="text-align: center;">NOTICE</p> <p>Risk of faulty cooling operation after improper calibration and adjustment. Damage of samples, incorrect test results.</p> <ul style="list-style-type: none">➤ Carry out the calibration and, if necessary, the adjustment regularly and carefully.
	<p>The Ultra-low temperature freezer should only be maintained, repaired and calibrated / adjusted by qualified personnel.</p>






To be able to carry out the work on ultra-low temperature freezer the enforcing personnel must be familiar with operation, maintenance, repair, calibration, and adjustment of the device. Sufficient qualification is achieved by:

- Electro technical training
- Knowledge of the present installation manual
- Knowledge of the current operating manual
- Experience in servicing ultra-low temperature freezers

Maintenance, repair and inspection of the cooling system must be performed by trained personnel, that has a certification in accordance with EC Regulation 303/2008 and expert knowledge in accordance with EN 13313:2010.

All work on the cooling system (repairs, inspections) must be recorded in the associated plant log book.


2.2 Safety and hazard instructions

 	<div style="background-color: red; color: white; text-align: center; padding: 5px;">! DANGER</div> <p>Electrical hazard during live maintenance and repair work Deadly electric shock.</p> <ul style="list-style-type: none"> ➤ Before conducting most of the described work, turn off the chamber at the main power switch and disconnect the power plug ➤ Take all precautionary measures that a unit which is disconnected from the power supply will not be inadvertently connected to the power supply. ➤ If the unit must be live to perform special service tasks: Make sure that a second person is present who is able to switch off the unit in case of emergency.
 	<div style="background-color: yellow; text-align: center; padding: 5px;">! CAUTION</div> <p>Danger of cutting by sharp edges of sheet metal parts. Cutting injuries.</p> <ul style="list-style-type: none"> ➤ Wear protective gloves during mounting and dismantling inner chamber and housing because sheet metal components may be sharp-edged.
	<div style="background-color: blue; color: white; text-align: center; padding: 5px;">NOTICE</div> <p>Danger of damaging electronic components by handling malpractices and electrostatic discharge. Malfunctions and damage of the electronics.</p> <ul style="list-style-type: none"> ➤ Prior to work at electronic components, take appropriate protective measures against electrostatic discharge. Wearing ESD shoes and a grounding bracelet have shown to be useful. ➤ Before opening the lock and controller housing, electrostatically discharge by touching a grounded metallic object. ➤ Prior to work at the electrical equipment check identity of the components with the aid of the wiring diagram. The assembly of the electrical equipment may be different from the description in this manual. <p>⊙ NEVER let mechanical components hang at electric cables. Electric cables are not appropriate to hold bigger components and will be damaged if you do so</p>

3. CO₂ emergency cooling

3.1 Required tools, components, and accessories

The following tables show the tools, components, and accessories that are required for the installation.

Required tools	<ul style="list-style-type: none"> • Torx screwdriver • slotted screwdriver • Open end wrench 12 mm • Open end wrench 14 mm • Open end wrench 17 mm • Open end wrench 30 mm • Cutter • Universal pliers
Auxiliary materials	<ul style="list-style-type: none"> • Leak detection spray • SUFG Service manual • Circuit diagram of the unit
Mechanical components	<ul style="list-style-type: none"> • CO₂ emergency cooling for SUFG (Retrofit kit) <div style="display: flex; align-items: center;">  <p>To perform a function test following installation (chap. 3.5), a CO₂-pressure cylinder <u>with dip tube</u> must be provided by the customer.</p> </div>

3.2 Overview

The CO₂ emergency cooling kit contains the following parts:

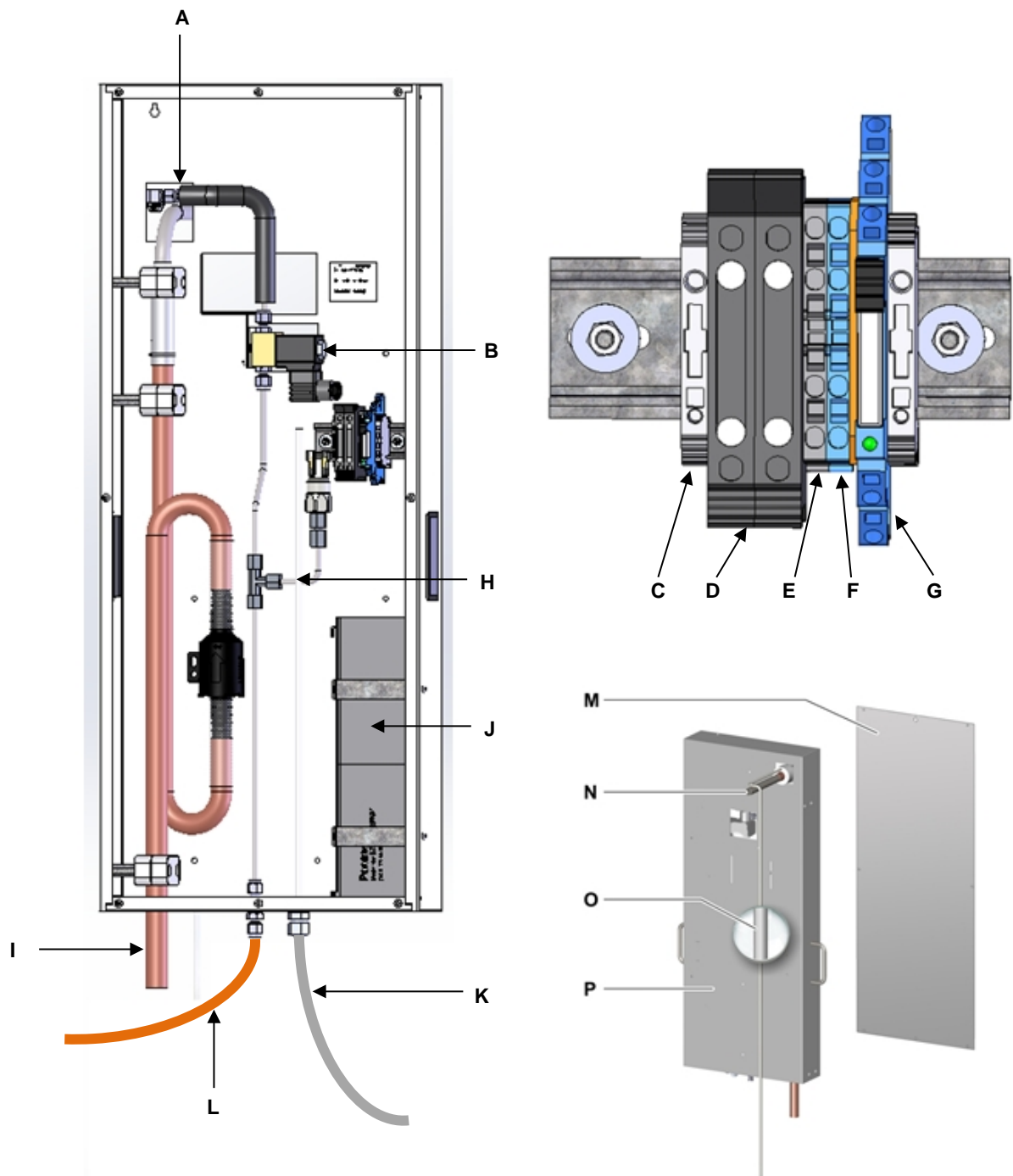
Overview of the supplied assemblies:

Description	Quantity
Mounting material, electrical	1
Mounting material, mechanical	1
CO ₂ Injection pipe	1
Housing for CO ₂ emergency cooling	1
Warning label	1
Installation manual for CO ₂ emergency cooling	1

Assemblies with component lists:

Description	Quantity
Mounting material, electrical	
4-wire end. 2,5mm ² orange	2
4-wire bracket 2,5mm ² blue	1
4-wire bracket 2,5mm ² beige	1
End bracket 6mm	2
Relay (2 W / 8 A) 24 V DC	1
Fuse, 4 A / 250 V - F - 6,3 x 32 mm UL	1
Fuse holder 6,3x32 mm	1
Cable ties 140mm	10
Nut DIN934 M3-8, nickel plated	2
Screw DIN7985 M3x10 zinc coated 4.8	2
Panel connector with flange, 7pol.	1

Description	Quantity	unit
Mounting material, mechanical		
Sealant Terostat-IX	0.05	kg
Armaflex insulating tape 50 x 3 (15m)	0.35	m
Armaflex insulating tube D10 x 11mm (35m)	0,35	m
EJOT thin sheet metal screw 40x9,5 T20 zinc-coated	13	St
Cable ties 200mm m.	2	St
Silicon-hose, transparent Ø 20	0.1	m
Silicon-hose D16,0 x 1,0	0.1	m
Screw ISO7380 M6x25 zinc-coated, therm.	2	St
Tube 1.4301 Ø16x1,0x270 mm	1	St
CO ₂ -supply line hose	1	St






- A** Threaded elbow joint
- B** Solenoid valve 12 V DC,
- C** End stop clamp 10mm
- D** 2 x Fuse connection 6,3 x 32 mm
- E** 4-pole through terminal, gray
- F** 4-pole through terminal, blue
- G** Relay (1W / 6A) 12 V DC
- H** Pressure switch
- I** Vent pipe Ø 16 mm



- J** Battery pack 12 V, 7.2 Ah,
- K** Connection cable CO₂ unit
- L** Gas hose CO₂
- M** Housing cover
- N** Vent pipe Ø 18 mm
- O** Injection pipe Ø 6 mm
- P** Housing




3.3 Installation

3.3.1 Mechanical installation

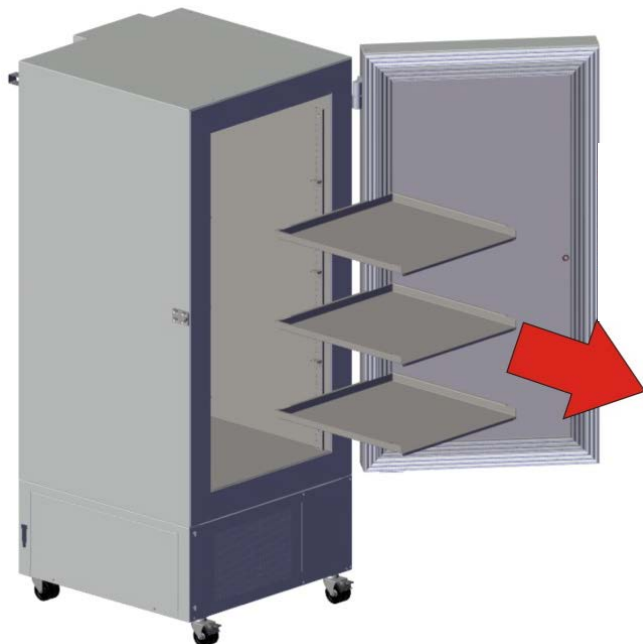
 	 DANGER
	<p>Electrical hazard during live maintenance and repair work Deadly electric shock.</p> <ul style="list-style-type: none"> ➤ Before conducting most of the described work, turn off the chamber at the main power switch and disconnect the power plug ➤ Take all precautionary measures that a unit which is disconnected from the power supply will not be inadvertently connected to the power supply.

During work inside the chamber there is danger of frostbite as the inner parts can become very cold

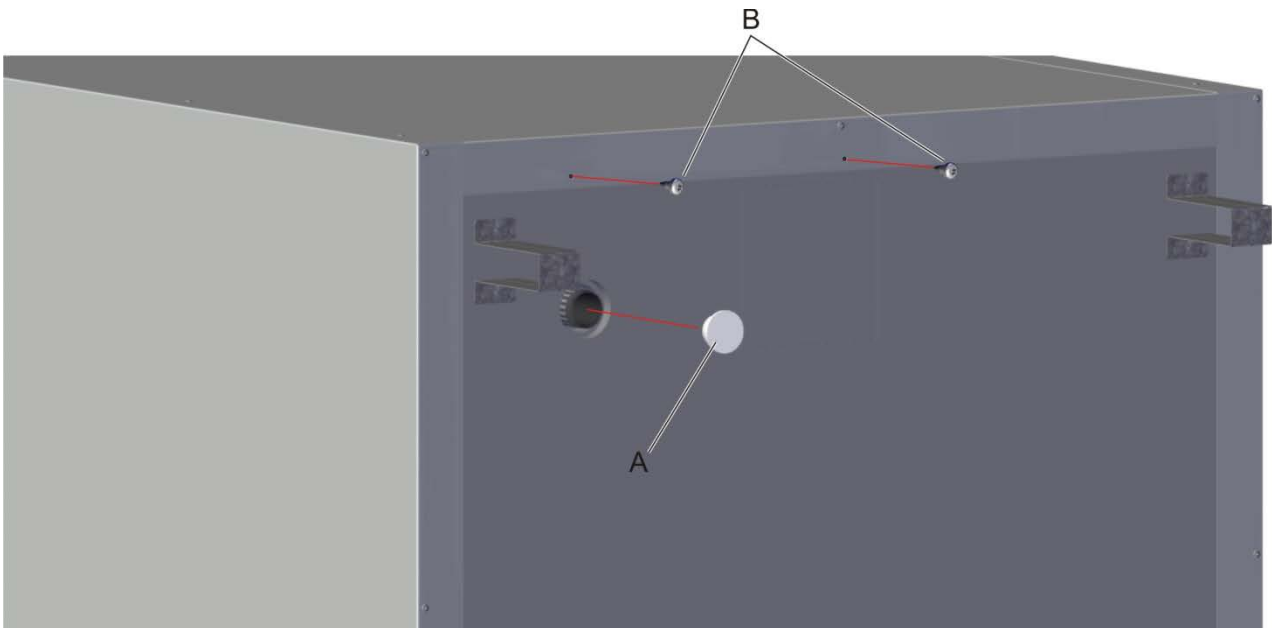
	 CAUTION
	<p>Danger of injury by freezing on when touching very cold surfaces. Local frostbite.</p> <ul style="list-style-type: none"> ➤ Wear protective gloves.

 	 CAUTION
	<p>Danger of cutting by sharp edges of sheet metal parts. Cutting injuries.</p> <ul style="list-style-type: none"> ➤ Wear protective gloves during mounting and dismantling inner chamber and housing because sheet metal components may be sharp-edged.

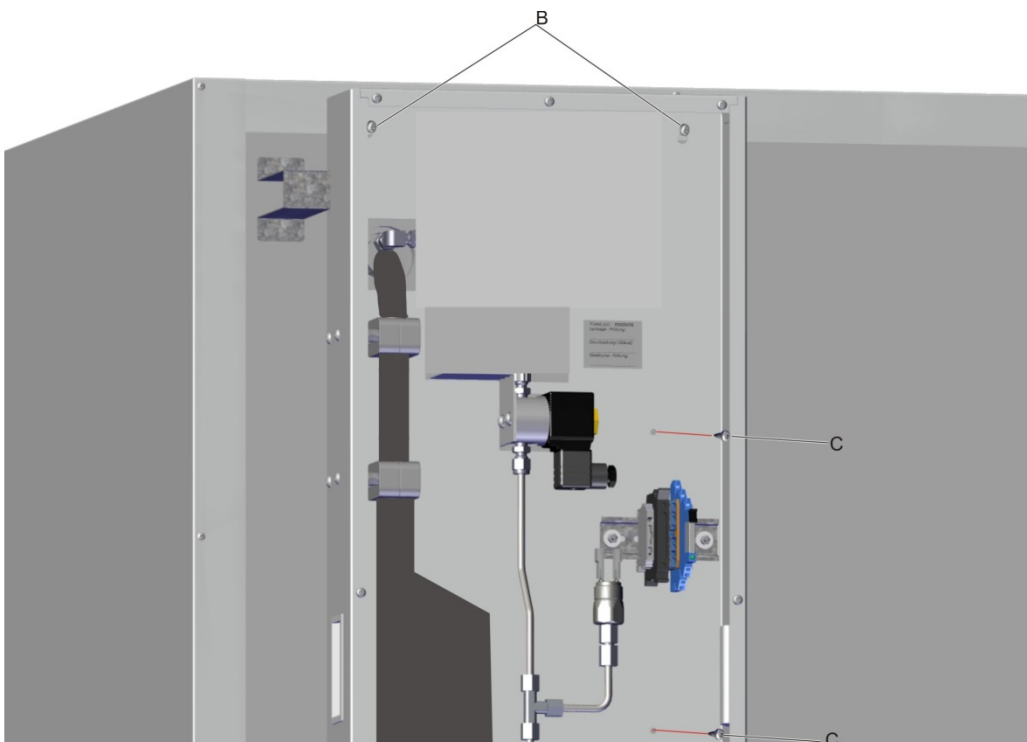
1. Open the door of the unit.
2. Disconnect the unit from the power supply.
3. Allow the unit to warm up with opened door to the ambient temperature.
4. Remove all shelf supports out of the unit.



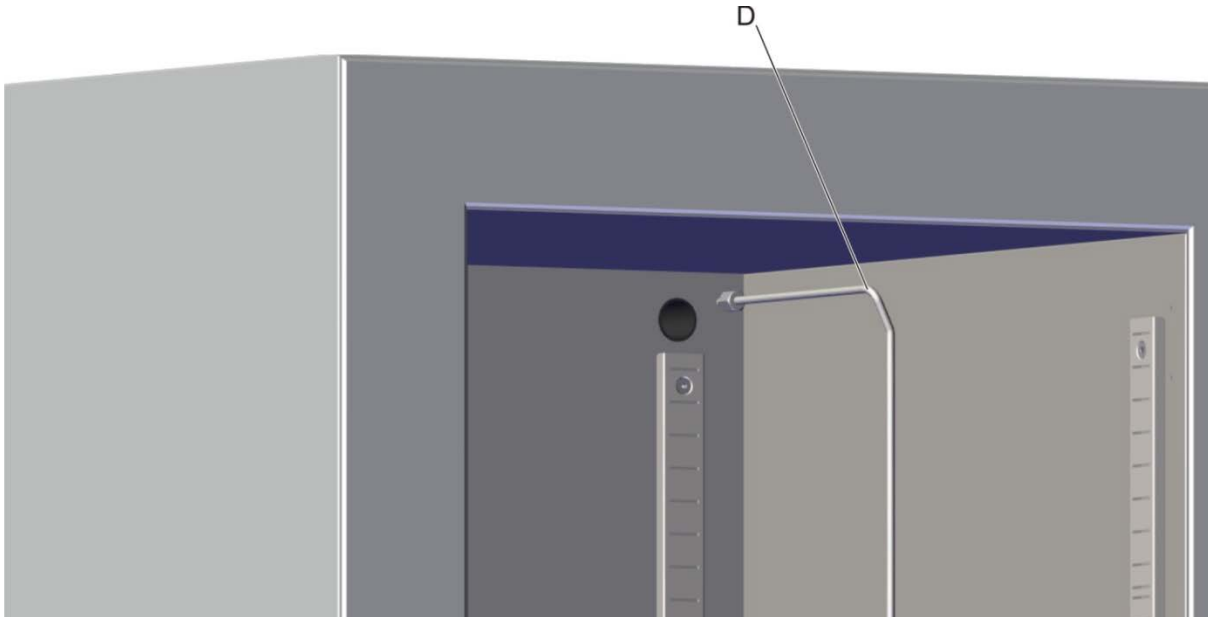
5. Remove the plug **A** from the upper port and screw the EJOT thin sheet screws **B** into the rear panel



6. Attach the emergency cooling and tighten the screws **B**. The vent pipe **E** is inserted into the upper port.
7. Attach the emergency cooling with 4 additional screws **C**.

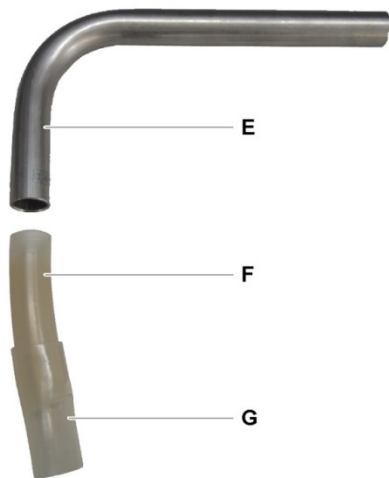


8. Guide the injection tube **D** from the inside through the top feed through.



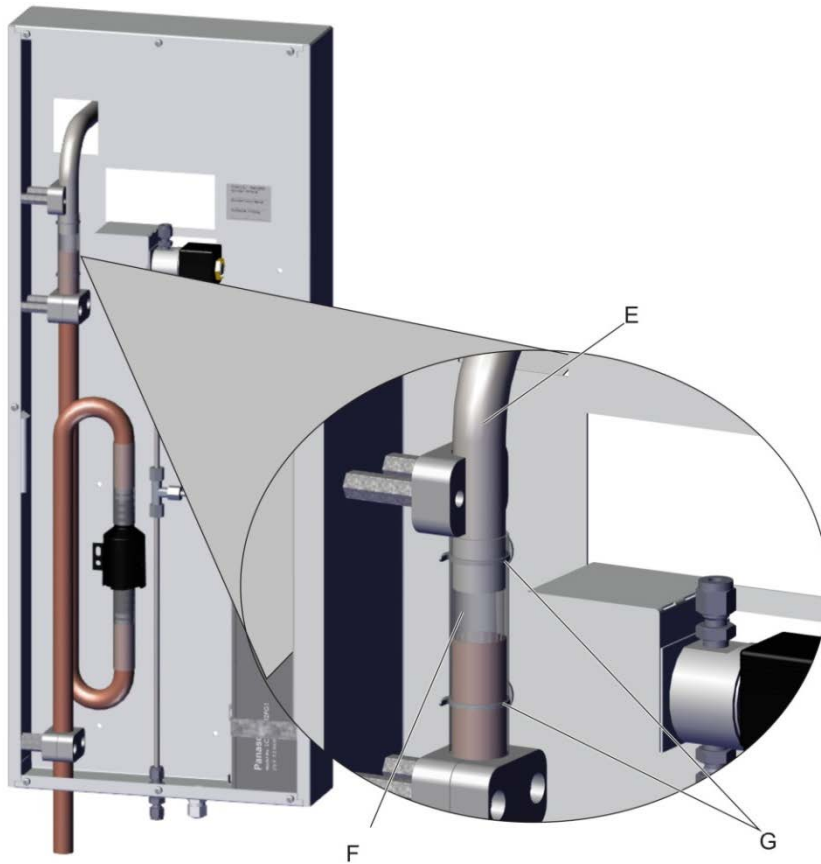
9. Feed the vent pipe **E** through the hole in the emergency cooling housing.

10. Connect the vent pipe **E** to the hoses **F** and **G**.

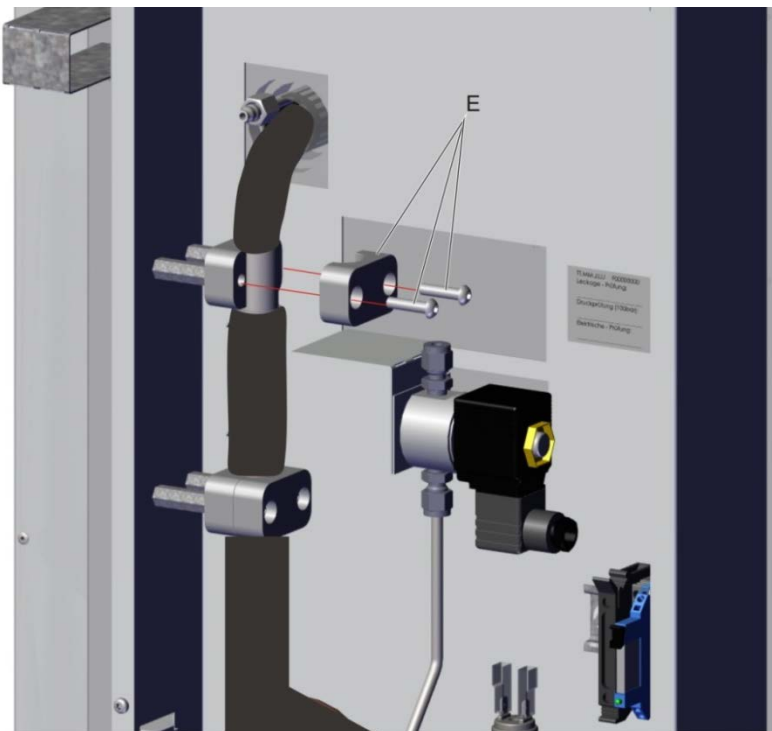


(representation without the black insulation)

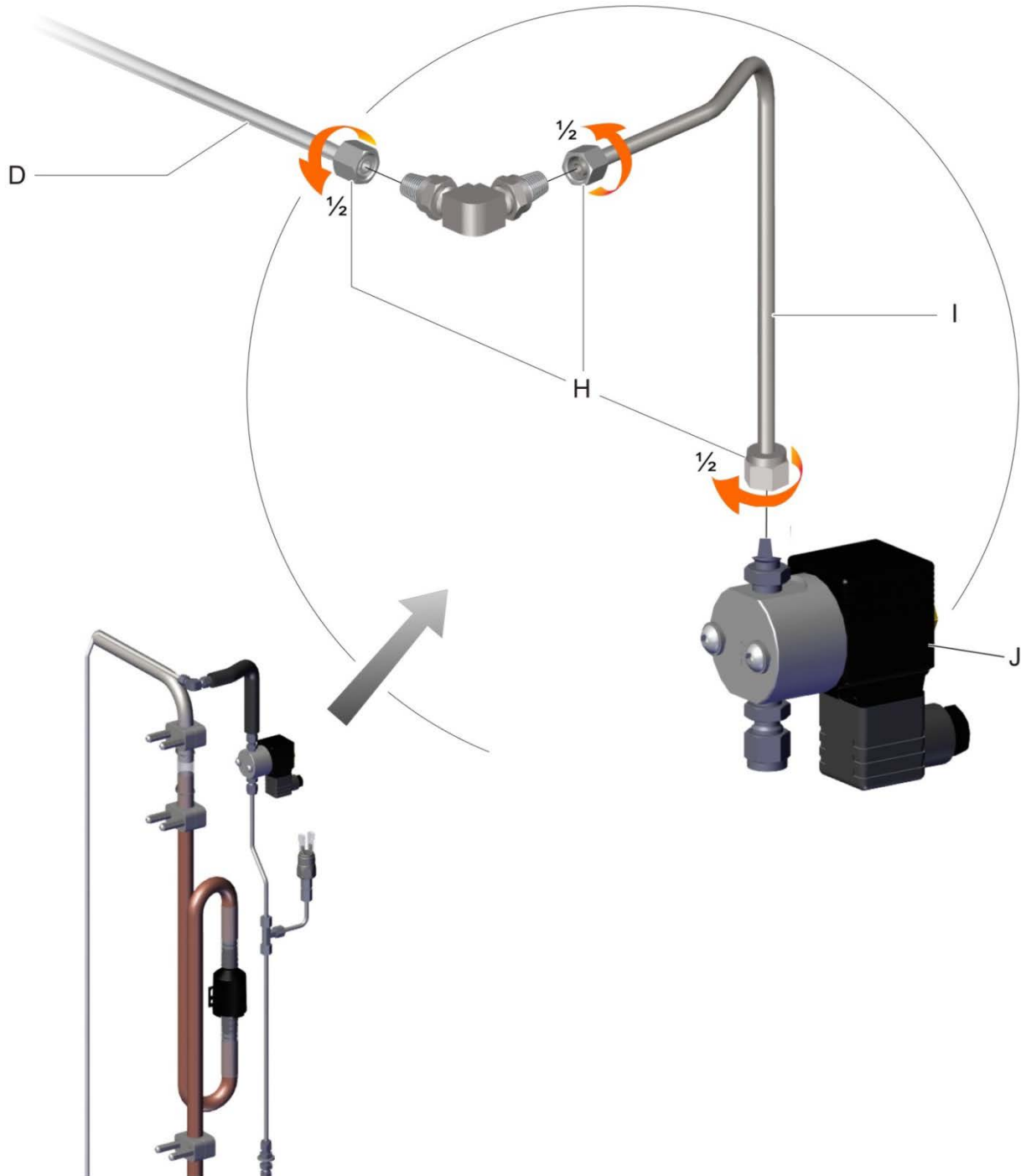
11. Insulate the vent pipe **E** and the hose **F** and install the emergency cooling on the rear panel of the device.



12. Mount the vent pipe with the clamp **E**.



13. Connect the injection pipe **D** and the connection pipe **I** with the magnetic valve **J**. Tighten the union nuts **H** hand-tight and then turn them with the open-end wrench $\frac{1}{2}$ turn.



D Injection tube

I Connection tube

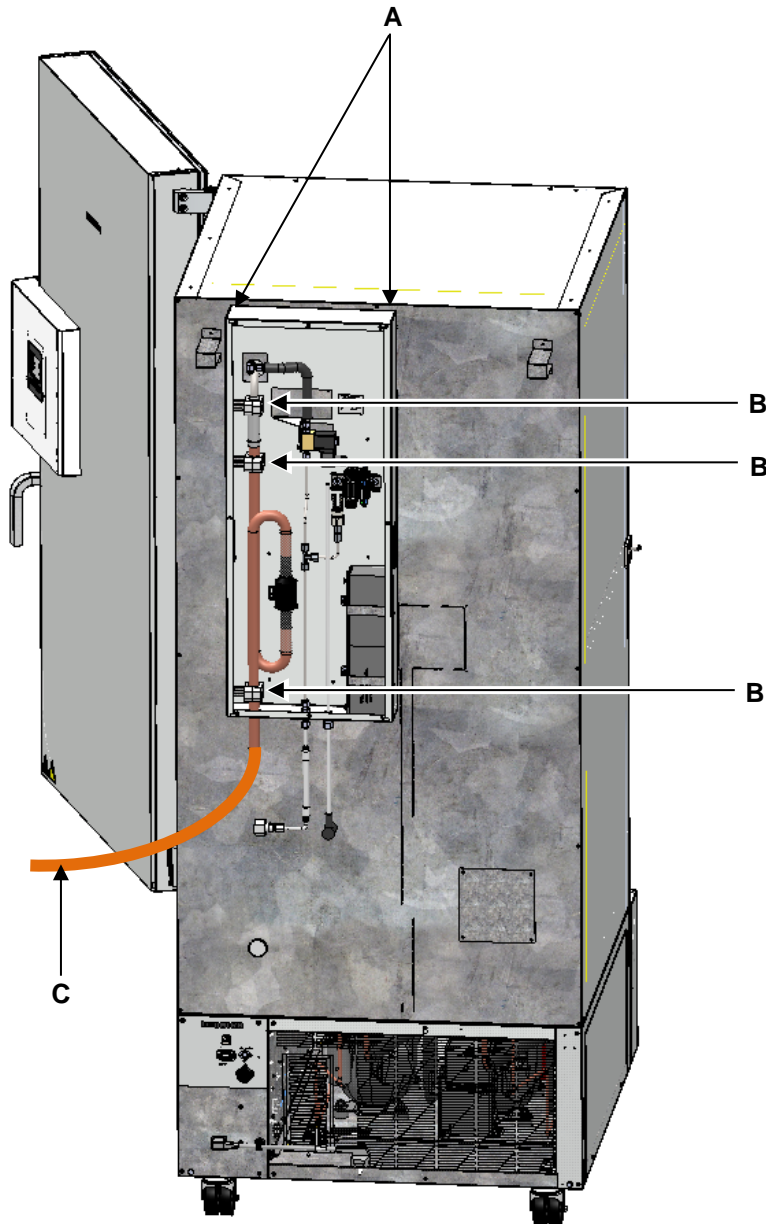
H Screw joint

J Magnetic valve



The gas hose (C) is already connected with the CO₂ emergency cooling system.
Do not remove this connection.

14. Hang the CO₂ emergency cooling onto the screws (A).
15. If necessary you can loosen the pipe clamps (B) for vertical adjustment.
16. Fix the CO₂ emergency cooling at the rear panel of the ultra-low temperature freezer.

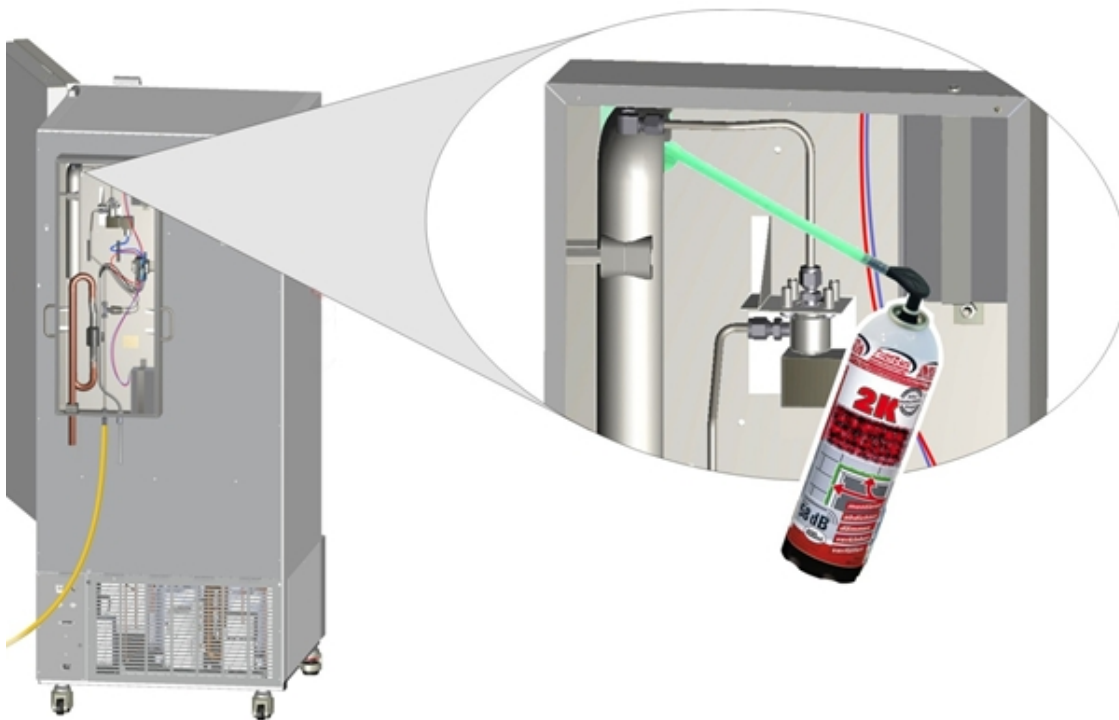


- A Screws
- B Pipe clamps
- C Gas hose

17. Seal the port in the inner chamber with Terostat IX.



18. Seal the port from the rear with 2k PUR foam.



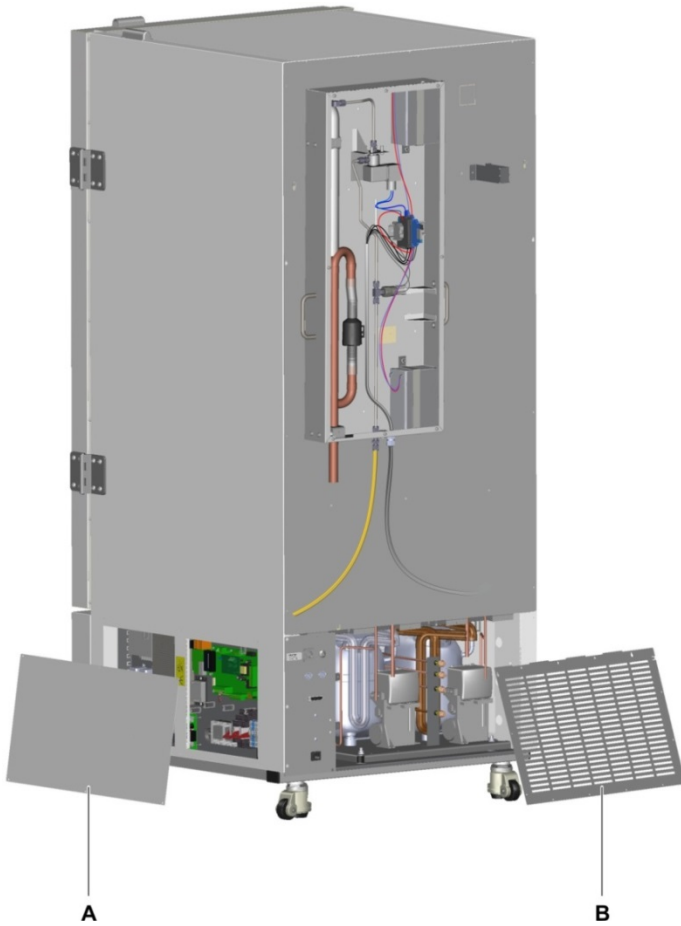
19. Cut off the excess PUR foam after approx. 20 minutes and remove the residue with a vacuum cleaner from the housing.

3.3.2 Electrical connection

Electrical components

Panel connector with flange

1. Remove and the right housing cover (A) and the lower rear panel (B).



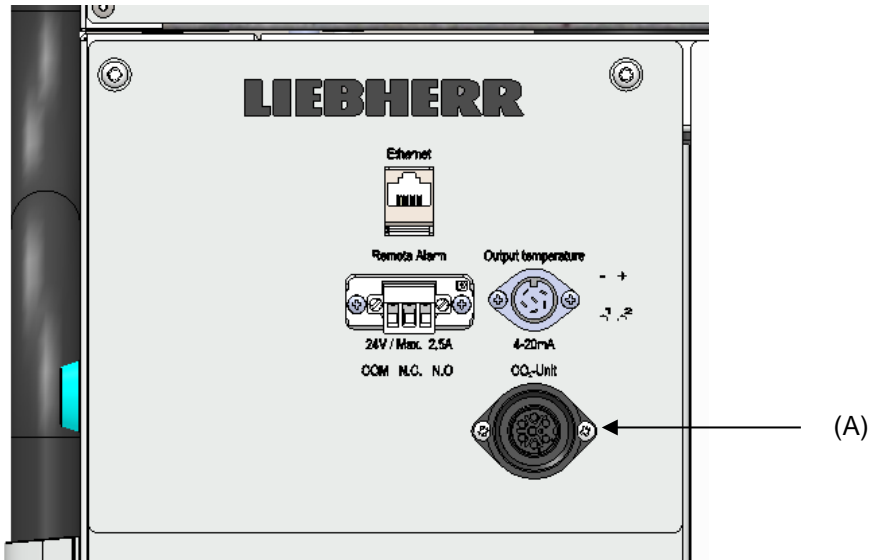
A Right housing cover

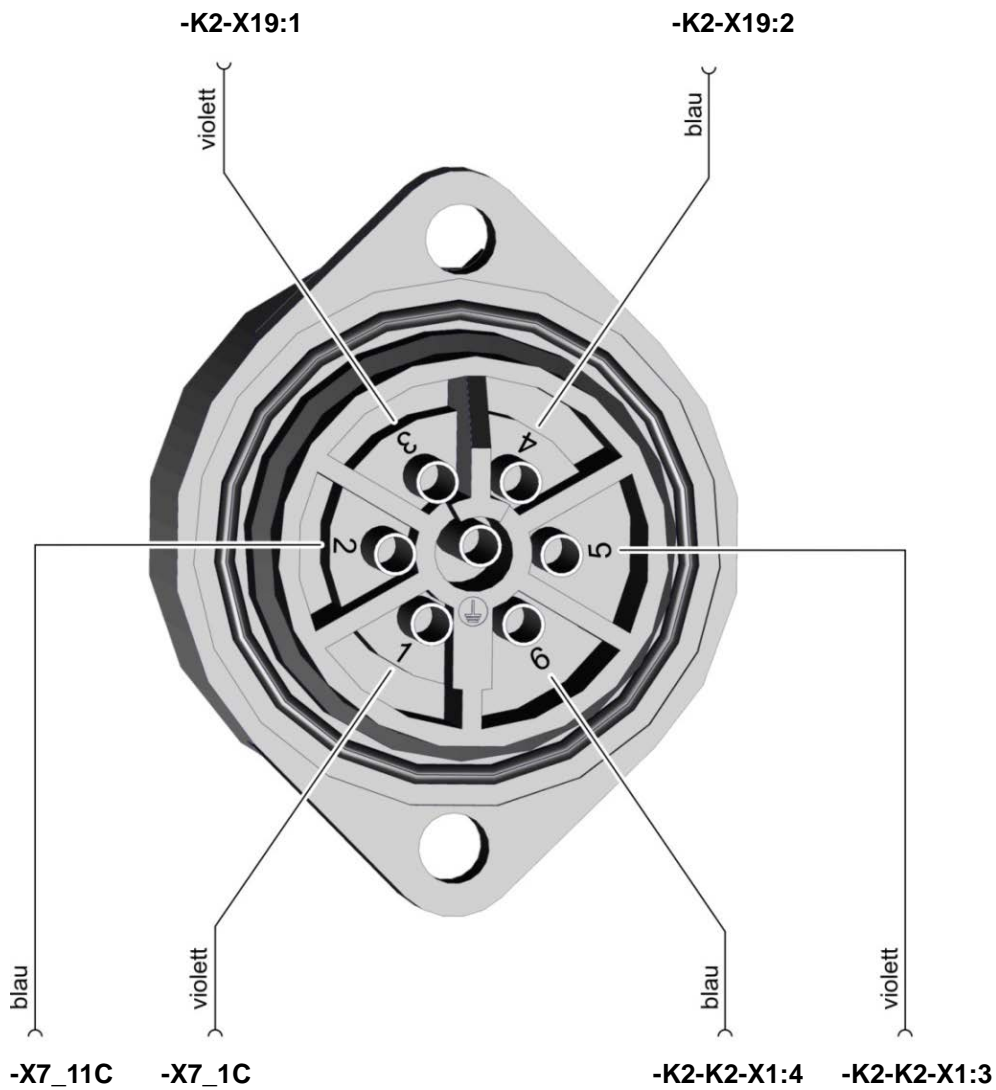
B Lower rear panel

2. Cut the hole for the socket.



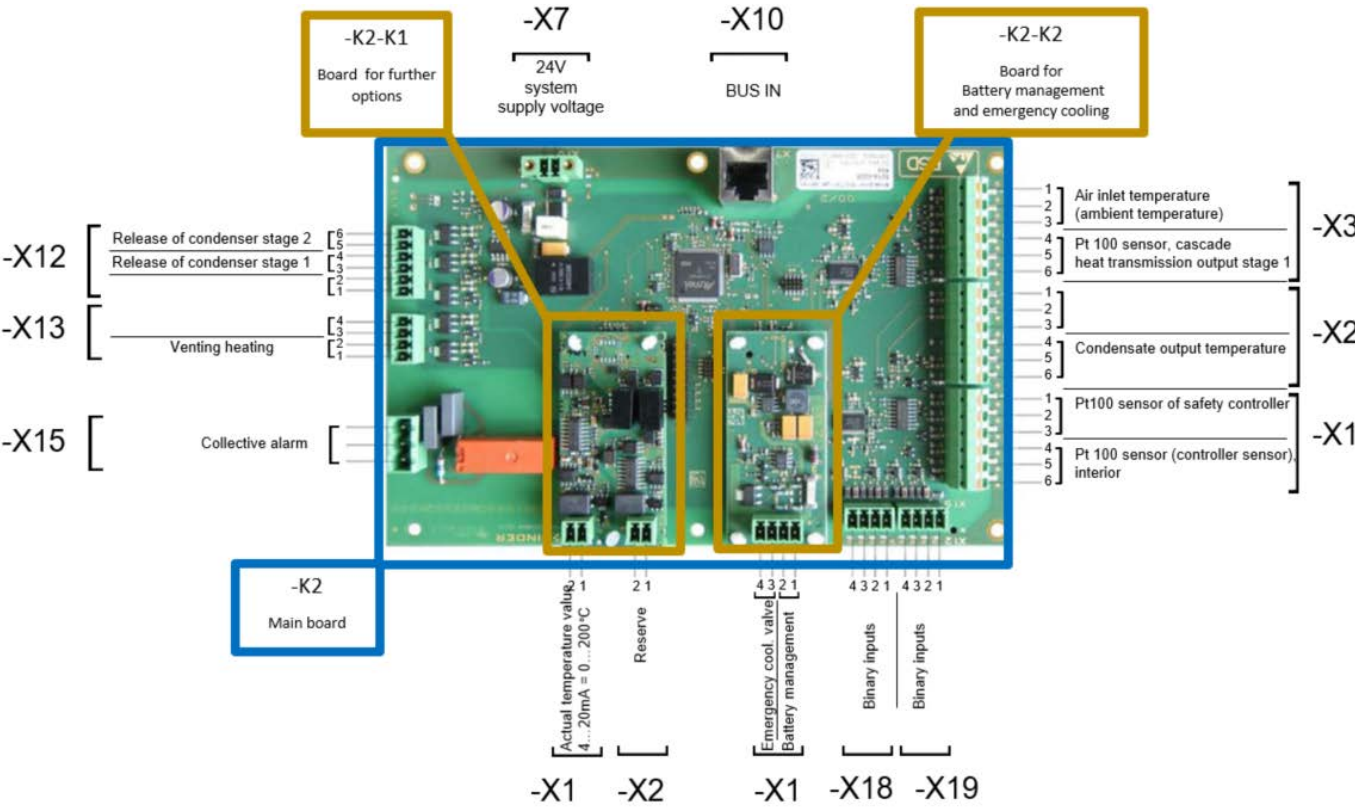
3. Insert the socket (A).





Wiring of panel connector (-X101)




4. Wire all components (panel connector and controller board) according to the circuit diagram.






Fully wired panel connector (-X101).

3.4 Leak detection

Precautions when handling gas cylinders:

 	 WARNING
<p>Risk of injury through sudden release of the stored pressure energy when the valve safety is torn off.</p> <p>Injuries. Local frostbite.</p> <ul style="list-style-type: none"> ➤ Secure gas cylinders against falling (by chaining it). ➤ Transport gas cylinders with a cylinder cart. ➤ Open the gas cylinder valve slowly to avoid pressure surges. ➤ Observe relevant regulations for dealing with gas cylinders. 	

	<p>Even when CO₂ or systems operated with CO₂ are handled carefully and appropriately, a residual risk remains, which can lead to life-threatening situations under certain circumstances.</p> <p>Therefore, we strongly recommend continuous monitoring of the CO₂ concentration in the ambience of the CO₂ emergency cooling. The maximum permissible occupational exposure limit for CO₂ (0,5 Vol.-% CO₂ for Germany) must never be exceeded.</p>
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	 DANGER
<p>Danger of suffocation and poisoning by high concentration of CO₂ (> 4 Vol.-%). Death by suffocation.</p> <ul style="list-style-type: none"> ➤ Operate the CO₂ emergency cooling only in a well-ventilated room. ➤ Install a suitable conduct at the CO₂ outlet of the emergency cooling system ➤ Observe the relevant regulations for handling CO₂. ➤ Comply with the occupational exposure limit ➤ Close the CO₂ supply when decommissioning the chamber. 	

1. Connect the hose to the CO₂-pressure cylinder.
2. Open the valve of the CO₂-pressure cylinder.
3. Check all fittings of the gas inlet for tightness with gas detection spray.



Connection of the CO₂-pressure cylinder



Check the gas fittings after connection with gas detection spray for leaks. The hose connection must be tight. Before installing or disconnecting the gas hose, the valve of the CO₂-pressure cylinder must be closed.



Please note

Even small leaks for a prolonged period of time decrease the content of the CO₂-pressure cylinder. To ensure the operational readiness of the emergency cooling system it is recommended to check up at regular intervals the capacity of the CO₂-pressure cylinder.

3.5 Software update

Uploading a new parameter set:

To import the configuration file, please proceed as described in the operating manual in the chapter "USB-Menu: Data transfer via USB interface".

You can download the configuration file from Liparts.

3.6 Function test

1. Connect the CO₂ emergency cooling via the connection cable (**B**) with the panel connector at the power connection plate.
2. Connect the unit to the power supply.
3. Turn on the unit.
4. Activate the emergency cooling at the controller (see operating manual).



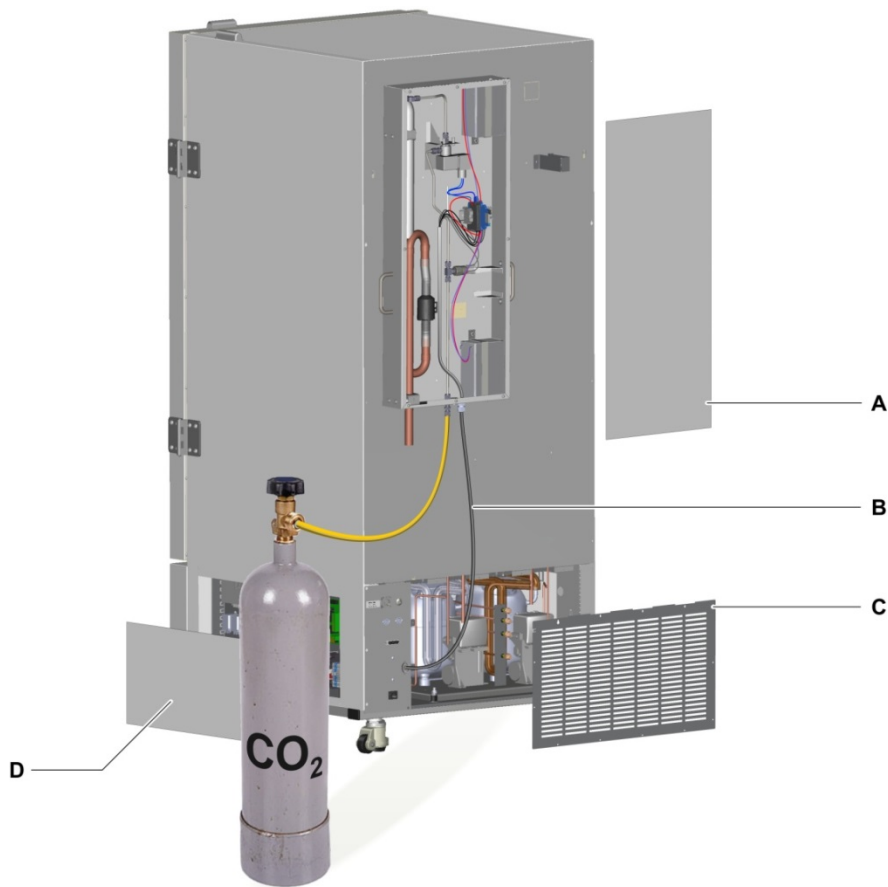
On activation and deactivation of CO₂ emergency cooling a restart of the controller is necessary. For this turn off the power switch for 10 seconds.

Further information for activation and deactivation as well as the testing of the CO₂ emergency cooling, refer to the operating manual supplied with the device.

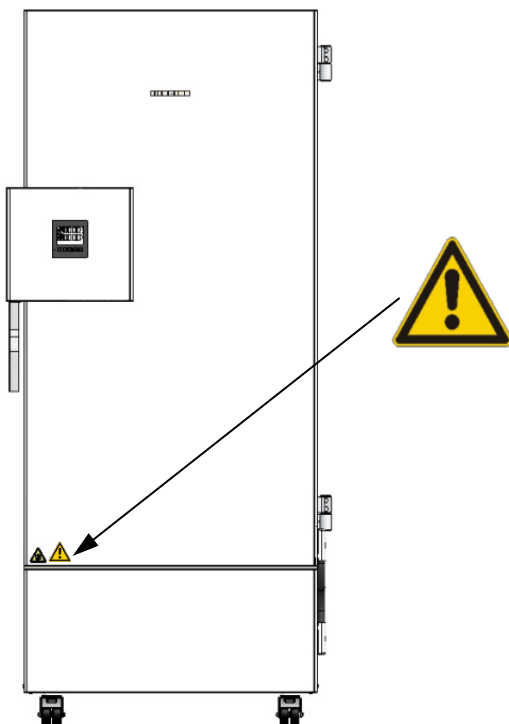


To prevent activating the CO₂ emergency cooling at too high temperature after turning on the unit, release in the controller menu should take place only after reaching the temperature set-point for the first time

5. Screw the housing cover (A) on the CO₂ emergency cooling.
6. Mount the lower rear panel (C) and the right housing cover (D).



7. Finally stick the supplied warning label on the door.





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